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## Abstract

Recent work in historical national accounting is surveyed, focusing on the Industrial Revolution and the Great Divergence. Eighteenth century Britain was the first economy to make the transition to modern economic growth, but this breakthrough built on earlier episodes of per capita income growth with declining population in the fourteenth and seventeenth centuries. Between these two episodes, the economy remained on a plateau rather than shrinking back to Malthusian subsistence as population recovered. The crude idea of a modernising Europe forging ahead of a stagnating Asia needs to be modified to take account of regional variation within both continents. The Great Divergence can be dated to the eighteenth century when the leading European region forged ahead of the leading Chinese region. This can also be seen as the culmination of a dynamic process beginning in the fourteenth century, with a reduction in the frequency and rate of shrinking.



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*Abstract:* Recent work in historical national accounting is surveyed, focusing on the Industrial Revolution and the Great Divergence. Eighteenth century Britain was the first economy to make the transition to modern economic growth, but this breakthrough built on earlier episodes of per capita income growth with declining population in the fourteenth and seventeenth centuries. Between these two episodes, the economy remained on a plateau rather than shrinking back to Malthusian subsistence as population recovered. The crude idea of a modernising Europe forging ahead of a stagnating Asia needs to be modified to take account of regional variation within both continents. The Great Divergence can be dated to the eighteenth century when the leading European region forged ahead of the leading Chinese region. This can also be seen as the culmination of a dynamic process beginning in the fourteenth century, with a reduction in the frequency and rate of shrinking.

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## 1. INTRODUCTION

This chapter provides a survey of recent findings in historical national accounting since the publication in 2001 of Angus Maddison's major work, *The World Economy: A Millennial Perspective*. Although Maddison's (2001) dataset represented a major breakthrough for the quantification of long run economic growth, it contained a large amount of "guesstimation" or "controlled conjectures" for the pre-1870 period. Furthermore, Maddison provided his conjectural estimates only for a small number of benchmark years before the nineteenth century.

Stimulated by Maddison's work, economic historians began to produce estimates of per capita national income for the pre-nineteenth century period that were based on contemporary data rather than guesstimation, and a firmer picture has begun to emerge of the contours of long run growth and development in both Europe and Asia. This is possible because medieval and early modern Europe and Asia were much more literate and numerate than is often thought, and left behind a wealth of data in documents such as government accounts, customs accounts, poll tax returns, parish registers, city records, trading company records, hospital and educational establishment records, manorial accounts, probate inventories, farm accounts, tithe files and other records of religious institutions. With a national accounting framework and careful cross-checking, it is possible to reconstruct population and GDP back to the medieval period, often at decadal or even annual frequency.

I will focus on the implications of this work for understanding the world's first Industrial Revolution in Britain and the dating of the Great Divergence in living standards between Europe and Asia. Broadberry, Campbell, Klein, Overton and van Leeuwen's (2015) new estimates of British GDP per capita show episodes of pre-industrial growth, interspersed with stagnation rather than decline. This implies that the Industrial Revolution built on prior developments. The British economy was substantially richer on the eve of the Industrial Revolution than it had been on the eve of the Black Death, having already developed the ability to maintain living standards during periods of positive population growth. In this way, the British economy was already breaking free from Malthusian constraints long before the Industrial Revolution.

New work in historical national accounting also casts fresh light on the Great Divergence debate. The traditional view, embodied in the work of Maddison (2001) saw a gap in productivity and living standards between Europe and Asia beginning to emerge perhaps as early as 1300 and certainly by 1500. Kenneth Pomeranz (2000) and other members of the California School argued strongly that this view represented a Eurocentric bias, and that no such gap had emerged until after 1800. This radical disagreement owes much to controversy over the appropriate territories to be compared, and quantification can be helpful here in narrowing the difference between the two sides. Comparing similar sized regions within both Europe and Asia, the view that emerges from recent work in historical national accounting is that the Great Divergence dates from around 1700. However, this was also the culmination of a dynamic process that began in northwest Europe after the Black Death of the mid-fourteenth century, whereby Britain and the Netherlands avoided the sustained periods of negative growth that continued to follow periods of positive growth in the rest of Eurasia. Understanding how to avoid sustained shrinking was the key to economic development in the past as well as for today's developing countries (Easterly, Kremer, Pritchett and Summers, 1993).

## 2. DATA AND METHODS

### 2.1 Data for the pre-1870 period

The Maddison Project, which seeks to extend the work of Maddison (2010), distinguishes four types of GDP data: (1) official estimates by national statistical offices (2) historical estimates based on the same methods and broad range of data (3) historical estimates based on indirect or proxy variables (4) "guesstimates" (Bolt and van Zanden, 2014: 629). It will be helpful to keep these distinctions in mind when assessing the quality and reliability of the per capita GDP estimates considered in this paper.

The historical estimates based on the same methods as those used by national statistical offices were often carried out by teams of researchers shortly after the introduction of official national accounts on a regular basis, and they were typically produced back to the first regular appearance of time series in statistical yearbooks. Although the precise dates varied across nations, official national accounts began to appear in western Europe and North America during or shortly after World War II, while official statistical yearbooks began to appear during the nineteenth century. Such data provide a natural source for the construction of historical national accounts from around 1870, and this material formed the basis of Maddison's (1964; 1985; 1991) early work on economic growth in OECD countries. However, the effects of these changes were not limited to western countries, as a result of the wide reach of European imperialism, with the imperial powers also collecting large amounts of data on their colonies.

In some nations, the state already collected much data before 1870 in connection with taxation and regulation, while other institutions such as the church, charities and corporations kept accounts so that the transition to the modern statistical age after 1870 was gradual rather than a dramatic break. In these nations, it has been possible to reconstruct historical national accounts for the period 1870-1950 that are relatively similar to the early official national accounts of the postwar period in terms of coverage of the different parts of the economy and the quality of the underlying data. Feinstein (1972) for the United Kingdom, Kuznets (1949) for the United States and Hoffmann (1965) for Germany provide early examples of this.

In these data-abundant countries, it is also possible to reconstruct historical national accounts for the pre-1870 period, at least on the output side, that have a similar coverage to the 1870-1950 accounts. Even here, however, there is typically more use of proxy variables, and the number of series declines the further back in time that the series are pushed. This reduction in the number of series is partly inevitable, as poorer, less developed economies are typically dominated by agriculture and experience limited structural change, so that this reduction in the number of series does not necessarily indicate larger error margins. For nations with less abundant data, a short-cut method has been developed, which is described below. This method economises on the number of data series required to reconstruct GDP per capita.

**2.2 Methods for data-abundant nations**

GDP can be estimated from the income, expenditure and output sides of the economy. In theory, all three approaches should give the same answer, although in practice there is often a residual due to measurement error. The most common method used to estimate GDP for the pre-1870 period is the output approach, which has been adopted by van Zanden and van Leeuwen (2012) for the Netherlands and by a series of authors working on Britain, from the pioneering work of Deane and Cole (1962) through the revised estimates of Crafts and Harley (1992) for the period since 1700, to the more recent estimates of Broadberry, Campbell, Klein, Overton and van Leeuwen (2015), which reach back to 1270.

The richness of the British sources offers an opportunity to illustrate the methods used for the estimation of pre-1870 annual GDP in data-abundant nations. Since Broadberry, Campbell, Klein, Overton and van Leeuwen (2015) incorporate data from the earlier works, I will focus here on their study. For the period after 1700, the data cover the territory of Great Britain, including Scotland and Wales as well as England, but for the period 1270-1700 only England is covered. Output is estimated separately for the agricultural, industrial and service sectors. For medieval agriculture, three main data sources are available, covering different periods. First, the Medieval Accounts Database of Campbell (2000, 2007) is based mainly on a large sample of manorial accounts drawn up using a common template by the reeve who managed the demesne under close supervision of the lord's bailiff or steward. These accounts provide detailed information on land use, crops, animals and livestock products. Second, the Early Modern Probate Inventories Database assembled by Overton (1991; 2000) and Overton, Whittle, Dean and Han (2004), pulls together similar information for the period between the mid-sixteenth and the mid-eighteenth centuries, extracted from inventories drawn up by the Church Commissioners for the estates of farmers. Third, the Modern Farm Accounts Database of Turner, Beckett and Afton (2001), which runs from 1720 until 1913, is based on a large sample of accounts produced by farmers and kept in local record offices. For all three datasets, agricultural outputs were calculated by multiplying the acreage for each crop by the yield per acre. The trends in yields were estimated for each of the three main time periods, based on microdata obtained from the three databases, and applied to the total acreage for the country as a whole. For output of the livestock sector, a similar procedure was undertaken, multiplying the number of animals by the shares producing and their yields. Prices for individual arable and livestock products are used to convert the output into current prices and create weights for the agricultural real output index.

Production estimates or indicators existed for the key English industries up to 1700, based on careful reconstruction from archival records by generations of scholars. Crucial sources included Carus-Wilson and Coleman (1963) for wool and woolen cloth, drawing on detailed records of exports of wool and woolen cloth; King (2005) for iron, based on a reconstruction of all blast furnaces, their capacity and knowledge of when they were in blast; and Hatcher (1973) for tin, based on receipts of coinage dues. Outputs related to leather and food processing were estimated by Broadberry, Campbell, Klein, Overton and van Leeuwen (2015) on the basis of key inputs obtained from the reconstruction of the agricultural sector. Construction combines detailed information on cathedral building with an index of housebuilding based on population and urbanization, while the growth of book production is based on titles listed by the British Library. These series are combined to generate an index of industrial production from 1264 to 1700. Crafts and Harley (1992) offer an index from 1700 until 1870, to which Broadberry, Campbell, Klein, Overton and van Leeuwen (2015) add some new series.

The service sector followed the approach developed by Deane and Cole (1962), with some adjustments. The sector is broken down into commerce, housing, domestic services and government. The commerce indicator is based on combining estimates of domestic trade (the volume of agricultural and industrial output adjusted for the growing share that was marketed) and international trade (derived from the detailed records of trade that were kept for taxation purposes), freight transport (based on merchant shipping tonnage, distances travelled on the main trade routes and volumes shipped) and financial services (using the velocity of money, derived by comparing estimates of the stock of money with existing estimates of nominal, as opposed to real, national income). Housing and domestic services were assumed to grow at the same rate as population. Government activity was based on its revenue, which exists in detailed annual exchequer accounts back to the early twelfth century (O’Brien and Hunt 1999).

The three real output series for the agricultural, industrial and service sectors were combined using a set of sectoral weights which capture the changing structure of the economy. The starting point is an input-output table for 1841 from Horrell, Humphries and Weale (1994). The nominal value added shares for 1841 are projected back using the sectoral real output series reflated to convert them into nominal series. The principal sources for the price series used include Clark (2004; 2005; 2006), Beveridge (1939) and Thorold Rogers (1866-1902). Value-added shares for each sector are derived in this way at roughly 50-year intervals, and used to create a chained index of GDP, following Feinstein (1972). To estimate GDP per capita, this aggregate GDP series is divided by population, taken from Wrigley and Schofield (1989) and Wrigley, Davies, Oeppen and Schofield (1997) for the period since 1541, and derived from information on the number of tenants in a regionally representative sample of manors using the method of Hallam (1988) for the pre-1541 period.

There have also been attempts to estimate British national income from the income side. The approach here is to estimate labour income from data on employment and real wages and combine it with income from capital and rental income from land. In the absence of readily available data on the returns to capital and land, the real wage has been the most popular alternative to GDP per capita since the pioneering work of Phelps Brown and Hopkins (1955; 1956), who provided an annual series for England back to the mid-thirteenth century. However, this approach requires care because the nominal wage data are most readily available as daily wage rates, which do not come with information on the number of days worked per year. As Angeles (2008) points out, there can be substantial divergence between the trends in real wages and GDP per capita as a result of a change in the number of days worked per year, a shift in labour's share of income or a change in the relative price of consumption goods. He shows that there was considerable divergence in English GDP per capita and real wages between 1700 and 1820 due primarily to an "industrious revolution" (or increase in days worked per year), with a distributional shift against labour and an increase in the relative price of food also having significant effects. Broadberry, Campbell, Klein, Overton and van Leeuwen (2015) use the same framework to explain the divergence between the daily real wage rate and GDP per capita between 1270 and 1870. The key factor explaining the divergence between the trend growth of GDP per capita and the stationarity of the real wage was the long drawn-out increase in days worked per year between the post-Black Death period and the Industrial Revolution. Subsequent research by Humphries and Weisdorf (2019) has confirmed this, with their estimates of days worked per year derived from a comparison of daily wages with annual wages from long-term contracts. Clark's (2007; 2010) British GDP per capita series, which adds income from capital and land rents to wage income derived on the assumption of constant days worked per year, follows a very similar path to daily real wages, and is therefore not a reliable guide to long-term growth between 1250 and 1850.

In the case of the Netherlands, the data for the period since 1806 are constructed using similar methods to Feinstein (1972), providing detailed estimates for all sectors of the economy encompassing the income, expenditure and output sides (Smits, Horlings and van Zanden, 2000). For the period 1510-1806, the approach is similar to that of Broadberry, Campbell, Klein, Overton and van Leeuwen (2015), concentrating on the output side with fairly comprehensive coverage of the main sectors, but only for the province of Holland (van Zanden and van Leeuwen, 2012). For the period 1347-1510, the number of series is relatively small and the coverage less complete, leading van Zanden and van Leeuwen (2012: 120-121) to describe this series as "a likely 'scenario' for the pace and character of economic growth during the late Medieval period".

### 2.3 Methods for data-scarce nations

Where data are less abundant, economic historians have developed an indirect or short-cut approach to estimating GDP per capita, which relies more heavily on modelling or using proxies to generate indicators of economic output. Rather than measuring agricultural output directly, it is derived from the demand for food. This demand-based approach builds on the work of Crafts (1976), who criticised Deane and Cole's (1962) early work on eighteenth century Britain, which assumed constant per capita corn consumption while real incomes were rising and the relative price of corn was changing. Crafts (1985) recalculated the path of agricultural output in Britain with income and price elasticities derived from the experience of later developing countries. The approach was developed further by Allen (2000) using consumer theory. Allen (2000: 13-14) starts with the identity:

$$Q^A = rcN \qquad (1)$$

where $Q^A$ is real agricultural output, $r$ is the ratio of production to consumption, $c$ is per capita consumption and $N$ is population. Real agricultural consumption per capita is assumed to be a function of its own price in real terms ($P^A/P$), the price of non-agricultural goods and services in real terms ($P^{NA}/P$), and real income per capita ($y$). Assuming a log-linear specification yields:

$$\ln c = \alpha_0 + \alpha_1 \ln(P^A / P) + \alpha_2 \ln(P^{NA} / P) + \beta \ln y \qquad (2)$$

where $\alpha_1$ and $\alpha_2$ are the own-price and cross-price elasticities of demand, β is the income elasticity of demand and $\alpha_0$ is a constant. The adding-up property in linear models of consumer behaviour requires that the own-price, cross-price and income elasticities should sum to zero, which sets tight constraints on the plausible values, particularly given the accumulated evidence on elasticities in developing countries (Deaton and Muellbauer, 1980: 15-16, 60-82). For early modern Europe, Allen (2000: 14) works with an own-price elasticity of -0.6 and a cross-price elasticity of 0.1, which constrains the income elasticity to be 0.5. Allen also assumes that agricultural consumption is equal to agricultural production.

In the indirect approach, the growth of the non-agricultural sector is proxied by the share of the population living in towns. This approach began with Wrigley (1985), and has recently been combined with the demand approach to agriculture to provide indirect estimates of GDP in a number of European countries during the early modern period (Malanima, 2011; Álvarez-Nogal and Prados de la Escosura, 2013; Schön and Krantz, 2012). With the path of agricultural output ($Q^A$) derived using equations (1) and (2), overall output (Q) is derived as:

$$Q = \frac{Q^A}{1-\left(Q^{NA}/Q\right)} \qquad (3)$$

where the share of non-agricultural output in total output ($Q^{NA}/Q$) is proxied by the urbanisation rate. The approach can be made less crude by making an allowance for higher productivity in the non-agricultural sector, so that ($Q^{NA}/Q$) increases more than proportionally with the urbanisation rate. The empirical implementation of the indirect approach relies on the availability of data on long run trends in urbanization rates. Here, Bairoch's (1988) data set of European towns greater than 5,000 inhabitants going back 1,000 years provides an important historical resource, but data are also available for individual Asian countries, including China, India and Japan (Rozman, 1973; Habib, 1982; Saito and Takashima, 2015; 2017).

### 2.4 Dealing with data reliability

Maddison (2001) was transparent about the element of guesstimation in his database, taking the view that setting out a number focuses the mind and stimulates others to provide a better alternative. However, the appearance of Maddison's database has undoubtedly allowed some economists to use the pre-1870 data in ways for which the data were never designed, without paying any attention to their fragility. Clark (2009: 1160) cites a number of papers published in leading journals. including the *American Economic Review*, *Quarterly Journal of Economics*, *Journal of Monetary Economics*, *Journal of Economic Growth* and *Journal of Economic History*, where the Maddison data are used inappropriately to test various theories.

An attempt has been made above to offer a guide to the accuracy of the data by distinguishing between the direct approach used for data-rich countries such as Britain and the Netherlands and the indirect approach for data-poor countries such as Italy and Spain. Yet the distinction is not always clear-cut. First, as pointed out above, the method used can sometimes vary within the same series. The per capita GDP series for Holland produced by van Zanden and van Leeuwen (2012) is an example of this: the data for Holland before 1510 are far less reliable than the data between 1510 and 1807, because the former are based on modelling agricultural demand and proxies for industry and services, whereas the latter are based on direct output measures. But second, some studies based on the indirect method go on to incorporate cross-checks based on the direct method. Thus, Álvarez-Nogal and Prados de la Escosura (2016) use tithe data to directly estimate agricultural output, which was previously estimated indirectly via a demand function in Álvarez-Nogal and Prados de la Escosura (2013). Similarly Broadberry, Custodis and Gupta (2015) cross-check their demand-side estimates of the growth of Indian agricultural output between 1600 and 1870 using reconstructions of the acreage and yields of all the main crops in two benchmark years.

There have also been attempts to add a quantitative dimension to guidance on the accuracy of historical national accounts using subjective error margins. Bowley (1911-12) pioneered this approach which was subsequently taken up in the construction of historical national accounts by Chapman (1953) and Feinstein (1972) for the case of Britain. Feinstein and Thomas (2002) provide a more recent statement of the case for the use of subjective error margins. In this approach, series are assigned reliability grades corresponding to error bands. Feinstein (1972: 21) suggested that for firm figures (grade A), the margin of error around the reported series should be judged to be ± less than 5%. For good estimates (grade B), the margin of error is ± 5% to 15%, while for rough estimates (grade C) the margin of error is ± 15% to 25% and for conjectures (grade D) it is ± more than 25%.

These subjective margins of error, set out in Table 1A, are then assumed to be held with 95 percent confidence, so that the average margin of error can be interpreted as two standard errors. Perkins (1969: 216) suggested an 80 percent confidence interval would be more appropriate for the less well documented Chinese case, although the statistical basis for either of these assumptions is somewhat tenuous. Bowley (1911-12) goes on to suggest that when constructing a composite series such as GDP, it is likely that some errors will be offsetting, with an upward bias in one series countered by a downward bias in another series.

The subjective error margins approach has been adopted explicitly in a number of the recent studies in historical national accounting that have been used in the Great Divergence debate. The study of the Netherlands by van Zanden and van Leeuwen (2012) was the first long run study to make use of this approach, which has also been applied to the cases of China and Japan (Broadberry, Guan and Li, 2018; Bassino, Broadberry, Fukao, Gupta and Takashima, 2019). The latter two studies also conduct sensitivity analysis, reporting the percentage increase (decrease) in GDP in response to an increase (decrease) of one average margin of error in each component series.

These exercises help to highlight where the strengths and weaknesses of the estimates lie. First, and perhaps unsurprisingly, for all three countries, the GDP series listed in Table 1B become more reliable as they move nearer the present, due to the greater quantity of available data. Second, since it is likely that some series are biased upwards and others downwards, some offsetting errors may be expected in the aggregates derived as the sum of individual series, so long as those series are derived independently (Feinstein and Thomas, 2002; Bowley, 1911-12). This explains the higher grades for GDP than for some of the component series in all three countries. Third, error margins for ratios may also be lower than suggested by the accumulation of error margins for the component series where the errors are positively correlated (Feinstein and Thomas, 2002; Bowley, 1911-12). In the case of China, this applies to GDP per capita, which is heavily influenced by the ratio of cultivated land to population. Since the population and cultivated land data were collected by the imperial authorities, it is likely that an under-estimate of one was accompanied by an under-estimate rather than an over-estimate of the other (Broadberry, Guan and Li, 2018: 981).

## 3. THE INDUSTRIAL REVOLUTION

### 3.1 British economic growth in long run perspective

Although there has been broad agreement about the quantitative dimensions of British economic growth during the period 1700-1870 since the work of Crafts and Harley (1992), Broadberry, Campbell, Klein, Overton and van Leeuwen (2015) shed new light on this work by providing historical national accounts for Britain reaching back to the late thirteenth century. An important result of the Crafts-Harley work was that economic growth during the Industrial Revolution was much slower than had originally been suggested by Deane and Cole (1962). This meant that Britain must have entered the Industrial Revolution already richer and more developed than earlier economic historians had assumed. To understand Britain’s transition to modern economic growth, it is therefore necessary to examine what happened further back in time.

Figure 1 shows the long run evolution of real GDP, population and real GDP per capita over the long period 1270-1870. GDP per capita stagnated during 1270-1348, before increasing sharply between 1348 and 1400, as population declined more sharply than GDP following the shock of the Black Death. GDP per capita then remained on a plateau between c.1400 and 1650 as population at first continued to fall and then began to recover from the late fifteenth century. A new GDP per capita growth phase started around 1650, as population stagnated and then declined slightly. Although GDP per capita growth slowed down after 1700 as population growth resumed, it remained positive and became increasingly stable, with fewer and milder years of negative GDP per capita growth. It seems, then, that the Industrial Revolution was less about growing faster and more about avoiding periods of negative growth or shrinking, than has previously been realised (Broadberry and Wallis, 2017).

Table 2 presents the average annual growth rates for the same three series: GDP, population and GDP per capita. Notice how the growth rate of GDP per capita after 1800 was actually slightly slower than after the Black Death (1350s-1400s) and after the Civil War (1650s-1700), despite the fact that GDP growth was much faster. The reason for this was the very different paths of population in these three periods. Whereas population declined very sharply after the Black Death, and still declined slightly after the Civil War, it grew very rapidly during the first two-thirds of the nineteenth century. This points to a major difference between modern economic growth and pre-industrial growth, as highlighted by Kuznets (1966). Pre-industrial growth required falling population, and this led to an increase in land per capita and capital per capita, which in turn led to higher output per capita. However, this was clearly not a route to sustained growth. For Kuznets, sustained or modern economic growth required rising output per capita together with a growing population.

### 3.2 Structural change in Britain

Another important aspect of modern economic growth is structural change. It has long been noted that economic development is associated with a shift in the structure of the economy away from dependence on agriculture. This has traditionally been seen as a process of industrialisation, although recent research suggests that this understates the role of services. Broadberry, Campbell, Klein, Overton and van Leeuwen (2015) note that the British economy diversified away from agriculture over a longer time span than was once believed by economic historians. Agriculture was less important and services more important earlier than widely perceived, with important consequences for sectoral productivity performance. Labour productivity growth was faster in industry than in agriculture during the Industrial Revolution rather than the reverse, as early quantification of the Industrial Revolution had appeared to suggest.

The quantitative dimensions of the structural shift away from agriculture in the British economy are set out in Table 3. The first point to note is that agriculture's share of output and employment declined in importance over time, while the shares of industry and services increased, as would be expected for a developing nation. Second, however, note that even as early as 1381, agriculture accounted for less than 60 per cent of employment and less than 50 per cent of nominal GDP, so that even in the fourteenth century, industry and services accounted for a substantial share of economic activity. Third, although agriculture accounted for a smaller share of output than employment for most of the period under consideration here, thus making agriculture a low productivity sector, this had ceased to be the case by 1801, a point first noted by Crafts (1985). Fourth, although industry increased its share of nominal GDP more rapidly than services until 1700, this ceased to be the case during the Industrial

Revolution period. This may at first sight seem surprising, but can be explained by a decline in the relative price of industrial goods, as technological progress increased productivity and drove down prices. By contrast, the more modest productivity improvement in services led to an increase in their relative price, so that the share of services in nominal GDP increased more rapidly than the share of industry after 1700.

A fifth striking feature of Table 3 is that much of the shift of labour from agriculture to industry occurred before 1759, which has important implications for the pattern of labour productivity growth before and during the Industrial Revolution. If, as was once believed, the shift of labour from agriculture to industry had taken place at the same time as the Industrial Revolution, then much of the growth of industrial output could be explained by increased labour input rather than by productivity growth. This counter-intuitive result was implicit in the work of Deane and Cole (1962), and also confronted more explicitly by Crafts and Harley (1992). With much of the shift of labour from agriculture to industry occurring between 1522 and 1759, there was a period of labour-intensive industrialisation (or proto-industrialisation) without dramatic industrial productivity growth, which can be tracked in Table 4. This was then followed by an Industrial Revolution, where capital deepening and technological progress raised industrial labour productivity rapidly after 1759.

## 4. THE GREAT DIVERGENCE

New estimates of GDP per capita during the period 1000-1870 have recently been produced in a number of European and Asian economies, making use of historical data collected at the time. These estimates show reversals of fortune within as well as between the two continents. First, they show a much clearer Little Divergence within Europe between the northwest and the rest of the continent than had been suggested by Maddison (2001), with Britain and the Netherlands overtaking Italy and Spain. Second, these estimates also show a much clearer Asian Little Divergence, with Japan overtaking China and India. And third, they show a later Great Divergence between Europe and Asia than suggested by Maddison, taking account of regional variation within the two continents. Although individual European nations or small regions were ahead of the whole of China as early as 1300, the leading Chinese region did not fall decisively behind the leading European nation until the eighteenth century. This is a lot later than suggested by earlier western economic historians such as Weber (1930), Landes (1969),or North and Thomas (1971), although not quite as late as suggested by Pomeranz (2000), who argued for parity until the early nineteenth century. However, Pomeranz (2011; 2017) has more recently accepted that his earlier claims were exaggerated and now sees the Great Divergence as dating from the eighteenth century.

The data are displayed in 1990 international dollars for comparability with each other and with the estimates of Maddison (2010). GDP per capita in national currencies cannot simply be compared at the nominal exchange rates which may move to clear international asset markets rather than reflect the price of goods and services that people living in the different countries purchase. The purchasing power parity (PPP) between two currencies is obtained by comparing the prices of individual products and services, weighted by their importance in the expenditure of households. In a two-country comparison, say between Britain and Italy, a different PPP would be obtained using British weights rather than Italian weights, so a compromise estimate can be obtained by taking the geometric mean of British and Italian weighted PPPs. However, a series of bilateral comparisons made this way may not be transitive, so in multi-country comparisons, it is necessary to choose a set of international weights. Most international comparisons are now carried out in 1990 Geary-Khamis international dollars, named after the economic statisticians who derived the weighting scheme.

Using PPPs for 1990, GDP per capita for all countries can be converted to 1990 international dollars, which provides a convenient standard for comparing per capita incomes over space and time. The World Bank poverty standard in 1990 suggested "bare bones subsistence" income was $1 per day, or $365 per year. Since any society has a rich elite living well above this level, Maddison adopted $400 as a guide to the minimum level of GDP per capita that should be expected. This is a useful figure to bear in mind when assessing the plausibility of the GDP per capita estimates.

**4.1 Europe's Little Divergence**

Europe's Little Divergence can be captured graphically in Figure 2, which presents data for Britain and the Netherlands in northwest Europe and Italy and Spain in Mediterranean Europe (Broadberry, Campbell, Klein, Overton and van Leeuwen, 2015; van Zanden and van Leeuwen, 2012; Malanima, 2011; Álvarez-Nogal and Prados de la Escosura, 2013). Although the new estimates in panel A are available on an annual basis from the late thirteenth century, they are plotted here on a decade-average basis for comparison with Maddison's data in panel B. A number of differences between the two data sets are immediately apparent. First, the new estimates revise upwards the level of per capita GDP in the middle ages. Medieval western Europe was substantially richer than Maddison thought, and subsequent growth therefore more gradual. Second, the new estimates suggest a different pattern of Europe's Little Divergence. Maddison saw more or less continuous growth in the whole of western Europe, with slightly faster growth in Britain and the Netherlands. The new estimates, by contrast, show little or no trend growth in Mediterranean Europe, where GDP per capita stagnated between 1300 and

1800, combined with relatively short bursts of episodic growth interspersed with long periods of stagnation in northwest Europe.

The reversal of fortunes between northwest Europe and Mediterranean Europe occurred in two phases. The first turning point came with the Black Death in 1348. Before then, per capita incomes were substantially higher in Italy and Spain than in Britain and the Netherlands. Although Italy, Britain and the Netherlands all received a positive boost to per capita incomes following the collapse of population beginning in the mid-fourteenth century, only Britain and the Netherlands remained permanently richer as population recovered. A second turning point occurred around 1500, as new trade opportunities opened up between Europe and Asia via trade routes around the south of Africa, and between Europe and the Americas via the Atlantic Ocean. This led to a shift in the focus of economic activity in Europe away from the Mediterranean towards the Atlantic. The Netherlands first caught up with Italy then forged ahead during its Golden Age, while Britain experienced a further growth episode from the mid-seventeenth century.

Annual data are also available now for other European countries, including France, Sweden, Portugal and Poland (Ridolfi, 2016; Schön and Kranz, 2012; Krantz, 2017; Palma and Reis, 2019; Malinowski and van Zanden, 2017). In addition, some linked benchmarks are available for Belgium and Germany (Buyst, 2011; Pfister, 2011). These estimates are shown in Figure 3 and confirm the picture of no trend growth outside northwest Europe, which forged ahead of the rest of the European continent from around 1500, led initially by the Netherlands, then by Britain.

### 4.2 Asia’s Little Divergence

Data are available in abundance for some Asian economies for some time periods, but there has been relatively little work so far processing this material. Much work remains to be done on the Chinese data, but it is now possible to produce decadal estimates of GDP from the output side, apart from during dynastic changes (Broadberry, Guan and Li, 2018). Indian data are less abundant, and it has so far only been possible to produce decadal estimates back to 1800 and benchmarks every half century between 1600 and 1800 (Broadberry, Custodis and Gupta, 2015). Most of the information about India comes from the records of the European East India Companies and the British Raj, apart from Abū'l-Fazl's [1595] remarkable document, *The Ā' īn–i-Akbarī*, which provides a wealth of information for the Mughal Empire in a single year at the end of the fifteenth century. Japan also has a wealth of data, but at this stage the estimates are available only for a handful of benchmark years (Bassino, Broadberry, Fukao, Gupta and Takashima, 2019).

The results for Asia in Figure 4, like those for Europe in Figure 2, suggest a general upward revision of early GDP per capita compared with Maddison's estimates. China was substantially richer than Maddison thought during the Northern Song and Ming dynasties and India was richer than Maddison believed at the height of the Mughal Empire. Interestingly, however, the upwards revision of Maddison's conjectural estimates of GDP per capita in Japan are for the late nineteenth century, as Fukao, Bassino, Makino, Paprzycki, Settsu, Takashima and Tokui (2015) argue that Maddison overstated Japanese growth during the late nineteenth century and first half of the twentieth. This means that projecting back from 1990, by the time of the Meiji Restoration in 1868, Japan was more developed than has been widely appreciated.

As a result of these changes, the new estimates show a much more significant reversal of fortunes within Asia than suggested by Maddison. This is consistent with a number of important strands in Asian economic history. First, there are writers such as Needham (1954), Wittfogel (1957 and Elvin (1972) who stress China's early economic leadership in science, irrigation and agricultural productivity. Second, the decline in Chinese per capita incomes during the Qing dynasty is consistent with the work of Huang (1985; 2002) on agricultural involution. Third, the progress of Japan before the Meiji restoration, particularly during the Tokugawa shogunate, fits well with the influential work of Smith (1959) and Hayami (1967; 2015) on agricultural development and the industrious revolution.

**4.3 Dating the Great Divergence**

Figure 5 puts together the new GDP per capita estimates for Europe and Asia from Figures 2 and 4 to provide a focus on the Great Divergence. China was surely one of the richest countries in the world at the beginning of the second millennium, with per capita GDP of around $1,000 in 1990 international prices. The most reliable estimate that we have for Europe around this time is the figure of $723 for Britain in 1086, based on the Domesday Survey (Broadberry, Campbell, Klein, Overton and van Leeuwen, 2015: 375; Walker, 2014). For Italy, Malanima (2011) suggests a per capita GDP of close to $1,500 by 1300, but this had grown substantially since the eleventh century as long distance trade recovered following its collapse during the Dark Ages, and using Malanima's (2002: 450) growth rate between 1000 and 1300 yields an estimate of $911 for the early eleventh century. China was going through its Mongol interlude in the fourteenth century, so that estimates of GDP per capita are not available, but it is unlikely that Chinese per capita incomes were any higher than during the preceding Northern Song dynasty or the following Ming dynasty. It is therefore tempting to use the Italian and Chinese data to conclude that the Great Divergence was already underway by the fourteenth century, while in the fifteenth and sixteenth centuries the temptation becomes even stronger with both Italy and the Netherlands clearly ahead of China in terms of GDP per capita.

However, we must be careful here before concluding that the Great Divergence began in the early modern period or even during the late medieval period, since China was dramatically larger than any individual European country. Chinese population in 1600 was 160 million, compared with just 13.1 million in Italy, 4.2 million in Great Britain and 1.5 million in the Netherlands (Maddison, 2010). Even France, which was western Europe's largest nation, had a population of only 18.5 million in 1600. While the GDP per capita gap between the leading west European nations and China remained small, as it did until the eighteenth century, smaller Chinese regions of comparable size, such as the Yangzi delta, may still have been on a par with the richest parts of Europe.

Li and van Zanden (2012) have produced a comparison of GDP per capita in the Yangzi delta and the Netherlands in the early nineteenth century, finding per capita incomes in the Yangzi delta to be around half of the level in the Netherlands in the 1820s. This suggests a per capita GDP figure of around $1,050 for the Yangzi delta, in 1990 international dollars, or about 75 percent higher than in China as a whole. Applying the ratio between the Yangzi delta and China as a whole in the 1820s to Chinese GDP per capita for earlier years produces a quantification of the leading Chinese region for comparison with the European leader in Figure 6.[1] The "European leader" series is based on Italy until the 1540s, followed by the Netherlands until the 1800s and then Great Britain. On this basis, it is only after 1700 that a significant gap opened up between the leading regions of Europe and Asia.

[1] This does not have to mean that the Yangzi delta was always the leading region, but rather that there was always a region that was proportionally as far above the Chinese average as the Yangzi region in the 1820s.

It is reassuring that the historical national accounting evidence suggests the first half of the eighteenth century as the point in time when the leading regions of Europe and Asia first emerged, since this seems to be the new consensus that is emerging from both California School authors such as Pomeranz (2011; 2017) and from economic historians using other quantitative indicators such as real wages and urbanization rates (Broadberry and Gupta, 2006; Allen, Bassino, Ma, Moll-Murata and van Zanden, 2011). The California School authors were right to point to the importance of regional variation within both Asia and Europe, but a bit too optimistic about the performance of the richest parts of Asia during the eighteenth century.

### 4.4 The dynamics of the Great Divergence

Settling the dating of the Great Divergence does not mean that what happened earlier can be disregarded in seeking to understand its origins. It is important to also examine the dynamics of the income process. One of the most interesting developments of the recent wave of research in historical national accounting has been the construction of annual estimates of GDP per capita reaching back to the thirteenth or fourteenth century for a number of countries. Using these data, a radically new picture of the Little and Great Divergences has appeared. Northwestern Europe forged ahead of the rest of Europe and also diverged from Asia not by growing faster during periods of positive growth, but rather by reducing the frequency and rate of shrinking during periods of negative growth (Broadberry and Wallis, 2017). Indeed, a key feature of British economic growth during the transition to modern economic growth was its relatively slow rate. This has been noted since the work of Crafts (1985), but it is given added emphasis by Broadberry, Campbell, Klein, Overton and van Leeuwen's (2015) finding that the growth rate was actually slower during the eighteenth century than during the second half of the seventeenth century. What mattered was that as population growth returned, the British economy did not experience negative per capita income growth. This process of avoiding growth reversals in northwestern Europe can be traced back to the growth episode following the Black Death of the mid-fourteenth century. In this sense, the origins of the Great Divergence are still to be found in the late medieval period, as earlier generations of economic historians argued, even though at this stage northwestern Europe had not forged ahead of the rest of Europe or Asia.

Explaining the Industrial Revolution has more in common with solving the problem of development today than is usually acknowledged. Getting growth going in the first place, the traditional focus of analysis, is only part of the story. Just as important is ensuring that periods of positive growth are not followed by periods of negative growth, or shrinking. This has been highlighted in the case of developing economies today by Easterly, Kremer, Pritchett and Summers (1993) and Pritchett (2000). For the transition to modern economic growth in Britain during the Industrial Revolution, it means paying as much attention to the absence of negative trend growth after the gains of the post-Black Death growth episode as to the innovations that started episodes of positive growth during the eighteenth century.

Figure 7 plots the new estimates of GDP per capita in northwest and Mediterranean Europe between 1270 and 1870. This shows the alternation of periods of positive growth and negative growth or “shrinking” in Italy and Spain, leaving little or no progress in the level of per capita incomes over the long run. For Britain and the Netherlands, by contrast, although there were alternating periods of positive and negative growth until the eighteenth century, there was also a clear upward trend, with the gains following the Black Death being retained, and the periods of shrinking eventually disappearing with the transition to modern economic growth. One way to think about Europe’s Little Divergence, and also the Great Divergence, is therefore not so much the beginning of growth, but rather the weakening and ending of periods of shrinking.

In one way, the Asian Little Divergence resembles its European counterpart, with Japan achieving trend growth over the long run, like Britain and the Netherlands. However, there were also important differences. First, economic growth was slower in Japan than in northwest Europe, and second, the divergence was as much the result of an increase in negative growth or shrinking in China and India. Note further that, given the wide acceptance by researchers of the low levels of per capita income in Asia in the nineteenth century and the relatively high levels of per capita income in medieval Europe, China can only have been a relatively rich country in the Northern Song and Ming dynasties if there was significant shrinking of per capita incomes during the population expansion of the Qing dynasty.

## 5. CONCLUSIONS

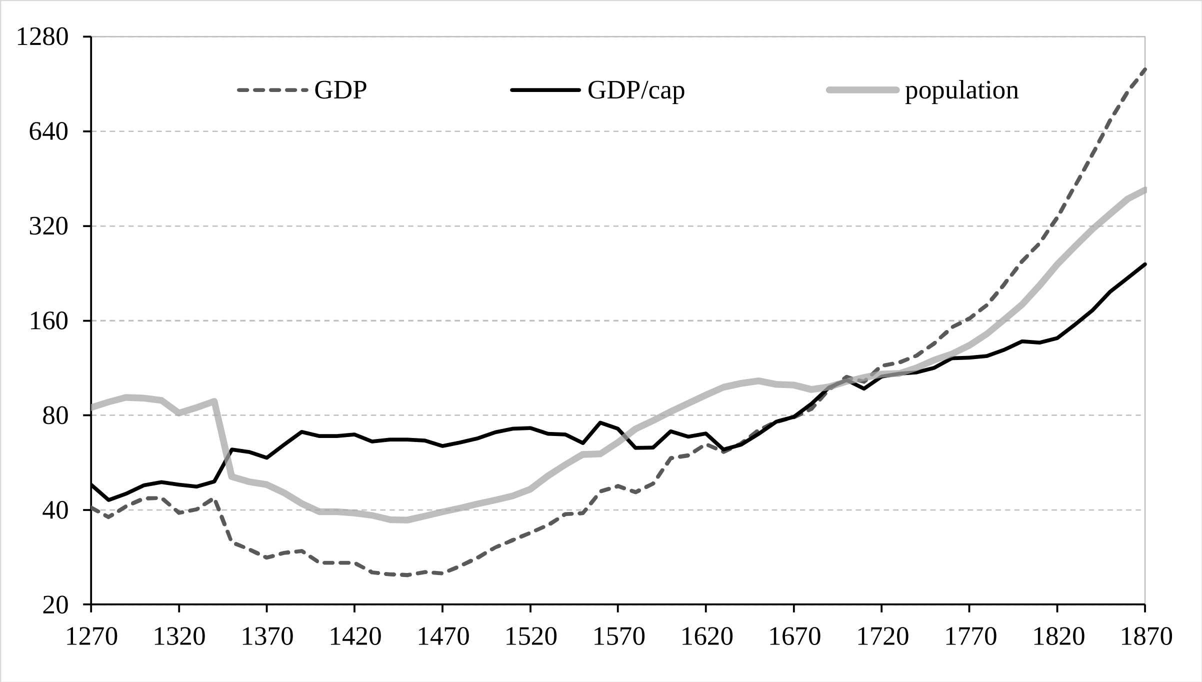
This chapter surveys recent research on historical national accounting since Angus Maddison's (2001) *The World Economy: A Millennial Perspective*, focusing on the implications for the Industrial Revolution and the Great Divergence. Maddison's data are best seen as "guesstimates" which were intended to spark further research using the existence of historical data for pre-industrial Europe and Asia. Utilising these data within a national accounting framework has produced a number of findings concerning the development process over the long period 1000-1870.

The first set of findings concern the Industrial Revolution. Eighteenth century Britain was the first economy to make the transition to modern economic growth, but this breakthrough built upon earlier episodes of growth after the Black Death in the fourteenth century and the

Civil War in the seventeenth century. Between these two episodes, the economy remained on a plateau rather than sinking back to Malthusian subsistence as population recovered. As a result, Britain improved its position relative to the rest of Europe (the Little Divergence) and relative to Asia (the Great Divergence).

The second set of findings concern the Great Divergence, where the old idea of a uniformly modernising Europe forging ahead of a uniformly stagnating Asia needs to be modified to take account of regional variation within both continents. There were reversals of fortune in the form of a European Little Divergence as Britain and the Netherlands overtook Italy and Spain, and an Asian Little Divergence as Japan overtook China and India, at the same time as the Great Divergence as the leading European region (the North Sea area) forged ahead of the leading Chinese region (the Yangzi delta). In terms of dating, the Great Divergence occurred in the first half of the eighteenth century at around the same time as the first transition to modern economic growth in Britain and the start of a period of shrinking in Qing dynasty China. However, this can also be seen as the culmination of a dynamic process beginning in northwest Europe in the fourteenth century, with a reduction in the frequency and rate of shrinking during periods of negative growth.

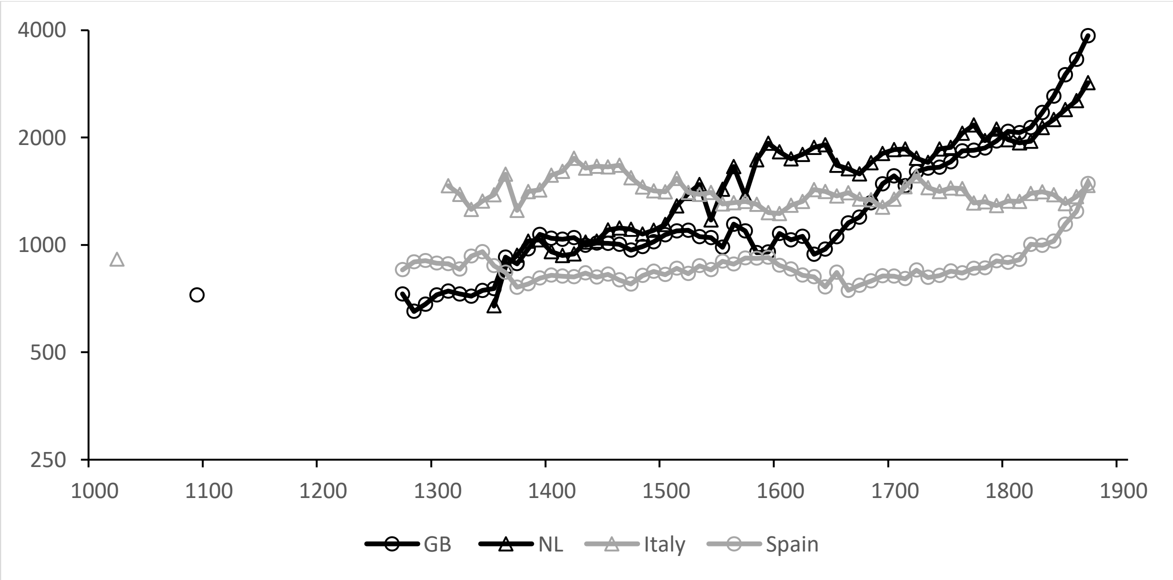
**FIGURE 1: Real GDP, population and real GDP per capita, England 1270-1700 and Great Britain 1700-1870 (averages per decade, log scale, 1700 = 100)**



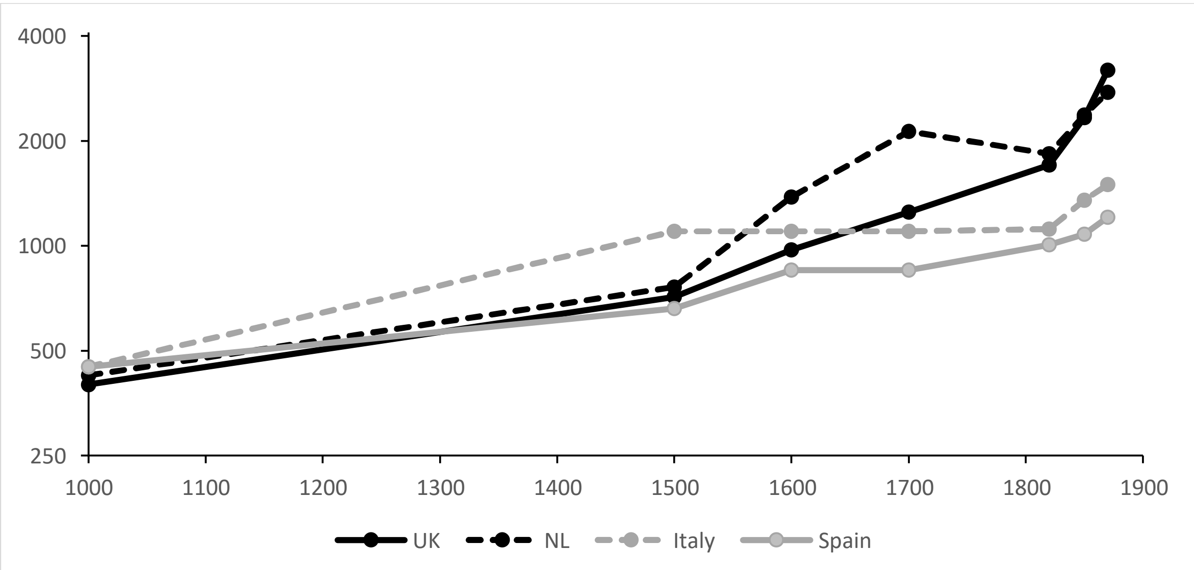

*Source*: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015: 204).

**FIGURE 2: New estimates of GDP per capita in western Europe compared with Maddison's estimates, 1000-1870 (1990 international dollars)**

**A. New estimates**



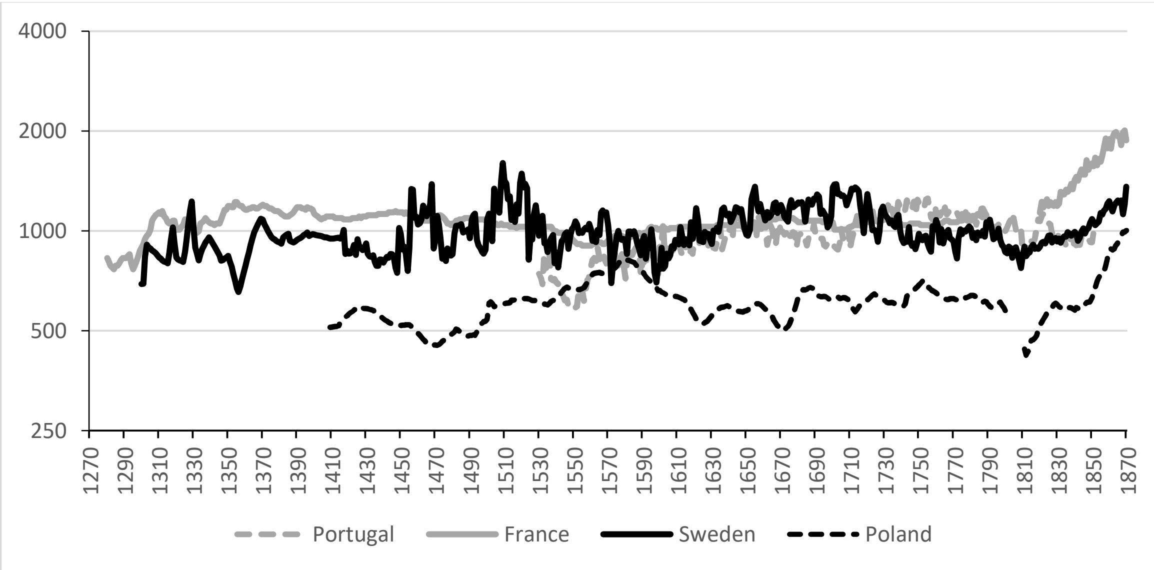

**B. Maddison's estimates**



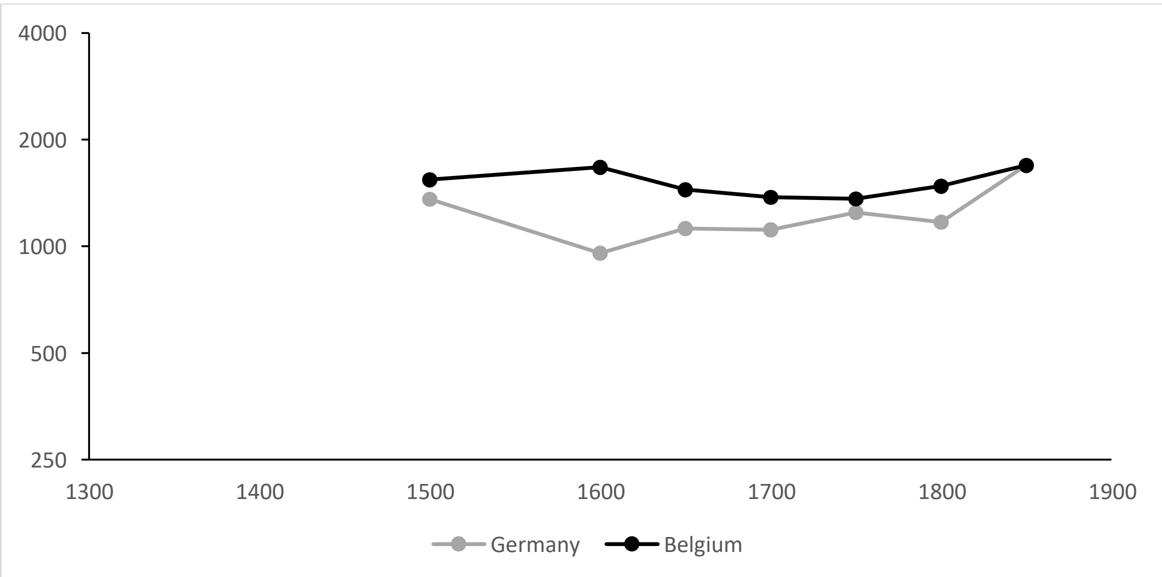

Sources: Panel A: GB: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015); NL: van Zanden and van Leeuwen (2012); Italy: Malanima (2002; 2011); Spain: Álvarez-Nogal and Prados de la Escosura (2013). Panel B: Maddison (2010).

**FIGURE 3: Real GDP per capita in other parts of Europe, 1270-1850 (1990 international dollars, log scale)**

**A. Annual data**



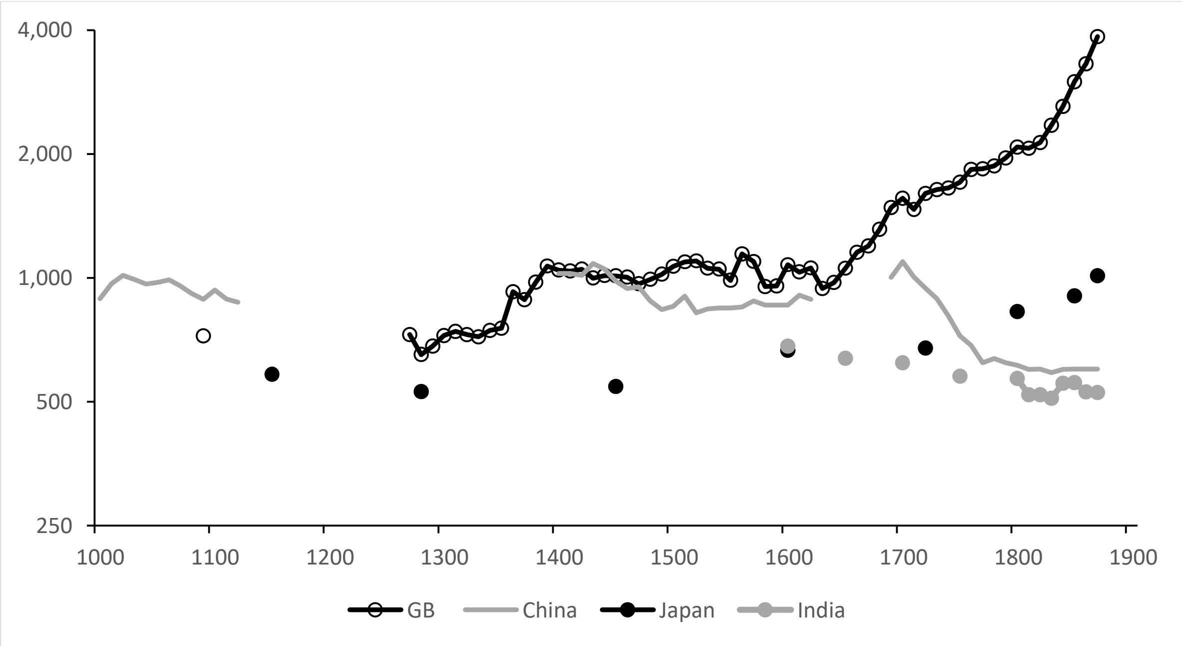

**B. Benchmark estimates**



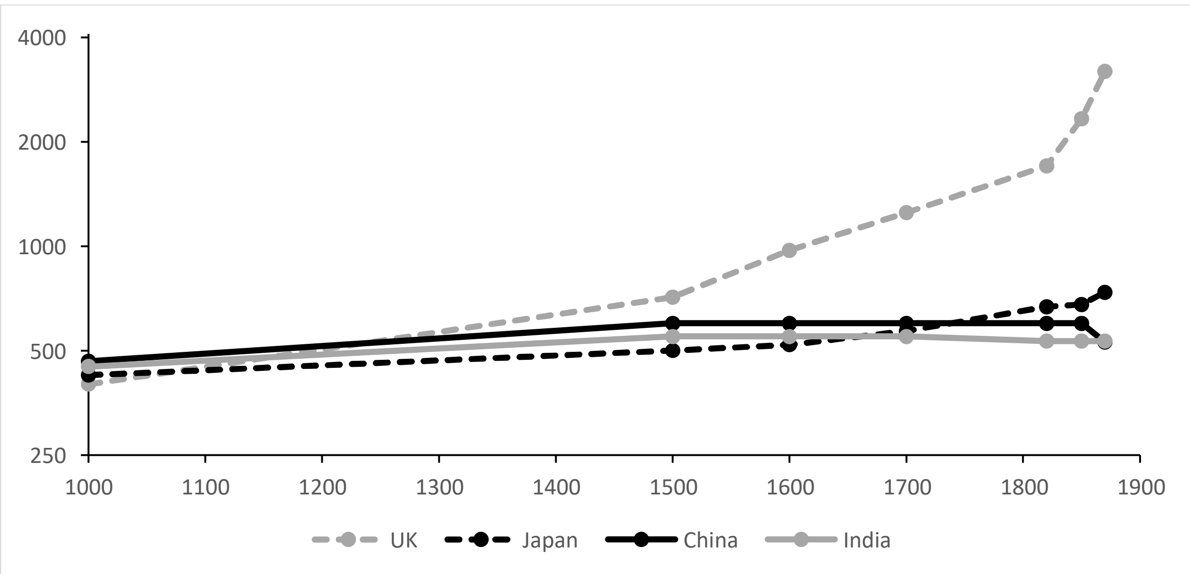

Sources: Panel A: Portugal: Palma and Reis (2019); France: Ridolfi (2016); Sweden: Krantz (2017, Schön and Krantz (2012); Poland: Malinowski and van Zanden (2017); Panel B: Germany: Pfister (2011); Belgium: Buyst (2011).

**FIGURE 4: New estimates of GDP per capita in Asia compared with Maddison's estimates, 1000-1870 (1990 international dollars)**

**A. New estimates**

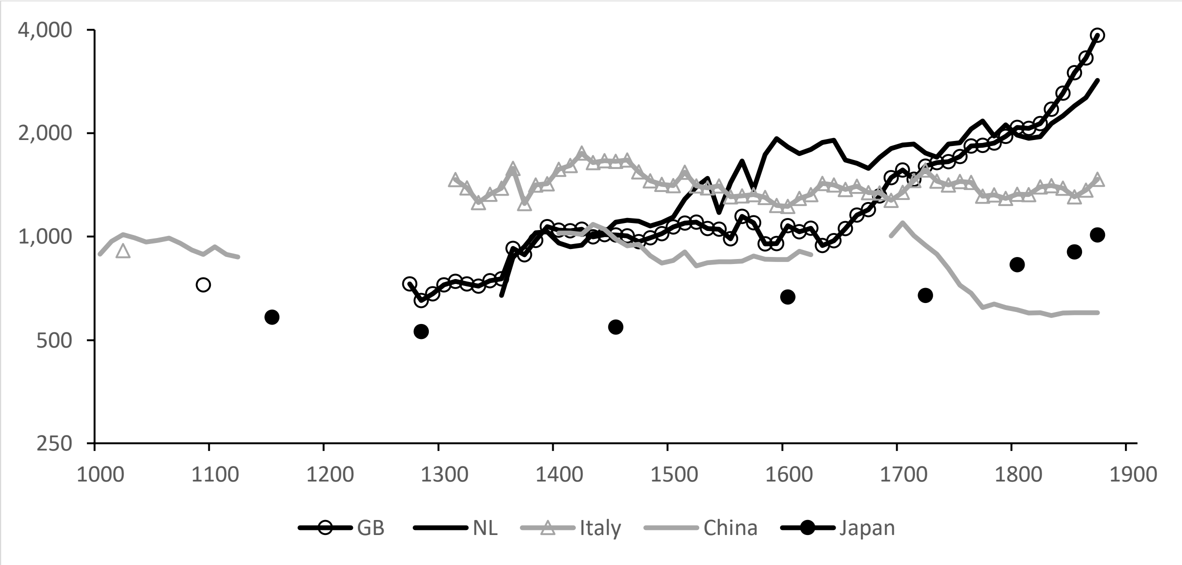



**B. Maddison's estimates**



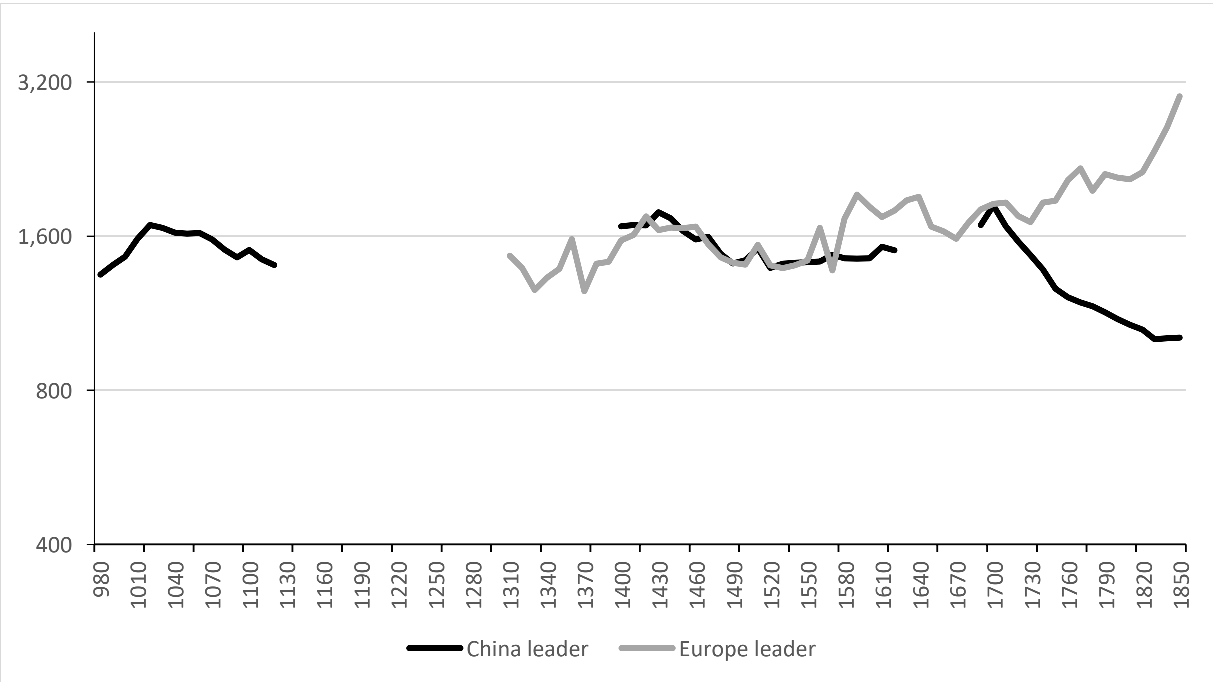

Sources: Panel A: GB: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015): China: Broadberry, Guan and Li (2018); Japan: Bassino, Broadberry, Fukao, Gupta and Takashima (2015); India: Broadberry, Custodis and Gupta (2015); Panel B: Maddison (2010).

**FIGURE 5: GDP per capita in Europe and Asia, 1000-1870 (1990 international dollars)**



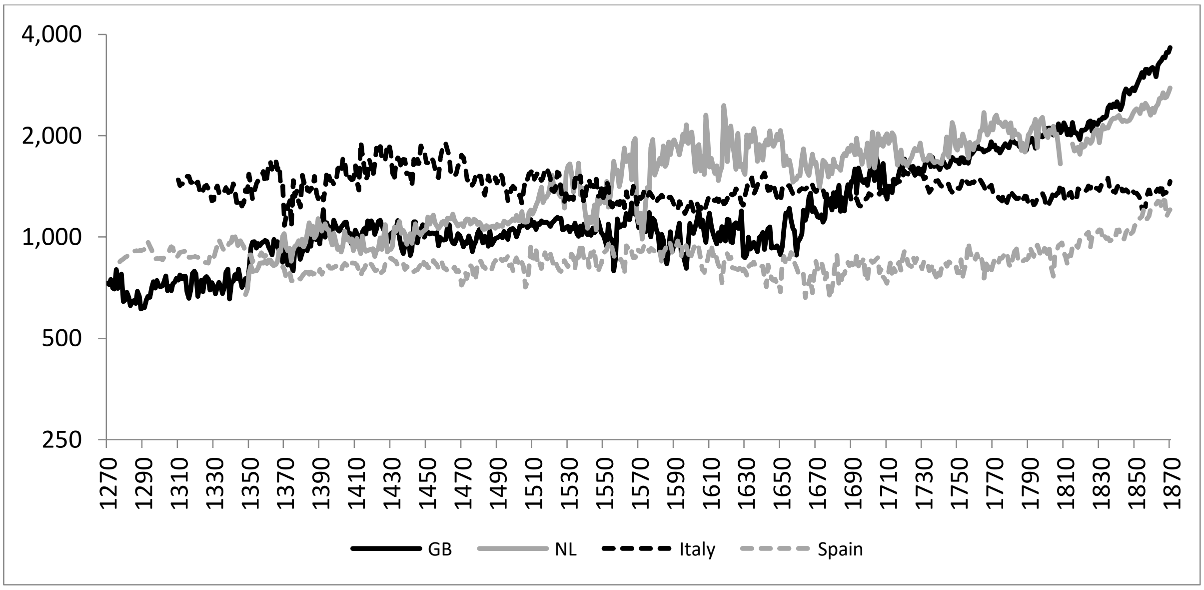

Sources: GB: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015); NL: van Zanden and van Leeuwen (2012); Italy: Malanima (2002; 2011); China: Broadberry, Guan and Li (2018); Japan: Bassino, Broadberry, Fukao, Gupta and Takashima (2019).

**FIGURE 6: Real GDP per capita in the leading regions of China and Europe, 980-1850 (1990 international dollars, log scale)**




Source: Broadberry, Guan and Li (2018).

**FIGURE 7 New estimates of GDP per capita in western Europe, 1270-1870 (1990 international dollars)**




Sources: GB: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015), NL: van Zanden and van Leeuwen (2012), Italy: Malanima (2011), Spain: Álvarez-Nogal and Prados de la Escosura (2013).

**TABLE 1: Data reliability assessments**

**A. Data reliability grades**

| Reliability grade | Margin of error | Average margin of error |
|---|---|---|
| A. Firm figures | ± less than 5% | ± 2.5% |
| B. Good figures | ± 5% to 15% | ± 10% |
| C. Rough estimates | ± 15% to 25% | ± 20% |
| D. Conjectures | ± more than 25% | ± 40% |

**B. Reliability assessments for GDP in the Netherlands, China and Japan**

| | Grade |
|---|---|
| ***Netherlands*** | |
| 1347-1510 | C |
| 1510-1650 | B |
| 1650-1750 | A |
| 1750-1807 | B |
| | |
| ***China*** | |
| Northern Song (980-1120) | B |
| Ming (1400-1620) | B |
| Qing (1690-1840) | A |
| | |
| ***Japan*** | |
| Ancient (730-1150) | D |
| Medieval (1250-1450) | C |
| Tokugawa (1600-1846) | B |

Sources: NL: van Zanden and van Leeuwen (2012); China: Broadberry, Guan and Li (2018); Japan: Bassino, Broadberry, Fukao, Gupta and Takashima (2019).

**TABLE 2: Annual growth rates of real GDP, population and real GDP per capita, Great Britain 1700-1870 (%)**

| | Real GDP | Population | Real GDP per capita |
|---|---|---|---|
| **A. England** | | | |
| 1270s-1300s | -0.02 | *0.27* | *-0.29* |
| 1300s-1350s | -0.64 | *-0.52* | *-0.12* |
| 1350s-1400s | -0.30 | *-1.06* | *0.76* |
| 1400s-1450s | -0.06 | *-0.21* | *0.15* |
| 1450s-1500s | 0.40 | *0.25* | *0.15* |
| 1500s-1550s | 0.51 | *0.65* | *-0.14* |
| 1550s-1600s | 0.81 | *0.62* | *0.19* |
| 1600s-1650s | 0.41 | *0.51* | *-0.10* |
| 1650s-1700 | 0.78 | *-0.04* | *0.82* |
| 1270s-1700 | 0.22 | *0.04* | *0.18* |
| **B. Great Britain** | | | |
| 1700-1750s | 0.49 | 0.30 | 0.19 |
| 1750s-1800s | 1.21 | 0.77 | 0.44 |
| 1800s-1850s | 2.08 | 1.34 | 0.74 |
| 1850s-1870 | 0.12 | 1.54 | 0.58 |
| 1700-1870 | 1.31 | 0.84 | 0.48 |

Source: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015: 208).

**TABLE 3: Sectoral shares in nominal GDP and the labour force, England 1381-1700 and Great Britain 1700-1870 (%)**

**A. Nominal GDP shares**

| Year | Region | Agriculture | Industry | Services | Total |
|---|---|---|---|---|---|
| 1381 | England | 45.5 | 28.8 | 25.7 | 100.0 |
| 1522 | England | 39.7 | 38.7 | 21.6 | 100.0 |
| 1700 | England and Britain | 26.7 | 41.3 | 32.0 | 100.0 |
| 1759 | Britain | 29.7 | 35.2 | 35.1 | 100.0 |
| 1801 | Britain | 31.3 | 32.7 | 36.0 | 100.0 |
| 1841 | Britain | 22.1 | 36.4 | 41.5 | 100.0 |

**B. Labour force shares**

| Year | Region | Agriculture | Industry | Services | Total |
|---|---|---|---|---|---|
| 1381 | England | 57.2 | 19.2 | 23.6 | 100.0 |
| 1522 | England | 58.1 | 22.7 | 19.2 | 100.0 |
| 1700 | England and Britain | 38.9 | 34.0 | 27.2 | 100.0 |
| 1759 | Britain | 36.8 | 33.9 | 29.3 | 100.0 |
| 1801 | Britain | 31.7 | 36.4 | 31.9 | 100.0 |
| 1841 | Britain | 23.5 | 45.6 | 30.9 | 100.0 |

Source: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015: 344).

**TABLE 4: Sectoral annual growth rates of output, labour-force and labour productivity, England 1381-1700 and Great Britain 1700-1851**

| Period | Annual % growth: | | | | | |
|---|---|---|---|---|---|---|
| | Agriculture | | | Industry | | |
| | Output | Labour-force | Labour productivity | Output | Labour-force | Labour productivity |
| 1381-1522 | 0.01 | -0.01 | 0.02 | 0.27 | 0.10 | 0.17 |
| 1522-1700 | 0.38 | 0.25 | 0.13 | 0.73 | 0.66 | 0.07 |
| 1700-1759 | 0.79 | 0.22 | 0.57 | 0.63 | 0.31 | 0.32 |
| 1759-1801 | 0.85 | 0.44 | 0.41 | 1.54 | 0.97 | 0.57 |
| 1801-1851 | 0.74 | 0.64 | 0.10 | 3.00 | 1.74 | 1.23 |
| | Services | | | GDP | | |
| | Output | Labour-force | Labour productivity | Output | Labour-force | Labour productivity |
| 1381-1522 | 0.06 | -0.16 | 0.23 | 0.11 | -0.02 | 0.14 |
| 1522-1700 | 0.74 | 0.60 | 0.14 | 0.60 | 0.45 | 0.16 |
| 1700-1759 | 0.70 | 0.44 | 0.26 | 0.69 | 0.32 | 0.38 |
| 1759-1801 | 1.36 | 1.00 | 0.36 | 1.23 | 0.79 | 0.44 |
| 1801-1851 | 2.16 | 1.45 | 0.71 | 2.10 | 1.35 | 0.74 |

Source: Broadberry, Campbell, Klein, Overton and van Leeuwen (2015: 367).

## REFERENCES


Abū 'l-Fazl [1595] (1927), *The Ā' īn–i-Akbarī*. Translated into English by H.Blochman, Delhi: Low Price Publications.

Allen, R.C. (2000), "Economic Structure and Agricultural Productivity in Europe, 1300-1800", *European Review of Economic History*, 3, 1-25.

Allen, R.C., Bassino, J.P., Ma, D., Moll-Murata, C. and van Zanden, J.L. (2011), "Wages, prices, and living standards in China, 1738-1925: in comparison with Europe, Japan, and India", *Economic History Review*, 64, S1, 8-38.

Álvarez-Nogal, C. and Prados de la Escosura, L. (2013), "The Rise and Fall of Spain (1270-1850)", *Economic History Review*, 66, 1-37.

Álvarez-Nogal, C. and Prados de la Escosura, L. (2016), "Spanish Agriculture in the Little Divergence", *European Review of Economic History*, 20, 452-477.

Angeles, L. (2008), "GDP per capita or Real Wages? Making Sense of Conflicting Views on Pre-industrial Europe", *Explorations in Economic History*, 45, 147-163.

Bairoch, P. (1988), *Cities and Economic Development: From the Dawn of History to the Present*, Chicago: University of Chicago Press.

Bassino, J.-P., Broadberry, S., Fukao, K., Gupta, B. and Takashima, M. (2019), "Japan and the Great Divergence, 730-1874", *Explorations in Economic History*, 72, 1-22.

Beveridge, W. (1939), *Prices and Wages in England from the Twelfth to the Nineteenth Century, Vol. I, Price Tables: Mercantile Era*, London: Longmans, Green.

Bolt, J. and van Zanden, J.L. (2014), "The Maddison Project: Collaborative Research on Historical National Accounts", *Economic History Review*, 63, 627-651.

Bouis, H.E. (1994), "The Effect of Income on Demand for Food in Poor Countries: Are our Food Consumption Databases Giving Us Reliable Estimates?", *Journal of Development Economics*, 44, 199-226.

Bowley, A.L. (1911-12), "The Measurement of the Accuracy of an Average", *Journal of the Royal Statistical Society*, 75, 77-88.

Broadberry, S.N., Campbell, B., Klein, A., Overton, M. and van Leeuwen, B. (2015), *British Economic Growth, 1270-1870*, Cambridge: Cambridge University Press.

Broadberry, S., Custodis, J. and Gupta, B. (2015), "India and the Great Divergence: An Anglo-Indian Comparison of GDP per capita, 1600-1871", *Explorations in Economic History* 55, 58-75.

Broadberry, S. Guan, H. and Li, D. (2018), "China, Europe and the Great Divergence: A Study in Historical National Accounting, 980-1850", *Journal of Economic History*, 78, 955-1000.

Broadberry, S. and Gupta, B. (2006), "The Early Modern great Divergence: Wages, Prices and Economic Development in Europe and Asia, 1500-1800", *Economic History Review*, 59, 2-31.

Broadberry, S. and Wallis, J. (2017), "Growing, Shrinking and Long Run Economic Performance: Historical Perspectives on Economic Development", National Bureau of Economic Research Working Paper No. 23343, Cambridge, MA, 2017. http://www.nber.org/papers/w23343.

Buyst, E. (2011), "Towards Estimates of Long Term Growth in the Southern Low Countries, ca.1500–1846", Paper for the "Quantifying Long Run Economic Development" conference at the University of Warwick in Venice, March 22–24, http://www2.warwick.ac.uk/fac/soc/economics/events/seminars-workshops-conferences/conferences/venice3/programme/buyst.pdf.

Campbell, B.M.S. (2000), *English Seigniorial Agriculture, 1250-1450*, Cambridge: Cambridge University Press.

Campbell, B.M.S. (2007), *Three centuries of English crop yields, 1211-1491*, http://www.cropyields.ac.uk.
Carus-Wilson, E.M. and Coleman, O. (1963), *England's Export Trade, 1275-1547*, Oxford: Clarendon.
Chapman, A.L. (1953), *Wages and Salaries in the United Kingdom 1920-1938*, Cambridge: Cambridge University Press.
Clark, G. (2004), "The Price History of English Agriculture, 1209-1914", *Research in Economic History*, 22, 41-125.
Clark, G. (2005), "The Condition of the Working-Class in England, 1209-2004**",** *Journal of Political Economy*, 113, 1307-1340.
Clark, G. (2006), "England, Prices and Wages since 13th Century", Global Price and Income History Group, University of California, Davis, http://gpih.ucdavis.edu/Datafilelist.htm.
Clark, G. (2007), *A Farewell to Alms: A Brief Economic History of the World*, Princeton: Princeton University Press.
Clark, G. (2009), Review of "Contours of the World Economy, 1-2030 AD: Essays in Macro-Economic History, by Angus Maddison", *Journal of Economic History*, 69, 1156-1161.
Clark, G. (2010), The Macroeconomic Aggregates for England, 1209-1869, *Research in Economic History*, 27, 51-140.
Crafts, N.F.R. (1976), "English Economic Growth in the Eighteenth Century: A Re-examination of Deane and Cole's Estimates", *Economic History Review*, 29, 226-235.
Crafts, N.F.R. (1985), *British Economic Growth during the Industrial Revolution*, Oxford: Oxford University Press.
Crafts, N.F.R. and Harley, C.K. (1992), "Output Growth and the Industrial Revolution: A Restatement of the Crafts-Harley View", *Economic History Review*, 45, 703-730.
Deane, P. and Cole, W.A. (1962), *British Economic Growth, 1688-1959: Trends and Structure*, Cambridge: Cambridge University Press.
Deaton, A. and Muellbauer, J. (1980), *Economics and Consumer Behaviour*, Cambridge; Cambridge University Press.
Easterly, W., Kremer, M., Pritchett, L. and Summers, L.H. (1993), "Good Policy or Good Luck?," *Journal of Monetary Economics*, 32, 459-483.
Elvin, M. (1973), T*he Pattern of the Chinese Past*, Stanford: Stanford University Press.
Feinstein, C.H. (1972), *National income, Expenditure and Output of the United Kingdom, 1855-1965*, Cambridge: Cambridge University Press.
Feinstein, C.H. and Thomas, M. (2002), "A Plea for Errors", *Historical Methods*, 35, 155-165.
Fukao, K., Bassino, J.-P., Makino, T., Paprzycki, R., Settsu, T., Takashima, M., and Tokui, J. (2015), *Regional Inequality and Industrial Structure in Japan: 1874-2008*, Tokyo: Maruzen Publishing.
Habib, I. (1982a), "Population", in Raychaudhuri, T. and Habib, I. (eds.), *The Cambridge Economic History of India, Volume 1: c.1200-c.1750* , Cambridge: Cambridge University Press, 163-171.
Hallam, H.E. (1988), "Population Movements in England, 1086-1350", in Hallam, H.E. (ed.), *The Agrarian History of England and Wales, Vol. II, 1042-1350*, Cambridge: Cambridge University Press, 508-593.
Hatcher, J. (1973), *English Tin Production and Trade before 1550*, Oxford: Clarendon Press.
Hayami, A. (1967), "Keizai shakai no seiritsu to sono tokushitsu [The Emergence of Economic Society and its Characteristics]", in Shakai-Keizaishi Gakkai (ed.), *Atarashii Edo Jidaizo wo Motomete*, Tokyo: Tōyō Keizai Shinpōsha.

Hayami, A. (2015), *Japan's Industrious Revolution: Economic and Social Transformations in the Early Modern Period*, Tokyo: Springer.

Hoffmann, W.G. (1965), Das Wachstum der deutschen Wirtschaft seit ser Mitte des 19. Jahrhunderts, Berlin: Springer.

Horrell, S., Humphries, J. and Weale, M. (1994), "An Input-Output Table for 1841", *Economic History Review*, 47, 545-566.

Huang, P. (1985), *The Peasant Economy and Social Change in North China*, Stanford, CA: Stanford University Press.

Huang, P. (2002), "Development or Involution in Eighteenth-century Britain and China? A Review of Kenneth Pomeranz's The Great Divergence: China, Europe and the Making of the Modern World Economy", *Journal of Asian Studies,* 61, 501-538.

Humphries, J., and Weisdorf, J. (2019), "Unreal Wages? Real Income and Economic Growth in England, 1260-1850", *Economic Journal*, 129, 2867-2887.

King, P. (2005), "The Production and Consumption of Bar Iron in Early Modern England and Wales", *Economic History Review*, 58, 1-33.

Krantz, O. (2017), "Swedish GDP 1300-1560: A Tentative Estimate", Lund Papers in Economic History; No. 152, Department of Economic History, Lund University, http://portal.research.lu.se/portal/files/21081639/LUP_152.pdf.

Kuznets, S. (1946), *National Product Since 1869*, New York: National Bureau of Economic Research.

Landes, D.S. (1969), *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present*, New York: Cambridge University Press.

Li, B. and van Zanden, J.L. (2012), "Before the Great Divergence? Comparing the Yangzi Delta and the Netherlands at the Beginning of the Nineteenth Century", *Journal of Economic History*, 72, 956-989.

Maddison, A. (1964), *Economic Growth in the West*, New York: Twentieth Century Fund.

Maddison, A. (1985), *Phases of Capitalist Development: A Long-Run Comparative View*, Oxford: Oxford University Press.

Maddison, A. (1991), *Dynamic Forces in Capitalist Development*, Oxford: Oxford University Press.

Maddison, A. (2001), *The World Economy: A Millennial Perspective*, Paris: Organisation for Economic Co-operation and Development.

Maddison, A. (2010), "Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD", Groningen Growth and Development Centre, http://www.ggdc.net/MADDISON/oriindex.htm.

Malanima, P. (2002), *L'economia italiana: dalla crescita medieval all crescita contemporanea*, Bologna: Il Mulino.

Malanima, P. (2011), "The Long Decline of a Leading Economy: GDP in Central and Northern Italy, 1300-1913", *European Review of Economic History*, 15, 169-219.

Malinowski, M. and van Zanden, J.L. (2017), "Income and its Distribution in Preindustrial Poland", *Cliometrica*, 11, 375-404.

Needham, J. (1954), *Science and Civilization in China*, Volume 1, Cambridge: Cambridge University Press, 1954.

North, D.C. and Thomas, R.P. (1971), *The Rise of the Western World: A New Economic History*, New York: Cambridge University Press.

O'Brien, P.K. and Hunt, P.A. (1999), "England, 1485-1815", in Bonney, R. (ed.), *The Rise of the Fiscal State in Europe, c.1200-1850*, Oxford: Oxford University Press, 53-100.

Overton, M. (1991), "The determinants of crop yields in early modern England", in Campbell, B.M.S. and Overton, M. (eds.), *Land, labour and livestock: historical studies in*

*European agricultural productivity*, Manchester: Manchester University Press, 284-322.
Overton, M. (2000), "Prices from probate inventories", in Arkell, T., Evans, N. and Goose, N. (eds.), *When death do us part: understanding and interpreting the probate records of early modern England*, Oxford: Leopard's Head Press, 120-143.
Overton, M., Whittle, J., Dean, D. and Hann, A. (2004), *Production and Consumption in English Households, 1600-1750*, London: Routledge.
Palma, N. and Reis, J. (2019), "From Convergence to Divergence: Portuguese Economic Growth, 1527-1850", *Journal of Economic History*, 79, 477-506.
Perkins, D. H. (1969), *Agricultural development in China, 1368-1968*, Chicago: Aldine.
Pfister, U. (2011), "Economic Growth in Germany, 1500–1850", paper for the "Quantifying Long Run Economic Development" conference at the University of Warwick in Venice, March, 22–24, https://warwick.ac.uk/fac/soc/economics/seminars/seminars/conferences/venice3/programme/pfister_growth_venice_2011.pdf.
Phelps Brown, H. and Hopkins, S.V. (1955), "Seven Centuries of Building Wages", *Economica*, 22, 195-206.
Phelps Brown, H. and Hopkins, S.V. (1956), "Seven Centuries of the Prices of Consumables, Compared with Builders' Wage-rates", *Economica*, 23, 296-314.
Pomeranz, K. (2000), *The Great Divergence: China, Europe, and the Making of the Modern World Economy*, Princeton: Princeton University Press.
Pomeranz, K. (2011), "Ten years after: responses and reconsiderations", *Historically Speaking*, 12(4), 20-25. Project Muse, https://muse.jhu.edu/login?auth=0&type=summary&url=/journals/historically_speaking/v012/12.4.coclanis.html.
Pomeranz, K. (2017), "The Data We Have vs. the Data We Need: A Comment on the State of the "Divergence" Debate (Part I)", The NEP-HIS Blog, https://nephist.wordpress.com/2017/06/06/the-data-we-have-vs-the-data-we-need-a-comment-on-the-state-of-the-divergence-debate-part-i/#comments.
Pritchett, L. (2000), "Understanding Patterns of Economic Growth: Searching for Hills among Plateaus, Mountains and Plains", *World Bank Economic Review*, 14, 221-250.
Ridolfi, L. (2016), "The French economy in the longue durée. A study on real wages, working days and economic performance from Louis IX to the Revolution (1250-1789), PhD thesis, IMT School for Advanced Studies, Lucca.
Rozman, G. (1973), *Urban networks in Ch'ing China and Tokugawa Japan*, Princeton: Princeton University Press.
Saito, O. and Takashima, M. (2015), "Population, Urbanisation and Farm Output in Early Modern Japan, 1600-1874: A Review of Data and Benchmark Estimates", RCESR Discussion Paper Series, No. DP15-3. https://hermes-ir.lib.hit-u.ac.jp/rs/handle/10086/27295.
Saito, O. and Takashima, M. (2017), Jinkō to toshika, idō to shūgyō [Population and Urbanisation, Migration and Employee Structure], in Fukao, K., Nakamura, T. and Nakabayashi, M. (eds.), *Kinsei, Iwanami Kōza Nihon Keizai no Rekishi 2 [Iwanami Lecture Series on the History of the Japanese Economy], vol. 2, The Pre-modern Period,* Tokyo: Iwanami Shoten, 61-104.
Schön, L. and Krantz, O. (2012), "The Swedish Economy in the Early Modern Period: Constructing Historical National Accounts", *European Review of Economic History*, 16, 529-549.
Smith, T.C. (1959), The Agrarian Origins of Modern Japan, Stanford CA: Stanford University Press.

Smits, J.P., Horlings, E.and van Zanden, J.L. (2000), *Dutch GNP and its Components, 1800-1913*, Groningen: Groningen Growth and Development Centre, https://www.rug.nl/ggdc/docs/mono5.pdf.
Thorold Rogers, J.E. (1866-1902), *A History of Agriculture and Prices in England*, Volumes 1-6, Oxford: Clarendon Press.
Turner, M.E., J.V. Beckett, and B. Afton (2001), *Farm Production in England 1700-1914*, Oxford: Oxford University Press.
Walker, J.T. (2014), "National Income in Domesday England", in Allen, M. and Coffman, D. (eds.), *Money, Prices and Wages: Essays in Honour of Professor Nicholas Mayhew*, Basingstoke: Palgrave Macmillan, 24-50.
Weber, M. (1930), *The Protestant Ethic and the Spirit of Capitalism*, London: Allen and Unwin.
Wittfogel, K.A. (1957), *Oriental Despotism: A Comparative Study of Total Power*. New Haven: Yale University Press.
Wrigley, E.A. (1985), "Urban Growth and Agricultural Change: England and the Continent in the Early Modern Period", *Journal of Interdisciplinary History*, 15, 683-728.
Wrigley, E.A., Davies, R.S., Oeppen, J.E. and Schofield, R.S. (1997), *English Population History from Family Reconstitution, 1580-1837*, Cambridge: Cambridge University Press.
Wrigley, E.A. and Schofield, R.S. (1989), *The Population History of England, 1541-1871: A Reconstruction*, Cambridge: Cambridge University Press.
van Zanden, J.L. and van Leeuwen, B. (2012), "Persistent but not Consistent: The Growth of National Income in Holland, 1347-1807", *Explorations in Economic History*, 49, 119-130.