THE CHARACTERISTICS OF MODERN ECONOMIC GROWTH REVISITED

Stephen Broadberry
Nuffield College, Oxford
stephen.broadberry@nuffield.ox.ac.uk

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Abstract: This paper revisits the work of Simon Kuznets on the characteristics of modern economic growth. Using new quantitative evidence on the process of growth and development reaching back to the medieval period, six new characteristics of modern economic growth are derived inductively. The most important changes from Kuznets concern the incorporation of new work on: (1) growth reversals (2) demographic transition (3) structural change and services (4) institutional change and the state (5) market integration and (6) the Great Divergence.

I. INTRODUCTION

When Simon Kuznets set out to define his famous six characteristics of modern economic growth in his Nobel memorial lecture in 1971, he was able to draw on only a very limited amount of quantitative information concerning growth before the mid-nineteenth century. Indeed, the estimates of national income that he set out in Kuznets (1966: 64-65) contained information before 1850 for just 3 economies (Great Britain, the United States and France) and before 1839 only for Great Britain, reaching back even then only to 1700. This is potentially problematic, because Kuznets was attempting to distinguish modern economic growth from pre-modern growth, and he associated modern economic growth with an epoch beginning in the mid-eighteenth century. This paper revisits the conditions set out by Kuznets, drawing on recent work in historical national accounting, which has greatly expanded coverage of the pre-1850 period, reaching back to the medieval period.

Although this paper changes the characteristics of modern economic growth, it retains the methodological emphasis of Kuznets on arriving inductively at the conditions of sustained economic growth, drawing on the best information available at the time. Although the inductive approach was already falling out of favour in economics when Kuznets was writing, the financial crisis of 2008 has led some to call for a reappraisal. A more inductive approach has begun to reappear in macroeconomics and financial economics, where over-reliance on introspection and a deductive approach had allowed economists to screen out the possibility of such a catastrophic occurrence (Wolf, 2014). As Taylor (2015) notes, within this literature, new empirical findings from economic history have emerged, which can strengthen arguments beyond a reliance on introspection and the deductive approach alone. The time is now ripe for a similar reconsideration in the area of economic growth and development, where a substantial amount of research in economic history has uncovered

many interesting findings about the experience of the last millennium and the transition to sustained economic growth.

The paper proceeds as follows. Section II sets out in summary form the characteristics of modern economic growth as identified by Kuznets. Section III then considers those characteristics in the light of recent findings by economic historians covering the period before the Industrial Revolution and during the transition to modern economic growth. Section IV provides a revised set of six characteristics of modern economic growth, while Section V concludes.

II. KUZNETS AND THE CHARACTERISTICS OF MODERN ECONOMIC GROWTH

Kuznets (1966: 490-500) first set out a list of the characteristics of modern economic growth at the end of a book which summarised what was then the latest available quantitative-historical evidence of economic development. At this stage, Kuznets listed fifteen characteristics, which were derived inductively from the historical evidence presented in chapters 2 to 9. When he came to deliver his Nobel memorial lecture, however, Kuznets [1971] refined this longer list into the famous "six characteristics", falling into three main groups, concerning aggregate growth (conditions 1 and 2), structural transformation (conditions 3 and 4) and international spread (conditions 5 and 6). Here we list the six characteristics in summary form before considering them in the light of subsequent research in long run quantitative economic history in the next section.

A. Aggregate growth

1. High rates of increase in per capita product, accompanied by substantial rates of population growth

2. High rates of increase in output per unit of all inputs

B. Structural transformation

3. A high degree of structural transformation, encompassing a shift from agriculture to industry and services

4. Changes in the structure of society and its ideology, including urbanisation and secularisation

C. International spread

5. Opening up of international communications

6. A growing gap between developed and under-developed nations

III. RECENT FINDINGS FROM LONG RUN ECONOMIC HISTORY

Kuznets [1971] was writing with a very limited evidence base on the transition to modern economic growth. At that time, there were no reliable quantitative accounts of the process of development amongst the developed countries of the 1960s. As a result of recent developments in quantitative economic history, we now have a much firmer idea of what happened before and during the Industrial Revolution and the transition to modern economic growth.

We now have estimates of GDP, population and GDP per capita reaching back to medieval times for a number of countries, covering a large share of world GDP and population. The first steps were taken with the publication of Angus Maddison's (2001), *The World Economy: A Millennial Perspective*, However, the pre-1820 data in that volume are available only for a small number of benchmark years and are best described as "controlled

conjectures" rather than drawn from archival evidence. Stimulated by Maddison's work, however, economic historians have recently begun to produce estimates of per capita income in a national accounting framework for the medieval and early modern periods, utilising evidence collected at the time. This is possible because medieval and early modern societies were more literate and numerate than is often supposed, and left behind a wealth of records from which quantitative data can be extracted.

For some European countries, abundant historical information has survived so that historical national accounts can be constructed on a sectoral basis at an annual frequency back to the late thirteenth century. The data for Britain and Holland are particularly rich, building on well-stocked archives and decades of work by generations of scholars processing their contents (Broadberry et al., 2015a; van Zanden and van Leeuwen, 2012). For Italy and Spain, where information is more limited and there has been less processing of the available data, Malanima (2011), Álvarez-Nogal and Prados de la Escosura (2013) and others have developed a short-cut method for reconstructing GDP per capita, estimating agricultural output from data on wages and prices via a demand function for food and non-agricultural output from the extent of urbanisation. The short-cut method has been used by Prados de la Escosura (2013) for Britain and Holland, and produces similar results at the aggregate level, thus providing as useful cross-check, although the direct method is to be preferred, since it produces a much fuller picture of the economy.

Following Maddison (2010), these estimates are expressed in terms of 1990 international dollars, so that comparisons can be made across both space and time. Maddison thought of a GDP per capita level of $400 as equivalent to most people living at bare bones subsistence, or the World Bank poverty level of $1 per day, together with a small but rich

elite. This section discusses the findings of this and other related quantitative research, which provides the basis for a revised set of characteristics of modern economic growth.

1. High rates of increase in per capita product and substantial population growth

A problem with the first characteristic set out by Kuznets is that further research in economic history has shown that growth rates were not as fast as once thought during the early stages of modern economic growth (Crafts, 1985; Crafts and Harley, 1992). Indeed, what has become apparent as a result of new quantitative work on economic growth reaching back to the medieval period is that the transition to modern economic growth required not so much faster growth in periods of positive economic growth as the elimination of periods of negative economic growth (Broadberry, 2015). In other words, it was crucial that the economy should stop shrinking during slumps rather than that it should grow faster during booms. The net effect of the same rate of economic growth during booms, combined with the absence of growth reversals during slumps, was a trend increase in the level of per capita income, slow at first, but gradually gathering pace. During the early years of the Industrial Revolution, there was revolutionary change only in a qualitative sense, but not yet in a quantitative sense.

A second issue that arises in connection with the first characteristic of modern economic growth concerns Kuznets's treatment of population growth. The insistence by Kuznets that high rates of per capita product growth should be accompanied by substantial rates of population growth was intended to distinguish modern economic growth from earlier episodes of pre-modern growth, where a mortality crisis such as that following the arrival of the Black Death in the mid-fourteenth century was believed to have raised per capita incomes temporarily. This is the classic Malthusian response to a sharp drop in the population, which makes survivors better off, because they have more land and capital. These gains are then

eroded by subsequent population growth, so that there is no sustained increase in living standards. However, the emphasis by Kuznets on high rates of population growth as a characteristic of prosperity was already beginning to seem problematic by the time he was writing, since the demographic transition had by then slowed population growth in the West and excessive population growth was increasingly being seen as a cause of poverty in less developed nations.

Kuznets (1966: 40-50) did allude to the decline of birth rates in the West and to the difficulties facing underdeveloped countries since World War II (Kuznets, 1974b). However, this stopped a long way short of a comprehensive discussion of the need for a demographic transition. This will seem surprising to anyone familiar with unified growth theory, which distinguishes between a post-Malthusian regime, combining high rates of per capita income growth with rapid population growth, and a regime of modern economic growth, combining rapid per capita income growth with slowly growing or stable population after a demographic transition (Galor, 2005).

A. Ending growth reversals

The data in Table 1 show the trends in GDP per capita for four European countries, indicating a reversal of fortunes between the North Sea area economies of Britain and Holland and the Mediterranean economies of Italy and Spain. Before the Black Death struck in 1348, wiping out between a third and a half of Europe's population, per capita incomes were substantially higher in Italy and Spain than in England and Holland, but by 1750 on the eve of the Industrial Revolution, Britain and Holland were clearly ahead. The annual data in Figure 1 shed light on this process of overtaking, sometimes known as the Little Divergence. In Figure 1A, there is clearly an alternation between periods of positive and negative growth in Italy

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and Spain, with growth booms typically followed by growth reversals, leaving little or no progress in the level of per capita incomes over the long run. In Figure 1B, by contrast, although there are alternating periods of positive and negative growth, which last until the eighteenth century, there is also a clear upward trend, with the per capita income gains following the Black Death being retained, and the growth reversals eventually disappearing with the transition to modern economic growth. Putting the two regions together in Figure 1C, Britain and Holland overtake Italy in Spain as a result of the dampening of growth reversals rather than any increase in the annual rate of growth during periods of positive growth. This suggests that in understanding the transition to modern economic growth, it is more important to understand the ending of growth reversals than the beginning of growth booms, on which most attention has usually been focused.

There is now a substantial literature on the importance of growth reversals in the post-World War II period. Easterly et al. (1993) have highlighted their importance in explaining the combination of, on the one hand, high persistence in comparative levels of GDP per capita across countries and, on the other hand, high variability in growth rates over time. Pritchett (2000) uses a topographical analogy to describe the difference between those countries that have made the transition to modern economic growth and those that have not. Modern economic growth is a "continuous hill" and getting there is the final stage of a dynamic process, which involves dampening growth reversals. This approach can be applied equally to the medieval and early modern world, now that annual data are available for these periods.

Returning to Figure 1B, although British GDP per capita followed a "hill" pattern during 1348-1400, as population declined catastrophically after the arrival of the Black

Death, it was followed not by a decline, but rather by a "plateau" between 1400 and 1650. British GDP per capita again followed a hill pattern after 1650, but this time the hill turned out to be continuous. However, it was not yet modern economic growth on the Kuznetsian definition, because population declined between 1650 and 1700. With the end of population decline from around 1700, GDP per capita continued to grow, as Britain became the first country to make the transition to modern economic growth.

By contrast, the growth paths of Italy and Spain in Figure 1A may be described as tracing out a series of "mountains", where a long period of positive trend growth was typically followed by a long period of negative trend growth. Examples would include the period of positive trend growth in Italy between the 1370s and the 1420s, followed by a period of negative trend growth between the 1420s and the 1490s, and the period of positive growth in Spain between the 1460s and the 1590s, followed by the period of negative trend growth between the 1590s and the 1680s. Sometimes, where the periods of positive and also negative growth were relatively short, the growth path traced out a "steep mountain" pattern. Examples would include Spain between 1645 and 1664 and Italy between 1346 and 1374.

B. Demographic transition and human capital

Kuznets (1966) was keen to distinguish modern economic growth from pre-modern growth by ruling out episodes such as the rise in GDP per capita that occurred across much of Europe following the Black Death of the mid-fourteenth century. Whilst it seems reasonable to rule out cases of per capita GDP growth at a time of falling population, it is not so clear that substantial population growth should be required. Indeed, as noted earlier, this emphasis on positive population growth sits uneasily with the observation that in the twentieth century, poverty has become associated with excessive population growth. By contrast, continuing

prosperity is associated with the idea of a demographic transition, from a world of high birth rates and death rates to a world of low birth rates and death rates.

The classic pattern of the demographic transition is illustrated in Figure 2A by the case of Sweden during the period 1735-2000. The crude death rate (the number of deaths per 1000 of the population) began to decline from the mid-eighteenth century, but the decline of the crude death rate (deaths per 1000) was delayed until the 1870s. As a result, Swedish population growth accelerated between the 1750s and 1870s before falling back. However, the classic Swedish pattern, which would have been known to Kuznets, was far from ubiquitous. The case of England, where the first transition to modern economic growth occurred, shown here in Figure 2B, deviates significantly from this pattern. Although there was a substantial increase in population growth between the mid-eighteenth and mid-nineteenth centuries, approximately two-thirds of this arose from an increase in fertility rather than a decline in mortality. The quantitative dimensions of this case were only established with Wrigley and Schofield's (1981) work, and did not undermine the idea of an acceleration of population growth during the demographic transition. The case of France, shown in Figure 2C, is different again, in a more significant way for Kuznets's first characteristic of modern economic growth. In France, fertility and mortality declined together from the late eighteenth century, so that population growth rates remained low throughout the nineteenth century. The French case thus makes clear that there is no need for substantial rates of population growth during the transition to modern economic growth, even if such an association existed in the cases of England and Sweden.

2. High rates of increase in output per unit of all inputs

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Growth rates of TFP, as well as GDP per capita, were not very high during fist transition to modern economic growth, as made clear by Crafts and Harley (1992). The growth of capital per worker was limited, as the capital stock barely kept pace with the rapid population increase, while including human capital as a factor input tends to lower TFP growth rates still further.

A. Capital and the Industrial Revolution

Little was known about the capital stock when Kuznets was writing, but for a limited number of economies, there are now have reliable estimates. For Great Britain, Feinstein's (1988) estimates back to 1760 have been produced using the perpetual inventory method, ensuring consistency between the stock of capital and the flows of investment. Crafts and Harley (1992) showed that TFP growth rate was not particularly high during the Industrial revolution, using Feinstein's (1988) estimates of the capital stock, together with their own estimates of output and the assumption that the labour force grew in line with population. In their estimates, shown here in Table 2, capital and labour are given equal weights. These data suggest that only one-third of the acceleration in output growth between the early eighteenth and mid-nineteenth centuries was due to faster TFP growth, with two-thirds of the increase being accounted for by faster growth of factor inputs. Furthermore, most of the TFP acceleration was delayed until after 1830. A good part of the increased input growth was due to labour, as a result of the rapid rate of population growth, hence leading to only a slow rate of per capita GDP growth. With capital growing a bit faster than labour, TFP growth was slower even than GDP per capita growth.

B. Human capital and TFP growth

Crafts's (1995) later TFP calculations also take account of human capital. This may not have been particularly important during the early stages of the Industrial Revolution, with literacy rates stagnating during the second half of the eighteenth century (Schofield, 1973). In Table 3, the traditional growth accounting uses equal weights of 0.5 for capital and labour, while the human capital-augmented Solow growth accounting uses weights of 0.4 for capital, 0.35 for labour and 0.25 for human capital. Comparing panels A and B of Table 3, TFP growth rates are reduced for all periods apart from 1760-80, when human capita is included as a factor input.

Estimates of TFP growth for Holland are provided by van Zanden and van Leeuwen (2012), reaching back to 1540 and including human capital as well as labour and capital inputs. In Table 4, Dutch TFP is estimated using the same weights as those used by Crafts and Harley (1992) for Britain (0.4 for capital, 0.35 for labour and 0.25 for human capital). These estimates differ only very slightly from those of van Zanden and van Leeuwen, who also include land as a fourth factor input. The period of fastest TFP growth was 1540-1620, during the Dutch Golden Age, at 0.64% per annum. This was higher than at any other time in Holland during the seventeenth and eighteenth centuries, or in Britain during the eighteenth and nineteenth centuries. However, this period of positive TFP growth was followed by a period of strongly negative TFP growth between 1620 and1665, and barely positive TFP growth thereafter, so there was no trend increase in TFP over the period 1540-1800 as a whole. The Dutch example thus serves as a reminder that growth reversals can occur in TFP as well as GDP per capita, and that the transition to modern economic growth requires an end to TFP growth reversals as well as GDP per capita growth reversals.

The overall message to take away from this section on output per unit of all inputs is that Kuznets placed too much emphasis on TFP in the transition to modern economic growth, which actually occurred against a backdrop of slow TFP growth. McCloskey (1981: 108), believing in the faster rates of output growth suggested by Deane and Cole (1967), and hence in a much larger Solow residual or TFP growth, wrote "ingenuity rather than abstention governed the industrial revolution". More reliable recent data suggest that the industrial revolution was governed more by abstention or thrift (savings = investment) and hard work (growth of labour supply) than by ingenuity (growth of TFP). What really seems to have changed was the elimination of phases of negative growth rather than anything fundamental during the phases of positive growth.

3. A high degree of structural transformation, encompassing a shift from agriculture to industry and services

Although Kuznets (1966: 86-113) discussed the structural transformation from agriculture to both industry and services, he clearly placed more emphasis on industrialisation in bringing about the transition to modern economic growth. This was in line with the views of Colin Clark (1960), who saw services as playing an important role in economic activity only much later in the process of development, after industrialisation had already occurred. This playing down of the role of services had some adverse consequences for the interpretation of economic history. First, it led to a neglect of the role of services during the British Industrial Revolution, despite a number of extraordinary commercial aspects of the rise of the British cotton textile industry, such as securing a supply of raw cotton from overseas in a country where no raw cotton was grown, while at the same time transporting and distributing huge volumes of yarn and cloth all over the world, and financing the whole dynamic enterprise. Only quite recently have economic historians begun to focus on these aspects of the British

cotton industry (Chapman, 1992; Farnie, 2004). Second, it led to Holland being perceived as a lagging industrial economy rather than as a rich and successful economy with a highly dynamic service sector, which played a key role in Europe's Little Divergence, as the North Sea area overtook Mediterranean Europe (de Vries and van der Woude, 1997; van Zanden and van Leeuwen, 2012).

It is also worth noting that the shift of labour from agriculture to industry and services was more gradual than implied by Kuznets's suggestion of a "high degree" of structural transformation. Table 5 from Broadberry et al. (2015a) shows that in Britain, services already accounted for more than 20 per cent of employment during the late medieval and early modern periods, rising to around 30 per cent by the start of the Industrial Revolution. Table 5 also establishes that the shift of labour from agriculture to industry and services began much earlier than once assumed, with agriculture accounting for less than 60 per cent of the labour force as early as 1381. This is also in line with the findings of Clark (2013), who independently derived his estimates from the poll tax returns for that year. With agriculture accounting for less than 40 per cent of the labour force by the early eighteenth century, the scope for redeployment of labour from agriculture to industry during the Industrial Revolution was quite limited. Combined with the relatively slow rate of industrial output growth established by Crafts and Harley (1992), these new employment data avoid the problem which had plagued the work of Deane and Cole (1967) as well as Crafts and Harley, that labour productivity growth appeared to grow more rapidly in agriculture than in industry during the Industrial Revolution.

4. Changes in the structure of society and its ideology, including urbanisation and secularisation

In his discussion of changes in the structure of society and its ideology, Kuznets seems to have been groping towards what economic historians today would call institutional factors. Here, work has tended to be split between those emphasising the need to build up state capacity to provide essential public goods and those who emphasise the need to impose constraints on an over-mighty state. On one side of the debate, Epstein (2000) argues that state power was fragmented in the medieval period, with market integration hindered by the "freedoms" granted to interests such as towns and guilds, so that what was needed for growth in the early modern period was centralisation of state power and expansion of state capacity rather than constraints on the executive. This view is supported by O'Brien (2011), who attributes Britain's success to the rise of the "fiscal state". On the other side of the debate, Acemoglu, Johnson and Robinson (2005), drawing on the approach of North and Weingast (1989), explain the success of Britain and Holland after 1500, together with the failure of Spain and Portugal, through institutional constraints on executive power. In Britain and Holland at this time, constraints on the executive are seen as sufficient to ensure that rulers were unable to act arbitrarily in their dealings with merchants. In late medieval and early modern Spain and Portugal, by contrast, states are characterised as being sufficiently powerful to prevent the merchant class from constraining their ability to intervene in business matters.

The two views can be reconciled once it is recognised that a balance is needed between having a state that is strong enough to enforce property rights but not so strong that it can appropriate all the gains from trade. Indeed, Dincecco (2011) argues convincingly on the basis of Europe's experience between 1650 and 1913 that what was needed for economic development was the establishment of a regime that was both fiscally centralised and politically limited. Fiscal centralisation was needed to ensure that the state had sufficient

capacity to provide public goods such as education and transportation infrastructure, while parliamentary control was necessary to ensure that the public revenues were spent effectively and that the state did not hinder the processes of private wealth creation. North et al. (2009) call such a society an "open access order", as opposed to a "limited access order", where access to rents is restricted to a small elite.

There is empirical evidence to back up the importance of the expansion of both state capacity and parliamentary control in the European Little Divergence. Early modern Britain and Holland dominated Spain and Portugal in terms of both the ability of the state to raise taxes that allowed for an expansion of state capacity and the control exercised by mercantile interests over the state through parliament. Table 6 on the ability of the state to raise fiscal revenue per capita shows a pattern of divergence between northwest Europe and the rest of the continent during the seventeenth and eighteenth centuries, with England and the Dutch Republic forging ahead. Table 7 shows very different patterns of parliamentary activity in the North Sea area and Mediterranean Europe from the twelfth to the eighteenth centuries. The index of parliamentary activity constructed by van Zanden et al. (2012) is based on the calendar years per century in which parliament met. During the first half of the second millennium, Parliamentary activity was higher in Spain and Portugal than in the North Sea area. However, activity then peaked in the fifteenth or sixteenth century in Spain and Portugal before going into decline. In the North Sea area, by contrast, although parliamentary activity was slow to get going, it continued to increase after 1500, reaching very high levels during the seventeenth and eighteenth centuries.

5. Opening up of international communications

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The phrase "opening up of international communications" carries with it overtones of globalisation and the free movement of goods and factors of production. However, Kuznets (1966: 349) noted that this only really applied to the period between the second quarter of the nineteenth century and the outbreak of World War 1 in 1914. After 1914, these trends were interrupted during and between the two world wars, and the return to globalisation after 1950 was at first quite limited. Before the 1830s, the transition to modern economic growth occurred during a mercantilist era, when all countries were pursuing a protectionist doctrine and free trade was not a realistic option (Findlay and O'Rourke, 2007). In the mercantilist era, state power was needed to guarantee the security of merchants, and success in international trade was underpinned by state power. This suggests that it may be better to see the transition to modern economic growth as depending on access to a sufficiently large market, which may be a result of the opening up of international communications, but may also be due to integration within a large domestic market behind protectionist barriers or integration within an empire through mercantilist restrictions.

Figure 3, from O'Rourke and Williamson (1999), shows a substantial narrowing of grain price differences between the United States and Britain between 1870 and1913. This is usually seen as evidence of the growing integration of global markets during the high period of globalisation. However, it is important to also note the key role played by market integration within the United States, with the price differential between Chicago and New York falling more than the differential between New York and London. Furthermore, this ignores the decline of price gaps between Midwestern farm gates and Chicago wholesale markets. Turning form grain markets to manufactures, the United States during the nineteenth century provides the classic example of a large economy industrialising behind a very high

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tariff wall. By 1913, the United States accounted for a lower share of world manufactured exports than the United Kingdom, despite its GDP being more than twice as large.

Another alternative to full globalisation was integration within an empire through restrictions on trade. Britain become the "Workshop of the World" during the Industrial Revolution, gaining access to empire markets through the use of naval power and mercantilist regulations, so that the share of Britain's exports going to "British countries" increased form 16.1 percent in 1700/01 to 55.1 percent by 1772/73 and 74.3 percent by 1797/98 (Deane and Cole, 1967: 87).[1]

6. A growing gap between developed and under-developed nations

Although Kuznets (1966: 359-399) did not provide a quantitative picture of the pre-modern world, it is clear that he subscribed to a view of long run development that was common amongst western economic historians at the time he was writing. In this view, Western Europe and its offshoots in the New World was slowly building up a productivity lead over the rest of the world during the early modern period, before an acceleration of the divergence after the Industrial Revolution (Landes, 1969; North and Thomas, 1973).

This view was challenged during the 1990s by the "California School", including Wong (1997), Frank (1998) and Pomeranz (2000). Pomeranz, who coined the phrase "The Great Divergence", transformed the debate, emphasising the existence of rich and poor regions within both Asia and Europe, and claiming that until 1800, living standards in the richest parts of Europe were no higher than in the richest parts of Asia. Broadberry (2015) draws on recent work in historical national accounting to narrow the difference between the

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[1] British countries are defined here as British islands (Ireland, Isle of Man and the Channel Islands), North America, West Indies and East Indies.

two views, establishing quantitatively the emergence of higher productivity and living standards in North West Europe at the beginning of the eighteenth century. This timing of the Great Divergence is later than the early sixteenth century, the old "Euro-centric" view, but is still significantly earlier than claimed by Pomeranz (2000). Furthermore, it recognises the importance of diversity within both the West and the Rest, with Little Divergences occurring within both Europe and Asia in parallel with the great Divergence between the two continents.

Europe's Little Divergence, with the North Sea area economies of Britain and Holland overtaking the Mediterranean economies of Italy and Spain, has already been discussed. Although separate literatures exist on the decline of China from the Northern Song through the Ming and Qing dynasties, and on the rise of Japan from the Tokugawa to the Meiji periods, it is only recently that they have been combined to demonstrate the existence of an Asian Little Divergence, with Japan overtaking China during the eighteenth century (Broadberry, 2013). Although China was richer than England in 1086, it must be remembered that England was a relatively poor part of Europe in the eleventh century. Comparing China with the richest part of medieval Europe, it seems likely that Italy was already ahead by 1300. However, care needs to be taken here, since a smaller region of China such as the Yangzi Delta may still have been on a par with the most developed parts of Europe in 1500, which would be consistent with the accounts given in the earlier, qualitative literature. This would only require per capita incomes in the Yangzi Delta to have been around 60 per cent higher than in China as a whole, which is broadly consistent with the scale of regional differences within China during the nineteenth century (Li and van Zanden, 2012; Yan, 2011; Rozman, 1973).

However, with the rise of Holland during its Golden Age, there are signs that the Great Divergence was already getting underway during the sixteenth and seventeenth centuries, since by this stage, the difference between the aggregates for China and Holland is too large to be bridged by regional variation. It may be argued that Holland was too small an area to be taken as evidence of a Great Divergence, but by the first half of the eighteenth century the gap between Britain and China was also too large to be bridged by regional variation, and the argument becomes even stronger if the whole of the North Sea area, including the Netherlands and Belgium as well as Britain, is taken into consideration.

It is worth noting that Pomeranz (2011) recently accepted that his earlier claim of China on a par with Europe as late as 1800 was exaggerated, and he now settles for the earlier date of 1700 to 1750, which seems to be broadly consistent with the data in Table 8, combined with a reasonable allowance for regional variation within China and India. Although Japan was by this stage on a dynamic path of rising per capita GDP, in contrast to the declining GDP per capita in China, this was not enough to stop the gap between Europe and Asia from continuing to widen, since Japan was starting from a much lower level than Britain and Holland, and continued to grow more slowly than these countries until after the Meiji Restoration of 1868. However, it must be emphasised that although the gap between Europe and Asia first became quantitatively significant during the first half of the eighteenth century, its origins can still be seen as stretching back to the aftermath of the Black Death in the mid-fourteenth century, after which the North Sea area economies of Britain and Holland began to dampen growth reversals, so that the gain ion per capita incomes ushered in by the demographic crisis were sustained.

IV. THE REVISED CHARACTERISTICS OF MODERN ECONOMIC GROWTH

In this section we provide a summary statement of the revised characteristics of modern economic growth, arrived at inductively from the growing availability of quantitative evidence on the long run growth process over the last millennium and presented in the previous section.

1. Sustained growth of per capita product, with the ending of growth reversals

Kuznets was right to emphasise the growth of per capita product, but we now know that in the early stages of modern economic growth, rates of increase were not particularly high. What really mattered was the dampening and eventual elimination of periods of negative per capita income growth, or growth reversals.

2. Demographic transition

The linking of growth of per capita product with substantial rates of population growth in Kuznets's first condition, although helpful in drawing a distinction between modern economic growth and growth following episodes like the Black Death, neglected some negative consequences of rapid population growth in the modern world. Although population growth did increase with rising living standards during the early stages of modern economic growth in many nations, high growth rates of per capita income came only later as birth rates declined in line with death rates and societies went through a demographic transition. Furthermore, the case of France demonstrates that there is no requirement for an acceleration of population growth during the demographic transition. Similarly, the historical record demonstrates that there is no requirement for high rates of TFP growth during the transition to modern economic growth.

3. Sustained structural transformation from agriculture to services as well as to industry

Too much emphasis has been placed on industrialisation, while services have been relatively neglected. We now know that services were an important part of the non-agricultural

economy earlier than was once thought and that the shift of labour from agriculture into industry and services occurred over a longer period of time than was once believed. The debate over Europe's Little Divergence has brought about a reassessment of the role of Holland as a dynamic service economy rather than a lagging industrial economy, and more work is needed on services in Britain during the Industrial Revolution.

4. Institutional change: fiscal centralisation and parliamentary control

This condition, based on the work of North (1990), replaces the emphasis by Kuznets on changes in the structure of society and its ideology. A new emphasis is placed on striking a balance between the state being both strong enough to raise the revenue needed to provide public goods and subject to sufficient parliamentary oversight to prevent arbitrary interventions in business matters.

5. Market integration

This is more than a rephrasing of Kuznets's condition of the opening up of international communications, which ran into difficulties of generalising across the period of globalisation between the 1820s and 1914 and the period of deglobalisation between 1914 and 1950. What mattered was access to a sufficiently large market to allow the efficient utilisation of modern technology. This could be achieved through globalisation, but also through integration of a large national market behind protectionist barriers (as in the United States during the nineteenth century) or integration of an empire through mercantilist restrictions (such as the British Empire during the mercantilist era before the 1830s).

6. Great Divergence

The phrasing of Pomeranz (2000) is applied here to Kuznets's condition on the emergence of a growing gap between developed and under-developed nations. This also means accepting his emphasis on regional variation within both Europe and Asia, with Little Divergences on

both continents. The gap between the two continents, even accounting for regional variation, emerged in the first half of the eighteenth century, although its origins can still be traced back to the dampening of growth reversals in northwest Europe from the late medieval period.

V. CONCLUSIONS

When Simon Kuznets first formulated his famous six characteristics of modern economic growth, there was very limited quantitative information available on the performance of economies during the early stages of the modern era, and nothing on the pre-modern period. This paper draws on the recent work by quantitative economic historians on long run economic growth to reassess the characteristics of modern economic growth. Although this can be seen largely as an inductive exercise, it is certainly not what Koopmans (1947) criticised as "measurement without theory", since many of the data have been collected as a result of theoretical advances, including unified growth theory and new institutional economics. The approach taken here builds on the belief that new empirical findings from economic history can strengthen arguments beyond a reliance on introspection and the deductive approach.

The most important changes from the six original characteristics of Kuznets concern the incorporation of new work in the following areas: First, the transition to modern economic growth was at first slower than Kuznets believed, and was the result not so much of an increase in growth rates during booms, as of a dampening of growth reversals. This remains a problem for under-developed countries today. Second, whilst recognising that economic growth accompanied by declining population growth should not be seen as modern economic growth, it is important to recognise that by the twentieth century, rapid population growth was becoming associated with poverty These first two characteristics are concerned

with aggregate growth, while the third and fourth characteristics are concerned with structural transformation.

Third, an important aspect of the structural transformation noted by Kuznets in the transition to modern economic growth is the growing importance of services, as well as industry. Existing accounts focus too heavily on industrialisation, neglecting the role of services, and also placing too much emphasis on the rapidity of structural change, rather than its drawn out nature. Fourth, institutional change is required, particularly in the role of the state, which involves a balance between being strong enough to raise sufficient taxes to provide public goods, without being so strong as to undermine incentives for investment and innovation through arbitrary actions.

The final two characteristics are concerned with the international spread of modern economic growth. Fifth, modern economic growth required access to a sufficiently large market to allow the efficient utilisation of modern technology. This could be achieved through full globalisation, but also through the integration of a large national market behind protective barriers or the integration of an empire within a mercantilist system. Sixth, despite the high degree of heterogeneity within both Europe and Asia, the Great Divergence of productivity and living standards between the two continents became quantitatively significant during the first half of the eighteenth century, and its origins can be traced back to the dampening of growth reversals in the North Sea area from the late medieval period.

TABLE 1: GDP per capita levels in Europe (1990 international dollars)

|	England/ GB	Holland/ NL	Italy	Spain
1086	754			
1270	759			957
1300	755		1,482	957
1348	777	876	1,376	1,030
1400	1,090	1,245	1,601	885
1450	1,055	1,432	1,668	889
1500	1,114	1,483	1,403	889
1570	1,143	1,783	1,337	990
1600	1,123	2,372	1,244	944
1650	1,100	2,171	1,271	820
1700	<u>1,630</u>	2,403	1,350	880
	1,563			
1750	1,710	2,440	1,403	910
1800	2,080	<u>2,617</u>	1,244	962
		1,752		
1820	2,133	1,953	1,376	1,087
1850	2,997	2,397	1,350	1,144

Sources and notes: England/Great Britain: Broadberry et al. (2015a); Broadberry and van Leeuwen (2011); Holland/Netherlands: van Zanden and van Leuwen (2012); Italy: Malanima (2011); Spain: Álvarez-Nogal and Prados de la Escosura (2013). Figures are for 10-year averages starting in the stated year (i.e. 1270-79, 1300-09,…) apart from 1348, which refers to the pre-Black Death years 1339-48.

FIGURE 1: Real GDP per capita in the North Sea area and Mediterranean Europe, 1270-1870, (1990 international dollars, log scale)
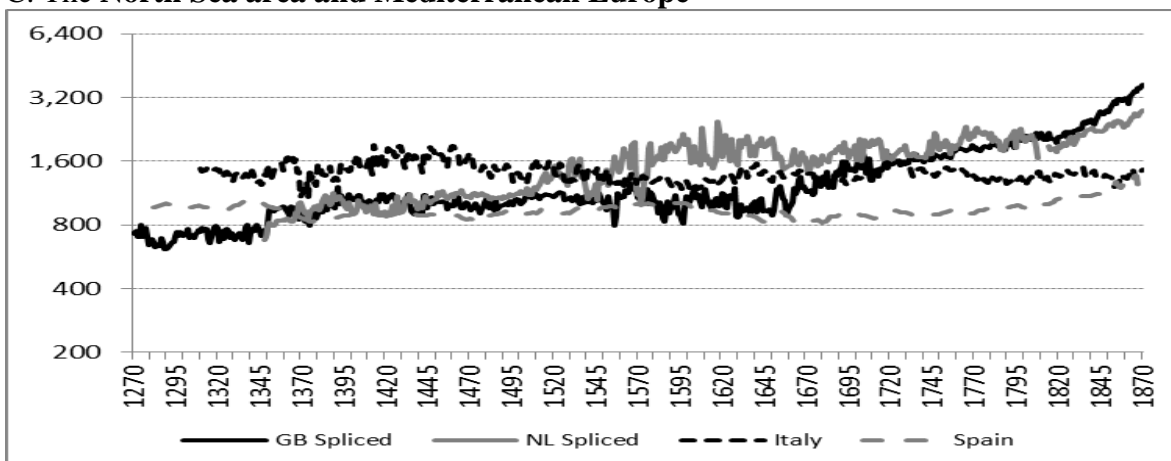
A. Italy and Spain
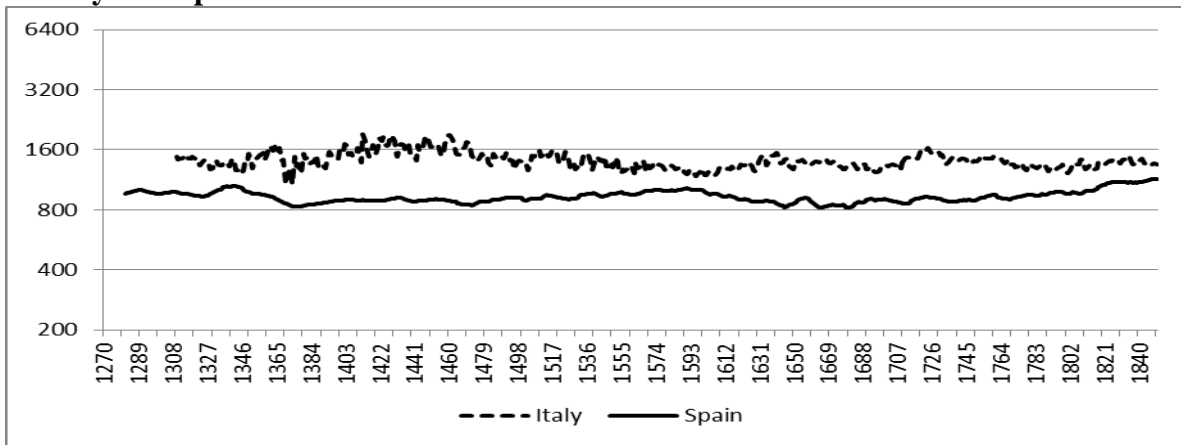
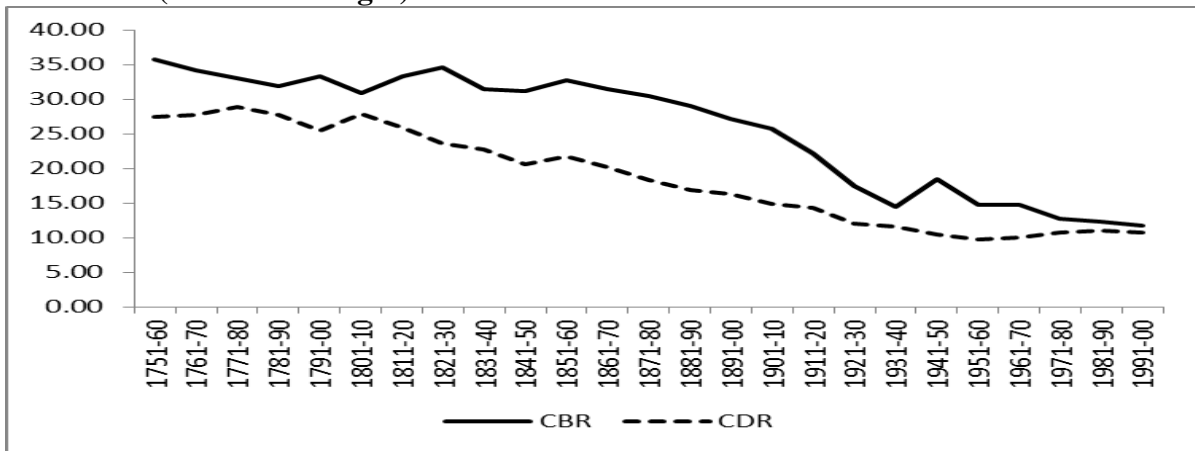**B. Britain and Holland**
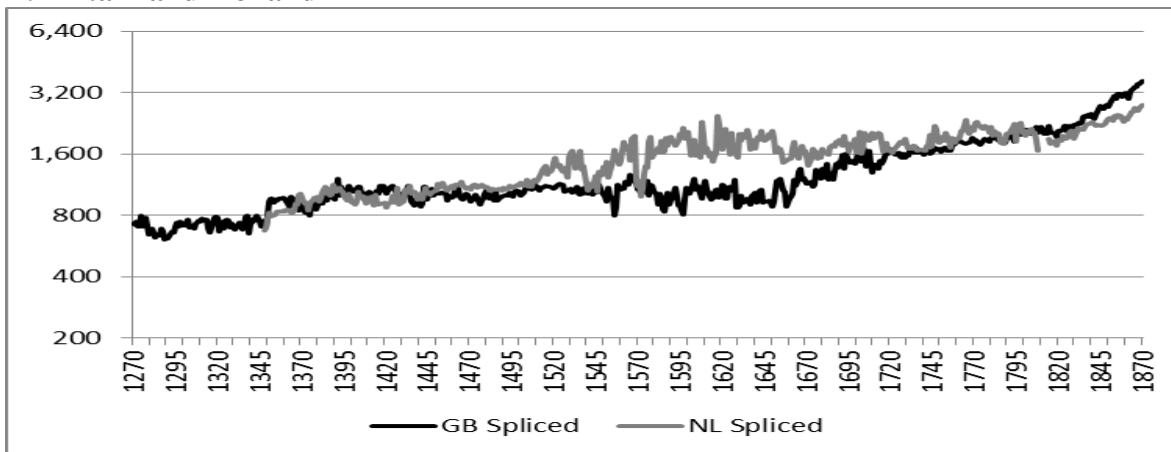
C. The North Sea area and Mediterranean Europe

Sources: Malanima (2011); Álvarez-Nogal and Prados de la Escosura (2012); Broadberry et al. (2015a); van Zanden and van Leeuwen (2012).

FIGURE 2: Vital rates in Sweden, England and France, 1681-2000 (crude birth rate and crude death rate per 1,000 population)

A. Sweden (decadal averages)

B. England (annual data)
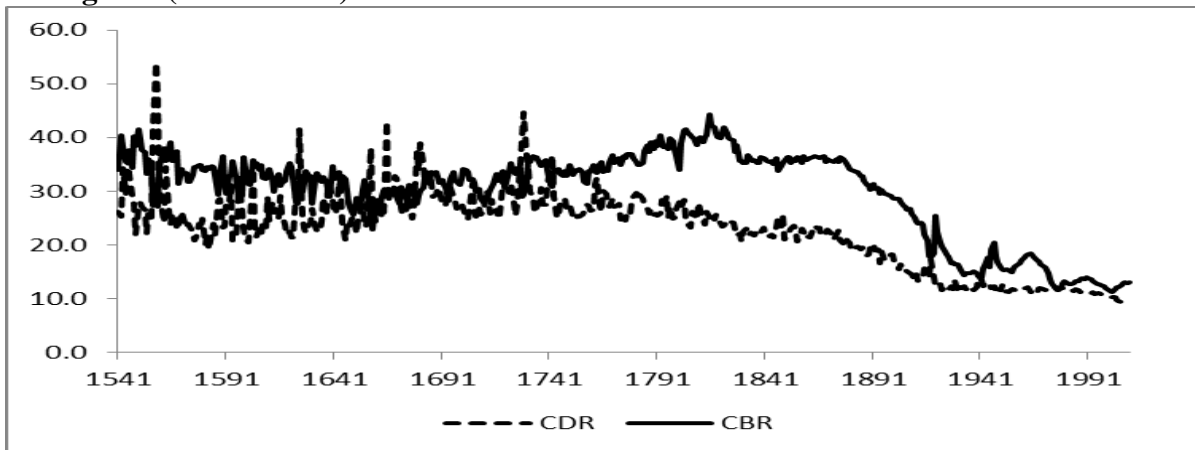
C. France (annual data)

Sources: Swedish Central Bureau of Statistics (1969), *Historical Statistics of Sweden, Part 1. Population*, (second edition, 1720-1967), Stockholm; World Bank (2015); Wrigley and Schofield (1981); Mitchell (1988); UK Office for National Statistics, http://www.ons.gov.uk/ons/index.html; Henry and Blayo (1975); Dyson and Murphy (1985).

TABLE 2: Accounting for British GDP growth, 1700-1860 (% per annum)

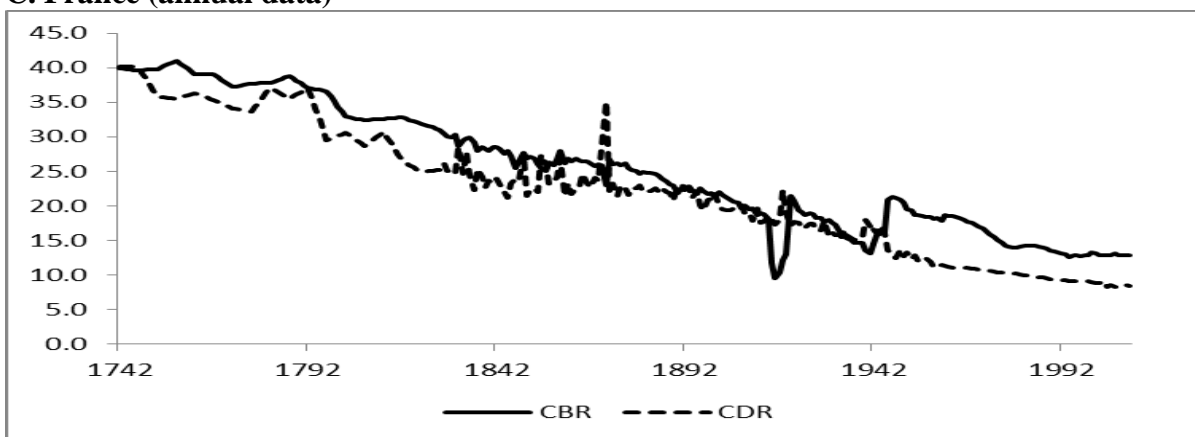|	Output growth	Due to capital	Due to labour	TFP growth
1700-1760	0.70	0.35	0.15	0.20
1760-1801	1.00	0.50	0.40	0.10
1801-1831	1.90	0.85	0.70	0.35
1831-1860	2.50	1.00	0.70	0.80

Sources and notes: derived from Crafts (1985: 81); Crafts and Harley (1992: 718); Harley (1993: 198). All calculations are on a 2-factor basis, with capital and labour weighted equally.

TABLE 3: Accounting for British GDP growth, 1760-1913 (% per annum)

A. Traditional growth accounting

	Output growth	Due to capital	Due to labour	Due to human capital	TFP growth
1760-1780	0.60	0.25	0.35		0.00
1780-1831	1.70	0.60	0.80		0.30
1831-1873	2.40	0.90	0.75		0.75
1873-1899	2.10	0.80	0.55		0.75
1899-1913	1.40	0.80	0.55		0.05

B. Augmented-Solow growth accounting

	Output growth	Due to capital	Due to labour	Due to human capital	TFP growth
1760-1780	0.60	0.25	0.20	0.10	0.05
1780-1831	1.70	0.60	0.45	0.45	0.20
1831-1873	2.40	0.90	0.45	0.70	0.35
1873-1899	2.10	0.80	0.30	0.50	0.50
1899-1913	1.40	0.80	0.30	0.50	-0.20

Sources and notes: Crafts (1995: 752). Weights are 0.4 for capital, 0.35 for labour and 0.25 for human capital.

TABLE 4: Accounting for Dutch GDP growth, 1540-1800 (% per annum)

	Output growth	Due to capital	Due to labour	Due to human capital	TFP growth
1540-1620	1.92	0.62	0.37	0.29	0.64
1620-1665	-0.18	0.30	0.24	0.32	-1.04
1665-1720	0.08	-0.10	-0.01	0.14	0.05
1720-1800	0.04	0.09	-0.11	-0.03	0.09

Sources and notes: Derived from van Zanden and van Leeuwen (2012: 126). Weights are 0.4 for capital, 0.35 for labour and 0.25 for human capital.

TABLE 5: Occupational shares in Britain, 1381-1851

	1381	1522	1700	1759	1801	1851
Agriculture	57.2	58.1	38.9	36.8	31.7	23.5
Industry	19.2	22.7	34.0	33.9	36.4	45.6
Services	23.6	19.2	27.2	29.3	31.9	30.9
Total economy	100.0	100.0	100.0	100.0	100.0	100.0

Source: Broadberry et al. (2015a: 344).

TABLE 6: Per capita fiscal revenues, 1500/09 to 1780/89 (grams of silver)

|	1500/09	1550/59	1600/09	1650/59	1700/09	1750/59	1780/89
Dutch Republic			76.2	114.0	210.6	189.4	228.2
England	5.5	8.9	15.2	38.7	91.9	109.1	172.3
France	7.2	10.9	18.1	56.5	43.5	48.7	77.6
Spain	12.9	19.1	62.6	57.3	28.6	46.2	59.0
Venice	27.5	29.6	37.5	42.5	46.3	36.2	42.3
Austria				10.6	15.6	23.0	43.0
Russia					6.3	14.9	26.7
Prussia			2.4	9.0	24.6	53.2	35.0
Ottoman Empire		5.6	5.8	7.4	8.0	9.1	7.1
Poland	1.5	0.9	1.6	5.0	1.2	0.8	11.2
China				7.0	7.2	4.2	3.4
India			11.1	17.4	21.9	17.6	5.5

Source: Europe: Karaman and Pamuk (2010: 611); China: Brandt et al. (2014: 69); India: derived from Broadberry et al. (2015b).

TABLE 7: Activity index of European parliaments, 12th to 18th centuries (calendar years per century in which parliament met)

	12th	*13th*	*14th*	*15th*	*16th*	*17th*	*18th*
North Sea area							
England	0	6	78	67	59	73	100
Scotland	0	0	10	61	96	59	93
Netherlands	0	0	0	20	80	100	100
Mediterranean							
Castile and Leon	2	30	59	52	66	48	7
Catalonia	3	29	41	61	16	14	4
Aragon	2	25	38	41	19	11	1
Valencia	0	7	28	29	12	4	0
Navarre	2	7	17	33	62	30	20
Portugal	0	9	27	47	12	14	0

Source: van Zanden et al. (2012: online appendix S1).

FIGURE 3: Trans-Atlantic wheat price differentials, 1870-1913 (British price – US price as % of US price)
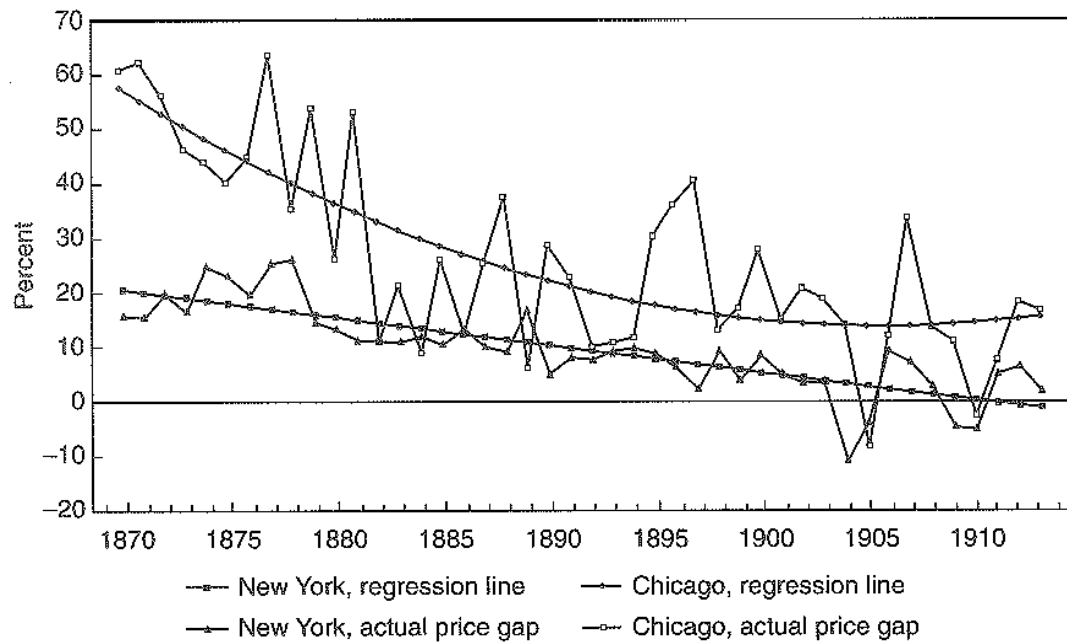
Source: O'Rourke and Williamson (1999: 46).

TABLE 8: GDP per capita levels in Europe and Asia (1990 international dollars)

	England/ GB	Holland/ NL	Italy	Spain	Japan	China	India
725					551		
900					476		
980						861	
1020						1,014	
1060						990	
1086	754					886	
1120						871	
1150					508		
1280	679			957	552		
1300	755		1,482	957			
1348	777	876	1,376	1,030			
1400	1,090	1,245	1,601	885		1,025	
1450	1,055	1,432	1,668	889	552	982	
1500	1,114	1,483	1,403	889		851	
1570	1,143	1,783	1,337	990		878	
1600	1,123	2,372	1,244	944	605	857	682
1650	1,110	2,171	1,271	820	619		638
1700	1,563	2,403	1,350	880	597	1,096	622
1750	1,710	2,440	1,403	910	622	723	573
1800	2,080	1,752	1,244	962	703	613	569
1850	2,997	2,397	1,350	1,144	777	600	556

Sources: European countries from Table 1; Japan: Bassino et al. (2015); China: Broadberry et al. (2015c); India: Broadberry et al. (2015b).

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