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Industrial Revolution did not boost economic growth and the growth of population even in the United Kingdom

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Abstract. Data describing economic growth and the growth of human population in the United Kingdom are analysed. Contrary to the widely accepted interpretations, Industrial Revolution had no impact on shaping trajectories of economic growth and of the growth of population. Within the range of analysable data, there was also no Malthusian stagnation. Consequently, there was no escape from Malthusian trap because there was no trap in the economic growth and in the growth of human population. The United Kingdom was the centre of the Industrial Revolution and yet its data are in the direct contradiction of the currently accepted interpretations. It is fortunate that natural processes did not comply with our fanciful and wished-for explanations of the mechanism of growth. If they did, if the generally claimed takeoffs did occur, it would have been a disaster because economic growth and the growth of population would have been already unmanageable everywhere.
Keywords. United Kingdom, Economic growth, Population growth, Income per capita, Malthusian stagnation, Industrial Revolution.
JEL. A10**,** A12, C12, Y80.

1. Introduction

It is generally believed that at a certain stage of human history, economic growth and the growth of population experienced a dramatic transition from the endless stagnation to a sustained growth (see for instance, Artzrouni & Komlos, 1985; Clark, 2003; Galor, 2005a, 2007; Galor & Weil, 2000; Hansen & Prescott, 2002; Klasen & Nestmann, 2006; Kögel & Prskawetz, 2001; Komlos, 2003; Manfredi & Fanti, 2003; Weiss, 2007). This dramatic event is described as the great escape from the Malthusian trap, as a take-off from stagnation to growth (Galor, 2005a, 2011) or as a transition to a "new stage" of "self-sustained growth" (Kögel & Prskawetz, 2001, p. 338). It was supposed to have been "a break from Malthusian equilibrium" (Clark, 2005, p. 1314), the escape characterised by "the unprecedented increase in population growth" (Galor, 2005b, p. 494), "the population sprint" (Thomlinson, 1965, p. 312) and the time when the "population growth accelerated" (Kögel & Prskawetz, 2001, p. 338). It was allegedly a massive "simultaneous take-off in economic growth and population growth" (Kögel & Prskawetz, 2001, p. 338).

This alleged dramatic escape from the imagined Malthusian trap is claimed to have been strongly prompted and assisted by the Industrial Revolution. The rapid and far-reaching technological and sociological changes associated with this event

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are claimed to have been the driving force of the economic and demographic transition (Bar & Leukhina, 2005; Clark, 2005; Galor, 2005a; Galor & Mountford, 2006; Goodfriend & McDermott, 1995; Khan, 2008; Komlos, 1989, 2003; Lucas, 2002; Manfredi & Fanti 2003; Mataré, 2009; Šimurina & Tica, 2006; Tamura, 2002; Weiss, 2007). Clark claims that the Industrial Revolution "represented a break from the Malthusian equilibrium" (Clark, 2005, p. 1314). According to Weiss, Industrial Revolution "facilitated an endogenous take-off from the Malthusian trap" (Weiss, 2007, p. 327). Likewise, Komlos claimed that "The industrial revolution can therefore be conceptualized as a break out of the Malthusian demographic regime. It was a period of both economic and demographic expansion" (Komlos, 1989, p. 203). He wrote that "Industrial Revolution was also accompanied by an acceleration in population growth" (Komlos, 2003, p. 18). "The Industrial Revolution drove the demographic transition" (Khan, 2008, p. 9). It "brought in its wake an accelerated growth in the size of human populations" (Mataré, 2009, p. 381). According to Galor, "In the first phase of the Industrial Revolution, prior to the implementation of significant education reforms, physical capital accumulation was the prime engine of economic growth" (Galor, 2005a, p. 212).

All such claims, descriptions and explanations of the past growth are not based on a scientific analysis of relevant data but on a good dose of fantasy. They may sound plausible but they have to be accepted by faith. Science has no room for such dubious speculations. Inevitably, when faith is defended, contradicting data are either ignored or suitably manipulated to support the preconceived ideas (Ashraf, 2009; Galor, 2005a, 2005c, 2007, 2008a, 2008b, 2008c, 2010, 2011, 2012a, 2012b, 2012c; Galor & Moav, 2002; Snowdon & Galor, 2008).

Remarkably, however, precisely the same data, when closely analysed, demonstrate that the preconceived ideas are incorrect (Nielsen, 2014, 2015a, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g). The established knowledge in demography and economic research, the knowledge revolving around the concept of Malthusian stagnation and around the concept of the escape from the alleged Malthusian trap is not based on the scientific process of investigation (Nielsen, 2016h).

In science, even one contradicting evidence in data is sufficient to question contradicted interpretations and then to try to revise them or even reject them, but in the case of the historical economic growth and of the growth of population we now have more than one contradicting evidence (e.g. Biraben, 1980; Clark, 1968; Cook, 1960; Durand, 1967, 1974, 1977; Gallant, 1990; Haub, 1995; Kapitza, 2006; Kremer, 1993; Livi-Bacci, 2007; Maddison, 2001, 2010; McEvedy & Jones, 1978; Nielsen, 2014, 2015a, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g, 2016i, 2016j; Podlazov, 2002; Shklovskii, 1962, 2002; Taeuber & Taeuber, 1949; Thomlinson, 1975; Trager, 1994; von Foerster, Mora & Amiot, 1960; von Hoerner, 1975).

We have carried out extensive investigation of the leading postulates used to explain the historical growth of human population and the historical economic growth (Nielsen, 2014, 2015a, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g, 2016i, 2016j). In particular, we have demonstrated that within the range of analysable data, economic growth and the growth of population were hyperbolic. There was no Malthusian stagnation and there was never a takeoff from stagnation to growth, which could be described as the escape from the Malthusian trap because there was no trap in the economic growth and in the growth of population.

The range of analysable data describing economic growth, global, regional and national, extends down to AD 1 (Maddison, 2001, 2010) but for the world economic growth it was extended down to 1,000,000 BC (De Long, 1998).

Maddison's data and the extended estimates show clearly that there was never stagnation in the economic growth.

For the growth of human population, regional and national estimates also extend only down to AD 1 (Maddison, 2001, 2010) but for the global growth, many estimates are available extending down to 10,000 BC (Biraben, 1980; Clark, 1968; Cook, 1960; Durand, 1974; Gallant, 1990; Haub, 1995; Livi-Bacci, 2007; McEvedy & Jones, 1978; Taeuber & Taeuber, 1949; Thomlinson, 1975; Trager, 1994, United Nations, 1973, 1999, 2013). They were also extended down to 1,000,000 million years ago (Deevey, 1960; cited by Kapitza, 2006, Kremer, 1993 and Livi-Bacci, 2007). From the distance of one million years it does not really matter whether it is a million years ago or million years BC. The evidence again is clear and consistent: there was no Malthusian stagnation but a steadily-increasing growth, interrupted only twice in the past million years, or maybe three times if we count the minor disturbance between AD 1200 and 1400 (Nielsen, 2016j). Each time, population growth was diverted from one hyperbolic growth to another. Our analysis, which is in harmony with earlier research (Kapitza, 2006; Kremer, 1993; Podlazov, 2002; Shklovskii, 1962, 2002; von Foerster, Mora & Amiot, 1960; von Hoerner, 1975), shows that fundamental postulates accepted by the established knowledge in demography and in economic research are repeatedly and clearly contradicted by data.

We have also demonstrated that the Industrial Revolution, 1760-1840 (Floud & McCloskey, 1994) had no impact on shaping the trajectories of economic growth and of the growth of population. Now we are going to demonstrate that Industrial Revolution had absolutely no impact on shaping the growth of population and the economic growth in the United Kingdom, the very centre of this revolution where its effects should be most convincingly demonstrated.

In our diagrams, population data will be expressed in billions while the data for the Gross Domestic Product (GDP) in billions of 1990 International Geary-Khamis dollars. The GDP per capita (GDP/cap) values will be expressed in 1990 International Geary-Khamis dollars.

2. Analysis of the growth of population in the UK

Hyperbolic growth can be uniquely identified by studying the reciprocal values of data (Nielsen, 2014) because hyperbolic growth is then represented by a decreasing straight line. For a sufficiently large range of data, if they follow a decreasing straight line, the growth is hyperbolic. In such displays, it is also easy to identify even small deviations from hyperbolic distributions because deviations from a straight line are easy to notice. In particular, any boosting in the economic growth or in the growth of population, such as the expected boosting caused by the Industrial Revolution should be readily identified.

For the reciprocal values, effects are reversed. A boosting of growth is indicted by a clear change of the trend in the *downward* direction while a diversion to a slower trajectory is indicated by an *upward* bending in the growth trajectory. Results of our analysis of population data (Maddison, 2010) in the United Kingdom are presented in Figures 1-3.

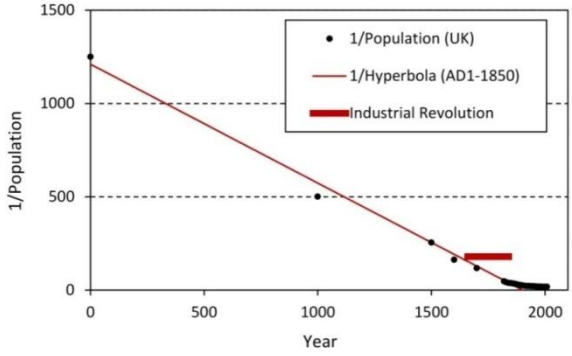

Figure 1. *Hyperbolic growth of population in the UK between AD 1 and 1850 as demonstrated by the decreasing straight line fitting the reciprocal values of the population data. Industrial Revolution did not boost the growth of the population in the UK. On the contrary, it coincided with the commencement of the gradually slowing down growth.*

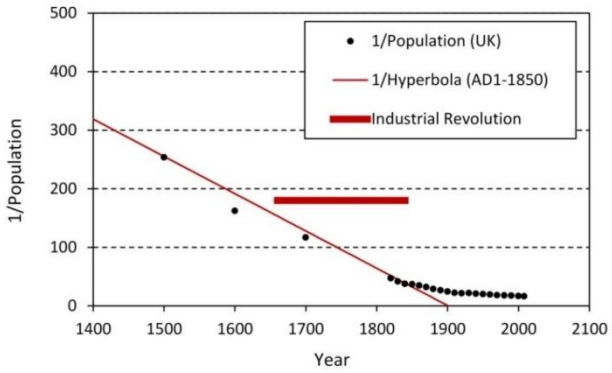

Figure 2. *The end part of the plot presented in Figure 1 showing that from around 1850, just at the end of the Industrial Revolution, the growth of the population in the UK started to be diverted to a slower trajectory. Industrial Revolution did not boost the growth of population in the UK.*

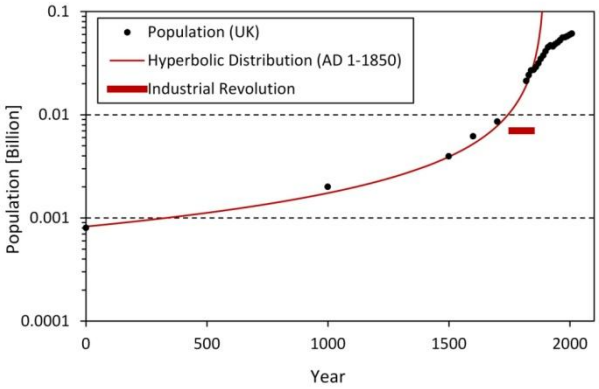

Figure 3. *Growth of population in the UK between AD 1 and 2008. Growth was hyperbolic between AD 1 and 1850. From around 1850, towards the end of the Industrial Revolution, the growth of population started to be diverted to a slower trajectory. Industrial Revolution had no impact on shaping the growth trajectory.*

In Figure 1 we show the reciprocal values of population data. Between AD 1 and 1850 they follow closely a decreasing straight line, showing that the growth of population was hyperbolic. Within the range of analysable data, which extends down to AD 1, the mythical epoch of Malthusian stagnation did not exist in the

UK. The proof of the existence of Malthusian stagnation would have to be based on the demonstration of the existence of Malthusian oscillations. The data displayed in Figure 1 follow closely an undisturbed linear distribution representing an undisturbed and stable hyperbolic trajectory, indicating that even if random Malthusian forces were present they had no effect on changing the growth trajectory. Any assumption of the presence of such forces is irrelevant.

It is also clear that the Industrial Revolution, 1760-1840 (Floud & McCloskey, 1994) had absolutely no impact on changing the growth trajectory. Data displayed in Figures 1-3 show clearly that there was no often-claimed boosting in the growth of population, no sprinting, explosion or any form of strong acceleration. On the contrary, from around 1850, shortly after the Industrial Revolution, the growth of population started to be diverted to a slower trajectory as indicated by the upper bending of the trajectory of reciprocal values shown clearly in Figure 2 and by a clear deviation from the hyperbolic trajectory shown in Figure 3.

These are remarkable results because the UK was in the centre of the Industrial Revolution. It is here that the effects of this revolution should be most strongly and most convincingly demonstrated but the data are in the direct contradiction of such expectations. It seems obvious that Industrial Revolution brought about many changes in the style of living and in social interactions, beneficial or detrimental, but all these changes had no effect on the growth of human population. It is as if this monumental event never happened.

Hyperbolic growth is described by a simple formula:

$$S(t) = \frac{1}{a - kt} \tag{1}$$

where $S(t)$ is the size of the growing entity (in our case either population or the GDP), while a and k are positive constants.

The increasing hyperbolic distribution, which could be also called the first-order hyperbolic distributions, is just the reciprocal of a decreasing straight line. That is why, a decreasing straight line of the reciprocal values identifies uniquely the first-order hyperbolic distribution.

Parameters of the hyperbolic distribution shown in Figure 3 are: $a = 1.210 \times 10^3$ and $k = 6.366 \times 10^{-1}$. Its singularity is at $t = 1901$. If continued along its historical trajectory, the growth of the population in the UK would have escaped to infinity in 1901. Fortunately, from around 1850 is started to be diverted to a slower trajectory bypassing the singularity by a safe margin of 51 years.

3. Analysis of the economic growth in the UK

Results of mathematical analysis of the historical GDP data for the UK are presented in Figures 4-6, while for the historical income per capita (GDP/cap) they are shown in Figure 7.

Reciprocal values displayed in Figure 4 show that the growth of the GDP was at first increasing along a fast, hyperbolic trajectory, as shown by a steep straight line fitting the reciprocal values of data. However, from around AD 1600, i.e. about 160 years *before* the commencement of the Industrial Revolution, the growth of the GDP was diverted to a *slower* hyperbolic trajectory as indicated by a less-steep straight line. This slower trajectory remained totally unaffected by the Industrial Revolution. This event did not even manage to revert the economic growth to the state experienced before AD 1600, when the hyperbolic trajectory was significantly faster. This slower hyperbolic growth continued until around AD 1850 when it

started to be diverted to even slower trajectory indicated by an upward bending shown in Figure 5.

There was definitely no boosting in the economic growth caused by or associated with the Industrial Revolution. There was even no visible delay in the diversion to a slower trajectory. Industrial Revolution had no effect on the economic growth trajectory.

Again, these results are remarkable because the UK was right at the centre of the Industrial Revolution and it should have experienced its strong effect on the economic growth and on the growth of population. Technological and sociological changes brought about by the Industrial Revolution were present but, surprisingly perhaps, they did not accelerate the economic growth. It was as if economic growth were prompted by some other, much stronger force, which overruled any possible impacts of the Industrial Revolution. It would be interesting to identify this force but it is clear that the usual explanations based on the hypothetical forces of Malthusian stagnation and on the equally hypothetical forces of the Industrial Revolution, including the forces of technological development, are irrelevant for explaining the mechanism of the historical economic growth.

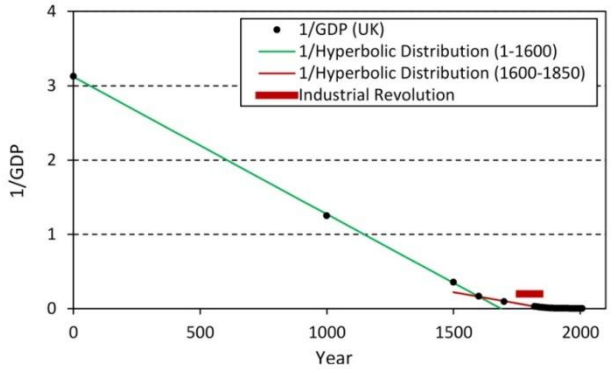

Figure 4. *Reciprocal values of the GDP data for the UK (Maddison, 2010) are compared with the decreasing linear distributions representing hyperbolic growth. The growth of the GDP was following a fast-increasing hyperbolic distribution (represented by a fast decreasing straight line) until AD 1600. From around that year and until around AD 1850, the economic growth was following a slower hyperbolic trajectory. Within the range of analysable data, i.e. from AD 1, the mythical epoch of Malthusian stagnation did not exist.*

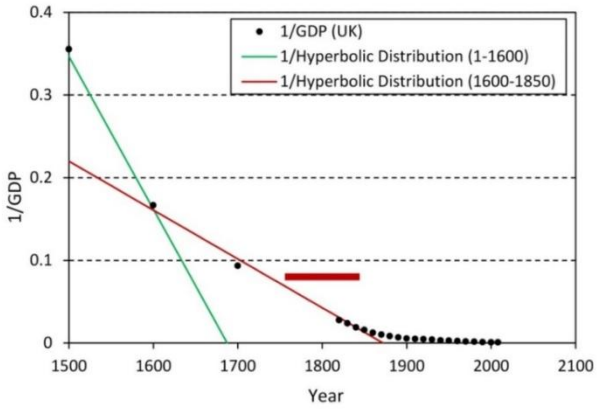

Figure 5. *The end part of the display shown in Figure 4. The slower hyperbolic growth, which commenced around AD 1600 (as indicated by the gently-decreasing straight line), continued undisturbed until AD 1850, i.e. throughout the entire time of the Industrial Revolution, which had absolutely no impact on the economic growth trajectory. There was no escape from the Malthusian trap because there was no trap. From around AD 1850, the growth of the GDP started to be diverted to a slower trajectory, as indicated by the upward bending of the reciprocal values trajectory.*

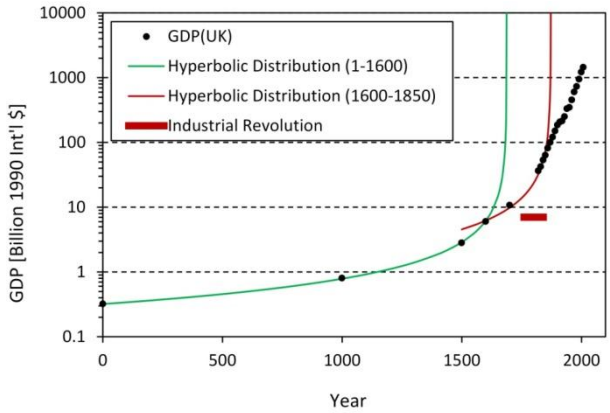

Figure 6. *Economic growth (as described by the GDP) in the UK. The growth was hyperbolic between AD 1 and 1600 and again (but a little slower) between AD 1600 and 1850. From around 1850, the growth started to be diverted to a slower but non-hyperbolic trajectory. Within the range of analysable data, i.e. from AD 1, the mythical epoch of stagnation did not exist. Economic growth was steadily increasing. Industrial Revolution did not boost the economic growth. There was no escape from the Malthusian trap because there was no trap.*

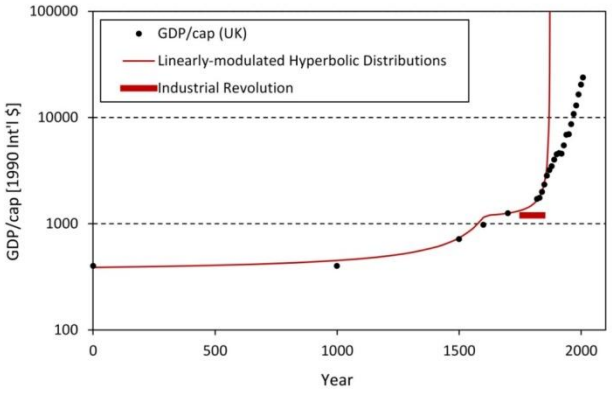

Figure 7. *Growth of income per capita (GDP/cap) in the UK between AD 1 and 2008. The GDP data follow closely the empirically-determined linearly-modulated hyperbolic distributions (defined in Nielsen, 2015a). Industrial Revolution did not change the growth trajectory. From around 1850, the growth of the GDP/cap started to be diverted to a slower trajectory.*

Hyperbolic fits to the GDP data are shown in Figure 6. The fast hyperbolic growth between AD 1 and 1600 is described by $a = 3.120 \times 10^{0}$ and $k = 1.849 \times 10^{-3}$ Its singularity is at $t = 1687$. Contrary to the doctrine of Malthusian stagnation, economic growth was remarkably fast. If continued, it would escape to infinity about 73 years *before* the commencement of the Industrial Revolution. The slower hyperbolic growth of the GDP, which commenced in around AD 1600 is described by $a = 1.106 \times 10^{0}$ and $k = 5.909 \times 10^{-4}$. Its singularity is at $t = 1872$. This was also a steadily-increasing economic growth at the time when it was supposed to have been stagnant.

Population and economic growth data for the UK, and in particular the relatively fast economic growth before AD 1600, show how absurd is the concept of Malthusian stagnation. This concept is consistently contradicted by the analysis of other data describing economic growth and the growth of population (Kapitza, 2006; Kremer, 1993; Nielsen, 2014, 2015a, 2016a, 2016b, 2016c, 2016d, 2016e,

2016f, 2016g, 2016i, 2016j; Podlazov, 2002; Shklovskii, 1962, 2002; von Foerster, Mora & Amiot, 1960; von Hoerner, 1975).

The data for the UK show also how absurd is the doctrine of the boosting effects of the Industrial Revolution. The GDP and GDP/cap were already following fast-increasing trajectories *before* the Industrial Revolution. If continued, economic growth would escape to infinity in AD 1872. Any boosting by the Industrial Revolution would have been disastrous. Fortunately, natural processes did not comply with this ludicrous concept. Economic growth in the UK was not boosted by the Industrial Revolution but it was soon diverted into a slower pathway.

The same argument applies to the global and regional economic growth and to the global and regional growth of population. Propelled by the historical hyperbolic growth, they are now increasing too fast. Any boosting by the Industrial Revolution, any differential timing of the alleged takeoffs claimed by Galor (2005a, 2011), would be disastrous because it would propel economic growth and the growth of population along even faster trajectories and would render them unmanageable. Even now, we are approaching a serious global crisis but with the mechanism of growth approved by the established knowledge, this crisis would have occurred much earlier.

Nature or naturally occurring process take no notice of what we think is logical. Imagination is important in science but imagination has to be checked by meticulous analysis of data. We can propose convincing explanations but what we think as convincing is not necessarily what is reflected in the real world. Scientific research has to be conducted scientifically; otherwise it is not scientific.

We can write as many fiction stories as we can possibly imagine them. They can be interesting and attractive but they have no place in science. Any theory that cannot be checked by data is regarded as unscientific and any theory that is contradicted by data has to be modified or even rejected and replaced by a new theory. Deliberately distorting the presentation of data (Ashraf, 2009; Galor, 2005a, 2005c, 2007, 2008a, 2008b, 2008c, 2010, 2011, 2012a, 2012b, 2012c; Galor & Moav, 2002; Snowdon & Galor, 2008) to make them comply with preconceived ideas is not only unscientific but also self-defeating – we learn nothing from such mutilations of scientific evidence.

Doctrines of Malthusian stagnation and of the dramatic impacts of the Industrial Revolution on the growth of population and on the economic growth are repeatedly and consistently contradicted. These two doctrines and all the associated explanations and elaborate descriptions have no place in the economic and demographic research and the sooner they are abandoned the better. The continuing use of these doctrines to explain the historical economic growth and the historical growth of population is scientifically unjustified.

Defined by the parameter *k*, hyperbolic growth between AD 1 and 1600 was about three times faster than the hyperbolic growth between AD 1600 and 1850. The mythical epoch of stagnation did not exist. The transition around AD 1600 was not the usually-imagined transition from stagnation to growth but from growth to growth. It was not boosting but a transition from a fast to a slower hyperbolic growth. There is absolutely no expected correlation between the economic growth in the UK and the Industrial Revolution. No expected boosting and no transition from stagnation to growth because there was no stagnation. The wished-for takeoff is replaced by a transition to a *slower* trajectory. The established knowledge in the economic research is spectacularly contradicted by data, which were expected to give the most convincing support for the generally accepted doctrines.

The data refuse to comply with the desired and wished-for interpretations of the mechanism of economic growth. There was no wished-for escape from the Malthusian trap because there was no trap in the economic growth. There was also

no trap in the growth of population in the UK. The only way to defend the established knowledge is to reject the data for the UK but then we would have to reject also other data and their analysed (Biraben, 1980; Clark, 1968; Cook, 1960; Durand, 1967, 1974, 1977; Gallant, 1990; Haub, 1995; Kapitza, 2006; Kremer, 1993; Livi-Bacci, 2007; Maddison, 2001, 2010; McEvedy & Jones, 1978; Nielsen, 2014, 2015a, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g, 2016i, 2016j; Podlazov, 2002; Shklovskii, 1962, 2002; Taeuber & Taeuber, 1949; Thomlinson, 1975; Trager, 1994; von Foerster, Mora & Amiot, 1960; von Hoerner, 1975).

Results of mathematical analysis presented Figure 7 show that the growth of income per capita in the UK can be described by two linearly-modulated hyperbolic distributions. The trajectory was calculated by dividing two hyperbolic distributions fitting the GDP data between AD 1 and 1850 (see Figures 4-6) by the hyperbolic distribution fitting the population data between AD 1 and 1850 (see Figures 1-3). For the discussion of the linearly-modulated hyperbolic distributions see Nielsen (2015a).

The growth of income per capita follows closely the empirically-determined growth trajectory. Industrial Revolution had no impact on changing the linearly-modulated hyperbolic growth. From around 1850, shortly after this industrial event, the growth of income per capita started to be diverted to a slower trajectory.

4. Summary and conclusions

The United Kingdom was in the centre of the Industrial Revolution. It is, therefore, the perfect place to test the currently accepted concept that the Industrial Revolution boosted economic growth and the growth of population. This concept is closely linked with the concept of Malthusian stagnation and the concept of the escape from the Malthusian trap. All these props are used to explain the mechanism of the economic growth and of the growth of human population. We have already demonstrated that all these accepted interpretations are contradicted by data (Nielsen, 2014, 2015a, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g, 2016i, 2016j). Now, we have focused our attention of the centre of the Industrial Revolution.

We have analysed the data (Maddison, 2010) describing the growth of population, the growth of the GDP and the growth of the GDP/cap in the UK. We have demonstrated that the historical growth of population and of the GDP were hyperbolic. Consequently, the historical growth of income per capita (GDP/cap) was linearly-modulated hyperbolic (Nielsen, 2015a).

We have demonstrated that over the entire range of the mathematically-analysable data, which in this case extends down to AD 1, the epoch of Malthusian stagnation did not exist. The growth of the population and the economic growth were increasing steadily without any signs of Malthusian stagnation.

We have demonstrated that the Industrial Revolution had absolutely no impact on shaping the growth of population and the economic growth in the UK, the very centre of this revolution where its effects should have been most clearly demonstrated. Thus, we have demonstrated yet again that the often-claimed effects of the Industrial Revolution on shaping the growth of population or on shaping the economic growth are contradicted by data.

The established knowledge in demography and in economic research is scientifically unacceptable (Nielsen, 2016h). It is contradicted by data and it flies in the face of everything we know about the current economic and demographic problems, which need to be urgently solved.

There was no transition from stagnation to a sustained growth regime (Galor, 2005a, 2011). The past growth was stable and secure as demonstrated by the

largely undisturbed hyperbolic distributions but now, even though it became diverted from the fast increasing hyperbolic distributions to slower trajectories, it is still too fast and consequently insecure (Nielsen, 2015b).We might still have a sustained economic growth and sustained growth of population but it is generally acknowledged that in the long run our sustained growth is unsustainable because for the first time in human history we have already reached and crossed the ecological capacity of our planet (WWF, 2010).

The currently accepted paradigm based on the concept of Malthusian stagnation, on the concept of the escape from the Malthusian trap and on the concept of the boosting effects of innovations and technological development as represented by the Industrial Revolution, by the progress in medicine and by the dramatic changes in the style of living, is not only scientifically untenable but it is also potentially dangerous because it propagates the idea that after the endless epoch of stagnation we have now entered at last the sustained growth regime (Galor, 2005a, 2011). The real world in different. We have not escaped a Malthusian trap because there was no trap in the growth of population and in the economic growth. However, after the ages-long stable and secure growth, our current growth is no longer sustainable. For the first time in human history we have found ourselves in the trap of the fast-increasing economic growth and in the fast-increasing growth of population.

The erroneous traditional interpretations of economic growth and of the growth of human population are well illustrated in the Unified Growth Theory (Galor, 2005a, 2011) based firmly on these incorrect concepts. In conformity with the traditional interpretations, Galor divided economic growth and the growth of population into three regimes: the Malthusian Epoch, the Post-Malthusian Regime and the Sustained Growth Regime. Economic growth and the growth of population is then explained using various complicated mechanisms, different for each of the imagined regimes. These erroneous concepts are supported by suitably distorted presentations of data (Ashraf, 2009; Galor, 2005a, 2005c, 2007, 2008a, 2008b, 2008c, 2010, 2011, 2012a, 2012b, 2012c; Galor & Moav, 2002; Snowdon & Galor, 2008).

Data are never analysed. In their distorted presentations they appear to support the erroneous concepts based on impressions and on a good dose of fantasy. However, when analysed, precisely the same data show that the traditionally accepted doctrines have no support in science. Furthermore, they suggest that the mechanism of the historical economic growth and of the growth of population must be simple because they are described by the exceptionally simple mathematical distributions.

While the paradigm based on the concept of the endless epoch of stagnation followed by a sustained growth regime, creates a sense of security and prosperity, the data show that the opposite is true. It was the past growth that was safe and secure because it is described by the generally steadily increasing trajectories. However, now, for the first time in human history, our economic growth and the growth of human population is uncertain and insecure. We might reach a certain maximum in the growth of human population during the current century but we might not (Nielsen, 2006, 2015b, 2016h). The future is far from certain.

Interpretations of the mechanism of the historical economic growth and of the historical growth of population have to be based on data, and data are in the direct contradiction of the currently accepted paradigm (Nielsen, 2014, 2015a, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g, 2016i, 2016j). These interpretations have to be based on accepting hyperbolic growth. There is no choice: the traditional paradigm based on the concept of Malthusian stagnation followed by a distinctly new regime of sustained growth has to be replaced by the evidence

presented by data that the past growth was hyperbolic but that, relatively recently, it was diverted to new trajectories.

Hyperbolic distributions may be confusing. They may create an illusion of stagnation followed by an explosion but this illusion is not a valid excuse for creating the whole system of scientifically unsupported doctrines and interpretations because the analysis of hyperbolic distributions is trivially simple (Nielsen, 2014). Anyone can do it and see that the currently accepted paradigm based on the assumption of the existence of Malthusian stagnation followed by the alleged escape from the Malthusian trap has no scientific support.

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