

Escaping from the Malthusian Population Trap in Northwestern Europe

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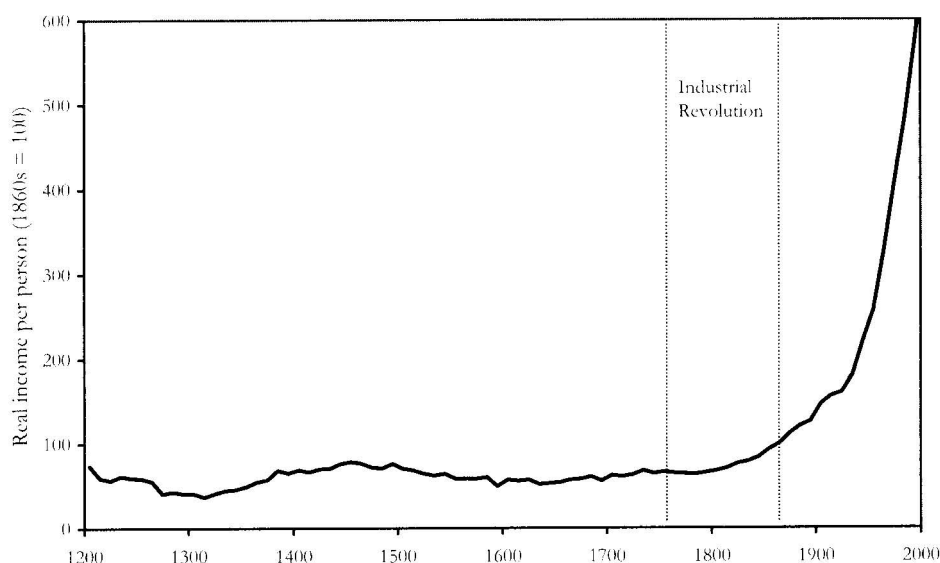
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During the last two centuries, people living in modern economies have gotten used to the idea that a modest level of economic growth will increase the standard of living for nearly everyone over time. Despite economic recessions, some of which were severe enough to be called depressions, this belief has been justified by the historical facts. Economic historians have shown that societies in developed economies are between ten and twenty times wealthier per person than they were in about 1800. This phenomenon of economic growth is perhaps the most important characteristic that makes wealthy societies ‘modern.’ Simon Kuznets put forth a definition of modern economic growth in 1974 as having the following six characteristics: (1) high rates of per capita economic growth (2) a high rate of growth for all inputs, such as labor, resources, and capital, which economists call ‘total factor productivity’ (3) high rates of structural transformation from agriculture to industry and services, and from personal enterprise to large-scale impersonal business organizations (4) changes in the structure of society and its ideology, including urbanization and secularization (5) the development of international communications and trade, often referred to as globalization (6) the limited spread of economic growth, leading to what has been called the “Great Divergence” between ‘developed’ and ‘underdeveloped’ economies.¹ The graph below is a dramatic long-term view of economic growth.

Historians disagree when modern economic growth began. Many date it to the late 18th century and associate it with the first industrial revolution, which took place in England between about 1750 and 1850. Others argue that modern economic growth can be traced to the Dutch Republic in the seventeenth century, which began to experience a modest but sustained rate of economic growth without the benefit of steam powered mechanization based on the use of coal. .

¹ Simon Kuznets, *Population, Capital and Economic Growth: Selected Essays*, (1974), pp. 165-84.¹

Almost all economic historians, however, agree on the fact that modern economic growth is a new phenomenon and that it began in Northwestern Europe. Economic historians also agree that the *rate*, or annual percentage of economic growth, increased during the early nineteenth century when the industrial revolution began to dramatically transform the economy and society in England, parts of Continental Europe and North America. Before that time, income per person varied across societies and epochs, but there was no sustained increase because economic progress was inevitably eaten up by population growth. This can be seen in the graph below, which shows real per capita income in England from 1200 to 2000.



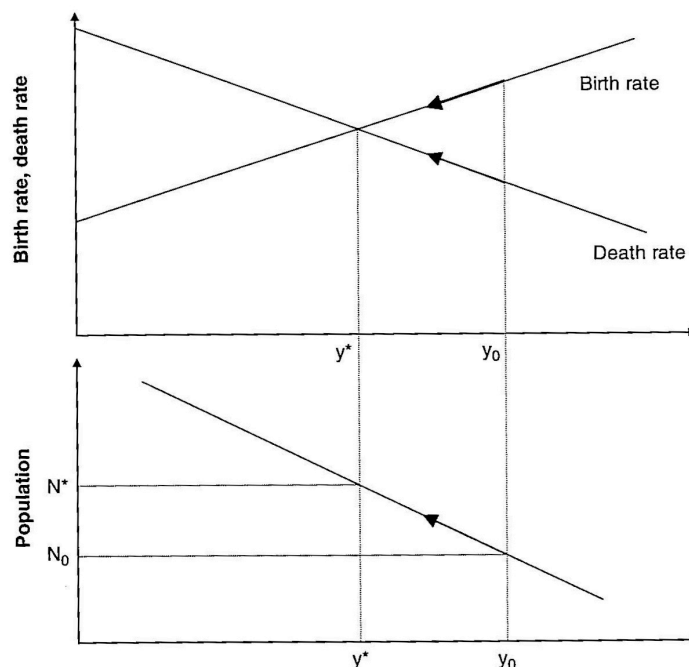
Source: Gregory Clark, *A Farewell to Alms: A Brief Economic History of the World* (2008), p. 195.

Thomas Robert Malthus made this phenomenon famous in his *Essay on the Principle of Population*, first published in 1798, and since then it has been called the Malthusian trap.

The idea of the Malthusian trap relies on four key assumptions. First, population responds positively to per capita incomes. As real wages per capita decline, fertility declined (what Malthus called the ‘preventive check’) and death rates increased the ‘positive check.’ Second, income per capita is negatively related to population size due to a diminishing return to labor. The classic example for this is the Black Death of the 14th century. As European populations declined by approximately one-third to half their level before the plague, wages rose since here

were far fewer workers available for a similar level of technology, resources and fixed capital. The result was that the standard of living for those that survived rose to a level for a time that was not reached again until the 19th century. As the level of wages increased after the Black Death, population growth resumed and the standard of living returned to its previous and lower level. This is often called the subsistence level of wages, or the famous ‘iron law of wages’ in classical and Marxist economics. Very poor hygienic conditions and environmental degradation can also reduce the population through higher death and lower fertility rates. This will not increase total wealth, but it will increase the wealth of those who survive. Another crucial component of the Malthusian model is the assumption that technological improvement will not be great enough to permanently overcome long term population growth. A final assumption of the Malthusian trap is that without effective birth control it is very difficult to reduce population growth.

According to Alter and Clark, the Malthusian Trap, the assumptions that kept population growth in line with resources, can be viewed as follows in their figure below.

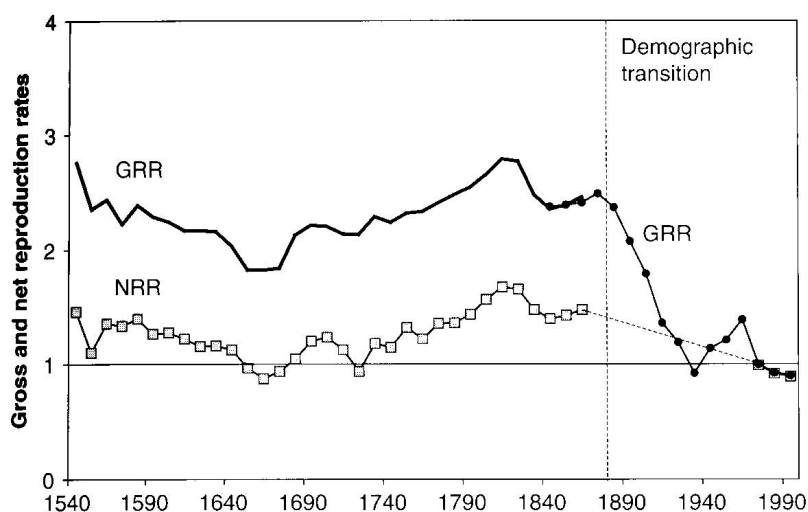


Source: George Alter and Gregory Clark, “The demographic transition and human capital,” Stephen Broadberry and Kevin O’Rourke, eds., *The Cambridge Economic History of Europe*, Vol. 1: 1700-1870, (2010). p. 46.

In the upper panel, birth and death rates are on the vertical axis, and material incomes per capita are on the horizontal axis. The Malthusian assumptions imply that there is only one level of real incomes at which birth rates equaled death rates, denoted as y^* . This is a stable equilibrium, or the subsistence level of income of a society at which the population just reproduces itself. In the pre-industrial world the Malthusian model had high fertility rates but also high death rates, low life expectancy and a subsistence income. The lower panel has population N on the vertical axis and material wealth on the horizontal axis. As population increased, material income per person decreased. The figure above also shows how a given society arrives at an equilibrium birth rate, death rate, population level, and real income in the long run. Starting at a population level of N_0 lower than N^* , this produces an income of Y_0 , above the subsistence level of income. At this income the birth rate exceeds the death rate, so population grows until income falls to y^* and population equals N^* .

A way to increase per capita wealth without a significant increase in technological improvement is by lowering the fertility rate through a later age of marriage and/or by a significant percentage of women not marrying at all. Both of these happened in Western Europe during the early modern period and has been called the European marriage pattern, which appears to have been unique in the world during the period. In the second edition of the *Essay on the Principle of Population*, Malthus recognized this possibility and argued that Europe's comparative prosperity was based upon the use of rational 'preventive checks.' Economic historians have shown that between about 1500 and 1750, the standard of living in Northwestern Europe in fact gradually drifted up while there was only modest population growth. However, during the second half of the 18th century population growth accelerated, prompting Malthus to write his famous treatise. During most of the 19th century Europe's population grew strongly, but, fueled by the technological innovations of the industrial revolution, so did economic growth, thus contradicting Malthus' pessimistic argument. By the 1870s, Malthus' argument was turned on its head as families in Western Europe's most advanced economic regions, began to have fewer children—a pattern that has spread to all developed areas of the world in more recent times.

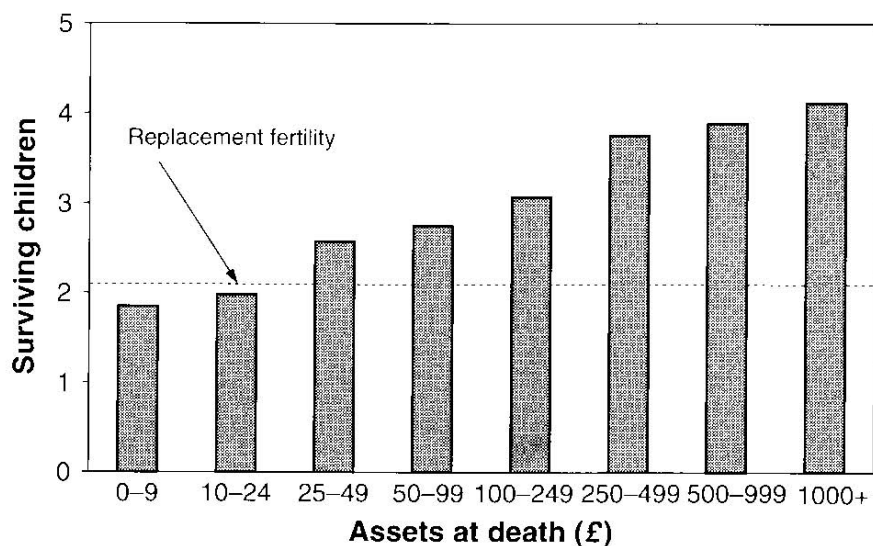
In 1700 all European societies had high fertility but this was nearly matched by high mortality rates so that population growth was modest. The average population growth in Europe in 1700-50 was 3.1%, ranging from 0.3% in the Netherlands to 8.9% in Russia. The table below shows the fertility history of England from 1540-2000. GRR shows the average number of daughters born per woman who lived through the full reproductive cycle. Such a woman would have born almost the same number of daughters, about 2.5 from the 1540s to the 1890s (for married women, the average number of births for the period was about six, since 10 to 15% bore no children at all). NRR shows the net reproduction rate. If the rate is one, then the female just reprocess herself during her lifetime. This rate fell much more slowly during the transition from the pre-industrial, or Malthusian rate, to the modern era.



Source: Alter and Clark, p.45.

The relatively slow population growth of the early modern era was especially pronounced in Northwestern Europe, in the area west of a line from St. Petersburg to Trieste. However, as evidence from England shows in the table below, fertility was higher for richer families than poor ones. The chart shows the number of surviving children per man for eight bequest classes from wills of the early 17th century. A man with a bequest of £25 had less than two surviving children at his death while someone with a bequest of £1,000 or more averaged four children. Since higher income is strongly associated with greater literacy and numeracy, the well to do not

only had more surviving children but added significantly to the educational level of society over many generations.



Source: Alter & Clark, p. 50.

This, and similar evidence from Holland and some other areas of Northwestern Europe, suggests that relatively prosperous families invested in the human capital of their children. Many economic historians suggest, that such investment, continued over many generations, helped produce a modest but cumulative rate of economic growth during the early modern period that laid the foundation of modern economic growth and was a key factor in the origin of the industrial revolution. An interesting characteristic of the Northwestern European marriage pattern of late marriages, as the work of Peter Laslett has shown,² included the cultural expectation that married couples would immediately create separate households as a nuclear family, as opposed to the Eastern and Southern European marriage pattern where the marriage age was younger and young couples often lived in extended households. More recently, Jan de Vries, has argued in a book, which has had a wide impact, that the Northwest European marriage pattern, produced an “industrious revolution” among workers, which helps explain the prosperity of countries such as the Dutch Republic and England before the industrial revolution and perhaps

² Peter Laslett, *The World We Have Lost: Further Explored* (1986).

the decline of population fertility in mature industrial societies.³ Jan Luiten van Zanden has gone even further by suggesting that the European marriage pattern, and a greater level of economic growth, could be seen in Northwestern Europe during the medieval period.⁴

The tables below show GDP per capita in European countries for 1500-1870 and comparative growth rates.

Growth rates of GDP per capita (% per annum)

	1500-1700	1700-1750	1750-1820	1820-1870
UK	0.12	0.35	0.20	1.25
Netherlands	0.24	0.00	-0.02	0.83
Belgium	0.09	0.19	0.02	1.44
France	n.a.	n.a.	n.a.	0.85
Italy	-0.08	0.14	-0.22	0.61
Spain	-0.02	-0.10	0.10	0.27
Sweden	0.02	0.03	0.06	0.65
Poland	-0.13	-0.24	0.21	0.59
Russia	n.a.	n.a.	n.a.	0.64
Turkey	n.a.	0.16	0.07	0.52

Comparative levels of GDP per capita (United Kingdom in 1820 = 100)

	c.1500	c.1700	c.1750	1820	1870
UK	57	73	87	100	187
Netherlands	67	109	109	107	162
Belgium	58	69	76	77	158
France	n.a.	n.a.	n.a.	72	110
Italy	83	71	76	65	88
Spain	63	61	58	62	71
Sweden	64	66	67	70	97
Poland	50-54	38-42	34-37	41	55
Russia	n.a.	n.a.	n.a.	40	55
Turkey	n.a.	35	38	40	52

Source: Stephen Broadberry and Kevin O'Rourke, eds., *The Cambridge Economic History of Europe*, Vol. 1: 1700-1870 (2010), p. 2.

³ Jan de Vries, *The Industrious Revolution: Consumer Behavior and the Household Economy, 1650 to the Present* (2008).

⁴ Zanden, J. L., van, *The Long Road to the Industrial Revolution: The European Economy in a Global Perspective, 1000-1800* (2009).

Note that the growth rate shown in the first table was higher during the period 1820-1870 than during the early modern period, 1500-1700. During the early modern period, there was a reversal of fortune between southern and northern Europe as the growth rates of Northwestern Europe became significantly higher. This has been labeled the 'Little Divergence' to distinguish it from the 'Great Divergence' in economic growth rates between Western Europe and Asia in the nineteenth century until growth rates again diverged in recent decades in favor of Asia.

The second table shows that the transition to modern economic growth was a long process. Even the annual growth rate of the fastest growing country, the United Kingdom, remained only 0.5% until well into the nineteenth century. Only after 1820 did annual growth rates in a handful of European countries exceed 1% per annum. Although modern economic growth began between 1500 and 1700 in the Netherlands and England, the economy of the Netherlands stagnated in the eighteenth century while British economic growth continued to increase. Nonetheless, comparatively, the Netherlands was still wealthier per capita than the United Kingdom in 1820. All European countries in the first table show an increase in wealth per capita after 1820, and, it was this growth that produced the Great Divergence of living standards between Europe and Asia.

During the 19th century, population growth occurred everywhere in Europe, see the table below. Annual rates of growth were between 0.4% and 1.3%, except for Ireland and France. Europe's population more than doubled between 1800 and 1900, while it only grew by 36% in 1500-1600, 13% in 1600-1700, and 56% in 1700-1800.⁵ Nineteenth century population growth was no longer accompanied by declining, or subsistence, living standards as it had in earlier periods. There were still famines in the 19th century, such as the potato famine in Ireland, but the traditional link between failed harvests and mortality disappeared. Moreover, population growth occurred all over Europe, including in areas of slow economic growth in eastern and southern Europe. Europe's escape from the Malthusian trap was a consequence of the industrial and agricultural revolutions in Europe, as well as a flood of cheap food from America, emigration to the Western Hemisphere, and major improvements in public health even in the less developed regions of Europe. Moreover, a demographic transition began in Northwestern Europe during the

⁵ Alter and Clark, p. 58.

late 19th century, which would spread to all of Europe in the 20th century, that reduced the fertility rate and saw a greater investment in the education and training of children. Malthus' rational 'preventive check' had ended the Malthusian trap and raised the standard of living of the European population.

Population Growth rates and of natural increase in Europe, 1750-1900

Country	Rate of growth (persons per thousand per year)			Rate of natural increase 1850–1900
	1750–1800	1800–1850	1850–1900	
England	7.9	13.2	12.1	12.8
Norway	6.4	9.4	9.3	13.9
Finland		8.9	9.4	10.1
Russia	8.9	8.6	12.1	
Denmark		8.6	10.5	12.2
Romania		8.1	9.3	
Sweden	5.6	7.9	7.8	11.5
Europe	5.8	7.8	7.6	
Netherlands	2.0	7.8	10.0	13.0
Belgium		7.6	8.5	9.0
Greece		7.4	11.1	7.5
Germany	7.3	7.4	9.3	11.3
Spain	4.2	6.7	4.6	6.0
Serbia		6.6	13.8	
Switzerland		6.3	6.5	7.2
Austria-Hungary		6.1	7.4	8.1
Italy	2.9	6.0	6.3	8.9
Ireland	10.1	4.4	-7.7	6.9
France	3.5	4.3	2.2	2.0
Bulgaria		4.1	6.5	
Portugal		4.1	7.1	9.6

Source, Alter and Clark, p. 53