250 years of Capitalism

A reconstruction of its dynamics

Marcel Roelandts, October 2019 (translated by AFRD)

Foreword - A work in progress

« I pre-suppose, of course, a reader who is willing to learn something new and therefore to think for himself. […] *Every opinion based on scientific criticism I welcome »* Karl Marx, Preface to the First German Edition of *Capital*.

Taking up a longstanding concern of Marx's he was unable to fulfil, the following presents the first part of an article series treating 250 years of Capitalism at the hand of examined statistic sources on its economic dynamic, in order to draw out its perspectives.

Introduction

In the hell of the workshop of the world, which is 19th Century's England, Marx and Engels developed their critique of capitalism and became involved in the first expressions of the workers movement. Engels began to do this in 1845 in his book *The Condition of the Working Class in England*, and later Marx analysed all its aspects in *Capital*. But the latter's concern is *"private"* and has existed *"for a long time"* : to construct graphs illustrating the evolution of the main economic indicators he has developed, in order to mathematically determine the essential laws of the [economic] crises : *"I submitted here to Moore* [The translator of the Communist Manifesto in English] *a story with which I have tussled around privately for a long time (...) you know the tables where prices, discount rates, etc., etc. are represented in their fluctuations during the year, etc. by zigzag curves that go up and down. I have tried several times – to analyse the crises – , to calculate these ups and downs as irregular curves, and I have believed it possible (I still believe it is possible, with sufficiently studied material) to determine the essential laws of the crises mathematically from there. Moore, as said, takes the case as not feasible until further notice, and I have decided to give it up for the time being"* (Letter from Marx to Engels of May 31, 1873 [1]). The paucity of the statistical apparatus of his time and Marx's poor health did not allow him to accomplish this final attempt and lifelong preoccupation, of which testify three examples among others : a) his urgent and recurrent demands to dispose of the accounting data of the family enterprise of his friend Engels [2] ; b) his work on the crisis of 1857, in which he collates statistical data in the form of Excel tables in order to validate his analyses (see the following illustration [3]), and c) his use of statistics to found the theoretical argument in his work *Value, Price and Profit* [4]. Our own contribution attempts – at least in part – to pursue this

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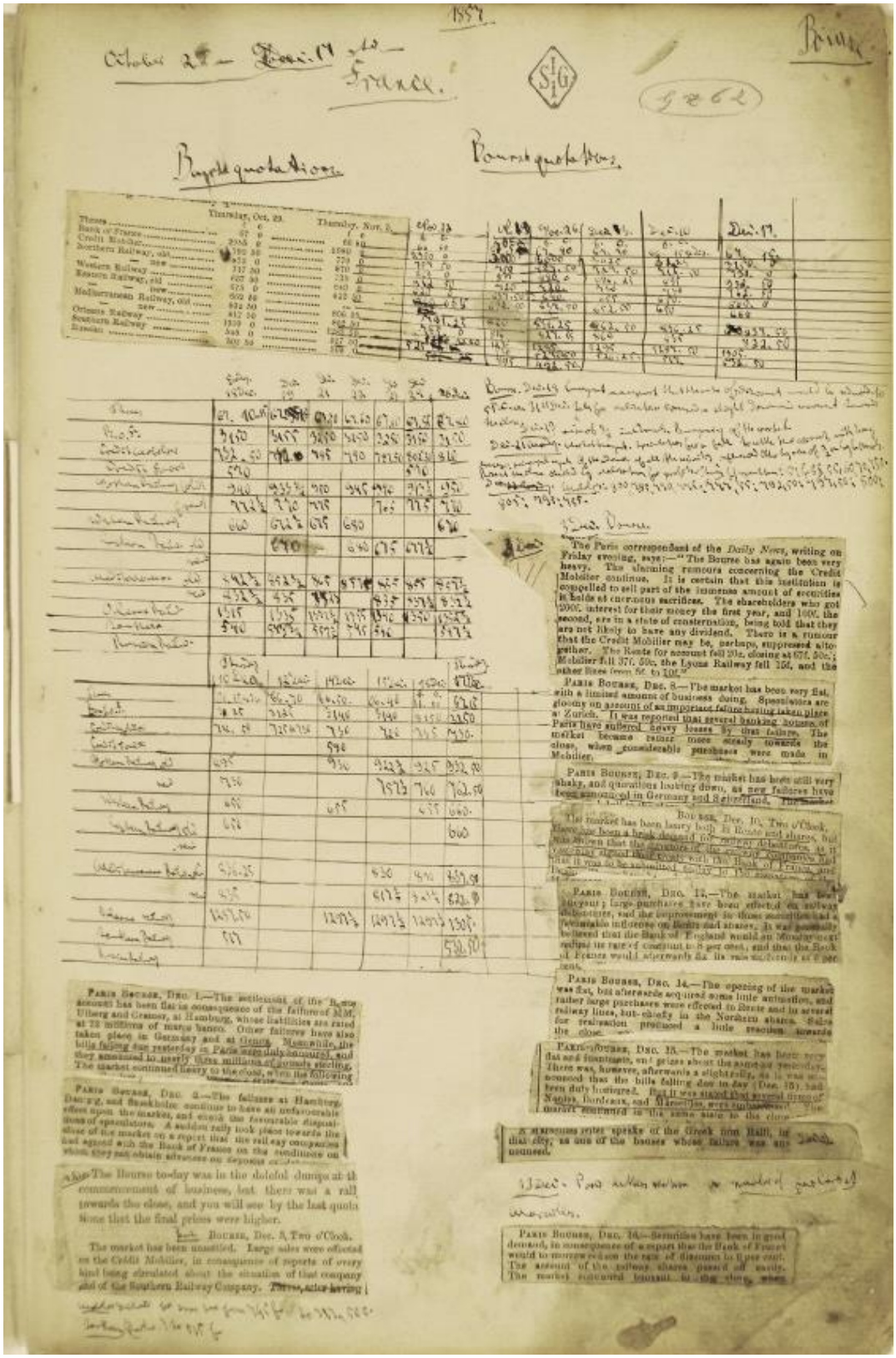
[1] Marx/Engels, Der Briefwechsel, Bd.4 (1868–1883), p. 398 (DTV Reprint from MEGA, Berlin 1931).

[2] Among many others, see notably his letters to Engels from March 2, 4 and 5, 1858.

[3] The document is reproduced from the work by R. Hecker on Marx' manuscripts: Text and Presentation.

[4] Edition of the speech delivered by Marx to the General Council of the *International Working Men's Association* in June 1865. See, from Value, Price and Profit, for instance : *"I mention Mr. W. Newman,* [W. Newmarch] *(...) because he occupies an eminent position in economical science, as the contributor to, and editor of, Mr. Thomas Tooke's History Of Prices, that magnificent work which traces the history of prices from 1793 to 1856."* [§II. Production, Wages, Profits] *"If instead of considering only the daily fluctuations you analyze the movement of market prices for longer periods, as Mr. Tooke, for example, has done in his History of Prices, you will find that the fluctuations of market prices, their deviations from values, their ups and downs, paralyze and compensate each other; so that apart from the effect of monopolies and some other modifications I must now pass by, all*

preoccupation *"with sufficiently studied material"* with respect to, for a large part, the country that was the subject of his study : England [5].



descriptions of commodities are, on average, sold at their respective values or natural prices." [§VI. Value and Labour].

[5] The sources of the data on which we rely, and the necessary indications on how we present them, can be consulted at the *Annex on the data and on methodology* at the end to this article series. As these data are easily accessible, anyone can consult them and check our calculations and graphs in order to complete, correct or contradict the analysis we propose.

I. 250 years of Capitalism – A rapid overview

From the *Industrial Revolution* to the End of the *twofold Bipolarization* of the World

The period from the second half of the 18th Century to the First World War constitutes a turning point in the world's economic history. The industrial revolution that is born in England spreads to Western Europe and the New World : North America, Australia and New Zealand. Some germs are also disseminated in certain other countries of the Americas, who had gained political independence in the early 19th Century – Argentine in particular. Then come Russia and Japan.

These countries, which held only 20% of the world's manufacturing production in 1800, concentrate nearly 80% of it in 1913. In other words, the first arrivals have taken the benefits of the industrial revolution at the expense of the rest of the world. This economic gap attains its maximum during the inter-war period. It is the result of a predatory colonial policy that deindustrializes the colonized countries. In effect, while it is very limited at the beginning of the 19th Century, colonization reaches its apogee on the eve of the first worldwide conflict.

This formidable concentration of wealth at one pole of the planet configures a first geo-economic bipolarization between a few industrialized countries and the rest of the world. In other words, while capitalism exercises its domination over all continents in 1913, it is still far from having developed everywhere. It was not until the end of the 'Thirty Glorious Years' and the 'Cold War' that it spread geographically throughout the world in a significant way, especially in Asia, but also in Africa, where some countries begin to experience very significant growth since several years (See chapter VI).

From the middle of the 18th Century, Great Britain occupies a prime position as an early laboratory of this dynamic : as the cradle of modern capitalism [6] and of political economy, this country dominates the world until the last third of the 19th Century, gradually giving way to the United States of America and

[6] *"...as is shown by the fact that with the crisis of 1825 it for the first time opens the periodic cycle of its modern life"* Afterword to the Second German Edition of Capital (1873).

to Germany on the European continent. In this context of overwhelming power of a few imperial economies, no country can claim real independence, not even those in South America who formally had already emancipated from their colonial tutelage. It is the extroverted economic logic of capitalism – that is, of a system that structurally needs to extend its sphere of valorization geographically and sector-based – which will be at the basis of this colonial and then warlike competition between the first industrialized countries. This imperial competition constitutes the framework of a second bipolarization of the planet, which is superimposed on the first. The Cold War is the ultimate outcome of this configuration, a total nuclear war that, albeit it has remained only a potential one, has generated multiple local hot wars that have claimed as many victims as the second imperialist planetary conflict.

The first bipolarization is essentially of an economic order ; it separates a few early industrialized and rich countries from the – extremely poor and dependent – others, known as the Third World. The second one is mainly geopolitical and pits constellations of countries against each other who are competing for continental or planetary domination : the Triple Entente and the Triple Alliance, who confront each other since the end of the 19th Century in order to lead to the First World War ; the Axis countries opposed to the Western bloc during the Second World War ; the Soviet and the American bloc during the Cold War.

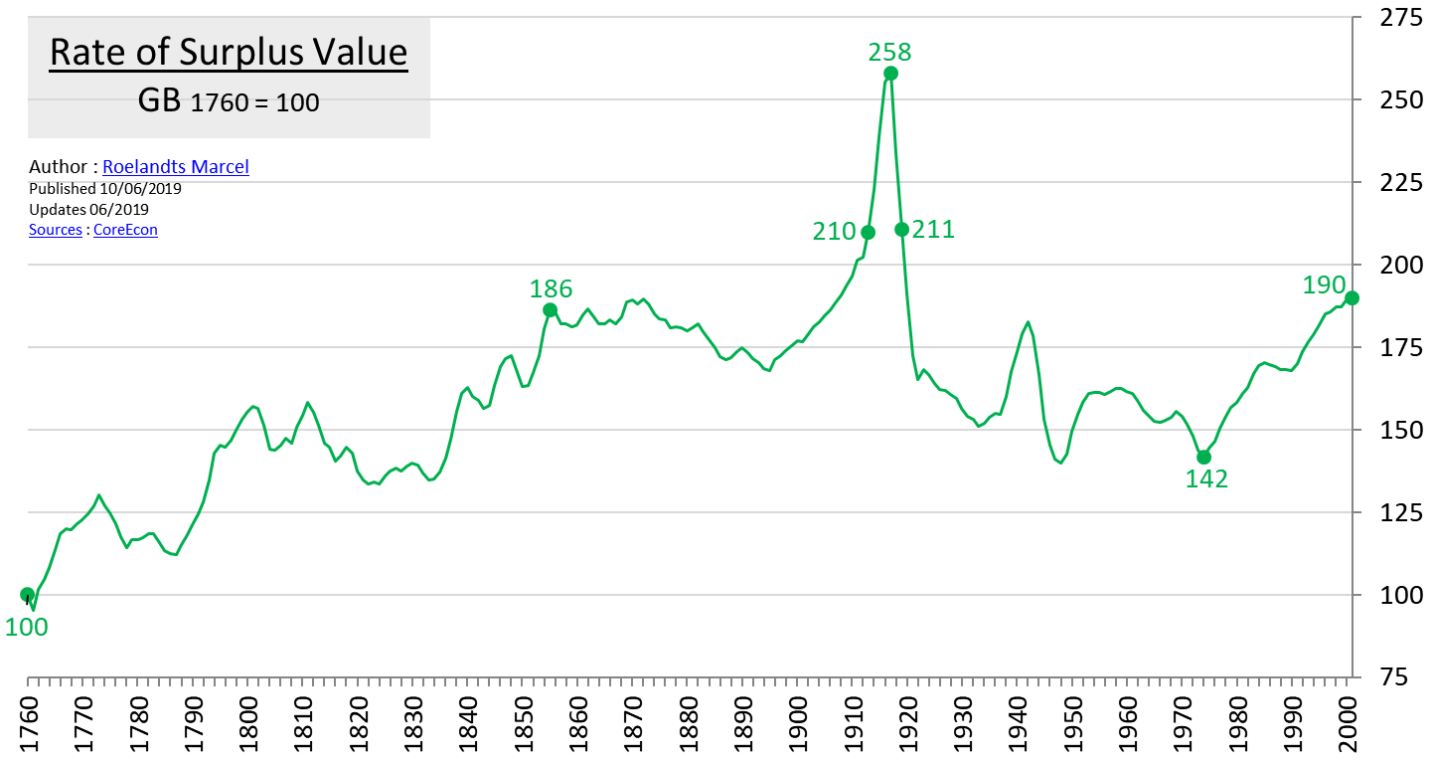
By loosening this double bench-vice of economic and geopolitical bipolarization that organized the world since the 19th Century, the end of the ‘Thirty Glorious Years’ (1975) and of the ‘Cold War’ (1989) allowed many countries to become autonomous and take off in a multipolar world that is starting to rebalance economically. This dynamic is developing all the more easily as the United States are losing ground to the point of being bitten in the tail by a China setting itself the goal of disputing the world leadership, both economically and geopolitics.

However, such a configuration is not likely to continue because a “pacified” multi-polar world operating within the framework of multilateral agreements is an illusion. Increasing economic competition, the nationalist-protectionist tendencies, the imperial aims of each nation, the relentless defence of American leadership and the contesting thereof by many countries gather all ingredients to create a new planetary wrench on the ground, in the air and in cyberspace.

The four times of the power relations between the classes

By dividing total profits by total wages, Marx constructs a measure of the economic rate of exploitation of the wage earners [7]. Its evolution over two centuries of modern capitalism illustrates his thesis that *"The history of any society up to the present day has been nothing but the history of class struggles"* very well [8] (Graph 1.1). In effect, four main times give rhythm to its evolution in function of the power relations between the classes.

Graph 1.1 : Rate of Surplus Value 1760 – 2001, GB (Index: 1760 = 100)



The first high point corresponds to savage capitalism and extends from the Industrial Revolution to the middle of the 19th Century. Numerically still weak, illiterate, poor, weakly organized and facing increasing unemployment, the wage earners of that time have little capacity to offer a sufficiently consequent resistance to attenuate the shameless exploitation of their labor

[7] As this fraction increases, the exploitation rate increases and inversely. In effect, in the annual total of created wealth (the Net Interior Product or NIP), the exploitation rate (which Marx called also the rate of surplus value) measures the part that falls to the employer (the profit or surplus value) and the part that falls to the wage earner (i.e. his wages). In other words : the **Rate of Surplus Value = Surplus Value / Wages = (NIP – Wages) / Wages**. This measure of the degree of *economic* exploitation of the wage earners must be distinguished from the degree of *physical* exploitation, like the work stress or the risks of the work. Its statistical calculation since 1760 until recently is provided in the *Annex on the data and on methodology*.

[8] The first phrase of the *Communist Manifesto* by Marx and Engels (1847).

force by the new entrepreneurs of the Industrial Revolution. It is a period during which the English ruling class amasses fortunes, multiplying the rate of surplus value of the wage earners by 1.86, from index 100 to index 186 between 1760 and 1855. As profits are abundant in a context in which investments are still modest, profit rates are high [9]. This first century of savage capitalism exacerbates economic and social inequalities and allows a small minority of entrepreneurs to capture a growing share of the wealth produced based on a fierce exploitation of pauperized wage earners.

The second high point extends from 1855 to the Russian revolution of 1917 [10]. The English working class, which had become more numerous, better educated and organized, for the first time in a century, succeeds in imposing a progressive increase in real wages during the following half-century (from 1855 to 1901, see below Graph 2.1) and in securing some legal advances in the social sphere. This explains the capping of the rate of surplus value between 1855 and 1872, and its subsequent, slow decline until 1895. If it hence recovers strongly, this is following a violent counter-offensive by the English bosses to take back what had been conceded to the wage earners. As a result, the overall increase in the rate of surplus value over the half-century preceding the conflict is much lower than during the century of savage capitalism when it almost doubled.

The third high point in the power relations between the classes begins with the year of the takeover of power by the Workers' Councils in Russia in 1917 and extends until the end of the glorious thirty years. If the exploitation rate of the wage earners has more than doubled throughout the first century and a half of capitalism, 1917 marks a turning point since this rate was reversed during the following sixty years : the index of the rate of surplus value diminishes strongly from 258 in 1917 (or 211 in 1919) to 142 in 1974. This downward turn of the rate of exploitation of the wage earners is the result of the wave of revolutions and large-scale social movements that develop to put an end to the

[9] The profit rate is the ratio between the obtained profits and the total investments consented to obtain these profits.

[10] The magnitude of the rate of surplus value in 1917 seems exceptional, even overestimated. It is however consistent with what can be observed in times of war, at least at the beginning of a conflict (a lowering of real wages and an increase of productivity gains). Nevertheless, we prefer to rely on the data of 1913 and 1919 to calculate the evolution of the rate of surplus value before and after the war, because the data between 1914 and 1918 may be less certain or overestimated. However, the year 1917 remains politically and socially very significant as a turning point in the evolution of the rate of surplus value.

horrors and massacres of the World War and to show solidarity with the Russian revolution.

The fourth and final high point begins at the end of the ‘thirty glorious years’, when the power relations between the classes reverse once again in favour of a ruling class that arrives at raising the exploitation rate, up to the present day. This reversal is the result of a combination of factors, in particular the rise of unemployment since 1974, which undermines the wave of struggles that began in the mid-1960s and that is exhausted at the end of the 1970s.

What are the driving forces behind all these dynamics of wealth accumulation, of geographical and sector-based extension of capitalism, of imperialist relations, of economic crises, of social conflicts, and what are their evolution over two centuries and a half of modern capitalism ? Are they carried out according to the modalities of the analysis traced by Marx in *Capital* ? Does the 20th Century confirm or contradict his analysis since the rate of surplus value is almost halved over the sixty years from 1917 to 1974 (from index 258 to 142) ? Among others, these are the main questions that motivate us in this first exercise of illustrating and deepening his work [11].

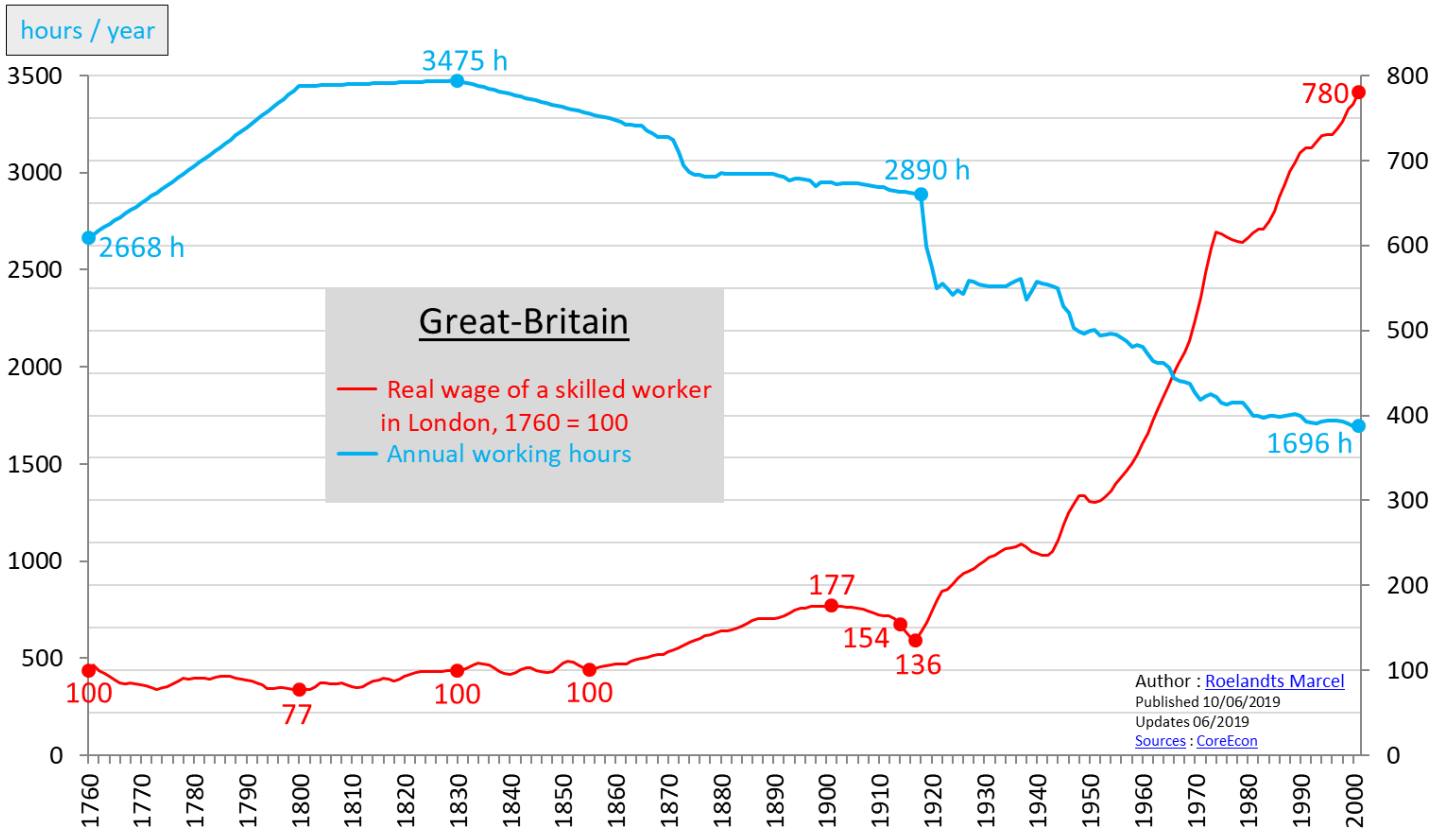
[11] This contribution therefore has only a limited objective, which complements Marx’s *Capital* and the more qualitative works of Marxist and other historians of the industrial revolution and the development of capitalism, works to which the reader should refer in order to obtain a complete vision.

II. The Class Struggle from 1760 to the Russian Revolution

Working more to earn less

The reduction of working time and the maintenance or increase of real wages (purchasing power, i.e. with inflation deducted) have been the main focus of the wage earners' struggle to reduce their exploitation. And for good reason, the latter first saw their living and working conditions deteriorate for almost a century before a slight and slow improvement occurred during the subsequent half-century. In fact, the Graph 2.1 hereafter shows us that the workers' real wages stagnated from 1760 to 1855. Worse, already very miserable in 1760, they began to decline by a quarter until 1800, then recovered around 1830 and stabilized until 1855.

Graph 2.1 : GB : Real wage (1760 = 100) and Annual working hours



The annual working time increased by almost a third from 1760 to 1830, and then declined only marginally until 1855. Comparing the latter with the real working time in the agricultural and artisan society of the Ancient Regime, this degradation is all the more spectacular when considering that: *"the farmers before the industrial revolution, effectively did not work more than 1,800 to 2,000 hours per year, due to the idle periods. The effective working time of the artisans was probably somewhat longer: about 2,300 to 2,600 hours per year (...) With 15 to 16 hours per day, and 6 days a week, the worker of the beginning 19th Century passed on average more*

than 4,200 hours at his work place, and effectively worked for about 3,500 hours." (Bairoch, 1997, Volume 1, p. 620). Moreover, these already very eloquent estimates do not take account of the long duration of daily commuting by foot, for a non-negligible part of wage workers who still lived at the countryside and worked in the towns (see the report by doctor Villermé below). It is thus no exaggeration to affirm that the first century of industrial revolution has virtually doubled working times, and that the diminutions of the second half of the 19th. Century have only very marginally attenuated this degradation. In reality, only after the subsequent reductions of working time after the First World War we see annual working times that are shorter than during the period of the Ancient Regime!

But the industrial revolution has introduced another degradation, the over-exploitation of child labor at a low age. Certainly, their work has always existed, but never [before] under the inhumane conditions induced by capitalism, because *"the beginnings of the industrial revolution are characterized by a lowering of the first working age… (…) … children below the age of 8 or even 6 years were commonly employed … (…) … in the first phase of the industrial revolution, the work time of the children was the same as that of the adults, namely 14 to 16 hours per day. (…) Children forced to sleep at their work places, in a corner of the workshop, or in a summarily adapted factory hall, were not isolated or rare cases, because the distance between the domicile and the work place, and the duration of the work, often made commuting impossible. The lecture of the different reports on the situation of the working children at the beginning of the 19th Century is succession of nightmarish images."* (Bairoch, 1997, Volume 1, p. 614 – 615) And for what salary? *"They work for ridiculous wages (…) … to quote only one significant example: in the spinning mills of Lancashire (England) around 1830 the remuneration of children under 11 years was six times less than that of an adult unskilled worker. A day's wages of a child could buy a little less than a kilo of bread! Thus a revenue insufficient to feed and cloth it. This poses a question: Why then send these children to work? Simply because the wages of the father (and even of both father and mother) were insufficient to maintain a family with 2 or 3 children."* (Bairoch, 1997, Volume 1, p. 615 – 616)

In addition to this physical and physiological over-exploitation of the wage earners, there are also the leonine labor regulations, which are similar to a prison regime made up of almost permanent psychological bullying and harassment. So, while the hourly wage of an unskilled worker around 1850 was 2 pennies, the fines provided for in the regulations of a textile factory in Lancashire (England) were *"2 pennies for anyone absent from their workplace or talking with another person; 2 pennies per tranche of 5 minutes of being late; 3 pennies for each curse or indecent word… (…) The owners wanted all their workers to wash themselves every morning; but they are obliged to wash themselves at least twice a week: Monday morning and*

Thursday morning. If this was not the case, a fine of 3 pennies was levied for each offense." (Bairoch, 1997, vol. 1, pp. 622-623).

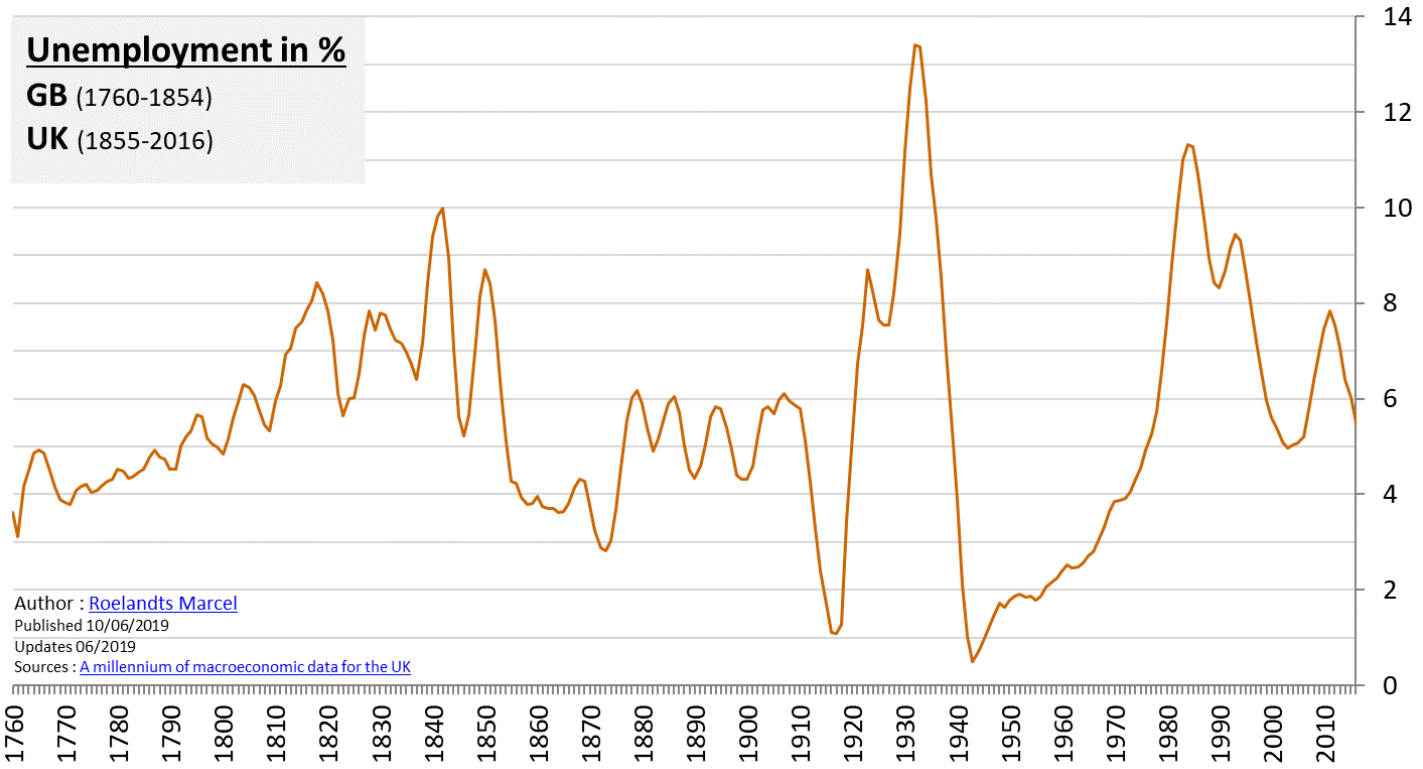
Moreover, to all these miserable and debasing work conditions a terrible degradation of the housing conditions is added. Certainly, the latter were far from excellent at the countryside, but these were incomparably better than the cramped slums in which several families had to pile up. This is how the report by doctor Villermé describes the housing conditions of French workers in the middle of the 1830s: *"I have seen … of these miserable lodgings, in which two families slept each in a corner, on straw thrown on the floor and contained by two planks. (…) … I have to say that in several of the beds that I have just spoken of, I have seen individuals of both sexes and of very different ages resting together, most of them without a shirt. Well, the cellars are not the worst. The worst lodgings are the attics, in which nothing protect tenants from temperature extremes; because the tenants, as miserable as those who live in cellars, are equally deprived of means to maintain a fire to keep themselves warm in winter. To conclude with, I would not provide a complete idea of the lodgings implied without mentioning that for those who live in several districts of which I spoke, and this sometimes applies to hundreds of individuals, there are only one or two of those toilets indispensable to the cleanliness of the towns."*

Finally, in addition to these miserable living and working conditions for the workers' families and their children, there is the scourge of growing unemployment resulting mainly from a galloping urban demography [12] and, subsequently, from the bankruptcy of small craftsmen as a consequence of competition from capitalist production and an exodus of rural people dispossessed of their land and/or impoverished by the prohibition of access to the commons [13]. Thus, the unemployment rate increased from 3.6% to 10% between 1760 and 1842, see Graph 2.2 below :

[12] This first century of industrial revolution was characterized by a strong demographic growth resulting from a widening gap between the birth and death rates : while the former increased from 3.4% to 4.2% between 1760 and 1876 and then stabilized at a high level (3.6%) until 1876 (the date of its rapid and continuous fall), the mortality rate fell from 2.9% in 1760 to 2.1% in 1876 (Source : Our World in Data).

[13] Free access to forest resources, grazing rights on fallow land, etc., all of which enable many poor farmers to survive in the countryside. Read in this regard the excellent contribution of J.M. Chevet (1996) on the agricultural revolution in England (French language).

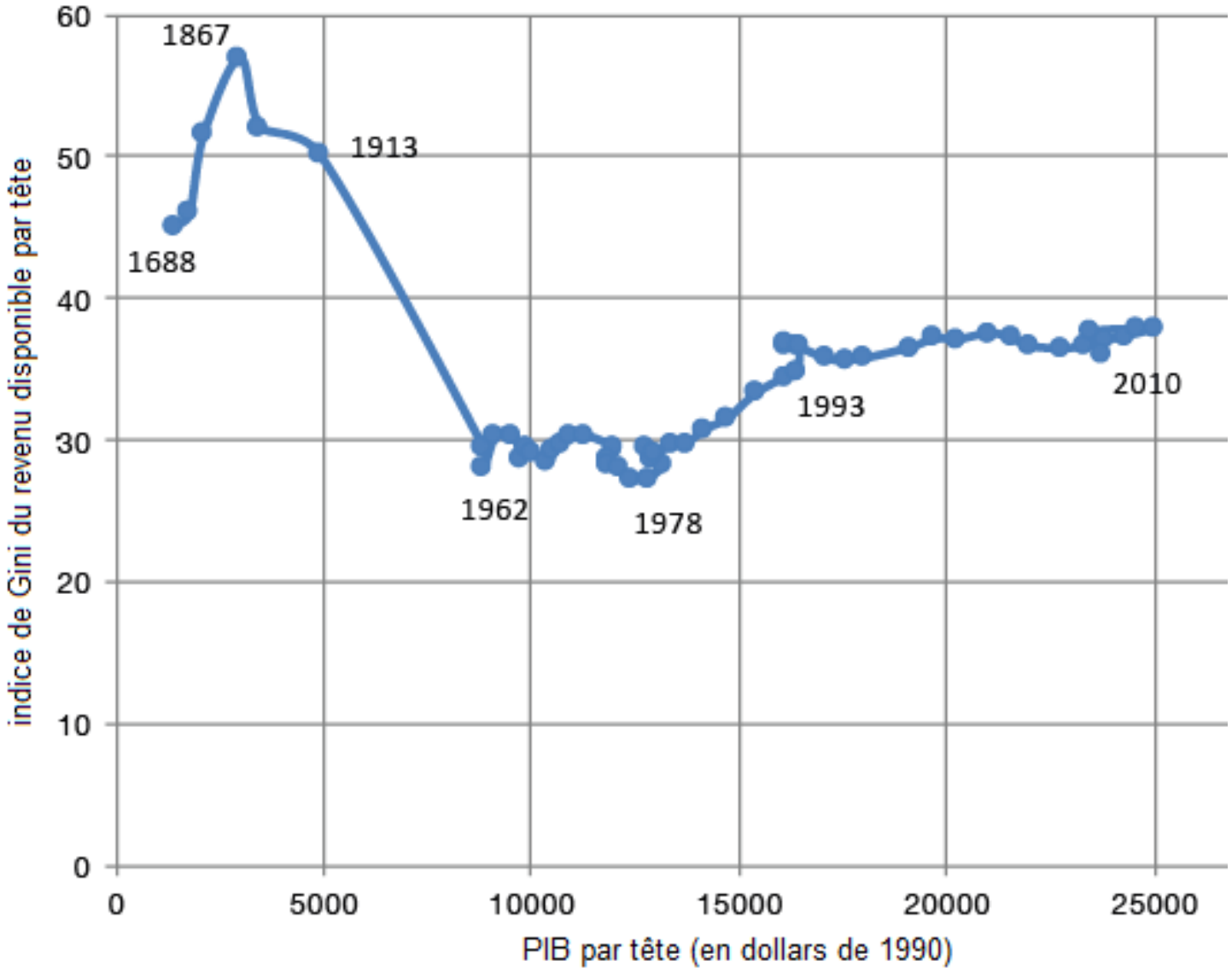
Graph 2.2 : Unemployment in %, GB 1760-1854, UK 1855-2016



Without any social and legal protection, and still too few in number to be able to impose a balance of power in their favor, these first wage workers are subjected to the horrors of competition on the labor market among them, due to a growing unemployment that will allow the employers to keep wages as low as possible and to impose a sharp increase in working time. In these miserable conditions, it is of no surprise that the number of poor people grows strongly during the first century of savage capitalism. By the way, in 1834 England adopts a new Poor Law in order to face up this influx.

The index of Gini, which measures the degree of inequality in the redistribution of the national income (Graph 2.3, Milanovic 2019), confirms the dynamics that we have established for the first times of the industrial revolution: the inequalities grow for two centuries (1688 – 1867), and subsequently inverse until the First World War, but without seeing a noteworthy amelioration, since in 1913 the inequality in the redistribution returns to what it had been at the beginning of the industrial revolution. The redistribution of wealth only becomes more egalitarian between the First World War and the end of the 'Thirty glorious Years'. Ever since, the neoliberal policies again deepen the inequalities.

Graph 2.3 : Gini's index of the available revenue per capita in the UK (1688 – 2010). Source: Milanovic, 2019.



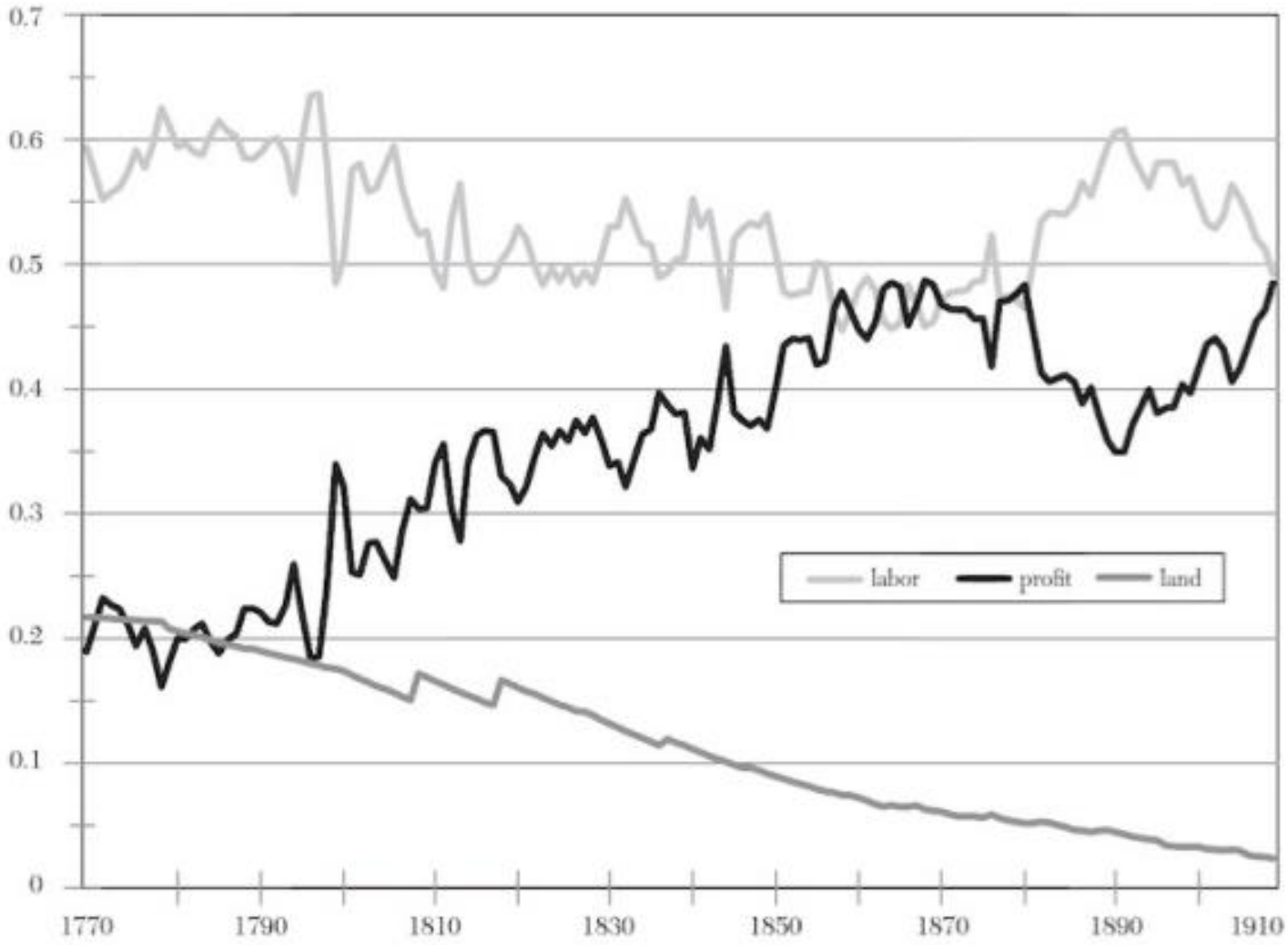
The available data for other European countries, the USA or Japan indicate similar evolutions (See the graphs in the Annex)

Undoubtedly, the slogan of the ruling class at that time was : *"work more to earn less"*, to paraphrase the formula of former French President Sarkozy. And this is still without considering the interdiction of demonstrations and coalition building (trade unions, strike funds, mutual societies, cooperatives…) ; the arbitrariness of the employers who can dismiss at will and without compensation, while workers are liable to prison if they leave their employers; the right to vote limited to a minority of rich men ; etc.

Profit share and profit rate

This first century of savage capitalism is therefore confounded with increased work, for a miserable wage, carried out in atrocious social conditions and a lack of political and social rights. Its operating logic is still largely based on increasing absolute surplus value, where profits are mainly increased by extending working hours and lowering or maintaining low real wages in a context of increasing unemployment. This explains the doubling of the rate of surplus value during this first century of savage capitalism, both according to our calculation (see Graph 1.1) and according to Allen's calculation (see the following Graph 2.4), since our index is multiplied by 1.82 from 1760 to 1855 and the other by 2.6 from 1770 to 1855 [14].

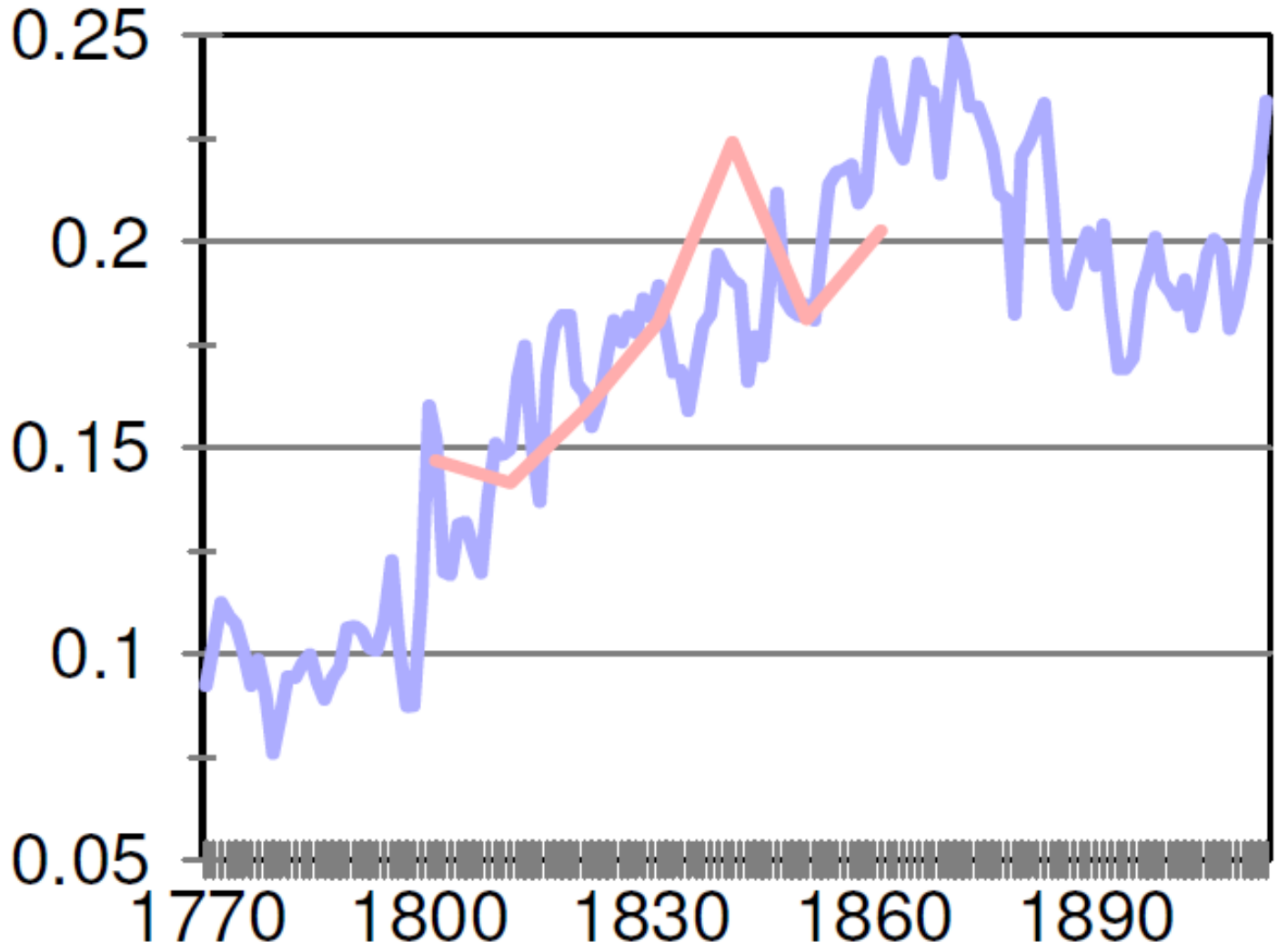
Graph 2.4 : Share of wages, profits and land rent in national income, GB, 1770-1910, constant prices 1850, (Allen, 2007)



[14] Calculated by dividing the profit share by the wage share from the data in graph 2.4. This results in a rate of surplus value of 32% in 1770 (19% / 59%.) and of 84% in 1855 (42% / 50%), which leaves us with a multi-plication by 2.6 from 1770 to 1855 (84% / 32%).

Undoubtedly, the stronger variation with Allen results from subtracting the land rent from the gross profits. This excessive exploitation of waged workers – an exploitation that goes as far as their physiological exhaustion, since the average life expectancy of a worker in Liverpool is only 25 years in 1860 – results in a decrease in the wages' share in GDP (from 60% in 1770 to 45% a little before 1860) and a corresponding increase in the profit share (from 20% to 50%). It should be noted that the latter also increases following the decline in the share of land rents resulting from the progressive domination of capitalism over the remains of the land aristocracy [15]. This doubling of the exploitation rate of wage workers largely compensates for the increase in the organic composition of capital during this first century of savage capitalism, since the profit rate progressively increases from 10% in 1770 to 24% in 1860 (with a maximum of 25% around 1875) as shown in Graph 2.5 (Allen, 2007).

Graph 2.5 : GB, Profit rate, real (1770 – 1913) and nominal (1800 – 1860)



[15] This share of land rent in GDP declines from 22 per cent in 1770 to 7.5 per cent in 1855 (Graph 2.4). It will only be residual throughout the 20th Century.

Big sacrifices for meager results

This phase of savage capitalism ends around the middle of the 19th Century, when we witness a reversal of the trend, as capitalism enters its typically colonial phase [16] : instead of continuing to grow, annual working time begins a slow decline until 1917, albeit it remains still higher than at the beginning of the industrial revolution ; similarly, real wages stop stagnating and increase slowly and modestly from 1855 to 1901, but then decline significantly until the First World War, following a counter-offensive by the English employers (explanation below). They have nevertheless increased by a factor of 1.54 in sixty years (from 1855 to 1914). In addition, a decline in unemployment occurs between 1842 and 1873, from 10% to 2.8%, certainly, only to rise again, but to a lower level (5%). Finally, the first basic social rights are wrested away, such as limiting the work of very young children (declared prohibited under the age of nine in the textile industry in 1833), the restriction of the daily working time for women and children (to 10 hours a day in 1847), the acquirement of the right to organize in trade unions in 1875, etc. This reversal of the trend is the result of social resistance that develops as the working class grows in number and concentration. This explains a) the capping of the rate of surplus value from 1855 to 1872 and its subsequent slight decrease until 1895 (Graph 1.1) ; b) the stabilization and subsequent rise of the wages' share, respectively the stabilization and drop of the profits' share from 1855 to 1890 (Graph 2.4) ; and c) the stabilization and subsequent drop of the profit rate from 1860 to 1890 (Graph 2.5).

At the end of the 19th Century and the beginning of the 20th (1895-1917), there is a counter-offensive by the English employers to restrict the concessions granted during the previous four decades and to restore their profit rate (Grey, 2018). It succeeds partially, helped by a restoration of unemployment at the turn of the century, since real wages fall from 1901 to 1917 (Graph 2.1). The wages' share drops and the profits' share rises from 1890 to 1910 (Graph 2.3) ; since, the rate of surplus value soars from 1895 to 1917 (Graph 1.1), as does the profit rate from 1890 to 1910 (Graph 2.4).

Nevertheless, in spite of the halt to the degradation of the condition of the waged workers and a first amelioration, if we look at the entire century and a half from the beginning of the industrial revolution to the outbreak of the Russian revolution (1917), and if we abstract from the particular dynamics proper to each of its two sub-periods (1760-1855 for savage capitalism and 1855-1917 for colonial capitalism), one cannot but observe that the real improvements of the conditions of

[16] For a more detailed description of the productive orders that pace the life of capitalism, we refer to the article Crisis – Conflicts – Struggles – Populism (Part 1) in 'A Free Retriever's Digest' Vol.2#6 (December 2018 – January 2019).

the working class are very meager, especially in view of the enormous sacrifices made to achieve them, and compared to what the workers succeeded to obtain after the First World War.

In fact, despite the fierce struggles to reduce an excessively long working time, it is still higher in 1914 than at the beginning of the industrial revolution ! More than a century of struggles has failed to recover the sharp increase in working time by nearly 800 annual hours imposed by the employers from 1760 to 1830. As for the real wages, after a decline and stagnation for a century, they have increased only very slightly and slowly until the First World War. Unemployment, although fluctuating between 3% and 10%, has been almost permanent from 1760 to the First World War (5.5% on average).

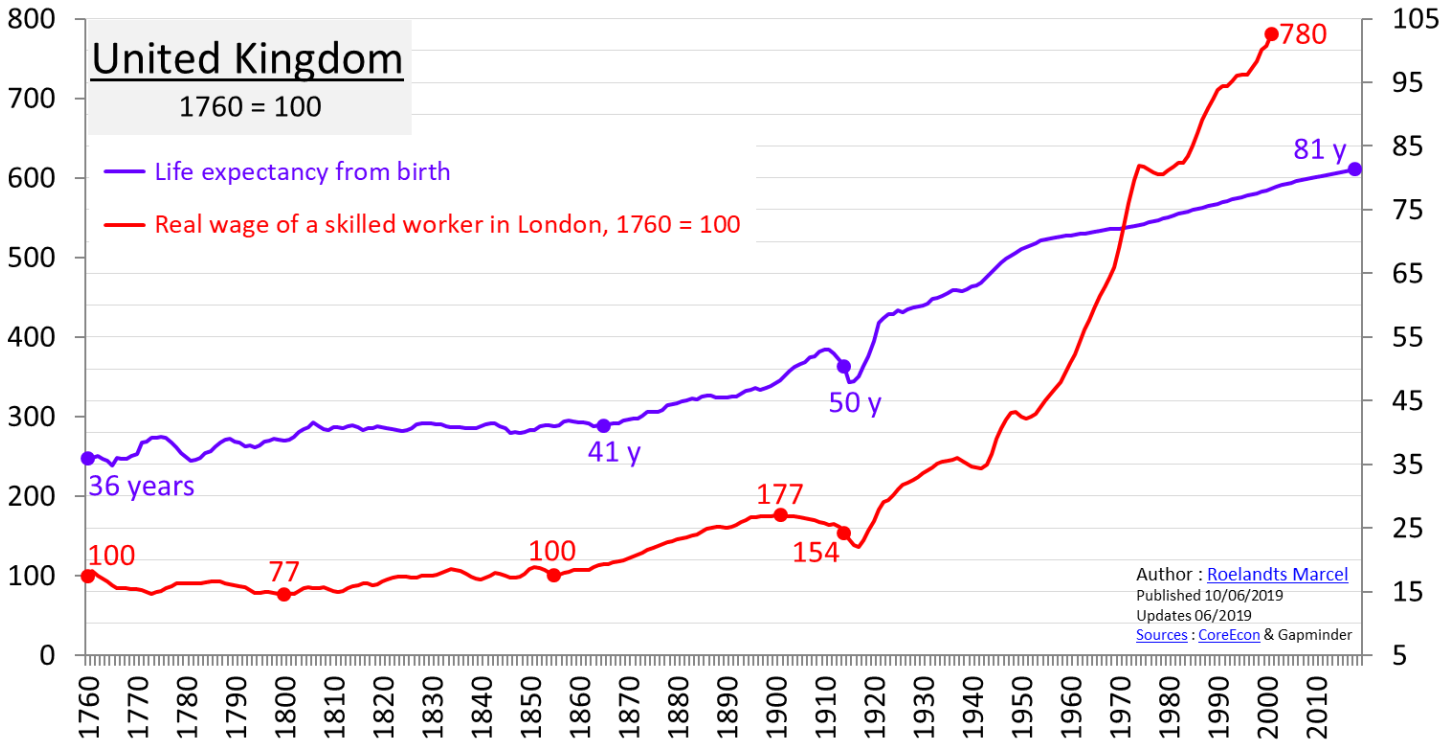
Concerning child labor, despite the social conquests of the second half of the 19th. Century, it is still very widespread. Its reduction will only be significant at the end of the 19th. Century “at the time when primary education, made compulsory in all countries, progressed”, we learn from Paul Bairoch (1997, vol. 1, p. 616-617). Thus, if the Factory Act of 1833 has prohibited the employment of children under 9 years of age and has limited working time at 8 and 12 hours for 9 to 14 year olds and for 14 to 18 year olds respectively, “This legislation remained however very timid” and “only applied to the textile industry”, he details. Also the case of the Belgian coal mines in 1880 needs to be mentioned, where nearly one-fifth of the underground miners are children under 16 years of age! In the United States, it was not until 1914 that the first steps were taken to limit child labor, and it was not until the New Deal of Roosevelt for an effective law to be passed in 1933!

As for social safety nets, social security measures and retirements schemes, the first concessions are timid and only come at the end of this period. There remain the legal rights that have been wrested away in hard-fought struggles, but whose practical provisions are rarely followed in practice, because there is still no such thing as a genuine labor inspection, accompanied by effective legal constraints. In this way, the [aforementioned] English Factory Act of 1833 provided only for a body of four inspectors in charge of monitoring its application!

These deplorable living and working conditions are to have a strong impact on the life expectancy at birth, which offer a different point of view of the socio-economic and health status of a population at a given time (Graph 2.6). It evolves very weakly during the first century of savage capitalism (from 36 to 41 years of age from 1760 to 1865) and only progresses by about ten years thereafter until the First World War. It should be noted, however, that the evolution reproduced here is that of an average population, combining all social classes; the life expectancy of a worker is obviously lower! Thus, in the workers’ cities par excellence of the English

industrial revolution, Liverpool and Manchester, it is only 25 and 29 years respectively in 1860 (Szreter & Mooney, 1998), whereas it has already reached 41 years for the average English population! Similarly, the life expectancy of a worker in France in 1913 is barely ±35 years, whereas its average population already reaches an age of 53 years (Leridon, 2012). This is a measure not only of the misery of the living and working conditions of the workers during the first century and a half of modern capitalism, but of a very shortened life because of these conditions!

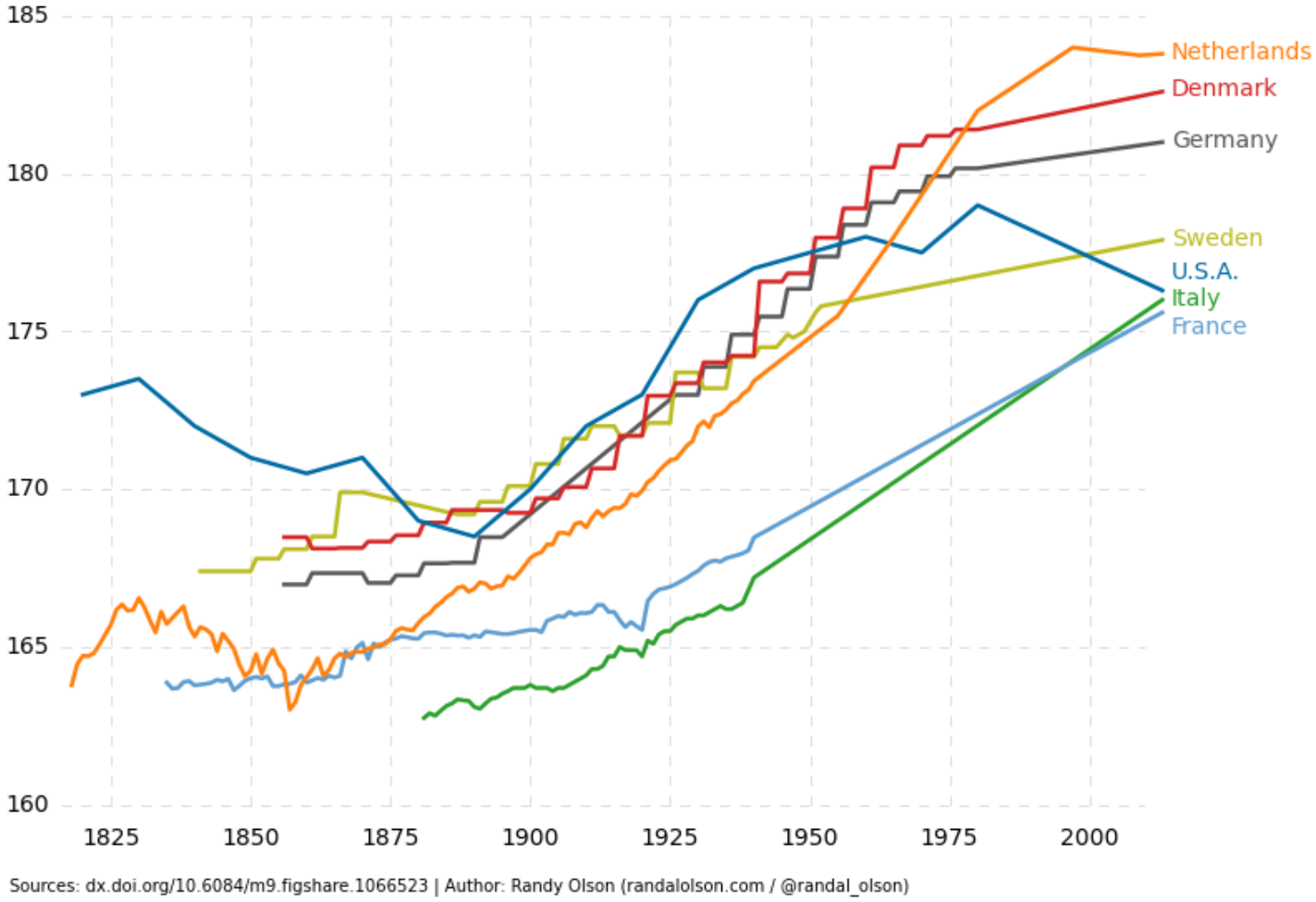
Graph 2.6 : Life expectancy at birth, UK (1760 - 2018) / Real wage of a skilled worker in London (1760 - 2001), UK 1760 = 100



This state of endemic poverty in the working-class world will change significantly after the revolutionary explosions following the First World War, and even more radically after the Second World War, given the much faster growth in real wages and of the reduction in working time. Thus, if life expectancy rises only by 14 years in one century and a half (1760-1914), it will rise twofold in less time : by more than 31 years in 104 years (1914-2018).

This multi-secular evolution is confirmed again if we observe variations in male body length. Thus, the median length of men generally declines, or remains stable, during the first century of savage capitalism. It slightly increases just since the last quarter of the 19th Century and rises significantly only in the 20th Century (Graph 2.7) :

Graph 2.7 : Median male body length (cm) in various countries (1820 – 2013) [17]



Finally, an evident sign of the still very miserable condition of the wage earners, despite the some hard-won improvements from the last third of the 19th. Century, is their increasingly massive emigration from Europe to supposedly milder airs, especially between 1881 and the First World War, i.e. during the period assumed to be the least worse for the working class. To measure its importance, let us look at the assessments of economic historians: one million Europeans have emigrated overseas between 1500 and 1800, another million between 1801 and 1850, but 41 million between 1851 and 1915, eight-tenths of which, or 33 million, [emigrated] during the three decades before the First World War (Bairoch, 1997, volume 2, p.169-185). Who, whereto, why and did they stay or return?

They are mainly English + Irish (40%), Italian (16%) and Germans (14%) who fled their country to go mainly to the United States (70%), Argentina (10%), Australia, Canada and Brazil (6% each). With the exception of the South American countries, only two million of Europeans have parted to what will become the future Third World (Africa and Asia) between 1800 and 1914. These candidates for emigrants are of course attracted by better life prospects abroad, but they have most often

[17] Olson, R. S. (2014). '[Why the Dutch are so tall ?]'

been forced by their miserable conditions in their country of origin. And if it was a success for some, for many others it was everything but an Eldorado, because the majority of them work in low-level jobs in the countries of arrival, and a significant proportion have returned, in the order of 40 to 45%, as they were unable to improve their daily lives. We are therefore very far from the image of Épinal, of the Uncle from the Americas who has made a fortune!

Overwhelming testimonies

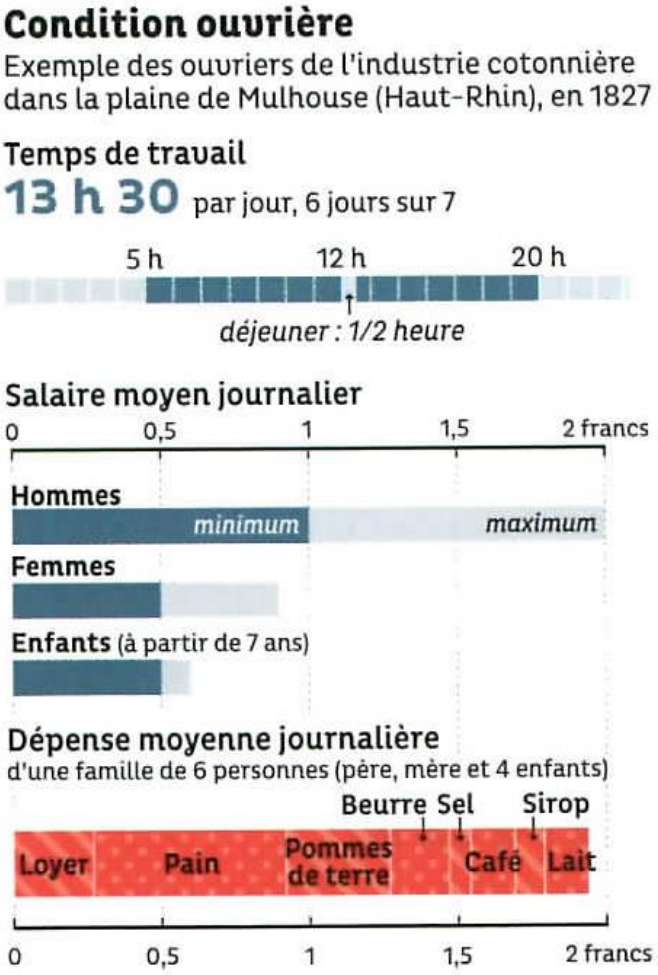
Document n°1, extract from the parliamentary report of 1840 for France by Dr. Louis Villermé :

"One has to see these workers arriving in town every morning and departing every evening. Among them are a multitude of pale and meager women, walking through the mud barefoot, and an even more considerable number of young children. In their hands or under their vests they carry the piece of bread that has to nourish them until the hour they return at home. Thus, to the fatigue of an already disproportionately long day, which lasts at least fifteen hours, add these so frequent journeys. They arrive at home exhausted in the evening and depart the other day before having completely rested. This is not a work anymore, it is a torture; and this is imposed upon children of six to eight years old. In order to prevent having to travel such a long way twice every day, they pile up in small rooms, unhealthy but in the proximity of their work. I have seen of these miserable lodgings, in which two families each sleep in a corner, on straw thrown on the floor…"

Document n°2, letter of 1848 by the employers of Lyon to the regional prefect, following a long social struggle that obtained to limit the working day from 16 to 14 hours in the local enterprises :

"We draw your attention to the grave consequences that our industries would have to undergo if the law would come to be applied. As you know the workforce here is demanding and beyond price. With sixteen hours we would hardly hold out. Fourteen hours would precipitate the bankruptcies. We draw your attention for the other part to the fact that, liberated earlier of its labor, the workforce would not gain sleep and rest. It would hasten itself to join the coffee shop or the pub and there would be much to fear for the young girls who, free and idle too early in the evening, would risk indulging in acts that morals disapprove of."

Document n°3, working time, daily wages and expenses for a workers' family in the cotton industry at Mulhouse in 1827 :



Workers' conditions

Example of the workers in the cotton industries of the Mulhouse plain (Upper-Rhine), in 1827
Work duration
13,5 hours per day, 6 days per week.

Average daily wages

Average daily expenses of a 6 persons' family (father, mother, 4 children)

Source: L.R. Villermé, Table of the physical and moral condition of the workers employed in the cotton, wool and silk manufactures, Renouard and Co., 1840.

Annex on the data and on methodology

Main Variables & Data

The grayed values have been included in the text and in graphs

	Life Expectancy	GDP/Capita	Productivity	Real Wage	Rate of Surplus Value	Annual Working Time	Unemployment Rate	World Population < $0.9/day
	Years	Index	Index	Index	Index	Hours	%	%
Smoothed →	5 years	5 years	5 years	5 years	5 years	-	5 years	-
1760	36,0	100	100	100	100	2668	3,6	-
1800	38,7	120	119	77	155	3446	4,8	87
1827	41,3	126	136	98	139	3472	7,3	86
1830	41,5	128	140	100	140	3475	7,8	86
1842	41,5	137	160	100	159	3392	10	84
1855	41,0	148	187	100	186	3305	4,3	82
1865	41,0	172	208	114	182	3241	3,6	79
1870	42,1	183	230	121	189	3183	3,8	78
1873	42,6	193	243	129	188	3037	2,8	78
1901	48,2	255	312	177	177	2950	4,6	69
1913	51,3	282	339	161	210	2908	3,3	64
1914	50,3	283	344	154	223	2899	2,4	64
1917	48,8	311	350	136	258	2893	1,1	65
1918	50,5	313	339	145	234	2890	1,3	66
1919	52	280	329	156	211	2618	3,4	66
1945	66,0	405	418	273	153	2315	0,9	62
1974	72,6	681	873	616	142	1845	4,3	50
1975	72,8	691	886	614	144	1814	4,6	50
2001	78,3	1238	1482	780	190	1696	5,3	26
2015	80,9	1473	1636	-	-	1669	6,0	12
2016	81,0	-	-	-	-	1668	5,5	11
2018	81,3	-	-	-	-	-	-	11

Data sources for our graphs

Data on GDP per capita, labor productivity per worker and real wages (see below for more details) are from the Core project : Unit-2-data-file-for-charts.xlsx (You have to subscribe on this web site to access to this Exel file). Those on **life expectancy at birth** are from version 7 of the Gapminder database. The **rate of surplus value** has been calculated in a traditional way, by dividing productivity by real wages (See below for more details). **Annual working time**, **unemployment rate**, **syndication rate** and the **number of social conflicts** in Great Britain were taken from the Bank of England's historical database. The **level of industrialization in the world**, **developed countries** and the '**Third World**' are drawn from the work of Paul Bairoch (Volume III p. 860, 1997). The **distribution of income worldwide** and the **number of people living below the absolute poverty line** are from Our World in Data (also available in the Gapminder database mentioned above).

Presentation of the data

In order to better reveal the true trends, beyond purely cyclical variations, we have smoothed most of the data over five years, i.e. each annual value is replaced by the average of itself and the values of the two adjacent years. In order to better compare their respective evolution, we then transformed our data into indices starting on a given date, usually 1760. Finally, in the same vein, some of our graphs are presented on a logarithmic scale (instead of an arithmetic one) to better understand the respective growth rates of the indicators because, in this case, the slope of the curve gives us its growth rate.

Notes on the choice of the series on the evolution of real wages

From the various estimates of real wages' developments, we have chosen the most recent and consistent one. It is also the one that enjoys the largest consensus at the moment. It was prepared by one of the best economic historians at present : Robert C. Allen. It is based on estimates that were already considered as the best (those of Charles H. Feinstein and Cregory Clark), while improving them. It makes it possible to rule out with certainty a significantly divergent estimate prepared by Peter Lindert and Jeffrey Williamson, which is flawed and very ideologically oriented. Moreover, and not least, it is also corroborated by other sources and methods, such as changes in the average population height (see graph below), or in life expectancy at birth (idem). Indeed, the body height data follow the same trend as that of R. C. Allen's real wages. The same is true for life expectancy, which also suggests a deterioration in living conditions during the first century of the industrial revolution, only to improve from 1860 onward. Life expectancy in 1860 in the two centres of the industrial revolution, Liverpool and Manchester, of 25 and 30 years respectively, are a sufficient indication of the deterioration suffered by the working class during this first century of the industrial revolution (see graphs below).

The calculation of the rate of surplus value in Great Britain

The rate of surplus value has been calculated as follows : starting with it classical formulation : **Surplus Value / Wages**, or : **(NIP – Wages) / Wages**, we have divided each term of the aforementioned expression by the wages. This results in : **(NIP / Wages) – 1**. By subsequently dividing the numerator and the denominator by the number of wage earners, the two determinants of the rate of surplus value are made to appear, labor productivity in the numerator and the real wages in the denominator : **(NIP / Wage Earners : Wages / Wage Earners) – 1**. In other words : **the rate of surplus value = (Productivity / Real Wage) – 1**. Its evolution depends thereby from the respective relationship between the variations of labor productivity and those of the real wage : if labor productivity increases more rapidly than the real wage, the rate of surplus value increases, and inversely. This approach permits to make the two essential determinants of the rate of surplus value appear, and to escape from the delicate bookkeeping decisions posed by the calculation of the Gross Interior Product (GIP) and the wages over long periods, by relying on two very solid statistical series that constitute a near consensus among economic historians. Marx had well understood the whole importance of this relative relationship between the growing labor productivity and the increase of real wages, since he discerned one of the possible causes of overproduction crises in their growing mismatch : *"Over-production arises precisely from the fact that the mass of the people can never consume more than the average quantity of necessaries, that their consumption therefore does not grow correspondingly with the productivity of labour"* [18].

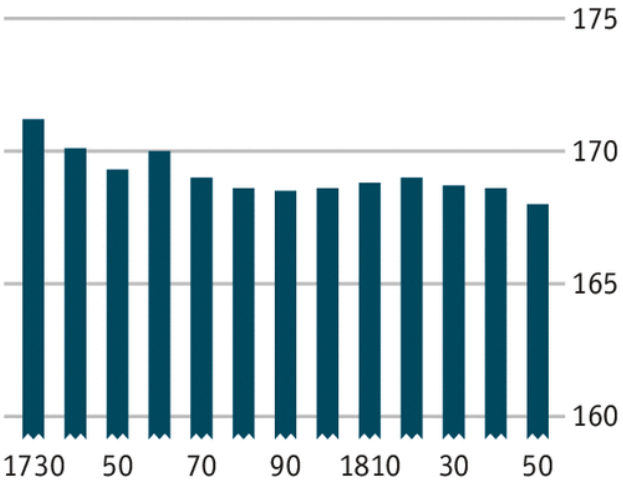
List of graphs (G), tables (T) and maps (M) per chapter

[18] Karl Marx, "Theories of Surplus Value" (1863), Vol.2, Ch. 16: Ricardo's Theory of Profit, [3.] Law of the Diminishing Rate of Profit; [e) Ricardo's Explanation for the Fall in the Rate of Profit and Its Connection with His Theory of Rent] (Translation by Progress Publishers, Moscow).

Some complementary graphs

Mean height of English soldiers

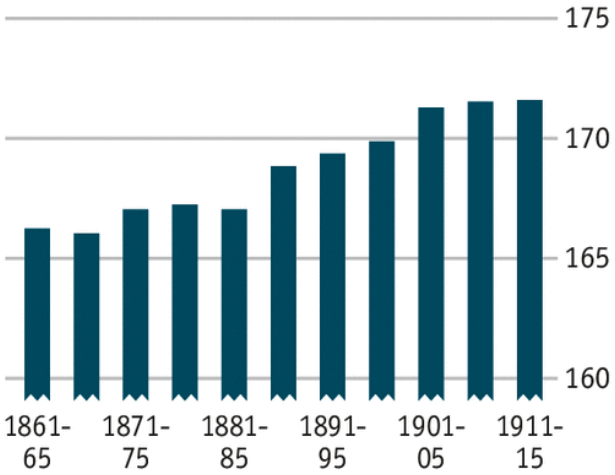
Aged 20-23 years old, cm



Source: Komlos, 1998

Mean height of men

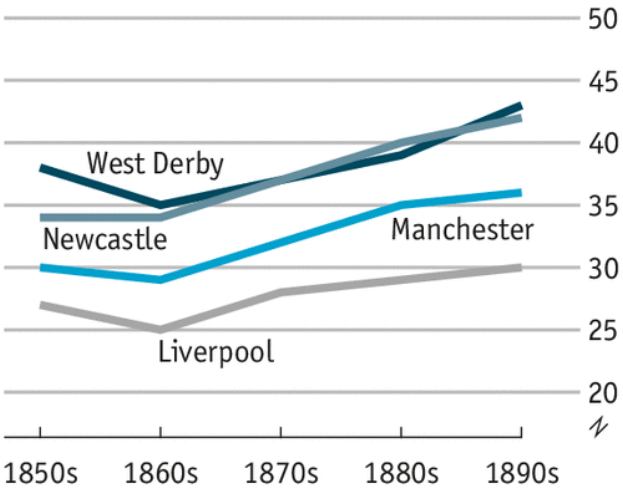
By birth cohorts, cm



Source: Hatton & Bray, 2010

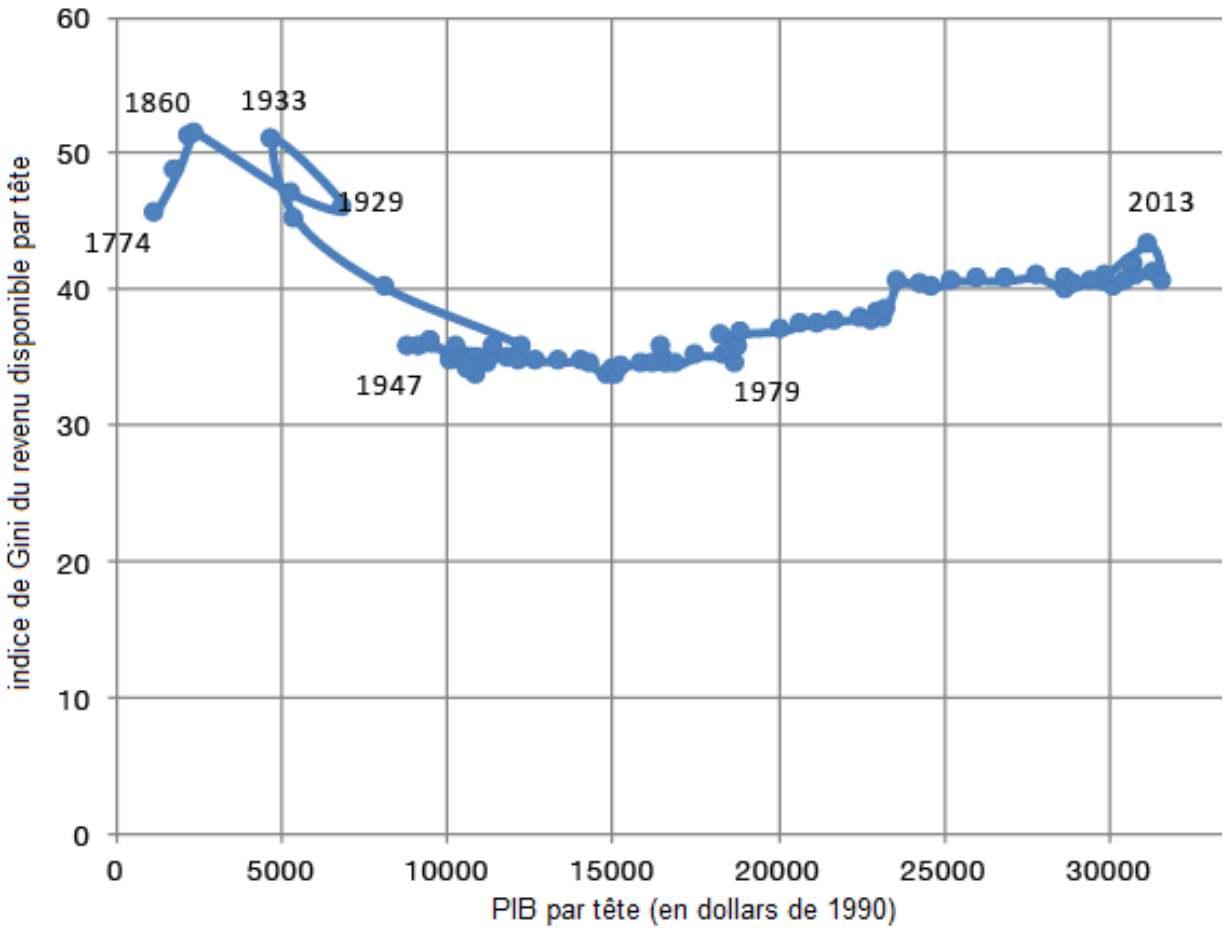
Life expectancy at birth

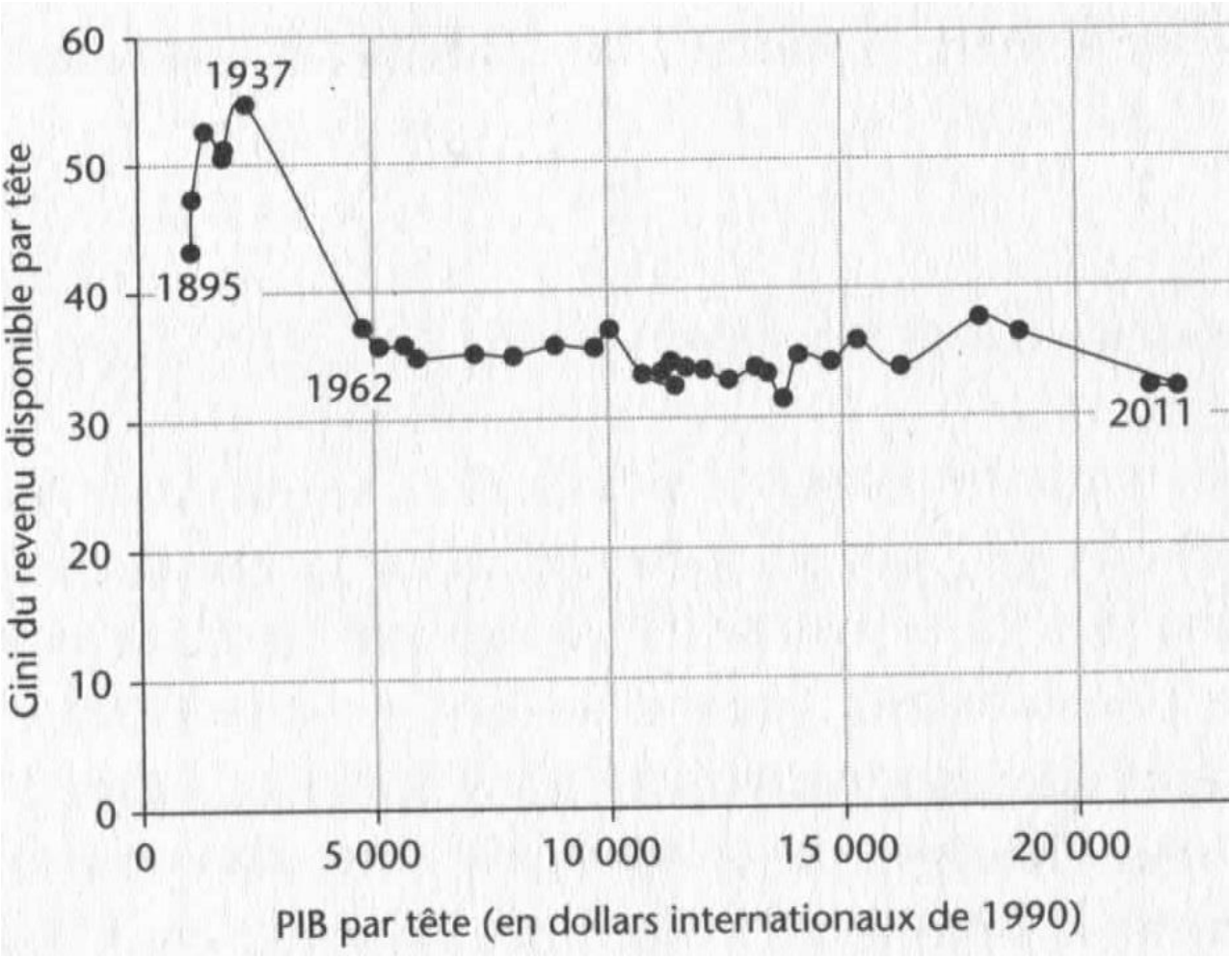
Cities in England, years

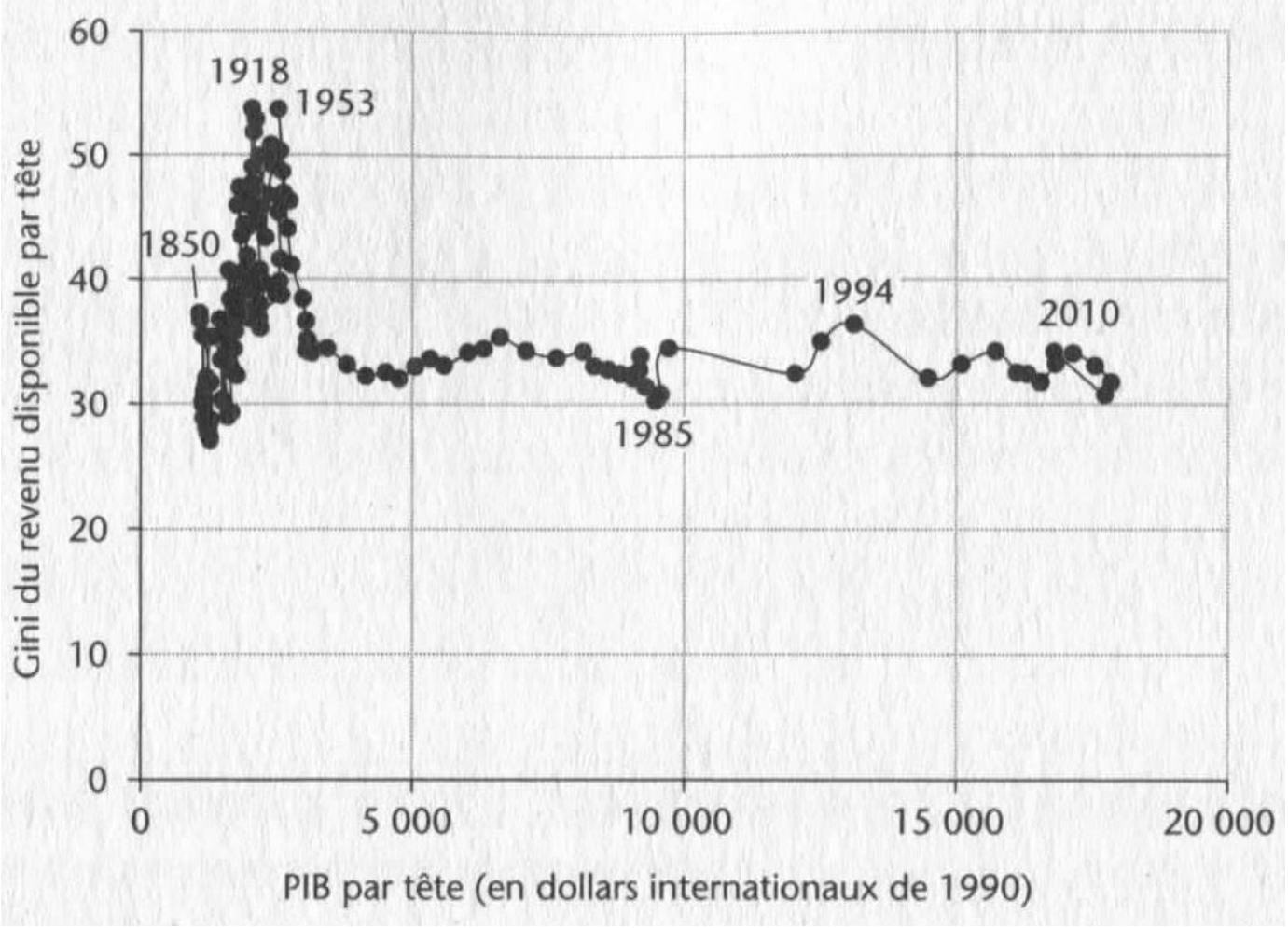


Source: Szreter and Mooney, 1998

Gini Indexes for the USA, Japan and Spain






60
50
40
30
20
10
0
1918
1953
1850
1994
2010
1985
Gini du revenu disponible par tête
0
5 000
10 000
15 000
20 000
PIB par tête (en dollars internationaux de 1990)

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