

Factory discipline and externalities in the reduction of working time in the 19th century in France

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Abstract

This paper emphasises an underestimated hypothesis - health considerations - explaining the reduction of working time in the 19th century in France. The first part is devoted to the rising wages and the declining health. In the second part, we show that the deterioration of living conditions was a negative externality suffered by workers and arising out of inter-firm competition. In the last section, we highlight one of the necessary conditions for any reduction in this externality: the growing realisation among both employers and workers of the long-term health effects of the prevailing working conditions. In this change, doctors played a decisive role.

Key-Words: Labour market, working time, health, economic history, externality.

JEL: H23, J7, J22, J5, N33

Discipline d'atelier et externalités dans la réduction de la durée du travail au 19^{ième} en France

Résumé

Ce papier analyse une hypothèse sous estimée - le rôle de la santé - dans la réduction de la durée du travail en France au 19^{ième} siècle. Dans une première partie, nous rappelons que la croissance des salaires réels s'accompagne d'une détérioration de la santé. Dans la seconde partie, nous montrons que la détérioration des conditions de vie est un effet externe, supporté par les salariés et qui émerge de la concurrence entre les entreprises. Dans la dernière partie, nous mettons en évidence l'une des conditions nécessaires à la réduction de l'externalité : la prise de conscience à la fois pour les salariés et les employeurs des effets sur la santé des conditions de travail existantes. Dans ce changement, les médecins ont joué un rôle décisif.

Mots-clés : Marché du travail, temps de travail, santé, histoire économique, externalité.

Classification JEL : H23, J7, J22, J5, N33

The reduction of working time in France bears the imprint of political and social struggles of such bitterness that it seems to exist in reality only when enshrined in legislation. Important milestones in its evolution include the 1841 legislation on child labour, the law on statutory working time enacted in 1848, the year of revolution, and abolished in 1851, which made a distinction between Paris and the provinces, the 1892 law on women's working time that banned them from night work and the legislation of 1900 that established the 10-hour day for adult manual workers. From a normative legal perspective, this chronology would appear to demonstrate the crucial importance of legislation in paving the way for changes in workplace practice. However, this is just one way of considering social changes dominated by the law. This primacy of the law and the belief in its efficacy have been challenged, particularly by economists who believe, on the contrary, that changes on the ground very often precede legislation. In a sense, there is nothing to prevent us supposing that the increase in real wages in the second half of the 19th century in France played a crucial role in the reduction of working time. In this standard economic interpretation, the optimal and spontaneous allocation of productivity gains is reflected in a reduction in working time rather than in a greater increase in wages.

Our outline of these two approaches is schematic, of course, but even so neither of them is of any help in understanding the forces that led to a reduction in working time rather than higher wage demands. It is true that some historians, such as Michelle Perrot (1972), have argued that time, being a universal standard, has an undeniable comparative advantage over wages, which are always difficult to compare. Nevertheless, however seductive this explanation may appear to be, there is no doubt that the balance between the two dimensions of time and pay deserves more profound analysis.

The emphasis in this article is on a hypothesis that is familiar but whose scope is, nevertheless, underestimated, namely that health considerations also played a role in the reduction of working time. The increase in manual workers' real wages that took place across Europe in the second half of the 19th century was accompanied by a deterioration in living conditions and particularly in health, as measured by a multiplicity of different indicators. This is the subject of the first part. Next, in the second part, we show that the deterioration of health in the workplace was a negative externality suffered by workers and arising out of inter-firm competition. On the one hand, employers unilaterally decided on the working time that they imposed on their workers, just as they determined all other employment and working conditions. They were instrumental in establishing factory discipline by imposing identical work rates and working times on all workers, leaving them with a false choice between submission and resignation. On the other hand, wages did not compensate workers for the deterioration in their health ; Driven by the forces of competition into ever harsher exploitation of the workforce, they generally had no reason to take into account the long-term effects of their decisions on the health of the workforce. In the last section, we highlight one of the necessary conditions for any

reduction in this externality. This was the growing realisation among both employers and workers of the long-term health effects of the prevailing working conditions. This was far from being an obvious realisation ; rather it was the product of an enormous effort that began with the discovery and then the recognition of a causal link between work and health which, given the state of medical knowledge and the power of certain institutions to deny any relationship that might be established, could not be taken for granted in the 19th century. Moreover, in order for employers to see reductions in working time not as an obstacle to their firms' competitiveness but rather as a possible source of productivity gains, it was necessary for them to change the time frame within which they made their decisions and to adopt a longer-term perspective. This change in thinking about labour force management could come about only under certain conditions. First, there had to be pressure from the workers themselves. Second, the value of maintaining employees' health had to be demonstrated by surveys and by the experiments conducted by certain employers in the textile industry of Eastern France. Finally, there were the interventions of the state and of its legislature, which succeeded in committing all firms, and not just a minority of paternalist employers, to decisions that would be viable over the long term.

From this point of view, we are not being anachronistic in investigating the 19th century. The negative health effects of certain working conditions are still being denied, as the case of asbestos, for example, shows. Although the dangers of asbestos were established scientifically in 1970, thirty years passed before the State recognised them and took the appropriate measures. This denial was facilitated by the very scientists who had discovered the health effects of asbestos and who therefore enjoyed a certain legitimacy¹.

In the final part of the article, we advance the hypothesis that factory discipline was the dominant organisational model in firms, even though other modes of organisation coexisted with it, as some historians, and in particular Clark (1998), have stressed. Indeed, we take the view that factory discipline was one of the visible faces of the '*disciplinary societies*' that Michel Foucault analysed (1976) and whose emergence dates back to the classical period. Factory discipline was imposed through a series of convergent microprocesses that were applied firstly in schools, hospitals and the army and insinuated themselves more discreetly into factories. Factory discipline was not based on a single institution, the employers, nor did it depend on civil law and the establishment of labour law. Rather, it had its roots in the power embodied in a number of different institutions, including the family, the education system and police², and which was reflected in tight surveillance of space and control of working time.

¹ See the very well-documented article by Patrick Herman : 'Dans l'enfer blanc de l'amiante', *Le Monde Diplomatique*, April 2002.

² In this regard, the worker's record book, introduced in 1803 and abolished in 1890, was a prototype for police control over labour. Cf. J.-F. Germe (1978).

1. Rising real wages and deteriorating health in the workplace

1.1. The difficulties of estimating working time

The first stage of our investigation consists of a description and analysis of how the very long working hours of the 19th century actually manifested themselves in concrete situations. After all, the notion of working time encompasses three different types of empirical questions.

- Working time can be observed over periods of different lengths (day, week, year, lifetime). In the case of the year, it has been established that the number of public holidays has declined considerably, because of the abolition of many religious festivals (J. Gershuny, 1991).
- Each value ascertained for working time, which implicitly denotes an average value, is subject to considerable variation.
- Finally, these various values imply very different levels of work intensity and very different working conditions.

It can be concluded from the work of Bertrand Gille (1964) and Michelle Perrot (1973), who conducts a critical analysis of all 19th century surveys of manual workers, that there is no systematic statistical source that enables us to follow the evolution of actual working time over the course of the 19th century in French manufacturing industry. The only complete, systematic survey is that carried out by the Office du Travail (Department of Labour) between 1894 and 1897, which covered 'large-scale industry' (establishments in all sectors, including agriculture, employing at least one person³); over the same period (1891 to 1896), surveys on wages and working time for home workers were carried out by the Office du Travail under the direction of P. du Maroussem. Other sources, mostly case studies, are summarised in Rist (1897). The picture these surveys paint is partially distorted by the political or literary uses to which they were put by, among others, Engels, Victor Hugo and Emile Zola. Nevertheless, in the first half of the 19th century⁴ in the textile industry⁵ and in the mines as well, working days of 15 hours and longer were not uncommon⁶.

Most of the estimates of annual working time involve calculating a value by multiplying an estimation of the 'standard' working day by the number of days usually worked in a year. Without even wishing to consider the various forms of resistance to work that manifest themselves in the workplace, such estimates cannot take into account days lost because of unemployment, sickness or absence nor of the days worked outside of the factory, which constitute, nevertheless, a significant source of variation in industrial activity, as is shown particularly by Sicsic (1986), Postel-Vinay (1989) and Bompard, Magnac, Postel-Vinay (1995). It is

³ In 1896, the 'large-scale-industry' faced the home workers who constituted 22.6% of the labour force (Cf. Professional census, 1896).

⁴ Cf. C. Rist (1897).

⁵ Cf. C. Fohlen (1956).

⁶ Cf. R. Villermé (1839), E. Buret (1840), E. Levasseur (1907), G. Noiriel (1986), A. Dewerpe (1998).

very difficult, therefore, to determine individual working times and there is a considerable risk of confusing the very long working times observed with the hours actually worked by any one individual over the course of a year (to say nothing of the hours worked by that individual over his lifetime, a calculation that becomes problematic as soon as it is accepted that the status of manual worker does not necessarily cover all eventualities).

If, despite everything, we had to content ourselves with ascertaining just the major trends, we could say that working times reached their high point (in terms of hours worked per day as well as per year) around 1840, after which a downward trend set in that brought daily working time down to about 10 hours by the end of the century⁷. The improvement in working conditions and the reduction in working time, which began to manifest themselves from the second half of the 19th century onwards, seem to be well established (Fridenson, 1992). In their recent book *Le Travail en France*, Marchand and Thélot (1997) offer the following summary of the long-run evolution of working time. In their view, the period from 1835 to the present is 'unique in history', characterised as it is by 'a very considerable reduction in working time' from 3000 to 1630 hours per year in 1995, with the downward trend being more particularly pronounced from 'the beginning of the 1880s' onwards. However, the figures they adduce (cf. in particular Table A.11 in the appendix, whose method of compilation is not fully explained) are based solely on an approximate method that involves inferring the figures from 'conventionally' estimated working times, from 'norms' or from the generalisation of particular observations. The data adduced by Marchand and Thélot are consistent in their trend with those of Maddison (1991), although the latter are lower in level.

The longest working times were reached at the beginning of the 1840s in France in manufacturing rather than in farming, where the length of the days imposed limits and the working day, at least outside harvest periods, was punctuated by regular breaks, as Garrier and Hubscher (1988), for example, show⁸. Working conditions were particularly harsh in industries such as textiles and mining. Nevertheless, as Levasseur (1904) noted in his comments on Buret's report of 1840, working conditions in factories were certainly no worse than those endured by home workers⁹. Moreover, even within the same industry, conditions were not uniform; the

⁷ Rist associated long working days with large-scale industry, and indeed this is where they are best documented. Nevertheless, there is a good deal of evidence that other modes of production were also affected by long hours. Levasseur suggests that homeworkers had to work even longer hours in extremely difficult conditions just to survive; faced with competition from the textile industry and its machines, this mode of production could be maintained only if wages were low and working times very long. The craft sector was not exempt either: in the baking trade, for example, L. and M. Bonnef (1914) note the persistence of unbearable working conditions until late in the century.

⁸ It should be noted, nevertheless, that Voth (1998) reaches different conclusions for Great Britain and maintains that only a very long working day in agriculture can explain the level of production at the end of the 18th century. Cf. Boudieu (2001).

⁹ E. Buret, 'a morose critic of industrialism' according to Levasseur, attributed many of the ills of the working classes to industry, which had 'replaced family work with factory work': '*Men, women and children have been crowded together in their thousands in vast factories where they have to work side by side and higgledy-piggledy for fourteen or fifteen hours a day*' (quoted by Levasseur (1904), p. 290-291).

analyses that were carried out were usually based on a particular region, which probably introduced some degree of bias into the conclusions obtained. This at least is what Boyer (1998) shows with respect to Marx and Engels: if they had not focused their research on Manchester and the Lancashire cotton industry, they would have had a different view of the effects of industrialisation. Similarly, the situation in the textile industry of Northern France described by Villermé did not reflect the more favourable conditions that existed in the Mulhouse region (cf. Villermé, 1840, Fohlen, 1956).

Overall, working time seems to be characterised by a very high level of heterogeneity between the sectors, which in reality conceals a common structure animated by a competitive principle that pushed some workers and firms into working virtually unlimited hours. For the labour movements and for some employers, there was no doubt that no spontaneous force could prevent the destabilising and dangerous effects of such practices. It was on this basis that the question of working time took on a reality of its own and became a major issue in political campaigns and struggles.

1.2. Rising wages and declining health : a paradox ?

It lies outside the scope of this article to give an account of the debate on whether or not the Industrial Revolution improved workers' living standards. The topic merits a whole book by itself.¹⁰ However, not locating our hypothesis within this debate is not an option either.

Remaining with the relatively recent history of the debate, it can be said to be structured around two opposing figures: the liberal Ashton (1949), who published an article in which he argued that workers' standard of living began to rise from 1820 onwards¹¹, and Hobsbawm (1964), who argued the opposite. Since then, three basic positions have emerged, which have come to be classified by their degree of 'optimism'. The '*optimists*' argue that there was a significant increase in living standards before 1850. The '*pessimists*' reject this position, but are themselves divided into the '*strong pessimists*' and the '*weak pessimists*'. The former believe that living standards really declined before 1850 because urban migration gave rise not only to additional costs (higher rents, absence of plots of land, etc.) but also to a deterioration in the quality of life. The latter argue that the available data do not justify rejection of the hypothesis that living standards remained constant between 1780 and 1850.

In our judgement, the increase in real wages, which is a fundamental characteristic of the second half of the 19th century in most European countries resulting in part from the productivity gains achieved during the same period (Figures 1 to 6 in the Appendix), gives only a partial view of workers' circumstances. This judgement reflects our scepticism towards the neo-

¹⁰ Those attempting to tackle this vast literature could start with Floud & McCloskey (Eds.), (1981), Mokyr (1988), Engerman (1995), (1997), Steckel (1995), Steckel & Floud (Eds.) (1997) and Boyer (1998).

¹¹ This article was subsequently republished in a book edited by Hayek in 1954.

classical approach, which gained fresh impetus from the research of Lindert and Williamson (1983). This work is based on a reconstitution of new statistical series on manual workers' pay in Great Britain between 1755 and 1851¹². The authors concluded that living standards rose significantly during the first industrial revolution¹³. One of the arguments advanced is that individuals were attracted to the towns and cities because wages were higher there than in the country. For Williamson (1981), this wage gap can be thought of as a measure of the 'urban' or 'industrial disamenities'. He then goes on to show that the gap was a small one, which made the towns and cities almost attractive.

Lindert and Williamson's position was criticised, firstly in strictly economic terms. This was the approach adopted by Mokyr (1988), who argued as follows. If Lindert and Williamson's revision of the wage series is correct, then observations relating to consumption must tend in the same direction. Now Mokyr shows that living standards, as measured by the consumption of tea and sugar, remained unchanged from 1815 to 1840.

Subsequent critiques of the neo-classical argument stepped outside of the strict economic paradigm. If non-economic indicators of well-being are taken into account, then different conclusions as to the evolution of living standards are reached. Indeed, many studies, such as those by Steckel and Floud (1997) or Weir (1997) in the case of France, based on anthropometric or demographic indicators (such as size and mortality respectively), all lead to the same conclusion that workers' health deteriorated¹⁴. Boyer's article (1998) also seeks to highlight the contradiction between the growth in real wages and the deterioration in health indicators. And Engerman (1994: 60- 61, 1997), having outlined all the precautions required in order to ascertain exactly what a change in height means (it may be the result of changes in diet but also in work intensity and environmental health), also noted that average heights decreased during the period of strong wage growth from 1850 onwards.

The effects of the very long working days impacted on French society as a whole. The most immediate and most visible consequence was the 'exhaustion through work' that Cottareau (1983) highlighted in the case of France. It manifested itself in an increase in work-related illness and disease (Lecuyer, 1983)¹⁵, in a rise in the mortality rate (Villermé, 1829, Bertillon, 1892)¹⁶ and in the number of people suffering accidents at work (Villermé, 1850) and in a reduction throughout the 19th century in the age at which the pensions paid out by the mutual aid societies could be drawn. Cottareau (1983), who sifted through the Philanthropy Society's yearbooks

¹² The new statistical series were grounded on the exploitation of a new source, 'The House of Commons' Account and Papers'. They mainly concerned the occupational services.

¹³ For an interesting criticism of this thesis, cf. Mokyr (1988), Feinstein (1988), (1998).

¹⁴ This critical approach has affinities with the analyses of Marx, who used size as a possible indicator of the subsistence level in *Critique of Political Economy*. Huck (1995) shows that infant mortality in the towns and cities of Northern England increased between 1813 and 1846.

¹⁵ Cf. Sachnne (1900). Describing the 'weavers' hell', L. and M. Bonnet (1914) observed that in Lille, a major centre of the textile industry, 'Deaths from tuberculosis account for 25 per cent of all deaths'.

¹⁶ Cf. also J. Vallin & F. Meslé (1989).

(*Annales de la Société de Philanthropie*) covering Paris, reached some significant conclusions. From a usual 70 years of age at the beginning of the 19th century, the pension age fell to 65 between 1816 and 1840 and to 60 between 1840 and 1847. Exhaustion through work was also reflected in the decreasing height of conscripts, which could also be attributed to inadequate diets¹⁷. The specific effects of working conditions in the textile industry are well documented. Michelle Perrot (1972) notes the very poor results recorded by the review committees in textile regions. In 1879, the exemption rate was as high as 18% in some cantons, compared with a national average of 11%. This situation seems to have been persistent since, according to Paul Pic¹⁸, in about 1898 in Mulhouse, which is actually a town noted for its paternalism, 100 conscripts were adjudged fit for military service while 166, or 62%, were classed as unfit. However, it is impossible to say that excessive working hours were the sole cause of this physical exhaustion. Competition between workers became more intense as a result of the widespread use of labour-only subcontracting and manifested itself in an acceleration of the daily work rate, which extended to all other aspects of life (Cottureau, 1983). Other consequences of excessive working hours were more indirect and were reflected particularly in alcoholism. This phenomenon, which became a veritable epidemic, preoccupied doctors throughout the entire century (Villermé, 1839, Sachnine, 1900, Bertillon, 1913).

2. Long working days: a source of external effects

2.1. The notion of externality

The lasting and cumulative effect of very long working days and of increasingly harsh working conditions became more and more evident and was reflected overall in a deterioration of the health of a growing share of the population. The situation was not unlike the effects of pollution on people living close to a factory, a classic example of a negative external effect. To what extent can the notion of externality legitimately be applied to work and its effects on workers' health?

In the standard conceptual framework (Laffont, 1970), an externality is said to exist when an agent's action directly influences the interests of another without being accompanied by a contractual, market exchange. Meade (1954) gives the example of the beekeeper whose bees benefit a farmer's orchard; Pigou cites that of the corn fields that are burnt by the ash and cinders from passing steam trains ; another example would be the noise pollution caused by a neighbour playing excessively loud music. In order to restore harmonious and efficient relations, Coase (1960) suggests that the best solution is to establish contractual conditions and that,

¹⁷ Cf. D. Weir (1991).

¹⁸ Pic (1900), p. 474, note 4. Cf. Sachnine (1900).

provided the transaction costs are not too high, such an economic contract between the two agents is far preferable to enacting legislation or introducing an order banning the undesirable action or behaviour.

One obvious characteristic of the relationship between an employer and a worker is that it is contractual, which would seem by its very nature to exclude the possibility of externalities. Before discussing this point, however, we can say that if the notion of compensatory wages is to prevail, then the harmful effects of long working hours and harsh working conditions have to be demonstrated. This is not to say that workers themselves do not feel the physical suffering their work causes them but rather that the link between working conditions and industrial diseases was not established in the 19th century. Indeed, even though the first Board of Hygiene and Public Health in the Seine department was set up in 1801, it was far from accepted that this new institution should work to improve the health of the working classes. Lécuyer (1983) has demonstrated absolutely convincingly that the reports compiled by doctors at the prefect's request prior to the authorisation of a new factory were completely biased: *'The primary concern [of the Board of Public Health] was not so much to protect the health of workers employed in the planned factories as to ensure that operations in the new plants would not have any adverse consequences on the surrounding area'* (Lécuyer, 1983: 49-50). Thus most of the reports sought to demonstrate the healthiness of the planned factories. From this point of view, Villermé was an exception.

An employment contract, defined as an exchange between free individuals, should exclude any possible externality, if we are to believe the expression coined by the celebrated legal expert Fouillé, a disciple of Kant: *'He who says contractual says fair'*. However, there are two scenarios in which an employment contract does in fact generate negative externalities. The first is when the workers have little scope for bargaining on working hours and working conditions, which applied to all factory workers. Consequently, they had to accept conditions imposed by employers who did not share their interests. The second scenario is when the wage does not provide adequate compensation for the negative utility generated by the working conditions. Mishan (1965) shows that externalities are created when an agent suffers from an 'unpaid factor', but they may also arise when there is an 'underpaid factor'. The following section is given over to a demonstration of this two facts.

2.2. 'Factory discipline', or the unilateral fixing of working hours and working conditions

Workers negotiated their contracts individually and were unable to alter their working hours or working conditions, which were the same for all employees in the factory. This point is emphasised by Feinstein (1988: 649).

The genuinely new factor in the 19th century, and one that arose out of the Industrial Revolution, was the way in which control over workers was exerted and the essential role that time played in this control. Thus timetables, schedules, work rate, break times and the conditions under which work might be interrupted occupied an important position in the rules laid down and imposed by employers¹⁹. Rolande Trempé (1971), for example, shows how employers used severe time constraints to prevent miners in Carmaux from working outside the mines. Working days were long, not only in order to increase output and return on capital invested, but also to make it more and more difficult for miners to combine their work in the mines with work on the land, which was prejudicial to their work in the mines for a number of reasons. It limited their availability, particularly during the harvest period, it made them less productive because of the double workload and, finally, it made them less dependent on the mines.

When the employer's authority was firmly established in the factory, it was he who determined his employees' working hours and working condition and even, to some extent, the way they lived. Fines²⁰, the clock, factory rules and the closing-off of the factory²¹ to all but the workforce were the main instruments employers used to exercise their power. They all helped to establish factory discipline and, in particular, to enforce long working hours. Finally, employers forced workers to remain with the company by setting up company stores. Workers were obliged to buy what they needed for their daily lives from the factory store; the products sold there were more expensive than in ordinary shops, to which workers did not have access either because they were too far away or because they were simply banned from going into them. One of the effects of this system was to force workers into debt, which in turn meant they had no choice but to go on working in the factory for their entire lives. In this way, employers were able to gain complete control over their workers. It became difficult for them to go on strike because that would deprive them of food: the factory store would not extend credit for that reason. The widespread practice of working overtime provides supporting evidence for the hypothesis that workers had no control over their working hours. According to the Labour Department survey of *Wages and working time in manufacturing industry (1894-1897)*, 76.3 % of factories (81% of workers) in Paris

¹⁹ This is the basis for E.P. Thompson's celebrated argument on 'time, work and capitalism', which shows how the notion that 'time is money' is in fact a product of recent history and specific to the Industrial Revolution and to the organisation of work in factories and owes a great deal to the clock, which made it possible to measure time. Cf. E.P. Thompson (1967).

²⁰ Workers were still being fined for lateness or absence at the end of the 19th century. According to the 1896 Labour Department survey, fines were imposed in 22% of factories in the provinces and in 6% of Parisian factories.

²¹ The closure of factories to all but the workforce took a long time to achieve : it was still an open building, without any real control, so much so that Michelle Perrot (1983: 6) could write that: '*the domestic space and the work space continued to be interlinked. Vagrants came in to warm themselves up in front of the ovens. Factories were a sort of night shelter open to itinerant workers*'. In our view, the slowness in closing off factories can be explained by the fact that the obverse of this repressive measure was greater solidarity among workers, which was a necessary condition for disputing the wage relationship.

and 33.3 % of factories in the provinces (40.2 % of workers) worked overtime, as the table below shows.

Table 1. Overtime in the Seine department and in the provinces²²

	Seine department		Provincial departments	
	% of factories	% of workers	% of factories	% of workers
All private industry, of which:	76.3	80.8	33.3	40.2
- 'Overtime at regular times'	14.4	12.6	10.5	8.5
- 'Overtime at any time depending on need'	61.9	68.2	23.8	31.8

Overtime worked in order to deal with peak workloads and for the purpose of machine maintenance was more frequent in Paris than in the provinces and was found in very different industries: food processing industries, textiles, fabric working, mechanical engineering, metal working and building in stone in Paris (Graph 7 in the Appendix) and leather and skins, iron working, mechanical engineering and the working of base and precious metals in the provinces (Graph 8 in the Appendix). We would put forward the following hypothesis by way of explanation for the great disparity between Paris and the provinces. Outside Paris, it was normal for workers to be engaged in more than one kind of work, with factory work being supplemented by work on the land. This was obviously not possible in Paris, where workers' financial needs were comparatively greater, with rents in particular being higher.

The next point to be made is that most overtime was '*worked at any time depending on need*'. Analysis of the questionnaire sent to factories shows that the needs in question were the employers' rather than the workers'. The questions asked about overtime were as follows :

- '*Which categories of workers do overtime ?*
- '*At what times of the year ?*
- '*From what time to what time ?*
- '*Is overtime compulsory ? If not, what proportion of workers do overtime ?*'²³

Mobility was a limited form of defence for workers against the working conditions imposed by employers.

²² Office du Travail, 1894-1896, volume 1, (Seine department): 482-483. Volume 4 (Provinces): 130-131.

²³ These supplementary questions appear at the bottom of the page in the questionnaire. It is question no. 6 (cf. Office du Travail, 1894-1896, volume 1 (Paris & Suburbs). No information has been provided on the question on whether or not overtime was compulsory.

Finally, and this is an essential point to emphasise, it was rare for overtime premia to be paid. According to the same survey, 18% of factories in Paris (Graph 9 in the Appendix) and 24% of those in the provinces (Graph 10 in the Appendix) paid higher rates for overtime²⁴. In most cases, overtime was worked at the standard rate, which gives good grounds for supposing that there was an imbalance of power between employers and employees. Nevertheless, overtime was not always worked just to avoid dismissal. It was also a way for workers to make ends meet. It is difficult to dispel these uncertainties, since they are directly linked to the notion of subsistence, which is debatable at the very least. Fogel (1994: 377) stresses '*the misleading nature of the concept of subsistence as Malthus originally used it and as it still widely used today. Subsistence is not located at the edge of nutritional cliff, beyond which lies demographic disaster. The evidence outlined in the paper implies that, rather than one level of subsistence, there are numerous levels at which a population and a food supply can be in equilibrium, in the sense that they can be indefinitely sustained.*'

2. 3. Wages no compensation for working conditions

Did manual workers in manufacturing find in high wages adequate compensation for the very long working hours imposed on them and for the risks they took, particularly in endangering their health? To answer this question, statistics on wages, duration of work, qualification as well as indicators reflecting the working conditions, ought to be studied. But these statistics are fragmented and their interpretation require a specific research. For example, the statistics carried out by Bertillon (1899), show that the mortality rate of the caretakers old of 40 to 59 years, is greater than that of bricklayers (respectively 33.6 per 1000 and 24.5 per 1000).

So it is out of the scope of this article to present well documented proofs; It only can be given some indicators, which support the hypothesis of non compensatory wages. In a same occupation in which workers suffer the same working conditions, wage differentials are observed. The survey conducted by the Office du Travail (1994- 97) shows two empirical evidences: 1. A great variability of wages according to the size of the firm, for a same occupation. Generally, wage increases with the size of the firm. Table 2 gives some examples. 2. For the average wage of a same occupation, there is a significant gap between Paris and the provincial areas: the Parisian average wage is about twice the provincial areas (cf. Figure 11, in the Appendix).

²⁴ Office du Travail, 1894-1897, vol. 1 (Seine department) : 482-483. Volume 4 (Provincial areas): 130-131.

Table 2. Average wage²⁵ by occupation and size of the establishment (Provincial areas)²⁶

size of the establishment	Minors	Quarrier	Wool mill worker	Metal worker
> 1000 workers	4,90	-	-	4,15
500 - 999	4,45	-	3,30	3,50
100 - 499	4,05	4,10	2,60	3,75
25 - 99	3,85	3,75	2,75	3,90
1- 24	2,40	2,70	2,40	-

3. The conditions for the reduction of working time

3.1. Inter-firm competition and the extension of employers' time horizons

If, as we have just established, workers were unable to internalise the effects of very long working days on their health, employers, who both determined their working conditions and suffered the consequences of them, might well have been concerned to look after their employees' health, if only to protect their own interests.

The nub of the argument deployed by certain liberal economists of the period who were favourable to working time reductions was that it was in the employers' interests to cut working hours. Rae (1900) in England and Rist (1897) in France were the most systematic advocates of this position. In their view, employers had to internalise some of the effects of excessively long working days on their workers' productivity and hence on their profits (without explicitly saying so, Rae invented the notion of the efficient working day, which is the counterpart of the current notion of efficiency wage). The notion that productivity declined as a result of worker fatigue when working days were too long was widely debated throughout the 19th century. Thus any reduction in working hours at that time would have come about because employers were more aware of where their own interests lay and were better informed about the prevailing modes of production. In any event, this line of analysis was not to be dismissed, and all the empirical analyses of working time reduction undertaken in the 19th century mentioned the existence of private, voluntary experiments with shorter working hours, generally in the most modern factories (Rist, Rae). In these factories, employers made explicit reference to considerations of efficiency in order to justify their decision not only to cut working time but usually also to reorganise the working day (for example by abolishing the first morning break, when a light meal was usually taken). However, such employers were in a minority and internalised only a small

²⁵ The average wage is calculated for 10 hours work.

²⁶ Office du Travail (1894- 1897). Vol. IV: 166-7.

part of the external effects, whose consequences they suffered only to a limited extent (they could always get rid of prematurely exhausted workers at little cost to themselves...).

Only organisations exercising complete control over the workforce could have had an interest in taking better account of the long-term effects of their decisions, and the most frequently cited examples of more humane working conditions do indeed relate to factories that were organised in such a way as to ensure a very long-term involvement with the workforce. The 'paternalist' employers of Eastern France are one such example. Thus Fohlen (1956) showed how in 1852 Jean Dolfus, an employer in the textile industry, '*launched the idea of workers' housing estates, the aim of which was to enable workers to own their own homes after twenty years*'.²⁷ Other institutions developed on the basis of this principle of employer-organised assistance, and in Mulhouse a pension fund and retirement home were set up in 1851, followed in 1852 by a mutual aid fund in the event of sickness and a society promoting savings.

Even at a time when such social institutions were still underdeveloped, the costs of exhaustion through work were being socialised in practice. Thus when an employer subjected his workers to very long working days in environments that put their health at risk and, when they fell ill, they had to be cared for by their families or, in one way or another, by the community (charities or public assistance), the very long working days did indeed constitute a negative external effect that diminished the collective well-being. Since they were bearing only a very small part of these costs, employers (who could always pay money to charitable organisations) were not internalising the effects of long working hours.

3.2. The production of the relevant information, or the collective construction of measurements of externalities

The idea of fighting excessive working hours did not develop until such time as all the social actors had at their disposal a shared knowledge of working conditions and hours, which required the production and interpretation of the relevant information. What we wish to analyse here, therefore, are the circumstances under which abnormal exhaustion through work became socially recognised. In France and in England, the 1830s saw the emergence of the social issue whose outlines have been sketched in by Castel (1995). As early as 1973, however, Michelle Perrot highlighted the influence of the medical profession on the creation of 'moral' statistics: '*Population censuses (...) should not consist simply of an enumeration of all inhabitants by gender, age and marital status but also, as far as possible, of an enumeration by profession and social conditions*', wrote Villermé, a member of the Academy of Medicine, in 1834²⁸. While the Journal of Public Health and Forensic Medicine (*Revue d'hygiène publique et de médecine*

²⁷ C. Fohlen (1956), p. 88.

²⁸ Cité par M. Perrot (1973) : 15.

légale), set up by Villermé in 1824, was an instrument for the diffusion of the latest knowledge in the sphere of industrial health and of the measures required to improve that knowledge, another institution also played an important role. This was the Academy of Moral and Political Sciences²⁹, which embodied a moral, 'hygienicist' (i.e. public health) position that had developed from the 1830s onwards out of research on worsening poverty, a point to which Michelle Perrot draws attention (1973: 15-35). It was against this background that the Academy commissioned two reports on the condition of the working classes. One was commissioned from Villermé in 1835, the other from Buret³⁰. Surveys on poverty proliferated between 1830 and 1850³¹. From an international point of view, it was Engels' study (1845) that attracted attention in that it had a considerable impact on the development of class consciousness, particularly through the widespread international diffusion of *Capital*. Moreover, there were considerable similarities between these surveys, so much so that some experts have wondered whether Engels might have plagiarised Buret's work.³² It is true that the two surveys are based on a report compiled by the same English doctor, Dr. Kay. Finally, Buret acted as Villermé's referee to the Academy of Moral and Political Sciences.

Our aim here is less to describe the content of these surveys than 1) to show that the surveys carried out by Villermé, Buret and Engels contain information on actual working conditions that had not previously been made available, 2) to show why these reports were socially effective and 3) to explain the mechanisms through which awareness of excessive working hours developed. Their legitimacy helped to make the reports effective but was not in itself a sufficient condition³³.

Our hypothesis is that the medical profession played an essential role in the development of this social awareness. Indeed it was doctors who converted a diffuse social malaise - 'the question of poverty' - into a naturalistic depiction of the destitution of the working classes. Although the importance of Villermé's report is now universally recognised, it seems to us that the reasons for its social effectiveness have gone largely unrecognised. Now it is not self-evident that it should have been members of the medical profession who helped to develop social awareness of the excessive working hours and atrocious working conditions that prevailed in manufacturing industry. Why was it the medical profession that exposed the situation? Why were the positions they adopted so socially effective, and perhaps more effective than others? What exactly did Villermé do?

²⁹ Set up by the National Convention in 1795, abolished in 1803 and re-established after the revolution of 1832. Villermé was head of the Academy's economic policy and statistics department (cf. Villermé, p. 21).

³⁰ Cf. R. Castel, p. 227.

³¹ A list of them will be found in Francis Démier's introduction to Villermé's *Tableau*, p. 77-79.

³² It was H. Rigaudias- Weiss (1936) who raised this question in his book, *Les Enquêtes ouvrières en France, entre 1830 et 1848*, Paris, Librairie Félix Alcan.

³³ There are conditions for the effectiveness of legitimacy, which are beyond the scope of the present analysis.

Villermé took care to establish the facts. He went into factories, carried out his own investigations, observed, noted down what he saw. His investigations took no fewer than four years to complete. For the first time, it was established that the working classes endured very long working days and lived in extreme poverty. It was in this sense that Villermé converted a partial and somewhat vague awareness of the condition of the working classes into a naturalistic depiction. In the conclusions to his report, Villermé called for a reduction in working time for children only, judging as the liberal that he was that the condition of adult workers had improved³⁴. The State passed the first piece of legislation seeking to limit children's working hours in 1841, immediately following the report's publication. This clearly demonstrates the ineffectiveness even of obvious facts if they are not mediated by an expert witness. Conversely, however, such an expert witness does not necessarily have any influence over the political authorities. For some historians, such as Michelle Perrot (1973 : 33-34) and Lecuyer (1983), Villermé was exploited by the politicians.

However, one of the strengths of Villermé's *Tableau* is that its author was able to develop a more scientific analysis of the condition of the working classes by drawing on new tools, namely statistics applied to demographic and social data, in which considerable advances were made during the first third of the 19th century, as a result particularly of Quételet's work³⁵. He compiled mortality tables by occupation, which had never been done before.³⁶ He measured the volume of air per person in factories.

In our view, the other main strength of Villermé's *Tableau* is that he draws on his medical expertise in order to examine a problem which, strictly speaking, lies outside the scope of medicine. The logic that underpinned the medical world meant that doctors sooner or later inevitably came up against the questions of public health raised by the very nature of industrial work in the 19th century. The more medicine developed as an autonomous world with its own value system, the more inevitable it was that it would eventually occupy this ground. Moreover, it had the legitimacy to do so³⁷. At the same time, precisely because it was occupying this ground on the basis of its independent position, it was able to do so without being suspected of bringing to bear a body of knowledge that was inherently biased because of its position and interests in the economic sphere itself, which was not the case with those in the political world, for example. Thus the medical profession's position as an 'outsider' is an essential and general characteristic that helps us to understand the weight carried by the stance it adopted³⁸. In this

³⁴ R. Villermé (1840), p. 565.

³⁵ On this point, we follow H. Rigaudias- Weiss (1936) and F. Demier(1989).

³⁶ R. Villermé (1840), Chapter VIII.

³⁷ Legitimacy is the corollary of autonomy.

³⁸ This analysis certainly needs to be refined. It is necessary, in particular, to ascertain the position medicine occupied in the scientific 'space' - it is in a sense the most moral of the 'hard' sciences - and also the position within medicine occupied by those doctors who took a stance.

case, therefore, effectiveness is linked to the bringing in of legitimate knowledge from an outside source.

This same phenomenon of the exteriority of expert medical knowledge can also be observed in other countries. In Belgium and England, for example, reports on child labour were compiled by the various academies and colleges of medicine. In Belgium, the *Survey on the condition of the working classes and on child labour*³⁹ was carried out on behalf of the Ministry of the Interior by members of the Royal Academy of Medicine (1848). The excessively long hours worked by children were denounced. They made it impossible for them to benefit from a 'normal' education, it was argued; it was difficult for them to attend evening classes because they were too tired and in any case such classes also put their safety at risk as they had to be out after dark. The Belgian Royal Academy of Medicine noted that '*night schools have serious disadvantages from the moral point of view, particularly in winter*'⁴⁰. In England, the reports of the Child Employment Commission, the first of which dates from 1829, were to be much used by Marx⁴¹ in his denunciations of child labour.

It seems to us impossible to understand the processes leading to the reduction of working time without factoring into the analysis the existence of the Academies of Medicine. In other words, the reduction of working time is due in part to social worlds like that of the medical profession that are independently constituted.

The social order that the doctors were challenging was in no way a natural order but a social order that was going to have to react, according to its own lights, by putting its own institutions in motion. Rabinbach (1986) shows how the scientific discourse on fatigue and the physiology of effort developed autonomously at the end of the 19th century. Nevertheless, its claim to neutral expertise was not accepted without resistance from both employers and workers. The medical and physiological observation - people are unwell, they are engaged in excessive physical activity associated with their work - served historically as the vehicle for a challenge to a mode of economic regulation that was incapable of providing workers with a satisfactory standard of living. Once again, this identification of deficiencies in the mode of regulation applied not only at the collective level, as an average outcome or as an abstract idea, but also at the individual level, influencing the notions each individual had about their situation in the world of work. It was out of the crisis of this set of representations that the reduction in working time emerged. Medical knowledge was an efficient way of incorporating the question of public health into people's thinking about work.

³⁹ Cited by M. Lecoq (1906), p. 45-48.

⁴⁰ Cited by M. Lecoq (1906), p. 47.

⁴¹ Cf. Marx, *Capital*, Appendix VIII, p. 1309 ff.

Conclusion

Since the concept of externality normally denotes a technical interaction in the absence of an economic transaction, it would seem at first sight difficult to apply the notion to the employment contract, which is based on a voluntary agreement between free individuals. However, if we draw on the analyses developed by Steinfeld and Engerman (1991) and by Engerman (1973), (1992), which challenge the widely held belief that there is an unambiguous distinction to be made between 'free labor' and 'coerced labor', and show that, in Hegelian terms, formal freedom in law does not ensure real freedom of choice and that employees are forced to work rather than being free to choose the time they devote to it, then it becomes clear that they are not in a position to defend their long-term interests, and in particular their health. Consequently, the notion of externality can be used even though an employment contract entails a monetary transaction. We have established how the working conditions and factory discipline imposed by employers could give rise to negative external effects. Although the very difficult situation in which the working classes found themselves has been known for a long time and although the apparent contradiction between industrial growth and the deteriorating situation of sections of the working class are important topics in contemporary historical analysis, the mechanism we identify - and this is the first contribution of our analysis - does not seem to have been highlighted before.

The notion of externality provides us with an important analytical tool that can be used to understand the process leading to the reduction in working time and the form it took. The idea that growth and productivity gains were partially converted into free time in an idealised trade-off between consumption and leisure does not tell us at what rate and in what way the actual reduction in working time took place. We then identified two conditions that had to be met if externalities were to be reduced. On the employers' side, only a change in the timeframe of their decision-making could bring them round to the view that a reduction in working time would not inevitably undermine their competitive position vis-à-vis other firms : the efficiency principle dictated that, in the long term, a healthier workforce would enable productivity gains to be realised. On the other hand, the information required to stimulate new thinking about work also had to be produced. The reduction of externalities was made possible by a change in employers' time horizons from the short term to the long term. The decisive contributions in this area were made by economists such as Rae and Rist, by the expertise of members of the medical profession and by the example of certain employers in the textile industry of Eastern France, such as Dolfus. A third condition not examined in this article was the mobilisation of the working classes themselves in support of a reduction in working time, which led eventually to the establishment of the right to strike in 1864 and the recognition of trade unions in 1884.

Our argument encourages us to advance a more general hypothesis about economic change, namely that the conditions under which it becomes possible depend on the involvement

of forces generated in social spheres other than the economic. These forces act on the economic sphere when they are able to provide representations that that sphere recognises. In order to do that, they have to manifest themselves in real effects on behaviour, institutional arrangements and the rules governing social relations.

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Figure 1. United Kingdom: Real Wages (Scholliers & Zamahni, 1995: 263-264)



Figure 2-a. France: Real Wages (Lévy-Leboyer & Bourguignon, 1985:333)

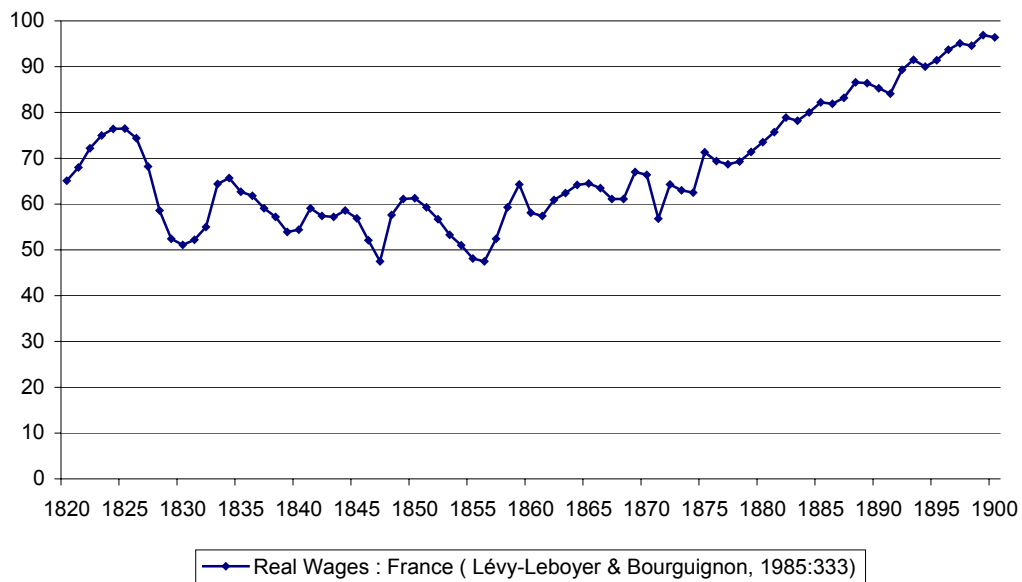


Figure 2b. France: Real Wages (Lévy-Leboyer, 1971, Table II, p. 490, reprinted from Scholliers & Zamagni (1995): 208- 209).



Figure 3. Germany: Real Wages (Mitchell, 1988: 181-182 & 839- 840)

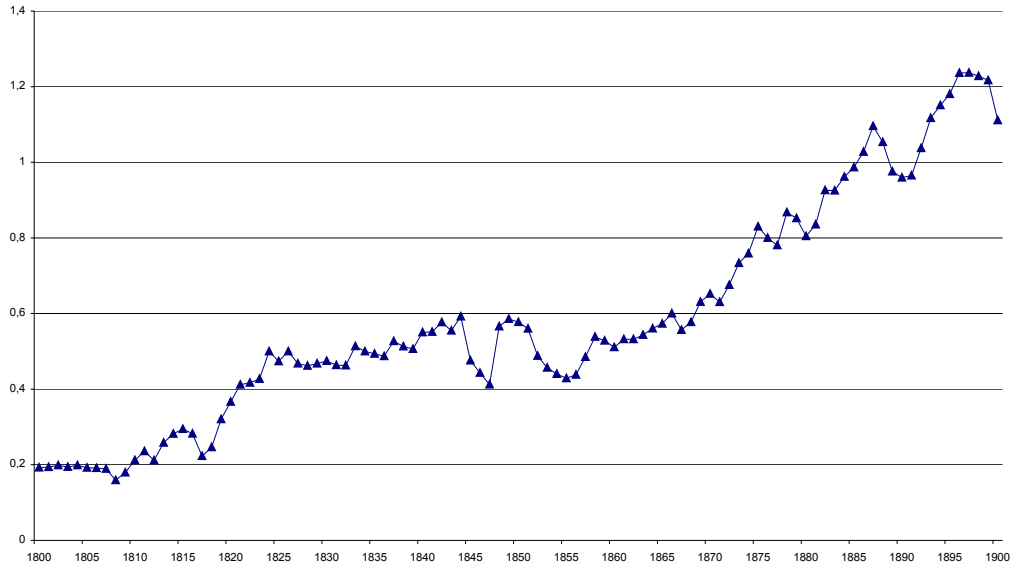


Figure 4. Norway: Real Wages (Scholliers & Zamagni, 1995: 240-242)

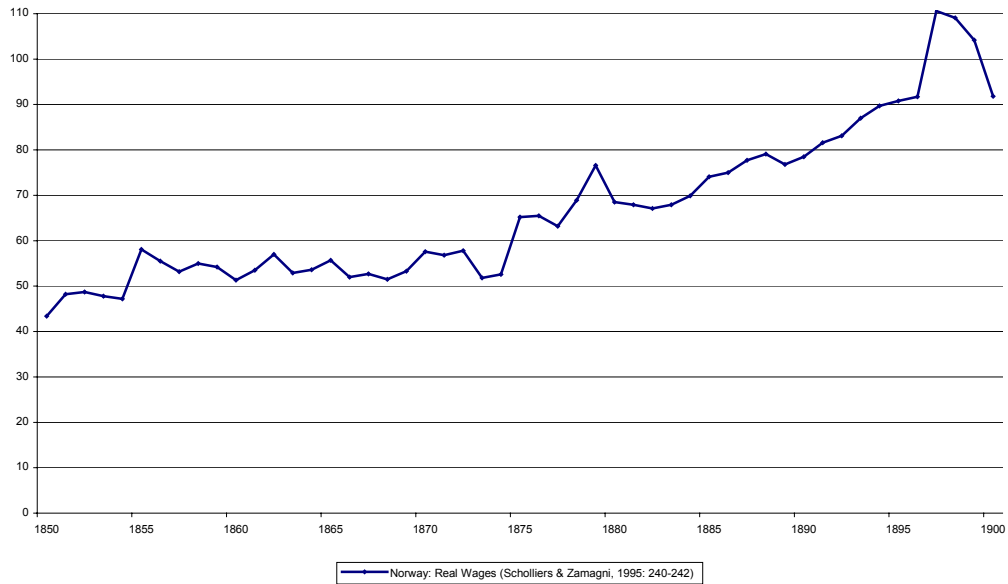


Figure 5. Netherlands: Real Wages (Scholliers & Zamagni, 1985: 234-235)

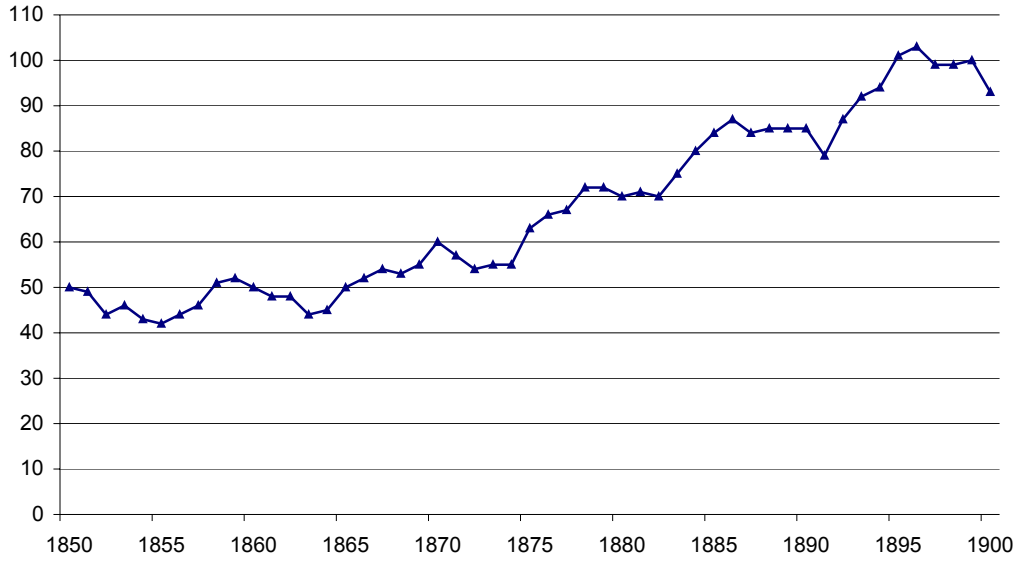


Figure 6. Belgium: Real Wages (Scholliers & Zamagni, 1995: 203-204)

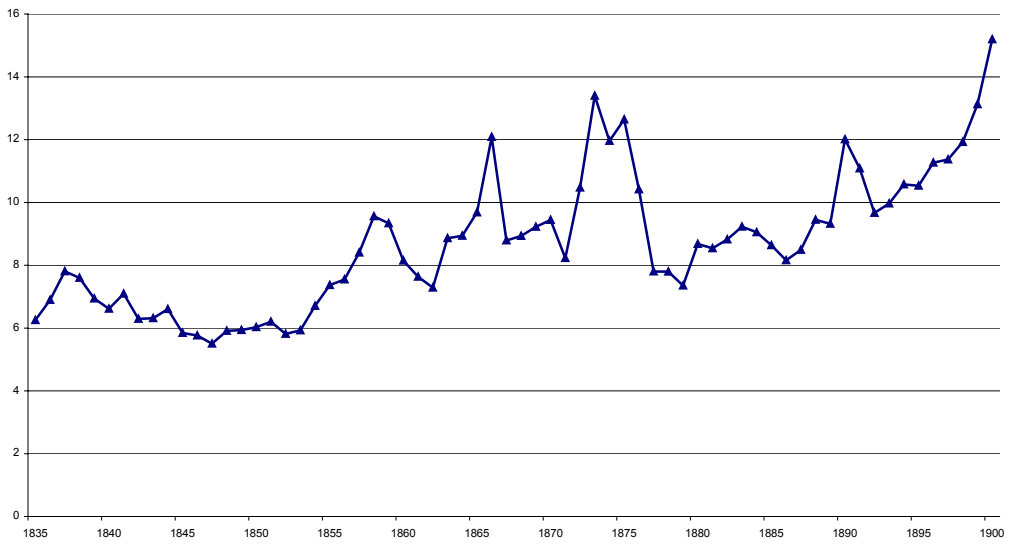


Figure 7. % of firms practicing overtime hours (Paris, 1894)
(Office du Travail, 1894- 1897)

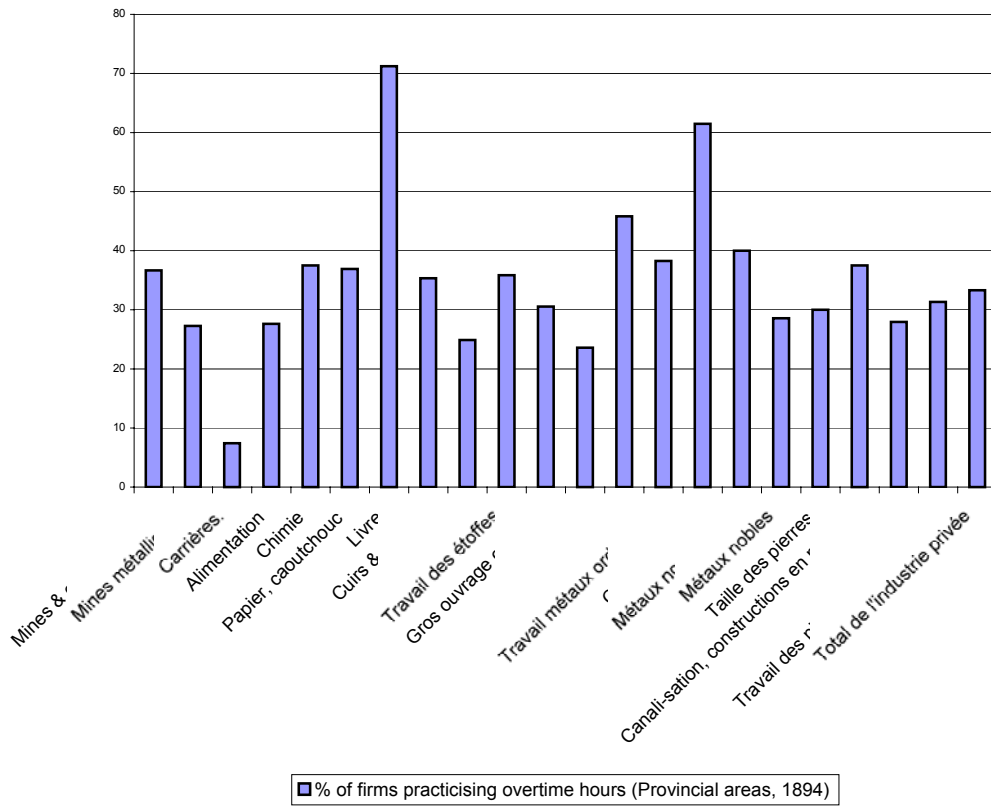


Figure 8. % of firms practicing overtime hours (Provincial areas, 1894)
 (Office du Travail, 1894- 1897)

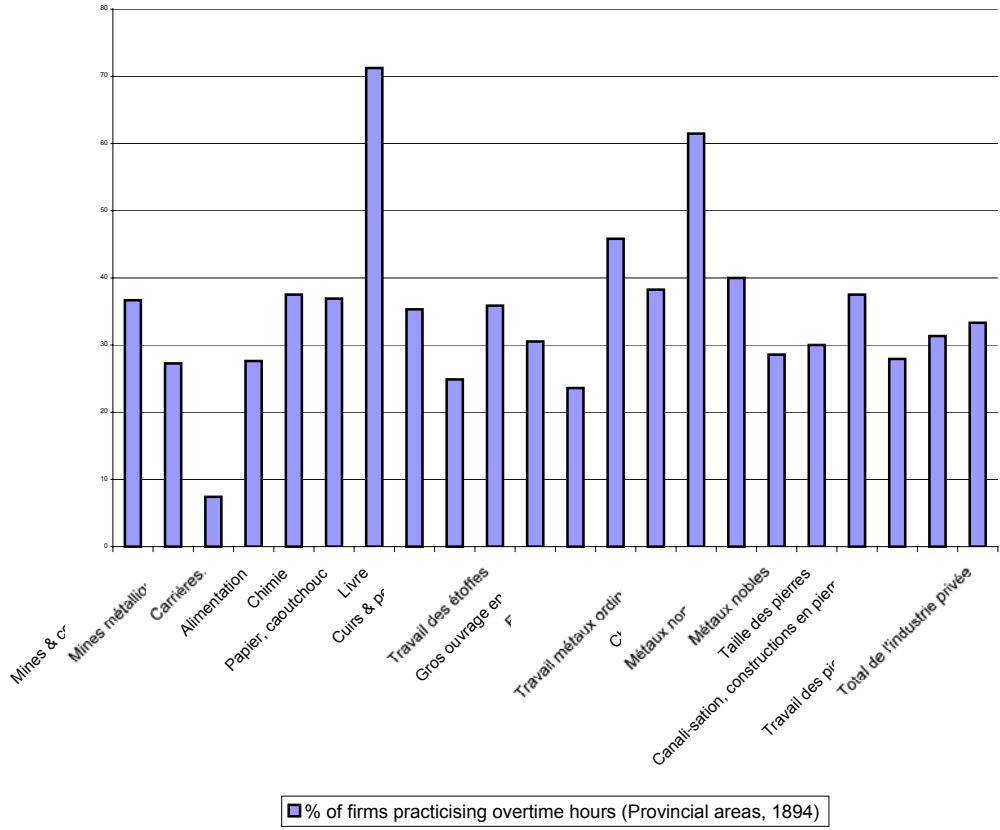


Figure 9. % of firms where overtime hours are paid at an increased rate (Paris, 1894)
(Office du Travail, 1894- 1897)

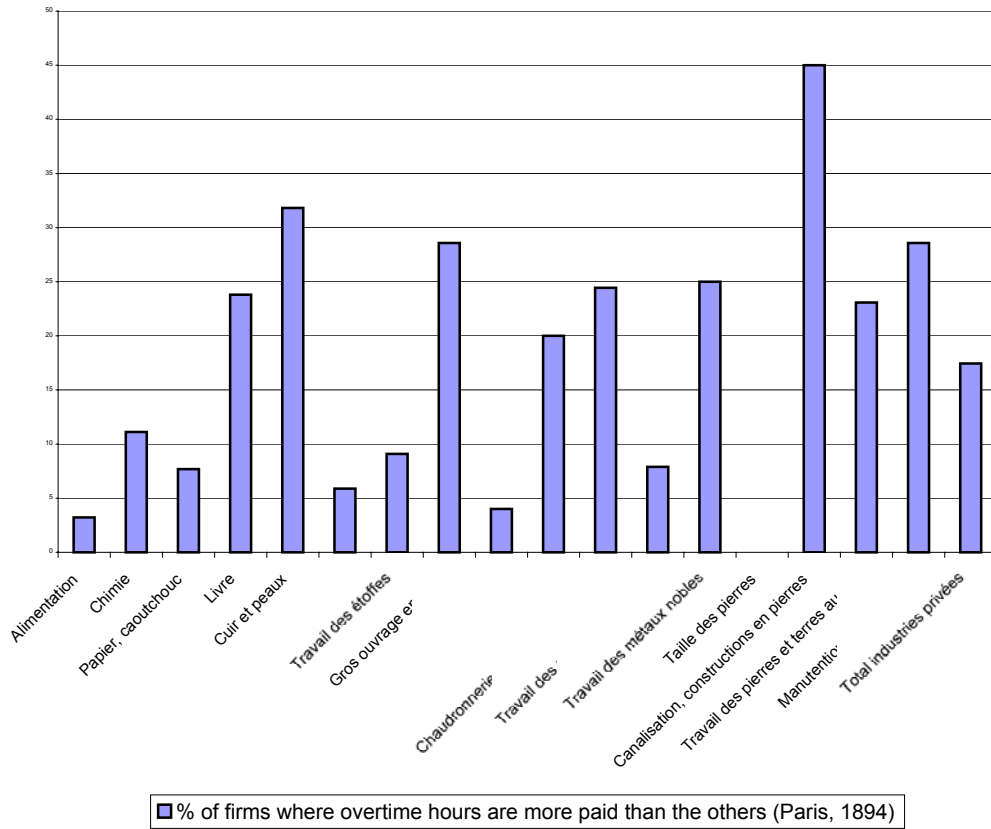


Figure 10. of firms where overtime hours are paid at an increased rate (Province, 1894)
(Office du Travail, 1894- 1897)

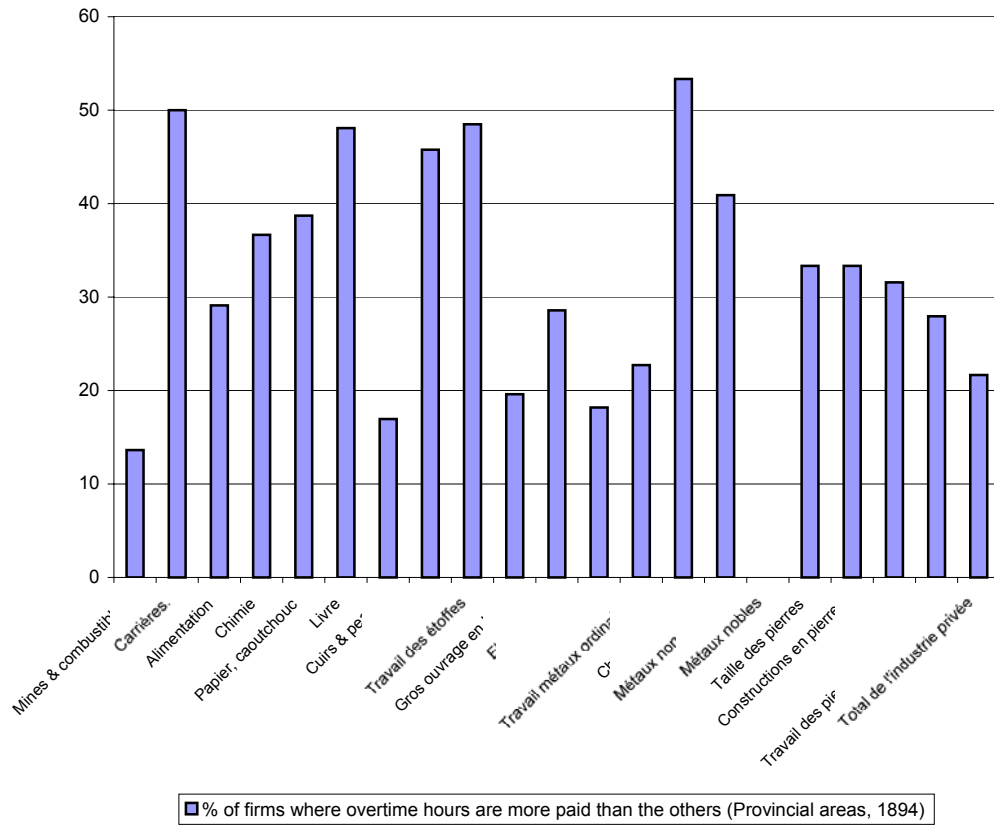


Figure 11. Average wage by industry: Paris - Provincial areas (1894-1897)
 (Office du Travail, 1894- 1897. Vol. 1: 38-39 & Vol. 4: 354-355.)

