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## HOURS OF LABOUR <sup>1</sup>

AFTER searching for some time for a topic for this address suitable to Winnipeg, I finally made a choice which may not commend itself at first as a happy one. It is not a topic of immediate local interest, but at a distance of nearly 4,000 miles I was not in a position to discover the economic problems the treatment of which would immediately arrest the attention of the people of middle Canada at the present time, and had a wizard's wand disclosed to me such problems I should not have been able to solve them on paper from the other side of the Atlantic. And yet my subject has a direct reference to Canadian affairs, though the extent of this reference is not apparent till we look ahead and view things in perspective. It occurred to me after a cursory examination of some recent examples of that remarkable modern crop of Utopias and anticipations which apparently are appealing to an extensive public. If only these "new worlds" represented what existed somewhere among human beings with passions and infirmities like our own, how much more instructive they would be! one was naturally led to reflect. You will see now the train of suggestion fired in my mind. Clearly, if the gaze of humanity is repeatedly drawn to its future, a visitor from a land of advanced industrialism who had made that industrialism his study, in speaking, in a country as yet thinly populated and young in industrial experience, of some of the most urgent problems which industrialism brings with it, might expect a hearing at least as patient as that which a very minor prophet would win. Now among the most insistent root problems to be found in our great industrial

<sup>1</sup> Presidential Address to the Economic Science and Statistics Section of the British Association for the Advancement of Science, 1909.

city civilisations are those which group themselves around wages, conditions of work and living, and the hours of labour. From this group I have chosen the problem of the hours of labour, as the one which has not, perhaps, received the same measure of practical consideration as the rest. Expressed in another way, our topic is the value of leisure, the bearing of industrial development upon it, and its effectiveness in shaping economic arrangements. The demands continually made for shorter hours and a normal day; the claim, now extensively supported among Western peoples, that the State should intervene; and the fact that some Governments have intervened, even to the length of regulating the hours of adult male labour, are additional grounds for trusting that this topic will be at present of more than academic interest.

We naturally inquire at the outset why the question of leisure does not assume prominence until modern industrialism has supplanted a simpler economy, and why much less is heard of it among agricultural than among industrial communities? In the hand industries of the past the hours of labour were excessively long in comparison with modern industrial standards, and among the peasantry and pioneering farmers work never wholly ceases in waking hours throughout much of the year except for short breaks for meals; and yet little complaint would seem to have reached us from either source. The explanation may lie partially in the fact that new grievances emerge with the spread of the wages system—the problem of the working-day does not present itself in quite the same light to wage-earners and to the self-employed—that these grievances are rendered more articulate by group production; and that the aggregation of people of one economic class in dense packs gives unanimity and volume to the demand for reform. The hardships suffered by a scattered population, occasioning discontents, which, however, stop short of provoking outbreak, seldom succeed in attracting public notice; and people acting in isolation are naturally timid. But this, I think, is not the sole explanation. The character of much of the world's work has changed, and so have the demands made upon leisure.

Industrial work on the whole has certainly become more regular and continuous throughout the year, and analysis would seem to show that work per unit of time gets more severe, in a sense, as communities advance, though no doubt a strong case could be made out for the view that the trend of economic progress is towards an end in which the character of labour generally will be far more conducive both to satisfaction and to human development. I am not so optimistic as to suppose that mechan-

ical improvements do not frequently bring with them a new monotony of work, though higher wages may prevent them from forcing greater monotony of life upon those who suffer from the new monotony of work. Mechanical improvement proceeds by "specialising out" mechanical tasks, the performance of which by hand must be a dreary occupation, but each step in the march of invention seems to create, as a rule, by its incompleteness, tasks meaning a new and more concentrated monotony, though no doubt it must generally result in an appreciable reduction of the amount of dull employment involved in the attainment of a given output. Any work must be wearisome the pace of which is set by a machine and kept absolutely steady. We may usefully compare mechanical improvements with discoveries relating to the utilisation of by-products. The latter always recover from refuse something of value to the community, but they generally leave a refuse more concentrated than that with which they began.

The road of economic advance is by way of specialism, and, just as there has been specialism in tools and in division of labour, so there has been a specialism of labour in working hours and of leisure and social intercourse in non-working hours. Specialism on the one side implies the elimination of waste, whether of means or of time, and it has therefore meant to the labourer the partial or occasionally complete elimination of the leisure with which his working hours used to be plentifully interspersed. In a modern workshop, noise, the necessity of discipline or of a continuously absorbed state of the attention, have frequently reduced the possibilities of conversation to the barest limits. Humanity has no doubt been relieved of the heaviest burden of toil by inventions relating to the mechanism of production, but their application has been accompanied on the whole by the closer concentration of some kind of effort in time. The intensification of labour in a more confined sphere of activity may, as Professor Münsterberg argues, exercise more fully the higher human faculties and thereby bring with it a deeper interest, but it will almost certainly prove more exhausting, even apart from the elimination of change, leisure, and social intercourse. And decade by decade, with the speeding up of machinery, we should expect to find more nervous strain accompanying the process of production. That industrial functioning has become a severer tax on the energy of the workman is fully borne out by the evidence of numerous reports upon industrial conditions.

The increasing nervous strain of industrial work, whether it results from the progressive specialisation of labour or not, would

account sufficiently for the curious circumstance that there is apparently no finality about any solution of the ever-recurring problem of the normal working day, though it is not the sole explanation. The workman whose day has been reduced is soon repeating again his demand for shorter hours, and there are pessimists who infer from this that the shorter hours attained hitherto have shifted the community on to a slippery inclined plane which leads from the economic "struggle for existence"—by which is meant the competitive striving for place, reputation, and achievement, whereby progress is naturally stimulated—to economic stagnation. They think they discern in the present generation a growing disinclination to make an effort and a growing disposition to take the easy path; but that the truth cannot be mainly with the pessimists an examination of the effects of curtailments of the daily hours of labour upon output would at least suggest. A mass of material exists in official and other reports in more than one advanced industrial country for a study of this question. Beginning with the writings of Robert Owen and Daniel le Grand, both of whom laid especial stress on moral and social elements, an investigator would find an almost unbroken sequence of evidence. Mr. John Rae collected a volume of facts in 1894, and these may now be supplemented by the experiences of yet another half generation.<sup>1</sup> Limitations of space forbid that I should quote examples, but I may at least roughly generalise from the recorded facts. I have found no instance in which an abbreviation of hours has resulted in a proportionate curtailment of output. There is every reason to suppose that the production in the shorter hours has seldom fallen short by any very appreciable amount of the production in the longer hours. In some cases the product, or the value of the product, has actually been augmented after a short interval. In a few cases the reaction of the shorter hours on the output per week has been instantaneously noticeable, and the new product has surpassed the old product before mechanical methods could be improved. Further, for some industries—for instance, for the Lancashire cotton industry—we have preserved for us the results of a string of observations reaching back about three-quarters of a century, and it would appear from them that the beneficial effects wrought upon output by the shortening of hours were substantially repeated, though, of course, in different degrees, at each successive reduction of the working day.

<sup>1</sup> Note in particular the report of the Industrial Commission of the United States.

So far I have directed your attention mainly to two incidents bearing upon the hours of labour : the one, the effect of industrial development in curtailing the hours which result in the largest daily output ; the other, the subjective effect of the increasing strain associated with such advance. I have now to add another influence, which is the enhancement of the value of leisure which must accompany a rise in wages, improved education, and social progress generally. It must be insisted that the amount of the real wage yielded by a given money wage varies as the time left to spend it ; and, further, that the value of leisure is a function of the goods which can be enjoyed in the period of leisure. The acute operative would aim at so distributing his time between work and recreation that the gain resulting from a little more leisure would equal the loss consequent upon the implied diminution of wages. Hence, when the volume of goods per head annually supplied to labour was augmented, an attempt would almost certainly be made by the operatives to buy more leisure, even if the satisfaction derived from leisure were unaffected, which it would not be, because the satisfaction derived from leisure must rise when each hour of leisure is enriched by greater possessions. As regards the effect of education, it is sufficient to point out that the value of leisure is a function of appreciative power and that this is developed by education, but it must be observed that the higher appreciative power might enhance the satisfaction got out of the work itself, and that this effect might conceivably counteract the effect on the value of leisure, or even more than counteract it. Ambitions would be further awakened, but the ambitious operative would probably demand, as a rule, more time for study. I think it unquestionable that, on the whole, educational advance causes a curtailment of hours. "But unfortunately human nature improves slowly, and in nothing more slowly than in the hard task of learning to use leisure well. In every age, in every nation, and in every rank of society, those who have known how to work well have been far more numerous than those who have known how to use leisure well. But on the other hand it is only through freedom to use leisure as they will that people can learn to use leisure well ; and no class of manual workers who are devoid of leisure can have much self-respect and become full citizens. Some time free from the fatigue of work that tires without educating is a necessary condition of a high standard of life."<sup>1</sup> Social progress, broadly regarded, by complicating life and rendering vague feelings of social obligation

<sup>1</sup> Marshall, *Principles of Economics*, 5th ed., pp. 719-20.

definite and more insistent, creates new claims on leisure. "Generally it can be said that the more complex the social organism becomes, the more its constituent individuals must devote time, apart from work and business, to the family and recreation, to education and general affairs, the more necessary is a general social arrangement concerning the distribution of time between the several purposes which it has to serve."<sup>1</sup>

The eight hours' day has come to be regarded by some social reformers as the ideal of the future. The doctrine that the workman should normally work eight hours a day has been put forward as holding at least as generally and with as high a degree of certainty as, say, the doctrine that the workman should normally sleep some definite number of hours a day. But I should argue that the problem of the length of the working day is of an order different from that of the problem of the time which should be devoted to sleep, for whereas the hours which should be given to sleep depend mainly upon physiological conditions, though these physiological conditions are affected by economic and psychological conditions, the hours which it is wise to assign to labour depend upon the attitude of the workman to leisure and work, which results as much from non-physiological as from physiological influences. It is my purpose to demonstrate that the non-physiological value of leisure, as well as its physiological value, must rise with progress, and, therefore, that in all probability the hours which should normally be worked per day will become steadily less. The ideal working day of the future cannot be eight hours, for it must be essentially a progressive ideal. As a community advances agitation for shorter hours will be constantly breaking out anew. If this be a correct reading of progress, it is important that we should understand fully the forces at work at each re-settlement of the length of the working day, those on the employing side as well as those expressed in the claims of the operatives. I propose now, in consequence, to disentangle the impulses and their relations, into which the question of the determination of the working day at any one time may be resolved.

The problem being elaborate, it is essential that we should proceed by successive steps of abstraction. We need not be afraid in this age of understanding of having recourse to abstraction; it is a method without which every scientific study, whether philosophy, biology, physics, or what not, even history, would be impossible. In the first instance, therefore, I intend to indicate

<sup>1</sup> Schmoller, *Grundriss der allgemeinen Volkswirtschaftslehre*, p. 741.

the length of working day which operatives and employers would respectively seek if they recognised their own interests and were endowed with complete foreknowledge of the effects of different hours of labour upon their interests. I shall assume—as I may legitimately for most employment in production on a large scale—that the workman tends to get as his wage his marginal worth, that is to say, the value which would be lost by his dismissal. We may assume, further, that the marginal worth of the workman for any given working day becomes in the long run a stationary amount. If the efficiency of labour rose continuously in consequence of a reduction of hours it would obviously approximate to some limit, and if it fell continuously in consequence of an extension of the hours of labour it would equally approximate to a limit. After some time the differences between these limits and the actual efficiency of labour could be taken as negligible. Merely for the sake of simplicity, I shall now suppose that one kind of labour only is employed. It is clear, then, that it is possible on these assumptions to indicate what in the long run (*i.e.*, when all the reactions as regards, for instance, the efficiency of labour and provision and arrangement of other agents have taken place) the marginal daily worth of labour will be for different lengths of working day, it being understood that the number of shifts worked remains the same. If the number of shifts were increased the value of the labour would rise, as will be fully explained later. Let us suppose that the following table represents, at a given time, the value of labour of a given kind per week, in relation to the length of the working day :—

Hours per Day					Value of Labour per week in Shillings.
6	...	...	...	...	34
7	...	...	...	...	38
8	...	...	...	...	40
9	....	...	...	...	41
10	...	...	...	...	40
11	...	...	...	...	39
12	...	...	...	...	37

The fall in the value of labour after the working day exceeds nine hours is due to the fact that diminished weekly productivity more than counteracts the direct effect of the extension of the daily time for work. The diminished weekly productivity may be due to impaired vitality—physical, mental, or moral—or to some extent to irregularity, where that is possible, as in the case of colliers. The damage to productivity may be inflicted directly

by excessive work, or it may be indirectly consequent upon it, the prime cause being found in the use of stimulants or recourse to unhealthy excitement in periods of leisure, reactions which are only to be expected when the day's work is very exhausting or very dull. The use of leisure affects, of course, mental vitality, culture, and character, and it will therefore be generally observable that labour which has had its hours reduced will be capable after a time—when the use of leisure has been improved and the improvement has produced its effects—of managing satisfactorily more complicated machinery, and will be generally more responsible and trustworthy, and therefore less in need of continuous watching and directing. Now, clearly; if employers are endowed with the foresight presupposed, and if their hours of work need not increase concurrently with a lengthening of the working day, it is in the case supposed to their interest collectively to come to an agreement not to employ labour more than nine hours a day, and to their interest individually not to employ labour for shorter hours than nine a day. The second conclusion follows from the fact that the weekly product would be augmented by a greater amount than 1s. multiplied by the number of operatives were the hours of labour increased, say from eight to nine, because labour, as every other agent employed in production, is paid not its aggregate but its marginal worth to the business in which it is employed. This proposition may be made more self-evident by the following example. Were labour rendered 25 per cent. more productive all round, the product and real wages would each be raised approximately 25 per cent., other things being equal; but as the product must be greater than aggregate wages the addition made to the former by the longer hours must be greater than the addition made to aggregate wages.

Next, suppose that an agreement between employers, tacit or overt, is impossible, and that each employer will make what he can when he can. What hours, then, will competition among employers tend to bring about, when humanitarian considerations and any resistance from the operatives are ruled out? Suppose the efficiency of labour at the time is that associated with a customary working day of ten hours. The product of the last fraction of the tenth hour could not be zero, for if it were ten hours would not be worked. The ultimate effect of extending the working day beyond nine hours is loss, not because the product of the last fraction of the ninth hour is zero, but because the product of the last fraction of the ninth hour just equals the ultimate reduction of the product of the other hours occasioned



by the lengthening of the working day. Hence, on the assumption that employers are perfectly far-sighted but that agreement between them as to working hours is lacking, the disposition on the part of each employer to reduce hours to nine would be weakened if each employer could not depend upon keeping operatives after he had brought them to the level of efficiency associated with the nine hours' day. The reforming employer would run the risk of paying the whole cost of the labour value created by shorter hours and getting little in return; other employers might secure and exhaust the new labour value, and no permanent good would be effected. Nor would there be any more guarantee in the conditions supposed that the nine hours' day would be retained, if instituted, for an employer could always snatch a temporary advantage by extending hours and paying slightly higher weekly wages. This is a general proof that, on the assumption made as regards the intelligence and foresight of employers and in the absence of agreement between them, the hours resulting in the maximum product would not necessarily establish themselves, no force on the side of the workpeople being supposed operative.

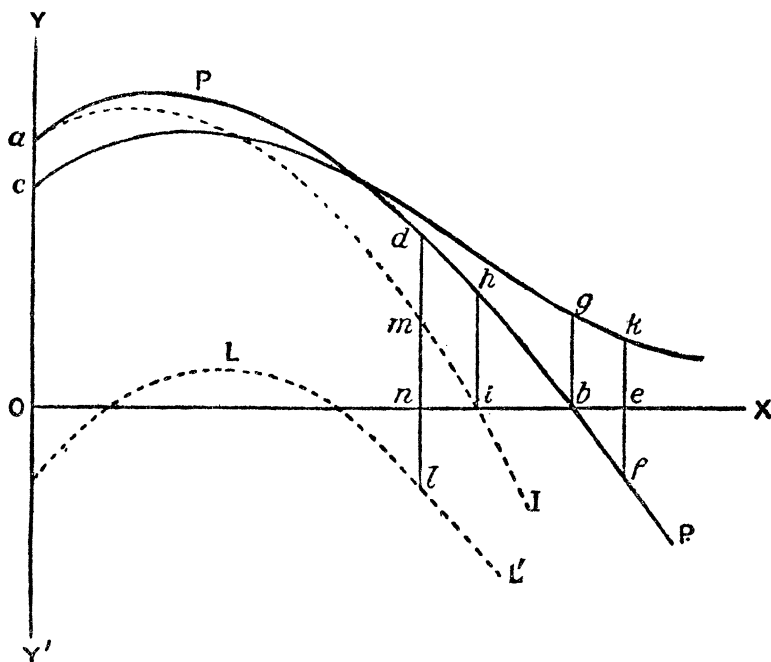
I now pass on to analyse the determinants of the operative's choice in the matter of the hours of labour, assuming that his wage equals his marginal worth and that he knows it, and supposing in the first place that he is endowed with perfect prevision. Two things affect him which do not appeal to the self-interest of the employer, namely, the direct value of his (the operative's) leisure and the balance or dissatisfaction which his work yields of itself. Here I must interpolate the remark that by "satisfaction" or "utility" in this address I merely intend a conventional objective representation of the subjective fact of preference, behind which the economist *quâ* economist cannot penetrate. I say this in order to evade the charge so frequently made against economics that it implies the acceptance of Utilitarianism, psychological or ethical. Picking up again the main thread of our discourse, we observe that, apart from the two considerations mentioned above, namely, the value of leisure and the satisfaction got directly from the activity of labour, the operative's real income is maximised when his money income is maximised. Hence apart from these two considerations the choice, as regards the length of the working day, of perfectly far-seeing operatives would be the choice of far-seeing employers were the latter combined. Now take the value of leisure into account. Any daily duration of production being premised, if the utility derived from an incre-

mental addition to leisure is greater than the utility of the increment of wage sacrificed by transferring an increment of time from production to consumption, the operative would gain from a contraction of the working day, other things being equal. Recurring to our earlier numerical example, we see that from the long-sighted point of view the productivity of the last fraction of the nine hours' day is zero, while its value as leisure must be greater than zero. Hence the operative would choose to work less than nine hours a day, it being understood, remember, that he is paid his marginal worth and knows what that will be for different daily periods of work. Leisure consists in rival satisfaction-yielding occupations, active or passive, which are rendered possible by wages. There is consequently a close connection between this and that other determinant of the operative's choice, namely, the positive or negative utility associated with labour itself. It may be granted that in the long run, after the working day has exceeded a certain length, any further addition to it diminishes the satisfaction directly derived from working or adds to the balance of dissatisfaction. If a balance of dissatisfaction were associated in the long run with the efforts of the last minute in the working day which the operative would otherwise choose, as would ordinarily be the case, he would elect, other things being equal, to work an even shorter day, the duration of which would be determined at the point at which the gains and losses came to equivalence when everything was taken into account, that is to say, at the point at which his satisfaction was maximised. Did the last minute of working still yield satisfaction in the long run when the hours were nine (referring to the case supposed), which is so highly improbable as to be a negligible case, the operative would prefer to devote more than nine hours of his day to production were this satisfaction of working greater than the value associated in the long run with the last minute of leisure left when nine hours a day were given to business.

So far in considering the operatives' interests we have fixed our eyes on a remote perspective. We next focus our attention upon immediate tendencies and suppose them not to be counteracted by forces arising out of a regard for ultimate results. In these circumstances the operative would be inclined to select a longer working day than that which would be continuously the most advantageous to him, because he would be blind to the reaction of the longer hours on efficiency and so on earnings and the capacity to take pleasure in work. Many people lower the general level of their earnings in the future, and spoil their enjoy-

ment of work and leisure in the future, by making as much as they can in the present. However, even in these circumstances operatives would not approve such long hours as employers who were short-sighted, because the latter would make no allowance for the disutility of labour to the operative or the utility to him of leisure.<sup>1</sup>

<sup>1</sup> The argument in the more technical parts of this address, concerned with the determination of the length of the working day, may be conveniently summarised with the aid of the following figure. In order to avoid the complexities arising from the redistribution of labour between the industries of a country, suppose that only one industry exists. Measure units of time in the working day along  $O X$ , and units of money along  $O Y$ . Consider first the unbroken lines which represent the influences governing employers. The curve  $P$  expresses the long-period variations with the length of the working day of the marginal value of a fixed quantity of labour: the opinion that these can be represented by a curve has been defended in the body of this address. If  $O n$  hours are worked daily, the daily value of labour and the wage will ultimately be  $O n d a$ ; if  $O b$  hours are worked, this value and wage rises to  $O b a$ ; if  $O e$  hours are worked, it falls to  $O b a - b e f$ . The meaning of the curve  $P$  will now be plain. The curve is supposed to rise in the first instance because increasing the daily hours of labour would at first raise the level of efficiency, and if it did not, the larger wage would. But  $P$  must begin to fall at some point, and eventually cross  $O X$ , as is demonstrated in the body of the address. Actually, of course,  $P$  could not start at  $O Y$ , because a man when



engaged for only a fraction of his time daily could not live on the proceeds of his work, but it has been so drawn in the figures to enable us to picture the value and wage of labour by the area between the curve  $P$  and the co-ordinates.

The curve  $c k$  represents the immediate variations of the marginal value of

We are assuming throughout, it must be remembered, that the wage will always be the operative's marginal worth—that is, what would be lost if he were dismissed—and that he knows it. Actually, of course, there is frequently an appreciable discrepancy between the marginal worth of labour and its wage, and the

a fixed quantity of labour with the length of the working day on the assumption that the normal working day has been  $O b$ . Hence the value of the normal product of the last minute of the working day  $O b$  is  $b g$ . *Ex hypothesi*  $O b g c$  must equal  $O b a$ . If the working day is lengthened to  $O e$  the product will at first be augmented by  $b e k g$ , but finally by a gradual decline it will sink to  $O b a - b e f$ .

The influences guiding the operatives are expressed in the dotted lines, the meaning of which must now be explained. Draw any vertical line  $d l$  to the left of  $b$ . Then  $d n$  is the addition made in the long run to the money income of the operative when the  $O n$ th increment of time is added to the working day. Let  $d m$  be the long-period value to the operative, when his income is  $O n d a$ , of the leisure destroyed by the addition of the  $O n$ th increment of time to the working day. The curve  $I$  is the locus of the point  $m$ . Evidently, starting at  $a$ , it will lie throughout its length below  $P$ , increasingly departing from  $P$  (because leisure is subject to the law of diminishing utility and the value of leisure rises with income), and cut  $O X$  to the left of  $b$ . Apart from the satisfaction or dissatisfaction of working, therefore, the far-sighted operative who took into account the value of leisure would choose a normal day  $O i$ , which is less than  $O b$  (the choice of far-sighted employers in combination). When the normal day is  $O i$  the marginal value of leisure to an operative with a wage  $O i h a$  would be  $i h$ , which equals the long-period marginal earnings attributable to the  $O i$ th increment of time in the working day. Now, let  $L$  indicate the long-period values to the operative of the effects of different lengths of working day on the absolute satisfaction or dissatisfaction involved in the labour itself,  $L$  being otherwise interpreted, when units of money are measured along  $O Y'$  as well as along  $O Y$ , and the parts of the curve below  $O X$  indicate the prices which would be paid to escape the dissatisfaction involved in working, and the parts above  $O X$  the money value of the satisfaction involved in working. As some of the time devoted to production will probably be pleasant to the operative when the length of working day is most favourable to his enjoyment of work, we may assume that  $L$  need not lie throughout its length below  $O X$ . Then the working day which perfectly wise operatives would choose would be  $O n$ , the point  $n$  being such that  $n m = n l$ , the attainment of which equation is the condition under which the operative's satisfaction is maximised. If, as is theoretically conceivable but practically impossible,  $L$  lay further above  $O X$  for the abscissa  $O b$  than  $I$  lay below it, the length of day most advantageous to the operative would be greater than  $O b$ .

If normal hours are  $O n$ , the operative who lives for the day and is aware that more work, measured by results, means proportionally more pay, will obviously desire hours longer than  $O n$  for the following reasons. The product attributable to the  $O n$ th increment of working time is greater than  $d n$ , since  $d n$  represents the gain resulting from the  $O n$ th increment of working time, less the loss occasioned by the reduction which will *ultimately* take place in the productivity of the operative's earlier hours in consequence of the addition of the  $O n$ th increment of time to the working day. For similar reasons the short-period or immediate value of leisure might be less than  $d m$ . Again, the money measure of the disutility of the  $O n$ th increment of working time is less than  $n l$ , because  $n l$  measures the disutility of the last fraction of time worked, together with the disutility which results from the fact that the  $O n$ th increment of working time diminishes capacity in earlier hours to enjoy labour or sustain fatigue. It is evident, therefore, that a balance of gain accrues to the operative from the work of the  $O n$ th unit of time,

usual connection between them has not been commonly understood by the wage-earning classes. It would seem from the records of labour movements as if the operative's fear—based as much on ignorance as on distrust—lest the longer day should mean no more pay, though the weekly product would be greater, has protected him against the injurious consequences of short-sightedness; but I am inclined to think that the dominant force in these labour movements has consisted in ideals of life, formed half instinctively, which are unconnected with views, fallacious or otherwise, concerning the mechanics of distribution. Bad arguments have been used to justify good ends. To these ideals of life I shall refer again.

In reality the actions of both employers and employed, in so far as they are governed by self-regarding motives, will be compromise resultants of immediate impulses and long-sighted calculations. Long-period results which are not very remote will usually be appreciated, and employers as well as operatives may aim at them, because the former may think the length of time an operative usually stays with one firm sufficient to justify a slight present sacrifice made with the object of securing improvement in the operative's efficiency.

The above analysis explains not only disagreements between

when everything, including wages, is taken into account, but the effect of the work on the  $O$   $n$ th unit of time on the gain associated with the rest of the working day ignored; and, further, that the balance of gain attributable to the  $O$   $n$ th hour will not disappear, though it may contract if the working day be slightly extended. Hence we must conclude that operatives who are not alive to the reactions of long hours on efficiency and capacity to enjoy life and work will tend to choose a longer working day than is wise from their point of view. However, to repeat, they will not approve such long hours as employers who are equally blind to future reactions, because the latter, if purely self-interested, make no allowance for the disutility of labour to the operative or the utility to him of leisure.

In the event of progress in methods of production the new position of  $P$  would be such that the area enclosed between it and the co-ordinate axes would be increased.  $P$  in its new position might cut  $OX$  at  $b$ , but in all probability the new intersection with  $OX$  would be to the left of  $b$ . It is not likely to fall to the right of  $b$ , since improvements in the mechanical aids of labour seldom mean that work is rendered less exhausting. Even if the new curve  $P$  passed through  $b$ , the new position of  $I$  would practically mean its intersection with  $OX$  to the left of  $i$  because of the enhanced value of leisure. Further,  $L$ , though it might rise higher than before, would probably descend sooner and at least as steeply. It is to be observed in addition that but for interest, rent, and heavy depreciation charges, industrial progress would bring about movements of  $P$  involving more considerable augmentation of the area contained between  $P$  and the co-ordinate axes. Improved education, apart from its effect on efficiency, would bring about a subsidence of the curve  $I$ , so that in its new position it would cut  $OX$  to the left of  $i$ . The effect wrought by progress on short-period forces need not be worked out in detail. The general conclusion is manifest that progress may be expected to be accompanied by a progressive curtailment of the working day.

employers and operatives as regards the normal working day, but also the friction which is constantly generated in the matter of "overtime." Without the admission of overtime heavy losses might be experienced by an industry in view of the inelasticity of its production and fluctuations in the market in which it sold; but, on the other hand, overtime once admitted sometimes tends to be worked out of proportion to the special need for it, and operatives are apt to suspect that it is being used unfairly to extend the normal day.

I now desire to compare specifically the effect on wages with the effect on the working day of the mechanical action of pure competition. In the matter of wages, if operatives were too weak to have much influence in settling their pay, competition between employers, were it keen and unchecked by combination, would at least secure to the operatives as a wage, for a given working day, their marginal worth (within limits set by social friction) in view of their then state of efficiency. Thus in the circumstances supposed the operative would tend to get approximately the utmost possible—apart from the question of the reaction of wages on efficiency—in an active society reposing economically on a basis of freedom of enterprise, for we may take it that in such a society the bidding of individuals against one another for labour would continue at least up to the known marginal worth of labour. Observe, however, that the existence of such bidding may imply that new businesses are being established, or that old-established employers are anxious to make considerable extensions, for old-established employers, knowing that similar workmen must be paid the same, might avoid courses of action which resulted in a gain less than the loss involved in the elevation of wages. It is doubtful whether employers would as a rule assume that if they did take steps leading to an advance in wages others would do so, for, not unnaturally, employers are commonly indisposed to disturb rates of wages except for strong reasons. And in the cases in which competition is effective in raising wages to the marginal worth of labour it must be remembered that employers even if endowed with a powerful telescopic faculty, would not necessarily be induced by self-interest to offer the wage in excess of the operative's worth at the time which would ultimately produce (by augmenting the bodily and mental vigour of the operative) efficiency value equal to it, for their precautionary instinct would attach weight to the apprehension lest some of their operatives should leave them and carry to rival employers the proceeds of the long-sighted investments thus made in them.

Other things being equal, of course, the higher the efficiency of labour the greater is the gain, not only of the workman, but also of the employer. Now, as regards the working day, we have already seen that uncombined employers might keep it longer than would be desirable from their point of view, for the same reasons for which they might keep wages lower than would be desirable from their point of view. These reasons are, I repeat again, short-sightedness, or fear of incurring an expense the fruits of which other employers might reap. In this respect competition between employers is equally defective in its bearing on wages and in its bearing on the length of the working day. But it has an additional defect, as regards the amenities of working-class life, in its bearings on the length of the working day; for though competition between employers in an enterprising society would bring about the degree of devotion of time to production which the operatives would choose at the wages rendering it possible, the choice of the operatives is apt to be governed by a circumscribed vision which is partially blind to the responses of efficiency to abbreviated hours.

It would seem, therefore, that two reasons at least can be derived from economic theory for State intervention in the matter of the hours of labour, if it be assumed that the State can discover what is best for the country. The one is to correct the tendency of people engaged in industry to agree upon an amount of sacrifice to money-making, which means a large future loss, involving the next generation, for a small present gain; the other is to fortify, if needful, the resistance of operatives to the disposition of some employers to secure a greater product at the expense of the operatives' convenience. This conclusion would, however, be too hasty a deduction. Economic matters are settled, not merely by the self-regarding forces which we have hitherto emphasised, but also by social conceptions, embodied in public opinion and class notions of what is right and proper, which defy expert analysis and any accurate evaluation as influences. These social conceptions, which are not deliberately framed on a rationalistic basis, but proceed insensibly as it were from the needs of human life, are less intermixed with religious elements now than they used to be, but are none the less powerful. Resting on the seventh day is not at present a religious observance to the extent to which it has been in certain periods of past history, but it has not universally been found necessary to supplement the declining religious sanction with the legal sanction. How far progress which runs counter to tendencies determined solely by self-regarding forces

may be left with confidence to the operation of these incalculable motives which sway every community can be settled only by careful observation. It is sufficient now to recognise their existence, and to point to the reductions of the hours of labour in recent years. I do not propose to consider here, in the light of the existence of these incalculable motives, the merits and demerits of the method of legal enactment for attaining the ideal in the matter of the daily duration of toil, except to observe, first, that Government interference which aimed at securing reasonable hours for adult males in all the diversified industries of a country would entail elaborate, elastic, and frequent legislation, and would no doubt be accompanied by many grave errors; and secondly, that a *prima facie* case can be made out for the regulation of the hours even of adult males by authoritative boards, Order of the Home Office, or by statute, when labour is weakly combined and hours are evidently sweated hours, and evidence is forthcoming that they are detrimental to health or vigour. Nor do I propose to consider whether it might not be better to suffer for a time present ills in the hope that there would grow up in the community an adequate power of self-regulation, which would incidentally be accompanied by highly valuable social consequences, outside the sphere of our present inquiry, that otherwise might never have been elicited. I am hopeful that the intangible force of public opinion, directed by economic and ethical enlightenment over a field rendered yearly more co-extensive with contemporary facts in consequence of the growing demand for publicity and the response made to that demand by governmental authorities and the Press, will become in the future an increasingly efficacious factor in progress, apart from its expression in law. Even to-day, in view of the dependence of producers on demand, neither employers nor trade unions can afford to brave for long public sentiment, though unorganised, when it is deeply stirred; and public sentiment in the years before us may be expected to respond more sensitively to incidents in its surroundings which offend against social conceptions of what is right and proper. The cases of children, young persons, and women, which bring in special considerations, must be ruled off from the subject matter of this address.

There is no doubt but that all advanced industrialism to-day is feeling the strain of an accumulation of forces tending to bring about an abbreviation of the working day, and that it will be subjected to the same strain in the future. Now, in relation to this experience, it is disturbing to notice that a close-set limit is



imposed upon reduction of hours by the heavy interest and depreciation charges with which the product of a machine is burdened when it works only a fraction of the time for which interest must be paid. As regards depreciation, it must be observed that buildings deteriorate in value at least as much when shut up as when they are occupied; that machinery continues to wear out, and sometimes rapidly, when it is idle; and that the reserve fund necessary because the market may contract at any time, and because machinery may at any time be rendered obsolete, is independent of the length of the working day. Many inventions involve an extended use of capital per head, though all do not, and interest and depreciation charges are, on the one hand, interdicting the application of some of those new ideas to industry which do necessitate heavier capital investment, and, on the other hand, preventing those applied from reducing hours so much as they otherwise would.

The weight of the discouragement indicated above to the shortening of the hours of labour depends, of course, upon the relation between wages and payments for capital in the expenses of a business, and the relation between wages and payments for capital in the expenses of a business varies with the industry. A rough calculation, nevertheless, for a particular industry of the saving in hours which might be effected by the continuous running of plant will not be altogether irrelevant. In the industry for which I have obtained figures, interest and depreciation would be reckoned ordinarily at 10 per cent. on the capital, about half for each, while wages would be in the neighbourhood of  $12\frac{1}{2}$  per cent. Now, it being assumed provisionally that the depreciation charge varies as the hours worked, that the rate of interest is a constant, that the equipment of the industry remains as before and labour tends neither to leave the industry nor to flood into it, and that other costs of production are not affected, we find that hours could be reduced from ten to eight without any loss of wages, were the continuous running of plant substituted for the ten hours' day.<sup>1</sup>

<sup>1</sup> The calculation is as follows :

Interest ... ..	=	5	per cent of capital.
Depreciation ... ..	=	5	„ „
Wages ... ..	=	$12\frac{1}{2}$	„ „
∴ Wages + Interest ... ..	=	$17\frac{1}{2}$	„ „

Continuous running would mean increasing the annual duration of production in the ratio of  $\frac{24}{10}$ . Hence, with continuous running,

$$\text{Wages + Interest} = 17\frac{1}{2} \times \frac{24}{10} = 42 \text{ per cent. of capital.}$$

Actually, of course, some of the gain would be taken in the form of higher wages. Further, it must be noticed that the assumptions made do not accurately correspond with fact, though they are satisfactory for the purposes of a first approximation. On the one hand they lead to an over-estimate of the advantages of continuous running, because twenty-four hours of work could not possibly be squeezed into a twenty-four hours' day, and because the cost of artificial light during night work is disregarded, as are also the costs connected with awkward points in organisation, with the sharing of responsibility for the proper treatment of machinery, and with the fact, universally experienced, that night-shifts are not so productive as day-shifts. On the other hand, they lead to an under-estimate of the advantages of continuous running, because the cost of depreciation, as we have seen, is not proportional to the daily hours of work,<sup>1</sup> because the shorter hours would raise the efficiency of labour, and because the demand for capital would be reduced, as would also the demand for land for manufacturing purposes. The inevitable contraction of the demand for capital is a point to be emphasised. If working hours per day were raised from ten to twenty-four, then, the reaction on the efficiency of labour still being disregarded, the old output could be obtained with five-twelfths of the old capital; the consequence would be a fall in interest, an augmentation of the amount of the plant per head of the people working with it at one time, and, therefore, an increased output per head.

In view of its great economies, the shift system calls for very careful consideration. The magnitude of the advantages which the wage-earners might hope to derive from its more extensive application has been denied, on the ground both of theory and of experience of those businesses in which it has been tried. But theoretic objections of a fundamental nature will be found to reduce to false doctrine concerning the determination of wages; and it must be remembered that as the benefits accruing from the

And, as the capital remains as before—

Interest	...	...	...	=	5	per cent. of capital.
Wages	...	...	...	=	37	„ „

Writing  $x$  for the daily hours worked per head which would yield the same weekly wages as before, we have

$$\frac{37}{24} \times x = \frac{12\frac{1}{2}}{10} \times 10.$$

$$\therefore x = \frac{300}{37} = 8 \text{ approximately.}$$

<sup>1</sup> Had the depreciation been taken as independent of the hours of work the calculation in the previous note would have pointed to a seven hours' day instead of an eight hours' day.

comparatively few cases in which the shift system is practised are by competition spread over the whole community, the gain of any individual is cut down to a very small figure. It must not be supposed that the effect of its universal adoption would be equally inappreciable. Without general recourse to shift systems I cannot see any immediate prospect of much additional leisure for the mass of the population. Shifts could be designed so that no one shift would be particularly disagreeable to work in, and, if all shifts did not offer equal advantages, the operatives could be moved round, being assigned for so many weeks to each shift. The shifts for foremen, and the management generally, which would have to be strengthened, might be arranged to run over a portion of two operatives' shifts, so as to cement the new work on to the old; and the connecting of the work of each shift with that of the shift which it followed could also be secured by arranging that the unit of labour should be a group of partners, consisting of one man from each shift, it being the duty of each man before commencing work to see his partner in the displaced shift and receive instructions from him. Naturally, a shift arrangement could only be introduced gradually. Are the objections to shifts of such gravity as to counteract their immense economies? The fact that an affirmative answer was generally given to this question in the past is no proof that the affirmative is the right answer to-day in England, or even in industrial Canada. Conditions have been revolutionised in the last fifty years. Improvements in artificial lighting and in intra-urban transportation have alone swept away a mass of the conditions underlying the evils which used to be associated with night work. And two or three shifts of approximately seven hours each, or three or four shifts of approximately six hours each—I state a not immediate attainable ideal—are very different in their effects upon social life, exclusive of those associated with the shorter period of toil for each workman, from two shifts of some ten or eleven hours each. With the shorter shift in use, arrangements could be made without much difficulty for all operatives to get most of their sleep in the night, if they so wished, and to enjoy most of their leisure in daylight. But it is not my intention in this address to make a practical proposal or argue points of detail: I merely present certain theoretic corollaries which have incidentally been derived from our analysis of conditions determining the length of the working day. In conclusion, I may quote Dr. Marshall's final judgment that were shift systems more extensively adopted "the arts of production would progress more rapidly; the national dividend

would increase ; working men would be able to earn higher wages without checking the growth of capital, or tempting it to migrate to countries where wages are lower : and all classes of society would reap benefit from the change.”<sup>1</sup>

Let me now summarise my main conclusions, and humanise them by restoring the moral and social elements from which our premisses were to some extent abstracted. I have hitherto spoken of progress in such terms that the critic would have some excuse for charging me with narrowness of vision. Progress is not summed up in improvements in productive methods which reduce the cost of things, nor in these improvements combined with the application to production of ideas which render work pleasanter and more educative. Nor is it wholly, or in bulk, summed up even if we add improvements in distribution (resulting in a more satisfying sharing of wealth) and a greater responsiveness of production to the needs of the community. The essentials of what most of us really understand by progress are to be found only in the world of consciousness—in the spiritual constituents of the universe. I mean what we cannot exactly define if we are not philosophers—and hardly then—but something implying a full living, with understanding of life and its surroundings, including its ethics, and a living with volitional powers strong enough to enable us to follow our lights. As all this is actually, though vaguely, desired in some degree by humanity generally, it is no doubt covered by the satisfactions measured in demand, but the admission of its reflection on one plane cannot be regarded as its adequate inclusion in our social philosophy. The most important aspect of the question of the length of the working day consists in its relation to the most intimate constituents of progress. Let us call progress in this sense “culture” —a term perhaps the best of the single terms available to convey my meaning. Now the world appears to be so designed that culture has on the whole a proportionately important place in the most primitive economic conditions. The hours of labour in such conditions may be long, but work is not so continuously absorbing that social intercourse during work is impossible, while variety of experience, contact with nature, and the calls made on initiative afford that intimacy with life as a whole, and that evocation of moral forces, which must be obtained in later stages of civilisation largely through systematic education and books. I have argued above that each step in civilisation brings intensified specialism. Work is by no means rendered non-cultural ultimately, but its

<sup>1</sup> Marshall, *Principles of Economics*, 5th ed., p. 695.

cultural aspects are specialised, as are its objective aspects. Interest may be deepened on the whole, but it is no longer diffused; the need for thought and purpose may be no less than before, but the thought and purpose are of a confined character. The intensification of economic life which is implied is in itself all to the good, but the community must lose something of culture unless corresponding with this intensification there is an expansion of leisure and a specialised use of leisure for the purposes of culture. Certain expressions which have come into common use would seem to be significant of the needs and dangers of an industrial society highly advanced on the technical side. Thus we speak of the "cultured" classes and the "leisured" classes. For the attainment of culture, leisure is essential to-day as it was not in the past in quite the same sense, "culture" being broadly defined. I need not say that a "progress" which meant the "specialising out" of leisure for the sole enjoyment of one class would not commend itself to any reasonable person; and I do not discern any danger of "progress" of this sort; but there is some danger lest the growing importance of leisure generally, and of a proper use of leisure, should not be fully realised. Tangible things force themselves upon our attention as the more intangible do not, and some of us who have an economic bent of mind get into the way, in consequence, of thinking too much of the quantity of external wealth produced and too little of the balance between internal and external wealth. In ultimate terms, to those who care to put it that way, all wealth is life, as Ruskin insisted. There hardly appears to be any risk of a general underrating of external goods, but there is some risk of an underrating of the new needs of the life lived outside the hours devoted to production—which should themselves be, not a sacrifice to real living, but a part of it—and of an underrating of the dependence even of productive advance upon the widespread enjoyment and proper use of adequate leisure and an adequate income.

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