CAPITALISM AND INDUSTRIALISM[*]

John Hicks

I begin, as in a paper with this title it is natural to begin, with Marx. If you look at the first volume of Marx's *Capital* (his major work) you find that it consists, in part, of some elementary algebra, but quite largely of terrifying stuff about the sufferings of the working-class in early nineteenth century England. And it is surely the latter which has made the impression. The reason why Marx has been such a great figure is that he gave a plausible explanation of these horrors, which he was not the only one to notice. It was what he called Capitalism that was responsible.

Now the view that the English Industrial Revolution was horrible, and that its horrors are to be ascribed to Capitalism (or Unregulated Capitaliam) is not a view that is confined to Marx or to Marxists. I remember when I was a student of economics in the 1920's, we used to read Marx (as a set book), but we also read books on the Industrial Revolution like those of the Hammonds (not Marxists at all) which told very much the same story. They were not revolutionaries, they had none of Marx's fierceness; but they could touch chords of pity which he could not. They left a strong impression on the minds of their readers that the Industrial Revolution was a great disaster, even a great crime.

But as time has gone on, the angle from which people view these things has changed. For it has become clear, at least in the "advanced" countries of this mid-twentieth century that there has been a great rise in the material standards of the workers (I am not saying it is all that it should be, or that even if it were it would be everything). But the fact is unmistakeable. It is also clear, and is generally accepted, that it could not have occured without industrialism. Thus we find that everywhere, but particularly in non-industrialised, or semi-industrialised

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countries, it is accepted   that   industrialisation is the answer. It is
accepted to an extent which would have surprised and horrified some   of
the writers to whom I have been referring. In so far as the old story   is
remembered at all, it is explained away by what is in fact some   version
of the Marxist explanation. The trouble was all due to Capitalism or   to
Unregulated Capitalism.

But this is really by no means satisfactory. For if (as is accepted)
there has been, after the Industrial Revolution, a great rise in the   ma-
terial standard of labour (at least in advanced countries) what is it due
to? The only explanation which is open to Marxists, or quasi-Marxists, is
to put it down to regulation or to Trade Unionism; but there has been   a
rise, of very similar character, in places where there has not been   much
regulation or much Trade Unionism; really when one looks at the facts,that
does not seem to wash. And there are some, who having seen this, go   back
to doubt the old stories of the Industrial Revolution horrors;   perhaps,
after all, they were much exaggerated. Productive power, in   the   early
nineteenth century, was greatly increasing; so the real wages of   labour
must have been rising.

The matter has been gone into very throughly by modern economic his-
torians, using information that was not available to Marx (or to the Ham-
monds). But there remains a lot of difference of opinion. Some   maintain
that there was a rise between say 1780 and 1840, some not. I doubt,   how-
ever,that the matter will ever be settled. For the sort of average, which
is the best we can hope for, would be bound to have subjective   elements
in it; it would not at the best mean very much. But even if we   decide
that there was some rise, it could hardly have been large. What is   stri-
king, even on the most favourable view, is how little real wages   rose in
the first generation or two of industrialism as compared with the undoub-
tedly significant rise which took place later. It is the lag of wages be-
hind industry which needs to be explained. In those terms, at the   least,
Marx's indictment stands.

Doubtless there were special causes. The long war with France, 1792-
1815, must have been a strain; the increasing population was hard to   ac-
commodate; and so on. Historians must pay a good deal of   attention   to
them. My subject, however, is a more general cause, which is interesting,
not only for this particular historical application, but also more widely.
It is not a matter of capitalists' monopoly, grinding the faces of   the

poor, as Marx supposed. It is a phenomenon which is liable to appear in the earliest stages of industrialism, however organised, anywhere.

There was one great economist who perceived it, namely Ricardo himself. But Ricardo was not good at expressing himself. His chapter "On Machinery" was written towards the end of his life; it is tacked on to the last edition of his *Principles*; and his followers never really understood what he was saying. Marx, of course, was familiar with his chapter in Ricardo; but he did not understand it either. It is only in our day, with the advantages we now have for the understanding of Ricardo (thanks. to Sraffa) that we can really work it out.

I have tried to work it out as an arithmetical example in four pages at the end of my *Theory of Economic History*. I wondered whether I should use different figures in this lecture, but I think that to do so would only be confusing. If I use the same figures, you can look up the book and check the thing through. I am going on, now, to explain the thing more fully than I did in the book, but I can still use the same framework.

What we want to explain is the failure of real wages to rise (much) in the early stages of industrialism; so let us take the rate of real wages to be fixed, and see what happens to the demand for labour. I begin with a stationary economy, in which employment is the same from year to year, and output the same. I shall suppose that some sort of simple machinery is already being used (this is really so that we can use the same model later on in a different way, it does not really affect the essence of the argument). Suppose that one of the original machines takes one year to make and lasts for 10 years. It takes 10 labour-units to make it, and 10 to work it in each of the 10 years of its life. It will then produce, each year, 100 units of product (what Ricardo would call corn, the finished consumption good). Let the fixed real wage be 8 units of product for each labour-unit.

With these figures, there will be a surplus of product over wages. It figures in many modern models as "consumption out of profits." But remember that in a practical case it has to cover government consumption expenditure, as well as the consumption of capitalists. The "unproductive labour" of Adam Smith, which includes that of "the sovereign, with all the officers of justice and of war that serve under him" gives a better idea of this "surplus consumption" than is given by those who think of it as purely the luxurious consumption of the capitalist.

Suppose that the initial stock (of the original machines) is 100. 10 will wear out each year, so to keep the system going 10 new ones must be produced. 100 labour-units will be required to make these new machines, and 1,000 to operate the 100 machines in use. So total employment is 1,100.

Total output of finished product will be 10,000. Total wages = 8 x 1,100 = 8,800. So there is a surplus of 1,200. That is the initial position.

Now suppose that a new machine is introduced, which takes the same time to construct, lasts the same time, and produces the same annual product; but instead of 10 labour, 15 labour are required to build it, while the number of labour-units required to operate it is reduced from 10 to 8. This is a thing which could happen, either in a "capitalist"or a socialist economy; there is no reason why it should not happen in a socialist economy, and (as we shall see)there are good reasons why it sometimes should.

The change in the prospects of the economy, due to the adoption of the new technique, may well affect the amount which capitalists(or government) decide to take out as surplus; but it is not easy to see in what way it would affect it. A case can be made for either. But in the socialist case, where the surplus is public (government) consumption, it is not easy to see any reason why it should be affected either way. Thus it is clearly interesting to see what happens on the assumption that the surplus taken out is unaffected. So the surplus is to be unchanged, and the real wage is to be unchanged; what then?

In the year the new technique is introduced, nothing much will happen. All that can happen, with an unchanged surplus, is that the 100 who would have made the old machines are making new ones. The difference comes at the end of year, when instead of 100 old machines, we have 90 old + 6. 67 new. So employment in operating = 90 x 10 + 6.67 x 8 = 953 (approximately) and output of product = 90 x 100 + 6.67 x 100 = 9,667.

Now if 1,200 has to be deducted for surplus, and 8 x 953 for wages in operating, that leaves 9,667 - 1,200 - 7,624 = 843 available for payment of wages to constructional labour. Dividing by the constant 8, this gives 105 (approximately) for employment in construction. So total employment comes out to 953 + 105 = 1,058 (instead of the original 1,100)

Go on to the third year. The stock of machines with which that year

starts is 80 old + 6.67 + 7.0 new. If you work the effect of this through
in the same way, you find that employment falls yet further, the very
small increase in the new machines coming into operation being insuffi-
cient to balance the old machines wearing out.

There is, however, one bright spot. Just as there was just enough in
the second year to enable the output of new machines to be larger in that
year than it was in the first year, so it will be found that there is a
further increase in the third year, and another in the fourth and so on.
This favourable factor is very small at first, but it grows. The time will
come (perhaps when all the old machines have worn out, perhaps earlier)
when this favourable factor has grown sufficiently to offset the decline
in employment on the old machines; and then the demand for labour will
start expanding.

It may take quite a long time before this happens; with the figures
I have been using it takes a very long time. Not until the eleventh year
does employment recover to its old level. But when it does so, it has not
just got back to the original position. In the original position, the eco-
nomy was not expanding, but now it is expanding. Even if there was no fur-
ther "technical progress" the demand for labour (at the constant rate of
real wages) would be steadily rising. The demand curve for labour would
be moving to the right, so that if the supply was not increasing too ra-
pidly, real wages could rise.

All this has been shown, with one particular set of figures, which
could be no more than an illustration. What would have happened, if we
had kept the main lines of the model, the initial stationary state, the
constant rate of real wages, and the constant surplus, but had chosen the
figures differently? I must admit I was not completely clear about this
when *A Theory of Economic History*[1] went to the press and passed out of my
hands; but I have now worked it out, and I can answer the question.

Let us keep the same rules about time of construction and rate of
wear. Let us continue to define a machine as something which will produce
100 units of product per annum. That leaves us with just two things
which have changed from the new to the old machine. The number of labour-
units needed to construct the machine has risen from 10 to 15; the number
required to operate it has been reduced from 10 to 8. These are the fi-
gures which produced our result. What happens if we vary them?

1. J. Hicks, *A Theory of Economic History*, (London: Clarendon Press, 1969).

I don't propose in this lecture to work the thing out in   detail, though I could now do so. For the result which emerges is simple, and easy to appreciate in the light of what has been said. There is a fairly wide range of figures which will produce the result already indicated. One of the possible results of the introduction of a new technique is that shown in(Diagram A.)

DIAGRAM A
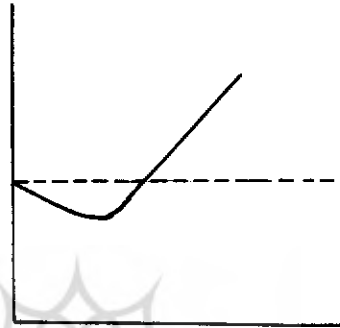
That is not very nice; but for all that has been said, we might have got a result which was even worse. Suppose that the labour cost of   the new machine had been even higher; say 20 instead of 15. Then there would be only 5 new machines at the end of the first year;so in the second year the stock would be 90 old plus 5 new; employment in operating would have been only 940; finished product would be only 9,500. Deducting our fixed 1,200 and 8 x 940 for wages to operating labour, this leaves 9,500-1,200- 7,520=780 for wages to constructional workers. Dividing by 8, this gives less than 98; so that employment in the constructional trade, instead of rising a bit in year II, falls a bit. And this is fatal.

For salvation had come, in our first example, from the little   gain in constructional employment in year II, which meant that more new   ma- chines were added in year II than in year I, so that year III began   a little better in this respect than year II, and so on. At first the gain is small, but it grows as time goes on. But in the case to which we have come, there is a fall in construction between year I and year II,and that also will grow, for the same reason. If you work it out, you   will   see that this is what happens. So there is another possibility, worse   than that with which I started, in which there is no kick-up. Just a continued contraction(Diagram B.)

DIAGRAM B
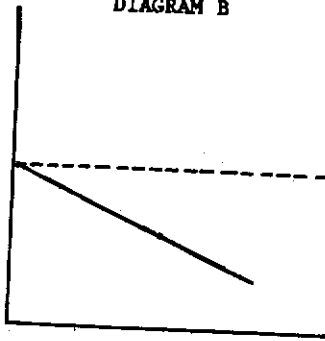
But as there is a more dismal, so there is a brighter alternative. Suppose that the new machine, instead of requiring 15 labour-units to produce it, had only required the same 10, as before. (But there was still the same saving of labour-10 to 8 at the operational stage). Then there would have been 10 old + 10 new machines at the end of the first year; and though employment in operating would have dropped in the second year (from 1,000 to 980), the amount produced would not have fallen. It would still be the same 10,000, so what is left for wages to constructional workers is 10,000 - 1,200 - 7,840 = 960; at a wage of the usual 8 this means that 120 constructional workers can be employed. Thus (since 980 + 120 = 1,100) there is no fall in total employment; there is just a shift in employment, from operating to constructing.

But now, in the next year, there will be 80 old + 10 + 12 new machines, and these can produce more than before. It is easy to see that production, and total employment, after being constant in year II as well as in year I, will thereafter go on rising.

If we had allowed the new machine to be labour-saving at the constructional as well as the operational stage, we should have found that the expansion started in year II not in year III. So the brighter alternative is in fact for a steady rise, with no initial fall (Diagram C.)

All we have been doing with this arithmetic is pure classification; but these are economic boxes that are by no means empty. Of course it is true that in a practical case we have lots of changes in technique going on together, both simultaneously and successively, not just the single change of our model. But that doesn't stop the model being useable; we have just to think of a lot of changes, as analysed, being superimposed

on one another. It will still make a lot of difference which sort is do-
minant.

DIAGRAM C
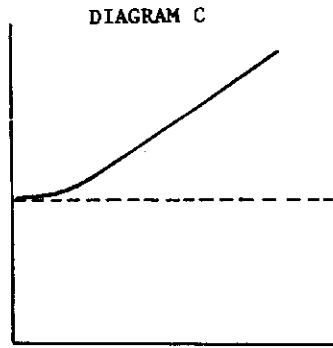
It is fairly obvious that if most of the technical progress is   of
type C, there will be continued expansion;if most is of type B,there will
be continued contraction; while if most are of type A, improvements   of
that type being made successively, one after another,there will be   con-
tractions due to one and expansions due to another going at the same time,
more or less cancelling out. The early type A improvements should be get-
ting into their expansionary phase, but these expansions may be offset,or
more than offset, by the contractions that are due to later type A   im-
provements. Taken in that form, the model fits the facts we began by dis-
cussing; we have just to suppose that in the early stages of   industria-
lism, most improvements were of type A, while later they have been mostly
of type C.

        I think there is a reason for this; but before I come to it,   what
about type B? This doesn't seem to fit the facts in the same way; we have
not (thank heavens) had to deal with its indefinite contraction.For   this
also I believe there is a reason. It is a reason which would make   Marx
get up and scream; for what I am going to say is that there is a   safety-
catch which prevents it under Capitalism. It can be worked out on   the
figures I have given and can be much more generally verified. A change in
technique which had such disastrous results would not be persisted in(un-
der Capitalism) because it would not be profitable. I say "it would   not
be persisted in"; I do not say "it would not be undertaken".Private busi-
ness men, like socialist administrators, make mistakes. But if   private
business moves at all far in this dangerous direction, by mistake,it will

find, by the effect on profits, that it has made a mistake; so it will turn back, indeed it will have to turn back. There may be a start along a B road, but it will not be prolonged. Under Capitalism, B "improvements" will be cut short; they cannot be a large part of the mixture.

It is not obvious that socialism possesses any similar safety-catch. I do not mean that socialist planners are so silly that they are likely to go far along a B road without noticing that they are getting into trouble. But they are not turned back so automatically. Thus there is a danger that they will go further along it before turning around. And this is confirmed by what we find in practice; that they find themselves longing, as a result of their experience, not perhaps for a check or safety-catch, but at least for a signal. Cannot one see that the economists of Eastern Europe, in Poland and Hungary, and perhaps even in Russia, are getting into this state of mind? Surely this is at least one of the things that their search for a way of "re-introducing the price-mechanism" is about?

Let us confine attention, from now on, to a system which does have a safety-catch. The terrible B alternative may then be neglected; but there remain A and C. Either of these may be profitable; it is really a matter of the kind of technical progress which occurs that decides which is dominant. I have said that I think there is a reason why in the early stages of industrialism it is more likely than in the later stages that A will be dominant.

I have said something about this in my book. It is essentially a matter of technology. It began to come clear to me from reading the Industrial Revolution chapters in the *A History of Technology*.[2] The early machines were largely hand-made, with a little assistance from water-power; so they must have been very-labour intensive at the constructional stage, which would certainly tend to mean that the improvements were of the A-type. Later on, as machines became used to make machines, this cost would come down. But that perhaps is a particular characteristic of the English Industrial Revolution, which would not repeat itself in other conditions, or not just like that. Surely there are other more general factors which work the same way. There are the general economies of scale, the Increasing Returns factors beloved of Marshall; there is also the learning factor "Learning by doing" in Arrow's famous and self-explanatory phase. They all work in the same direction; by the very progress of industry, constructional costs

2. *A History of Technology*. Vol.4. (Oxford: Oxford University Press).

come down, so that improvements tend to be more of the C, and less of the A type. I shall not go into this in detail, for the matter is technological rather than economic, and I do not feel especially equipped to say much about it. All I can say is that it seems very plausible to suppose that there has been such a change. My business is to show that it is a hypothesis which if it were correct would have economic consequences that seem to fit the facts.

There are two things I want to discuss in the remainder of this lecture. One is to answer a question which some of you I expect will be asking:what is the relation between what I have been saying and the old stuff about labour-saving and capital-saving inventions, which has penetrated so deeply into economic thinking, and with which I have myself been concerned, so that my name gets tied on to it, sometimes at least? The other, more important, is to say something about the bearing of what I have been saying, not just on past history, but on some of the problems of the modern world.

To begin with the theoretical matter. There was always a trouble with the old classification, that there is such an obvious sense in which all inventions, or nearly all inventions, are labour-saving. Even the invention of a better-yielding form of wheat, or other cultivated plant, is labour-saving; for if it increases the output of a fixed amount of labour, it reduces the amount of labour that is needed to produce a given output. Even the invention (the successful invention) of a new consumption good is labour-saving, in the more esoteric sense that it increases the satisfaction (or utility) that is got from given labour; so it enables a given utility level to be reached with less labour. All of these improvements, in a more or less refined sense, are labour-saving.

The distinction I have been drawing is between inventions that are labour-saving *at the constructional stage* and those which are labour-saving at the other stage at the expense of using more labour in construction. This, as we have seen, does make a profound difference. It does correspond, at least up to a point, with what the older analysis (even my own older analysis) used to say about saving capital versus saving labour.The thing about my A improvements (which save labour at the operational stage at the expense of "spending" labour at the constructional stage) is that they are heavily capital-using if we fix our attention on the operational stage, and think of the machine that is used at that stage as *capital*. If

we look at the middle part of my sequence, when the demand for labour has
fallen on the A-curve, but risen on the C-curve, it does fit in with the
conventional stuff. The trouble with the A-sequence, at that stage   is
that it is labour-saving but capital-using (so *relatively* labour-saving).
Thus we should not be surprised to find that the demand for labour, at a
given level of real wages, falls which comes to the same thing as saying
(in neo-classical terms) that the marginal product of a given labour sup-
ply has fallen. The jolly thing about the C-sequence, at that same stage,
is that it is not in the same way capital-using (or "spending"): so   the
demand for labour can increase from the start, or the marginal product of
labour rise from the start. One can in that way build a bridge.

The merit of my new "Ricardian" approach, I would now claim, as against
the neo-classical approach (even in the form I gave it   myself   nearly
forty years ago) is partly that it reminds us (in Joan Robinson's manner)
that capital is made by labour; but also (and this to my mind is more im-
portant) that it teaches us to look at the matter sequentially. Not just
to step at the middle point of the sequence, as if that were all that mat-
tered.

Now I come to my final topic:the bearing of what I have been saying
on some problems of the contemporary world. But in order to come to that,
I must make a distinction which (so far) I have not bothered to make. I
have allowed myself so far to fall into the bad habit, into which an eco-
nomist so easily falls, of not distinguishing whether one is talking about
the whole world (a *closed* economy) or whether one is talking about   a
single country, which may, if it chooses, be   an *open* economy. It was
actually the case that when one was talking about the English Industrial
Revolution (the stage at which England was practically the only industri-
alised country, the Workshop of the World) one could get away without ma-
king this distinction. But when one turns to contemporary   applications,
one certainly cannot.

When one is thinking of the world as a whole, one can say with some
confidence that it has (probably) passed into a stage in which C-type im-
provements, though not the only sort, are pretty safely the dominant sort;
so that the distinctions I have been making are of no more than histori-
cal importance (not that history is unimportant, it leaves its marks).But
when one is thinking of particular countries, that will not do at all.

One cannot even be sure, when one is   thinking   of   particular

countries, that the safety-catch, which cuts out the B-sequence *under ca-pitalism*, is so very reliable. If an improvement is profitable, it will probably be to the advantage of labour, *in the end* and *somewhere;* but there is no reason at all why labour *everywhere* should, even in the end, be advantaged by it. The damage may be in one place, and the advantage in another. It will abstain from taking controversial examples, in Wales or in Ireland; let me just take a strong example, rather far away. There was a time when almost the sole source of sugar, to many of the advanced countries, was the cane that was produced in a few tropical islands. When beet sugar began to develop, it was heavily protected, and it could be fairly maintained that this was an infringement of proper (capitalist) economic principles. More important, perhaps, was the cost of the protection to the protecting countries; this ensured that it was not carried so far as to deprive the cane sugar producers of a market altogether. But technical progress has not gone so far (one is given to understand) that beet sugar is fully competitive with cane sugar, no longer relying upon the protection which has been given to it; so the prospects before the old cane sugar producers, especially those who are in places where there is little possibility of finding alternative products, are black indeed.

These things do happen; and because they happen sometimes they are (very naturally) generally feared. This is one of the reasons (though not the only reason) why it is nowadays so largely taken for granted that a "developing" country is to develop, so far as possible, in a self- sufficient manner. It is not enough to be a developing part of a world economy, which can so easily (it is feared) let one down. But as soon as the issue is regarded as a problem of self-contained development, the questions we have been discussing come back in full force.

The most perfect example of a self-contained (or autarkic) development that has been seen in this twentieth century is the case of Russia after the Revolution, indeed one should probably say, after 1928. The Russian example is indeed confused by the War and the Invasion of 1941-44 (just as we have seen that the English is confused by the strain-admittedly the far smaller strain - of the war with Napoleon). Nevertheless there is a parallel. Even without the complications of the wars, we can now see that we would expect that there would have been a period of strain; a delay before the point is reached when there can be a rise in real wages, in the Russian as in the English case. In both cases, it should

be noticed, productive power was increasing rapidly; there must have been a sharp rise in GNP "at constant prices". But the increase in productive power does not, for a long while, get through to real consumption.

Russia in the twentieth century, like England in the nineteenth century, was initially a rich country, which could stand the strain. It is difficult to see that poorer countries, like India or some of those in Africa or South America, could stand it. In fact, whatever they say, they do not really expect to do their development autarkically.

There are two ways in which they may ease their problem by developing less "on their own". One is through trade. By importing capital goods or at least the more difficult capital goods - instead of trying to make them themselves, they may take advantage of the cost-reduction which (as we have seen) has occurred elsewhere. But if this is all, it gives no more than a limited help. For though the cost of machines has come down in terms of English or American labour, it is not so low in terms of Indian labour. For what then comes into consideration is the quantity of Indian labour which is needed to make the exports which should pay for the imported machines; and there are plenty of problems on that score.

The prospect is much better if there can be alleviation through (so-called) "movement of capital" - international lending and investment. This again comes out in my "Ricardian" model. For what caused the strain (the bad patch on my A-curve) was the failure - which I assumed, and I think justly assumed - to find a source of *increased* saving to match the heavy increase in investment, that was needed in order that the technical improvement should be carried through. Because there was no other source, the burden was thrown on to labour. The point of my argument was that if the adjustment can come in no other way, it will come in that way. Now if our single country is able to borrow abroad during its bad patch, to repay later, when it is much more capable of repaying, the difficulty is overcome. This is of course the reason why some newly settled countries- the Australias and Canadas and so on-were able to start their process of development without any comparable strain.

The obstacles to the application of that solution to the general run of what are (so pathetically) called "developing countries" are well-known; I shall not enlarge upon them. I would merely remark that there are obstacles at both ends. They are not insuperable, but they are formidable. I hope that what I have said may have cast some light on the problem with which they (and we) are confronted.