

ON THE NEED FOR REGULATING TECHNOLOGICAL CHANGE

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1. It is a matter of great honour for me that I have been asked to deliver this lecture in memory of Professor J.K.Mehta as part of his centenary celebrations. Professor Mehta was a renowned economist. He was highly original and has been acclaimed by Professor Joan Robinson as one of the originators of the concept of "marginal revenue". He was a legend in his life-time and inspired deep affection, tinged with a sense of awe, among his students and contemporaries. This awe arose because of his remarkable personal integrity and frugal habits. Professor Mehta was a philosophically-inclined economist, who sought to express his own personal *weltanschauung* through a set of highly original economic doctrines. In particular he developed over the years his view that the unlimited generation and cultivation of wants stood in the way of human development.

Professor Mehta's view on this issue of course can be interpreted in two very different ways. On the one hand one can argue, in a manner that would perhaps be literally closer to his own thinking, that the individual's own sense of enjoyment is impaired because of the excessive generation of wants. On the other hand, one can detect in his intellectual position an early concern with some of the modern-day problems that occupy economists, such as the issue of "sustainable development". I would like in the course of this lecture to follow this latter track and argue that spontaneity in the matter of technological change, which is closely linked with the ceaseless creation of new wants, militates against the realization of another basic feature of a humane society, namely the elimination of involuntary unemployment.

2. I use the term "involuntary unemployment" here in a somewhat wider and more inclusive sense than Keynes did. I mean by it simply the existence in any period of an excess supply of labour at the prevailing real wage rate, and cover under it three possible cases, of which the Keynesian case happens to be only one. These cases are: first, where the real wage rate is not flexible downwards (or can be pushed down only slowly over time); second, where even if the real wage rate can be pushed down, unemployment would not shrink relative to the initial situation because there would be no demand for any extra output produced through the lowering of the real wage rate (the Keynesian case); and third, where even if the real wage rate could be pushed down there would be no reduction in unemployment because the available stock of equipment is unable to employ any more workers (the Marxian case).

Involuntary unemployment in the above sense is in my view closely associated with poverty. And in recent years in our country the problem has been getting worse. A comparison of the 1993-4 and 1999-2000 NSS data on employment shows for instance that total rural employment has been increasing at the rate of a mere 0.6 percent per annum, which is far below the rate of growth of the rural population. The consequent increase in the unemployment rate in rural India is camouflaged to an extent as a decline in the work-participation rate, but this is only a *form* that unemployment takes. The

increase in rural poverty in the nineties is very much in keeping with this worsening employment scenario. (The government of course has been claiming a *decline* in rural poverty on the basis of the 1999-2000 quinquennial survey, but this decline is entirely on account of "contaminated" data in the NSS 55th round consumer expenditure survey and should not be taken seriously. On the other hand, the annual expenditure surveys through the nineties, right until 1998-9 have been showing a trend increase in rural poverty).

3. It is generally assumed that if the economy experiences a high enough growth rate, then the problem of involuntary unemployment would automatically disappear. Let us go back to the three possible cases mentioned above. If involuntary unemployment is on account of a shortage of wage-goods (with the wage rate inflexible downwards), then clearly a high growth rate which enlarges the wage goods output sufficiently, relative to the rate of growth of the work-force, would automatically bring about a progressive elimination of unemployment. Likewise if unemployment is on account of an insufficiency of equipment, then too a high enough growth rate, by enlarging equipment output (or availability through trade), would progressively absorb the unemployed into the ranks of the employed. And as regards Keynesian unemployment, a high growth rate would be precluded in a demand-constrained economy, so that the very realization of a high growth rate presumes the overcoming of such a constraint. It follows from this reasoning that if the economy experiences a sufficiently high growth rate, then involuntary unemployment would progressively disappear over time.

This indeed is the basis of the so-called "trickle down" effect. As long as a high growth rate is achieved, no matter how (even by increasing income and wealth inequalities in society), unemployment, and with it poverty, must disappear. If we find empirically at any time that despite an observed level of high growth, unemployment, far from disappearing, is in fact getting worse (as is the case in India in the nineties), then that can only go to show that the requisite growth rate for overcoming unemployment happens to be even higher. Society should then have even less qualms about taking all possible measures, including increasing the extent of income and wealth inequality if necessary, to promote still higher growth.

4. This entire argument however is based on a fallacy. Along with growth there is usually some rise in labour productivity, so that the rate of growth of labour demand is given by the excess of the rate of growth of output over the rate of growth of labour productivity. For unemployment to decrease, the rate of growth of labour demand must be higher than the rate of growth of the work-force. Now, it is perfectly possible that an *increase* in the growth rate of the economy is accompanied by a *reduction* in the rate of growth in labour demand (if the rate of growth of labour productivity associated with the output growth rate *increases* to an even greater extent), in which case an acceleration in output growth would be accompanied by a *worsening* of the unemployment situation.

If for example an economy is growing at 6 percent per annum with a 4 percent growth rate in labour productivity, then the rate of growth of labour demand is 2 percent per annum (I assume continuous time here for simplicity). If the work-force is also growing at 2 per cent per annum then the unemployment rate can never come down.

Now, suppose, in response to this situation, the growth rate of the economy is stepped up to 7 percent. But if, as a consequence of the measures adopted for doing so, the rate of growth of labour productivity increases to 6 percent per annum, then the rate of growth of labour demand *falls* to 1 percent per annum from the 2 percent earlier. Associated with this *increase* in the growth rate therefore, there would be a *worsening* of unemployment. There is thus no direct connection between growth and unemployment or between growth and poverty.

5. It may appear at first sight that this is only an arithmetical point with little practical relevance. Typically, it would be argued, a 1 percentage point increase in the growth rate of output would be associated with a *less than* 1 percentage point increase in labour productivity, so that any increase in the growth rate would necessarily raise the rate of growth of labour demand. Putting it differently if g denotes the output growth rate in the economy and b denotes the rate of growth of labour productivity, then $b = f(g)$, with $f' < 1$. Since the rate of growth of labour demand is $(g-b)$ it follows that any increase in g must increase it and hence must improve the employment situation.

But this is erroneous for the following reason: there is no stable function linking the rate of growth of labour productivity to the rate of growth of output in the context of economies like ours (though Nicholas Kaldor did put forward a stable function in the context of the advanced capitalist countries). How productivity behaves in relation to growth depends upon a number of factors, viz. how this growth itself is achieved, what is happening to the extent of income and wealth inequalities during the process of this growth, the pace of innovations being introduced in the advanced economies etc. These factors are not constant; they change from one episode of growth to another, which is why there is no stable relationship (and that too of a kind where f' must necessarily be less than 1) between output and productivity growth rates in economies like ours.

6. Let us see why each of these factors, claimed to be affecting the growth-productivity relationship is important. In economies like ours, the trajectory of innovations is not an independent one, but is heavily influenced by the trajectory followed in the advanced capitalist economies. The new processes and products introduced there make an appearance after a certain time-lag in economies like ours. Typically the nature of technological progress in the advanced economies is such that while it does not much affect the overall capital-output ratio it does tend to lower over time the labour-output ratio. And this is precisely what gets replicated in economies like ours. The speed with which the labour-output ratio declines in economies like ours depends therefore upon two considerations: the speed with which it declines in the advanced economies, i.e. the pace of innovations there (which is the ultimate source for the innovations here), and the pace at which they get "diffused" to economies like ours. This pace of "diffusion" in turn depends upon the nature of our economic regime, i.e. how "liberal" it is, and upon the strength of demand for "Western" goods, which in turn is closely linked to the extent of income and wealth inequalities in society (a more unequal distribution setting up pressures for a more rapid "diffusion"). These were the factors mentioned above, and it is clear that the fact of their operation prevents any one-to-one correspondence between the rate of growth of output and the rate of growth of labour

productivity in economies like ours. A mere increase in the growth rate of output therefore does not necessarily result in an alleviation of unemployment and poverty. What is more, if such an increase is associated with an increase in economic inequalities in society resulting in a more rapid transplantation of new goods and new life-styles, currently prevalent in the advanced countries, to economies like ours, then it would lead to a worsening of unemployment and poverty here.

7. This is no idle speculation. A favourite argument of the Washington Consensus, which is the fountain-head of the current "neo-liberal" agenda being adopted all over the third world, is that its policies are vindicated by the rapid growth in the nineties witnessed in the world's two most populous economies, China and India. This claim about growth rates in these two economies has itself been contested. It is a further moot point whether the high growth, to the extent it has occurred at all, can be attributed to "neo-liberal reforms"; the Chinese economy certainly is far from being an archetype of "neo-liberal reforms". But even without going into these issues we should note that *the unemployment situation in both these economies has palpably worsened during these very years of high growth*. China is reported to be having close to double-digit growth rates for nearly a decade and a half, and yet, as is well-known, China is currently afflicted with a severe unemployment problem. We need not go into the merits of the Maoist employment policies, but we cannot remain oblivious to the simple fact that if at the end of a decade and a half of nearly double-digit growth rate we find that the unemployment situation has worsened, then this kind of growth is no panacea for unemployment. And exactly the same holds for India, where, notwithstanding the claim of a higher growth of GDP during the decade of the nineties, the unemployment situation at the end of the decade is worse than at the beginning. In short, overcoming unemployment and poverty is not a matter of merely increasing the growth rate of the GDP.

8. An argument of the following kind is often advanced. To say that a high rate of productivity growth is inimical for achieving full employment may be true in the short-run but cannot be true in the long-run. A high rate of labour productivity growth, occurring in the midst of involuntary unemployment which keeps trade unions weak and hence real wages down, would raise the share of surplus in output, and hence the share of investment. This would increase the rate of growth of the economy still further, and this process of accelerating growth would necessarily go on until involuntary unemployment substantially disappears.

The basic presumption of this argument is that the higher is the share of surplus, the higher is the share of investment in output. But this is far from being the case. Even if we assume that the share of surplus does rise with the rise in labour productivity, i.e. that real wages do not rise *pari passu* with productivity, surplus is far from being synonymous with investment. The latter depends upon the expected growth in the size of the market, and the increase in the share of surplus *per se* does not give rise to such expectations. In fact Kalecki had argued the opposite, namely that a rise in the share of surplus (brought about through what he called a rise in the "degree of monopoly") *lowers* the growth rate of the economy (not asymptotically but over an actual chunk of historical time). Even if we assume that the surplus that is not invested is consumed, i.e. is *realized*, then though

the strong Kaleckian argument would not hold, there would still be no increase in the growth rate owing to the rise in labour productivity even when real wages do not increase *pari passu*. The fact that the investment ratio in India has not increased noticeably during the nineties despite the rise in the share of surplus (which most people would agree has occurred) only underscores the point.

9. If growth *per se* is not the panacea for eliminating involuntary unemployment, then what can be done about it? Growth to be sure has to be there, but in addition one can think of two kinds of measures that must supplement growth. The first is a control over the pace of technological change, which requires in turn a combination of two different kinds of measures: *selectivity* in adopting innovations that have already been introduced in the advanced economies; and the initiation of an *independent trajectory of innovations*, emphasizing in particular output-augmenting, as opposed to labour-displacing innovations, i.e. emphasizing innovations that *in their total effect* raise the output-capital ratio for a given labour-capital ratio rather than those that lower the labour-output ratio for a given capital-output ratio (which as we have seen is what occurs *in the aggregate* under capitalism). In short, the process of economic growth has to be accompanied not by a replication of the technological change that has occurred in the advanced countries but by a process of regulated technological change which overcomes spontaneity (since the latter would only result in a replication of advanced country experience).

The second kind of measure is something which Social Democratic governments in Europe have been thinking about, namely reducing the work-load per worker and letting the same labour-demand be met by a larger number of workers. But if this work-sharing is accompanied by a sharing of the same wage-bill, i.e. if the reduction of work-load per worker is accompanied by a corresponding reduction in the real wage rate per worker, then we are not really overcoming involuntary unemployment and poverty. We are simply sharing out the unemployment and the poverty. For *reducing* unemployment and poverty, it is essential that work-sharing be accompanied by an *increase* in the wage-bill, subject of course to the fact that this increase must not be so large as to impinge on the growth rate itself (via reduced savings and investment). We argued earlier that the rise in surplus does not raise the investment ratio or the growth rate; by the same token a reduction in the share of the surplus, at any rate compared to what it otherwise would have been, should not lower the investment ratio or the growth rate. As long as this is ensured through appropriate fiscal means, work-sharing can be combined with a freezing, at the very least, of the share of the wage-bill in output, so that real wage rate per worker rises even as leisure per worker expands, the rate of growth of the two adding up to equal the rate of growth of labour productivity. In short, if the rate of growth of labour productivity is such that, given the output growth rate, the growth of labour demand falls short of the growth of work-force, the workers can still derive the benefits of productivity growth through a *combination of growth in real wages and in leisure* (See Appendix for clarification and elaboration).

10. It is obvious however that either of these avenues would be shunned in a capitalist economy. The first entails regulation, and hence a degree of planning. This is invariably anathema for capitalists, and more so these days, when any "State control" would be

attacked as "curtailing freedom". The intellectual basis of the attack itself is unsound (even if we go no further than our own experience, the Nehruvian State, despite being highly interventionist, cannot be accused of being in any sense less "democratic" in comparison to the current Indian State in the era of "liberalization"). But the attack, sound or not, would be there. Capitalism does not like State intervention except in the interests of the capitalists; it may temporarily tolerate such intervention, even when it is not in the direct interest of capitalists, if it finds that the balance of class forces is unfavourable to it, but this temporary tolerance ends at the first opportunity when it feels confident of ending such intervention.

As for the second avenue, i.e. converting unemployment into leisure without reducing the wage rate in tandem with the work-load per worker, this is clearly even more disagreeable for the capitalists, since it entails a higher wage-share compared to what otherwise would have prevailed. Even apart from narrowly economic considerations, the very fact of wages not being cut when the work-load is reduced goes against the ethics that capitalists prescribe for the workers. It would be so subversive of the ideological foundations of capitalism that they would fight it tooth and nail. It follows that the only means of reducing involuntary unemployment in societies like ours are such that they can be adopted, not under capitalism but under an alternative system that goes beyond capitalist property relations. The case for socialism (by which I do not mean what actually existed earlier and was marked by a combination of "command economy" and dictatorship of the Party) arises overwhelmingly in my view from the perception that it is the only system capable of overcoming permanently the state of unemployment and poverty in societies like ours.

11. The record of capitalism in this regard even in its metropolitan base is worth examining. Capitalist industrialization in the metropolis too had, in its initial phase, failed to absorb the labour reserves that had been thrown up as a result of the primitive accumulation of capital. But three factors specific to metropolitan capitalism played a crucial role in ensuring that the problem of domestic unemployment did not reach catastrophic proportions: first, the ability to inflict de-industrialization in the colonies which amounted *de facto* to an export of unemployment; second, the fact that, in the years of the early industrial revolution, machine-making itself was a highly labour-intensive activity, so that as workers were being displaced through the *use* of machinery, they were also getting absorbed in the *making* of machinery, thus ensuring that the magnitude of *net* displacement was small. Thirdly, and most importantly, workers migrated in large numbers from the European mainland to the temperate regions of white settlement where they obtained access to plentiful land by ousting, and mostly decimating, the local population. This "safety valve" of out-migration was always available to the population of Europe, and it played a major role in restricting the magnitude of unused labour reserves. Even so, metropolitan capitalism had always been saddled with substantial unemployment, which of course reached massive proportions during the Great Depression of the inter-war years before declining under the impact of war and militarism. The adoption of Keynesian demand management policies *inter alia* brought down unemployment to remarkably low levels in the post-war period, and even necessitated the use of immigrant labour in a variety of low-paid occupations, but with

the end of the long post-war boom, unemployment in the metropolis has once again emerged as a serious problem. In short, even with its global reach metropolitan capitalism has never succeeded in overcoming the problem of involuntary unemployment, except for a brief period after the war; its global reach has only ensured that the problem has remained within socially and politically manageable limits.

12. By contrast, the erstwhile socialist economies, whatever else one may think about their performance, were remarkably successful in using up their labour reserves. Indeed even a critic of these regimes, the Hungarian economist Janos Kornai, has credited them with the using up of their labour reserves and suggested that this was one of their most significant achievements. The reason they could do so was of course by restricting the pace of introduction of innovations. But this, though it led to the achievement of full employment and even gave rise to labour scarcity, also meant that when full employment was reached, the level of technology in most sectors, especially in those producing consumer goods, was quite primitive, so that the gap between this level and what prevailed in the advanced capitalist economies was quite large (with a corresponding gap in the quality of consumer goods available), and the task of bridging this gap correspondingly more formidable.

The lesson to be drawn from the experience of the erstwhile socialist countries by societies like ours, which do not have access to land and resources all over the globe and which cannot therefore use the out-migration route to solve their unemployment problem, is that some regulation of the pace of introduction of innovations is essential, though this regulation need not mean a "freezing" of the technology level (since this makes adjustment to the post-full employment situation difficult); societies like ours can work out an "optimum" pace for the introduction of innovations.

13. But, why, it may be asked, should a *socialist underdeveloped economy* impose any restrictions on the pace of technological change, since no matter what the rate of labour productivity growth it can always maintain full employment through an appropriate rate of growth of leisure without in any way foregoing real wage increases (in fact the rates of growth of leisure and real wage should together add up to the rate of growth of labour productivity)? There are two reasons for it. First, all sectors in the economy do not have the same rate of labour productivity growth. Likewise, labour is not perfectly mobile across sectors. It follows then that unless we are talking about a differential rate of growth of leisure across sectors (which would be inequalizing and hence contrary to the spirit of socialism), any uniform growth of leisure across sectors, *at a rate equal to the difference between the overall rates of growth of labour demand and work-force*, would necessarily entail unemployment in some sectors together with labour scarcity in others. For these practical reasons therefore the economy cannot rely exclusively on the work-sharing route to maintain full employment.

The second reason is the following. We have argued that the rates of growth of leisure and real wages should together equal the rate of growth of labour productivity. Given their low consumption base, however, the workers may prefer, to start with, higher real wages to greater leisure. Now, it can be seen (see Appendix) that the rate of growth

of real wages in a socialist underdeveloped economy, maintaining full employment through work-sharing, must equal $g-n$ where n is the rate of growth of the work-force and is exogenously given. To have a higher rate of growth of real wages therefore it is necessary to raise the rate of output growth. Till now we have assumed that growth depends entirely on the investment ratio with no balance of payments problems. But a more "liberal" trade regime in the periphery with a faster pace of "diffusion" into it of new products and life-styles from the advanced countries is likely to be associated with balance of payments problems which would lower the growth rate below what the investment ratio alone would have warranted. Restrictions on such "diffusion" therefore are a means of *increasing* the economy's growth rate and hence the rate of growth of real wages as desired by the workers. It follows again that relying exclusively on the leisure route would be impractical and against the wishes of the workers. Some regulation of the pace of technological change in a third world economy is essential for the using up of labour reserves.

14. It is interesting to note that the two most outstanding thinkers thrown up by the two most populous economies in the world, economies saddled with massive labour reserves, have been acutely aware of this problem of overcoming unemployment, and have come, each by his own route, to the need for regulating the pace of technological change for overcoming this problem. When Mao Zedong talked of "backyard steel" during the Great Leap, or, later, of the need for a highly dispersed industrialization strategy, he obviously was underscoring the need for regulating the pace of technological change. When Gandhiji was talking of khadi and cottage industries, he too was emphasizing the same need. The point is not whether we accept the Gandhian recipe of khadi and cottage industries; the point is that we can neither remain oblivious of the problem of unemployment, which Gandhi and Mao had drawn attention to with such great acuity, nor afford to ignore altogether the direction in which they had looked for solutions.

APPENDIX

Consider the following economy. Its growth rate g is simply the product of the investment ratio i and the output capital ratio c .

$$(1) \quad g = i.c$$

The investment ratio is simply the share of profits p times the savings propensity out of profits s :

$$(2) \quad i = s.p$$

It wishes to maintain full employment through work-sharing, so that the rate of growth of labour demand and the rate of growth of labour supply are identical. The former is merely the excess of the rate of growth of output over the rate of growth of labour productivity. The latter is simply the sum of the rate of growth of work-force and the rate of growth of work (in hours) per unit of the work-force. Hence, denoting the rate of growth of labour productivity by b , of the work force by n and of work-hours per unit of work-force by h we have

$$(3) \quad g - b = n + h$$

Now the wage share $(1-p)$ is by definition equal to the ratio of real wages to labour productivity, which is the same as the ratio of the real wage rate per worker to the product of two variables, labour productivity per hour and the number of hours per worker. It follows that

$$(4) \quad d(1-p)/dt \cdot 1/(1-p) = 1/w \cdot dw/dt - b - h$$

If g is held constant at some level, then, since n , c and s are given, for any level of b there is a certain h and a certain rate of growth of real wages. These together add up to b , since lhs in (4) must equal zero. From (3) and (4) it follows that the rate of growth of real wages equals $(g-n)$. These are the results which have been used in the text.