Increasing Returns and Economic Progress

Allyn A. Young

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INCREASING RETURNS AND ECONOMIC PROGRESS [1]

My subject may appear alarmingly formidable, but I did not intend it to be so. The words economic progress, taken by themselves, would suggest the pursuit of some philosophy of history, of some way of appraising the results of past and possible future changes in forms of economic organisation and modes of economic activities. But as I have used them, joined to the other half of my title, they are meant merely to dispel apprehensions, by suggesting that I do not propose to discuss any of those alluring but highly technical questions relating to the precise way in which some sort of equilibrium of supply and demand is achieved in the market for the products of industries which can increase their output without increasing their costs proportionately, or to the possible advantages of fostering the development of such industries while putting a handicap upon industries whose output can be increased only at the expense of a more than proportionate increase of costs. I suspect, indeed, that the apparatus which economists have built up for dealing effectively with the range of questions to which I have just referred may stand in the way of a clear view of the more general or elementary aspects of the phenomena of increasing returns, such as I wish to comment upon in this paper.

Consider, for example, Alfred Marshall's fruitful distinction between the internal productive economies which a particular firm is able to secure as the growth of the market permits it to enlarge the scale of its operations and the economies external to the individual firm which show themselves only in changes of the organisation of the industry as a whole. This distinction has been useful in at least two different ways. In the first place it is, or ought to be, a safeguard against the common error of assuming that wherever increasing returns operate there is necessarily an effective tendency towards monopoly. In the second

[1] Presidential Address before Section F (Economic Science and Statistics) of the British Association for the Advancement of Science, Glasgow, September 10, 1928.

place it simplifies the analysis of the manner in which the prices of commodities produced under conditions of increasing returns are determined. A representative firm within the industry, maintaining its own identity and devoting itself to a given range of activities, is made to be the vehicle or medium through which the economies achieved by the industry as a whole are transmitted to the market and have their effect upon the price of the product.

The view of the nature of the processes of industrial progress which is implied in the distinction between internal and external economies is necessarily a partial view. Certain aspects of those processes are illuminated, while, for that very reason, certain other aspects, important in relation to other problems, are obscured. This will be clear, I think, if we observe that, although the internal economies of some firms producing, let us say, materials or appliances may figure as the external economies of other firms, not all of the economies which are properly to be called external can be accounted for by adding up the internal economies of all the separate firms. When we look at the internal economies of a particular firm we envisage a condition of comparative stability. Year after year the firm, like its competitors, is manufacturing a particular product or group of products, or is confining itself to certain definite stages in the work of forwarding the products towards their final form. Its operations change in the sense that they are progressively adapted to an increasing output, but they are kept within definitely circumscribed bounds. Out beyond, in that obscurer field from which it derives its external economies, changes of another order are occurring. New products are appearing, firms are assuming new tasks, and new industries are coming into being. In short, change in this external field is qualitative as well as quantitative. No analysis of the forces making for economic equilibrium, forces which we might say are tangential at any moment of time, will serve to illumine this field, for movements away from equilibrium, departures from previous trends, are characteristic of it. Not much is to be gained by probing into it to see how increasing returns show themselves in the costs of individual firms and in the prices at which they offer their products.

Instead, we have to go back to a simpler and more inclusive view, such as some of the older economists took when they contrasted the increasing returns which they thought were characteristic of manufacturing industry taken as a whole with the diminishing returns which they thought were dominant in agriculture because of an increasingly unfavourable proportioning

of labour and land. Most of them were disappointingly vague with respect to the origins and the precise nature of the " improvements " which they counted upon to retard somewhat the operation of the tendency towards diminishing returns in agriculture and to secure a progressively more effective use of labour in manufactures. Their opinions appear to have rested partly upon an empirical generalisation. Improvements had been made, they were still being made, and it might be assumed that they would continue to be made. If they had looked back they would have seen that there were centuries during which there were few significant changes in either agricultural or industrial methods. But they were living in an age when men had turned their faces in a new direction and when economic progress was not only consciously sought but seemed in some way to grow out of the nature of things. Improvements, then, were not something to be explained. They were natural phenomena, like the precession of the equinoxes.

There were certain important exceptions, however, to this incurious attitude towards what might seem to be one of the most important of all economic problems. Senior's positive doctrine is well known, and there were others who made note of the circumstance that with the growth of population and of markets new opportunities for the division of labour appear and new advantages attach to it. In this way, and in this way only, were the generally commonplace things which they said about " improvements " related to anything which could properly be called a doctrine of increasing returns. They added nothing to Adam Smith's famous theorem that the division of labour depends upon the extent of the market. That theorem, I have always thought, is one of the most illuminating and fruitful generalisations which can be found anywhere in the whole literature of economics. In fact, as I am bound to confess, I am taking it as the text of this paper, in much the way that some minor composer borrows a theme from one of the masters and adds certain developments or variations of his own. To-day, of course, we mean by the division of labour something much broader in scope than that splitting up of occupations and development of specialised crafts which Adam Smith mostly had in mind. No one, so far as I know, has tried to enumerate all of the different aspects of the division of labour, and I do not propose to undertake that task. I shall deal with two related aspects only : the growth of indirect or roundabout methods of production and the division of labour among industries.

It is generally agreed that Adam Smith, when he suggested that the division of labour leads to inventions because workmen engaged in specialised routine operations come to see better ways of accomplishing the same results, missed the main point. The important thing, of course, is that with the division of labour a group of complex processes is transformed into a succession of simpler processes, some of which, at least, lend themselves to the use of machinery. In the use of machinery and the adoption of indirect processes there is a further division of labour, the economies of which are again limited by the extent of the market. It would be wasteful to make a hammer to drive a single nail; it would be better to use whatever awkward implement lies conveniently at hand. It would be wasteful to furnish a factory with an elaborate equipment of specially constructed jigs, gauges, lathes, drills, presses and conveyors to build a hundred automobiles; it would be better to rely mostly upon tools and machines of standard types, so as to make a relatively larger use of directly-applied and a relatively smaller use of indirectly-applied labour. Mr. Ford's methods would be absurdly uneconomical if his output were very small, and would be unprofitable even if his output were what many other manufacturers of automobiles would call large.

Then, of course, there are economies of what might be called a secondary order. How far it pays to go in equipping factories with special appliances for making hammers or for constructing specialised machinery for use in making different parts of automobiles depends again upon how many nails are to be driven and how many automobiles can be sold. In some instances, I suppose, these secondary economies, though real, have only a secondary importance. The derived demands for many types of specialised production appliances are inelastic over a fairly large range. If the benefits and the costs of using such appliances are spread over a relatively large volume of final products, their technical effectiveness is a larger factor in determining whether it is profitable to use them than any difference which producing them on a large or a small scale would commonly make in their costs. In other instances the demand for productive appliances is more elastic, and beyond a certain level of costs demand may fail completely. In such circumstances secondary economies may become highly important.

Doubtless, much of what I have said has been familiar and even elementary. I shall venture, nevertheless, to put further stress upon two points, which may be among those which have

a familiar ring, but which appear sometimes to be in danger of being forgotten. (Otherwise, economists of standing could not have suggested that increasing returns may be altogether illusory, or have maintained that where they are present they must lead to monopoly.) The first point is that the principal economies which manifest themselves in increasing returns are the economies of capitalistic or roundabout methods of production. These economies, again, are largely identical with the economies of the division of labour in its most important modern forms. In fact, these economies lie under our eyes, but we may miss them if we try to make of *large-scale* production (in the sense of production by large firms or large industries), as contrasted with *large* production, any more than an incident in the general process by which increasing returns are secured and if accordingly we look too much at the individual firm or even, as I shall suggest presently, at the individual industry.

The second point is that the economies of roundabout methods, even more than the economies of other forms of the division of labour, depend upon the extent of the market—and that, of course, is why we discuss them under the head of increasing returns. It would hardly be necessary to stress this point, if it were not that the economies of large-scale operations and of "mass-production" are often referred to as though they could be had for the taking, by means of a "rational" reorganisation of industry. Now I grant that at any given time routine and inertia play a very large part in the organisation and conduct of industrial operations. Real leadership is no more common in industrial than in other pursuits. New catch-words or slogans like mass-production and rationalisation may operate as stimuli; they may rouse men from routine and lead them to scrutinise again the organisation and processes of industry and to try to discover particular ways in which they can be bettered. For example, no one can doubt that there are genuine economies to be achieved in the way of "simplification and standardisation," or that the securing of these economies requires that certain deeply rooted competitive wastes be extirpated. This last requires a definite concerted effort—precisely the kind of thing which ordinary competitive motives are often powerless to effect, but which might come more easily as the response to the dissemination of a new idea.

There is a danger, however, that we shall expect too much from these "rational" industrial reforms. Pressed beyond a certain point they become the reverse of rational. I have

naturally been interested in British opinions respecting the reasons for the relatively high productivity (per labourer or per hour of labour) of representative American industries. The error of those who suggest that the explanation is to be found in the relatively high wages which prevail in America is not that they confuse cause and effect, but that they hold that what are really only two aspects of a single situation are, the one cause, and the other effect. Those who hold that American industry is managed better, that its leaders study its problems more intelligently and plan more courageously and more wisely can cite no facts in support of their opinion save the differences in the results achieved. Allowing for the circumstance that British industry, as a whole, has proved to be rather badly adjusted to the new post-war economic situation, I know of no facts which prove or even indicate that British industry, seen against the background of its own problems and its own possibilities, is less efficiently organised or less ably directed than American industry or the industry of any other country.

Sometimes the fact that the average American labourer works with the help of a larger supply of power-driven labour-saving machinery than the labourer of other countries is cited as evidence of the superior intelligence of the average American employer. But this will not do, for, as every economist knows, the greater the degree in which labour is productive or scarce—the words have the same meaning—the greater is the relative economy of using it in such indirect or roundabout ways as are technically advantageous, even though such procedure calls for larger advances of capital than simpler methods do.

It is encouraging to find that a fairly large number of commentators upon the volume of the American industrial product and the scale of American industrial organisation have come to surmise that the extent of the American domestic market, unimpeded by tariff barriers, may have something to do with the matter. This opinion seems even to be forced upon thoughtful observers by the general character of the facts, whether or no the observers think in terms of the economists' conception of increasing returns. In certain industries, although by no means in all, productive methods are economical and profitable in America which would not be profitable elsewhere. The importance of coal and iron and other natural resources needs no comment. Taking a country's economic endowment as given, however, the most important single factor in determining the effectiveness of its industry appears to be the size of the market. But

just what constitutes a large market? Not area or population alone, but buying power, the capacity to absorb a large annual output of goods. This trite observation, however, at once suggests another equally trite, namely, that capacity to buy depends upon capacity to produce. In an inclusive view, considering the market not as an outlet for the products of a particular industry, and therefore external to that industry, but as the outlet for goods in general, the size of the market is determined and defined by the volume of production. If this statement needs any qualification, it is that the conception of a market in this inclusive sense—an aggregate of productive activities, tied together by trade—carries with it the notion that there must be some sort of balance, that different productive activities must be proportioned one to another.

Modified, then, in the light of this broader conception of the market, Adam Smith's dictum amounts to the theorem that the division of labour depends in large part upon the division of labour. This is more than mere tautology. It means, if I read its significance rightly, that the counter forces which are continually defeating the forces which make for economic equilibrium are more pervasive and more deeply rooted in the constitution of the modern economic system than we commonly realise. Not only new or adventitious elements, coming in from the outside, but elements which are permanent characteristics of the ways in which goods are produced make continuously for change. Every important advance in the organisation of production, regardless of whether it is based upon anything which, in a narrow or technical sense, would be called a new "invention," or involves a fresh application of the fruits of scientific progress to industry, alters the conditions of industrial activity and initiates responses elsewhere in the industrial structure which in turn have a further unsettling effect. Thus change becomes progressive and propagates itself in a cumulative way.

The apparatus which economists have built up for the analysis of supply and demand in their relations to prices does not seem to be particularly helpful for the purposes of an inquiry into these broader aspects of increasing returns. In fact, as I have already suggested, reliance upon it may divert attention to incidental or partial aspects of a process which ought to be seen as a whole. If, nevertheless, one insists upon seeing just how far one can get into the problem by using the formulas of supply and demand, the simplest way, I suppose, is to begin by inquiring into the operations of reciprocal demand when the commodities exchanged

are produced competitively under conditions of increasing returns and when the demand for each commodity is elastic, in the special sense that a small increase in its supply will be attended by an increase in the amounts of other commodities which can be had in exchange for it.[1] Under such conditions an increase in the supply of one commodity *is* an increase in the demand for other commodities, and it must be supposed that every increase in demand will evoke an increase in supply. The rate at which any one industry grows is conditioned by the rate at which other industries grow, but since the elasticities of demand and of supply will differ for different products, some industries will grow faster than others. Even with a stationary population and in the absence of new discoveries [2] in pure or applied science there are no limits to the process of expansion except the limits beyond which demand is not elastic and returns do not increase.

If, under these hypothetical conditions, progress were unimpeded and frictionless, if it were not dependent in part upon a process of trial and error, if the organisation of industry were always such as, in relation to the immediate situation, is most economical, the realising of increasing returns might be progressive and continuous, although, for technical reasons, it could not always proceed at an even rate. But it would remain a process requiring time. An industrial dictator, with foresight and knowledge, could hasten the pace somewhat, but he could not achieve an Aladdin-like transformation of a country's industry, so as to reap the fruits of a half-century's ordinary progress in a few years. The obstacles are of two sorts. First, the human material which has to be used is resistant to change. New trades have to be learnt and new habits have to be acquired. There has to be a new geographical distribution of the population and established communal groups have to be broken up. Second, the accumulation of the necessary capital takes time, even though the process of accumulation is largely one of turning part of an increasing product into forms which will serve in securing a further increase of product. An acceleration of the rate of accumulation encounters increasing costs, into which both technical and psychological elements enter. One who likes

[1] If the circumstance that commodity a is produced under conditions of increasing returns is taken into account as a factor in the elasticity of demand for b in terms of a, elasticity of demand and elasticity of supply may be looked upon as different ways of expressing a single functional relation.

[2] As contrasted with such new ways of organising production and such new "inventions" as are merely adaptations of known ways of doing things, made practicable and economical by an enlarged scale of production.

to conceive of all economic processes in terms of tendencies towards an equilibrium might even maintain that increasing returns, so far as they depend upon the economies of indirect methods of production and the size of the market, are offset and negated by their costs, and that under such simplified conditions as I have dealt with the realising of increasing returns would be spread through time in such a way as to secure an equilibrium of costs and advantages. This would amount to saying that no real economic progress could come through the operation of forces engendered *within* the economic system—a conclusion repugnant to common sense. To deal with this point thoroughly would take us too far afield. I shall merely observe, first, that the appropriate conception is that of a *moving* equilibrium, and second, that the costs which (under increasing returns) grow less rapidly than the product are not the "costs" which figure in an "equilibrium of costs and advantages."

Moving away from these abstract considerations, so as to get closer to the complications of the real situation, account has to be taken, first, of various kinds of obstacles. The demand for some products is inelastic, or, with an increasing supply, soon becomes so. The producers of such commodities, however, often share in the advantages of the increase of the general scale of production in related industries, and so far as they do productive resources are released for other uses. Then there are natural scarcities, limitations or inelasticities of supply, such as effectively block the way to the securing of any important economies in the production of some commodities and which impair the effectiveness of the economies secured in the production of other commodities. In most fields, moreover, progress is not and cannot be continuous. The next important step forward is often initially costly, and cannot be taken until a certain quantum of prospective advantages has accumulated.

On the other side of the account are various factors which reinforce the influences which make for increasing returns. The discovery of new natural resources and of new uses for them and the growth of scientific knowledge are probably the most potent of such factors. The causal connections between the growth of industry and the progress of science run in both directions, but on which side the preponderant influence lies no one can say. At any rate, out of better knowledge of the materials and forces upon which men can lay their hands there come both new ways of producing familiar commodities and new products, and these last have a presumptive claim to be regarded as em-

bodying more economical uses of productive resources than the uses which they displace. Some weight has to be given also to the way in which, with the advance of the scientific spirit, a new kind of interest—which might be described as a scientific interest conditioned by an economic interest—is beginning to infiltrate into industry. It is a point of controversy, but I venture to maintain that under most circumstances, though not in all, the growth of population still has to be counted a factor making for a larger *per capita* product—although even that cautious statement needs to be interpreted and qualified. But just as there may be population growth with no increase of the average *per capita* product, so also, as I have tried to suggest, markets may grow and increasing returns may be secured while the population remains stationary.

It is dangerous to assign to any single factor the leading rôle in that continuing economic revolution which has taken the modern world so far away from the world of a few hundred years ago. But is there any other factor which has a better claim to that rôle than the persisting search for markets? No other hypothesis so well unites economic history and economic theory. The Industrial Revolution of the eighteenth century has come to be generally regarded, not as a cataclysm brought about by certain inspired improvements in industrial technique, but as a series of changes related in an orderly way to prior changes in industrial organisation and to the enlargement of markets. It is sometimes said, however, that while in the Middle Ages and in the early modern period industry was the servant of commerce, since the rise of "industrial capitalism" the relation has been reversed, commerce being now merely an agent of industry. If this means that the finding of markets is one of the tasks of modern industry it is true. If it means that industry imposes its will upon the market, that whereas formerly the things which were produced were the things which could be sold, now the things which have to be sold are the things that are produced, it is not true.

The great change, I imagine, is in the new importance which the *potential market* has in the planning and management of large industries. The difference between the cost per unit of output in an industry or in an individual plant properly adapted to a given volume of output and in an industry or plant equally well adapted to an output five times as large is often much greater than one would infer from looking merely at the economies which may accrue as an existing establishment gradually extends the

scale of its operations. Potential demand, then, in the planning of industrial undertakings, has to be balanced against potential economies, elasticity of demand against decreasing costs. The search for markets is not a matter of disposing of a "surplus product," in the Marxian sense, but of finding an outlet for a potential product. Nor is it wholly a matter of multiplying profits by multiplying sales; it is partly a matter of augmenting profits by reducing costs.

Although the initial displacement may be considerable and the repercussions upon particular industries unfavourable, the enlarging of the market for any one commodity, produced under conditions of increasing returns, generally has the net effect, as I have tried to show, of enlarging the market for other commodities. The business man's mercantilistic emphasis upon markets may have a sounder basis than the economist who thinks mostly in terms of economic statics is prone to admit. How far "selling expenses," for example, are to be counted sheer economic waste depends upon their effects upon the aggregate product of industry, as distinguished from their effects upon the fortunes of particular undertakings.

Increasing returns are often spoken of as though they were attached always to the growth of "industries," and I have not tried to avoid that way of speaking of them, although I think that it may be a misleading way. The point which I have in mind is something more than a quibble about the proper definition of an industry, for it involves a particular thesis with respect to the way in which increasing returns are reflected in changes in the organisation of industrial activities. Much has been said about industrial integration as a concomitant or a natural result of an increasing industrial output. It obviously is, under particular conditions, though I know of no satisfactory statement of just what those particular conditions are. But the opposed process, industrial differentiation, has been and remains the type of change characteristically associated with the growth of production. Notable as has been the increase in the complexity of the apparatus of living, as shown by the increase in the variety of goods offered in consumers' markets, the increase in the diversification of intermediate products and of industries manufacturing special products or groups of products has gone even further.

The successors of the early printers, it has often been observed, are not only the printers of to-day, with their own specialised establishments, but also the producers of wood pulp, of various

kinds of paper, of inks and their different ingredients, of type-metal and of type, the group of industries concerned with the technical parts of the producing of illustrations, and the manufacturers of specialised tools and machines for use in printing and in these various auxiliary industries. The list could be extended, both by enumerating other industries which are directly ancillary to the present printing trades and by going back to industries which, while supplying the industries which supply the printing trades, also supply other industries, concerned with preliminary stages in the making of final products other than printed books and newspapers. I do not think that the printing trades are an exceptional instance, but I shall not give other examples, for I do not want this paper to be too much like a primer of descriptive economics or an index to the reports of a census of production. It is sufficiently obvious, anyhow, that over a large part of the field of industry an increasingly intricate nexus of specialised undertakings has inserted itself between the producer of raw materials and the consumer of the final product.

With the extension of the division of labour among industries the representative firm, like the industry of which it is a part, loses its identity. Its internal economies dissolve into the internal and external economies of the more highly specialised undertakings which are its successors, and are supplemented by new economies. In so far as it is an adjustment to a new situation created by the growth of the market for the final products of industry the division of labour among industries is a vehicle of increasing returns. It is more than a change of form incidental to the full securing of the advantages of capitalistic methods of production—although it is largely that—for it has some advantages of its own which are independent of changes in productive technique. For example, it permits of a higher degree of specialisation in management, and the advantages of such specialisation are doubtless often real, though they may easily be given too much weight. Again, it lends itself to a better geographical distribution of industrial operations, and this advantage is unquestionably both real and important. Nearness to the source of supply of a particular raw material or to cheap power counts for most in one part of a series of industrial processes, nearness to other industries or to cheap transport in another part, and nearness to a larger centre of population in yet another. A better *combination* of advantages of location, with a smaller element of compromise, can be had by the more

specialised industries. But the largest advantage secured by the division of labour among industries is the fuller realising of the economies of capitalistic or roundabout methods of production. This should be sufficiently obvious if we assume, as we must, that in most industries there are effective, though elastic, limits to the economical size of the individual firm. The output of the individual firm is generally a relatively small proportion of the aggregate output of an industry. The degree in which it can secure economies by making its own operations more roundabout is limited. But certain roundabout methods are fairly sure to become feasible and economical when their advantages can be spread over the output of the whole industry. These potential economies, then, are segregated and achieved by the operations of specialised undertakings which, taken together, constitute a new industry. It might conceivably be maintained that the *scale* upon which the firms in the new industry are able to operate is the secret of their ability to realise economies for industry as a whole, while presumably making profits for themselves. This is true in a way, but misleading. The scale of their operations (which is only incidentally or under special conditions a matter of the size of the individual firm) merely reflects the size of the market for the final products of the industry or industries to whose operations their own are ancillary. And the principal advantage of large-scale operation at this stage is that it again makes methods economical which would be uneconomical if their benefits could not be diffused over a large final product.

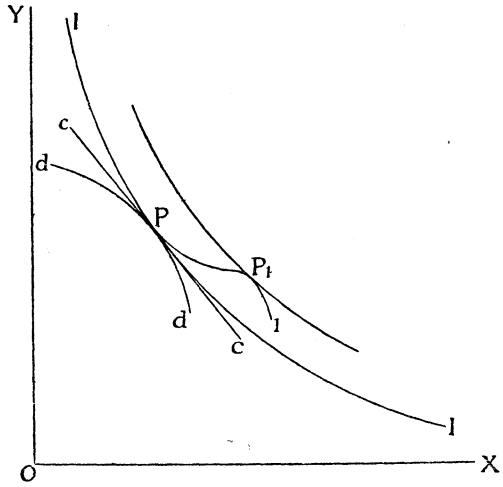
In recapitulation of these variations on a theme from Adam Smith there are three points to be stressed. First, the mechanism of increasing returns is not to be discerned adequately by observing the effects of variations in the size of an individual firm or of a particular industry, for the progressive division and specialisation of industries is an essential part of the process by which increasing returns are realised. What is required is that industrial operations be seen as an interrelated whole. Second, the securing of increasing returns depends upon the progressive division of labour, and the principal economies of the division of labour, in its modern forms, are the economies which are to be had by using labour in roundabout or indirect ways. Third, the division of labour depends upon the extent of the market, but the extent of the market also depends upon the division of labour. In this circumstance lies the possibility of economic progress, apart from the progress which comes as a result of the new knowledge

which men are able to gain, whether in the pursuit of their economic or of their non-economic interests.

ALLYN A. YOUNG

NOTE

IN the accompanying construction (which owes much to Pareto), a collective indifference curve, I, is defined by the condition that, at equal cost, there would be no sufficient inducement for the community to alter an annual production of x units of one commodity and y units of another in order to secure the alternative combination of the two commodities indicated by any other point on the curve.[1] Each commodity might be taken as representative of a special class of commodities,



produced under generally similar conditions. Or one commodity might be made to represent "other goods in general," the annual outlay of productive exertions being regarded as constant. Alternatively, one commodity might represent "leisure" (as a collective name for all non-productive uses of time). The other would then represent the aggregate economic product.

There will be equilibrium (subject to instability of a kind which will be described presently) at a point P, if at that point a curve of equal costs, such as d, is tangent to the indifference curve. The curve of equal costs defines the terms upon which the community can exchange one commodity for the other by merely producing less of the one and more of the other (abstraction being made of any incidental costs of

[1] The collective indifference is to be taken as an expository device, not as a rigorous conception. The relative weights to be assigned to the individual indifference curves of which it is compounded will depend upon how the aggregate product is distributed, and this will not be the same for all positions of P.

change). Negative curvature, as in *d*, reflects a condition of decreasing returns, in the sense that more of either commodity can be had only by sacrificing progressively larger amounts of the other. Although a sufficient condition, the presence of decreasing returns is not a necessary condition of equilibrium. There would be a loss in moving away from *P* if equal costs were defined by the straight line *c*, which represents constant returns. Increasing returns, even, are consistent with equilibrium, provided that the degree of curvature of their graph is less than that of the indifference curve. It might happen, of course, that returns would decrease in one direction and increase in the other. Curve *d*, for example, might have a point of inflexion at or near *P*.

Consider now the conditions of departure from equilibrium. The curve *i* is drawn so as to represent *potential* increasing returns between *P* and P_1, which lies on a preferred indifference curve. If these increasing returns were to be had merely for the taking, if *i* were, for example, merely a continuation of the upper segment of *d* or *c*, *P* would not be a point even of unstable equilibrium. The advance from *P* to P_1 would be made by merely altering the proportions of the two commodities produced annually. To isolate the *problem* of increasing returns it is necessary to assume that *P* is a true point of equilibrium in the sense that it is determined by a curve of equal costs, such as *d* or *c*. The problem, then, has to do with the way in which the lower segment of *d* or *c* can be transformed into or replaced by such a curve as *i*. This requires, of course, that *additional* costs be incurred, of a kind which have not yet been taken into account. To diminish the amount of the one commodity which must be sacrificed for a given increment of the other, some of the labour hitherto devoted to its production must be used indirectly, so that the increase of the annual output of the one lags behind the curtailing of the output of the other.

This new element of cost might be taken into account by utilising a third dimension, but it is simpler to regard it as operating upon Δx, the increment in x accompanying the movement from *P* to P_1, so as to move the indifference curve upon which P_1 lies towards the left. It would be an error, however, to think that the combinations of x with y and $x + (\Delta x)$ with $y - \Delta y$ (where (Δx) is the contracted form of Δx) are themselves indifferent, so that P_1 is, in effect, brought over on to the original indifference curve, *I*, and no advantage is reaped. The path from *P* to P_1 is a *preferred* route, not merely a segment of an indifference curve. The cost of moving along that route is a function of the *rate* (in time) of the movement. An equilibrium rate (which need not be constant), such as would keep the movement from *P* to P_1 continuous and undeviating, would be determined by the condition, not that (Δx) and $-\Delta y$ should negate one another, but that either an acceleration or a retarding of the rate would be costly or disadvantageous. Because a mountain climber adjusts his pace to his physical powers and to the conditions of the ascent, it does not follow that he might as well have stayed at the foot. Or, alternatively but not inconsistently,

the movement from P to P_1 may be conceived as made up of a series of small steps, each apparently yielding no more than a barely perceptible advantage, but only because the scale of reference for both costs and advantages depends at each step upon the position which has then been reached.

Several sets of circumstances will affect the amount and direction of the movement. (1) Even if i has no point of inflexion, such as has been indicated at P_1 (merely to simplify the first stages of this analysis), it will sooner or later (taking into account the " contraction " of Δx) become tangent to an indifference curve. In the absence of any other factor making for change, progress would then come to an end. (2) There may be another possible alternative path of increasing returns extending upwards from P and curving away from I. The most advantageous route will then be a compromise between (or a resultant of) the two limiting alternatives. In such circumstances the only effective limitation imposed upon the extent of the movement may come from the failure of elasticity of demand on one side or the other. (3) Successive indifference curves cannot be supposed to be symmetrical, in the sense that dy/dx remains the same function of y/x. If, for example, the slope of successive indifference curves at points corresponding to given values of y/x decreases (indicating that the demand for the commodity measured in units of y is relatively inelastic), freedom of movement in the direction of P_1 is reduced, while it becomes advantageous to move a little way in the opposite direction along even such a path as c or d. Under inverse conditions (with $-dy/dx$ increasing relatively to y/x for successive indifference curves) the extent of the possible movement in the direction of P_1 is increased. This conclusion amounts to no more than the obvious theorem that the degree in which the decreasing returns encountered in certain fields of economic activity operate as a drag upon the securing of increasing returns in other fields depends upon the relative elasticities of demand for the two types of products. But this consideration, like the others of which note has been made, serves to make clear the general nature of the reciprocal relation between increasing returns and the " extent of the market." (4) Discoveries of new supplies of natural resources or of *new* productive methods may have either or both of two kinds of effects. They may tilt the curves of equal cost and they may modify their curvature favourably. In either event a point such as P is moved to a higher indifference curve, and the paths along which further progress can be made are altered advantageously.