THOSE EMPTY BOXES

§ 1. A YEAR ago the pages of this Journal were enlivened by a battle of giants. The contest raged over the practical utility of certain refinements of analytical economics: in particular it was debated whether the theoretical sorting of industries into boxes labelled "diminishing return" and "increasing return" could be turned to practical account. Into that mêlée it is not my purpose to enter directly, though I think that my suggestions, if correct, may have some bearing upon its issue. My purpose is an even more presumptuous one—to engage, albeit armed with an apparatus as defective as David's, one of the giants upon his own ground, and to cast a pebble which, if it glances innocuous from that august brow, may perhaps at least elicit an explanatory roar.

My aim then is to echo, and I hope to expand, certain criticisms which have been wafted across the Atlantic of the analytical mechanism elaborated by Professor Pigou in his Economics of Welfare for dealing with these conceptions of diminishing and increasing return. I desire to suggest that the character of that mechanism (1) renders the "filling of the boxes" unnecessarily difficult; (2) prompts to a use of the boxes, if filled, which under certain conditions of political and economic development might become positively misleading and dangerous. And I desire to suggest that this unfortunate result has its roots—I will not say in an unhappy choice of terminology (there are limits even to David's presumption), but in a tendency to discover a simplicity of parallelism where none exists, and to submit disparate materials to an identical logical process. The boxes, if I may make free with the metaphor, are not in my view properly to be loaded upon the same cab. It is almost as though one were a hat-box, and the other a monstrous compound of a box at the opera and a box growing alongside a garden path.

§ 2. Now first, while far from insisting that this question of terminology is fundamental, I must be allowed my private grumble about it. By industries which obey the laws respectively of diminishing and increasing return I take to be meant those in which the average full expenses per unit of product respectively
increase and diminish as the scale of production is expanded.\textsuperscript{1} In spite of Dr. Marshall's arguments to the contrary,\textsuperscript{2} I wish heartily that English-speaking writers could agree to speak of such industries as obeying respectively the laws of increasing and decreasing cost.\textsuperscript{3} What superfluous confusions about the emergence of rent in manufacturing industries, what regrettable misunderstandings of the teaching of economic science about the relation of agricultural progress to the problem of population,\textsuperscript{4} could have been avoided if the phrase "the law of diminishing return" could have been tied down to denoting the results of either (a) applying successive doses of one factor to a fixed quantity of all the others, or (b) applying successive doses of all the factors but one to a fixed quantity of that one! And even that much duplicity of function would seem to entitle it to extra pay! I look forward to the time when this hard-worked phrase, relieved of all other duties, shall thus be confined to expressing the great unifying principle which runs through the whole theory of distribution—surely a sufficient honour to content the most ambitious company of words.

I propose, therefore, to speak of "decreasing cost" industries and "increasing cost" industries; but I repeat that I do not intend that this choice of phrasing shall alter the substance of my argument.

\textbf{§ 3.} And now to business. Professor Pigou's most momentous conclusion is that under conditions of free competition production in "increasing cost" industries is carried further, and in "decreasing cost" industries less far than the true interests of society require. I shall not attempt to summarise his argument, but shall give such references as will enable the reader to refresh his memory of it.

Let us confine ourselves at present to "long-period" conditions, in the sense that we are not concerned with the effects of cyclical or other temporary fluctuations of demand. And let us deal first with "decreasing cost" industries in the sense defined. Now the first point is that, so far as I can see, this apparently harmless phrase covers two sets of analytically quite distinct phenomena. As the scale of output of an industry is increased,

\textsuperscript{1} Professor Pigou does not himself use this definition; but it appears consistent with, and is indeed derived from, the definition and properties of his "supply-curve" (\textit{Economics of Welfare}, p. 933).

\textsuperscript{2} \textit{Principles}, p. 319 n.

\textsuperscript{3} See Professor Bullock's most valuable article, "The Variation of Productive Forces," \textit{Quarterly Journal of Economics}, August 1902.

\textsuperscript{4} A distinguished Colonial professor still, I believe, boasts publicly of his intention of disproving the existence of the law of diminishing return from land.
the average cost per unit may fall for either of the two following reasons. (I) In some branches of production the process of investment of fixed capital is, from the nature of the case, lumpy and discontinuous; and once such a process is completed, the larger the number of units of output produced (or, to put the same thing in a different way, the larger the number of units of floating resources of all kinds employed) the smaller the share of fixed capital charges which each unit has to bear, and the less therefore, in general, its full cost. "We may take the production of a medal as a type of such a supply. For we may suppose that it costs a manufacturer of medals £20 to produce a steel die, and after that has been made it costs him 5s. for the metal and stamping of each medal. If then he produced only one medal the cost would be £20 5s. If he produced two medals, £10 5s. each. If he produced fifty medals, the cost would be 13s. each; and so on." 2 Note first that such a statement may well represent, not an evanescent state of affairs, but the permanent conditions under which an industry (such as newspaper enterprise?) is operated. Note secondly that the element of time, so often the source of all our troubles, is here as nearly as possible innocent: a raising of the demand schedule for the medals (occasioned, say, by the establishment of a permanent state of war) will instantaneously lower their average cost.

But (II) decreased average cost may accompany expanded output for another reason, namely, because, given time, methods of technique and of organisation are capable of improvement in any one of a myriad different ways, so that ultimately a larger output can be produced at a lower cost per unit than that at which a smaller output was previously produced. I do not pretend that this class of cases is entirely unconnected with the first class; for the "economies of large-scale production," and among them the installation of large and specialised pieces of plant, are among the causes of the prevalence of decreasing cost in my sense (II). But the difference between the classes can be seen by reflecting that nothing but a raising of the demand schedule can be relied upon to establish a lowered cost in Class (I), while the progress of time, the enterprise of producers and the occurrence of invention 3 are expected, without necessarily any alteration of normal demand, to produce this result in Class (II).

1 I use this word henceforth as an abbreviation for "full expenses of production."

2 Cunynghame, A Geometrical Political Economy, p. 57.

3 Dr. Clapham's query whether invention is to be classed among the causes of "decreasing cost " must clearly, on my definition, be answered in the affirmative (ECONOMIC JOURNAL, 1922, pp. 314, 562).
§ 4. But already I seem to myself to hear a triple growl from the giant. (A) First, "Have I not made it clear," I hear him ask, "that for simplicity's sake I conceive of the resources applied to industry as a homogeneous flow (Economics of Welfare, p. 114)? And how am I touched then by that discontinuous £20 steel die, or by your distinction between fixed and floating resources, which I have decided to ignore?" And I can only reply, Yes, he seems to have made that clear. But I shall go on to urge three things. (1) There is no doubt that, in ordinary discussions of the phenomenon of decreasing cost, industries of my set (I) play a very large part. It seems to be of such cases that Prof. Edgeworth speaks as "so important as often to obtain the title of Increasing Return par excellence," and of the five sets of conditions which he distinguishes as "attended with the attribute Increasing Return," two indubitably turn on this principle of the discontinuity of investment and the economy of multiplication. (2) The case is covered by Professor Pigou's diagrams in so far that while, in the case of our medal-manufacturer, the "curve of marginal supply prices" (Economics of Welfare, p. 931) would become horizontal after the second medal, it would remain continuously below the supply-curve, and cut the demand-curve further to the right than the supply-curve does. (3) But I can appeal more directly to Professor Pigou. He states specifically (op. cit. pp. 275-6) that "among railways there is ground for believing that, at all events until considerable development has been reached, this condition [strong action of the law of increasing returns] is generally satisfied. The reason is that the fixed plant of a railway cannot, in practice, be so made as to be capable of effecting less than a considerable minimum of transportation. The aggregate costs of arranging for rail transport for one ounce per week are very nearly as great as those of arranging for the transport of many thousand tons. . . . This implies increasing returns acting strongly till a large investment has been made, and afterwards less strongly." There can indeed be no question that Professor Pigou's analysis is intended to apply to railways; nor that, in Ripley's words, quoted by Edgeworth, "Contributions," etc., Economic Journal, 1913, p. 217; who, while holding that other conditions generating "increasing return" have been too much ignored by writers on Railway Economics (ibid., 1911, p. 553), seems to concur in giving such considerations the primacy.

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2 Ibid., pp. 553-5.
3 Quoted by Edgeworth, "Contributions," etc., Economic Journal, 1913, p. 217; who, while holding that other conditions generating "increasing return" have been too much ignored by writers on Railway Economics (ibid., 1911, p. 553), seems to concur in giving such considerations the primacy.
may it be affirmed that railroads offer a notable example of the law of increasing returns.” If, therefore, Professor Pigou tells me that his apparatus of a homogeneous flow of resources is not a suitable one for dealing with my Class (I) industries, I shall joyfully agree; but if he forbids me on that account to discuss them with him, I shall decline to obey.

§ 5. (B) But there is another door of escape for the wounded giant which I think it prudent to bar. We are dealing so far with a regime of competition; and he may tell me that my adopted medal-maker is not a true subject of that regime. If he were, and if he found that £10 5s. were the ruling price for medals, he would produce not two, but ever such a large number. The fact that an output of two is associated with a price of £10 5s. indicates that he is regulating output with an eye to the effect of his actions upon the price of his product, which is improper conduct in a denizen of the realm of competition, even though to act otherwise would, by preventing him covering his total costs of production, drive him out of business. Now poor David has no weapons with which to attack this mathematical conception of pure competition. But he knows, or thinks he knows, that his Class (I) industries exist, and that they do not all exercise monopoly powers, but that in their case, as in others, normal competitive price must in the long run cover supplementary as well as prime costs. He is even prepared to invent for his own use a meaning of the term “competition,” which shall imply that producers are not in a position to make monopoly profits, but are free, and determined, in the long run to cover their standing charges. He suspects that printing, and in most countries in normal times railways, are conducted permanently on these lines, and he is tempted (but without falling) to hazard further attempts at filling this particular sub-box. He suspects too—a point to which he will return—that it is “competitive” conditions of this kind that the State, if it takes over an industry, should (unless for good reason to the contrary) seek to emulate.

(C) There is one more loophole—will the giant make for it? Will he charge me with neglecting his warning (op. cit. p. 115 and p. 931, note) that whatever the scale of output, the flow of resources must be conceived of as organised appropriately to that scale? I shall not plead guilty; for whether my medal-maker is turning out two medals or fifty, he must be assumed to be acting in the most sensible way open to him. The relatively high cost per unit of the smaller output is due, not to any lack
of judgment on his part in combining his factors, but to technical facts beyond his control.

§ 6. I shall assume, therefore, that I am entitled to discuss with Professor Pigou both my types of "decreasing cost" industry, and to discuss them separately. Let us take Group (I) first.

Let us suppose that \( m \) units of fixed resources (typified by the steel die) have been sunk in the industry, and that \( n \) units of running resources (typified by metal and labour for stamping) are being employed in conjunction with them, and that \( p \) units of output are being produced. Professor Pigou's analysis (op. cit. p. 937) leads us to suppose that, in the social interest, \( p \) should be such that the additional units of output specifically attributable to the addition of the \( n \)th unit of running resources should sell for a price which adequately remunerates that \( n \)th unit of running resources. In our concrete case, if demand is such that fifty medals can be disposed of at 5s. each, fifty medals should be produced, since the fiftieth medal is the "net product" of the marginal 5s. worth of resources, and 5s. is the "marginal supply price" for an output of fifty—the difference made to aggregate expenses of production by organising production so as to produce fifty instead of forty-nine (op. cit. p. 931).

Now I deny that this \( p \)th unit of output is in any significant sense the net product of the \( n \)th unit of running resources. It is the net product of \([\text{that unit} + \frac{m}{p} \text{ units of fixed resources}]\). The fact is that these \( m \) units of fixed resources yield no product unless at least one unit of running resources is applied in conjunction with them, and that in order to make sense at all we must credit them with a part of any additional output which appears at first sight to be specifically attributable to the addition of any \( n \)th unit of running resources. Professor Pigou's statement (op. cit. p. 190) that when any given aggregate of resources is devoted to an occupation, any one unit of those resources must be conceived of as yielding the same net product as any other, leads me to suppose that he would agree with this view; but, on the other hand, the rest of his analysis, and especially his treatment of the railway problem, leads me to suppose that he would not. For if the view is correct, the whole case for

\footnote{In our concrete case, we can choose our units so that \( p \) always = \( n \). If the special costs per medal for labour and materials either increase or diminish as output is expanded, the argument becomes slightly more complex in form, but is unaltered in substance.}
carrying production in this group of "decreasing cost" industries beyond the competitive point seems to me to vanish. And consider how paradoxical that case is! For if it is sound, the logical outcome seems to be that the State, if it takes over an industry of this type, is entitled to neglect altogether, in determining its price-and-output policy, the costs of the fixed capital embarked, paying for them presumably out of taxation, and pushing production to such a point that price covers only the special costs of the \( p \)th unit of output. Whereas, if my view is correct, the State (unless for clear cause shown) ought so to regulate output that aggregate receipts cover aggregate costs without yielding monopoly profits. Even if through want of capacity I have misunderstood the giant's analysis, let me try to pin him down to this supremely important point of practical policy. Suppose discrimination to be ruled out, as in the sale of Government publications (for I see an avenue of escape for him along the road of discrimination), how should such a nationalised enterprise (any broader social reasons for subsidisation being disregarded) fix the scale of its output and its charges? Does his analysis or does it not lead directly to the conclusion that it should claim to be subsidised to the extent of the whole burden of the charges of the fixed original plant? And can this conclusion possibly be sound? And if not, what logical half-way house is there between this procedure and charging so as to cover total costs, \( i.e. \) simulating the conditions of free competition?

§ 7. Now let us turn to my second group of "decreasing cost" industries—those in which an enlarged output is associated with a decreased cost per unit of output as a result of the introduction of improvements in technique and organisation. How far is it true that in these industries output is smaller than is socially desirable, and might be brought to a socially more desirable level by some form or other of State intervention?

Now it is these industries that, at any rate in the prelude (op. cit. pp. 189–192) to his discussion of the whole matter, Professor Pigou seems to me to have uppermost in his mind. His explanation there given of the failure of competition to produce the best results must therefore be carefully noted. The employment of an additional unit of resources in any industry may, it appears, so modify the general organisation of the industry as to make each of the units of resources employed in it yield a different net product from what it otherwise would have done; but since, under pure competition, the individual who has made the extra
investment experiences only a very small part of the effects of this indirect impact upon general organisation, it is not to be expected that the probable nature and total magnitude of these effects should appreciably influence his actions. The relevance of this doctrine to "increasing cost" industries does not concern us here; as applied to "decreasing cost" industries, it can only mean that all the improvements in organisation from which "decreasing cost" arises are of the nature of "external economies"—"those dependent on the general development of the industry"—, the familiar "internal economies"—"those dependent on the resources of the individual houses of business engaged in it, on their organisation and the efficiency of their management"—having vanished into thin air.

Now once again I am conscious of being up against the mathematical theory of pure competition, and aware that that is so much the worse for me. But I cannot let it rest at that. I recall to mind the "representative firm," which "has its fair share of those internal and external economies, which appertain to the aggregate scale of production in the industry to which it belongs"; whose size, "while partly dependent on changes in technique and in the costs of transport, is governed, other things being equal, by the general expansion of the industry," and is therefore clearly to be regarded as capable of significant variation; and which is nevertheless certainly a denizen of the realm of competition, and indeed plays a commanding part in the theory of normal competitive price. I even take the supreme risk of starting to fill the sub-box under consideration, by flinging into it at a venture electrical engineering and cinema-film manufacture, in order to confirm my impression that any likely occupant of the sub-box is almost sure to be carried on by firms who are capable of introducing and appropriating internal improvements in organisation and technique. I cannot, therefore, bring myself to believe that, under any conception of competition which is appropriate to the matter in hand, the phenomenon of decreasing

1 Marshall, Principles, p. 266.
2 So determined is the Professor to banish these old friends that, disturbed by the apparent theoretical incompatibility of pure competition with the prevalence of decreasing cost at all, he seems to hold (p. 192) that each firm is (? or would be if it were isolated) working under conditions of increasing cost while the industry as a whole is working under conditions of decreasing cost. I would prefer to offend the mathematical theory of competition than to follow him through this logical hole in his own logical net; therein agreeing with Professor Allyn Young, who "cannot imagine 'external economies' adequate to bring about this result" (Quarterly Journal of Economics, August 1913, p. 678, note).
cost can be explained entirely in terms of external economies: nor, therefore, that if the rigid mathematical disharmony which Professor Pigou predicates (op. cit. p. 938) between competitive and socially desirable output really exists, it is to be explained on this ground of the certainty that the individual producer will not reap the reward of his own improvements. And in order to test this conclusion, I make my old supposition. Suppose an industry of this character to be administered in trust by a National Guild. Since the disharmony of interest due to the externalisation of economies is removed—since the Guild can be certain that the full advantages of any improvement which it makes in organisation will be enjoyed by itself alone—it would be natural to infer from Professor Pigou's analysis that such a Guild will produce what he holds to be the socially most desirable output—that is, will push production to a point at which the product of the marginal unit of resources is sold for a price which just affords adequate remuneration to that marginal unit. But of course it will do no such thing, for that would be to carry on production at a loss. It will regulate output in such a way that total receipts cover total costs—that is, it will seek to establish deliberately the equilibrium which tends to be established automatically under conditions of competition.

§ 8. If, therefore, competition really offends in the rigid mathematical manner asserted, we must look for some other explanation. And I can find none. I am led on to question the relevance of Professor Pigou's whole apparatus to this group of "decreasing cost" industries as well as to the other. Is not the body (whether private monopolist or State) which seeks to improve substantially on competitive output in such cases seeking to voyage pennis non homini datis, and not merely to penetrate the secrets of Time, but to do that leisurely old gentleman's work for him? I struggle out of the giant's embraces into the peaceful enclave of my hard-won prejudices about the nature of decreasing cost of this type:—that it only means that, given time and the progress of organisation, a larger output can be produced at a lower cost per unit than a smaller output used to be. We used not to dare conceive of falling cost per unit as a determinant of increased output, but only as resulting from it, or at the rashest as "being associated with it." 2 Dare we, there-

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1 For I have some qualifications to make, below, § 9.

2 Cp. Marshall, Principles, p. 45, note. "But in real life the cost of production per unit is deduced from the amount expected to be produced, and not vice versa. Economists commonly follow this practice."
fore, conceive of falling "marginal supply price" as a potential determinant of increased output, as Professor Pigou seems to do when he comes to discuss the actions of a monopolist with powers of discrimination (op. cit. pp. 248, 950)? Let me make my full confession. I do not believe the "curve of marginal supply prices" has any message for us at all in connection with my "decreasing cost" industries of Group (II). I can attach a meaning to him in connection with my Group (I), and though I do not regard him as such a socially desirable character as Professor Pigou does, I can see his bearing on certain problems of price-discrimination. But in our present surroundings I do not want him at all. I am content with an old-fashioned supply-curve, the locus through time of the end-points of a number of "particular expenses curves," each of them indicating the conditions of production in a given state of organisation. And I am content to suppose that at each point on the locus competition, by producing just so much that total receipts cover total costs, is on the whole securing the best results at that time and in that stage of organisation attainable.

§ 9. On the whole, for having cleared away the alleged rigidly mathematical sins of competition, we are now free to consider its not precisely measurable peccadilloes. For I have no wish to deny that the State, by well-devised intervention, can in certain cases accelerate the improvements in organisation from which decreasing cost arises. It can artificially raise the demand-curve by protective tariffs; it can artificially lower the particular expenses curve in force for the time being by the grant of well-administered subsidies; and in either way it may enable any given point on the original supply-curve to be reached earlier than it otherwise would have been. This would be true even if all economies were "internal"; but the admitted fact that some of them are "external" strengthens the point; for I have no wish to deny that the uncertainty of enjoying the full fruits of one's labours retards progress.¹ I have no theoretical quarrel, therefore, with the old-fashioned "infant industry" argument for protection or subsidisation, which it seems to me would remain intact even if Professor Pigou's constructions were to collapse, and which indeed is supported by him without the aid

¹ But it might, I think, be argued that under competition, since each supplier is chronically tempted to cater for a larger part of the market than is in fact likely to fall to his share, those experimental enlargements and improvements in which some of the roots of "decreasing cost" are found are more likely to take place than under a regime of single supply, even if the latter does not seek monopoly profits.
of their more intricate scaffolds (*op. cit.* p. 122). But the aim of such State intervention must be clearly conceived. It is not to maintain permanently a production which is "uneconomic" in the old-fashioned sense that receipts do not cover costs, but, at the expense of temporary loss, to bring about more quickly a state of affairs where production is still "economic," though larger than before. Such a policy of subsidy is, therefore, quite different in nature from the policy of *permanent* subsidy to "decreasing cost" industries recommended, at least in theory, by Professor Pigou (*op. cit.* p. 193).

§ 10. Has David grown bolder? Or is the giant really an easier mark when he stalks through the pastures of "increasing cost"? At any rate I take up my sling with alacrity.

What meaning are we to attach to the curves which exhibit the disharmony between competitive output and socially desirable output under conditions of increasing cost? We must return to the already-quoted prelude (*op. cit.* pp. 190–191) for Professor Pigou's answer. We find there that the employment of an additional unit of resources in an industry may modify *unfavourably* the general organisation of the industry, so as to make each unit of resources there employed yield a *smaller* net product than it would otherwise have done. And since, as we have seen, Professor Pigou conceives of each supplier as producing an indefinitely small proportion of the total output, these unfavourable results are felt almost entirely by other suppliers. In other words, we are asked to recognise the existence of "external diseconomies"¹ arising from the increase in output, and sufficient to produce the rigid mathematical defect of competitive output from the output socially desirable.

Now external economies we know, even if we refuse to yield them exclusive homage: transport developments, the telephone and the trade journal, the shop of the club and the market-price, subsidiary industries, a skilled labour supply,—we have all at some time tried to memorise and to reproduce the formidable list. But these external diseconomies, mathematically no less powerful, who in the world are they? Can we not be told at least one of their names? We are told in an appendix that "the reason why diminishing returns in terms of money appear where they do appear is, in general . . . that that proportionate combination of factors which it is most economical to employ when \((x + \Delta x)\) units of commodities are being produced is in

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¹ I am not attempting to father the actual phrase on Professor Pigou, but must ask him to admit parentage of the conception.
general a less efficient proportionate combination than that which it is most economical to employ when \( x \) units are being produced" (op. cit. p. 936); but we seek in vain for a further word of explanation, or for any word at all of illustration. Out with your pebble, David, and get it over! You do not believe that there are "no such persons."

It is natural that we should fall back on what we learnt long ago about the phenomenon of increasing cost. We know that additional applications of capital and labour to a given piece of land yield after a point a diminishing return of product; we know that the supply of land, and still more the supply of land of any particular quality, is limited; and we know that in industries making, directly or indirectly, a large use of land, the influence of these facts may overbear the influence of improvements in technique and organisation, and bring it about that, even if we allow for the progress of time, a larger volume of output is produced at a greater cost per unit than that at which a smaller volume of output used to be produced. Herein I am content to find the sole and sufficient explanation of the phenomenon of increasing cost. But I see no reason at all to infer from this state of affairs that production in such industries is being carried further than the social interest dictates. The land itself, and the other factors employed with it, are presumably each being employed up to, but not beyond, the point at which any further application would be less advantageous to the individuals concerned than application in some other field; and I see no cause for suspecting in this matter any but special and incidental disharmonies, of varying and indefinite magnitudes, between the interests of the individual and of society.

§ 11. But this, the giant may say, is to evade his fortifications, not to overthrow them by frontal attack. I must reply that that task, in my judgment, has been performed. Professor Allyn Young, accepting the twin curves but not the inferences drawn from them, argues that the reason for the excess of the "marginal supply price" of any given volume of output over its average cost per unit, lies in the necessity which increased output entails of paying higher prices for the land employed in yielding every unit of output, and not in any attraction of real resources to the industry beyond those specifically employed in producing the additional units of output.\(^1\) I am convinced by this, and unshaken by the Professor's reply (op. cit. pp. 934–6), which

turns once more on the negligibility of the relatively small. Any given industry, he states (a generous exception is made for "dominant crops" such as wheat), uses so small a proportion of the community's whole supply of land that it can obtain additional supplies of land without driving up against itself the price of land per unit. Yet I cannot unlearn all at once that the rent of land in any use depends on its productivity in that use, and not in some other use; I recall that farmer who has no doubt at all that it is best to grow hops on his land,¹ and therefore presumably under competition has to pay a rent appropriate to hop-growing; and I feel convinced that if there is a large expansion in the scale of production, say, of the cinema industry in any town, its effect will be felt on the rental value of the sites which that industry occupies.

And if Professor Pigou is right, how does it come about that when output is expanded a "less efficient proportionate combination of factors" has to be employed than was previously the case? I can see no reason for such a drop in efficiency, except that the margin of application of capital and labour has had to be pushed further, owing to the impossibility of obtaining indefinitely increased supplies of land at the old rent. Will Professor Pigou tell us clearly whether he conceives this drop in efficiency to be due to the operation of the law of diminishing return from land, or to some other "external diseconomy"? If the former, why should this law be brought into play if the industry can obtain the use of increased quantities of land at the old rent? And if the latter, what, once more, are these "external diseconomies"?

Meanwhile I conclude provisionally that, under increasing as under decreasing cost, competitive output, whilst doubtless not impeccable, commits no such rigid mathematical sin as that which has been laid to its charge.

§ 12. There remains a word to be said about "short periods," with reference to my Group (I) of "decreasing cost" industries. Such industries are, as has long been recognised, liable to terrible disorganisation in times of temporary depression of demand, since any hope of covering standing charges is apt to be temporarily abandoned, and slaughter prices accepted. If sellers

¹ Marshall, Principles, p. 436. Cf. the note on the following page: "And if for the purposes of any particular argument we take together the whole expenses of the production on that land, and divide these among the whole of the commodity produced, then the rent which we ought to count in is not that which the land would pay if used for producing the first commodity, but that which it does pay when used for producing the second."
"pursue this policy constantly and without moderation . . . they might ruin many of those in the trade, themselves perhaps among the number; and in that case a revival of demand would find very little response in supply, and would raise violently the prices of the goods produced by the trade." ¹ Further, as I have argued elsewhere,² such a policy may be disadvantageous to output in other trades, since if the demand for the product becomes inelastic (as it may, for instance, in such circumstances for machinery or for railway transport) the incentive to output in other trades is reduced. Restriction of output is the remedy now normally proposed and frequently adopted in such circumstances, and is in harmony with the general presumption (§ 6) that price should be made to cover full costs; but it does not follow that, *if we confine our view to temporary results*, there are not other better ways of dealing with the situation. Discrimination may be practised (as in the dumping policy of cartells), or a State subsidy may be given (as in effect proposed recently by the Industrial Group of Members of Parliament, and to some extent already done under the Trade Facilities Act), or, perhaps better still, the State might assist in storing the results of continued output clear of the market until demand revives once more.³ I am far from denying that such devices have their place in dealing with emergencies; and I concede, therefore, that in such cases it may be right to push production in these industries beyond what is at the moment the "economic" point (in my sense of receipts covering costs). But I suggest that this is a wholly different matter from a permanent policy of subsidisation; and I would urge further that in all such emergency measures the urgency of the immediate necessity must be weighed against the danger of encouraging *over-investment* in these industries in the future, by relieving them from the responsibility for the consequences of any excesses in investment policy in which they may choose to indulge.

§ 13. Have I fulfilled either of my remoter hopes? Have I, by attempting a further analysis of the boxes, contributed at all either towards making them easier to fill, or towards making any good use of them when filled? As to the latter, at all events, I fear that I have been destructive rather than helpful; for if I am right, the uses that can be made of them are more modest, even in theory, than has been claimed. But I have, to console

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² *A Study of Industrial Fluctuation*, pp. 203–205.
³ See *A Study of Industrial Fluctuation*, p. 251.
me, Professor Pigou's contention, and Dr. Clapham's admission, that even negative conclusions may be of use.¹

And yet at the end I am a little despondent. Clad in the cuirass of the calculus, the vizard of unverified probability, and greaves of the second order of smalls, perhaps the giant is still unscathed and derisory. But will he at least—for he is a gentle giant—deign to pick up David's pebbles and fling them back at him? For David is humble at heart, and would like to sing new songs to his sheep if only he really understood the tunes. And further, being of a mischievous disposition, he would rather enjoy telling the chieftains that the stern science of economics, who has so often enjoined the contrary, now actually urges them to supply many things to the people—Ford chariots perhaps, perhaps even copies of the Psalms—at almost nominal prices.

D. H. ROBERTSON

The Editors have invited comment from me upon Mr. Robertson's article. As I have rewritten and altered my discussion of these matters in the new edition of The Economics of Welfare, which is appearing shortly, it would be wasted labour to debate the old version in detail. I will, therefore, content myself with the following brief reply. Mr. Robertson must forgive me if, in the course of it, I do not speak of myself by somebody else's name or in the third person singular.

(1) The question whether the apparatus of curves presented in my book is or is not useful depends on the tastes of the user. The discussions in which I employed it could have been conducted to the same result by means of the differential calculus, or of either of Dr. Marshall's two systems of curves, or, if one were clever enough, by the light of nature, with no apparatus at all. I have no particular affection for the duplex curve apparatus. For mathematicians it is unnecessary, and to persons innocent of mathematics it appears to be unintelligible. In my new edition, therefore, I am dispensing with it.

(2) In his discussion of increasing returns Mr. Robertson does not seem to have understood the nature of the issues involved. My conclusions, which he considers new and revolutionary, are identical with those established thirty years ago by Dr. Marshall (cf. Principles of Economics, Book V. ch. xiii.). The suggestion that they imply a policy of subsidising nationalised enterprises to the extent of the whole burden of the fixed

original plant," is, of course, a grotesque misunderstanding. It is arrived at, so far as I can see, partly by confusing long- and short-period conditions and partly by applying to production generally propositions that are only applicable to quantities of production less than the quantity which the minimum practicable plant could provide. Mr. Robertson is also in error in suggesting that I deny the existence of internal economies. It is fair to admit that some bad phrasing in the text—not the appendix—of my book lends colour to this suggestion. As, however, it is obvious that no economist, who is not imbecile, could deny the existence of internal economies, it would have been flattering in Mr. Robertson to look for some other explanation of the language used.

(3) Professor Allyn Young's criticism of my analysis of diminishing returns, which Mr. Robertson has transcribed, is, in my present judgment, substantially valid as regards long-period problems, and the reply which I made to it in *The Economics of Welfare* is not adequate. In view of that criticism important modifications in my analysis are necessary, and are made in the forthcoming new edition.

A. C. PIGOU

To which Mr. Robertson rejoins:

(1) My quarrel is not with Professor Pigou's geometrical methods (like many non-mathematicians I find diagrams peculiarly helpful), but with the processes of thought which they enshrine and the conclusions which they are used to establish.

(2) On increasing return, Professor Pigou states that I am confused: I can only regret that he has not thought it worth while to clear up the confusion. He replies to my *reductio ad absurdum* (§ 6) by stating that he is not so silly as to believe the *absurdum*.

I did look for some explanation, other than a neglect of internal economies, for the language used on pp. 189–192 of *The Economics of Welfare*, and could find none. I hope other readers have been more fortunate.

(3) I attempted to criticise in detail the reply given by Professor Pigou in his second book to Professor Allyn Young's criticism of his first book. I do not think this process is quite correctly described as "transcribing" Professor Allyn Young's original criticism. But I am glad that Professor Pigou has come independently to the conclusion that his reply was inadequate.

D. H. ROBERTSON
Those Empty Boxes
A. C. Pigou; D. H. Robertson
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[Footnotes]

3 *The Variation of Productive Forces*
Charles J. Bullock
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3 *Of Empty Economic Boxes*
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