Monopoly, X-Efficiency and the Measurement of Welfare Loss

By ROSS PARISH and YEW-KWANG NG

In a recent article, Comanor and Leibenstein [1] incorporated into the analysis of the welfare cost of monopoly the assumption that monopoly gives rise to what Leibenstein [5] has called X-inefficiency. The Comanor–Leibenstein analysis was subsequently extended by Crew and Rowley [3]. We wish to suggest that the arguments of these two papers have to be seriously qualified (Section I), and to present an alternative analysis of this problem.

The principal difference between our approach and that of Comanor and Leibenstein is that we, following Corden [2], take account of the gain to the monopolist of being “inefficient”. It will be seen that our proposed measure of welfare loss is different from both the traditional measure and the Comanor–Leibenstein measure (Section II). We also examine the welfare implication of a type of managerial inefficiency not considered by Comanor and Leibenstein, viz. the selection of the “wrong” level of output (Section III). Some qualifications to our analysis are also mentioned (Section IV), and a general conclusion regarding the welfare effects of X-inefficiency is stated (Section V).

I

Referring to the argument that free trade improves X-efficiency by subjecting the home producers to the “cold shower” of foreign competition, Corden has shown that the extent of this benefit of trade is much less than is usually thought. We will utilize his argument that, even if protection does reduce X-efficiency, this may simply mean that the “increase in producers’ surplus is taken out in leisure rather than in command over goods and services”.

Now consider the argument of Comanor and Leibenstein with respect to monopoly.

In the first place, the process of competition tends to eliminate high-cost producers, while the existence of substantial market power often allows such firms to remain in business. This is due to the oft-noted fact that the high price-cost margins, which are established by firms with substantial market power, often serve as an umbrella which

1 We are indebted to W. M. Corden for helpful comments on an earlier draft.
2 References in square brackets are listed on p. 308, below.
3 The comments by Johnson [4] and Parish [6] on Corden’s paper are also relevant to the question under discussion.

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protects their high-cost rivals. Second, the process of competition, by mounting pressures on firms' profits, tends to discipline managements and employees to utilize their inputs, and to put forth effort, more energetically and more effectively than is the case where this pressure is absent. ([1], p. 304).

Given the condition that monopolistic power both restricts the entry of low-cost producers and allows the existing high-cost producers to survive, then the shift to competition may tend to increase X-efficiency. However, it seems that this sort of condition is not likely to prevail in many cases. Unless there is some governmental restriction or some collusive action of the existing producers, the monopolist, if able to exclude prospective low-cost competitors, would be likely to be able to exclude the existing high-cost producers.

It is also clear that the second point in the quotation is subject to Corden's criticism. If the monopolist prefers to "take it easy", this may just be a form of producers' surplus. Nevertheless, it may be held that the monopolist is indulging in satisfying non-essential wants. Given that each man is the best judge of his own interest, this only means that distribution is regarded as being too favourable to the monopolist. There is a case for competition on this ground only if there is no other better way of achieving the desired redistribution (a tax on the monopolist, for example). Moreover, this case for competition is distributional rather than allocational.

We conclude, therefore, that the applicability of Comanor and Leibenstein's argument (and hence also that of Crew and Rowley¹) has to be seriously qualified. Indeed, an alternative analysis of the problem may be justified.

II

At the outset we make the analytically useful (and usual) assumption that we are dealing with a first-best world, blemished only by the presence of a monopoly sector. We also assume that, cushioned as it is by monopoly profits, the monopoly sector is more likely to be characterized by "inefficient" management than is the competitive sector. The source of managerial inefficiency is simply that monopolist entrepreneurs or their agents can indulge their tastes for leisure with greater impunity than can competitive entrepreneurs and managers. These assumptions also underlie Comanor and Leibenstein's analysis. Unlike them, however, we assume that monopolists gain utility from the

¹ As an example, consider their case 3a "in which a monopolistic price solution is accepted but X-inefficiency is eliminated, perhaps by a regulatory commission motivated to achieve technological efficiency but undecided as to the policy significance of allocative 'inefficiency'" ([3], p. 202). This may well mean that the monopolist is forced to take less leisure than he would prefer, and this loss of the monopolist may outweigh the gain, if any. We are far from being able to conclude, as Crew and Rowley do, that the "welfare gain is unambiguous both under first-best and under second-best conditions" ([3], p. 203).
quieter lives which they are enabled to lead, and that these benefits have to be taken into account in an analysis of the welfare costs of monopoly.

Consider Figure 1, which represents the demand and cost conditions facing a monopolist or a competitive industry. For simplicity, the industry is assumed to operate under conditions of constant cost. If the industry is organized competitively, the level of costs is assumed to be $C_c$; if it is monopolized, managerial slack will allow costs to rise to $C_m$. $Q_c$ represents the level of output under competition, while $Q'_m$ is the monopoly output. What are the welfare costs associated with a reduction in output from $Q_c$ to $Q'_m$?

Let us assume the contraction in output takes place in two stages, the first stage being a contraction from $Q_c$ to $Q_m$, the latter being the optimum output of an $X$-efficient monopoly. The social cost of this movement is the triangle $GHE$. Next, managerial slack appears and the monopoly's costs rise to $C_m$, and output is further reduced to $Q'_m$. Associated with this reduction in output there is a loss of consumers' surplus equal to $P'_mAGP_m$. There is also a loss of monopoly profits equal to the difference between $P'_mGHc_m$ (profit at the output $Q'_m$) and $P'_mABC_m$ (profit at the output $Q'_m$). Presumably, however, the monopolist attached a greater value (or at least as great a value) to quiet living as to these profits foregone. Hence the net change in producer's surplus (including non-pecuniary as well as pecuniary income) is positive, or, at worst, zero. The net social cost of the reduction in output from $Q_m$ to $Q'_m$ is therefore the loss of consumers' surplus $P'_mAGP_m$, less any net increase in producer's surplus. The welfare cost of monopolizing the previously competitive industry is therefore at most the sum of the areas $GHE$ and $P'_mAGP_m$.

An alternative and perhaps more appealing depiction of our measure
of welfare cost is as follows. It can be shown that $P'_m AGP_m = ABHG$.\(^1\) Hence our measure of the welfare cost is equal to or less than $ABHE$. Now, this area has a clear meaning when compared with the competitive situation. The movement from $E$ to $A$, and from $C_e$ to $C_m$, involves (i) a loss of consumers’ surplus of $P'_m C_{CEA}$, (ii) a gain in monopoly profits of $P'_m C_{mBA}$, and (iii) a gain in monopolist’s non-pecuniary surplus equal to or greater than $C_m C_{mHB}$. And $(i) - (ii) + (iii) \leq ABHE$.\(^2\)

Our result can be compared with that of Comanor and Leibenstein. Their account proceeded in the opposite direction (i.e. they looked at the gains to be had from breaking the $X$-inefficient monopoly producing the output $Q_m$), and, as a result, their partitioning of the movement differed from ours. They argued that the ordinary measure of the welfare loss arising from allocative efficiency is the triangle $ABC$; that when account is taken of the lower costs associated with competition, the proper measure becomes $ADE$; and that in addition there is a welfare loss from $X$-inefficiency equal to $C_m C_{mDB}$.

According to our reasoning, the whole of the welfare loss arises from allocative inefficiency. The loss can be partitioned into $GHE$, the loss arising from under-production by an $X$-efficient monopoly, and $ABHG$, the loss arising from the further curtailment of production which occurs because the monopolist fails to keep his costs as low as a competitive firm would. Each element of the loss is traceable to the fact that the value to the monopolist of an increment of production is less than its value to society.

III

It is not entirely clear, either from Leibenstein’s original article \([5]\) or from the Comanor–Leibenstein article \([1]\), what phenomena are encompassed by, and what are excluded from, the concept of $X$-inefficiency. In the latter article, $X$-inefficiency is assumed always to manifest itself in the form of higher costs than are necessary, given better or better-motivated management. But since $X$-inefficiency arises from managerial slackness, and since this can give rise to inefficiencies

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\(^1\) Let the demand curve be $P(Q)$, where $Q$ is the amount of output. Total revenue is thus $QP$, and marginal revenue is $QP' + P$.

$$P'_m AGP_m = \int_{P_m}^{P_m} QdP = \int_{Q_m}^{Q_m} QP'dQ = -\int_{Q_m}^{Q_m} QP'dQ;$$

$$ABHG = \int_{Q_m}^{Q_m} [P - (QP' + P)]dQ = -\int_{Q_m}^{Q_m} QP'dQ.$$  

The proof (which we owe to our colleague, M. Weisser) is general and is not restricted to linear cases, as we do not place any restrictions apart from integrability on the relevant functions.

\(^2\) In the case where $X$-inefficiency leads to an increase in overhead cost but not in marginal cost, as analysed by Crew and Rowley, it is easily seen that there is no additional welfare loss from this “inefficiency”. The increase in cost solely reduces the profit but does not affect prices or output levels. Consumers are not affected, while the monopolists choose to be “inefficient” of their own free will.
other than those that show up in higher costs, this seems an unduly restrictive approach. In particular, in an analysis of the welfare costs of monopoly, it is of interest to examine the consequences of the failure of a monopolist to choose the profit-maximizing rate of output. We will now consider this problem, assuming it to be the only type of inefficiency displayed by the monopoly sector.

In the absence of evidence or argument to the contrary, the appropriately neutral assumption would seem to be that monopolists just as frequently over-produce as under-produce, relative to the profit-maximizing level. This assumption can be stated more formally as follows: the probability that a monopoly will select an output which exceeds the profit-maximizing output by a given amount (say, 10 per cent.) is the same as the probability that its chosen output will fall short of the optimum output by the same amount. If this assumption is granted, and given that there is some dispersion of actual outputs about the optimal output, it follows that the welfare costs of monopoly (as they are ordinarily measured) are greater than they would be if the optimal output was always chosen. This is so because with a downward-sloping demand curve, and a marginal cost curve which is non-negatively sloped—or, if negatively-sloped, is less steep than the demand curve—

1 Political constraints and fear of attracting entry may induce monopolists to over-produce. But this is in the nature of a conscious and rational policy, and must be excluded from a consideration of under- and over-production arising from managerial inefficiency.

2 If the marginal cost and marginal revenue curves are linear over the relevant range, this assumption implies that departures on either side from the optimal output, measured in terms of loss of potential profits, are equi-probable.
the social gains arising from a 10 per cent. over-production are less than the social losses engendered by a 10 per cent. under-production. Thus, if it is assumed that the probability that the monopolist depicted in Figure 2 will choose output $Q_1$ is 0.5, and similarly for output $Q_2$, the expected welfare loss is $\frac{1}{2}(ABJ + EFJ)$, which exceeds the loss $DCJ$ which would be incurred had he chosen the optimum output.

However, this is not the end of the story. Choice by the monopolist of the sub-optimal output levels $Q_1$ or $Q_2$ involves him in a sacrifice of potential profits equal to $HBC$ or $CFG$ (these triangles being of equal area). The disutility of avoiding this sacrifice by the exercise of greater managerial effort presumably exceeds the value of the profits foregone. Hence the expected net social loss—as ordinarily defined—has to be reduced by an amount equal to or greater than $HBC$, representing the monopolist’s gain of non-pecuniary surplus. Since it can be shown geometrically that $HBC > \frac{1}{2}(ABJ + EFJ) - DCJ$, it follows that the net result is a social gain, rather than a loss.¹ A verbal proof of this proposition is as follows. The net change in social welfare is the sum of changes in producer’s and consumers’ surpluses. The first of these is non-negative, since the monopolist gains as much or more utility from greater leisure than he would from the profit he forgoes. The second change is positive. As was shown by Waugh [7] many years ago, the gain in consumers’ surplus when a good is under-priced exceeds the loss of surplus when it is over-priced by the same amount (provided the demand curve is linear). Hence the replacement of output $Q_0$ with probability of 1 by the outputs $Q_1$ and $Q_2$, each with probability of 0.5, results in a gain in consumers’ surplus. The net change in social welfare is therefore positive, since it is made up of one positive and one non-negative component.

In summary, then, we have shown that if the costs of improving managerial efficiency are ignored, inefficiency which leads a monopolist to choose outputs other than the profit-maximizing output gives rise to a welfare loss. However, when account is taken of the costs to the manager of improving his efficiency, this particular form of managerial “inefficiency” will result, if the demand curve is linear, in a gain in welfare, because it confers an external pecuniary economy on consumers.

IV

Our analysis has so far been based on the assumption that, apart from the existence of a monopoly sector, we are dealing with a first-best world; and, in particular, that there is no divergence between the private

¹ We have to show that $HBC + CFG > ABJ + EFJ - 2(DCJ)$; or $HBC + CFG > ABCD - DCFE$; or $CFG > AHCD - DCFE$; or $DCGE > AHCD$. Now if the demand curve is linear and downward sloping, the marginal revenue curve must be more steeply downward sloping, hence $DCGE > AHCD$. This proof depends on a linear demand curve. However, it would take a “peculiar” shaped non-linear demand curve to make $DCGE < AHCD$. 
and the social cost of leisure. However, the structure of taxation in most countries probably tends to under-price leisure. Also, in firms not operated by their owners, managers, if not closely supervised, may be able to pursue quiet lives at no cost to themselves but at a cost to the owners. If, for these or other reasons, the social opportunity cost of leisure exceeds the private opportunity cost, the offset in the form of increased managerial leisure to the increased costs of X-inefficient firms will be only partial, rather than complete, or more-than-complete, as we have assumed.

Managerial slack can give rise to higher costs for various reasons: non-optimal combinations of inputs may be employed; poor performance by factor suppliers may be tolerated; unnecessarily high prices may be paid for factor supplies because the monopolist may be unwilling to engage in hard bargaining. In the case of the second and third types of inefficiency, the increase in costs measured by the area $C_mC_DB$ in Figure 1 will be at least partly compensated for by an increase in surplus accruing to factor suppliers. This surplus, which may be pecuniary or non-pecuniary in form, is additional to and separate from the non-pecuniary surplus which the monopolist derives from being a slack manager. In the absence of additional assumptions, we are able to say little about the magnitude of this additional surplus accruing to suppliers of factors.

V

If the leisure of entrepreneurs, and that of other factor suppliers, is reckoned as part of the social product, and if entrepreneurs are assumed to act rationally, X-inefficiency per se gives rise to no net social costs whatsoever. Social costs arise only when, because of some pricing inefficiency, the full cost of substituting leisure for money income is not borne by the person making the substitution. The under-taxation of leisure is the most obvious pricing inefficiency. The existence of monopoly is another: since price exceeds marginal revenue, the social value of the marginal output foregone as part of the price of leisure exceeds its private value to the monopolist.

These propositions can be illustrated by analysing the welfare effects of the introduction of X-inefficiency into a competitive industry. Suppose that all of the existing and potential entrepreneurs in the competitive industry depicted in Figure 1 were suddenly to acquire a uniformly-heightened taste for leisure, leading to slackness in their managerial activities, and to a rise in their minimum average cost of production from $C_c$ to $C_m$. Industry output is cut back to $Q_c$. The value of the output lost is $CEQ_cQ'$. But at the new higher costs of production the costs saved are equal to the rectangle whose sides are $Q'Q_c$ and $CQ_c$; there is no social loss here. In addition, resources equal in value to the rectangle $C_mCFC_c$ are drawn into this industry. But this social loss is at least fully offset by the gain in entrepreneurial leisure: each
entrepreneur could, if he wished, lower his unit costs by the amount $C_m C_e$, and earn a money profit equal to this amount times the volume of his output. The fact that he does not do so indicates that he values his increased leisure more highly. Hence there is no net social loss as a result of the entrepreneurs’ increased taste for leisure. There is, of course, a redistribution of real income, the gain to entrepreneurs being the consumers’ loss.\footnote{The loss of consumer surplus $C_m C_e$ is not additional to the identical resource cost mentioned above; it is another way of expressing the same cost. Indeed, it is the reduced ability of consumers to purchase other things which releases the resources that are drawn into X-inefficiency industry.} It is also of interest to note that the redistribution effect is greater in the case of perfect competition than in monopoly; in the latter case, only half of the increased costs associated with X-inefficiency are passed on to consumers, whereas in the former the whole amount is passed on. The part that the monopolist does not pass on he absorbs from money profits; this is not possible with perfect competitors since they earn no profits.

University of New England, Armidale, NSW.

REFERENCES


