Economics Matters

FEATURED ARTICLE:
Allocative efficiency - why is it so important?

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Allocative efficiency - why is it so important?

by Robert Nutter

Allocative efficiency occurs when there is an optimal distribution of goods and services in an economy as it takes into account the preferences of consumers and thus maximises total economic welfare, sometimes referred to as the community surplus. From the point of view of the whole economy it can be shown as a particular point on the production possibility frontier. All points on a production possibility frontier are productively efficient because as no resources are being wasted this implies that all firms must be operating at minimum average cost. However only one point on the production possibility frontier is allocatively efficient because it gives households exactly the distribution of goods and services that will maximise welfare.

If all markets in an economy were perfectly competitive then the economy would operate at the allocatively efficient level of output. This is because firms are price takers and therefore the industry output will be the one at which demand equals supply. However, in economies where there are no markets to reflect the preferences of consumers such as in command economies there may well be productive efficiency but not allocative efficiency. In a command economy the decisions of what, how and for whom to produce are decided by state planning committees and thus with an absence of market prices and the laws of demand and supply allocative efficiency is not likely to occur. In the command economies of Eastern Europe until the collapse of the Berlin wall in 1989 a large number of resources were deployed for military and security purposes, heavy industry such as coal and steel and in the Soviet Union (now modern day Russia) the space programme. The majority of the population would almost certainly rather have had greater quantity and quality of the consumer goods available. The Soviet Union was a military superpower and had the first man in space but the quality of shoes, washing machines etc was very poor and in short supply.

In the production possibility diagram immediately below (Figure 1) suppose the economy can produce only burgers and pizzas and q on the horizontal axis is the allocatively efficient output of burgers. In the demand and supply diagram below the production possibility frontier (PPF) the horizontal axis is on the same scale as that for the PPF and q is also point where the demand and supply of burgers intersect at the equilibrium price p. In a perfectly competitive market the supply curve for burgers is also the marginal cost

curve (MC) and the demand curve represents the marginal private benefit (MPB) curve which in turn is closely linked to marginal utility. Marginal utility describes the benefit that a consumer receives from consuming one additional unit of a good, while the MPB shows what the consumer is willing to pay to acquire one more unit of the good. When a person consumes increasing numbers of burgers their marginal utility (extra satisfaction) diminishes because their need has already been partly met and thus the price they are prepared to pay for each extra burger also declines. The allocatively efficient consumption of burgers occurs where the marginal private benefit equals the marginal cost because at this level of consumption the valuation people place on the product is equal to the resource cost of producing that product that is MPB = MC. It is also where demand and supply are equal, the equilibrium or market clearing price where all goods that are offered for sale by producers are purchased by consumers. All the units up to the equilibrium yield more utility (benefit) than the cost of resources used to make them. Hence all the units up to the point at which price = MC add to welfare, but all the ones beyond this point would begin to reduce it.
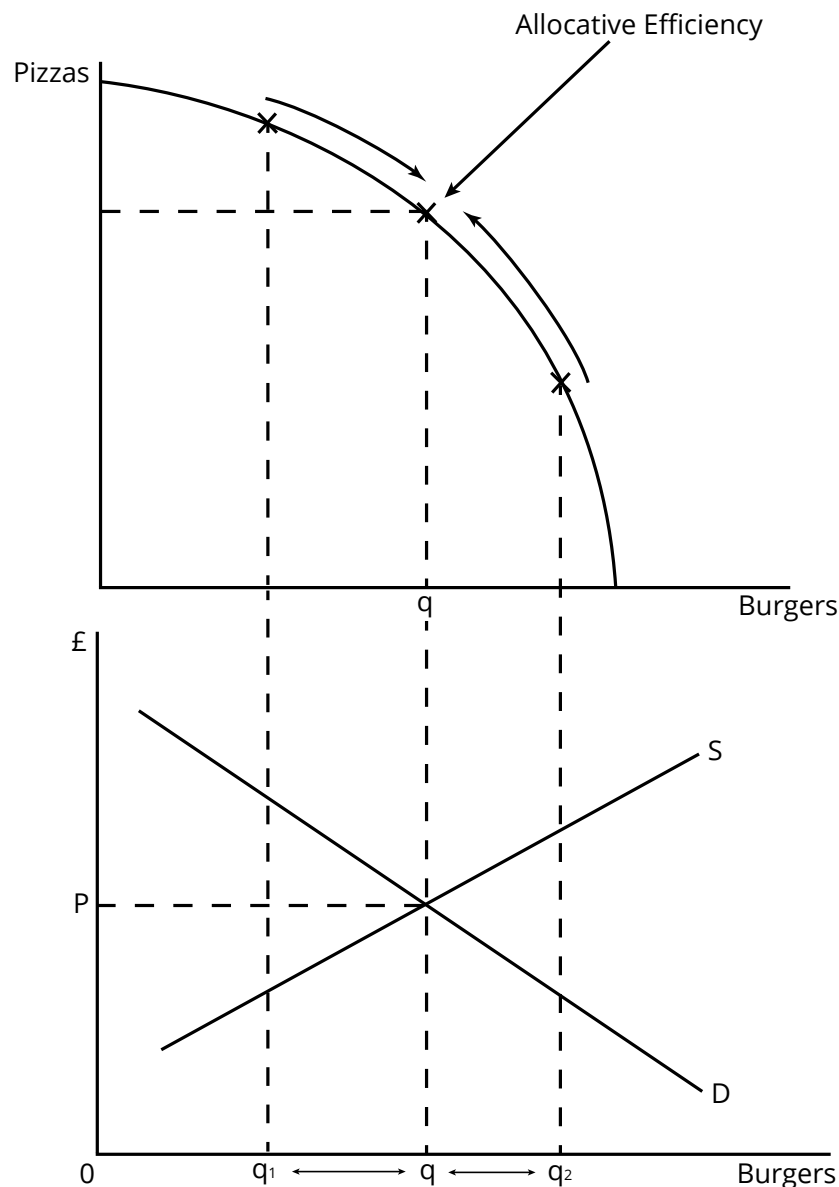

Figure 1

If output of burgers was at q1 then the price (MPB) is greater than marginal cost (MC) – suggesting under-consumption and under production of the good. This is because there are units to the right of q1 where MPB is greater than MC which would mean that the benefits gained by society from consuming them are greater than the cost of resources used to make them.

If output increased and price fell, society would benefit from enjoying more of the good because up to q the MPB is greater than MC. At q2 there is over-consumption and over-production of the product because MC is greater than MPB and thus output should fall to q. Thus at the price p allocative efficiency occurs where price (MPB) equals marginal cost. As burger production changes to reach the allocatively efficient level pizza production will also change to reach its own allocatively efficient level of output. If consumers are rational then the equi-marginal principle will apply which means that consumers will choose a combination of pizzas and burgers which will maximise their total utility. This will occur where:

$$\frac{\text{Marginal utility of pizzas}}{\text{Price of pizzas}} = \frac{\text{Marginal utility of burgers}}{\text{Price of burgers.}}$$

This means that the benefit gained per pound of expenditure is equal from each of the two goods – if this wasn't true then consumers would change their spending pattern.

In the diagram below (figure 2) the allocatively efficient level of output (q) occurs where the community surplus is maximised, that is the consumer surplus plus the producer surplus. At any other level of output there is allocative inefficiency and either under-production or over-production.
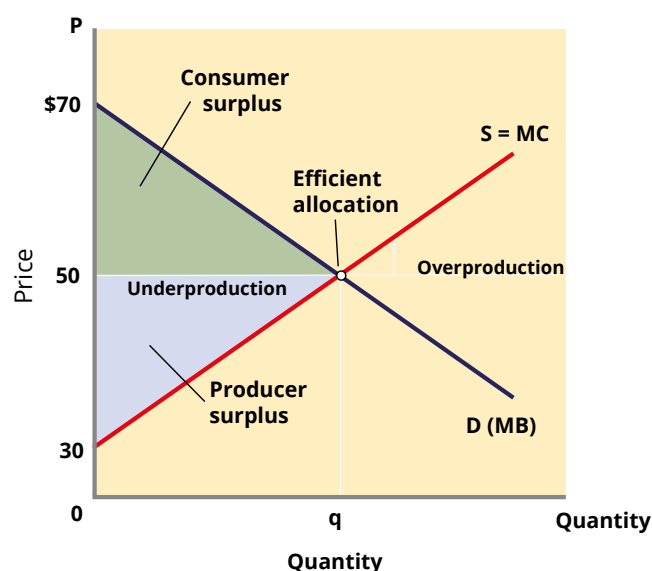

Figure 2

From the above analysis it appears that if societies want to achieve what is called Pareto Optimality where no one can be made better off without making someone else worse off then all markets should be perfectly competitive. This is because firms are price takers with a horizontal demand curve and therefore marginal revenue (MR) = average revenue (AR), so when firms maximise their profits at the output at which MC=MR, this is also the output at which MC=AR. Since price =AR this will mean that firms operate at the allocatively efficient output.
Can setting price equal to marginal cost be achieved in the real world in all markets?

Unfortunately in the real world markets are imperfect, there is monopolistic competition, oligopoly and monopoly where price is above marginal cost. As can be seen in the diagram below (figure 3), the allocatively efficient output occurs at Q2, where AR (P) =MC. The monopoly firm will choose to maximise its own profits, however, producing at QM, where MC=MR. This means that the units from QM to Q2 are not produced, which would reduce welfare relative to where it could have been because these units would have had marginal private benefit above the cost of the resources needed to make them ie the marginal cost.
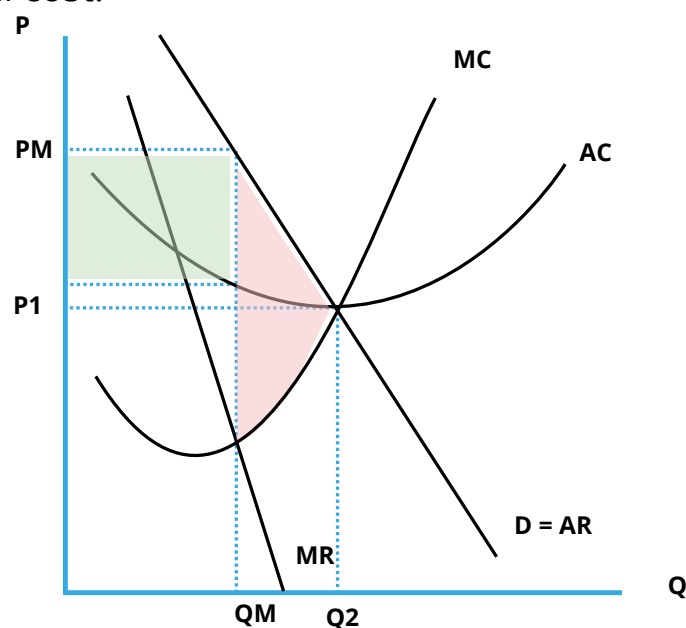

Figure 3

In addition in practical terms it is very difficult to calculate marginal cost in some markets. There is also the problem of external costs and benefits from both the consumption and production of goods and services. Allocative inefficiency will occur if private cost or benefit diverges from social cost or benefit. Where externalities exist the condition for allocative efficiency is that price = social marginal cost= social marginal benefit; the price must equal the true marginal cost of production to society as a whole, rather than just the marginal private cost. Accurate calculations of the value of external costs and benefits are also very difficult in most markets. In the diagram below (figure 4) supply will equal marginal private costs (MPC) and demand MSB = MPB as there are assumed to be no external costs or benefits from consumption.

Thus means that the market will be in equilibrium at Q1 where price or average revenue =MC. However, because not all the resource costs have been taken into account, there is a welfare loss because the units between Q and Q1 have MSC above the MSB, meaning that they are not economically desirable. This is a result of external production externalities.
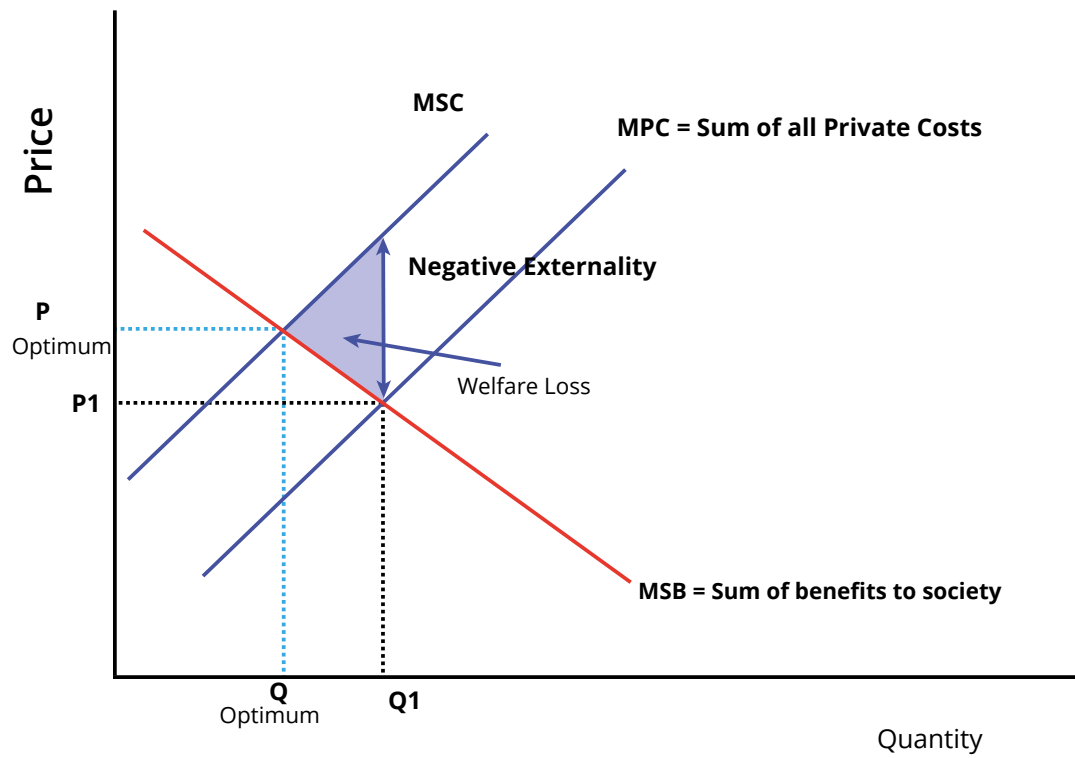

MSC

MPC = Sum of all Private Costs

Negative Externality

Price

P
Optimum

P1

Welfare Loss

MSB = Sum of benefits to society

Q
Optimum

Q1

Quantity

Figure 4

One of the main problems with setting price equal to marginal cost comes in markets where producers have large fixed costs. Due to the large range of output over which the benefits of economies of scale are experienced these markets are often best served by one firm. These are called natural monopolies and some examples are in areas of infrastructure such as cable television, energy, water and railways. If price is set equal to marginal cost then firms will make huge losses because they will be unable to recover their high fixed costs. In the diagram below (figure 5) if the firm profit maximised where MC=MR at price P and output Q the firm would be inefficient but would make abnormal profit (PZBR) because average revenue is greater than average cost. At the allocatively efficient price P1 the firm would make losses (CXAP1) because AC is greater than AR.
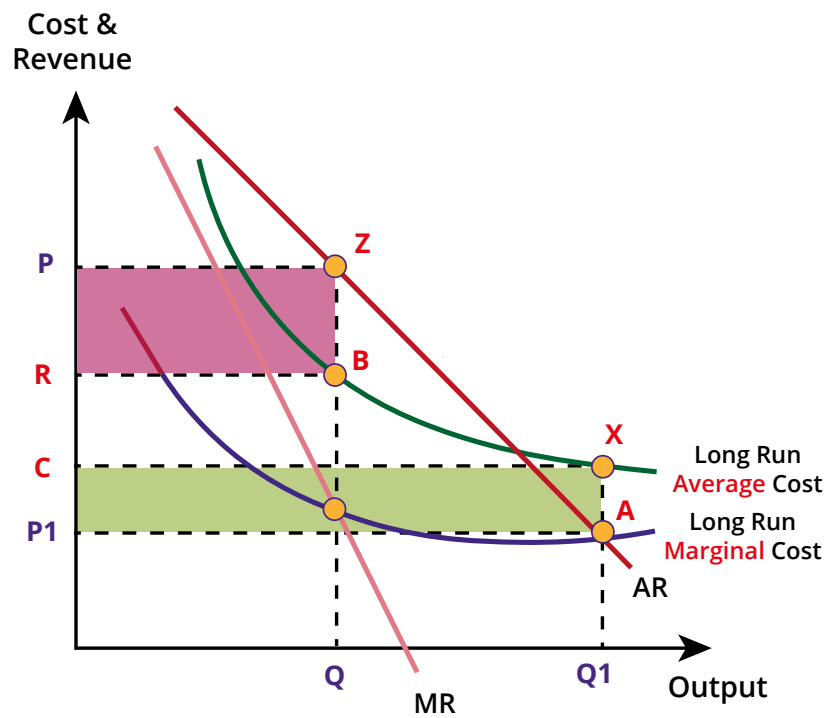
Figure 5

This suggests that pricing equal to marginal cost to achieve allocative efficiency is not practical. However, even in infrastructure companies such as water marginal cost pricing could at least be partially applied. Assume that all households are fitted with a water meter consumers could be charged a price per litre that equates to the marginal cost of supply. With water supply priced in this way rational consumers would use water up to the point where the marginal utility or the consumers' valuation of the water ie the price they were prepared to pay equated to the marginal cost of supply. The fixed cost of water supply could be recovered by a fixed connection charge paid by all households which would be unrelated to their water consumption. At present about 60% of households don't have a meter and pay an annual bill based upon their home's council tax band. Thus the amount they pay for their water is unrelated to their consumption and hence in theory will consume water up to the point where their marginal utility is zero and their total utility is maximised. This is inefficient because some units will be consumed for which the cost of resources used to supply the water, such as filtering and processing (the MC) is above the utility that such consumers actually gain.

Regulators when looking at the price charged in highly concentrated or dysfunctional markets may try to examine how far prices to consumers deviate from marginal cost. Price capping by regulators might direct firms to push their prices closer to marginal cost. Firms in the public sector may be directed to charge a price equal to marginal cost with the government covering the losses by a subsidy. This was a practice used in some of the UK's nationalised

industries in the 1960's and 70s and it proved expensive for the government and difficult to apply in certain sectors.

The use of marginal cost pricing only in some nationalised markets brings in the theory of second best. This theory suggests that if two or more markets are not perfectly competitive, then efforts to correct market distortions in only one market say by the use of marginal cost pricing may drive the economy further away from Pareto efficiency. The problem of second best thus raises the question of whether interventions such as directing a few nationalised firms, where there are market imperfections, to price at marginal cost can actually improve overall social welfare in an economy where most other firms' prices are above marginal cost.

Marginal cost pricing has relevance with the provision of public goods such as flood defences like the Thames Barrier. As pure public goods are provided free at point of consumption and the marginal cost of providing these goods to an extra person is zero then price = marginal cost and there is thus allocative efficiency.

Firms may sometimes price some of their output at marginal cost using price discrimination. This is quite possible when less fortunate consumers of the product have to pay a price way above marginal cost so that the firm can cover fixed costs and make a profit. This was recently used with great success by The Economist magazine that offered to sixth form students 30 editions for £16.00 which was just over 50p a copy for a magazine with a then cover price of £4.20. Students at university are currently being offered The Economist for 12 weeks for £12 which is only £1 per copy compared to a cover price of £5.00. The huge discount price offered to students probably equates closely to marginal cost (printing and distribution) and may build up enough brand loyalty for those same students to buy the magazine at full price when they are adults. The high fixed costs of creating the magazine will be covered by those paying the full price making marginal cost pricing quite practical albeit only for some consumers of the product.