

Monopoly and Perfect Competition Compared

I. Definitions of Efficiency

A. Technological efficiency occurs when:

Given the output produced, the costs of production (resources used) are minimized.

or

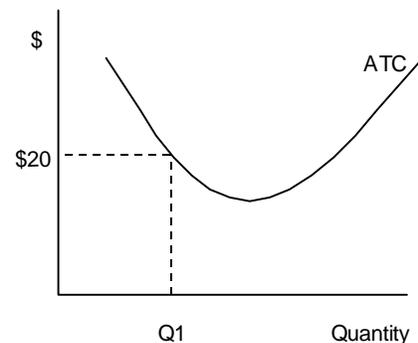
Given the costs of production (resources used), the output produced is maximized.

There are two kinds of technological efficiency:

Firm technological efficiency

Given the output produced by the firm, the firm must minimize the costs of production. A firm's average cost curve shows, given the quantity produced, the minimum average cost for which that quantity can be produced. Hence, firm technological efficiency occurs whenever, given the quantity produced, the firm is producing on their cost curves. All profit-maximizing firms wish to achieve firm technological efficiency because decreasing costs will increase profits.

In the graph to the right, the firm producing quantity level Q_1 at an average cost of \$20 illustrates firm technological efficiency. The firm cannot produce this at an average cost below \$20 and if it produces it at an average cost above \$20, then it is technologically inefficient.



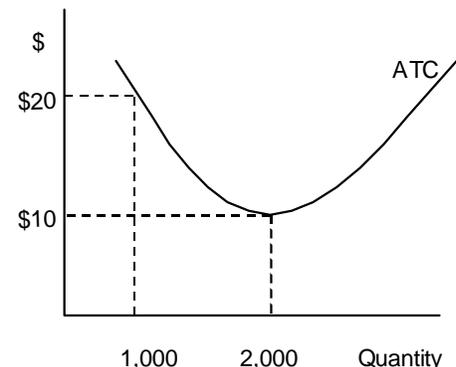
Industry technological efficiency

Given the output produced by the industry, the industry must minimize the costs of production. An industry can be technologically inefficient even though all firms in the industry are technologically efficient.

This possibility is illustrated in the graph to the right, which represents the ATC curve for each firm in the industry. Consider the following two scenarios:

Scenario 1: The output produced by the industry equals 10 million. The industry output is produced by 10,000 individual firms in the industry each producing 1,000 units of output. Each firm producing this output does so in a technologically efficient manner (i.e., each firm produces on their cost curves). Thus in the industry ATC equals \$20.

Scenario 2: The output produced by the industry equals 10 million. The industry output is produced by 5,000 individual firms in the industry each producing 2,000 units of output. Each firm producing this output does so in a technologically efficient manner (i.e., each firm produces on their cost curves). Thus in the industry ATC equals \$10.



Even though in both scenarios the firms in the industry are technologically efficient (i.e., are producing on their cost curves given the quantity produced), the average cost of producing the industry output is not the same. The industry output is produced at the lowest possible average cost in scenario 2, where each firm is producing at the minimum point of their ATC curve. Thus, **industry technological efficiency** requires that each firm in the industry produce where its ATC is at its minimum point.

B. **Allocative efficiency** occurs when:

Resources are allocated to the production of a good or goods in such a manner that society is as well off as possible.

Earlier in the semester allocative efficiency was defined to occur whenever all possible mutually beneficial exchanges had occurred. However, this definition is inadequate given our current level of understanding. Hence, we will define allocative efficiency in terms of two marginal concepts:

Marginal Social Cost (MSC)

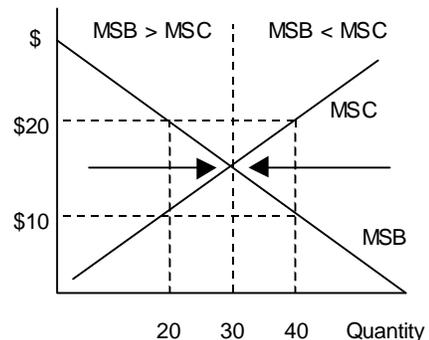
MSC equals the extra cost to society of producing one more unit of output. The law of diminishing returns implies that MSC will be upward sloping.

Marginal Social Benefit (MSB)

MSB equals the extra benefit to society of producing one more unit of output. The law of diminishing marginal utility implies that MSB will be downward sloping.

The graph to the right is divided into two areas:

MSB > MSC. For example, consider the decision to produce the 20th unit of output. It costs society \$10 to produce the 20th unit, but yields a benefit of \$20. Hence, society's welfare increases, on net, by \$10 (MSB – MSC) if society produces the 20th unit of output. Clearly it is in society's best interest to produce the 20th unit of output. **In fact, as long as MSB exceeds MSC, society is made better off by increasing output.**



MSB < MSC. For example, consider the decision to produce the 40th unit of output. It costs society \$20 to produce the 40th unit, but yields a benefit of only \$10. Hence, society's welfare increases, on net, by \$10 (MSB – MSC) if society does not produce the 40th unit of output. Clearly it is not in society's best interest to produce the 40th unit of output. **In fact, as long as MSB is less than MSC, society is made better off by decreasing output.**

Given that society is better off when output is (1) increased when MSB > MSC and (2) decreased when MSB < MSC, it is clear that **allocative efficiency occurs where MSB = MSC.**

As a final step, recall that Demand curves measure the maximum price that consumers are willing to pay for a given quantity of a good. That is, a consumer's Demand curve is a measure of marginal benefit (or marginal utility) to the consumer. Which means that Market Demand measures the marginal benefit for all consumers in the market. In the absence of externalities, Market Demand measures marginal social benefit. Thus, we can say that MSB = D = P.

Recall also that in perfectly competitive industries, the market supply curve is a measure of the marginal cost in the industry. In the absence of externalities, this marginal cost equals the marginal social cost. Thus, we can say that $MSC = S = MC$.

Thus, allocative efficiency occurs whenever:

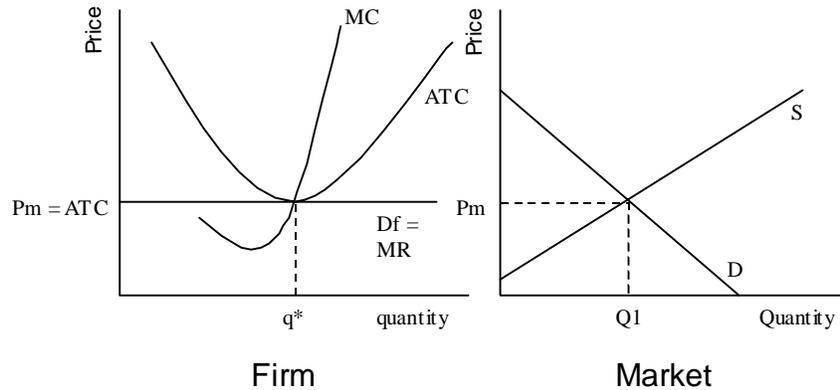
$$MSB = MSC$$

$$P = MC$$

Allocative efficiency can be referred to in either of these two methods. However, it is more common to use the latter, $P = MC$, than the former. In fact, on the departmental final exam you can expect allocative efficiency will always be defined as occurring where $P = MC$.

II. Evaluating the Efficiency of Perfectly Competitive and Monopoly Markets

- A. The long-run in a perfectly competitive market. The graph below demonstrates the long-run equilibrium in a perfectly competitive market, where profit equals zero



We observe that the following is the case for a perfectly competitive market in long-run equilibrium:

- Profit (π) = 0 because $P = ATC$.
- $P = MR = MC = D_f = ATC$.
- The firm is producing the quantity where ATC is at its minimum point.

Technological Efficiency for the Perfectly Competitive Market

Firm Technological Efficiency: Is the firm producing on its cost curves? **Yes.**

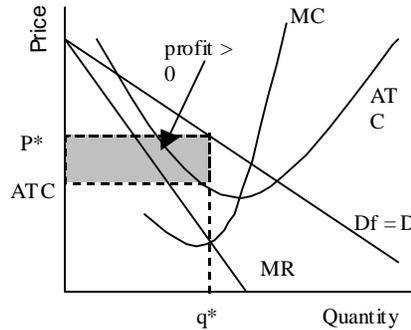
First, all profit-maximizing firms wish to minimize the cost of producing a given quantity because reducing costs increase profits. Second, profit equals zero for a perfectly competitive firm in long-run equilibrium. Hence, if the firm did not choose to minimize the cost of producing its output by producing on its cost curves, ATC would increase and profit would be less than zero. In the long-run, the firm would be driven out of business by its more efficient competitors.

Industry Technological Efficiency: Are all firms in the industry forced to produce at the quantity where its ATC is at the minimum point? **Yes.**

Allocative Efficiency for the Perfectly Competitive Market

Is the firm producing where $P(\text{MSB}) = MC(\text{MSC})$? **Yes**

B. The long-run in a monopoly. The graph below demonstrates the long-run equilibrium for a monopoly, where profit is greater than or equal to zero.



We observe that the following is the case for a monopoly in long-run equilibrium:

- Profit (π) ≥ 0 because $P \geq ATC$.
- $P \geq ATC$; $P > MC$, $P > MR = MC$.
- The firm is not producing the quantity where ATC is at its minimum point.

Technological Efficiency for the Monopoly Market

Firm Technological Efficiency: Is the firm producing on its cost curves? **Yes..**

Recall that all profit-maximizing firms wish to minimize the cost of producing a given quantity because reducing costs increase profits.

Industry Technological Efficiency: Is each firm in the industry producing at the minimum point of its ATC curve? **No.**

Allocative Efficiency for the Monopoly Market

Is the firm producing where $P = MC$? **No.** Price is greater than ATC. Hence, the firm is producing too little at too high a price.

Is the industry producing where $\text{MSB} (D) = \text{MSC} (S)$? For monopoly, there exists no supply curve.

C. Final Comparisons: Perfect Competition versus Monopoly

See the graph below for comparisons. Perfectly competitive firms have the least market power (i.e., perfectly competitive firms are price takers), which yields the most efficient outcome. Monopolies have the most market power, which yields the least efficient outcome.



Public Policy given this analysis?

The policy that follows from the above analysis is straightforward. Perfectly competitive industries yield efficient outcomes while monopolies yield inefficient outcomes. Hence, an appropriate policy, whose goal is to increase efficiency, would be to reduce monopoly power and by increasing the level of competition in monopoly markets.

III. Exceptions to this Analysis

There are two possible types of exceptions to the conclusion that perfectly competitive industries are efficient while monopoly industries are inefficient. Either **(1) perfect competition is not as efficient as thought OR (2) monopoly is not as inefficient as thought**. Below, exceptions of both types will be described. This is a suggestive, rather than an exhaustive, list.

A. Contestable markets

(2) Monopoly is not as inefficient as thought

A contestable market is one with a single firm that (1) produces a product that has no close substitutes and (2) has no any competition from other firms. However, no barriers to entry prevent other firms from entering the industry.

In this situation, no actual competition exists. However, the threat of competition will generally be sufficient to prevent the firm from raising the price to the monopoly level and reducing the quantity produced to the monopoly level. Hence, the monopolist is not as inefficient as thought.

B. Externalities

(1) Perfect competition is not as efficient as thought

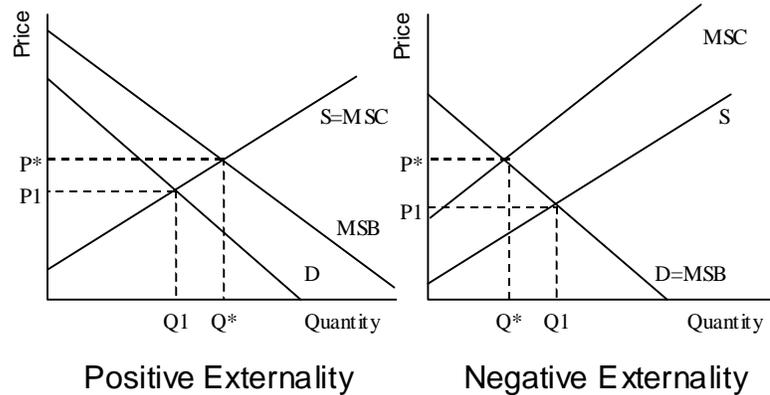
Externalities defined:

In an exchange of a good, there exist two parties internal to the exchange of the good, the buyer and seller of the good. An externality occurs whenever a third party(ies), external to the exchange, is affected by the exchange.

If the third party is benefited by the exchange, this is known as a **positive externality**. In positive externalities, the marginal social benefit, which includes the benefit to the third party, does not equal the demand curve for the good, which includes only the private benefit to buyers of the good. Hence, marginal social benefit exceeds the demand curve.

If the third party is harmed by the exchange, this is known as a **negative externality**. In negative externalities, the marginal social cost, which includes the cost to the third party, does not equal the supply curve for the good, which includes only the private costs of production to sellers/producers of the good. Hence, marginal social cost exceeds the supply curve.

Positive and negative externalities are shown in the graph above. As is demonstrated



by the graphs, both types of externalities result in allocative inefficiency. In both graphs, the market will produce where $Q_d = Q_s$, which occurs in both graphs at the point P_1, Q_1 . However, allocative efficiency occurs where $MSB = MSC$ and not where $Q_d = Q_s$. Hence, the allocatively efficient production level occurs in both graphs at the point P^*, Q^* .

As a result, when an externality exists in a perfectly competitive market, resources will be misallocated and the market is inefficient. In the case of a negative externality, the market will produce too much output, at too low a price. In the case of a positive externality, the market will produce too little at too low a price.

C. Theory of the second best

(2) Monopoly is not as inefficient as thought

The theory of the second best focuses on the important concept that the ideal, or the first best, outcome is never achievable. Rather, we may often have to accept an outcome that is achievable even though it is not ideal. This is referred to as a second best outcome.

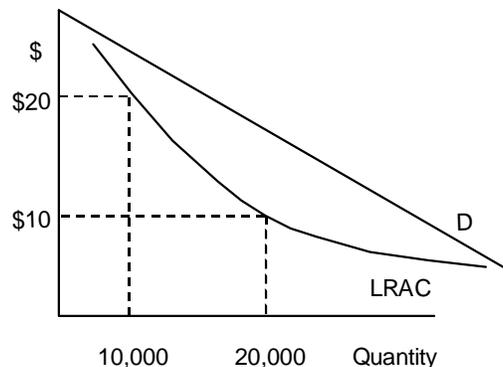
Consider the situation regarding monopoly versus perfectly competitive markets. The ideal or first best outcome is to have all markets perfectly competitive, which would yield efficiency, both technologically and allocatively. However, it may not be possible to achieve competition in all markets. Hence, it is not clear that making only one, or a few, markets competitive will increase efficiency. Thus, the second best outcome may be keeping monopoly power.

D. Economies of scale (natural monopoly)

(1) Perfect competition is not as efficient as thought

A natural monopoly is defined to exist whenever a single firm can produce a given quantity in the market at a lower average cost than can any other number of smaller firms. In the graph to the right, one can see that a single firm can produce a given quantity, say 20,000 units of the good, at an average cost of \$10. However, it would cost two firms, each producing 10,000 units of the good, an average cost of \$20 to produce the same total quantity.

Thus, as can be seen by the graph, a natural monopoly has a LRAC curve that is downward sloping (i.e., has economies of scale) for the entire range where demand is positive. Eventually, of course, LRAC will increase due to



diseconomies of scale caused by increased communication costs as the firm size increases. However, that point occurs well beyond the point at which demand for the good exists so is irrelevant.

Given that a single large firm always has lower average costs than do smaller firms, the larger firm will always be able to drive out smaller, less cost-effective, competitors. A monopolized industry will be the natural result of this process. What happens in this industry if the resultant monopoly is broken up into small competing firms? Each of the competitive firms will have only a small fraction of the total market quantity and, as a result, will produce at a much higher average cost and price than does the monopoly. As a result, even though the monopoly remains inefficient, small competitive firms are even more inefficient.

The common prescription for a natural monopoly is to regulate the market price rather than breaking up the monopoly into smaller firms which will compete with each other.

E. Economies of scope

(1) Perfect competition is not as efficient as thought

A natural monopoly is defined to exist whenever a single firm has economies of scale that persist throughout the entire range of demand. Economies of scale, as described in D. above, exist when LRAC declines as the quantity or scale of operations increase in the long-run. Economies of scope refer to a similar situation. The scope of production, in contrast to the scale of production, refers not to increasing the quantity produced but to increasing the number of products produced by the firm. Economies of scope, thus, refer to the situation where LRAC decline as the firm produces, not more quantity of a given product, but as the number of products the firm produces increases.

Consider a firm that monopolizes the production of two goods. However, only one of these goods is extremely profitable while the other good is either unprofitable or yields a zero profit to the firm. If economies of scope exist in the production of these two goods, then the single firm can produce both goods at a lower average cost than can smaller competitors. What happens in this industry if the resultant monopoly is broken up into small competing firms? Again, the average costs will rise and inefficiency will result.

One example of economies of scope, commonly thought to exist, is the wide range of products provided by a hospital. It is common to observe small out-patient surgery clinics which locate around full-service hospitals. These clinics do not provide the full range of services that the hospital itself provides. Rather, they only compete with the hospital in the production of the most profitable good, out-patient surgery. They locate next to the hospital so that, if complications from the procedures they perform arise, they can quickly transport the patient to the hospital where the more complicated, and less profitable, procedures can be performed. However, it may well be the case that the cheapest method of producing both types of services is done by the hospital alone. If so, this would be an example of economies of scope.

F. Innovation

(1) Perfect competition is not as efficient as thought and

(2) Monopoly is not as inefficient as thought

Innovation occurs in the very long run, when technology can change. Consider an innovation, the development of new technology, which reduces the average cost of producing an existing product. For example, a chemical compound might be developed which, when added to ceramic, reduces the time it takes for ceramic products to harden.

What is the incentive to the firm to innovate?

Obviously, since $\pi = TR - TC$, the innovation which reduces TC will result in higher profits. The additional profits constitute the incentive to innovate to the firm.

Which market structure, perfect competition or monopoly, will have the largest incentive to innovate?

First, consider perfect competition. Recall that the long-run equilibrium in perfect competition (see above) is where profit equals zero. If the perfectly competitive firm innovates, profits rise. However, in the long run entry will occur (i.e., the firm's competitors will copy the innovation) and force prices back to zero. Hence, given that no potential for a long-run increase in profits exists, no incentive for innovation exists in perfectly competitive markets.

Second, consider monopoly. If the monopoly firm innovates, profits rise. In contrast to perfect competition, monopolists have no competitors because of the existence of barriers to entry. Hence, the firm will retain the increased profits from the innovation in the long run and will have a significant incentive to innovate.

The above analysis assumes that perfectly competitive firms cannot protect their innovations from competitors through the existence of a patent system. Hence, **in the absence of a patent system, perfect competition is less efficient than we previously thought because they will have no incentive to innovate. Monopoly, however, is more efficient than we thought because they will have an incentive to innovate.**

Which market structure, perfect competition or monopoly, will have the largest incentive to innovate in the presence of a patent system?

The patent system protects a perfectly competitive firm's innovation from copying by its competitors. However, the firm can license its patented innovation to its competitors. Thus, the firm can gain profit both by reducing the cost of its production and by selling the innovation to other firms.

Suppose that an innovation reduces the average costs of production by \$5. Profit will rise by \$5 for each unit of output produced and, hence, the industry structure with the highest industry output will have the largest incentive to innovate. In the long run, a perfectly competitive industry produces where price equals MC while a monopoly produces where price exceeds MC. Thus, all else equal, a perfectly competitive market will produce a larger total industry output than will a monopoly market. Thus, we can conclude that **with a patent system, the perfectly competitive industry has a larger incentive to innovate than a monopoly. With a patent system, therefore, perfect competition is more, not less, efficient than we thought.**

G. Price discrimination

(2) Monopoly is not as inefficient as thought

Price discrimination is defined to occur whenever a firm charges different customers different prices, **even though costs of production are the same for both customers.** Hence, charging different prices **because** costs of production differ is not price discrimination.

Examples:

- Chevrolet charges \$500 more for a car sold in Idaho Falls, Idaho than for a car sold in Salt Lake City, Utah because of higher transportation costs. Since transportation costs are part of production costs, this is not an example of price discrimination.
- The SMSU bookstore gives a discount to faculty and staff for textbooks and other items that is not offered to students. It seems reasonable to assume that the costs of production are the same. Hence, this is an example of price discrimination.

- The local movie theatre charges a lower price to see first run movies for customers who go to matinees (movies shown during the afternoon or early evening hours). It seems reasonable to assume that the costs of production are the same. Hence, this is an example of price discrimination.
- There are, literally, hundreds of examples of price discrimination. Try to think of some examples yourself that fit the definition given above.

What are the requirements for a firm to successfully price discriminate?

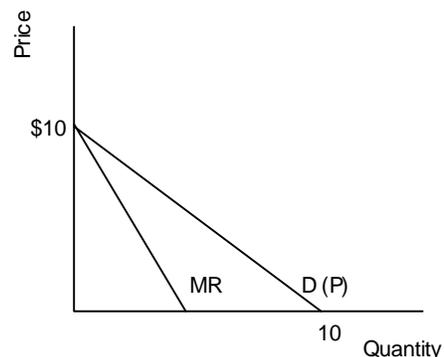
1. The firm must have at least some market power. It is not required that the firm be a monopolist. However, perfectly competitive firms, who have no market power at all, cannot price discriminate because if they charge a price higher than the market price, plenty of competitors exist to take away their business.
2. The firm must be able to separate the market into at least two different groups of customers – high demanders, those willing to pay a higher price, and low demanders, those only willing to buy at a much lower price. If the firm can't do this, they will be unable to identify which group should pay the higher price and which the lower price.
3. The firm must be able to prevent resell of the product from low demanders to high demanders. If not, the low demanders will buy the product at a low price and become competitors of the firm, by reselling to high demanders.

If the firm fails in any of these requirements, they will be unable to price discriminate.

Consider two types of price discrimination. In **Perfect Price Discrimination**, the firm can do much more than the minimum of separating the market only into two groups. In fact, the firm is able to determine the maximum price that each customer is willing to pay. As a result, the firm will set the price for each customer based upon this knowledge. In **Imperfect Price Discrimination**, the firm can only imperfectly separate the market into groups of consumers with similar willingness to pay.

For simplicity, the analysis below is done for **Perfect Price Discrimination**. However, the conclusions that we will draw also apply to other types of price discrimination.

Consider the simple demand curve, in the graph to the right. For a monopolist who is not practicing price discrimination, demand gives the price which exceeds the MR curve, as shown. However, for a firm that is practicing **perfect price discrimination**, MR will now equal the price or the demand curve. This is true because the firm will charge the first customer the same price regardless of the price charged to subsequent buyers of the product.



But when price discriminating, the monopolist firm will still produce where MR equals MC. Now, however, since P equals MR, it will also be producing where P equals MC, which is the allocatively efficient level of output. Hence, price discrimination increases the efficiency of monopolies. However, they do so at the expense of consumers, who lose consumer surplus.