Principles of Economics

Chapter 5

Firms in Competitive Markets

You would be able to learn…

1. Understand the features of firms in competitive markets
2. Explain how a perfect competitor decides how much to produce
3. Visualize a firm’s profit or loss in perfect competition
4. Explain why firms may shut down temporarily
5. Evaluate how entry and exit ensure that firms earn zero economic profit in the long run

How we characterize a market

The decision about which industry belongs to which market structure depends on three key characteristics:

- The number of firms in the industry.
- The similarity of the good or service produced by the firms in the industry.
- The ease with which new firms can enter the industry.

What is a competitive market

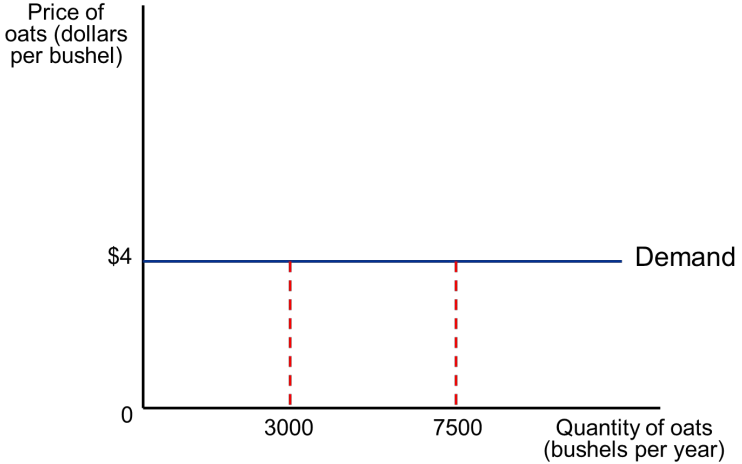
A competitive market, sometimes called a perfectly competitive market, has the following characteristics:

- There are many buyers and many sellers in the market.
- The goods offered by the various sellers are largely the same.
- Buyers and sellers in competitive markets must accept the price the market determines and, therefore, are said to be price takers.
- Firms can freely enter or exit the market.

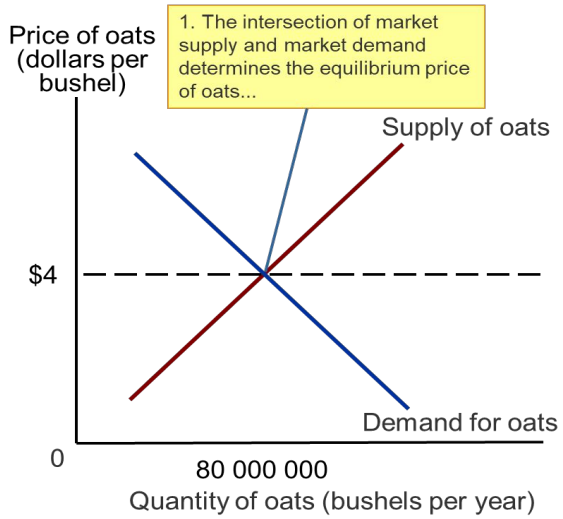
The actions of any single buyer or seller in the market have a negligible impact on the market price. Each buyer and seller takes the market price as given.

Demand for the product of an individual firm

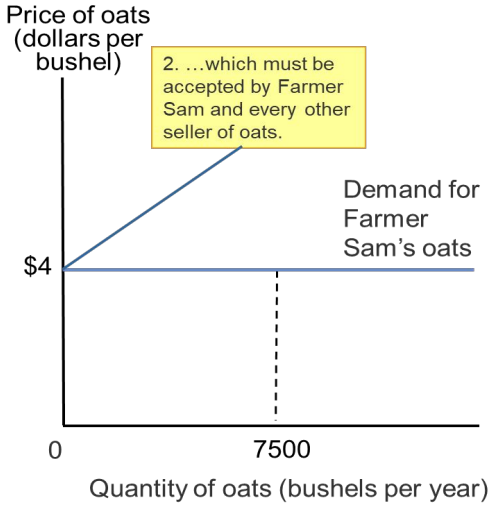
- Buyers and sellers in competitive markets must accept the price the market determines and, therefore, are said to be price takers.
- The actions of any single buyer or seller in the market have a negligible impact on the market price. Each buyer and seller takes the market price as given.
- No firm can impact the market price.
- The demand curve for a price taker is horizontal, or perfectly elastic.



Market demand and individual firm demand



Market for oats



Demand for oats of an individual farmer

In a perfectly competitive market, price is determined by the intersection of market demand and market supply. The demand and supply curves for oats intersect at a price of $4 per bushel. An individual oats farmer like Farmer Sam has no ability to affect the market price for oats.

What is a competitive market: examples

Agricultural products — Think **wheat, corn, rice,** or **potatoes**.

Basic commodities — Gold, silver, crude oil.

Stock markets — Shares of big companies (like Apple or Microsoft) are all identical.

Foreign exchange markets — Currency trading (like USD to Euro).

Revenue of a competitive firm

A firm in a competitive market, like most other firms in the economy, tries to maximize profit (total revenue minus total cost).

Average revenue: total revenue divided by the quantity sold
Marginal revenue: the change in total revenue from an additional unit sold

For all types of firms, ***average revenue equals the price of the good.***
For competitive firms, ***marginal revenue equals the price of the good.***
So, AR = MR = P

(1) Quantity (*Q*)	(2) Price (*P*)	(3) Total Revenue ($TR = P \times Q$)	(4) Average Revenue ($AR = TR / Q$)	(5) Marginal Revenue ($MR = \Delta TR / \Delta Q$)
1 gallon	$6	$6	$6	
				$6
2	6	12	6	
				6
3	6	18	6	
				6
4	6	24	6	
				6
5	6	30	6	
				6
6	6	36	6	
				6
7	6	42	6	
				6
8	6	48	6	

Revenue of a competitive firm: class quiz

When a competitive firm doubles the amount it sells, what happens to the price of its output and its total revenue?

Profit Maximization and the Competitive Firm's Supply Curve

Once the Farm has reached 5 gallons of milk, the situation changes. The sixth gallon would have a marginal revenue of $6 and a marginal cost of $7, so producing it would reduce profit by $1 (from $7 to $6). As a result, the firm would not produce beyond 5 gallons.

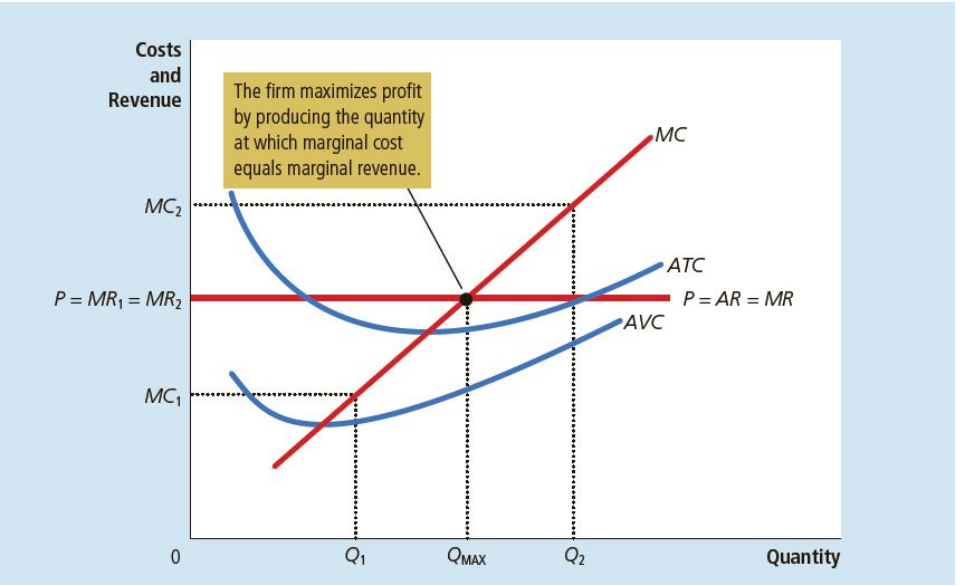
If MR is greater than MC—as it is at 1, 2, and 3 gallons—the firm should increase the production of milk because it will put more money in their pockets (MR) than it takes out (MC).
If MR is less than MC—as it is at 6, 7, and 8 gallons— the firm should decrease production.
If the firm thinks at the margin and makes incremental adjustments to the level of production, they end up producing the profit-maximizing quantity (where MR=MC).

(1) Quantity (*Q*)	(2) Total Revenue (*TR*)	(3) Total Cost (*TC*)	(4) Profit (*TR* − *TC*)	(5) Marginal Revenue (*MR* = *ΔTR* / *ΔQ*)	(6) Marginal Cost (*MC* = *ΔTR* / *ΔQ*)	(7) Change in Profit (*MR* − *MC*)
0 gallons	$ 0	$ 3	−$3			
				$6	$2	$4
1	6	5	1			
				6	3	3
2	12	8	4			
				6	4	2
3	18	12	6			
				6	5	1
4	24	17	7			
				6	6	0
5	30	23	7			
				6	7	−1
6	36	30	6			
				6	8	−2
7	42	38	4			
				6	9	−3
8	48	47	1			

Profit maximization rules

Recall,
The MC curve is upward-sloping.
The ATC is U-shaped.
The MC curve crosses the ATC curve at the minimum of ATC.
The price line is horizontal because a competitive firm is a price taker, so marginal revenue equals market price.
And, P = AR = MR

- At the quantity Q1, MR1 exceeds MC1, so raising production increases profit.
- At the quantity Q2, MC2 is above MR2, so reducing production increases profit.
- **The profit-maximizing quantity QMAX is found where the horizontal line representing the price intersects the MC curve.**



Profit maximization rules

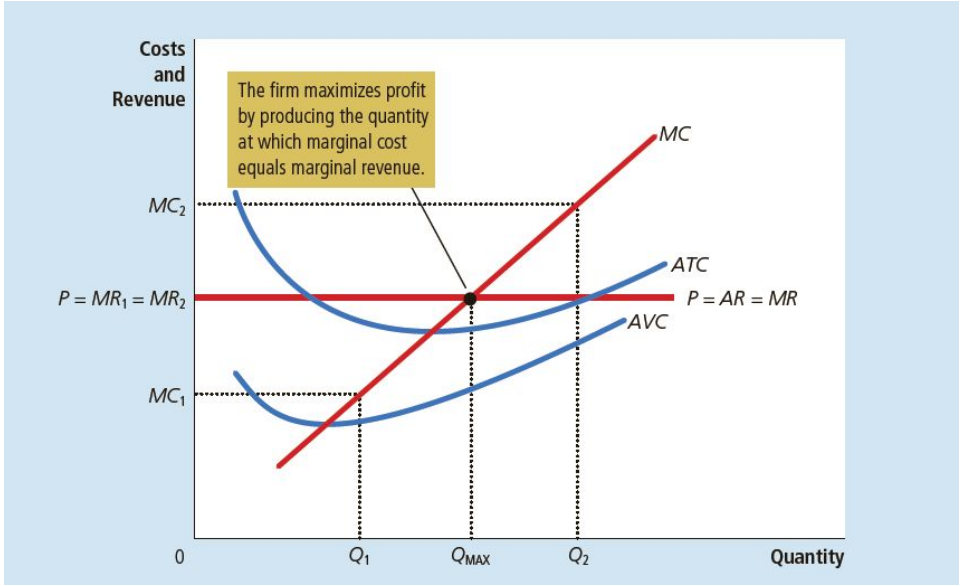
This analysis yields three general rules for profit maximization:

• If marginal revenue is greater than marginal cost, the firm should increase its output.

• If marginal cost is greater than marginal revenue, the firm should decrease its output.

• At the profit-maximizing level of output, marginal revenue and marginal cost are exactly equal.

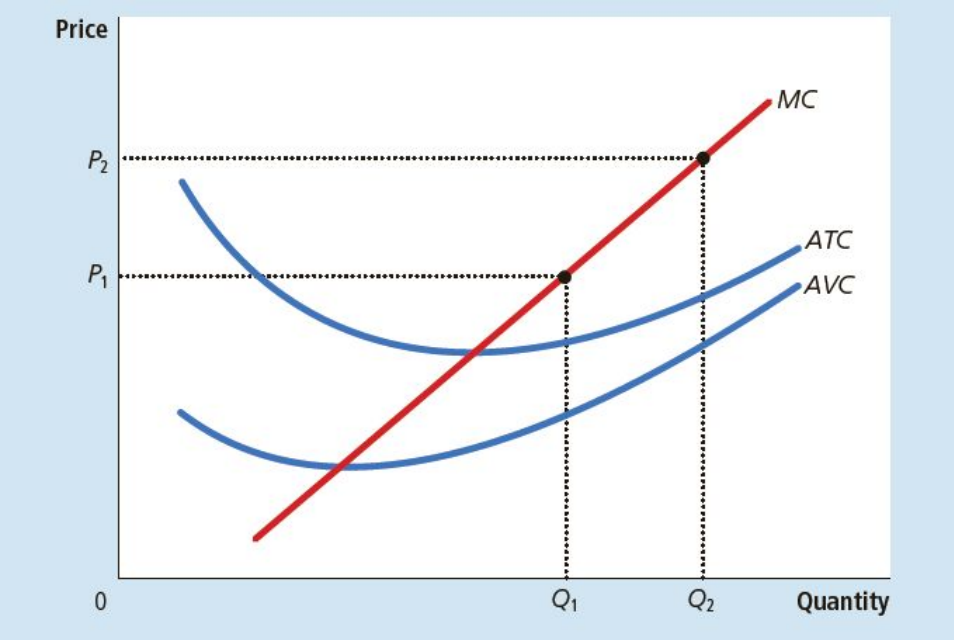
These rules are the key to rational decision making by any profit-maximizing firm.



Marginal Cost as the Competitive Firm's Supply Curve

An increase in the price from P1 to P2 leads to an increase in the firm's profit-maximizing quantity from Q1 to Q2.

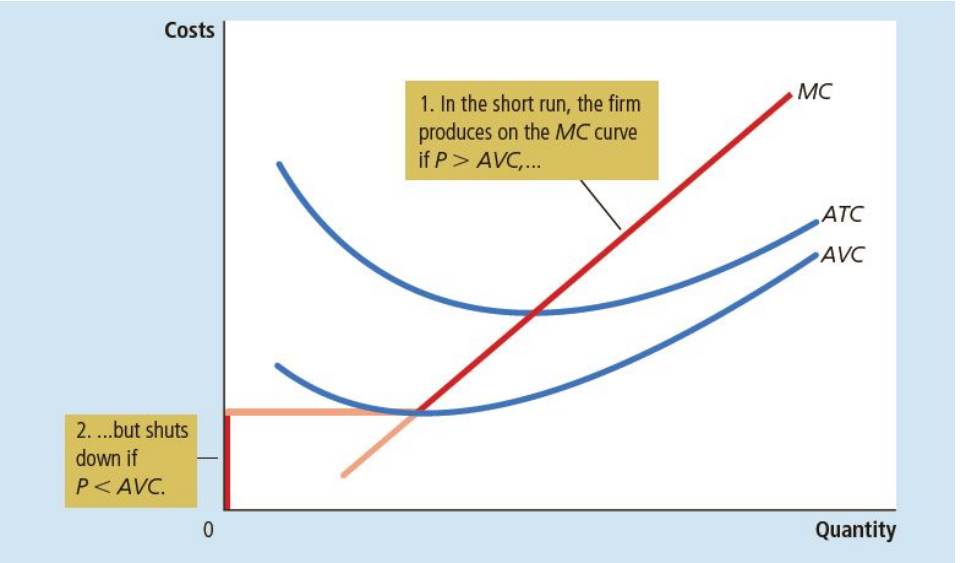
Because,
the firm's marginal-cost curve determines the quantity of the good the firm is willing to supply at any price, the marginal-cost curve is also the competitive firm's supply curve.



The Firm's Short-Run Decision to Shut Down

In the short run, the competitive firm's supply curve is its marginal-cost curve (MC) above average variable cost (AVC).

If the price falls below average variable cost, the firm is better off shutting down temporarily.



The Firm’s Short-Run Decision to Shut Down

A **shutdown** refers to a short-run decision not to produce anything during a specific period of time because of current market conditions.

Exit refers to a long-run decision to leave the market.

The short-run and long-run decisions differ because most firms cannot avoid their fixed costs in the short run but can do so in the long run.

That is, a firm that shuts down temporarily still has to pay its fixed costs, whereas a firm that exits the market does not have to pay any costs at all, fixed or variable.

The Firm's Short-Run Decision to Shut Down

If the firm shuts down, it loses all revenue from the sale of its product. At the same time, it saves the variable costs of making its product (but must still pay the fixed costs, sunk cost).

Thus, the firm shuts down if the revenue that it would earn from producing is less than its variable costs of production.

If TR stands for total revenue and VC stands for variable cost, then the firm's decision can be written as Shut down if TR < VC. The firm shuts down if total revenue is less than variable cost.

By dividing both sides of this inequality by the quantity Q, we can write it as,

Shut down if TR/Q < VC/Q or AR < AVC, or P = AR < AVC.

A firm chooses to shut down if the price of the good is less than the average variable cost of production.

The Firm's Short-Run Decision to Shut Down

When choosing to produce, the firm compares the price it receives for the typical unit to the average variable cost that it must incur to produce the typical unit.

If the price doesn't cover the average variable cost, the firm is better off stopping production altogether.

The firm still loses money (because it has to pay fixed costs), but it would lose even more money by staying open.

The firm can reopen in the future if conditions change so that price exceeds average variable cost.

The Firm's Short-Run Decision to Shut Down: a case study

Have you ever walked into a restaurant for lunch and found it almost empty? Why, you might have asked, does the restaurant even bother to stay open?

In making the decision of whether to open for lunch, a restaurant owner must keep in mind the distinction between fixed and variable costs.

The rent, kitchen equipment, tables, plates, silverware, and so on—are fixed. Shutting down during lunch would not reduce these costs. **These costs are sunk in the short run.**

When the owner is deciding whether to serve lunch, only the variable costs—the price of the additional food and the wages of the extra staff.

The owner shuts down the restaurant at lunchtime only if the revenue from the few lunchtime customers would fail to cover the restaurant's variable costs.

Staying open can be profitable, even with many tables empty.

The Firm's Long-Run Decision to Exit or Enter a Market

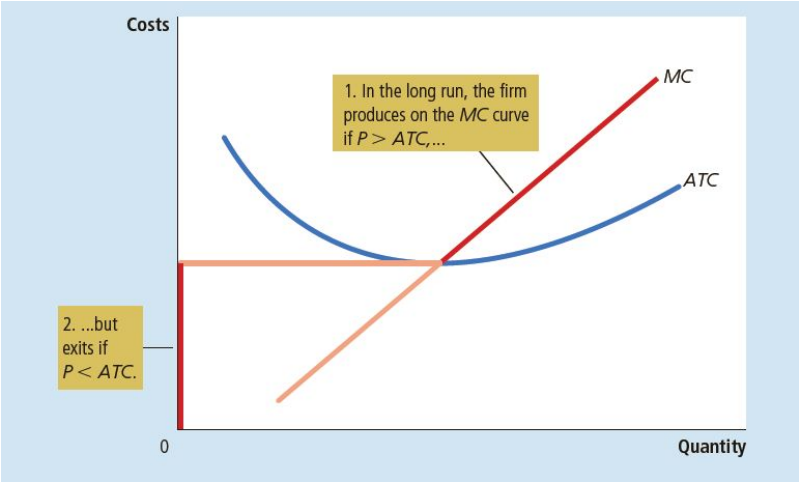
If the firm exits, it will again lose all revenue from the sale of its product, but now it will save not only its variable costs of production but also its fixed costs. Thus, **the firm exits the market if the revenue it would get from producing is less than its total cost.**

Exit rule, if TR < TC or TR/Q < TC/Q or AR < ATC or P < ATC.

A firm chooses to exit if the price of its good is less than the average total cost of production.

Firm will enter the market if starting the firm would be profitable, which occurs if the price of the good exceeds the average total cost of production (P > ATC).

The competitive firm's long-run supply curve is the portion of its marginal-cost curve that lies above average total cost.



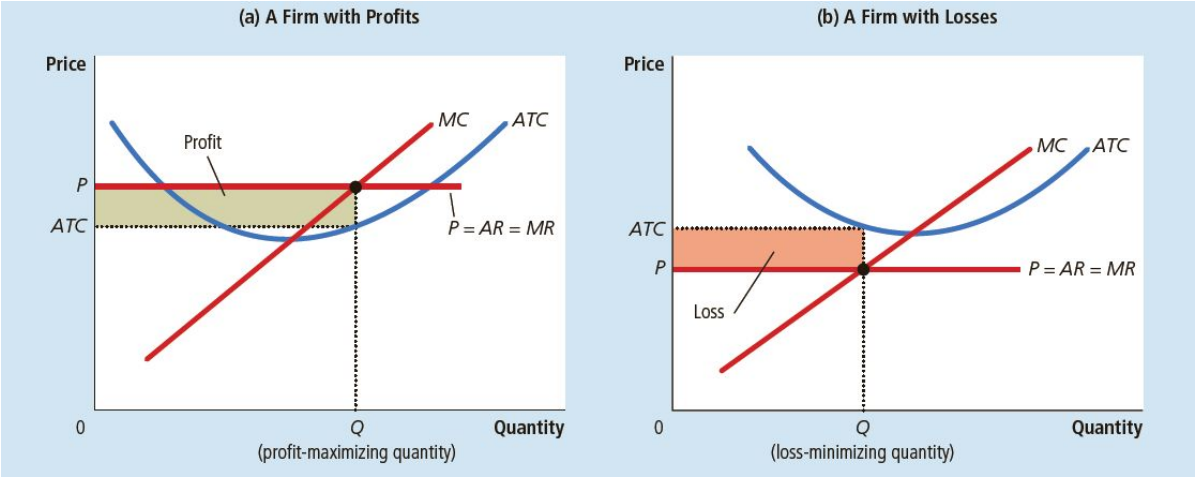
Measuring Profit in Our Graph for the Competitive Firm

The area of the shaded box between price and average total cost represents the firm's profit.

The height of this box is price minus average total cost (P 2 ATC), and the width of the box is the quantity of output (Q).

In panel (a), price is above average total cost, so the firm has positive profit.

In panel (b), price is less than average total cost, so the firm incurs a loss.



The Long Run: Market Supply with Entry and Exit

Decisions about entry and exit in a market of this type depend on the incentives facing the owners of existing firms and the entrepreneurs who could start new firms. If firms already in the market are profitable, then new firms will have an incentive to enter the market.

This entry will expand the number of firms, increase the quantity of the good supplied, and drive down prices and profits. Conversely, if firms in the market are making losses, then some existing firms will exit the market.

Their exit will reduce the number of firms, decrease the quantity of the good supplied, and drive up prices and profits. **At the end of this process of entry and exit, firms that remain in the market must be making zero economic profit.**

$$\text{Profit} = (P - ATC) \times Q$$

Zero profit if and only if the price of the good equals the average total cost of producing that good.

If price is above average total cost, profit is positive, which encourages new firms to enter. If price is less than average total cost, profit is negative, which encourages some firms to exit.

The level of production with lowest average total cost is called the firm's efficient scale. Therefore, **in the long-run equilibrium of a competitive market with free entry and exit, firms must be operating at their efficient scale.**

Why Do Competitive Firms Stay in Business If They Make Zero Profit?

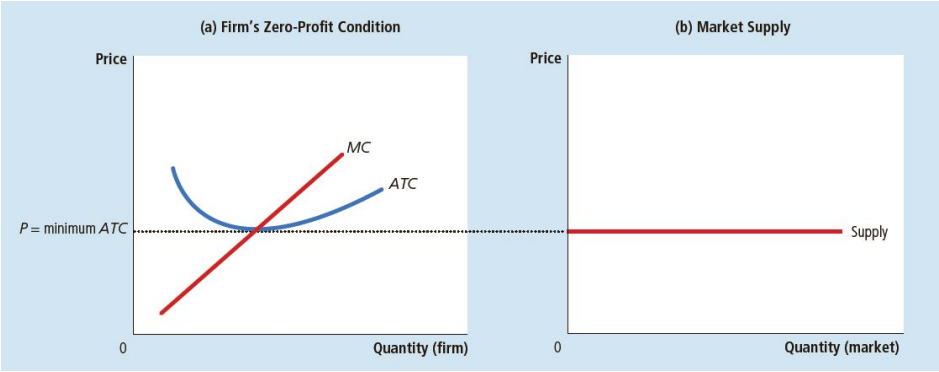
People start businesses to make a profit. If entry eventually drives profit to zero, there might seem to be little reason to stay in business.

In the long run, firms will enter or exit the market until profit is driven to zero (P = min ATC)

Total cost includes all the opportunity costs of the firm. In particular, total cost includes the time and money that the firm owners devote to the business.

In the zero-profit equilibrium, the firm's revenue must compensate the owners for these opportunity costs.

Zero economic profit doesn't mean the business isn't making money — it means the **business is covering all of its explicit (cash) and implicit (opportunity) costs.**



Why Do Competitive Firms Stay in Business If They Make Zero Profit? A Case Study

John owns a 500-acre wheat farm. He inherited the land and runs the farm himself, occasionally hiring seasonal labor. He competes with thousands of other wheat farmers, both domestically and internationally.

Revenue:

- **Market price of wheat:** $5.00 per bushel (determined by global supply/demand).
- **Annual yield:** 30,000 bushels.
- **Total revenue:** $5 × 30,000 = **$150,000**

Explicit Costs (Out-of-Pocket):

- Seeds, fertilizer, pesticide: $40,000
- Equipment fuel and maintenance: $20,000
- Hired labor: $15,000
- Property tax and utilities: $5,000
- Total **explicit costs** = **$80,000**

Implicit Costs (Opportunity Costs):

- **John's time:** He could earn $40,000/year working as a farm manager elsewhere.
- **Land use:** He could rent out the land for $30,000/year.

Total **implicit costs** = **$70,000**

Economic Profit Calculation:

- **Total revenue** = $150,000
- **Total cost (explicit + implicit)** = $80,000 + $70,000 = **$150,000**
- **Economic profit = $150,000 – $150,000 = $0**

Why Do Competitive Firms Stay in Business If They Make Zero Profit? A Case Study

Economic Profit Calculation:

- **Total revenue** = $150,000
- **Total cost (explicit + implicit)** = $80,000 + $70,000 = **$150,000**
- **Economic profit = $150,000 – $150,000 = $0**

Why He Stays in Business:

- John earns a living wage and retains his land.
- He values independence and legacy.
- As long as revenue covers all his costs (including what he's giving up), he has no reason to leave farming — and new farmers have no profit-based reason to enter either.


The Original
FARMERS MARKET