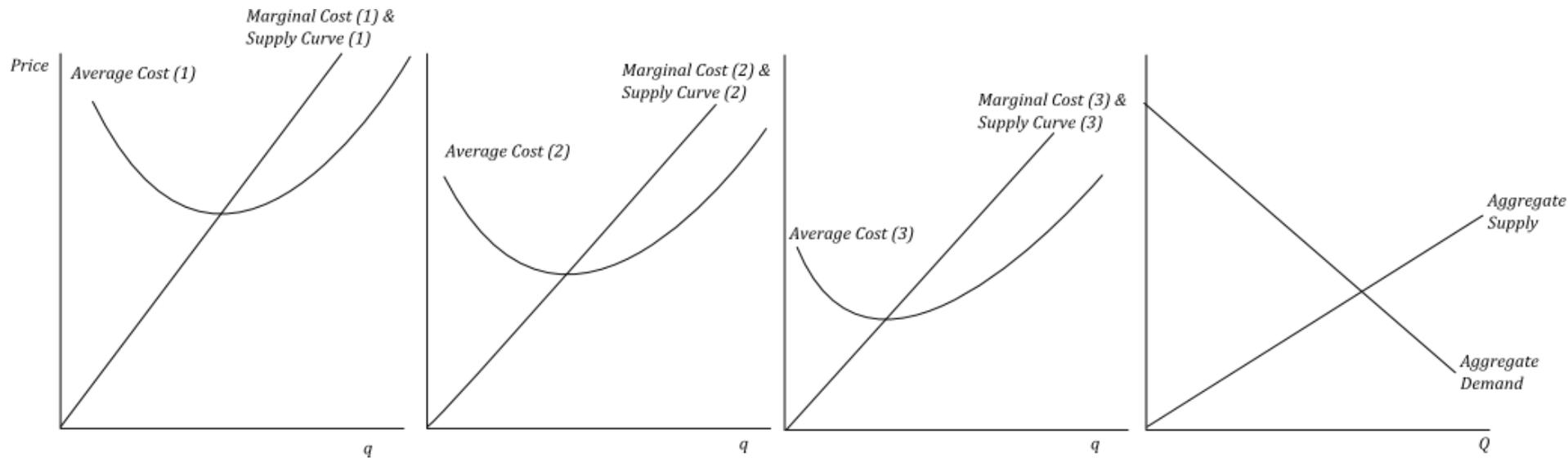


# Markets in the Long Run

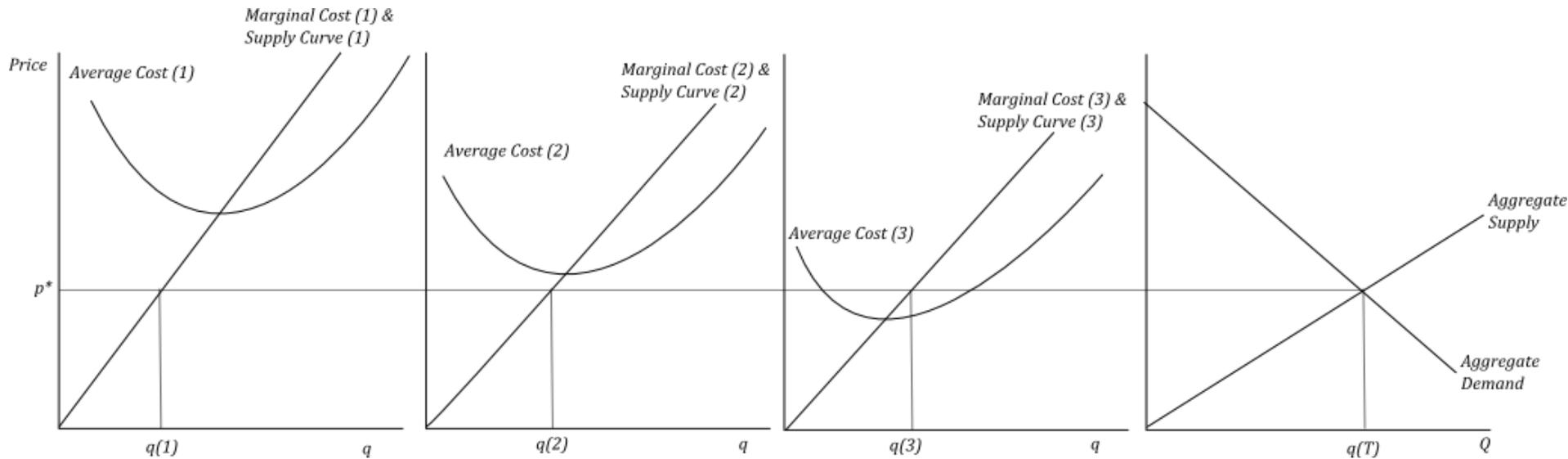
Econ 101

# Suppose There Are Three Kinds of Firms



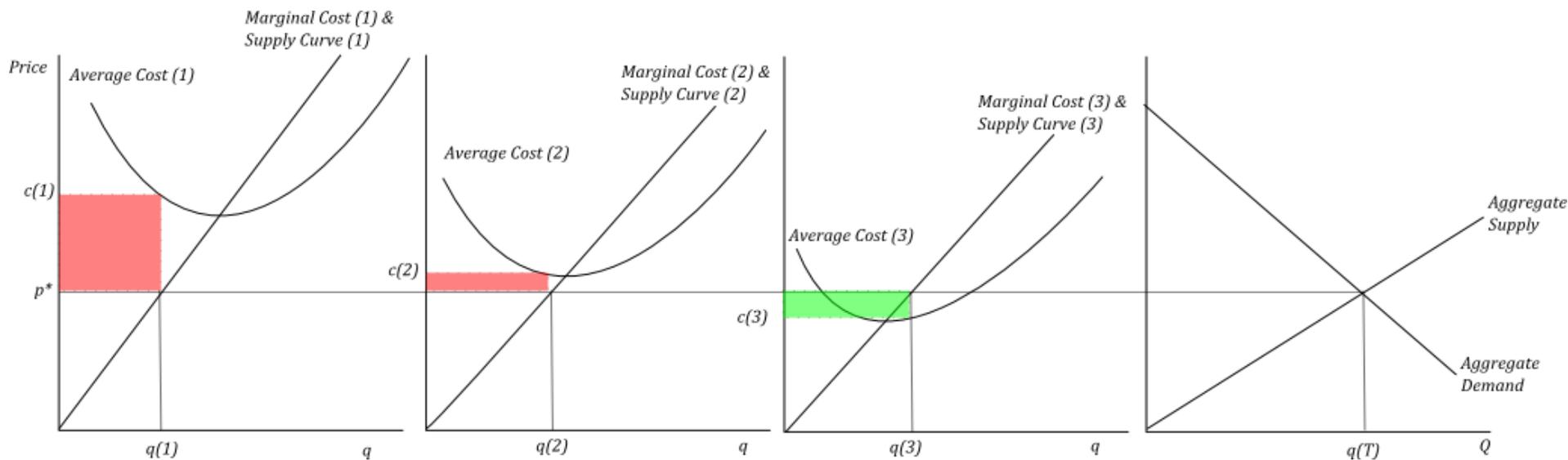
- The left three charts above depict the marginal and average cost curves for the three types of firms
- Note that, under perfect competition, the marginal cost curve of a firm is also its individual supply curve
- Further note that marginal cost crosses average cost at its minimum
- The right-most chart depicts aggregate supply for the market (found by summing individual supply curves) and the aggregate demand curve.

# Prices and Quantities



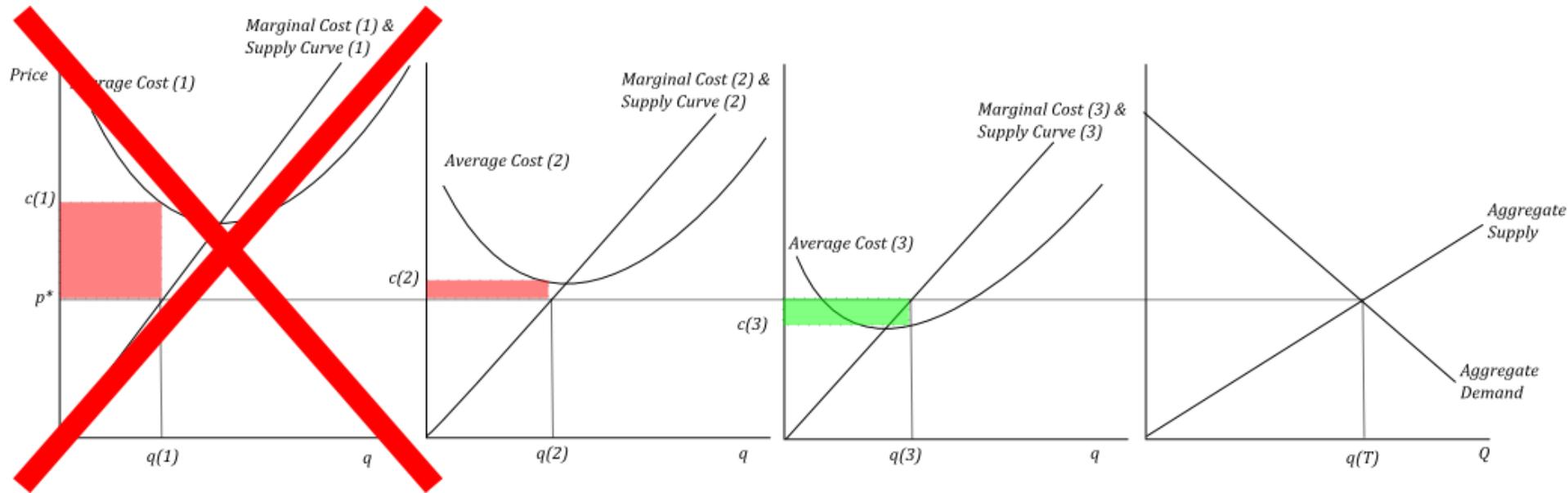
- The price faced by each firm is determined by the intersection of aggregate supply and demand, at right.
- The equilibrium price is  $p^*$  and the aggregate supply is  $q(T)$
- Under perfect competition, no firm can affect the price on its own, and faces a horizontal residual demand curve at the market price  $p^*$ . This is also its marginal revenue curve.
- In the short-run, profit maximizing firms select the supply so that marginal revenue equals marginal cost. These points are given by  $q(1)$ ,  $q(2)$ , and  $q(3)$ .

# Profits and Losses



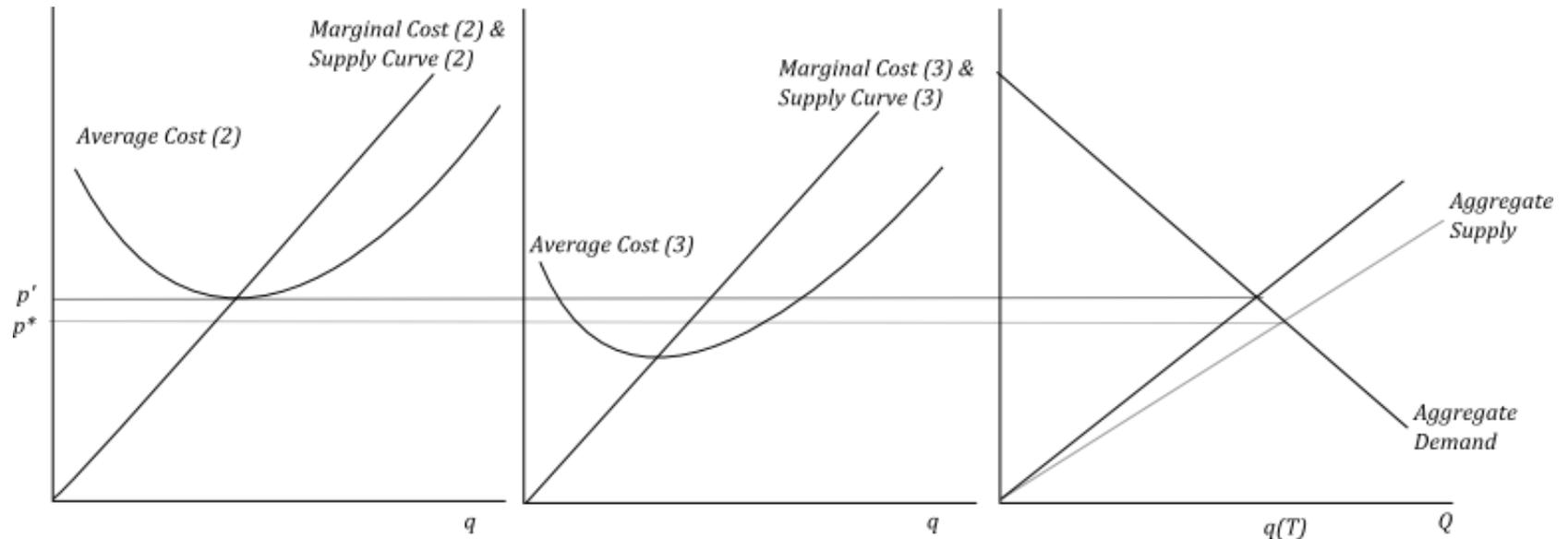
- The average cost is found by drawing a line vertically from the quantity supplied to the average cost curve. For type 1, average cost is  $c(1)$ , for type 2 it is  $c(2)$ , and for type 3 it is  $c(3)$
- For every unit sold, the firm gets profit  $p^* - c$  if the cost is less than the price, or it loses  $p^* - c$  if the cost is greater than price.
- Multiply this amount by the quantity to obtain the profit or loss. This can be represented by the rectangles, which have area  $q \times (p^* - c)$ .
- Types 1 and 2 lose money on each unit sold, since  $c(1), c(2) > p^*$ . Type 3 makes a profit.

# Firms Exit



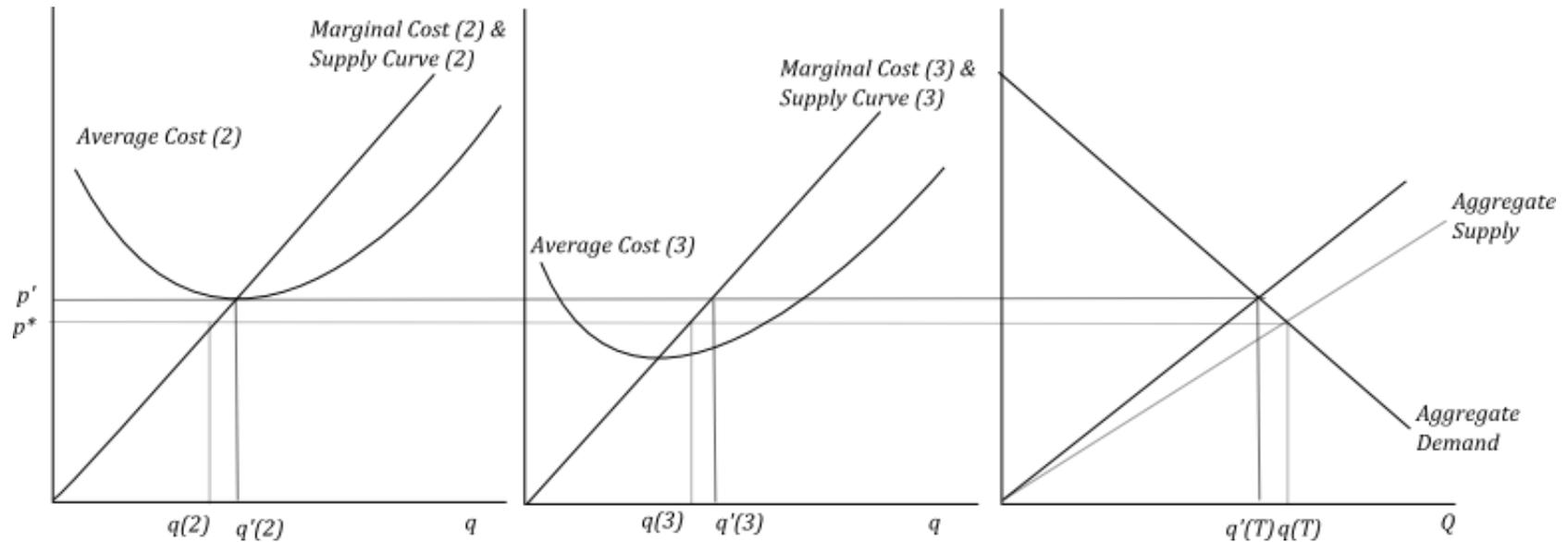
- Because type 1 firms make negative profit, they close in the long run.

# Fewer Firms Shifts Aggregate Supply



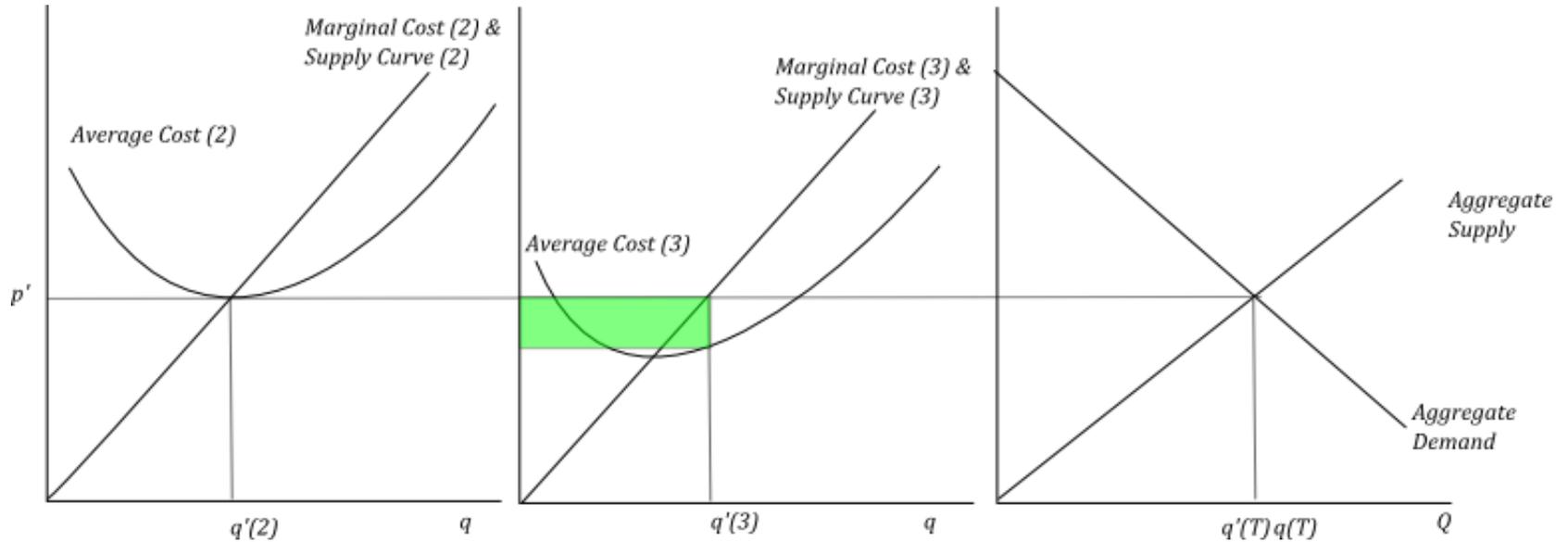
- If this was all that happened, the aggregate supply curve would shift upwards, since there are now fewer firms.
- The shift of the supply curve would increase the price faced by each surviving firm from  $p^*$  to  $p'$ .
- In this example, I have drawn the shift so that  $p'$  is the minimum average cost for type 2 firms, but this need not be the case.

# Changed Price Changes Supply



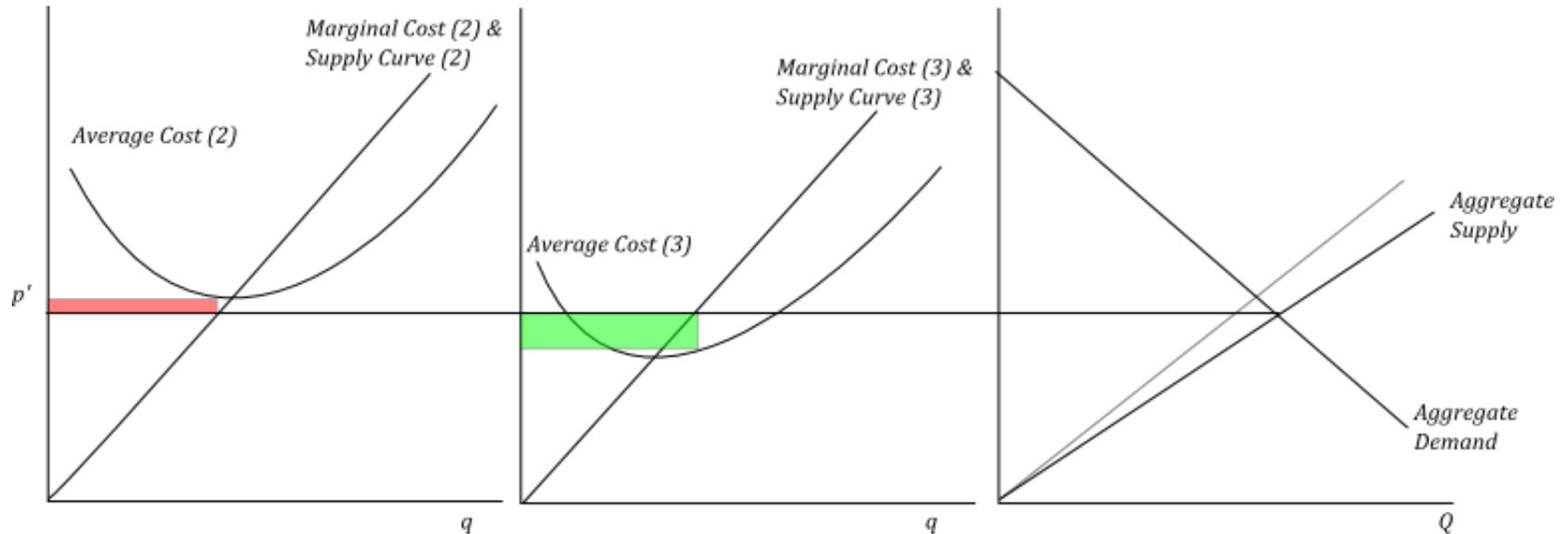
- Each firm adjusts its supply so that marginal cost is equal to the new marginal revenue (the new price  $p'$ ).
- In this example, each individual firm raises its output, but the decline in the number of firms means aggregate supply declines.
- To summarize: If all that happens is firms exit, the price rises, each firm produces more, but total supply falls because there are fewer firms over all.

# Surviving Firm Profits



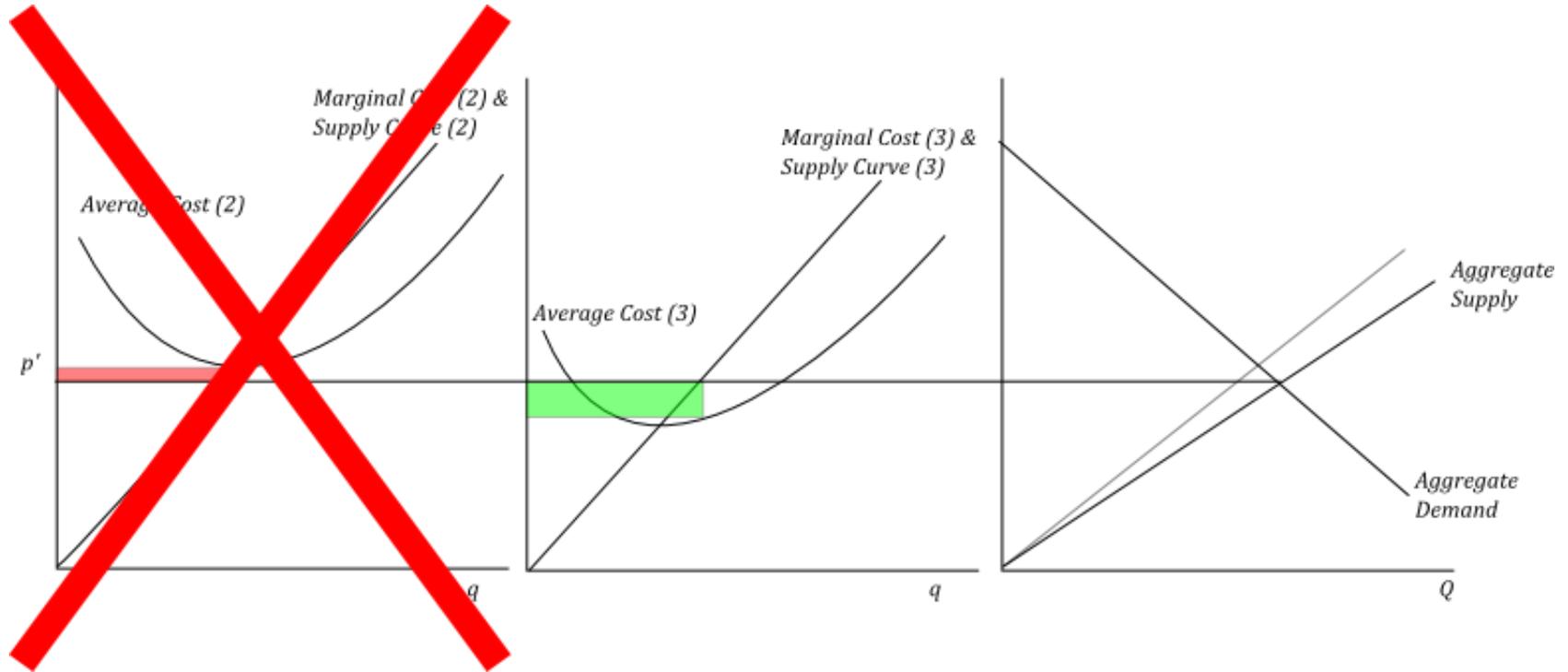
- This is not the end of the story though
- Each firm continues to earn  $p' - c$  on each unit sold, where  $c$  is their average cost.
- Type 2 firms have  $p'$  equal to their average cost, so they make zero profit
- Type 3 firms earn the positive profit represented by the area of the green rectangle.
- New entrepreneurs can copy the production technology of type 3 firms and enter, earning positive profits.

# Entry's Impact on Profits



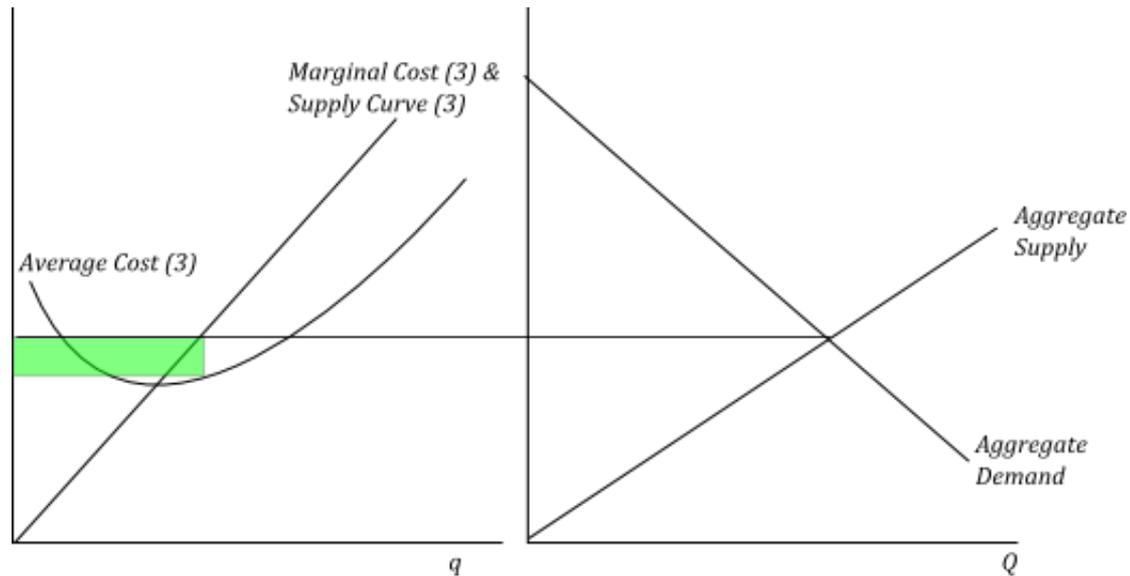
- The increase in the number of firms reduces the price faced by every firm
- Type 2 firms can no longer earn positive profit, or even zero profit, by staying in the market
- The profit of type 3 firms is reduced, since the price falls.

# More Firm Exits



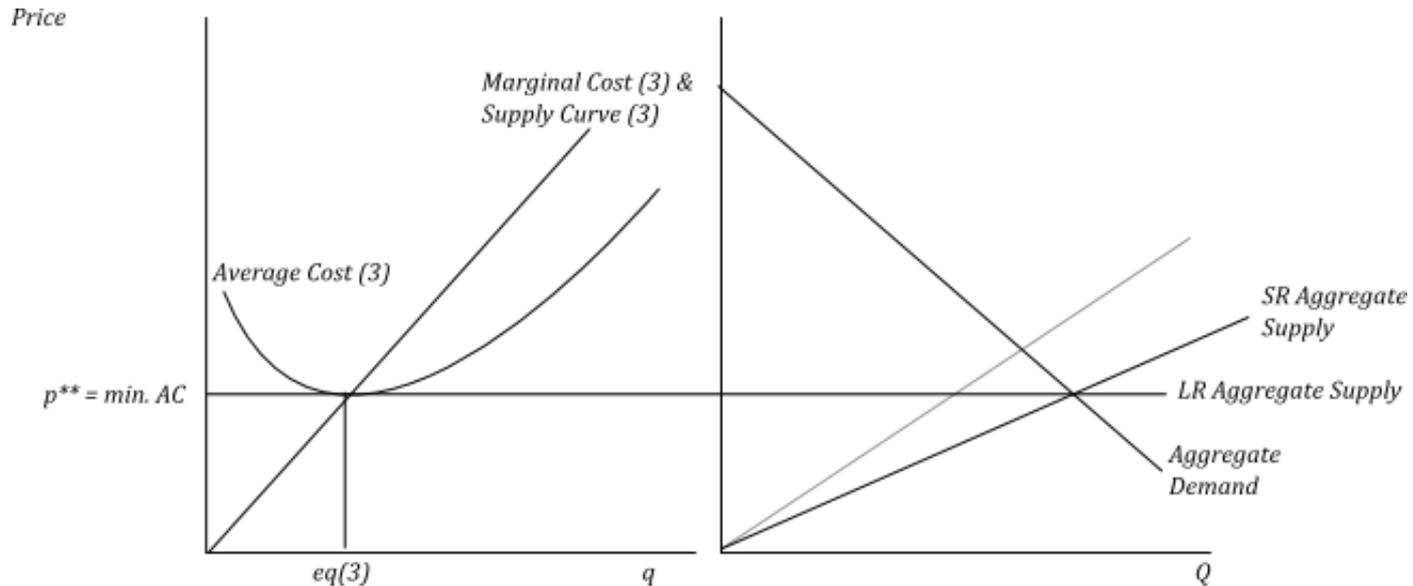
- In the long run, type 2 firms must exit, since they make negative profit.

# Most Efficient Type Survives



- Eventually, only type 3 firms – the type with lowest costs – is left.
- However, so long as profit is positive, more entrepreneurs copy the firm's production techniques and enter

# Long Run Equilibrium



- The entry of more firms shifts out the aggregate supply curve, which reduces the price.
- The reduction of price continues until profits are zero
- At this point:
  - No firms enter, since they would earn zero profit if they did
  - Each surviving firm is of the efficient type
  - Each surviving firm produces at the minimum average cost (efficient scale), denoted  $eq(3)$  in this example
- The minimum average cost therefore forms a long-run aggregate supply curve

# Final Thoughts

- In reality, all of these steps happen at the same time.
- Short-run aggregate supply is set by the sum of individual supply curves (set by  $MC = \text{price}$ )
- Long-run aggregate supply is a horizontal line at the minimum average cost