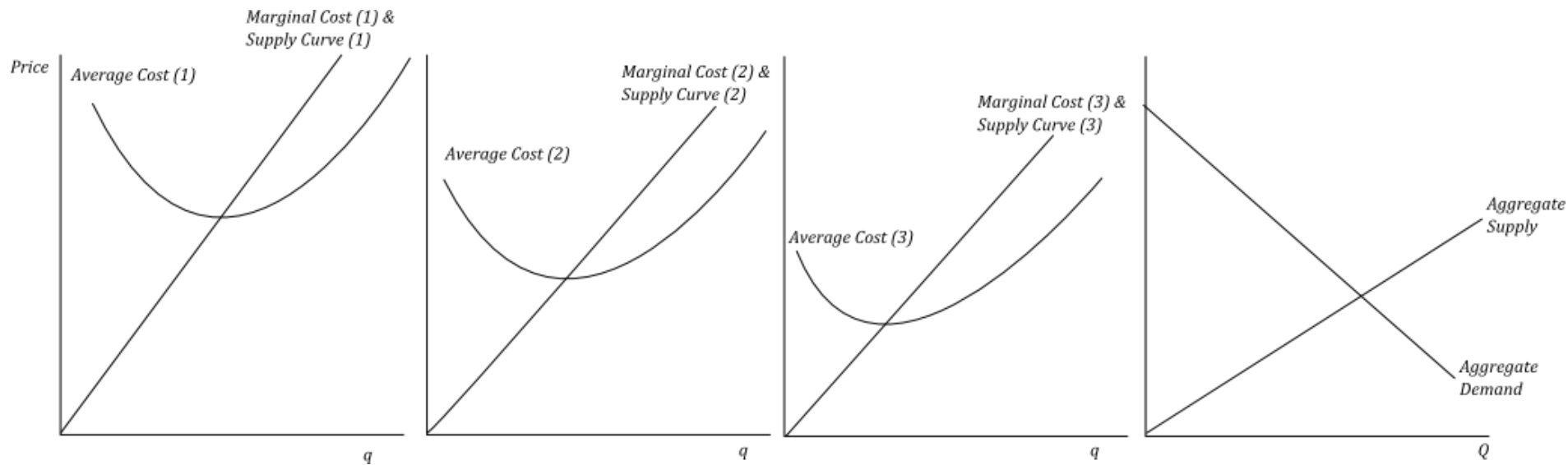


Markets in the Long Run

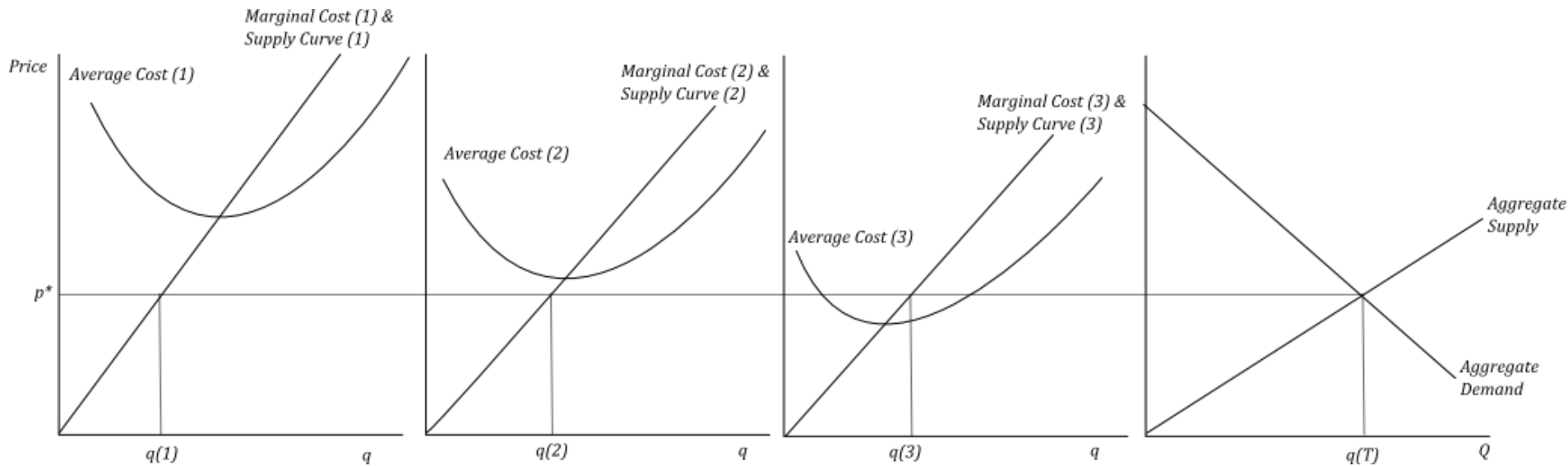
Econ 101

Suppose There Are Three Kinds of Firms



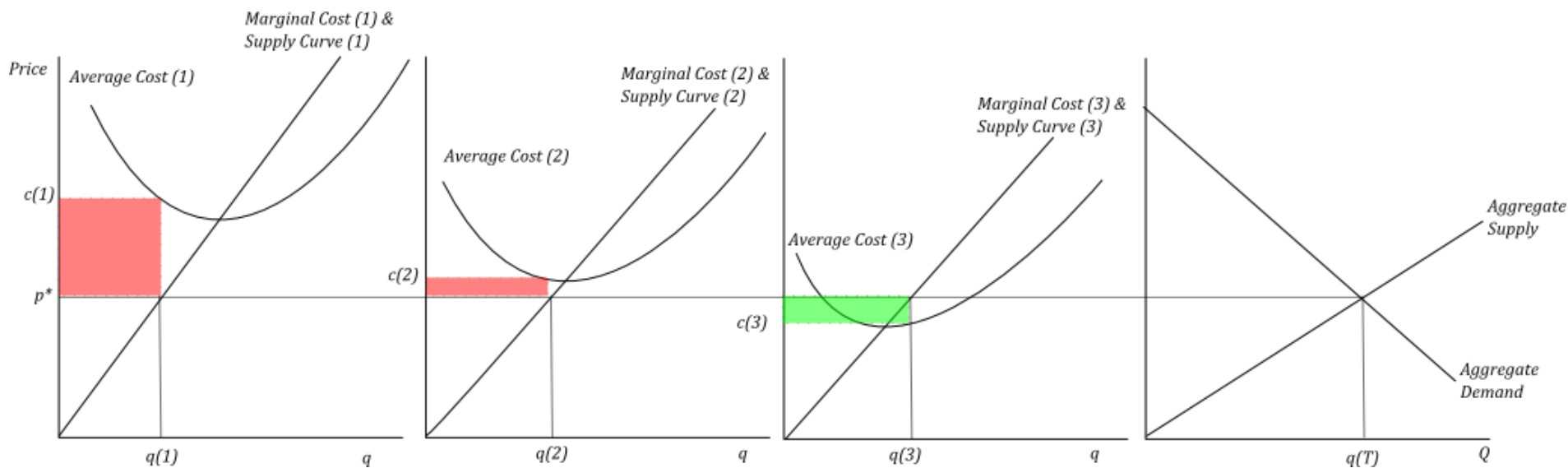
- The left three charts above depict the marginal and average cost curves for the three types of firms
- Note that, under perfect competition, the marginal cost curve of a firm is also its individual supply curve
- Further note that marginal cost crosses average cost at its minimum
- The right-most chart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

Prices and Quantities



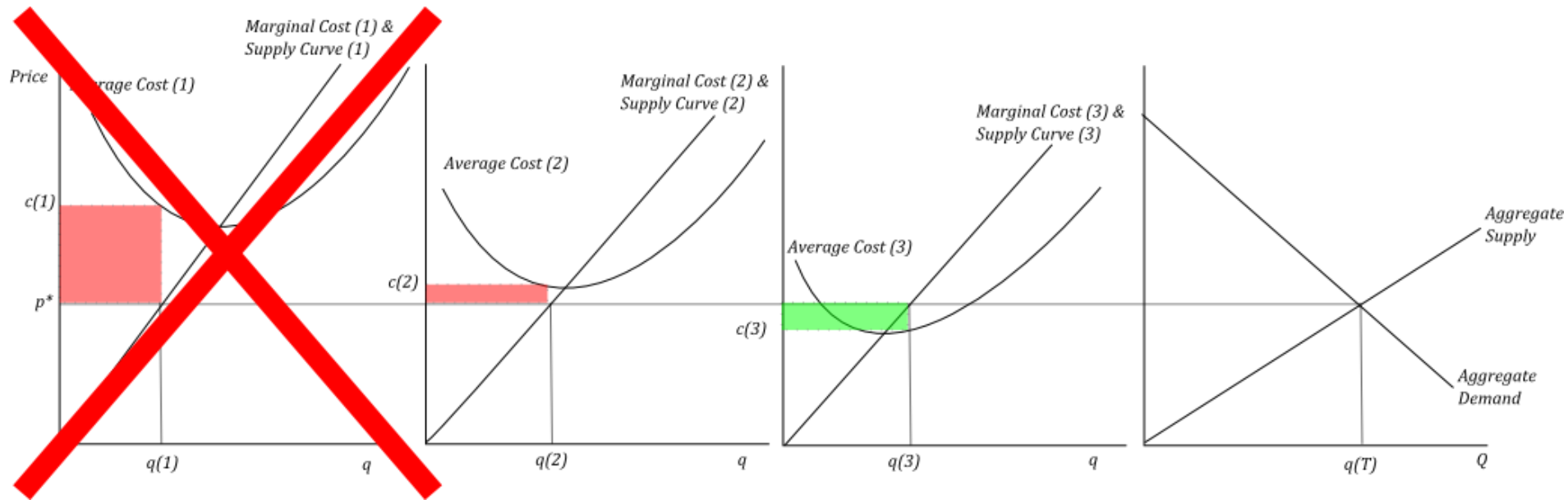
- The price faced by each firm is determined by the intersection of aggregate supply and demand, at right.
- The equilibrium price is p^* and the aggregate supply is $q(T)$
- Under perfect competition, no firm can affect the price on its own, and faces a horizontal residual demand curve at the market 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



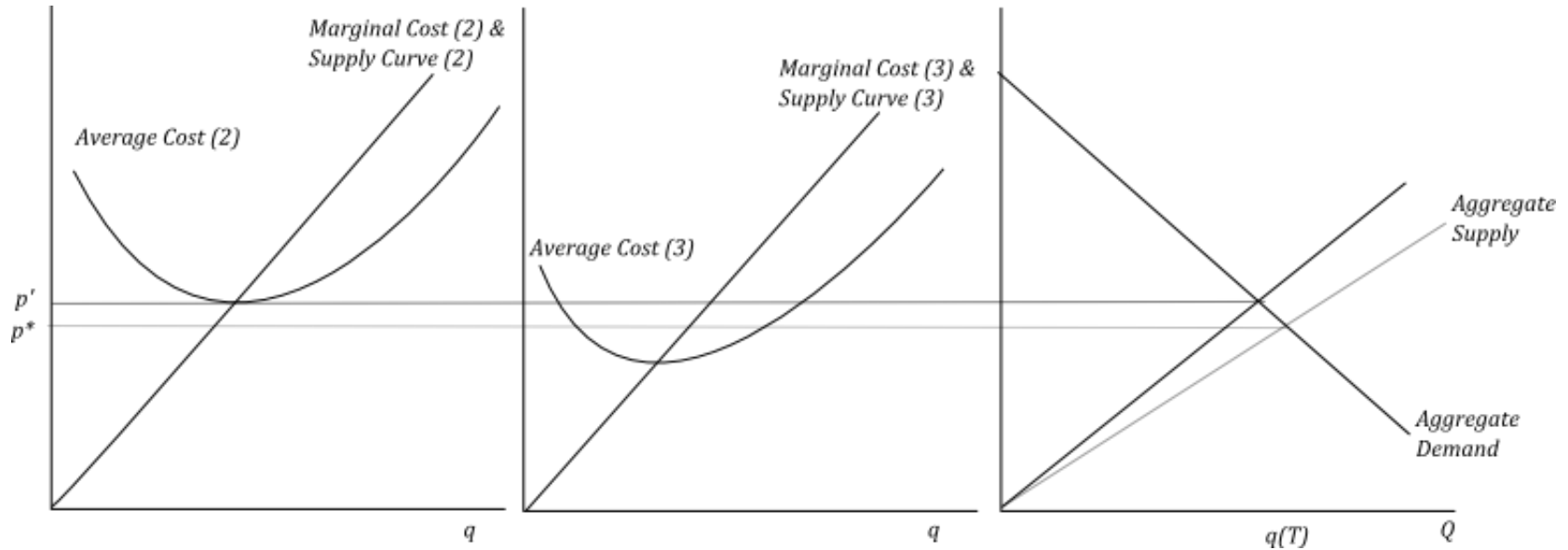
- The average cost is found by drawing a line vertically from the quantity supplied to the average cost curve. For type 1, average cost is $c(1)$, for type 2 it is $c(2)$, and for type 3 it is $c(3)$
- For every unit sold, the firm gets profit $p^* - c$ if the cost is less than the price, or it loses $p^* - c$ 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



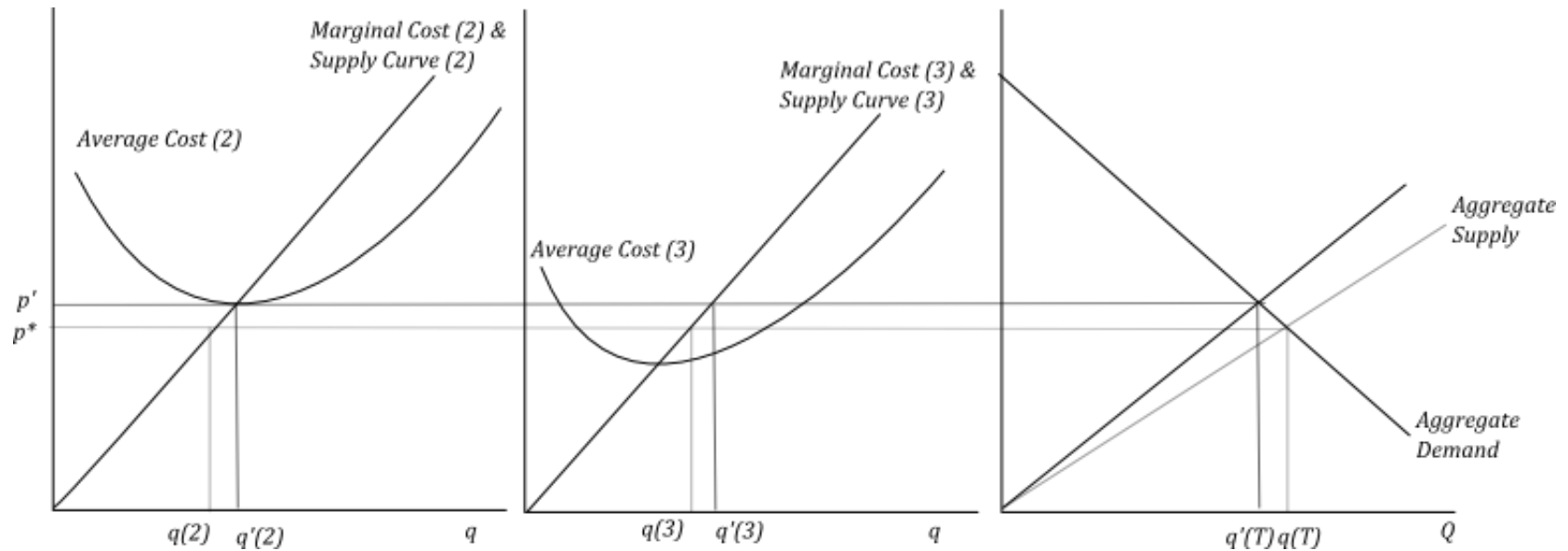
- Because type 1 firms make negative profit, they close in the long run.

Fewer Firms Shifts Aggregate Supply



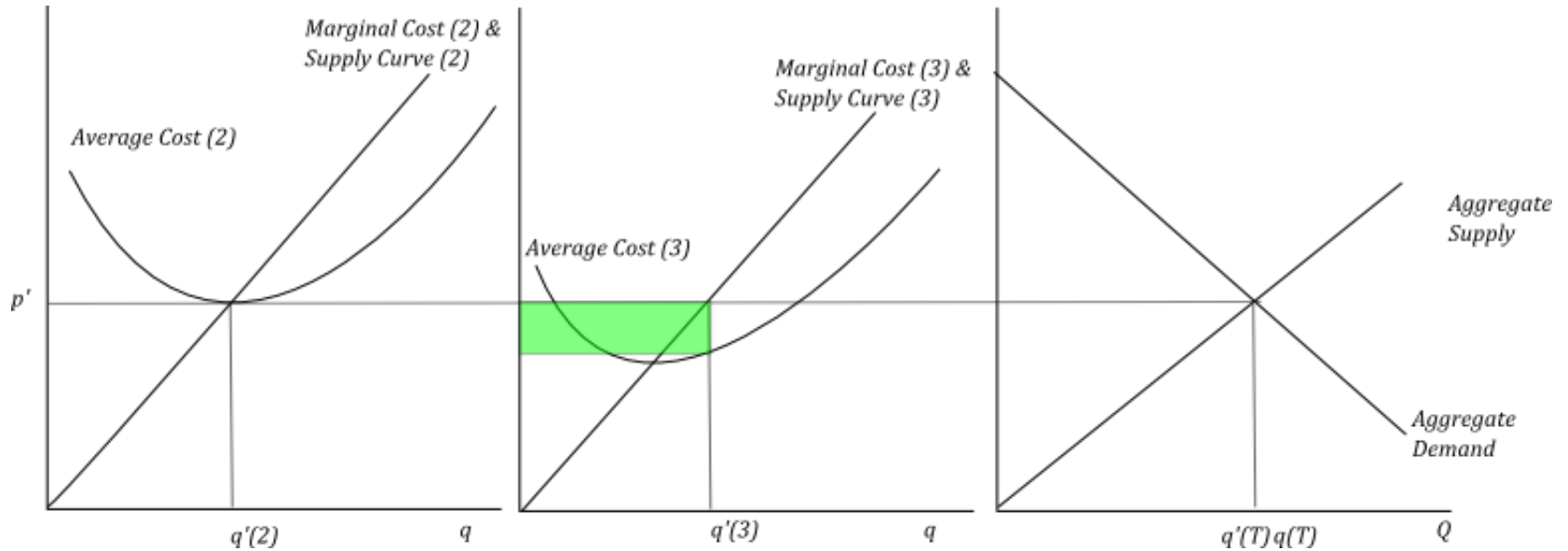
- If this was all that happened, the aggregate supply curve would shift upwards, since there are now fewer firms.
- The shift of the supply curve would increase the price faced by each surviving firm from p^* to p' .
- In this example, I have drawn the shift so that p' is the minimum average cost for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

Changed Price Changes Supply



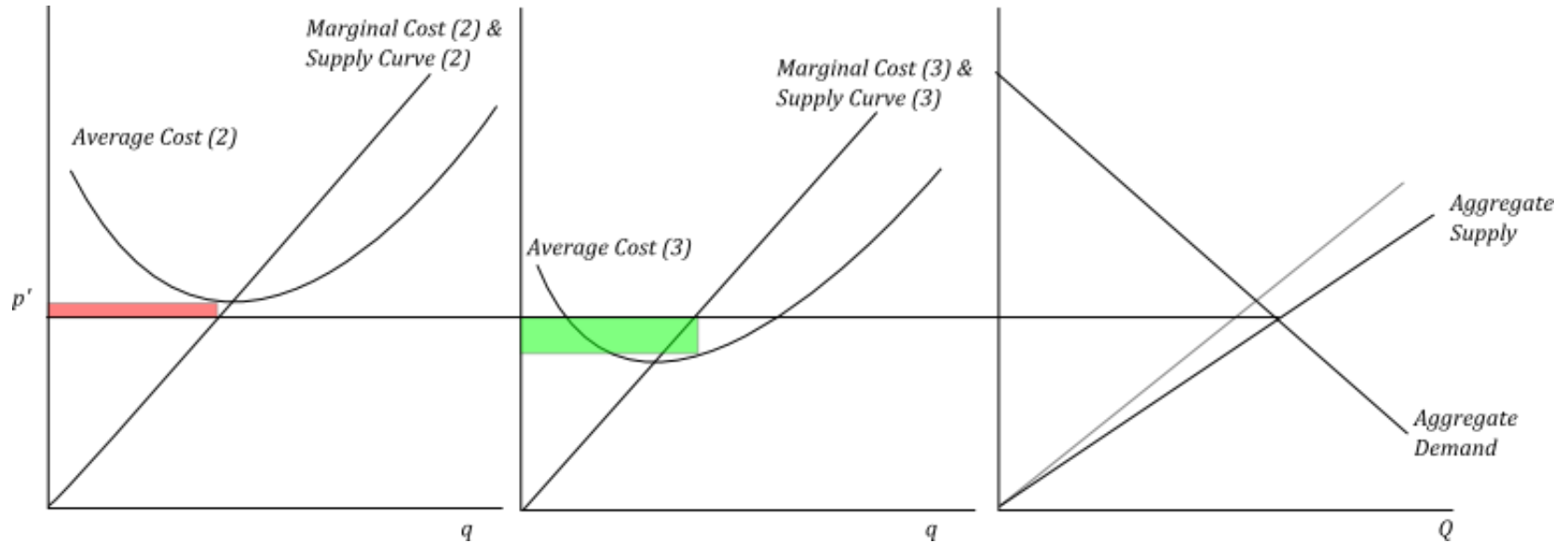
- Each firm adjusts its supply so that marginal cost is equal to the new marginal revenue (the new price p').
- In this example, each individual firm raises its output, but the decline in the number of firms means aggregate supply declines.
- To summarize: If all that happens is firms exit, the price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

Surviving Firm Profits



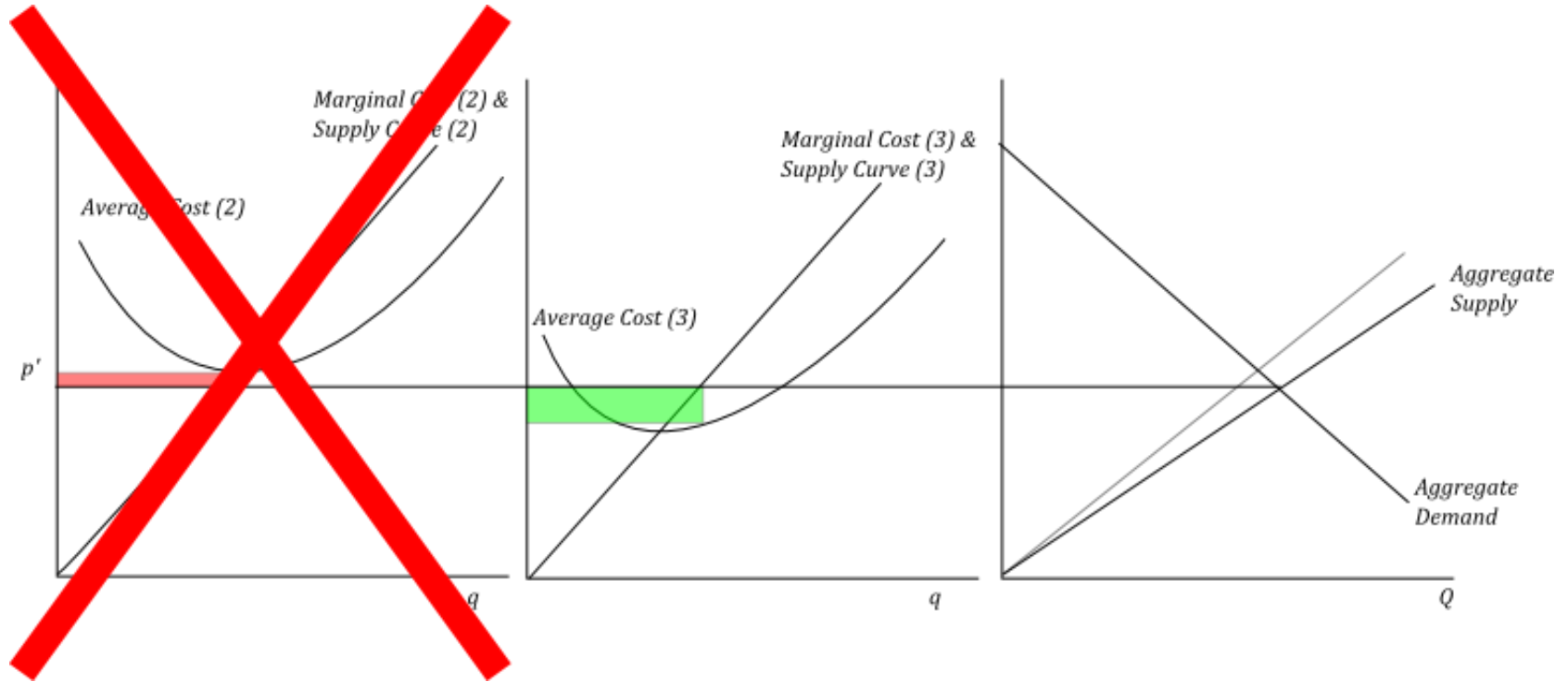
- This is not the end of the story though
- Each firm continues to earn $p' - c$ on each unit sold, where c is their average cost.
- Type 2 firms have p' equal to their average cost, so they make zero profit
- Type 3 firms earn the positive profit represented by the area of the green rectangle.
- New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

Entry's Impact on Profits



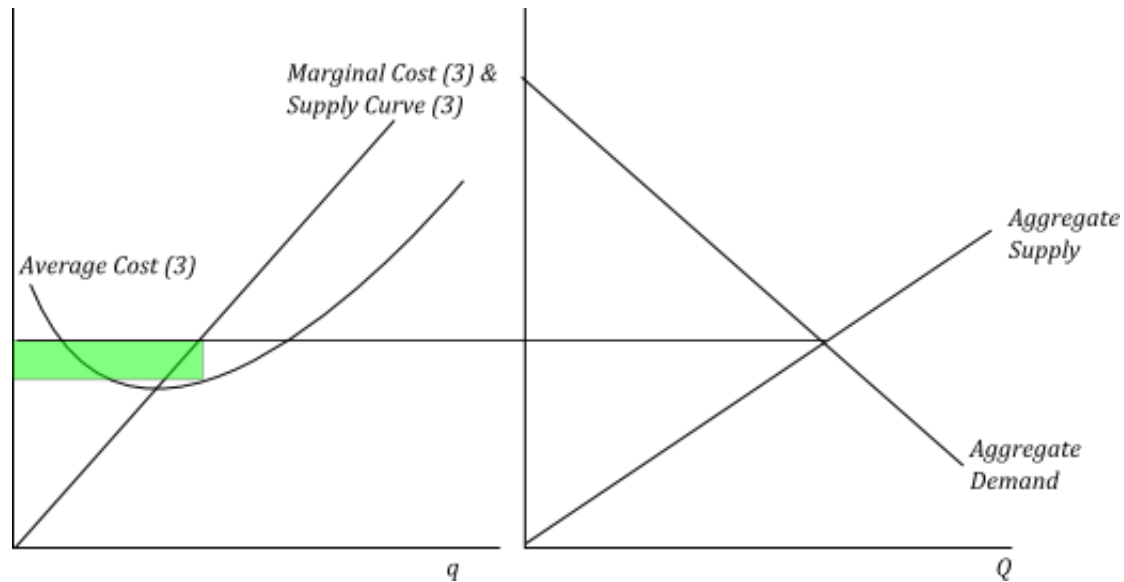
- The increase in the number of firms reduces the price faced by every firm
- Type 2 firms can no longer earn positive profit, or even zero profit, by staying in the market
- The profit of type 3 firms is reduced, since the price falls.

More Firm Exits



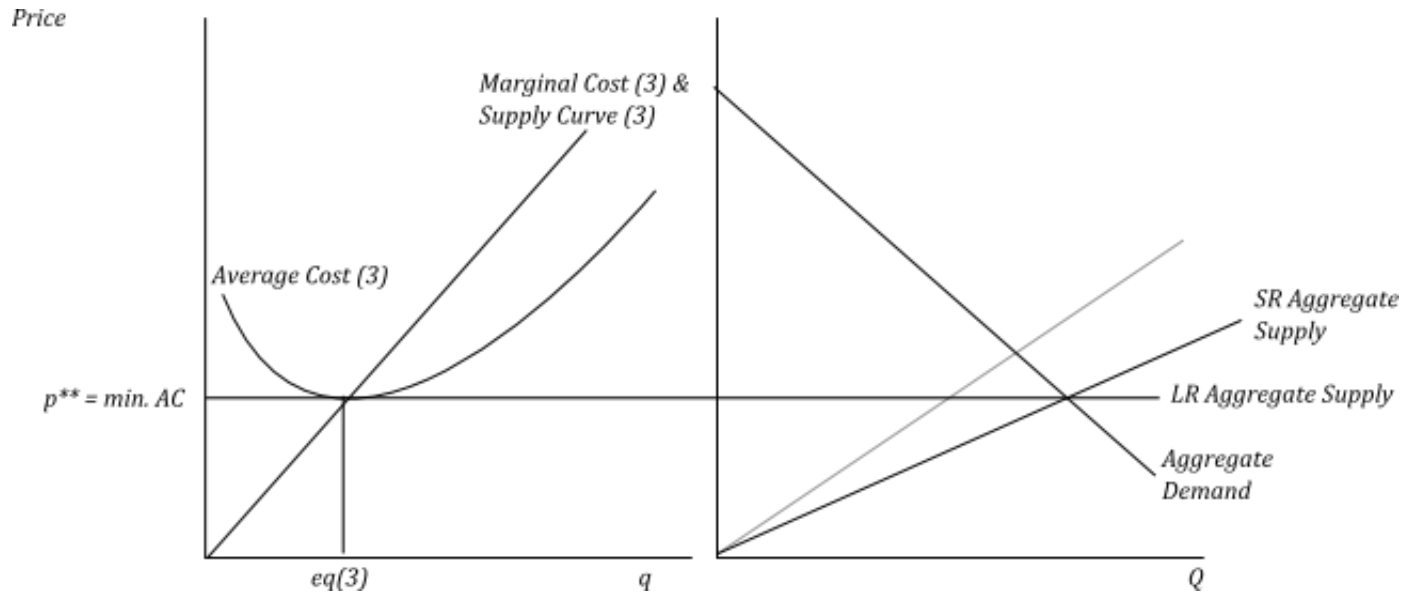
- In the long run, type 2 firms must exit, since they make negative profit.

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