

LECTURE NOTES ECO 54 UDAYAN ROY

Antoine Augustin Cournot (1801-1877)

Cournot pioneered the modern price theory for industries consisting of profit maximizing firms.

He introduced differential calculus and the associated mathematics of maximization into economic analysis. These eventually became the indispensable tools of economic analysis.

He introduced the demand function.

He introduced the familiar demand curve.

Monopoly: Taking the market demand of a product to be a given mathematical function of the product's price, Cournot derived the rule that a profit-maximizing monopolist would follow in deciding what price to charge. (This one-good-at-a-time approach is called partial equilibrium analysis.) The monopoly pricing rule is the familiar $MR = MC$ condition.

Showed that an increase in production cost (more precisely, the cost of producing an additional unit) would raise the price charged by the monopolist...

... and that the price increase could be smaller than or greater than the increase in cost.

Lump sum taxes (that is, taxes that are not dependent on the monopolist's decisions) do not affect the monopolist's decisions. (This may sound simpler than it really is!)

Cournot showed that an excise tax (on sellers) and a sales tax (on buyers) are equivalent. These are in turn equivalent to an increase in cost or a decrease in demand.

Duopoly: Two firms sell the same product. If they together produce a high output, the price of the product will be low; if they together produce a low output, the price will be high. Each firm independently decides what amount to produce. (That is, no firm knows the other firm's output decision before making its own.) So, what reasoning would each firm use to decide what output to produce? And, how will the duopoly outcome differ from the monopoly outcome? Cournot's solution to this duopoly problem is the same as the solution now called Nash Equilibrium in modern game theory. (Keep in mind that Cournot wrote in 1838.)

Cournot showed that the output will be higher and the price will be lower in duopoly than in monopoly.

The total profit of the two firms in a duopoly will be lower than profit of the one firm in a monopoly.

Nevertheless, the duopolists will not be able to coordinate their decisions to simulate the monopoly outcome. Even if they agree to restrict their joint output to the monopoly output, they will have huge incentives to secretly renege on the agreement. (This was an early example of the Prisoners' Dilemma.)

Pure Competition: Here Cournot derived the familiar profit-maximization condition: $P = MC$.

Way back in 1838, Cournot single-handedly created most of the price theory that economics relies on today.