**Game theory** concepts are used to develop effective competitive strategies for setting prices, the level of product quality, research and development, advertising, and other forms of nonprice competition in oligopoly markets. Game theory concepts have also been used to set public policy for currency market intervention in emerging markets and auction strategies for broadcast spectrum in the telecommunications industry. This brief introduction shows how managers can use a simple understanding of game theory concepts to make better managerial decisions.

***Prisoner's Dilemma***

Game theory is a general framework to help decision making when firm payoffs depend on actions taken by other firms. Because decision interdependence is a prime characteristic of oligopoly markets, game theory concepts have a wide variety of applications in the study of oligopoly. In a **simultaneous-move game**, each decision maker makes choices without specific knowledge of competitor counter moves. In a **sequential-move game**, decision makers make their move after observing competitor moves. If two firms set prices without knowledge of each other's decisions, it is a simultaneous-move game. If one firm sets its price only after observing its rival's price, the firm is said to be involved in a sequential-move game. In a **oneshot game**, the underlying interaction between competitors occurs only once; in a **repeat game**, there is an ongoing interaction between competitors.

A game theory strategy is a decision rule that describes the action taken by a decision maker at any point in time. Asimple introduction to game theory strategy is provided by perhaps the most famous of all simultaneous-move one-shot games: The so-called **Prisoner's Dilemma**.

Suppose two suspects, Bonnie and Clyde, are jointly accused of committing a specific crime, say inside trading. Furthermore, assume that the conviction of either suspect cannot be secured without a signed confession by one or both suspects. As shown in Table, if neither Bonnie nor Clyde confesses, the prosecutor will be unable to obtain a conviction, and both will be set free. If only one suspect confesses, turns state's evidence and implicates the other, then the one confessing will get the relatively light penalty of a having to pay a fine and serving probation, and the implicated party will receive the harsh sentence of 5 years in prison. If both suspects confess, then each will receive a stiff 2-year sentence. If both suspects are held in isolation, neither knows what the other will do, and a classic conflict-of-interest situation is created. Although each suspect can control the range of sentencing outcomes, neither can control the ultimate outcome. In this situation, there is no **dominant strategy** that results in the best result for either suspect regardless of the action taken by the other. Both would be better off if they could be assured that the other would not confess, because if neither confesses both are set free. However, in failing to confess, each is exposed to the risk that the other will confess. By not confessing, they would then receive the harsh sentence of 5 years in prison. This uncertainty creates the Prisoner's Dilemma. To confess, or not to confess—that is the question.

A **secure strategy**, sometimes called the maximin strategy, guarantees the best possible outcome given the worst possible scenario. In this case, the worst possible scenario for each suspect is that the other chooses to confess. Each suspect can avoid the worst possible outcome of receiving a harsh 5 years in prison sentence only by choosing to confess. For each suspect, the secure strategy is to confess, thereby becoming a prisoner, because neither could solve the riddle posed by the Prisoner's Dilemma. Though the Prisoner's Dilemma is posed within the scope of a bargaining problem between two suspects, it has obvious practical applications in business.

Competitors like Coca-Cola and Pepsi-Cola confront similar bargaining problems on a regular basis. Suppose each has to decide whether or not to offer a special discount to a large grocery store retailer.

Table shows that if neither offers discount pricing, a weekly profit of $12,500 will be earned by Coca-Cola, and $9,000 per week will be earned by its smaller competitor, Pepsi- Cola. This is the best possible scenario for both. However, if Coca-Cola is the only one to offer a discount, it will earn $10,000 per week, while Pepsi-Cola profits fall to $1,000 per week. If Pepsi-Cola offers a discount and Coca-Cola continues to charge the regular price, Pepsi-Cola profits will total $6,500 per week while Coca-Cola weekly profits fall to $1,500. The only secure means Coca-Cola has for avoiding the possibility of a meager $1,500 per week profit is to grant a discount price to the retailer, thereby assuring itself of a weekly profit of at least $4,000. Similarly, the only means Pepsi-Cola has of avoiding the possibility of meager profits of $1,000 per week is to also grant a discount price to the grocery retailer, thereby assuring itself of at least $2,000 in weekly profits. For both Coca-Cola and Pepsi-Cola, the only secure strategy is to offer discount prices, thereby assuring consumers of bargain prices and themselves of modest profits of $4,000 and $2,000 per week, respectively.

***Nash Equilibrium***

In Table, each firm's secure strategy is to offer a discount price regardless of the other firm's actions. The outcome is that both firms offer discount prices and earn relatively modest profits. This outcome is also called a **Nash equilibrium** because, given the strategy of its competitor, neither firm can improve its own payoff by unilaterally changing its own strategy. In the case of Coca-Cola, given that Pepsi-Cola has chosen a discount pricing strategy, it too would decide to offer discount prices. When Pepsi-Cola offers discount prices, Coca-Cola can earn profits of $4,000 rather than $1,500 per week by also offering a discount. Similarly, when Coca-Cola offers discount prices, Pepsi-Cola can earn maximum profits of $2,000 per week, versus $1,000 per week, by also offering a discount.

Clearly, profits are less than if they colluded and both charged regular prices. As seen in Table, Coca-Cola would earn $12,500 per week and Pepsi-Cola would earn $9,000 per week if both charged regular prices. This is a business manifestation of the Prisoner's Dilemma because the dual discount pricing Nash equilibrium is inferior from the firms' viewpoint to a collusive outcome where both competitors agree to charge regular prices. Of course, if firms collude and agree to charge high prices, consumers are made worse off.