

Princeton University

HONORS FACULTY MEMBERS
RECEIVING EMERITUS STATUS



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The biographical sketches were written by staff and colleagues in the departments of those honored.

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DILIP J. ABREU



After a thirty-seven-year-long, very productive, and occasionally interrupted affiliation with Princeton University, Dilip Abreu will advance to emeritus status on July 1, 2017. Dilip's life at Princeton began in 1980 when he joined the economics department as a Ph.D. student. Before arriving at Princeton, Dilip earned an undergraduate degree in economics and statistics from Elphinstone College at University of Mumbai, a master's degree in economics and econometrics from Delhi School of Economics at University of Delhi and another master's degree in economics and mathematical economics from Balliol College at University of Oxford.

Dilip completed his Ph.D. in three years. His thesis and his subsequent related work with coauthors led to some of the most influential papers in game theory. In his dissertation, Dilip studied repeated games; that is, repeated interaction among self-interested strategic agents. Typical examples of such games are firms competing over time and arms races among nations. Repeated game theory has many other applications across all subfields of economics and related disciplines.

An equilibrium, in a one-shot game, specifies behavior for each agent that is optimal given the specified (and hence anticipated) behavior of the other agents. In repeated games, the specified behavior has to be credible in addition to optimal. This means that even the behavior that a player is to undertake after he observes a deviation by another player must be optimal. Thus, in a credible equilibrium, opponents cannot be kept in line with the help of wild threats of retaliation.

In his thesis, Dilip identified new classes of strategies that facilitate extremal equilibria; that is, equilibria that yield the best possible or worst possible equilibrium payoffs to players. One of the most important observations in game theory is that, in dynamic settings, cooperation can be sustained even among purely self-interested agents. This strategic cooperation is feasible because players can be induced to choose actions in conflict with their short-run interests for fear of their opponents' unfavorable responses if they fail to act in the

expected manner. In turn, these opponents can be induced to respond unfavorably to unexpected actions, at significant short-term cost to themselves for fear unfavorable treatment by their opponents if they fail to carry out the specified punishment for the original deviator, and so on. Dilip's thesis identified strategies that combine intricate punishment and reward regimes to sustain extremal equilibria.

Dilip's first appointment was as an assistant professor in Harvard's economics department. During the early years of his career, repeated games continued to be the focus of his research. With his coauthors, Ennio Stacchetti and David Pearce, Dilip developed ideas originating in his Ph.D. thesis into new methods for analyzing equilibrium behavior among agents who engage in repeated strategic interaction. In particular, Dilip and his coauthors developed methods for assessing the extent to which noncooperative collusion is feasible among competing economics agents. This work enabled the incorporation of dynamic programming ideas and methods into the analysis of repeated games.

Toward the end of his time at Harvard, Dilip and his coauthor Hitoshi Matsushima wrote a seminal paper on implementation theory. This theory studies the feasibility of a social planner's objective given that the planner does not know all of the parameters relevant for his objective. In their paper, Dilip and his coauthor introduced the notion of virtual implementation and showed that much stronger implementation results are feasible; that is, many more social plans are feasible, if the planner is content with nearly optimal, as opposed to exactly optimal, outcomes.

In 1990, Dilip returned to the Princeton Department of Economics, this time as a professor. After his return to Princeton, Dilip developed an interest in game-theoretic models of reputation. Reputation models postulate that with some small probability, one or more of the players might have unusual constraints. For example, a reputation type might be unable to change her choice of action even when the action is unfavorable. The possibility that one player might be a reputation type affects the expectations and behavior of opposing players and therefore all players. Dilip and his coauthors developed and investigated rich sets of reputation types in a variety of games. They showed that introducing a small probability of players being a reputation type into games with multiple equilibria might reduce to a set of equilibrium payoffs, often to a singleton. They identified salient outcomes of

dynamic games without reputation types by investigating the unique outcome of the corresponding games with reputation types.

Dilip left Princeton in 1995 to take a position in the Department of Economics at Yale University but returned to Princeton two years later. He has been at Princeton since 1997. In total, he has been a faculty member at Princeton for twenty-five years. After his return to Princeton, Dilip's research interest in repeated games, reputation, and bargaining has continued. He also developed new research interests. Most notably, he has done work on financial markets. In his influential joint work with Markus Brunnermeier, Dilip showed that market bubbles might persist despite the presence of arbitrageurs due to the inability of these arbitrageurs to effectively coordinate their actions.

During his time at Princeton, Dilip has taught both undergraduate and graduate courses. He has taught all or part of the required first graduate microeconomics course for many years. His undergraduate course on game theory and information economics has been a gateway to graduate school in economics for many Princeton undergraduates.

Dilip is a fellow of the Econometric Society (since 1991), a member of the American Academy of Arts and Sciences (since 2001), and an Economic Theory Fellow of the Society for the Advancement of Economic Theory (since 2013), and has served as a council member of the Econometric Society (2003–2008) and of the Game Theory Society (2011–2014). He is and has been for many years an exceptional researcher, an inspiring adviser and teacher, a great mentor, a cherished colleague, a force to reckon with at seminars, a voice of reason in faculty meetings, and the dearest of friends to many in the economics department.