IN MEMORIAM

VLIAY SINGH BAWA

Vijay Bawa taught at The University of Texas from 1981 until his death on August 23, 1983. He was one of the leading finance theorists in the world, and his research contributed to the international reputation of the Graduate School of Business at The University of Texas as a center for financial research. His untimely death in 1983 was a profound loss, not only to The University of Texas, but also to the finance profession.

It would be very easy to simply summarize Vijay's professional research accomplishments, for they are truly extraordinary. However, this would overlook his substantial contributions in classroom teaching and the important role he played as both friend and colleague. Vijay was in many ways bigger than life. His sparkling sense of humor combined with a relentless drive for perfection in classroom teaching made him a popular teacher among both M.B.A. and Ph.D. students. Perhaps the highest compliment we can make to others is our desire to learn from them. In this regard Vijay's Ph.D. seminars were always at least half filled with his faculty colleagues who came to his classes to learn from this very gifted teacher. We feel warmth and affection for Vijay the person; this memoriam tells you also about the academic things we learned from
him. He was our friend, a scholar and colleague whose memory will live on with those of us who knew him personally.

Vijay was born in India on March 19, 1944. He received his Bachelor's Degree from the Indian Institute of Technology in Bombay, India. He received his Ph.D. degree in 1970 from Cornell University in operations research. His dissertation "Asymptotically Optimal Ranking and Selection Procedures" addressed fundamental problems relating to the comparison of experiments. But even before completing his dissertation, Dr. Bawa began his phenomenally prolific career in scholarship with the publication in 1969 of "The Assignment of Co-operating Workers to Service Automated Machines" in the *Journal of Industrial Engineering*.

Upon graduation from Cornell in 1970, Vijay joined the technical staff of Bell Laboratories. From 1970 until 1975 he was a member of the technical staff in economics at Bell Laboratories, and from 1975 until 1978 he served as Supervisor of Financial Economics. Finally, from 1978 until 1981 he was head of the Department of Economics and Financial Research. In his first three years at Bell Labs his research was focused on operations research and management science. During this period he authored or co-authored nine working papers and journal articles. His publications included "On The Asymptotic Relative Efficiency of R-factor Experiments to Select The Best Normal Population" which appeared in the *Journal of the American Statistical Association* and was abstracted in the *Annals of Mathematical Statistics*, two prestigious journals in statistics. As well as publishing in statistics, Dr. Bawa also made an important contribution to chance constrained programming
and general optimization theory with the publication of "On Chance Constrained Programming Problems with Joint Constraints" and "Minimax Policies For Selling a Divisible Asset" in *Management Science*, the premier journal in its field. These works were an indication of the quality of the work which was to follow and helped establish his reputation as an international scholar.

Bawa's most important contributions were to emerge from his work in financial economics, which began in 1973. From 1973 until his death in 1983, Professor Bawa authored or co-authored over forty working papers and journal articles in financial economics. At the time of his death, Professor Bawa had the distinction of being the most published researcher in the *Journal of Financial Economics*, a leading journal of finance theory.

Initially Professor Bawa's research in finance focused on the use of stochastic dominance to assess investor preferences over risky investment prospects. Prior to his work, general conditions for stochastic dominance had been derived that were theoretically satisfying, but were not always easy to implement. In "Optimal Rules for Ordering Uncertain Prospects" published in the *Journal of Financial Economics*, he developed an efficient algorithm to determine stochastic dominance relations. This made stochastic dominance a practical tool for portfolio selection.

The desire to confront and resolve the real world obstacles to the implementation of financial theory is also apparent in his 1976 *Journal of Financial Economics* paper "The Effect of Estimation Risk on Optimal Portfolio Choice." In this paper, co-authored with two leading econometricians, Stephen Brown and Roger Klein, Dr. Bawa
analyzes the impact of estimation risk on the construction of optimal portfolios. Because of the thoroughness and rigor of its analysis, this paper has since become widely recognized as one of the seminal papers in financial econometrics.

In many ways 1977 was an important year in Dr. Bawa's career. In this year he accepted an appointment to the faculty at New York University and published three articles in the *Journal of Financial Economics* "-- The Effect of Portfolio Risk and Limited Information on Optimal Portfolio Diversification," "Portfolio Choice and Equilibrium in Capital Markets with Safety First Investors," and "Capital Market Equilibrium in a Mean-Lower Partial Moment Framework." While the first paper extended the work begun in his 1976 paper on estimation risk, the second and third papers broke new ground in theoretical finance. "Portfolio Choice and Equilibrium in Capital Markets with Safety-First Investors" extended to a capital-market-equilibrium setting the safety-first criteria for portfolio choice first proposed by Roy. In "Capital Market Equilibrium in a Mean-Lower Partial Moment Framework," Dr. Bawa developed an original model for portfolio choice under uncertainty and demonstrated that this concept could be used to generate a market equilibrium model of asset prices. Bawa's lower partial moment paradigm of investor choice under uncertainty accounted for the fact, ignored in mean-variance analysis, that investor's attitudes towards downside risk and upside risk are very different. At the same time, the lower partial moment approach retained much of the tractability associated with the mean-variance approach. The intuition behind this analysis can be stated as follows. Variance is an
improper measure of risk: individuals do not like unexpectedly low stock returns, but they are delighted with unexpectedly high stock returns. Since variance gives upside returns equal weight with downside returns, it is a flawed measure. Hence, the need for the Bawa-type analysis.

In 1978, Dr. Bawa was promoted to the rank of Professor at New York University, a position he was to hold jointly with his position at Bell Labs until 1981, when he joined the faculty of The University of Texas. During this period, Professor Bawa's research focused on incorporating more realistic assumptions regarding the distribution of asset returns into financial economics. Most of the researchers who proceeded Professor Bawa had ignored the limited liability of equity investors in their specification of the distribution of common stock returns. In "Optimal Portfolio Choice and Equilibrium in a Lognormal Securities Market," which was published in *Studies in Management Science*, Dr. Bawa developed a model of asset pricing which incorporated equity investor limited liability into capital market theory. Dr. Bawa made another important contribution to extending the class of distributions utilized in financial market models when he co-authored, in the *Journal of Finance*, "Simple Rules for Optimal Portfolio Choice in Stable Paretian Markets," with Edwin Elton and Martin Gruber. At the same time Dr. Bawa continued to make contributions in implementing the theory of stochastic dominance with "A Efficient Algorithm to Determine Stochastic Dominance Admissible Sets," co-authored with E.B. Lindenberg and L.C. Rafsky. This publication, which appeared in *Management Science*, extended his earlier results published in the
Journal of Financial Economics. In addition to working on problems in financial economics, Professor Bawa also made a useful contribution to the theory of the regulated firm with the publication of "Dynamic Behavior of the Firm Subject to Regulatory Review" published in the International Economic Review.

In 1981, Professor Bawa joined the faculty of The University of Texas as the C.B.A. Foundation Professor of Finance. During the time that Dr. Bawa taught at the University, he made a major contribution to the development of the Finance Department both through his own research and his contributions to the research of others. In 1981, Dr. Bawa co-authored five working papers with junior faculty members. Yet in that same year, despite his poor health, Dr. Bawa developed with D.L. Goroff a general formulation of stochastic dominance theory with "Stochastic Dominance, Efficiency and Separation in Securities Markets". The paper, which was published in the leading journal of mathematical economics, The Journal of Economic Theory, extended the standard theory of portfolio selection over a finite number of securities to a much more generalized setting.

The summary above touched on the high points of Professor Bawa's scholarly career. He also authored research bibliographies on stochastic dominance, portfolio theory and international trade which have been of great value to other scholars in his field. He served as an editor for the Journal of Financial Economics and Management Science and as a referee for the leading journals in both management science and finance.
Vijay's life was blessed with both the things which he accomplished and those things which he received as pure gifts. We will remember Vijay for his extraordinary accomplishments; his contributions to the finance profession; the positions of leadership which he held; his meticulousness as a teacher; and the pride which he took in his work. While Vijay was not blessed with good health, we are thankful that his short life was blessed with other wonderful gifts: an incisive mind, the capacity to organize and lead, and the warmth to develop and cultivate friends.
This Memorial Resolution was prepared by a special committee consisting of Professors Stephen P. Magee (Chairman), Robert C. Witt, and John D. Martin.