

**CAPITAL STRUCTURE DECISIONS UNDER MULTIPLE
OBJECTIVES: A STUDY OF INDIAN CORPORATES**

by

YAMINI AGARWAL
Department of Management Studies

Submitted

in fulfillment of the requirements of the degree of

DOCTOR OF PHILOSOPHY

to the



Indian Institute of Technology Delhi

November 2009

CERTIFICATE

This is to certify that the thesis titled "**Capital Structure Decisions under Multiple Objectives: A Study of Indian Corporates**" submitted by **Ms. Yamini Agarwal** at Indian Institute of Technology, Delhi, India for the award of the DOCTOR OF PHILOSOPHY (Ph.D.) is a record of bonafide research work carried out by her. She has worked under our guidance and supervision. She has fulfilled the requirements for the submission of this thesis which has attained the standard required for a Ph.D. degree of this Institute. The results presented in this thesis have not been submitted elsewhere for the award of any degree or diploma.

Prof. Surendra S. Yadav
Professor
Department of Management Studies
Indian Institute of Technology
Delhi, India

Prof. K.C. Iyer
Professor
Department of Civil Engineering
Indian Institute of Technology
Delhi, India

ACKNOWLEDGEMENT

It is impossible to express adequately my indebtedness to Prof. K.C. Iyer and Prof. Surendra S. Yadav. They not only provided me with specific background for this work but, by insisting on and aiding me in my efforts towards greater rigor, forced me to develop and refine my ideas to carry them forward to this written essay. They were very kind, cooperative and helpful to spare hours of their valuable time to go through drafts, discuss and give suggestions which have helped me improve this work. I must say my research supervisors are par excellence. At every stage of my work I have freely encroached upon their time, but for their keen interest, invaluable guidance and intellectual stimulation, this work would not have taken its present shape.

I would also like to thank Prof. P.K. Jain, Prof. Sushil, Prof. Vinayshil Gautam of Department of Management Studies, IIT Delhi for their counseling from time to time at various stages. They and other Professors in the Department have been very kind for their cooperation, academic inputs and in helping me in analysis and interpretation whenever and wherever I was in doubt.

The goal programming model for capital budgeting developed and applied by Prof. J.D. Agarwal provided me initial motivation to start work on this research which I studied in detail at my post graduate level. I owe him a debt of gratitude not only for his work brings motivation as it could be available for any researcher but for his being available to me all the time both at his office and at home and for his continuous support, constant guidance, encouragement and development of a critical and positive attitude towards the research work. His “Whys” and “Hows” at times became irritating but in minutes converted into smile when he gave me hints, and at times,

solutions. It amazed me that the drafts given to him for his opinion were given back to me in shortest possible time with suggestions and corrections.

I would also like to thank Prof. Robert Merton, John and Natty McArthur University Professor at the Harvard Business School, USA, Prof. James Heckmann, Professor of Economics at the University of Chicago, USA Prof. Richard Brealey, Professor of Finance, London Business School, Prof. Michael Adler, Professor, Finance and Economics, School of International and Public Affairs, Columbia University, Prof. Hide Kamiryō, Emeritus Professor, Hiroshima Shudo University, Japan, Prof. Harry Markowitz, Adjunct Professor of Finance, Rady School of Management, San Diego, Prof. John Graham, D. Richard Mead Jr. Family Professor of Finance, Duke University, Prof. Edward Altman, Max L. Heine Professor of Finance at the Stern School of Business, New York University, Prof. Hubert Fromlet, Professor in International Economics, Baltic Business School, Sweden and Jonkoping International Business School (formerly: Chief economist at Swedbank, Stockholm), Prof. Mukul Asher, Professor in Public Policy Program, National University of Singapore, Prof. I.M Pandey, Professor of Finance, University of Delhi and Prof. V.K. Bhalla, Professor of Finance, Faculty of Management Studies and large number of authors and researchers, whose works I have consulted, referred and some of whom have been cited. I have had the opportunity to interact with some of these professors and other professors from time to time during my research work.

I would also like to thank my elder brother Prof. Aman Agarwal for his moral support and timely advice on the reading selections, drafts and formats. I also thank my younger brother Prof. Saurabh Agarwal for helping me in various ways including academic inputs.

I am also thankful to the editors of various journals, particularly, Prof. V.R. Panchmukhi, editor *Indian Economic Journal*, and Prof. George Parenti, editor, *Euro Mediterranean Economic and Finance Review (EMEFR)* in publishing articles based on this work and anonymous referees for their blind review and recommendations.

I am also thankful to the organizers of various international conferences and seminars, particularly, National University of Singapore at Singapore, Central Bank of Finland at Helsinki, Sweden International Development Authority (SIDA), International Finance Conference at Hammet, Tunisia for giving me an opportunity to make presentations based on this work. I would fail in my duty if I did not thank various researchers and members of audiences at these presentations whose provoking questions helped me revise and refine my thinking on the subject.

I am also thankful to the authorities of Indian Institute of Technology, Delhi, Department of Management studies, IIT, Delhi and Indian Institute of Finance, Library and computer center for providing me the necessary facilities very generously. I would also like to thank all my peer research scholars at IIT Delhi, for the discussions on the research areas, methodology and work schedules and my colleagues at Indian Institute of Finance.

I am grateful to Indian Institute of Finance for the leave granted to me to complete this work and necessary fellowship to pursue this work till its completion.

Finally, I thank my mother Prof. Manju Agarwal, and my brothers Aman and Saurabh who saw this work through most of its many drafts and for suggesting me improvements in my work. I am thankful to my family members for bearing with me

for all this while. It was their continuous encouragement and support which has enabled me to carry this task to its completion.

Yamini Agarwal

ABSTRACT

Capital structure decisions have become complex in the changing business paradigm. The evaluation techniques used for capital structure decisions by the theories and models developed in the 1950s have lost their relevance due to changes over the years. Capital is still scarce despite financial liberalization and globalization. Business environment are exceedingly competitive. Stakeholders are awfully demanding. Survival and growth is restrained by competition. Decision maker's choice on capital structures is not restricted to debt and equity alone. Bankruptcy and distress risk go beyond on balance sheet items including off balance sheet exposures. In the light of this background the premise of a single objective for evaluating capital structure decision is questioned in this study. The study explores the multiple considerations followed by decision maker for capital structure decisions.

The study investigates capital structure practices in the Indian industry through a sample of top 500 companies classified in 19 industries for a 10 year period (1998-2007) for 67 variables including the leverage variables. The spread of leverage ratio is also examined. The relationship of leverage ratios with market capitalization and EPS is also explored.

Multi objective criteria for processing capital structure decisions is identified and justified based on the findings of the past researches and the empirical survey conducted as a part of this study. In the empirical survey, CFOs as respondents are investigated for their goals, priorities, motivations, constraints and practices for capital structure decision making.

Goal Programming model was selected from different multi-objective optimization techniques. The model was found to be capable of providing satisficing solutions to multiple goals simultaneously by minimizing the deviation from the objective function after assuming that the decision maker is an optimist and does not attempt to satisfy all objectives fully. The study has applied this model to three firms in the Indian industry and discussed its results. The results give justification and validity to our basic premise of questioning the relevance of the single objective postulation in capital structure decisions.

The study has discussed a number of important issues which must be addressed well in the context of capital structure decisions under the multi-objective framework.

Keywords: Capital structure Decisions, Multiple objectives, Goal Programming Model

TABLE OF CONTENTS

	Page No.
Certificate	i
Acknowledgement	iii
Abstract	vii
List of Figures	xii
List of Tables	xv
List of Appendices	xix
Abbreviations	xvi
Glossary	xxiii
Units of Currency Measurement	xxix
Notes on Notations	xxxii
Chapter 1 Introduction	
1.1 Background	1
1.2 Need for the Study	3
1.3 Objectives of the Study	8
1.3.1 Primary Objective	8
1.3.2 Sub Objectives	8
1.4 Research Methodology	8
1.5 Organisation of the Study	9
Chapter 2 Literature Review and Synthesis	
2.1 Introduction	11
2.2 Optimal Capital Structure	13
2.3 Determinants of Capital Structure Decision	21
2.3.1 Macroeconomic Factors	23
2.3.2 Microeconomic Factors	40
2.4 Management Goals and Priorities	55
2.4.1 Ownership Influence and Capital Structure Decisions	56
2.4.2 Compensation and Capital Structure Decisions	62
2.4.3 Management Attitude: Goals and objectives	64
2.5 Synthesis	67
2.5.1 Evaluation of Existing Models	67
2.6 Concluding Observations	73
Chapter 3 Research Methodology	
3.1 Introduction	75
3.2 Sample Design	75
3.3 Data Collection	77
3.3.1 Primary Source	78
3.3.2 Secondary Source	83
3.4 Preliminary Study: Pilot Testing Methodology and Learning	86
3.4.1 Detailed Study Sample	87
3.5 Concluding Observations	90

Chapter 4 Understanding of Capital Structure Practices in India

4.1 Introduction	91
4.2 Pilot Study Results	94
4.2.1 Objectives of Pilot Study	94
4.2.2 Pilot Study: Inter Industry Assessment of Debt Choices	98
4.2.3 Pilot Study: Inter Temporal Assessment of Debt Choices	101
4.3 Empirical Assessment of ET 500 Companies	103
4.3.1 Population Parameters and Leverage Assessment	103
4.3.2 ET 500 Sample: Inter Industry Assessment of Debt Choices	112
4.3.3 ET 500 Sample: Inter Temporal Assessment of Debt Choices	118
4.4 Spread of Capital Structure Variables	122
4.4.1 Testing Long Term Debt to Equity for Normal Distribution	124
4.4.2 Testing Total Debt to Equity for Normal Distribution	128
4.5 Leverage Variables and Market Capitalization	130
4.6 Concluding Observations	132

Chapter 5 Capital Structure Decisions: A Case for Multiple Objectives

5.1 Introduction	135
5.2 Capital Structure Decisions and Objectives of a firm: A Conceptual framework	136
5.3 Identification of objectives	141
5.3.1 Factors Affecting the Decision to Issue Common Stock /Equity Shares	142
5.3.2 Factors Affecting the Decision to Issue Debt	144
5.3.3 Factors Affecting the Decision to Issue Foreign Debt	145
5.3.4 Factors Affecting the Decision to Issue Convertible Debts	146
5.3.5 Factors Affecting Maturity Structures of Security Instruments	147
5.4 Need for Understanding Objectives of Indian Firms and their Ordinal Preferences	149
5.5 Questionnaire Survey	150
5.5.1 CFOs' Financial Objectives	150
5.5.2 CFOs' Non Financial Objectives : Survey Results	155
5.5.3 Summarized Capital Structure Decisions: Structured preferences of CFOs	160
5.5.4 CFOs' Motives and Constraints for Raising Equity	161
5.5.5 CFOs' Motives and Constraints for Raising Debt	164
5.5.6 Equity Capital Market Exposure	166
5.5.7 Constraints for Raising Funds at Premium	168
5.5.8 Cost of Raising Funds through Equity or Debt	169
5.5.9 Strategies for Adopting Appropriate Financing Mix	169
5.5.10 Market Valuation Techniques Used by the Firm	170
5.5.11 Bonus Shares as Capital Structure Decision Strategy	171
5.5.12 Buyback as Capital Structure Decision Strategy	172
5.5.13 Stock Split as Capital Structure Decision Strategy	173

	Page No.
5.5.14 Trading on Equity as Capital Structure Decision Strategy	173
5.5.15 Action of Regulatory Bodies Facilitating the Capital Structure Decisions	176
5.5.16 Action of Financial Institutions in Facilitating Capital Structure Decisions	177
5.5.17 Foreign Exchange Exposure Among Survey Firms	177
5.5.18 Affect of Foreign Exchange Exposure among Survey Firms	178
5.5.19 Exposure In International Capital Market	179
5.6 Concluding Observations	180
Chapter 6 Capital Structure Decisions under Multiple Objectives: Application and Testing of the Model	
6.1 Introduction	183
6.2 Evaluation of Multi-Criterion Decision Making Techniques	184
6.3 Goal Programming Model: A Brief Description	186
6.3.1 GP Model for Capital Structure Decisions: Specification of Goals	192
6.3.2 GP Model for Capital Structure Decisions: Specification of Constraints	193
6.3.3 Specification of Industry Constraints in Agriculture	195
6.4 Formulation and Application of Goal Programming Model in Capital Structure Decisions	207
6.4.1 Case 1: α_1 Co. (Alpha One Company) in Agriculture Industry	207
6.4.2 Case 2: β Co. (Beta Company) in Chemical and Petrochemical Industry	214
6.4.3 Case 3: γ Co. (Gamma Company) in FMCG Industry	221
6.5 Concluding Observations	227
Chapter 7 Summary and Conclusion	
7.1 Introduction	233
7.2 Summary of Chapters	233
7.3 Contribution of the Study	237
7.4 Main Findings of Research	237
7.4.1 Main Findings of Capital Structure Decision Practices among Indian Firms	237
7.4.2 Main Findings of Questionnaire Survey	238
7.4.3 Main Finding of Application of the Goal Programming Model	240
7.5 Limitation of the Study	241
7.6 Future Scope of the Study	241
7.7 Concluding Observation	242
References	243
List of Publications	255
Appendices	257
Resume	315