Chapter 7
Summary of Findings and Conclusion

7.1 Summary of Findings

The study has tried to analyse the issues of Risk Management in Infrastructure Financing at both aggregate level (population-wide) and at disaggregated level (project level) with a lenders perspective. After a thorough analysis of the Structure and forms of flow of finance to infrastructure sector and the various mechanisms and strategies used for it, the acquired understanding as to how the role of Public-Private Partnerships (PPPs) route to infrastructure provisioning is redefining the landscape of Infrastructure was focussed upon. The findings and conclusions of the research have been high-lighted specifically at the end of each analysis chapters itself, and hence it is fruitless to repeat it again. However, what is sought to be achieved in the following paragraphs of this chapter is to highlight the findings in a very generic sense instead of going to the specifics. Needless to say, the shortcomings, extension that are possible to this piece of research to enhance and further the body of knowledge in this sphere has also been attempted.

7.2 Analysis with Aggregates

After understanding the basics and the role of PPPs, the subsequent analysis in Chapter 4 empirically analysed the population wide characteristics of PPPs using two most authentic databases in the subject the PPI project Database of World Bank and the Loanware database of Capital Data (an Euromoney affiliate). It has very clearly brought out how the developing countries thrust for Private Infrastructure was led initially by Latin American and Caribbean countries which have gone for deeper sectoral reforms through disvestitures and privatizations which redefined the role of the State. Contrastingly, the analysis also brought out how the East and South Asia emphasized creating new assets through Greenfield infrastructure projects through BOT schemes. The sectoral characteristics has shown how the power and telecom sectors were off the block first and how it is difficult to commercialise and commoditise water. Deeper analysis of the data using OLS regression model has brought out the Loan Pricing inequalities and characteristics of various forms of
Project Finance that exist in the Global Finance lexicon today. These analysis has helped to understand the aggregate macro issues and functions in the sector which help sharpen the lenders perspective and involvement.

7.3 Analysis with Disaggregates

It is the researcher’s understanding gained from more than a decade of experience as a Finance professional/ Banker, researcher, consultant and above all an avid observer that many excellent pieces of research work done on macro economic issues on vital topics fail the all important “applicability” criterion to the real world conditions, as micro issues, the influences of which are normally captured from unit-level disaggregated data is over-looked or not given the requisite attention. It is also true that many excellent research work involving micro issues analysed using disaggregated data failed to make any impact as the jigsaw of how it fits into the macro canvas of the overall scheme of things is either not clearly conceptualised/ understood or sometimes overlooked. This issue of macro Vs micro is a running battle and a raging debate with the researchers across all countries- irrespective of topics or subjects. This debate is even more crucial in social sciences research as the very nature of social sciences research has limitations put in its applicability.

The researcher having fully aware of the relevant factors and issues in this sphere was committed to pursue the research using both the approaches of analysing aggregates and disaggregates - independently and dispassionately so that the findings are understood with proper perspective. No generalisations have been done in this study wherein micro data is used to generalise a population-wide characteristic or vice-versa. It was the researchers commitment and gut feel gained from years of experience that the above referred are some of the potent reasons why the social sciences research fail the applicability test. An honest attempt has been made to address this issue in Chapter 5 of this dissertation. It deals with analysis of a fine collection of disaggregated data collected from the “insiders” and “outsiders” of the project finance arena and goes on to analyse the attributes which captures the project level variables and its influences as they perceive it. Advanced statistical modelling and scaling techniques have been used including proven index methods to convert what are seemingly qualitative attributes to quantitative ones so that dispassionate and objective analysis are possible.
The Project Evaluation model arrived at after studying the influences of 23 attributes which in itself has been selected after the initial data collection and screening is a multi-attribute evaluation model that can be used to evaluate projects and project promoting companies. The researcher had the opportunity to interact with a whole spectrum of infrastructure finance institutions in India and elsewhere for inputs at the time of development of the evaluation model. Some of the institutions like IDFC have started using this model already in their risk management cells and some are trying to evolve a software which would incorporate this model. Research models of this nature are bound to improve the quality of appraisal and use of risk management methodologies.

7.4 Adoption of Best Practices

It is only logical that nowadays any complex areas or topics, more so in vital sectors attracts framing of a set of practices as guidelines often dubbed as “Best practices”. This is normally done by an organisation or institution which works at an Apex level or sometimes even the regulator. For example, the Bank for International Settlements (BIS) as a global regulator of banking standards has prescribed Best Practices in very many areas as and when required. SEBI does it for capital market related practices in India. When such best practices already exist in one’s area of research, it is not incumbent on the researcher to prescribe another set of practices. It is found redundant. Conscious of these nuances, it was felt that analysing the progress made by us in adopting to the Best Practices would be a far better measure and would indicate how our infrastructure sectors are placed. The result of many negotiation and discussion with the industry people is the culmination of drawing Chapter 6 which captures the essence of happenings in the Indian Infrastructure Sector and ranks them in their progress in terms of adoption of Best Practices.

The findings interestingly revealed how we have jumped up sequences prescribed in Best Practices in sectors like Power and telecom (though they are ahead of the pack now) and as to how we could amend our mistakes in hindsight which saved the situation in these sectors. The rankings have highlighted how sectors like Urban Infrastructure and Water are finding it difficult to take off. A closer analysis of the best practices prescribed by ADB in each of the sectors would also bring home a few commonalities in issues which can be described as cross-sectoral issues in financing.
of private infrastructure. ADB has also recognised these and talks about the cross sectoral issues in many of its reports. The role of government, institutional reforms\(^1\), Legal and Regulatory framework, Sources of Financing, Risk and Risk Mitigation etc., are all issues of cross-sectoral relevance, the influence of which cannot be undermined. It has to be admitted that this research couldn't tread to such areas because it was felt that much of these issues are in itself very big topics for research in the area and justice could not be done if it were to be done as part of this research piece.

7.5 Extension of this Research Findings

Most models that are analysed and evolved in financial research are either cash-flow based or Capital-based. Obviously, there exists a raging debate\(^2\) in the community of researchers and modellers with financial data, of the superiority of one over the other though none could establish it conclusively till date.

Four factors make infrastructure investments tricky for traditional financial institution. First, since private investments in infrastructure are relatively new and few - and in comparison to corporate lending the information is closely held- there is considerable lack of historical data. In the absence of this informed judgement about possible outcomes for different situations is virtually impossible. Second each project will demand large funding exposures. Hence, in comparison to the past, institutions are bound to have their funds deployed in fewer projects, leading to a statistically riskier situation. Third, the challenges of the sector will ensure that the structures evolved for each project are unique, which will call for tremendous depth of appraisal and risk evaluation competencies within the financing institution. Fourth, risk mitigation measures followed in normal corporate financing will not be easily adaptable to infrastructure project finance.

\(^1\) "ROLE OF INSTITUTIONAL ARRANGEMENTS IN FINANCING PROJECT COMPANIES IN ASIA*, 2003 a Post-doctoral work by the scholar Dr. K.A.K. Devipriya and a few others who have worked on the areas such as institutional aspects of infrastructure have established that reforming and restructuring institutional infrastructure of ministries, departments, regulatory and legal institutions are as important, if not more to see a real change happening in this sector.

\(^2\) It is interesting to note that many high-end Journals in Finance including the famous "Journal of Finance" itself carry these debates, arguments and counter-arguments by publishing empirical research evidences to establish the supremacy of one over the other. Anybody who has followed this debate for the past 10 years or so would subscribe that neither of the group could get an upper hand and even now the debate is on an even keel. Needless to say that professional researchers across the globe have benefitted immensely from these debates.
It is here that the thinking sinks in to say that infrastructure project financing would get a boost, if it would be possible to determine the quantum of capital necessary to cover unexpected losses on a given project, leading to an intelligent assessment of Risk Adjusted Return On Capital (RAROC). The attractive part of such a model would be its link to capital and RAROC. Unfortunately, it is beyond the scope of this research. The researcher would humbly leave it to the scholars who would be interested to work further in these areas. However, a few suggestions and ideas on how to go about it have been advanced which evolve from conceptualised thoughts by going on and on in this topic.

**How to do it?**

No research is complete in itself and it is a journey. Extension of a journey is very much a possibility. And the researcher is interested in lending ideas to anybody who would be doing further work in this area. The following lines are penned to meet this end.

As a first step in going to a RAROC model a detailed Project Risk Review to find out the Expected Default Probability (EDF) by assessing the ability to contain the future losses in terms of timing, cost and recovery need to be undertaken of the samples under consideration. Probability of Default associated with a list of exposures like Country risk, Currency risk, Market Risk, Operating Risk, Interest Rate Risk, etc may have to be arrived at. Exposure at Default by analysing the cash flows to each factor like amortisation schedule, PPAs, Tolling Agreement, Indexing Contracts, Hedging, Takeouts, Reserve Accounts, Offshore Escrow, Construction Incentives etc., can be arrived at by statistical simulation of project’s operating characteristics. The Expected Default Probability (EDF) and Loss Given Default (LGD) derived could then be mapped on to the cash flow distribution to quantify the distribution of likely losses.

A true Net Present Value (NPV) based performance measure can then be generated and pricing and portfolio performance can be compared and optimised. The project-related profitability data provides unique insights to the structuring effects in terms of the expected loss (EL) and the unexpected loss (Capital requirements), over the tenor of the project. The transaction/deal level analysis can then be consolidated across portfolios and business units with linkages established through correlation analyses. Ultimately, the institution can create a fully integrated structure for bridging together tactical responses, for instance, deal structuring, and strategic decisions for

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instance exposure to telecom projects etc. The most attractive element of having the project evaluation model in this form is it becomes a RAROC model and would tell the financier as to what extent he is risking his capital. Further, such a model has all the advantages of a RAROC based approach to risk management.

7.6 The Road Ahead

The road ahead in infrastructure financing is bound to be interesting in the days to come, especially in a developing country like India which is in the threshold of catching up with the developed nations of the world. The importance of having the requisite infrastructure in aiming for a double digit growth need not be over-emphasised. There are many learning and unlearning to be done in the process of the journey and the success of it, would lie in perhaps shortening the curve of both learning and unlearning. A mention has been made during the initial analysis of the chapters as to how experts conceptualise nationalisation and privatisation as a cycle when one analyses it in a broader time-line. If it were to be true, a fitting candidate for such a cycle could be found in infrastructure financing itself. The reference here is to the various BOT structures in infrastructure financing which by its very design transfers the ownership from the SPV (which is a private entity) to the government after the project promoter reaps his sunk cost with an agreed return on the investment. Hence, it is interesting and welcoming that no emotions are attached in promoting such concepts which are bound to stay.

7.7 Conclusion

Through this study which involved pain staking effort spanning more than half a decade of effort at analysis and understanding, a long cherished dream of undertaking application-oriented research in lesser explored area could be brought to its logical end. It has enriched the understanding of hard core research by leaps and bounds and have taken the researcher to an innumerable number of people/professionals and institutions. While thanking each one of them for their contributions, the real use of this research which has been tried with applicability as the mantra, would be more than well served if the institutions and individuals use it to their advantage.

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