Chapter 3

PROJECT APPRAISAL AND RISK MEASUREMENT IN INFRASTRUCTURE FINANCING BY INDIAN BANKS

3.1. Introduction

As mentioned in Chapter 1, the challenge before the lenders of infrastructure projects lies in evaluating the viability and bankability of a project by following proper appraisal process. The key to successful project appraisal is in ensuring that the project has passed through a stringent appraisal process and risk evaluation and that the lender should not feel that the decision to lend is merely based on “gut” feeling. Of course, it is a known fact that lenders the world over are on a learning curve and Indian Banks and Financial Institutions are no exception.

The process of project appraisal for the infrastructure sector financing adopted by Indian banks is discussed in Section A. Though the process of risk management, consisting of risk identification, allocation and mitigation is a part and parcel of the overall project appraisal process, considering its importance, those aspects relating to risk are discussed separately in Section B.

Section A

Project Appraisal

3.2. Project Structure

As discussed in Chapter 2, infrastructure project financing in India follows the project finance structure. Project financing is generally used to refer to a non-recourse or limited recourse financing structure in which debt, equity, and credit enhancement are combined for construction and operation, or the refinancing, of a particular facility in a capital-intensive industry, in which lenders base their credit appraisals on the projected revenues from the operation of the facility, rather than on the general assets or the credit of the sponsor of the facility, and rely on the assets of the facility, including any revenue-producing contracts and other cash flows generated by the facility, as collateral for the debt (Hoffman, 2001).
Broadly, the projects may be classified as: **Brown field**, which may mean the expansion of capacity of the product lines by the existing ventures or expansion by adding new product lines or further investment by the existing ventures in new technologies, or, **Green field**, which may be an entirely new industrial venture being established (Prasanna Chandra, 2003). Since most of the infrastructure projects are started out as a public private partnership and for a limited concession period, they may be considered mostly as greenfield projects (Das, 2006). Investments in infrastructure are mostly through project companies (SPVs) that rely on project cash flows rather than parental support. These projects are highly capital intensive and have long-gestation periods. They have to shoulder higher risks that need to be evaluated carefully and proper structures have to be provided for mitigation. Better understanding of the sectoral dynamics from different perspectives would help the banker greatly in his efforts to quantify and measure the risks arising out of various factors. Further, the infrastructure sector has its own unique features which are not found in the other sectors of the economy. The banker’s views on a project are based on a wider canvas and therefore s/he should appreciate the inter-linkages of the sector with socio, cultural, political and economic factors. The banker may keep in mind the historical development, evolution of the sector, key-drivers of commercialization of infrastructure, contemporary scenario at local, state, national and international levels.

In India, traditionally project financing has been carried out by bankers using the corporate finance structure. See Figure 3.1.

*Figure 3.1: Traditional Corporate Finance*
In fact, bankers lend to the sponsors who invest money in the projects. Bankers are able to get the repayment from the sponsors who have to capture the cash flows of the project. Bankers are connected to the project through the sponsors and, therefore, they have recourse on to the balance sheet of the sponsors, which means, if anything goes wrong, then the sponsors will ultimately have to bear a major chunk of the risk of the project.

However in Infrastructure, most of the financing is done on the basis of Project Finance structures as elucidated in some of the definitions in the previous chapter. The structure for financing infrastructure projects is as follows:

- As most of the structures discussed in Chapter 1, like BOT, BOLT, BOOST, etc., are of limited-duration, it is quite logical for the project sponsors to create a Special Purpose Vehicle/Entity (SPV). In the case of infrastructure projects, SPVs are formed under the Companies Act, 1956, and are therefore legally independent from the parent company. These SPVs are incorporated with the sole objective of implementing and operating the project. The SPV is different from a subsidiary as there may be two or three equity sponsors and none of them will have more than 51 per cent stake in it. Project sponsors take an equity stake in the SPV, depending on project cost and sponsors’ ability. Normally, bankers insist on an equity contribution of 15-30 per cent of the project cost. This is called “Sponsors’ Equity Contribution”. As some banks find it difficult to finance such a high debt-equity ratio, in order to increase the bankability of the projects, the government has come out with a “Viability Gap Funding Mechanism”, wherein the government or its department gives the SPV an upfront equity support in the form of a grant. However, as per the Circular dated July 2004 (NHAI, Ministry of Finance), the upfront grant cannot exceed 40 per cent of the project cost. This grant can be either a positive grant, which means the government contributes to the equity of the project, or it can also be a negative grant. Because it is bidding for a highly lucrative project the SPV has to pay upfront money to the government, as in the case of the Mumbai Pune Satellite Highway, the Delhi Gurgaon Road Project, etc. It becomes obvious, therefore, that these projects are financed at a relatively very high gearing (Debt Equity Ratio) vis-a-vis conventional projects, especially if the offtake is assured by bankable entities. The main reasons why sponsors will form an SPV would be to derisk own balance sheet from the high project leverage, create an exit option for equity investors and tax structuring. It means that for lenders there is a legal and structural separation (bankruptcy
remoteness) of the project from the sponsors and the sponsor’s cash flows are ring-
fenced from the cash flows of the project since the SPV is a focused entity with a
limited purpose (cash-flow protection). It also restricts additional debt issuances.

- The SPV thus formed would enter into contractual agreements with project
  contractors, operators, government and project lenders (together referred to as
  “Project Parties”). As explained in the last paragraph, in non-recourse project
  financing, project lenders would not have any fall back on the resources/balance
  sheet/ assets of the sponsors if the SPV fails to meet its debt servicing obligations;
  however, in the case of limited recourse financing, under certain defined conditions
  (mostly cost over-run support from sponsors till the construction period), project
  sponsors would have certain contractual obligations towards project lenders. In most
  cases of project financing, other lenders would have no recourse to the sponsors.
  Because of this, it becomes imperative that lenders examine the project proposal
given by the borrowers more carefully as the success or failure of their lending
decision would depend solely on the success or failure of the project per se and
the cash flows generated by the project rather than strength of the sponsors or
the security on offer. The objective of the contracts is to fix project-related
obligations on each project party and ensure that certain risks are allocated to those
parties that are best suited for mitigating the risk diligently. At the project
development stage itself, therefore, it is important for the bankers and legal councilors
to advise the sponsors and SPV on appropriate risk allocation and to ensure that a
robust legal and structural framework is put in place.

3.3. Key Project Parties

As the project moves from the development phase to the financing stage and thereafter to
construction and finally operations, several project parties get involved with the project. It is
therefore important for the lenders to identify these parties so as to have a robust contractual
framework which would include all the parties who have a stake in the project.

3.3.1. Project Sponsors: Project sponsors are responsible for converting a concept into a
project and have a role in setting up the project vehicle, identifying and recruiting the right
managerial talent to implement and run the project, providing a clear mandate to such
management on their expectations, and, finally, subscribing to a portion of equity in the
project vehicle. The acumen and financial strength of the sponsors are critical as the
management team put up by them should have the relevant skills and experience in the project area and, in case the project gets into trouble, the sponsors can also infuse additional equity.

3.3.2 Project Vehicle: The SPV is responsible for delivering a bankable project during the financing phase, implementing the project and thereafter operating it in a manner that is financially viable. It selects and appoints all the project contractors, negotiates and executes the contracts, raises the necessary finance, supervises construction and commissioning and ensures smooth operation of the project either directly or through an Operations and Maintenance (O & M) Contract.

3.3.3 Project Lenders: Project Lenders provide debt to finance the construction of the project. Typically a consortium of project lenders, led by a “Lead Bank” ascertains the bankable project cost, and, in consultation with the SPV and the project sponsors, arrives at a “Means of Finance” to finance the same. They disburse the debt in stages and perform a monitoring role during the construction phase, and, on commissioning monitors the performance and operation of the project till all the debt is repaid. Project lenders are secured by project assets and do not normally interfere in the day to day operations of the SPV. However, under conditions of default, the project lenders’ rights are invoked. Lenders normally sign a “Substitution Agreement” with the sponsors and SPV, as a part of loan documents which gives them the rights to look into the SPV’s and management’s structure and they can then resell the equity to a third party which can carry forward the project profitably.

3.3.4. Engineering Procurement and Construction (EPC) Contractor: Typically the EPC contractor designs the project, procures all the engineering skills and equipment to construct the project, erects all the project facilities, ensures that the test and trial runs are completed and finally commissions the project, all on a “Fixed Time-Fixed Price” basis. The EPC contractor’s key objective is to deliver a project as per predefined specifications within a certain cost and time frame. It also provides for performance guarantees to the SPV. It may choose to subcontract certain portions of the assignment to other contractors but such subcontracting does not relieve it from its sole responsibility of delivering a completed project to the SPV.

3.3.5. Operations and Maintenance (O & M) Contractor: As the name indicates, the O&M contractor is responsible for operating and maintaining the plant in line with industry
best practices. Performance parameters that need to be achieved during operations are predefined in an O&M contract and the O&M contractor provides managerial skills and operations experience to achieve and even surpass the agreed parameters.

3.3.6 Government: The Government is a key project party. A particular government department or agency will grant the concession to the SPV to set up the project and ensure that a proper legislative and regulatory framework exists that allows the concerned SPV to compete on a level playing field along with existing, possibly government-owned entities, in the same area. In some cases, like the electricity generation sector, the state governments have counter guaranteed the performance of off-take obligations of the State Electricity Boards (SEBs) and in certain cases the Central Government has counter guaranteed the performance of the state Government.

3.3.7 Suppliers: The Suppliers are critical during the project development stage. Usually the EPC contractor ties up with the suppliers of materials prior to the construction phase. For instance in a power project, suppliers of raw materials for power production are critical. Supply of coal for thermal power plants has to be tied with the Coal Corporation, and then, if the power plant is not located at the pithead, transportation of coal also needs to be arranged. There are examples of many power plants which have defaulted on payments because supplies of inputs were not provided on time. A glaring example is the case of Dabhol Power Plant which had to be shifted from Gas-based power plant to Naptha, which is a costly source of fuel, thus raising the cost per mega watt of power produced.

3.3.8 Off-takers (Customers): There are two kinds of projects in terms of off-takers. One, where off-takers cannot be defined like road and telecom where for demand projections we have to fall back on historical traffic/tariff studies and there are projects like power, where the off-taker is the State Electricity Board. Once the off-takers are defined we can have a "Take or Pay" kind of agreement with them, which means a certain predefined payment will be made (under defined conditions) even if the off-taker is not able to buy the infrastructure output. This structure of a project is represented in Figure 3.2.
3.4 Key Project Documents and Contracts

The project company/structure defined in the previous section is unusual in the sense that it is set up to undertake a single project. From the perspective of a banker, documentation will be the primary evidence in case of any dispute with the borrower. Documentation will be useful to prove bank's claims/charge against legal representatives, liquidators, official receivers, etc. Correct documentation may also lay bank’s prior charge against the government, other creditors, etc. In the case of disputes referred to a court of law, documentation will help in proving the bank’s case against the defaulter. The party to a project will agree to assume risk at a reasonable price only if s/he understands that risk clearly. Hence project finance is appropriate only for projects like power stations, roads, railway lines, airports and telecom networks that involve established technologies. Correct documentation at the development stage helps in monitoring the project during the construction and operation stages as it lays down terms and conditions for operational performance that is legally binding. However, project finance may not be suitable for projects that involve complex or unproven technologies as suggested by the inability of the UK Government to arrange project finance for research and development projects (Chandra, 2002).

There are two major categories of documents in any Infrastructure Project. They are Project Documents and Financing Documents.
3.4.1. Project Documents

3.4.1.1. **Concession/License Agreement:** This is the first agreement that the project SPV signs through bidding or a tender system. It is an agreement with the government granting the right to the project vehicle to develop the project. It is called by the name of Concession Agreement in Road Projects; Licensing Agreement in the case of Telecom projects where licenses to particular circles are bid by the telecom service providers; Operations, Maintenance and Development Agreement (OMDA) in the case of Airport Privatization. The concession agreement delivers the project site to the private developer. Usually in the concession agreement the government/public body agrees to meet the Rehabilitation and Resettlement (R& R) expenses, if any. The concession agreement specifies the term of the agreement – say 12 years – in case of 6-laning road projects and also specifies the termination rights in the case of end of concession period or force majeure closure in the event of political/non-political disturbance. It lays down the technical specifications and terms and conditions for any direct agreement of the state with the SPV called the State Support Agreement (SSA) which mitigates political risk to a large extent.

3.4.1.2 **Shareholders’ Agreement (SHA):** This is the agreement between all the shareholders of the SPV, including project sponsors who propose to establish the shareholding pattern and the shareholders’ representation in the management with minority protection rights, if any. It clearly establishes the decision-making process in reserved matters. From the bankers’ point of view, shareholders’ agreement clearly defines the cash calls and remedies available against funding defaults by the shareholder. In case of disputes, the agreement defines the shareholders’ exit process and Right of First Refusal (ROFR) to other shareholders.

The Shareholders’ Agreement is critical as it ensures that equity funding is fully tied up and available to the SPV as per its financing requirements. It attempts to ensure the smooth functioning of the SPV and ensures that certain decisions are made with the concurrence of all shareholders as opposed to simple majority of the SPV’s board. It lays down a simple process by which a shareholder can monetize his/her shareholding and the rights of other shareholders in such an event. This helps the banker in clearly resolving disputes between shareholders once the SPV starts getting profits. It also prevents the project from suffering losses on account of shareholders’ apathy, as it defines their rights and responsibilities clearly.
3.4.1.3 Engineering Procurement and Construction (EPC) Contract: It is an agreement between the SPV and the EPC contractor that establishes the sole right of the EPC contractors in designing, procuring, constructing, testing and finally commissioning the plant/facility according to specifications laid down in the contract within a specified date and at a certain cost. It lays down guaranteed and minimum performance parameters which the EPC contractor will need to achieve. It also fixes the responsibility of the contractor to rectify/modify the plant if it fails to meet the guaranteed performance parameters and penalties/liquidated damages. Liquidated damages are also used against time overruns, if any, by the EPC contractor. Typically liquidated damages are capped at 20 per cent of the EPC contract value. Once the project is executed, and, if during the post-commercialization period any defect in the design of the road/plant is found, the EPC contractor is liable to pay the Defect Liability.

A well-drawn up EPC contract protects the project against time over-runs and cost escalations particularly if it is a fixed-time fixed-price contract. Still a limited cost over-run support is sought by the bankers from the sponsors. Therefore, the selection of the EPC contractor is critical; and in the power sector it becomes mandatory to select a qualified EPC contractor through the international bidding route. However, in the road sector it is often seen that the SPV awards the EPC contract back to one of the sponsors since it is observed that many sponsors of SPVs in road projects are construction contractors themselves. Presently, in certain power projects the EPC contracts are not awarded at all, as they are developed on Boiler Turbine Generator (BTG) basis, and also because the sponsor of the SPV procures the most critical parts on individual contract basis. This happens only when the sponsor has an extremely strong track record in the sector. Also by seeking warranties from the contractor, the SPV ensures that the liability period is taken care of by ensuring the availability of adequate spare parts and having repairs carried out by experienced personnel at zero or low cost.

3.4.1.4 Operations and Maintenance Contract: It is an agreement between the SPV and the O&M contractor that establishes the responsibility of the O&M contractor to operate the plant/ facility to ensure its productivity and smooth functioning. It clearly defines the maintenance obligations that will ensure that the project/facility is maintained as per the industry best practices. It also specifies the bonus ratios payable to the O&M contractor, for exceeding the predetermined performance parameters and also penalties applicable for under-achievement. The O&M contract ensures a certain level of mitigation of operating and
performance risks. Certain other sector specific project documents like the Power Purchase Agreement, Fuel Supply Agreement, Fuel Transport Agreement, and Default Escrow Account are discussed in the next chapter.

3.5 Financing Documents

The documents that govern the financing of the project as agreements between SPV and Project Lenders are referred to as Financing Documents.

3.5.1 Loan Agreement: The loan agreement, which can depend on the bank and the structure being used, may be called as the: Common Loan Agreement, Facility Agreement, Rupee Facility Agreement, Senior Loan Agreement, etc. It defines the amount and purpose of the loan and the term of the loans or repayment schedule. Normally the infrastructure loans repayment schedule is a balloon-shaped figure or step-up repayment graph. It has a defined moratorium period. The loan agreement specifies the interest rates, which because of the long tenure of the project are based generally on floating interest rates (in the case of foreign currency loans) and pegged to a benchmark like the Mumbai Inter Bank Call Money Rate (MIBOR) or the London Inter Bank Call Money Rate (LIBOR). Generally the interest rates come with a reset clause. The loan agreement defines the pre-commitment and pre-disbursement conditions, which are discussed in detail in the next section. The draw-down schedule or disbursement schedule is prepared in consultation with the 'consortium' lenders and it is specified in detail in the loan agreement. The loan agreement also clearly states the debt fees/service, representation and warranties and the conditions which may be deemed as events of default and the dispute resolution procedure to be followed in case of default.

3.5.2 Inter-Creditor Agreement: As the quantum of the infrastructure loan is large, the infrastructure debt is arranged by the process of Debt Syndication. Since in syndication the creditors to a single project are large in number, the syndicate agreement amongst the lenders is critical which helps in coordinated action by all the bankers. It also prevents action by any single lender. This agreement preserves the right of each individual lender with the borrowers by writing a procedure for the same in the agreement. The agreement specifies Lenders of Facility agents, if appointed, and the rights and responsibilities are clearly spelt out.

The Project Documents and Financing Documents along with the key contracts listed above are called "Transaction Documents" of the project.
Figure 3.3 depicts the contractual linkages discussed above. At the centre are the SPV and concerned government department/authority which is bound by a concession agreement. Lenders are contractually obligated to give funding, and borrowers (SPVs) are contractually obligated to protect the interests of the lenders. Shareholders’ agreement plays a key role in the constitution of the SPV.

**Figure 3.3 : Contractual Structure**

It works as a credit enhancer for lenders who use the provisions of shareholders’ agreements as financial covenants. Lenders and SPV give payments to EPC consortium with a contract to build and the O&M consortium is linked to the EPC consortium for handing over and taking over of the project sites. O&M contractor has the obligation to maintain operate and collect the revenues.

*The strength of Transaction Documents forms the basis of the Project Appraisal by the bankers. If all the project parties are bound by an iron-clad contract at the initial stage and all potential risks are plugged, then there is little chance of the project being unsuccessful.*

Some sector-wise critical documents are listed down in Table 3.1
Table 3.1: Critical Transaction Documents for Infrastructure Loans

<table>
<thead>
<tr>
<th>Sector Name</th>
<th>Critical Transaction Document/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Fuel Supply Agreement/ Power Purchase Agreement</td>
</tr>
<tr>
<td>Roads</td>
<td>Concession Agreement / Traffic Study</td>
</tr>
<tr>
<td>Ports</td>
<td>Concession Agreement/ Traffic Study</td>
</tr>
<tr>
<td>Telecom</td>
<td>Licensing</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>Fuel Supply Agreement/ Off-takers’ Agreement</td>
</tr>
<tr>
<td>SEZ</td>
<td>State Support Agreement</td>
</tr>
</tbody>
</table>

3.6. Project Appraisal Cycle: Stages in Infrastructure Financing

3.6.1 Development Construction and Operation Stage: Debt Syndication: Figure 3.4 illustrates the critical stages through which a project passes. It is important for a lender to understand the various stages and the implications on financing thereof.

Figure 3.4: Time Distribution of Project Effort

At the development stage itself when the SPV is formed, the type of arrangement, under PPP or any other such initiative, is also to be identified and then the bid for the project is announced. This process normally takes three to six months. The SPV does the techno-economic feasibility study of the said project and ties up issues such as location, linkages to
raw material, utilities, etc. Then the financial feasibility including debt capacity and promoters’ equity stake is identified. The project report thus prepared (3-6 months) is then presented as information memorandum to the lenders. After an analysis of the information memorandum, the bank decides whether to commit to associate itself or not with the project at the development stage itself. Herein the lender may put in various pre-commitment conditions like the signing of principal agreement enabling promoters to develop the project, appointment of Lenders’ Independent Engineer and Lenders’ Legal Counsel and ask the borrower to refer all documents to them for preparation of insurance agreements, a letter of comfort for equity contribution, cost over-run guarantee, conditions for state government guarantee and acquisition of all clearances by the SPV including Pollution Control Board certificates, clearances from Ministry of Environment, Finance, etc. Once all the pre-commitment conditions are met (2-9 months), the bankers associate themselves with the project and help in drawing up iron-clad contracts with project parties for the launch of the project. For meeting this requirement, the SPV gives the mandate to the financier (1 month) and the financier starts the syndication process for arranging the loan.

3.6.2 Syndication Process: The information memorandum along with the project structure and appraisal note (if specifically requested) is sent to the all the banks which the lead banker wants in the syndicate. Normally the syndication fee is 0.2-1 per cent of the project cost. (2-6 months). When funding certainty is critical, borrowers request for the fully underwritten bids, meaning the lead arranger commits to provide the full amount on specific terms and pricing. The alternative is a best-efforts fund raising in which the lead arranger agrees to underwrite less than 100 per cent of the loan (typically the amount it is prepared to hold on its own balance sheet after general syndication) and attempts to place the remainder in the bank market. The fees and inherent risks differ between these two kinds of deals. In the best-efforts deal (also known as arrangement), the borrower pays the lead arranger an arrangement fee for its services and pays other lenders closing fees for their commitments. Thus, the borrower takes the risk that the market does not accept the deal and so it might have to pay higher fees or spreads to entice greater participation. In an underwritten deal, the borrower pays a single up-front fee to the lead arranger/underwriter, who retains some portion as compensation for his services and uses the rest as closing fees for banks participating in the syndication. Although underwritten deals can get funded faster, the underwriting fee is generally higher than the up-front fees in a best-efforts deal because the underwriter faces greater credit and syndication risks. After awarding the mandate, the borrower and lead arranger execute a commitment letter that confirms the amount and terms of financing, and specifies the
arranger's duties and compensation. The lead arranger then engages a legal counsel to prepare an initial set of loan documents. At that point, the lead arranger and the borrower usually agree on one of two basic syndication strategies – a single-stage general syndication or two-stage syndication with sub-underwriting prior to general syndication.

In a deal with sub-underwriting, the lead arranger and a small group of banks underwrite the full amount before offering participation to a broader group of banks. The two-stage process is a way to reduce the lead arranger's overall exposure more quickly and to broaden support for a deal. The final step, known as general syndication, serves to distribute the loan to a group of invited banks that is large enough to commit the desired amount, but not so large enough as to create unattractively small loan shares or an unwieldy number of banks. Creating a supportive and cooperative syndicate facilitates making changes to loan documentation when necessary, either because exceptions arise, as they invariably do during the life of a loan, or because financial problems create a need for financial restructuring. Prior to general syndication, the lead arranger structures the syndicate in tiers according to commitment amounts, sets closing fees for each tier, and identifies the banks to be invited to participate. Each tier has a title based on the commitment amount. The most common titles are, in descending order of commitment amount: arranger, co-arranger, lead manager and manager.

The banks invited to participate are not necessarily the borrower's relationship banks, but rather banks with syndicate relationship with the lead arranger. The lead arranger prepares and sends an information memorandum containing a description of the borrower and the transaction involvement to each bank. The lead arranger then holds a meeting, with invited banks to address questions about the deal, announce closing fees, and set a timetable for commitments and closing. If the total commitments received equal the amount desired, the deal is said to be fully subscribed; if they exceed or fail to reach the target amount, the deal is said to be oversubscribed or undersubscribed, respectively. In either case, the lead arranger, often in consultation with the borrower, determines the final allocation. The commitments embody credit approvals from each bank, and as such, the lead arranger cannot increase the amounts. However, the lead arranger has the right to scale back commitments at its discretion. Each bank's final hold position is a matter of internal policy and varies based on factors such as the size of the bank, its internal credit policies on exposure to the particular client, country, or industry, and specific loan terms.
In a general syndication, the final allocations serve to reduce the underwriter(s) exposure to a desired final hold position. Given this position, syndicated finance groups perform two key functions: (i) structuring, which involves designing and negotiating deals with borrowers, and (ii) distribution, which involves selling the deal into the bank market. These two functions must work closely together throughout the process because the deal that is presented to the borrower (structuring) has to reflect terms that are acceptable to the market (distribution). When the syndication process is complete, the process of documentation starts and all project documents as discussed in the previous section needs to be signed by the respective project parties. This involves several rounds of discussions, exchange of voluminous documents, draft agreements, meetings with various participants over a long time which can run into months (3-15). Once the documentation is complete Financial Closure for the project is announced (One month from the Documentation). This means that all the funds for the project is 'neatly' tied up and the documentation is complete in all respects.

Once the syndication is complete, the bankers lay down certain pre-disbursement conditions like: Commitment of equity support by the sponsors; Trust and retentionship account, Debiting of SPV’s accounts for cost of review and Lenders independent engineer expenses. Bankers also put in certain negative covenants at this stage. Once the pre-disbursement conditions are met, the disbursements will be linked to a drawdown schedule which will be linked to certain milestones in the construction period. Broadly, these are the major factors in the Project’s development stage (Euromoney, D C Gardner, Workbook, 2005).

Key ratios like: Total Outside Liabilities to Tangible Net Worth; Current Ratio; Debt Service Coverage Ratio; Interest Coverage ratio, etc., and its permissible ranges will be used for monitoring the violations which may trigger penal interest charges.

The periods indicated (above) in parenthesis are only indicative durations, however in the Indian context, given the level of uncertainty arising out of various reasons, it will be highly difficult to fix a similar time frame. Besides, the time frame is not cumulative and can be overlapped. In any case the total period taken to complete all negotiations, in an ideal situation, may be around 12-36 months.

3.6.3. Detailed Project and Feasibility Report: Typically, the project appraisal by the banks starts with detailed presentation by the project sponsors on the proposed venture at the development stage itself. It is desirable that the lenders insist that the sponsors cover all
information, in their preliminary presentation, based on a questionnaire or application form supplied by the lenders. This would help the presentation to be comprehensive as not to miss any major points which are of concern to the lender. The questionnaire generally should cover: a brief description of the project including statements and projected statements; proposed management arrangements; names and curriculum vitae of directors of the sponsor company and of the proposed project company may also be sought. It is important to have the description of technical and other external assistance (management, production, marketing, finance aspects). The borrower must provide details of technical feasibility, manpower, sources of raw material and their cost and quality, suppliers of equipments, availability of work force and other utilities. The proposed project location in relation to suppliers, markets, infrastructure and work force is also critical. Potential environmental issues need to be identified and highlighted at this stage and also the SPV’s plans to address them. The SPV should give the estimate of the total project cost, broken down into land, construction, installed equipments, working capital and the proposed financing structure indicating expected sources and terms of equity and debt financing. Also projected financial statements, information on profitability and estimated return on investment are to be provided. The SPV presents a timeframe for project preparation and completion.

3.7. Detailed Appraisal by Banks

In the previous section, the project appraisal process flow has been briefly explained. Hereafter, the process of detailed appraisal followed by lending institutions is elaborated. The appraisal consists of several segments and can be grouped under the following four heads:

3.7.1 Management Appraisal: The lenders analyze the ‘sponsors/owners’ in terms of their past record in managing projects, performance of their group companies, their exposure and relation to the sponsoring company, level of commitment to the proposed project and their other commitments. Professional management is critical but more so is the ‘project team’ which the sponsors have put in place. The sponsors may do very well in other areas of business but the project team is the key factor for the proposed infrastructure project. Also the lenders should feel confident of the fact that the sponsors are in a position to give additional equity in case of a credit crisis. No doubt, if the sponsors have international business interests and the performance of such business ventures is good, it improves the perception of international lenders towards the sponsors. And, if the existing companies of the sponsors are listed on the stock exchange, this is a position of strength favorable in the reckoning of the
lenders as the sponsors will face reputational risks if something wrong happens with the proposed project. At this point, it may be critical to evaluate the sponsors, especially if there are two or more, in the SPV to ensure that there is no internal squabbling or business rivalry. Bankers try to address this issue by gleaning information from the documentation and shareholders' agreement discussed earlier. They also insert a clause relating to dividends not being paid at least for some years so that the interest of the sponsors is maintained in the project.

3.7.2 Technical Feasibility: Though the efficiency of the management plays a key role in project appraisal process, in the final analysis, the project structure centers on the technical feasibility. Some of the key factors that influence the selection would be proven technology, capital and operating costs and probability and incidence of obsolescence. Some of the most important technical aspects that need to be addressed are: age, availability and appropriateness of technology; the reputation and basis of selection of equipment suppliers; the terms of supply including the liquidated damages and defects liability discussed above. Keeping in mind the complexities involved in technical appraisal and due to lack of in-house expertise, lenders often engage the services of knowledgeable outside consultants who are experts in their own right to assess the veracity of the claims and estimates made in the technical feasibility study. These independent consultants are called Lenders' Independent Engineers (LIEs) and Lenders' Legal Counsels (LLCs) to look into the validity of claims and contracts. The LIE can be appointed for different phases of the project – for Project Review, Assessment (Date of appointment till closure), subsequently for Construction monitoring and Performance Testing and so on. Some banks also engage them for an optional annual review. It is critical for the lenders to understand that in conventional projects they may still accept the various assumptions given by the borrower on cost of inputs and overall cost of the project. Here each element of the cost submitted by the borrower needs to be vetted by the LIE. If the deviation is more than 5 per cent between what the borrower has predicted and what the LIE has assessed, then the appraising officer needs to investigate as to the reasons thereof. Also in the case of certain road projects when the sponsors themselves get the EPC contract, there may be instances of cost pad-up which needs to be looked into. Normally, the cost of EPC contract must be in the range similar to that of EPC contracts executed for similar projects and this has to be verified by LIE. Besides this, there are numerous studies that LIEs do to assess the techno-economic viability of the project.
In the technical analysis all the contractual aspects of the project like statutory clearances, environmental clearances and project contracts such as EPC, O & M, off-take agreements, raw material supply, transport and credit worthiness of the off-taking party needs to be assessed as well. While these independent consultants do bring value-addition to the project appraisal process and command a good respect among the lenders, the latter however cannot wish away the potential risk arising out of inadequate appraisal of the technical aspects. The lenders should exercise due caution and be judgmental on such independent aspects. Additionally, the lenders usually obtain expert views on tax and accounting matters.

3.7.3 Commercial Viability: Commercial viability of an infrastructure project is the bedrock of private participation. Private participation in infrastructure project would become a non-starter if there is no possibility of the project being structured on commercial lines. The whole issue here is being discussed under the presumption that projects are amenable to commercialization. In other words, like in the case of any other corporate project, the project company should be able to earn a return on investment that is comparable with other alternatives available to the prospective investors. Though infrastructure projects are unique in several ways, the common thread that binds them together is the "return on investment". It is, therefore, natural for the lending institutions to look at the viability of the project especially from the profitability angle.

While in the case of corporate finance it is easy for the lending institutions to take a view on the commercial viability, in the case of infrastructure projects it is more complex. This is so because, while in a typical corporate environment, the return is primarily driven by the demand-supply price equation for the end product, it is not so in the case of infrastructure projects. In infrastructure projects, the return on investment is the function of several external factors such as government policies, regulatory interventions, price fixation, public interest, etc. Primarily, the appraiser should analyze the impact of market/non-market and technical factors that would influence the commercial viability of projects.

3.7.4 Financial Appraisal: To define briefly, financial appraisal refers to the process of evaluation of viability of a proposed project by assessing the value of net cash flows and resulting interpretation. The financial appraisal aims at analyzing the volume of cash flows – outflows and inflows – and its time value. More specifically, financial appraisal involves evaluating the cash flow model developed by project sponsors from the lenders’ perspective and the process of taking a view on the integrity of the said model. Most often the sponsors
prepare the cash flow model with an upside attitude. It is at this stage that lenders impute their risk perception about the project into the cash flows and judge the downside of the project. Thereafter, the lenders will temper the projections to reflect their assessment and prepare a "Base Cash Flow Model". Thus, financial appraisal is an effective and standardized tool to bring in a level of tolerance in cash flow projections, which the lenders find comfortable, and remove uncertainty. It is an important stage in the detailed project appraisal process.

3.7.4.1. Financial v/s Economic Appraisal: Financial appraisal differs from economic appraisal in the scope of its investigation, the range of impact and the methodology used. The financial appraisal essentially views investment decision from the perspectives of the organization undertaking the investment including lenders' interest. It therefore measures only the direct effects of an investment decision on the cash flows of the organization. By contrast, an economic appraisal considers not only the impact of the project on the organization sponsoring the project, but also considers the external benefits and costs of the project for other government agencies, private sector enterprises and individuals – regardless of whether or not such impacts are matched by monetary payments. Usually financial institutions evaluate the Social Cost Benefit Analysis (SCBA) for large government projects. Two approaches suggested by UNIDO and Little Mirrless are popularly used for this purpose. In India in the days when large public development projects were being sanctioned, the IDBI partially used the Little Mirrless Approach for calculating the shadow economic costs by using social conversion factors for both tradable and non-tradable commodities. Currently it is not much in use for large PPP projects.

Financial appraisal also differs from economic appraisal in that the market prices and valuations are used in assessing benefits and costs, instead of measures such as willingness to pay and opportunity cost. The discount rate used represents the weighted average cost of debt and equity capital rather than the estimated social opportunity cost of capital. The discount rate and the cash flows to which it is applied are usually specified on a nominal basis as the cost of debt and equity is observed in only nominal terms.

The various steps in conducting a financial appraisal are as follows:

3.7.4.2 Cost of the Project: The lenders must determine the accuracy of cost estimates, suitability of the envisaged pattern of financing and general soundness of the capital structure.
The following aspects need to be analysed for impact:

3.7.4.2.1 Itemized cost of the project: Conceptually, it is the total of all items of outlay associated with the project which are to be supported by long-term funds. Inaccurate estimate of the total project cost, i.e. either underestimated or overestimated cost projections will have an adverse impact on the ultimate course of the project. Under-estimation will inevitably lead to a cost overrun and hamper the project's implementation because of the likely delays in obtaining additional funds at a later stage for matching the overrun. Over-estimation, on the other hand, will inflate the total project cost and thus affect its financial strength. The assessment of capital cost of the project involves a vigorous check on the financial projections provided by the sponsors with regard to the following aspects: Padding or underestimation of costs; specification of machinery; credibility of various suppliers; allowances for contingencies; inflationary factors and estimation of the working results. Projections supplied by the promoters regarding the sales, realizations and profits are assessed by checking whether a realistic market demand forecast has been given. Price computations for inputs and outputs are based on current quotations/estimations and inflationary factors. It is to be ascertained whether appropriate time schedule for capacity utilization has been given. Cost projections are to be distinguished between fixed and variable costs appropriately.

3.7.4.2.2 Means of finance: It requires analysis of proportion of Equity (owned funds) and Debt (borrowed funds) to finance the entire cost of the project. The gearing depends on type and size of the project, capital intensity, promoters' capacity, importance to national economy. There is no standard for project debt/equity (D/E) ratios prescribed for any project. One of the deciding factors of the D/E ratio is the debt servicing ability of the project. In the case of infrastructure companies, the D/E ratio is generally higher. Power-sector financing guidelines issued by the Government of India allow leveraging up to 4:1 (viz. 80% debt); however, lenders are usually comfortable with 70:30 (i.e. 2.33) ratio. In most non-infra projects, D/E ratio of more than 1.5 is also considered high. Equity represents long-term capital provided in exchange for shares representing part ownership of the company. Equity holders are primarily sponsors and minority investors. Investment is in the nature of equity or preference shares. In case of availability of state subsidies, it is taken as capital. In order to promote investment in particular sector or region, the State or Central Government accords financial concessions basically towards supporting the viability of the project as far as the developer is concerned. The banker needs to examine their riders and compliance requirements. As
subsidy is basically public money being allocated, a number of compliances would need to be taken care of before funds can be drawn, e.g. draw on reimbursement basis. The borrowed funds are generally term loans which are usually termed as / take the form of senior debt and are sourced from banks / financial institutions – domestic / overseas – either in the form of consortium or multiple banking. It requires interest and principal servicing at monthly / quarterly intervals, subject to restrictive covenants / prudential norms.

3.7.4.2.3 Capturing cash flows: While negotiating the terms of the loans, it is also pertinent to factor in a repayment profile that matches with the inflow profile. The repayment profiles could be Equal, Front-ended, Back-ended, Ballooning, Bullet or Equated. The borrowed funds can be unsecured loans/deposits and Subordinate debt; these can be considered as quasi-equity. Subordinated debt represents finance with repayment priority over equity capital but not over commercial bank loans or senior debt in the event of default or bankruptcy. Such debt is usually provided by sponsors and has an outlined schedule for payment of interest and repayment of the principal. As all payments are subordinate, the contract may contain provisions for sharing up-sides. The timing of infusing owned/borrowed funds depends on the phase of development of the project. Equity is infused in the early stages of development, while debt financing follows after financial closing. It is critical to determine the extent of profitability of the project and its sufficiency in relation to the repayment obligations pertaining to debt assistance and servicing of sponsor’s interests. The entire transactions of the project are routed through Trust and Retention Account (TRA) where payments/disbursements are done during operations as per the agreed pattern. A waterfall mechanism is shown below in Figure 3.5 wherein sub accounts and specific charges are created on the main account, implying that revenues of the project must meet the operating expenses, administration costs, debt repayments, then Debt service reserve account wherein two or three quarters’ installments are kept as cushion against default and then finally the sponsors can have access to the profits. Unless the previous bucket is full, the money will not flow into the next one. Working capital needs are assessed by the Second Method of Maximum Permissible Bank Finance wherein the borrower will contribute 25 per cent of the working-capital gap; the remaining 75 per cent is to be financed from bank borrowings. This method gives a current ratio of 1.33 : 1. Some banks use the turnover method for credit limit upto five crores and cash budgeting method for seasonal industries as well.
3.7.4.2.4 **Financial analysis: rate of return:** The advantage of financial appraisal is that the viability of projects can be established by effecting minor changes in certain assumptions such as: growth rates, cost structures, residual values, etc. (often up to second or third decimal point). However, financial appraisal remains an extremely important step, as it is the yardstick which influences the decisions of the lenders. Secondly, the sensitivity and scenario analysis conducted as a part of such studies forms the basis for identifying the crucial parameters for the success of the project. Lenders tend to monitor the project progress through these milestones and parameters.

In case the of sectors involving standard technologies and based on numerous projects experiences, norms are available for most of the parameters like: gestation period, build up of capacity utilization, the unit project cost, cost structure, etc. However, in the case of other projects, such financial analyses often tend to be based on an aggregation of reasonable assumptions. Lenders rework these projections based on the 2 or 3 parameters where they have standardized assumptions. This could be built up on the basis of capacity utilization, power tariff per unit, etc.
In day to day practice however, the lending institutions have their own independent criteria and credit rating methodology for rating and arriving at decisions on each project. They calculate Debt Service Coverage Ratio (DSCR) and Internal Rate of Return (IRR) and all projects need to surpass the threshold ratio to be eligible for funding.

Financial ratios are used widely to take a view on the adequacy of cash flows as projected by promoters. Some of the important ratios are given in Table 3.2.

Table 3.2: Important Ratios for Infrastructure Finance

<table>
<thead>
<tr>
<th>Long Term Debt Equity Ratio</th>
<th>Long Term Debt / Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest Coverage Ratio</td>
<td>Profit before Interest and Taxes/ Interest Payments Due for the Year</td>
</tr>
<tr>
<td>Fixed assets Coverage Ratio</td>
<td>Fixed Assets / Term Loan and Other Long-Term Debt Obligations</td>
</tr>
<tr>
<td>Debt Service Coverage Ratio</td>
<td>Profit after Tax + Interest + Depreciation/ Interest Payments + Principal Payments</td>
</tr>
</tbody>
</table>

The above-mentioned ratios are not mandatory. A certain degree of flexibility is shown on the basis of the nature of the project, risks inherent in the project and the status of the promoter.

An appraising officer is required to give scores on all the parameters of the above appraisal criteria discussed above. The scoring is based on predefined cut-offs, but flexibility is exercised depending on perception and judgment of the appraising officer. Besides, the values are also the functions of the overall risk perception. A rating is assigned to the project based on the scores allotted on all the above criteria by the appraising officer. A cut-off rating determines whether to finance the project or not. Based on this and the other project characteristics, the final terms and conditions of financial assistance are decided upon.
### 3.7.5 Summary of Key Issues for Appraising Projects in Each Sector

**Table 3.3: Key Review Issues for Appraisal across Sectors**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Key Review Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roads</td>
<td>Traffic study and its sensitivity analysis by a reputed consultant; Ballooning structure for repayment; Cushion in tenure between life of concession period and repayment schedule; Major Maintenance; Reserve account and success fee.</td>
</tr>
<tr>
<td>Power</td>
<td>Type of plant; Load factor; Technologies used; Power purchase agreements/Contingent buyers; Availability of fuel; Linkages with networks in transmission; Pancaking; Congestion; Distribution losses; Multiple licenses; Political issues.</td>
</tr>
<tr>
<td>Telecom</td>
<td>Upfront license fee; Technology risk, Cost and time overrun; Right of way in laying cables; Spectrum and congestion; Network rollout; Subscriber base; Average revenue per unit (ARPU); and Minutes of usage (MOU).</td>
</tr>
<tr>
<td>Port</td>
<td>Draft plan of the port; Firm user linkages for revenue projections; Traffic study based on hinterland connectivity; Port operator has to be a participant; O&amp;M on account of mechanization; Landside logistics; Containerization in terms of Twenty Feet Equivalents (TEU) as expected; Container freight stations (off-dock); and Inland container depots.</td>
</tr>
<tr>
<td>Airports</td>
<td>Degree of asset control is minimal; Developers have a right to operate; Perpetual Debt; Continuous capital expenditure <em>(mandatory capital expenditure to be funded by equity)</em></td>
</tr>
<tr>
<td>Urban Infrastructure</td>
<td>Limited financing transactions based on recourse to specific revenue streams; Pooled financing – a single entity raising finance to fund a group of municipal bodies.</td>
</tr>
</tbody>
</table>
| Special Economic Zones | Project with implementation risks and market risk  
R & R and occupancy important elements for SEZ projects |

### 3.7.6 Security Documents

Drawing up security documents is an important part of financing procedure. They protect the lenders in the event of default by the borrower. The document defines the claim of senior lenders over the subordinate lenders. In times of crisis, it allows lenders to assume control over the project assets. The assets which are available for security are: land, buildings, plant, and equipment of the SPV or project assets besides receivables and book debts and other contractual rights and intangible assets.

*The security documents generally involved in Infrastructure projects are the following.*
3.7.6.1 Mortgage Document, Deed of Hypothecation: As most of the assets which are available to be offered as securities are project assets, these come under the concession agreement and will be with the government department. There is little by way of tangible security which is created. The assets which are available for security are land, building, plant and equipments, bank accounts and receivables of project assets. Trust and retentionship account described earlier is a part of security structure.

3.7.6.2 Share Pledge Agreement by the Sponsors: Normally the lenders insist of pledging of the equity of sponsors in the project’s SPV; however, in certain cases they have to be satisfied with negative lien, which is not exactly a charge.

3.7.6.3 Assignment of Key Contracts: Concession agreement, Licensing Agreement, Insurance contracts, Off-take agreements, Construction contracts, etc., are all assigned to the banker. In the light of lack of tangible security, the assignment assumes importance in infrastructure finance. Various guarantees are sought for mitigating risks such as: from sponsors - the completion guarantee; from concessioning authority - termination payments and force majeure guarantees; from insurance company - damages; from project contractor - construction guarantee; from O & M supplier - Performance guarantee; similarly other guarantees. The deed of assignment of contracts will attract ad valorem stamp duty. Assignments are included as a part of English mortgage law. Stamping authorities do not levy additional stamp duties.

In the next section, risk identification, mitigation and measurement are discussed.

Figure 3.6 Risk/Security Package
Section B

Measurement of Risk

3.8. Assessment of Risk

It is amply clear from the discussion so far that infrastructure projects are highly risky, and, in fact, its risk factor is one of the most important distinguishing aspects compared to traditional asset-based corporate lending. The project investments are very large, complex to plan and build, and, more importantly, the lenders will have limited or no recourse to the balance sheet of the sponsors or the project company. These and many other issues articulated earlier inhibit lenders from assuming a variety of risks.

Risk is variability in cash flows from what has been projected. Risk can best be represented by a Chinese symbol which means both “Danger” and “Opportunity”. Upswings as well as downswings from the base denotes risk in finance (Damodran, 2003)

The risk-related issues assume increased importance for the Indian banks especially in the Indian context. As already mentioned, private project companies in India are on a learning curve and so are Indian banks. While taking exposure to infrastructure projects it is essential that banks do not add to their legacy of poor balance sheets in the form of Non-Performing Assets (NPAs) which is already enormous and alarming. In this scenario, it becomes critical that both project companies and project financiers appreciate the importance of understanding and managing the project risks. In this section, issues relating to managing project risks, which primarily consist of risk identification, allocation and mitigation, from lender’s perspective have been discussed in detail.

3.8.1 Risk Identification: The first step in the assessment of risk is the Identification of Risk drivers in a project. A risk driver is the factor which will have an impact on the cash flows of the project (Balu, 2002). The risk driver will have direct impact on risk variables which can be cost, revenue, and completion time. The fluctuations in any of these variables cause deviations from the projected cash flow statement given by the borrower.

The project risk can be broadly classified under the following heads:

♦ From stakeholders’ point – sponsors, lenders and the government.

♦ Based on project phase – construction, start-up and operation.
• External Environment – market and industry risks which can be: macroeconomic policy changes, interest rate changes, financial system changes or any other such changes that would affect the whole market as such.

• Project specific and sector/industry specific – this research will focus on measurement of project specific risk from the banker’s point of view.

• Financial and non-financial factors – capital Mix Factors like Debt Service, Liquidity, Cost of Capital (COC), Break-even Point, Foreign Exchange and Cost overruns

The above categories are based on certain parameters, and, a particular type of risk may fall under more than one category. Since every type of risk has an impact on the overall success of the project and on its cash flow, lenders are required to identify and analyse threadbare their possible effects on the project. The major elements of risk and their mitigation mechanisms are discussed subsequently.

3.8.2 Market Risk: The long-term market outlook of the infrastructure service, the size of the market, geographical spread and growth, counterparty risk and whether the service is economical for the off-taker will have also an impact, particularly in the case of power projects. Sustainability of pricing, variability in cost structure, input price risks, foreign currency exposure, level of competition, types of entry barriers (location/technology/size) and risk of product substitution are other important market risks.

3.8.3 Asset Liability Mismatch: Banks usually carry short-term liabilities. The infrastructure loans are long term in nature, usually 10-12 years. The present financing structure is usually 70 per cent debt and 30 per cent equity – the debt portion comes from the banks. In order to address Asset Liability Mismatch related issues, the world-wide practice is to have bond financing either at the initial stage or, more often, project finance being taken out off-bond financing after commercial operation.

3.8.4 Project Specific Risk Identification: Based on international experience, lenders identify a typical set of risks which are found in all types of projects, viz. road, power, telecom, etc. Although efforts have been made to collate a detailed list of risks, it can only be illustrative and not exhaustive. In this dynamic world, depending upon the circumstances, new varieties of risks arise constantly and appropriate strategies are being adopted by the lenders. There is no single parameter or measuring instrument to identify risk, rather, it depends more on knowledge and experience of the lenders. Each project has a different set of
risk profile, and the magnitude of risks will differ from project to project. In general, however, there are key areas of risk which every lender should be aware of and these should be kept in mind while appraising the project.

The whole exercise of identification, allocation and mitigation of risk followed by lenders is explained in detail in the following paragraphs.

3.8.5 Risks at the Development Stage: Lenders in certain circumstances do assume pre-completion risk for projects. Particularly when the borrower is preparing for the bidding process, as it happens in Ultra Mega Power Projects (UMPPs), lenders may question the bid risk, that is: Will the borrower be able to service the costs of bidding? However, acceptance of pre-completion risk is by no means the norm. Often lenders will require some kind of external recourse until completion, such as guarantee from third parties, like the owners of a project-owning joint venture company. The level of pre-completion risks involved is modest.

3.8.6 Risks at Construction Stage: This is also referred to as completion, development or cost-over-run risk. In an ideal situation, the lender should avoid all construction risks. The most common risks at this phase are: Time Overrun Risk, Cost Overrun Risk, Performance Risk and External Parties Risk. The lender would like to ensure that there is no cost or time over-run. Any start-up delay would have a serious impact on the cash flows and debt servicing. This risk will be the highest in the case of new or untested technology. Lenders look towards experienced sponsors for support in such cases.

Lenders use two methods of ‘completion test’ to deal with this risk. First, they will seek to minimize this risk by insisting on fixed-price “turnkey” contracts to be negotiated with the contractors. They will also analyse whether the various contractors are financially sound and whether their obligations are covered by performance bonds or third-party sureties. Second, a more common assurance is the performance completion test which might have all or some of the following of components:

- Continuous operation for specified months.
- Specified percentage of capacity utilization or throughput achieved.
- Ensuring a defined operating cost per unit of the end-product.
3.8.7 Sponsor Risk: This is also known as participant risk. Sponsor risk is closely associated with completion risk. The lender's view on completion risk will be strongly influenced by his view of sponsor risk. Sponsor risk may be broken down into two elements:

(a) Equity commitment,

(b) Corporate strength and experience.

Regarding equity, lenders will normally require a contribution of 15 to 50 per cent of the project cost to ensure the sponsor's continued commitment. Regarding corporate substance, regardless of whether the lender is seeking pre-completion guarantees from the sponsor or not, the banks, not surprisingly, like to work with corporate sponsors who have substantial technical expertise and financial depth. Lenders will allocate and mitigate risk through several structures, such as joint venture agreement, contingent financial support, benchmark financial ratios or cross-collateralization and cross-default clauses.

3.8.8 Risks at Operations Stage

3.8.8.1 Demand Risk: There may be two types of projects – One that will have single / few buyers (Power) where the lender may have to use a 'take or pay' contract to meet the debt service or multiple or numerous buyers of the output (Airport, Telecom, Toll-Roads) where historic traffic survey is the only way to mitigate the risks.

3.8.8.2 Technology Risk: Lenders should pay a great deal of attention to technology risk and they should limit such risk and if possible avoid accepting risks, as these should be borne by the equity owners of the project. Any technology, which is at the "cutting edge" currently, will definitely be placed in this category. As new technology becomes more established, the lenders become comfortable with the predictability of the processes involved and may even occasionally be inclined to accept such technology risk.

Lenders can address this risk by ensuring that the technology being used has a satisfactory track-record, that the contractor building the project has experience of working with the technology, and ensuring the existence of adequate guarantees and warranties which have been negotiated. Lenders should also look into the ease with which maintenance and, if necessary, component replacement can be carried out. They should also ensure that the availability and efficiency levels projected can be easily achieved. Lenders may also require the opinion of an independent technical consultant for the project. Technology risk can be
addressed through Technology Insurance, Quality Assurance Contracts, and Business Interruption Insurance.

3.8.8.3 Management (Personnel) Risk: Management risk refers to the risk pertaining to key personnel, other than sponsors, who are responsible for the administration of the project. This risk can be addressed by ensuring that the key management personnel possess the requisite expertise, skill and knowledge in handling the technology being used. Any abrupt exit of key personnel may also pose a risk to the project. This risk can be allocated through devices such as Key-man Insurance, Management contracts, Training agreements, etc.

Many a times, lenders may be reassured by the employment by the project sponsor of a third-party operations and maintenance (O&M) contractor. Contracting through his specialization and experience with other similar projects can be a better solution as compared to the project company employing specialists on their own unless otherwise warranted. If the lenders are not convinced about the sponsors’ ability to manage the project, they may insist on an O&M Contractor even if it involves higher cost.

3.8.8.4 Cost Risk Component: This risk refers to the increase in expenditure on direct (material and labour) and indirect expenses (overheads) because of inflation. Escalation provisions are the most commonly used tools to cover such risks. Cost risk can be covered through devices such as ‘complete cost pass-through’, fixed price with escalation built in, published price or index price.

3.8.8.5 Supply Risk: The price and supply of the raw materials or other inputs to the project should be capable of being forecast and incorporated into the cash flow model. Supply risks are acute in case of power projects. Where there is a distinct (finite) supply of fuel for a project, bankers will look for an independent corroboration of the sponsor's reserve figures by a reputed consultant. Given the risk-reward relationship the banker has with the project, he will typically wish to concentrate on the "core" reserves which have the highest degree of certainty so that his debt is repaid well within the predicted economic life of these reserves. The project sponsors should be required to demonstrate the security of supply arrangements, including the basis of pricing of the fuel. The sponsors' presentation should show that the assumptions made relating to the quantities and pricing of fuel are conservative and that even on this basis the proposed debt can be retired with a significant margin of safety.
In a road or port project, this risk pertains to whether the road users will pay the toll. Lenders can address this risk by scrutinizing closely the traffic/throughput studies already done by the sponsors, and, if necessary, by arranging for independent studies and also by properly assessing the competing or alternate routes. In the case of fuel, lenders can insist on agreements with the sponsors for a supply undertaking or depletion protections.

3.8.8.6 Off-take and Sales Risk: This risk, also referred to as market risk, arises due to change in the demand for the end-product, which then has a direct impact on the project’s cash flows. This risk may occur due to fall in sale price or demand or drop in market share due to competition. This risk may also arise when sales are cancelable after a period due to the failure to abide by the terms of the agreement. The quality of market survey and analysis, revenue and margin projections plays a pivotal role in addressing such risks. Often the projections made by the sponsors are over-optimistic and, therefore, the lenders should take an independent view of the market conditions, and, if necessary, engage private market survey companies to carry out a consumer-demand study.

The risk is best addressed by the sponsors through long-term off-take contracts extending beyond the end of the loan life. Typically, the agreements take the form of ‘take-or-pay’ or ‘take-and-pay’. The contract should provide for all future eventualities such as inflation, price escalation, etc. In the case of power projects, it is common practice to have ‘power purchase agreement’ (PPA) where the buying entity is often a government undertaking. A PPA specifies clearly the power purchasing price or the method of arriving at it. Although, the price may not be fixed explicitly in the agreement, as long as variables determining the price are clearly defined, the PPA should address this important risk.

One more way of mitigating off-take risk is through ‘Escrow Account Mechanism’, by which a part or the entire project’s cash flows are channeled for the purpose of servicing the debt. The lenders will normally enter into a tripartite agreement with the project sponsors and the banker to exercise control over such escrow account. More often, the lenders will seek assurance from the project company and work out the escrowable capacity by identifying the major/larger customers of the project sponsors who can contribute substantially to the project cash flows. In the Indian context, this mechanism has been widely used in several independent power projects.

3.8.8.7 Transportation Risk: Quite often due to severe constraints in transportation – be it road, railway or shipping – the project, though well structured, may become non-viable and
uncompetitive. Material handling costs, delivery costs and transmission costs may be prohibitive, adversely affecting the project. This problem may be more acute if the government is the transportation provider, as in the case of Indian Railways, and Indian shipping. In Chennai, for instance, a wind-energy generation project failed a couple of years ago because of non-availability of cost-effective power transmission lines.

This risk can be addressed by having sales contract, where the responsibility of lifting the end product, at whatever the cost, lies with the buyer. Project companies can also enter into an agreement or sign memorandum of understanding to ensure that the necessary transportation facilities are provided by the government.

3.8.8.8 Environmental Risk: In the light of increasing global consciousness on environmental issues this risk has assumed significant importance. Lenders world over (especially European and American) pay close attention to the project company's ability to manage the environmental issues. Multilateral financial Institutions like, International Bank for Reconstruction and Development (IBRD) and International Finance Corporation (IFC) have brought out very stringent norms on environment protection and conservation for project companies seeking their funding. For instance, IFC has established procedures to guide its operations and address environmental matters. In 1994, after consulting its staff, shareholders, clients and non-governmental organizations, it had implemented a revised environmental procedure that clearly defined the roles and responsibilities of the staff and project sponsors, and strengthened the requirements for public disclosure of environmental information about the proposed projects.

The project company should not proceed without proper environmental clearance from the appropriate authorities. This risk should be addressed by project company at the planning stage itself, keeping in mind the impact of the proposed project on heritage sites, native reserves or on the population. Some of the risk allocation devices in this regard are:

- Rehabilitation Guarantee provided to the local authorities by the project company to rehabilitate the area/population in case the plant has to be shut down.
- Environmental Insurance for any disaster, clean-up or unforeseen event.
- Agreement for Rehabilitation Waiver where the operation is benign or the area is beyond reprieve.
- Information about Public Hearing.
3.8.8.9 Force Majeure Risk: This type of risk cannot be controlled by the participants or be avoided by exercise of due care. These broadly include:

- Floods, earthquakes and other natural disasters (referred to as “Acts of God”).
- Wars, civil disturbances
- Acts of man – strikes

In projects with only private sector participants, expropriation and other political risks are often considered as force majeure risks.

Project companies take out insurance policies against “Acts of God” as a risk allocation measure. However, this may be less useful for risks arising out of ‘acts of man’ or ‘acts of governments’.

3.8.8.10 Political Risk: Political risk is mainly attributed to the omissions and commissions of the governments and local authorities. The risks generally identified are:

- The expropriation of the project facilities by the government
- Unduly withholding or delaying of granting of licenses required for construction or operation of the project by the government
- Currency non-convertibility
- Regulatory and tax risks
- War and terrorist acts
- Agitation by political activists

All the above risks affect both domestic and external lenders. In the Indian context, a number of infrastructure projects have been hit by this type of risk. For instance Enron Power and Narmada Dam Projects suffered substantially due to this risk. Currency convertibility risk has the maximum and direct impact on the external lenders.

Following are some of the important devices through which this risk can be allocated and mitigated:

(a) Political risk insurance: Several Export Credit Agencies and multi-lateral financial institutions, such as US Exim Bank or Multilateral Investment Guarantee Corporation
(MIGA), provide insurance against political risk, especially against currency inconvertibility, expropriation, etc.

(b) **Arbitration clause:** Through a proper arbitration clause inserted in the agreement with the government, this risk can be minimized. Enron Power Corporation, when faced with this risk, effectively contained the damage through international arbitration clause.

(c) **Co-financing:** Often commercial lenders, world over, feel assured if multilateral or bilateral financial institutions also participate in financing the project. In such a scenario, lenders will not consider political risk as being a major issue. This is because governments would not like to invite the displeasure of the multilateral financial institutions as they have to rely on them for loans for other projects in future.

(d) **Government guarantee for currency convertibility:** Sponsors and lenders can insist on government guarantee for currency convertibility.

3.8.8.11 **Forex Risk:** Foreign exchange (Forex) risk is usually high in foreign capital-intensive infrastructure projects. This risk arises mainly on two accounts; (a) exchange inconvertibility and (b) exchange rate risk. While the former refers to the probability of local currency not being able to be converted into foreign currency at the time of debt servicing, the latter arises due to the depreciation of the local currency against the currency in which the loans are designated. Exchange inconvertibility, perceived more as a political risk, may not be of serious concern where full convertibility status exists, though there are exceptions like the Asian crisis period. Exchange rate risk simply refers to the burden on debt servicing due to the depreciation of local currency. This risk will be very high where the revenues generated are in local currency.

Currency risk can be mitigated in the following ways:

(a) **Proper mix of local and forex loans:** Mixing local and foreign currency denominated loans in an appropriate ratio can reduce the risk considerably.

(b) **Denominating tariff in foreign currency:** Though this is not possible in all the sectors, such as toll-roads, urban infrastructure, etc., the sponsors will hedge themselves against currency risk by fixing tariff in foreign currency. Airport and port projects are considered amenable to this option.
(c) Index the end product to forex rate: Often, this risk is passed on to the consumer by indexing the tariff to currency fluctuations.

(d) Use of derivatives: Wherever, strong currency swap market is available, the exchange risk can be hedged through currency swaps. However, since infrastructure loans are normally of long-term duration, it is difficult to find long-term swap markets in developing countries, including India. The roll-over cost is too prohibitive for the sponsors to use this method to mitigate the exchange rate risk.

3.8.8.12 Interest Rate Risk: From the lender’s perspective, interest rate risk has several inherent dimensions, and, if they not managed properly, serious problems can arise. First, the adverse movement in interest rates may pose serious problems to project company in servicing the debt, due to the rise in interest costs. Secondly, the lenders themselves may face interest rate risk due to asset liability mismatch as infrastructure financing is often done on a long-term basis. While lenders seek to hedge themselves with the floating interest rate as a norm, this cannot always be ensured. Thus, both the project company and lenders are subject to this risk. Interest rate risk can be mitigated in various ways.

(a) Fixed interest rate contract: Project companies can mitigate interest rate risk to a great extent by having fixed rate debts. Though this would assure them of predetermined cash outflows in the form of interest servicing, it can sometimes prevent them from benefiting from falling interest rates.

(b) Use of derivatives: Project companies can enter into Interest Rate Swaps (IRS) or Forward Rate Agreements (FRAs) to hedge themselves against the interest rate risk. This depends on the depth of the derivative market. In India, for example, though banks are allowed to offer IRS and FRAs to customers, it is yet to reach minimum volumes and gather momentum. In the absence of a sufficiently liquid market and long-term products, it would be very difficult to use derivatives as a method to hedge interest rate risk.

(c) Repayment risk: This risk arises due to faulty repayment structure of the loan. Essentially, lenders should ensure that the repayment is parallel to the expected cash flows and it is free from any bunching of major debt service. The project company as well as lenders should give due attention to the cyclical behaviour of cash flows.
3.8.8.13 Legal Risk: Structure of an infrastructure project is highly complex. The robustness of the project structure depends on the defining and documenting role and responsibilities of various participants, method and level of risk apportionment among them. Similarly, as far as possible, the role and responsibilities of parties who are not directly participating in the project structure also needs to visualized and built into the documentation process. Legal risk may emanate from any loose ends in the process of project structuring and documentation. Though there is no straight-jacketed devices to mitigate this risk, by engaging reputed and experienced legal firms for advice and by seeking a ‘second opinion’, this risk can be minimized to a large extent.

3.9 Measuring Credit Risk

If credit can be defined as “nothing but the expectation of a sum of money within some limited time”, then credit risk is “the chance that expectation will not be met”. Credit Risk is defined by the losses that arise in the event of default of the borrower or in the event of deterioration of the borrower’s credit quality (Orgeldinger, 2002). The simple definitions hide several underlying risks. The “quantity” of risk is the outstanding balance due from the borrower. The “quality” of risk results both from the chances that the default occurs and from the guarantees that reduce in the event of default. The amount of risk, the outstanding balance on the date of default, differs from the loss in the event of default because of potential recoveries. Those depend on credit risk mitigators, such as guarantees, collateral or third-party guarantees, the capability of the negotiating with the borrower and the funds available, if any, to repay the debt after repayment of lenders.

Default is an uncertain event. In addition, the future exposures at the time of default may not be known. This is because the repayment schedule may not follow the ‘waterfall’ arrangement in the contract. Finally, potential recoveries cannot be predicted in advance. Hence, credit risk can be divided into three parts, (i) default risk, (ii) exposure risk and (iii) recovery risk. In the present research, the focus is on default risk.

3.9.1 Default Risk

(a) Default risk happens when the borrower fails to service the debt obligation or the borrower’s assets are not sufficient to pay off the debt – Measurement of Default Probability (MDP).
(b) *Recovery risk* is the uncertain recovery of debt after the default – Measurement of Loss Given Default (LGD).

(c) *Exposure risk* is the amount at risk in the event of default – Measurement of Exposure at Default (EAD).

3.9.1.1 *Definition of Default*: There are several possible definitions of default: missing a payment; breaking a covenant; entering a legal procedure or economic default (Bhattacharya and Thakore, 1993). Breaking a covenant such as a financial ratio subject to upper or lower bounds is a “technical default”. It usually triggers negotiation, even though some technical defaults do not necessarily endanger the borrower’s survival. Without waivers granted by the lender in such situations, the borrower is virtually bankrupt since he cannot deliver the repayments of all funds he has borrowed. The definition of default employed in Basel II is based on two conditions: 1. “The bank must consider that the obligor is unlikely to pay in full”; 2. “The obligor’s past due is more than 90 days on any material credit obligation.” While the former is a subjective condition, the latter is an objective condition where the number of ‘90 days past due’ is what triggers default (2 years in the case of infrastructure loans) and the minimum past due threshold amount is the level of materiality fixed by the bank.

As per Basel II Accord, project finance is a method of funding in which the lender looks primarily to the revenues generated by a single project, both as a source of repayment and as security for the exposure (Esty, 2005). The Accord provides the following list of parameters to determine the rating grades. The banks use sensitivity analysis to measure stand-alone risk and the credit-rating mechanism based on the grades below to give a score to the proposal. This score helps in the forecasting of probability of default.

(a) *Market Condition of the Borrower’s Business*: whether favorable or not


(c) *Stress Analysis*: Whether the project is capable of meeting the financial commitments under severely stressed economic condition

(d) *Political and Legal Environment in the area of business operation of the borrower*: Transfer risk, risk of war, civil unrest, government support, stability of legal and regulatory environment
(e) **Transaction Characteristics:** Design, technology and construction risk, completion guarantee

(f) **Operating Risk:** Scope and nature of Operational and Maintenance Contracts, operator’s expertise, track record, etc., Reserve risk (natural resource)

(f) **Strength of Sponsor:** Track record, financial strength, equity/ownership support, if any

(g) **Security Package:** Whether security cover has been arrived at after taking into account quality, value and liquidity of assets. It is to be assured that security documents (pledge, assignment, etc.) are comprehensive and provide the lender control over cash flow (e.g. escrow account), mandatory payment, dividend restrictions.

3.9.2 **Measures of Risk:** Regardless of the risk measure employed, there are different perspectives on risk. These are:

(a) **Stand-alone Risk:** This represents risk of a project when it is viewed in isolation.

(b) **Firm Risk or Corporate Risk:** This reflects the contribution of a project to the risk of the firm.

(c) **Systematic Risk:** Risk of a project from the point of view of an investor. Such risk is called market risk.

A variety of measures are used by Indian banks to capture different facets of risk. The most important ones are Standard Deviation and Coefficient of Variation.

3.9.2.1 **Standard Deviation:** Standard Deviation of a distribution is given by:

\[ \sum [Probability \ of \ Value \times (Value - Expected \ Value)^2]^{1/2} \]

It is the most commonly used measure of risk in finance. If a variable is normally distributed, its mean and standard deviation contain all the information about its probability distribution. Sometimes for measuring expected value and dispersion of a variable, its probability distribution is required. In some cases probability distribution can be defined with a fairly high degree of objectivity, based on past evidence. Such a probability distribution is substantially based on objective facts and it may be referred to as “Objective” probability distribution. However, in real life situations, such objective evidence may not be available for defining probability distributions. Therefore, in project appraisal by Indian Banks, bankers
with vast experience use their judgment to define probability distribution. These distributions are called as subjective probability distributions (Chandra, 2002).

One problem with standard deviation is that it is not adjusted for scale. Therefore, sometimes a coefficient of variation is used which may adjust standard deviation for scale:

\[
CV = \frac{\text{Standard Deviation}}{\text{Expected Value}}.
\]

3.9.2.2. **Sensitivity Analysis:** It is the function of analysis to show the impact of the risk drivers identified earlier on risk variables like sales or investments and the resultant impact on the target variable of a project, like Net Present Value (NPV), Internal Rate of Return (IRR) and Debt Service Coverage Ratio (DSCR). It is a “what if” analysis. In order to carry out a sensitivity analysis only one variable at a time is changed and the rest of the variables are assumed to be constant, which is unlike what happens in the real world. It shows how robust or vulnerable a project is to changes in the values of underlying variables. It also indicates what further work can be done. If the net present value is highly sensitive to some changes in some factor, it may be worthwhile to explore how the variability of that critical factor may be contained. However, sensitivity analysis merely shows what happens to NPV when there is a change in some variable, without providing any idea of how likely the change will be. Therefore, it remains a relatively subjective analysis.

3.9.2.3 **Scenario Analysis:** In the real world when the variables are interrelated, as they are most likely to be, it is helpful to look at plausible scenarios, each scenario representing a consistent combination of variables. Usually, in order to do scenario analysis, one risk driver is selected around which other scenarios are built. The drivers chosen are the largest sources of uncertainty for the success of the project. Value of each variable is then calculated depending on the chosen driver. Based on what happens under the most favorable or the most adverse configuration of key variables, Best Case, Normal and Worst Case scenarios are created. However, this analysis does not help if we assume that a continuum exists between these three states.

3.9.2.4 **Simulation Analysis:** Sensitivity analysis indicates the sensitivity of criterion of merit (NPV, IRR or any other) to variations in basic factors. Though useful, such information may not be adequate for decision making. The banker may like to know the likelihood of such occurrences. This information is generated by simulation analysis which may be used
for developing the probability profile of a criterion of merit by randomly combining values of variables that have a bearing on the chosen criterion.

3.9.2.5 Break-Even Analysis: A banker is always interested in knowing how much is going to be produced and sold at a minimum to ensure that the project does not loose money. Such an exercise is called break-even analysis. The break-even point for a project is calculated with reference to the year when the project is expected to reach its target level of capacity utilization. So it is also called Breakeven Capacity Utilization (BEPCU) (Chandra, 2002). It is obtained by the formula:

\[
\text{BEPCU} \text{ (%) } = \frac{\text{Fixed Costs and Semi Fixed Costs} \times \text{Percentage Capacity Utilization}}{\text{Contribution}}
\]

3.9.2.6 Debt Service Coverage Ratio: The debt service coverage ratio (DSCR) is defined as:

\[
\text{DSCR} = \frac{\text{Profit after Tax} + \text{Depreciation and Amortization} + \text{Interest on Term Debt} + \text{Lease Rentals/Repayment of term debt} + \text{Interest on Term Debt} + \text{Lease Rentals}}{\text{Total debt service burden over the entire period}}
\]

The average DSCR is computed by taking the total of all values of the numerator and denominator for the entire period of the proposed term loan, commencing from the year in which the commercial production starts and not by taking DSCR for each year.

\[
\text{Average DSCR} = \frac{\text{Total Cash Accrual over the entire period}}{\text{Total debt service burden over the entire period}}
\]

Hilliers Model, Decision Tree Approach and Certainty Equivalent Methods are also used in risk analysis of projects but are not made use of by Indian Banks.

3.10. Assessment of Credit Risk: Credit Rating Mechanism

Measurement of credit risk starts with the process of scoring and rating.

3.10.1 Credit Scoring and Rating: The Basel Committee has defined credit rating as a "summary indicator" for the risk inherent in individual credit, embodying an assessment of the risk of loss due to default of a counterparty by considering relevant quantitative and qualitative information. Thus, credit rating is a tool for the measurement and quantification of
risk. Default risk is measured by the probability that it occurs over a period of time. Default risk depends on the credit standing of the borrowers. Default probability cannot be measured directly. Historical statistics of default can be used. Such data can be collected or obtained from rating agencies. Since rating by an outside agency like CRISIL or ICRA is not prevalent in infrastructure finance, the bankers concentrate on internal data.

Credit scoring and rating are done for the borrower and the project facility (Bagchi, 2005). A conceptually sound rating model captures probability of default and loss given default separately. It involves both qualitative and quantitative data. While financial analysis covers the quantitative part, qualitative analysis covers a host of elements like management, demand and price, technological, legal and regulatory issues.

3.10.2 Methods of Credit Rating: The goal of credit rating is to create an accurate and consistent risk rating, yet allow professional judgment to significantly influence the rating where it is appropriate (Bagchi, 2005).

3.10.2.1. Through the Cycle: In this method of credit rating, the condition of the obligor and/or position of exposure is assessed assuming the worst point in the business cycle. There may be a strong element of subjectivity on the evaluator’s part while grading a particular case. It is also difficult to implement this method when the number of borrowers/exposures is large and varied.

3.10.2.2. Point in Time: It is a rating scheme based on current condition of the borrowers/exposure. The inputs are provided by financial statements, current market position of the trade/business, corporate governance, over-all management expertise, etc. Banks adopt a point-in-time approach because it is relatively simple to operate while at the same time providing a fair estimate of the risk grade of an obligor/exposure. It can be applied consistently and objectively. Periodic review and downgrading are possible depending on the position.

3.10.2.3 Scores/Grades in Credit Rating: The main aim of the credit rating system is the measurement or quantification of credit risk so as to specifically identify the probability of default (PD), exposure at default (EAD) and loss given default (LGD). Hence, it is a tool to implement the credit rating method (generally the point in time method). The rating agency/bank also needs to design appropriate methods for various grades of credit at an individual level (a close analogy is the marks obtained by a student in various subjects and
the final outcome in the form of ultimate grade achieved in an examination) or at a portfolio level. These may be indicated in the following forms:

- Alphabetical: AAA, AA, BBB, etc.,
- Numerical: I, II, III or 1, 2, 3, etc.

The fundamental reasons for various grades (as an outcome of aggregate score) are to signal default risk of an exposure, facilitate comparison of risk to aid decision making, to show compliance with regulatory requirements of asset classification and risks of exposure and providing flexible means to ultimately measure the credit risk of an exposure.

3.10.2.4 Components of the Score: Scores are mere numbers (1, 2, etc.) allotted for each quantitative and qualitative parameter – out of a maximum allowable for each parameter as may be fixed by any bank – of an exposure. The issue of identification of specific parameters, its overall marks and finally relating the aggregate marks (for all quantitative and qualitative parameters) to various grades is a matter of management policy and discretion – there is no statutory or regulatory compulsion. However the bank is guided by the sector and the product that the project is offering. A basic requirement in risk grading is that it should reflect a clear and fine distinction between credit grades covering default risks and safe risks in the short run. While there is no ideal number of grades that would facilitate achieving this objective, it is expected that more granularity may serve the purpose. According to the RBI, there should be an ideal balance between both acceptable and unacceptable credit risk in the grading system. They have suggested that a rating scale may consist of 8-9 levels. Of the above, the first five levels may represent the acceptable credit risk while the remaining four may represent the unacceptable credit risk. The RBI in its master circular dated October 12, 2002, says that a bank can initiate risk grading activity on a relatively smaller/narrower scale and introduce new categories as risk gradation improves.

The infrastructure projects are rated on quantitative and qualitative factors such as: Management Risk, Market Risk, Demand and Pricing Risks, Construction Risk, Operations risk, Legal Risk, Political Risk, and Strength of Relationship. Each factor has five sub-variables to which appraising officers assign scores. Though each bank is free to choose the variable, the descriptive research on participating banks will help the researcher to identify the sub-variables under the broad factors. The scores are assigned on the basis of cut-off scores given by banks against each parameter. However, there are a large number of parameters which are subjective. Also the scoring method is used to rate all the projects in all
the sectors. Based on the scores given by the bankers, a cumulative score for the borrower is calculated which is then converted into rating model which is used for pricing as well as monitoring the account by creating transition matrices for ratings over a period of time. From the statistics of observed defaults over a given period, the ratio of defaults over the total sample of borrowers can be derived. It is the default rate in this study which will serve as the proxy for default probability. Such default frequencies are then captured by the rating class that is derived above. The scores and grades appear in Table 3 (Illustrative). It is observed that credit scoring in Infrastructure does not change from sector to sector, though the issues are quite different in each sector.

Table 3.4: Credit Rating Mechanism

(Illustrative Table)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Total Score for an Exposure</th>
<th>Grade Accorded</th>
<th>Implications for Grades Accorded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>86 - 100</td>
<td>AAA</td>
<td>Excellent safety &amp; timely repayment</td>
</tr>
<tr>
<td>2</td>
<td>71 - 85</td>
<td>AA</td>
<td>Very good safety &amp; timely repayment</td>
</tr>
<tr>
<td>3</td>
<td>61 - 70</td>
<td>A</td>
<td>Good Safety &amp; repayment</td>
</tr>
<tr>
<td>4</td>
<td>51 - 60</td>
<td>BBB</td>
<td>Ordinary safety &amp; repayment</td>
</tr>
<tr>
<td>5</td>
<td>41 - 50</td>
<td>BB</td>
<td>Less ordinary safety &amp; repayment</td>
</tr>
<tr>
<td>6</td>
<td>36 - 40</td>
<td>B</td>
<td>Low safety &amp; repayment</td>
</tr>
<tr>
<td>7</td>
<td>31 - 35</td>
<td>C</td>
<td>Unsafe</td>
</tr>
<tr>
<td>8</td>
<td>0 - 30</td>
<td>D</td>
<td>Default category</td>
</tr>
</tbody>
</table>

3.10.3 Risk Quality and Rating: The quality of risk covers both the default probabilities and the recoveries in the event of default. Ratings qualify the risk of losses in the event of default, a combination of default probabilities and recoveries. The ratings are rankings, not quantitative measures of risk quality. Common rating systems include 6 to 10 different ranks, which are sufficient to discriminate among risk classes. Ratings attached to facilities are useful whenever guarantees and agreements are attached to individual facilities. Therefore, for infrastructure finance, the credit scores and subsequent ratings calculated in the above steps may serve as valuable inputs for banks to develop their own rating models.

3.10.4 Risk Mitigation: The party bearing the risk may undertake preventive measure for limiting the likelihood of risk, as well as specific measures to protect itself in whole or in part.
against the consequence of risk. Such agreements and contracts are called “Risk Mitigation”. Various types of contracts and financing, construction, and operations agreements will be undertaken in future research.

3.10.5 Probability of Default (PD): PD is a quantitative measure of default risk. Each credit rating grade as described earlier corresponds to a particular probability of default, that is, the probability/chance of an obligor defaulting on the payment of the credit obligation. Normally a banker calculates this by credit ratings which are given based on a basket of identified risk elements. These elements and the variables therein do not normally change from sector to sector. Default probability of a borrower can be analyzed and monitored through historical statistics on default, which is often given by the rating that the borrower is assigned. The broader elements of the rating scale would be the project of specific risks identified above and the variables would be the components that would define the said bucket of risks.

3.10.6 Loss Given Default (LGD): It is the percentage/fraction of exposure amount that will be lost in the event of default:

\[ LGD = (1 - \text{Recovery Rate}) \]

LGD is the economic loss in at a time case of default. Economic means that all the related costs have to be included and the discounting effects have to be integrated. Input to this will be the exposure at default, recoveries, costs incurred, time of default and net recoveries and discount rate. Higher the discount rate, higher the LGD.

\[ LGD = 1 - \frac{\sum \text{Recoveries} - \text{Costs}}{(1 + r)^t} \]

3.10.7 Exposure at Default (EAD): It is the amount at risk in the event of default without considering recoveries. It is generated by the associated uncertainty with the future amount at risk, as default occurs at an unknown future date. For credit lines with a repayment schedule, the exposure risk can be small, like amortized credit that is repaid on the basis of a contractual schedule. Committed lines of credit allow the borrower to draw on those lines whenever he wants to, depending upon his needs, and subject to a limit fixed by the bank. Overdraft balances change at the initiative of the borrowers. Project financing implies uncertainty in the scheduling of the outflows and repayments. The lines which are not fully
used are treated as given contingencies and recorded off-balance sheet. For proper risk measurement, such contingencies are required to be captured in the bank’s Management Information System (MIS). With the help of the MIS the bank can calculate the expected losses on infrastructure portfolio.

Expected Credit Risk Loss (ECRL) is intended to set reserve requirements for doubtful accounts calculation of PLR (default premium), pricing credit, risky instruments (bonds and exotic options), and for risk-adjusted profitability (e.g. RAROC).

The bank can also suffer losses in excess of what is calculated, say, during economic downturns. These losses are called *Unexpected Losses* (UL) or uncertain losses.

The capital base is required to absorb the UL, as and when they arise. Expected Loss (mean) and Unexpected Loss (standard deviation) serve as useful measures of credit risk quantification.

\[
EL = EAD \times PD \times LGD
\]

\[
UL = EAD \times \sqrt{PD \times \sigma^2_{LGD} + LGD^2 \times \sigma^2_P}
\]

The present research considers credit rating mechanism as the valid tool used by Indian banks for assessment of risk. It will therefore focus on the elements and sub-variables of the credit scoring used in Infrastructure Finance.

Through credit scoring a particular rating is given to the projects that correspond to the probability of default of the asset class. Data in infrastructure finance is limited with banks as it is a comparatively new product. So the research does not focus on Loss Given Default and Exposure at Default. These values are of the in Indian banking system and they are provided by the central bank, that is the Reserve bank of India.

3.11 Conclusion

In this chapter a detailed study is made on the structural aspects of infrastructure projects including project parties and contracts, agreements and guarantees that are put in place to ensure viability of the projects. Although most of the issues are generic, it cannot be denied that there are certain issues which depend on the economic drivers of the sector. For example, roads will have certain issues unique to it and so will power, ports, etc. The Best practices
followed by Indian banks with reference to project appraisal and risk measurement and all the
generic issues involved are discussed in great detail in this chapter.

In Chapter 5 the application of the above-mentioned procedure of identifying project
parties and key contracts, appraisal, risk identification and analysis and measurement is
discussed for the power and road sectors.