A study of project finance banking: with a special reference to determinants of investment strategies for major petroleum projects located in less developed countries

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A Study of

PROJECT FINANCE BANKING

with a Special Reference to
Determinants of Investment Strategies
for Major Petroleum Projects Located in
Less Developed Countries

by

Sabah A. Fadhley

A Doctoral Thesis
submitted in partial fulfilment of the
requirements for the award of
Doctor of Philosophy
of the
Loughborough University of Technology

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ABSTRACT

The study investigates the motives and objectives of borrowers, lenders and host developing countries in adopting the strategy of Project Finance (PF) when financing a major petroleum project. The overall aim of the study is to develop the empirical basis for a PF theory and to assess its relevance for the less developed countries.

The methods of investigation include literature review, desk research, development of case studies and field survey. The study analysed data relating to a large sample of LDC petroleum projects and organised direct interviews with major international institutions. It also organised a mail questionnaire survey which was designed to test its assertions and hypotheses relating to PF strategies.

It is shown that project finance can be explained in terms of an eclectic theory which draws its premises from innovations on proven investment, financial and risk concepts. It is also shown that project finance theory represents a system which has its own causes, mechanisms of risk hedging, predictive functions and strategic advantages.

In the future, the market for project finance is expected to continue its growth and be strengthened through further financial innovations. The subject is expected to grow even more important both as a proven tool for the investment and financing strategies of host developing countries and as a theory of direct bank participation in major projects located in less developed countries.

This study addressed the needs of bankers and industrialists who wish to diversify their business internationally through PF participation in major LDC projects. The study should also be of interest to students of international investment and finance who wish to advance the subject through further research.
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Chapter 1

INTRODUCTION

1.1 BACKGROUND PERSPECTIVE

There has been a growing tide of interest in Project Finance (PF) banking by capital intensive industries and international banks. The subject is regarded as "innovational" because it involves the provision of loans to finance a major investment project with repayment being tied to the project's own earnings. Accordingly, project finance involves little or no dependence on the balance sheet of any corporate owners or backers who "sponsor" the loan.

This type of borrowing facility is most popular in the petroleum and petrochemical industries which operate through large-scale projects with extensive financial risk. In the less developed countries (LDCs), the financial requirements of the petroleum industry have recently become very critical as world-scale joint venture projects are increasingly being adopted.

During the 1960s, for instance, a major petroleum project in these countries would typically cost US$ 50 million and would have been virtually financed by the state or internally by the oil companies. In 1990 this study identified 198 LDC petroleum projects with an average cost of US$ 321 million. Seventy three out of the 198 projects (37%) relate to international investments and account for 66% of the aggregate capital investment deployed by the industry with an average cost of US$ 577 million. These included 14 projects with costs ranging from US$ 1,000 million to US$ 7,000 million. The typical financial structure of these projects includes 70% to 90% debt finance and 10% to 30% equity capital. This compares with debt financing of 25% to 35% of total capital employed by the principal developer companies in the petroleum industry.

The ability of the individual project to carry greater debt capacity than its parent company has a number of significant implications for the investment strategies of the corporate sponsor and the host developing country. The most immediate of these implications is that the project being financed is either so large that the sponsor company
cannot bear the risk to its own capital and reserves, or prudentially does not wish to do so. Weyer (1979) of the Barclays Merchant Banking Group asserts that this type of debt financing is innovational, because "in the history of private sector financing, this is a fairly new feature" and the "banking techniques of project financing entail taking an equity risk without equity participation".

This emerging financing strategy suggests that project finance involves the placing of bank finance in essentially equity situations. For this reason project finance incorporates considerable amount of financial innovations. These are designed to protect the lender's sensitive position relative to the risks introduced by the developer company and the host LDC country. A great deal of these innovations relate to the proven role and established credit-worthiness of the Multinational Corporations (MNCs) which participate in promoting major projects. In the less developed countries (LDCs), major petroleum projects generally involve the MNCs as the principal procurers of capital equipment, operating technology, management and marketing services. This participation, however, is largely contract-based and involves a minimal equity cash investment. Instead the MNCs undertake the function of mobilising international finance and act as major supporters of financing packages. The traditional industry pattern of financing with retained earnings that was typical of the petroleum industry in the 1960s had thus to give way to innovative methods of debt financing in order to raise the huge funds required for investment without impairing the credit rating of the sponsor.

The corollary of this situation is that project finance mitigates the vulnerability of the host developing countries to external payments difficulties, since PF repayments are tied to the capacity of the new project to perform and generate its own income. As most LDCs lack the appropriate technology or the resources to enable them to obtain project finance on their own effort, the opportunity to borrow on the credit of a project provides a relief to LDCs that are straining at their borrowing limits. This results in a significant expansion of their borrowing capacity.

Access to project finance thus represents additive credit which is a function of the technology and successful marketing efforts required when developing a major project. Much of this effect is attributed to financial innovations of project finance which, as explained above, permit a new venture project to carry greater debt capacity than its
parents. This suggests a new theoretical basis which differentiates project finance from other forms of finance.

1.2 DEFINITION OF PROJECT FINANCE

The available literature evidence differentiates PF from other forms of lending in terms of a number of criteria. These include the mechanism of borrowing, techniques of evaluation, application of fund, source of repayment, and impact on the balance sheet of the borrower. The following four criteria provide the key generalised bases used in the specialised literature on project finance when distinguishing PF transactions from other forms of bank lending:

1. The project must be physically isolated from the assets and liabilities of its sponsor and established as an autonomous legal borrowing entity;

2. The disbursement of the finance must be for the specific purpose of investment in the borrowing project entity rather than for the general purpose of the parent; and

3. As a borrowing entity, the project should offer the lender tangible security which must lend itself to analysis and evaluation. As far as possible this should be separated from the credit risk of the corporate parent and be shielded from host country risk;

4. The source of repayment of the loan is tied primarily to the project's future earnings and secured by the project's own assets. As far as possible, this should minimise or limit the recourse to the project's owners and other sponsors in the event of a probable default situation.

These four criteria suggest that project finance is a method of facilitating self-financing green field productive investments in such a way that the borrowing is kept off the balance sheet of the principal sponsor company and, to a large extent, isolated from host country risks. Under the above criteria, projects which are supported through the provision of a full corporate or sovereign financial guarantee do not qualify as project
finance. In this respect, project finance differs from traditional approaches to bank investment financing which attempt to relate debt directly to the general credit-worthiness of corporate or sovereign borrowers.

The approach to financing a major project generally involves the intermediation of a vehicle company which is incorporated for this specific purpose. A classical example for illustrating how lenders utilise the concept of a vehicle company, together with indirect or contractual performance guarantees from the principal developer, when lending on a project basis is the frequently quoted (Brealey & Meyers, 1988; Nevitt, 1989) case of the BP's Forties Field Development in the North Sea which in 1972 raised an initial investment of US$945 million. The financing arrangement of this case is illustrated in Figure 1:

![Figure 1: BP Forties Development Financing](image_url)

This over-simplified diagram helps to show how a commercially viable investment can be physically "isolated" from the assets and liabilities of the promoter through the intermediation functions of the project entity. In the case of BP's Forties Field, a vehicle company was incorporated under the name "Norex" which was controlled by the banks as a security. The banks provided the loan to Norex. Norex in turn paid the money to BP
Development, which was responsible for developing the Forties Field, by way of advance payment for future deliveries of oil. At the same time, another subsidiary of BP (BP Trading) undertook to purchase and pay for the oil from Norex at an agreed price. Norex then used the proceeds of its oil sales to repay the loan.

The banks thus financed BP development indirectly through the intermediation of the project entity and looked primarily to the project entity for the repayment of the loan. On the other hand, BP serviced its ultimate debt obligation through the intermediation of the project entity. The borrowing was secured by way of a production payment by Norex itself. Norex was a newly created project company of no performance history but yet filled in the role of an independent producer and supplier of oil.

The debt obligation under this arrangement did not show up in BP's balance sheet as a debt and BP was financially "isolated" from the project company. The passing on of the loan fund to BP Development was not in the form of a loan but by way of "an advance payment for future deliveries" of oil to the project company. This arrangement was a performance contract aimed to ensure project completion and timely supplies of oil. In return, the banks bore the risk of tying in the repayment to the flow of oil production and accepted the ultimate risk that the oil reserves could be insufficient to service their loan. In this case, the banks would have no claim against BP's other assets.

This type of financing arrangement has traditionally been considered the speciality of the large private commercial and investment banks. More recently, however, increasing interest is being shown in project-related finance for developing countries by export credit agencies (Leeper, 1979; Sarmet, 1980). For example, in 1988 such agencies as ECGD and Hermes introduced new schemes to lend and insure project financing transactions involving limited recourse to the sponsor\(^1\). Other specialised financial institutions such as the International Finance Corporation, (IFC), the commercial arm of the World Bank, and the European Investment Bank also have a tradition of participating in project finance. These financial institutions generally lend for specific development projects and ensure that the proceeds of their loans are used only for the purposes for which they were granted (Golsong, 1981; Daffern, 1986). It can thus be argued that the four criteria definition of

project finance (as outlined above) also covers a great deal of project financing undertaken by the official sector.

It is possible, however, to distinguish official sector PF from private commercial PF, because the former is "cooperative" in nature and linked to macro-economic considerations. It can be further argued that the traditional focus of official finance is on promoting national exports or helping member countries through a system of preferences (Sassoon, 1982). From this perspective the policies of the official lending agencies are designed primarily to promote and meet certain macroeconomic objectives. This is in direct contrast to the sort of commercial risk criteria considered important by private commercial lenders. In this respect, private commercial project finance may be seen as a segmented approach to business risk (Nevitt, 1989; Mathrani, 1987) while official institutions traditionally have regard for much broader political and economic issues (Chandhri, 1982).

However, there is considerable evidence of a gradual shift by the official sector towards market related criteria and a growing emphasis on quasi private commercial lending considerations. Helleiner (1990), for example, shows that the World Bank provided a great deal of finance in the 1970's and 1980's for development projects with conditions "typically related to the effective and remunerative functioning of the projects" being financed.

Most major projects also draw on the supply of both the private commercial and the official sectors. For example, the financing of the European Channel Tunnel Project included the participation of the major private commercial banks as well as the European Investment Bank and the European Coal and Steel Community Fund. Similarly, as explained by Weyer (1979), the financing of major LDC projects has traditionally involved a considerable amount of interdependence between the World Bank and the private commercial banks.

This suggests that a study of project finance should consider the interdependence of the private and official sectors as a strategy of mitigating LDC risks. In the petroleum industry the investment risk is generally dependent on common factors of prices, demand and supply which cannot effectively be mitigated merely by country or project portfolio diversification. The risk strategy must also include diversified sources of finance. This is
important from both the lender's banking prudence and the borrower's investment strategy as this provides a secondary level of protection while the exposure to LDC risk continues to increase. Most major projects thus draw finance from multiple sources in order to maximise debt capital, reduce financing costs and diversify financing risk.

Project finance is therefore not a precise concept. As used in the literature, the term is not only vague but its parameters are indeterminate. There is no clear and valid basis for excluding the official sector or for disqualifying project loans simply on account of the availability of corporate or sovereign financial guarantees. In particular, the actual value of some LDC guarantees is often questionable and may be taken to serve a strategic rather than a financial purpose. The literature definitions also hold a narrow focus either on the lender's or the borrower's advantage which often points to irreconcilable objectives.

It was therefore considered important for the study to develop a suitable alternative definition at the outset of the research. The required definition was to help to explain project finance from the risk perspectives of both the borrower and the lender and yet provide a deliberately broad coverage for the myriad of financing techniques, sources of finance, and types of borrowing industries. The study's definition is as follows:

"Project finance is a structured lending package designed for independently viable investments on a future cash flow basis which permits high volume transactions without impairing the sponsor's gearing and embeds the creation and maintenance of a community of interest among all parties as a source of security for the project and its lenders."

1.3 **Internationalisation of Project Financing:**

The availability of PF to the LDCs is a nascent phenomenon. Until the mid 1970's, Project Finance was virtually unavailable for LDCs. The PF market was not truly international, because it was virtually exclusive to the US and European industries and their overseas subsidiaries. The LDCs had no direct access to the PF market and the limited size of their industries often precluded its use.

In developing countries, major petroleum projects were directly controlled and financed by the major multinational oil companies (MNCs) which typically operated under
license or a production sharing agreement with the government of host countries. In the earlier years, these MNCs dealt directly with the governments of host countries which were relatively unsophisticated and therefore not ideally suited to participate in the management or financial decision making process relating to complex investments.

During the past fifteen years or so a number of new considerations have emerged which have structurally altered the global financing of industrial developments, particularly those relating to LDC energy and capital intensive projects. Looked at from the industrial perspective, the following five factors have had a direct bearing on the focus of this research study:

(1) **Emergence of National Oil Companies**

Nationalisation or acquisition of upstream oil ventures and concessions (which were hitherto exclusive to the multinational oil corporations) created a new generation of national oil companies. Because of their direct linkage with government policies and objectives, these have tended to behave differently from the international majors and other private sector companies (Parra, 1981) when making financial decisions.

One immediate effect was that the host countries had to start dealing directly with the problems of financing the rising cost of ownership and developing new projects. Many developing countries thus experienced a reduction in their foreign direct equity investment which during the 1970s and 1980s made up a declining share of total investment, capital imports and GNP of developing countries (Landell-Mills, 1985; Helleiner, 1990). The host countries concerned compensated for this reduction in foreign direct investment by resorting to direct commercial borrowing (Odell & Rees, 1987) and project-related finance. The Euromoney journal, Trade Finance, for example, reported in March 1988 that the main impetus for the credit export agencies to cover project risk stemmed from the importing developing countries which were increasingly demanding project finance instead of direct loans.

(2) **World Bank Support**

The World Bank since 1977 embarked on a programme calling for an expansion of lending in the development of fuel and non-fuel mineral resources of the oil importing developing countries. This induced multinational oil companies to invest in LDC
exploration projects owing to the improved prospects of raising finance for their
development. This was eventually followed by a favourable joint initiative by the World
Bank and the IMF in 1985 which resulted in the establishment of the Multilateral
Investment Guarantee Agency (MIGA). MIGA was created to provide political risk
insurance against expropriation, breach of contract, inconvertibility, and war or civil
disturbance. These developments meant that certain critical risks relating to LDC projects
could be covered and low cost finance mobilised for major LDC petroleum projects.

Other related and equally important techniques also put into place by the World
Bank to stimulate major project financing in the poorer LDCs. These included the
following:

- Making fuller use of the way "remedy clauses" can be written
  into World Bank loan agreements to include a host country's
  commitment not to alter the fundamental laws or conditions
  surrounding large foreign investment projects.

- Expanding co-financing "B" loans whereby the Bank participates
  in and guarantees the later maturities of loans made directly to
  projects, subject to the same contractual commitments and
  guarantees enjoyed by the Bank itself.

- Incorporating the concept of "cross default" under which a
  default on any lender will be considered a default on the World
  Bank, thus extending the security of lending to commercial
  private banks.

The effect of these World Bank initiatives has been to allow LDC projects to be
launched that otherwise would have remained on the drawing boards; they have also
enhanced and reinforced the borrowing capacity of the poorer LDCs. International
investors have thus had to revise their strategies relating to foreign direct investment in
LDCs as these new developments called for new approaches to investment and financing of
large projects.
(3) **Location Specific Advantage**

The majority of petrochemical industries have experienced structural change. The oil prices of the 1970's have effectively shifted the production cost structure of many basic and intermediate products used in the final product industries in favour of feedstock and energy fuel input costs. The result of this change is a steady decline of the traditional industrial centres of supply in the U.S.A., Europe and Japan and a concomitant rise of new supply centres in the oil producing developing countries.

The endowment of the LDCs with about 80% of the known world oil and gas reserves has provided the incentive as well as the base asset for developing major industrial projects. However, so far the LDCs have managed to account for only 13% of the world's petrochemical industrial output and just 25% of the global capital invested by the petroleum industry². This suggests that the massive international investment that has so far been implemented in developing petroleum export capacities of LDC countries is only the beginning of a potentially much bigger industry.

In the 1970's petroleum gas, which was produced in association with oil, was largely flared and so there was a very strong motive to develop economic uses of this resource through industrialisation. As the operating, management and marketing experience of LDC countries was limited to the upstream sections of the oil industry the new projects presented major opportunities for downward diversification of the petroleum industry. The availability of abundant and very cheap gas was also a major economic factor in deciding the location of petroleum processing and manufacturing plant. This is because gas is required for multiple purposes as raw materials, feedstock and energy fuel. Consultations with industrial executives during the development of the case studies have suggested that the total costs of the gas inputs for these requirements in the European centres of manufacturing account for up to 80% of total production costs. The availability of a vital resource at very low cost has thus provided a powerful economic basis for a structural shift in the comparative cost advantage of production in favour of LDC locations.

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²*Oil and Gas Journal*, 13th April, 1988.
(4) **Industrial Diversification**

As the oil producing developing countries began to diversify their output and trade in basic and intermediate products (petrochemicals, iron, steel, aluminium) the industries in the advanced developed countries (of USA, Europe and Japan) adapted and improved their relative economic position by moving further downstream and specialising in high precision products which offered higher value-added margins.

This provided the commercial incentive to progressively abandon those traditional midstream lines of production which were more advantageously duplicated in developing countries. Consequently, the internationalisation of the petroleum and petroleum-based industries of the developing countries was further accelerated as more of the industrialised countries (such as Japan, the USA and Italy) began to switch their petrochemical base to such countries as Saudi Arabia through the vehicle of industrial joint ventures. The growth of international joint ventures has also been accelerated by the facility of project finance which permits the MNCs to establish contract-based linkage with an LDC project as an alternative strategy to direct foreign investment. Tindall (1975) shows that most MNCs resort to contract-based relationships to secure access to sources of supply because this type of linkage does not require increase in capitalisation.

(5) **Access to Mature Technology**

The internationalisation of the industry has been greatly assisted by the availability and transferability of mature technologies of production and operation to developing countries. This was accomplished through the direct involvement of the MNCs (Odell & Rees, 1987). These corporations were typically spearheaded by either the major oil companies (such as Shell, Exxon, Mobil) which already had established commercial interest in the oil producing countries or the engineering construction companies (such as Fluor, Bechtel, Foster Wheeler, Lummus, Kellogg, Snamprogetti, Technip, Uhde, etc.) which sought new markets for their engineering services (Fayad & Motamen, 1986).

The above five factors explain the basis for the increased involvement of multinational corporations (MNCs) in the industrialisation plans of oil producing
developing countries. This resulted in two major phenomena which describe the emerging new markets for project finance:

(a) A markedly enhanced credit rating of new major projects and industries. International banks began to structure financial packages which utilise the reputation and commercial knowledge of the sponsoring MNC's to assess certain risk factors. As these sponsors assume the responsibility for the development and marketing of the project, lending banks are able to discount key risks when assessing financial viability of projects in developing countries.

(b) A growing internationalisation of the newer industries in LDC's. This caused a structural shift in the pattern of new project funding from predominantly equity to predominantly debt financing. The shift has systematically been associated with the rising phenomenon of project finance which provided a good fit for the requirements of international joint venturers among partners of varying financial and technical strength.

These results explain the bases for easing the traditional problems of raising direct finance on the credit of LDC petroleum projects. A related development is that some of the more successful national LDC industrial organisations have become international borrowers.

1.4 IMPORTANCE OF THE SUBJECT

Project finance is considered to be one of the most important industrial lending techniques and an investment strategy. A PF structure can be designed to overcome various problems of risks which are generally associated with the funding of large projects. The relevance of project finance is particularly critical for international lenders and borrowers which invest in developing countries.

It has been suggested that the size of a borrowing project that could attract interest in the project finance market is unlikely to be smaller than US$ 100 million in value of investment, and usually has a very large impact on the economy of the host country (Jeffery, 1986). In international petroleum developments the typical size of project investment is in fact considerably more (White, 1978). It is typically in the order of US$ 500 million or so (Jahnke & Webb, 1983) for production fields and in the Middle East the
cost of the majority of petroleum and petrochemical projects, which have been reviewed by this research, fall in the range of US$ 200 million to US$ 2,000 million.

The input of debt finance in petroleum projects is very significant and steadily increasing as a ratio of total capital investment. A study by Castle (1975) examined 29 major projects with inputs of debt capital ranging from 33% to 97.5%; the average debt to equity capital of these projects was 70% to 30%. Analyses by Wynant (1977) and Ulatowski (1983) similarly showed that the input of debt capital in the financial structure of large projects is as much as 75%. This study analysed 62 major petroleum projects and found that the average debt financing accounts for as much as 74% of the total investment. This level of debt capital investment in major projects could be compared to debt capital of 25-35% of total capital employed by the principle developer companies.

This type of financing means that a great deal of new industrial investment is in fact being carried by lenders. It also confirms the existence of a very high degree of interdependence between industry and lending banks which has now become a major variable in deciding new project developments. This is being reflected through the increasing concern shown by investors and contractors (Clarke, 1986) about the needs of lending banks to cover key risks in project financial plans and in anticipating bank participation as a strategy for successful implementation.

A manifestation of this phenomenon is the increased self-reliance of the industry on in-house financial expertise to ensure acceptability of investment projects to banks. The industry is devoting considerable time and ingenuity to designing ownership structures and financing packages with the objectives of minimising its exposure to the risks associated with the project and the cost of borrowing while increasing the availability of external fund sources. During the field interviews for the study cases, a number of senior managers pointed out that some 60% to 70% of the industrial planning effort invested toward the implementation of major projects by the industrial promoters is concerned with their economic and financial, as opposed to technical and engineering, aspects.

Similarly, most international banks now have a specialised department to handle complex financial packages in support of development projects (Marple, 1977; Leeper, 1979; Howcroft, 1986). This development seems to endow certain banks with specialised knowledge of the risks inherent in certain industries and the techniques of hedging required
for various investment situations. The banker's approach in project finance may also be viewed as an external check on logistic planning and risk treatment. This represents an important type of linkage or interdependence between banks and industry with a focus on the project's successful performance.

The nature of this linkage is not examined in the literature, but seems to provide a partial explanation for the apparently aggressive, risk oriented and entrepreneurial style of some banks which are more confident in their approach to PF lending. These functions suggest that project finance could play a very important role in LDC industrial development, not only in providing a new source of finance but also in improving the quality and quantity of industrial investment.

A study of project finance is thus considered an important subject and even more so in relation to the growing number and size of international projects located in developing countries. The importance of the subject will be further enhanced through formal research by way of new contributions to the literature and by developing new criteria and concepts relating to the theory of project finance and its relevance to the investment strategies of the less developed countries.

1.13 NEED FOR THE RESEARCH

The study is organised with a special focus on the needs of banks and industries which operate in developing countries and require strategic guide-lines and funding criteria in managing their exposure to new risks and the new capital markets. In particular, there is no research which analyses the functional relationship between PF investment, borrowing capacity and risk sharing strategies relating to LDC projects. With the rising need of the LDCs for technological and financial inputs a research study which includes reference to the specific requirements of developing countries will have a significant contribution to the literature in this field.

The PF experience in the LDCs also include the increasing involvement of national and regional banks. The emerging banks of developing countries invariably tend to copy the experience of the multinational banks, which operate from a completely different environment. Moreover, the new generation of politically funded and managed LDC banks and financial institutions tend to consider their corporate financial objectives of profit
maximisation as less important than the desire to act in the national and regional interest as 
"engines of development" (Nakhjavani, 1983). Such lending institutions seem to lack 
strategic banking concepts for effective participation in industrial development and 
therefore may be prepared to take excessive risks or concentrate their activities in the less 
novational sectors of the capital markets. Formal in-depth research is needed to help in 
the definition of appropriate rules of financial participation in project developments and in 
explaining the prudential criteria for avoiding excessive risks by banks in such 
participation.

The volume of general literature on project finance has been steadily increasing, but 
the treatment is still scant. In particular, there are no theories of project finance. The 
literature is mainly of a descriptive or prescriptive nature which so far has helped to 
popularise the subject by way of examples or specific applications of project finance to 
large scale investments. The small amount of formal academic research that has been 
undertaken (Wynant, 1977; McGown, 1980; Gill, 1981) provides a helpful background for 
understanding the subject. However, these have also focused on the descriptive and 
mechanical packaging of PF transaction or have not gone far enough to differentiate the 
risk phenomenon of project finance banking in terms of its specialised functions. Only 
Wynant's study stands out as an important contribution to the subject by analysing the 
impact of project finance on the borrowing strategy of the mining industry.

Accordingly, there are no structured bases in the literature for a general theory 
which explains how the risk strategy in PF banking tends to reconcile the divergent motives 
and objectives of borrowers and lenders. Wynant was mainly concerned with the shifting 
pattern of financial strategies in the mining industry and was unable to differentiate 
asset-based lease financing from non-recourse project finance. He assumed that all forms 
of financing which are off-balance sheet are synonymous with project finance. McGeown 
and Gill, on the other hand, merely navigated the applied techniques of project lending 
without attempting to develop a new concept or hypothesis. Extensive literature searches 
did not locate any other academic research over the past fifteen years or so and of those 
identified none attempted to develop the subject into a financial theory.

Project finance is thus still a field of international banking which is not well 
explored, understood or defined. This is in spite of its ever increasing use and importance
in determining major investments (Sarmet, 1981) and their implementation success, particularly in the petroleum (White, 1978) and energy-related (McKechnie, 1983) industries.

Our tracking of the relevant literature confirms this situation and also suggests that the popular theme of project finance in the literature may even have resulted in some disinformation about the real phenomenon of risk in project finance. In particular, literature definitions seem inconsistent with each other, being either too narrowly modelled on the principles of "pure non-recourse" and "off-balance sheet" financing or too unbounded in their reference to diverse capital and money markets which could provide finance for industrial investment. There also appears to be a misconception in the literature about the nature and function of "innovation" in PF approaches. As explained by Sarmet (1980), some authors "seem to equate project finance to financial methods which involve the general surrender of a lender's traditional right of recourse to the prime borrower and hence the responsibility for the repayment of the project debt depends only on the success of the project itself".

If this is so then the credit approach in project finance is somehow similar to taking equity risk though without the benefit of sharing the upside profitability potential on the loan asset (Weyer, 1979). However, this type of unbalanced risk taking will be neither prudent nor consistent, because the risk-reward relationships of the lender and the prime borrower are very different (McTiernan, 1983). Given a typical loan margin of about 1%, the bank's prospective economic return is far less than the return earned by an equity investor. Furthermore, as will be seen from the study cases, a project-related loan may be repaid prematurely if a project performs better than expected, thereby reducing the income of the project lender. On the other hand, if a project runs into difficulties, the lending bank could be fully exposed to loss of the entire project loan. Evidently, it is more likely that the sponsor could abandon a segregated project than a linked project, because the former may not affect other operations materially.

This line of analysis suggests that Project Finance must necessarily involve a focus on the down-side risks in the project. It also suggests that the most likely mechanism of protection against project risks will be through establishing strong linkages between the
sponsors and the project entity in order to provide the lender with indirect guarantees of performance through establishing "a community of interest".

This analysis suggests that those literature criteria and assertions which over-emphasis the separate legal entity of the borrowing project while overlooking the contractual linkage of the sponsor to the project are not very helpful. For example, it is not clear from the literature definitions why and how project finance strategy tends to reconcile the divergent motives and objectives of borrowers and lenders. There is a clear need for a contribution to the literature in this field.

1.6 THE RESEARCH OBJECTIVES

The initial motivation for the research was the author's desire to extend his past experience in corporate financial planning and petroleum project economics to related financial and bank lending decision-making and strategy analysis. This desire was aroused by financial reports on petroleum projects which, over the past two decades or so, had suggested a possible departure from conventional banking practice and bank lending theory.

During the 1970's and especially after the recycling of OPEC petroleum dollars, banks became more internationally aggressive in finding new business. This expansionist mood resulted in project loans being undertaken which at the surface seemed to lack any appreciation of risks inherent in projects; e.g., lack of completion guarantee by the parent; lack of lender's assessment of the sponsor's capacity and willingness to produce more equity if necessary; lack of independent assessment of reserve risk; and so forth. These apparent omissions represented a marked departure from traditional industrial banking practice and involved banks taking "equity" risk.

The issues involved in this "erosion" of traditional bank lending criteria were analysed by Jahnke & Webb (1983) of the Chemical Bank. They claimed that in order to increase profits, banks had become active in high risk high return business by participating in projects with little or no parent support, and by making loans to higher risk clients such as small or single purpose petroleum companies. This observation appeared to be inconsistent with the literature description of PF strategies (White, 1978; Zenoff, 1980; Nevitt, 1989) and therefore raised the distinct possibility of formal research in this area.
The need to fully understand these problems also provided a personal intellectual challenge in attempting the research.

The general objectives of the research are therefore to investigate the strategic choices and decision criteria involved in project finance and to examine the impact of PF on the borrowing capacity and investment capability of developing countries which host major petroleum projects. Resolving these objectives involved empirical research into PF motives and objectives, risk strategy and market approaches of lenders and borrowers. It also involved a conceptual analysis of project finance in an attempt to determine a model or a financial theory which adequately explained it. These issues were analysed from the strategic perspectives of both the prime borrower and the lender with a special focus on the risk characteristics of host developing countries.

The orientation of the study is therefore primarily financial and microeconomic in nature. Specifically, it seeks to understand the following:

1. What are the distinguishing risk characteristics of Project Finance?
2. By what rules of lending is Project Finance justified or being classified and differentiated from other forms of industrial lending?
3. How is Project Finance risk determined in terms of its main factors?
4. How does Project Finance determine the relation between lender's claims and borrower's obligations toward the project investment?
5. How effective is PF theory as a predictive model in determining the requirements of the petroleum industry?
6. What are the strategic implications of Project Finance for industrial capital formation in the less developed countries?

These aims are achieved through the pursuit of a number of important empirical and conceptual tasks which form the key objectives of the research as illustrated in Figure 2. These are listed and explained below:

First, a thorough desk research analysis is undertaken to generate empirical evidence relating to the pattern and scale of financing risk involved in developing petroleum projects. This involved collecting and analysing data to provide a measure of the relationship
Key Objectives

Empirical Investigations and Analysis

1. Desk research assessment of pattern and scale of financial risks in LDC petroleum projects.

2. Case study simulation of the forms of linkage between the borrowing project and its sponsors and their influences on the credit assessment.

3. Field visits and interviews to relate PF banking practice to key issues for the research.

4. Field survey questionnaire to test the research hypotheses relating to decision strategies and concepts of Project Finance and its benefits

Conceptual Analysis and Development

1. Assessment of the literature concepts and their relevance to current PF banking practice.

2. Development of definitional criteria and concepts

3. Explanation of the determinants of PF investment strategies and their advantages.

4. Development of PF theory and its basis in existing lending concepts and risk criteria

5. Assessment of the implications of PF theory on the borrowing capacity of the industry and host developing countries.

Figure 2
The Research Objectives
between the financial gearing of the projects and the nature of the business risk of the industry. This analysis included a review of the characteristics of petroleum projects and the nature of risk involved in developing oil and gas reserves. The aim of this analysis was to prepare the ground for the field investigation and survey of the relevant literature criteria relating to project finance.

Second, the practice of matching specific risks against credit and security criteria is subjected to critical review and assessment through the development of case studies. These case studies were carefully selected to relate to the experience of two countries of differing borrowing capacities and industrial development. The aim of the case studies was to provide the empirical evidence for identifying the key influences which relate to the credit of the sponsor and the host country. In this respect, the aim is to assess the possible conditions where these influences could partially or substantially be substituted by the credit of the project entity itself. This helped to develop a thorough understanding of the decision criteria being used in the petroleum industry and to establish the forms of linkage that exists between the sponsor and the project entity. In particular, the study aimed to assess how project finance results in viable "autonomous" investment when both lenders and borrowers appear to have completely differing business and risk perspectives about the project.

Third, a critical evaluation is undertaken of the literature concepts of project finance and its risks. The aim of this evaluation is to establish how the literature definitions succeed in reconciling and recognising the risk aversion position of both the lender and the borrower when considering project finance.

Fourth, the study attempted to identify and define the underlying objectives and motives of participants in project finance through the analysis of determinants of borrowing and lending on the collateral of a viable project entity. This analysis utilised the empirical evidence of the case studies, the field interviews, the literature reviews and the questionnaire survey results. The intention of the analysis is to investigate the various forces which act as explanatory determinants of lending and the extent to which these explain the willingness of participants in project finance to bear risks. This analysis helped to explain the divergent motives and objectives of PF borrowers, lenders and the host country in terms of possible linkages to their organizational and capital structure and needs.
It also illustrated how the project entity provides an intermediation function to reconcile differing requirements of participants.

Fifth, the study consolidated its knowledge base by attempting to define the framework for a theory of project finance banking. Having established the conceptual bases for the study through the literature assessment, case studies, and analysis of the major determinants of project finance, the study attempted to integrate these concepts into an eclectic theory of project finance banking. It was shown that project finance is a self-contained theory which incorporates the complementary roles of the borrower, the lender and the host country in defining a viable investment strategy. The theoretical bases of the theory were drawn from established and proven concepts of finance and risk management.

The above objectives covered aspects of both "normative" and "applied" themes which are hardly addressed in the literature on project finance. These provided possibilities for explaining the subject in terms of its own general theory. This is shown to be useful in the determination of financial strategies of both the industrial borrower and the industrial lender.

The normative approach also involved a study of the logical intersection of established theories of investment, finance and banking. Each of these theories offers a partial explanation of the subject of project finance and thus permitted development of a basis for linking proven concepts into an eclectic theory of project finance.

The applied perspective of the research aimed to determine how project finance participants identify and deal with project risks and make their choice of security criteria and how these considerations relate to their capital structure. The research involved the identification of empirical issues and related decision criteria by assessing whether these confirm with the field practice and if so whether they imply a systematic relation that could be generalised for similar lending situations in industry.

Having accomplished the above objectives within the limitations of this research it was also possible to define areas where further formal research could be undertaken.
1.7 **THE RESEARCH QUESTIONS AND HYPOTHESES:**

The realisation of the research objectives involved conceptual analyses and hypothesised explanations of PF strategies and decision criteria. The study approach to these analyses and explanations involved the development of the following research questions:

1. What is the typical pattern of project financing risks in the petroleum industry and how important is bank debt capital in the development of petroleum projects?

2. What is meant by the term "Project Finance"? Given that project finance involves lenders in essentially equity decision situations, how do lending banks reconcile project risks with their sensitive capital structure?

3. What is meant by PF risks, and what are these risks? Given these risks, how are they structured and how these structures provide the security needed by PF lenders?

4. Why do borrowers and lenders prefer PF structures to conventional loans, and why does PF strategy result in higher ratios of debt finance than conventional loans?

5. What factors, other than the obvious availability of debt capital, are important considerations in the strategies of a host LDC government when choosing to support a PF structure?

6. What are the conceptual or theoretical justifications for lending on the credit of a new project, and to what extent is a bankable project entity a substitute for the credit risk of its sponsor?

While these six questions were used to structure the study investigations the conceptual analyses gave rise to five major research hypotheses for testing by the study. These are as follows:

Hypothesis 1 Relating to PF Criteria and Concepts

"The essence of the concept of Project Finance is its advantage of risk sharing to both the borrower and the
lender. This advantage results from the PF intermediation function which is project-specific and location-specific. Its purpose is to utilise the viability of a major investment to mitigate the impact on the sponsor's debt gearing while protecting the lender against major business and country risks. While the mechanism of Project Finance involves the establishment of a legally independent entity, the PF concept necessarily relates to the establishment of a strong "community of interest" among all participants. This is achieved by incorporating long-term economic and commercial linkages between the project and its sponsors. This type of structured linkage is the source of security for the lender and invariably involves the transfer of credit among participants and forms the essence of definitional criteria."

Hypothesis 2 Relating to Determinants of PF Borrowing Strategy:

"The preference of borrowers for the facility of Project Finance is substantially a function of its real or economic benefits. In addition to the usual benefit of debt finance to shareholders, the main benefit of project finance is its contribution to financial stability and the increased borrowing capacity of the firm. If the major benefits of PF borrowing are defined and tested, then it will be possible to explain why the industry seeks high investment leverage through project finance."

Hypothesis 3 Relating to Determinants of PF Lending Strategy:

"A major limitation of a lending strategy is that the bank is only able to accept certain risks and will therefore participate in project finance only if it can pass on other risks to more qualified parties. If the risk bearing capacity of project lenders can be defined and tested then it will be possible to define the rules for extending bank investment to essentially equity situations."

Hypothesis 4 Relating to Host Country Strategy:

"The basis for financing major projects in resource-endowed developing countries is the exchange of benefits relating to long-term access to real resources for project credit support. The basis of this credit support is the mechanism of risk transference which involves both technology and marketing considerations. If the credit rating of LDC projects can be tested in terms of sponsor's linkage then it will be possible to explain how Project
Finance results in enhancement of the credit rating and investment capacity of host LDC governments without the traditional increase in general debt obligation."

Hypothesis 5 Relating to the Theory of Project Finance:

"The essence of the theory of project finance relates to two strategic intermediation functions provided by the separated project entity, namely: credit transference and risk transformation. These two functions explain why the phenomenon of project finance results in the loan obligation and debt risk to the prime borrower being significantly less than the loan security and credit risk to the lender. They also facilitate a valid basis for credit risk assessment by reference to established financial theories and concepts of finance and risk management. Credit transference is the phenomenon of capitalising on the credit of the stronger parties which partake in a community of interest. On the other hand, risk transformation is a function of the financial structure; it is achieved when lenders can rely on the credit of a new major project as a substitute for the credit of its sponsors. If the basic concepts of PF banking are defined it will be possible to relate these to proven theories of finance and risk management. This in turn will permit the definition of project finance in terms of an eclectic theory."

The conceptual explanation and testing of these hypotheses relied on the study findings through the case studies, field interviews, the questionnaire survey and the literature reviews. The test results are fully analysed in the main body of the thesis.

1.8 RESEARCH METHODOLOGY

A number of methods can be attempted to investigate the research subject as outlined so far. However, certain methods stand out as more appropriate than others, but the actual methods used have been dictated by the needs of the study situation as the research progressed. The logistic organisation and methods that have been used for the research are illustrated in Figure 3 which represents a model of the study plan and its outcome.

The starting base for identifying and evaluating the determinants of project finance was the literature survey. This involved a critical examination of the key variables of
project finance transactions, in particular those which relate to the nature of risk, borrower's obligations, lender's claims and the various related issues and criteria that characterise the study problems as outlined in the previous sections.

Through this survey the study extended the investigation of the subject into the field of PF practice to assess the criteria and techniques used in the industry and develop a conceptual framework for understanding how the market works and how it is determined.

The literature survey and desk research set the stage for the case studies. The case studies proved genuinely fruitful, particularly as the field of project finance application to LDCs is still empirically unploughed. The sources of information for the development of the case studies were visits, interviews with informed opinions and desk research analysis of project loan agreements, annual reports, financing information memoranda, trade journals and the financial press. The case studies were structured to represent a sufficiently broad sector of the LDC petroleum industry and to include a review of project financing strategy of industrial organisations involved in the development and financing of major projects.

Prior to the construction of case studies, the study carried out desk research into the pattern and trend of project investment in the petroleum industries. The focus of the analysis was on the distribution of investment and debt finance used in the industry of the developing countries where the use of project finance is increasing substantially.

Alternative approaches to the determination of the case studies were considered. One approach would have centred on certain large projects with a focus on their financial structure and its relation to participants' interests. Another approach would have involved a method of stratifying project samples by host country or regions and analysed in detail the common attributes of each sample.

There was also a third possible approach. This was to investigate the project financing strategy of some representative industrial organisations which carried on a substantial business of promoting and financing international joint ventures. This was the method actually selected for the study objectives.

Another important methodological issue for the study was the choice of the field survey questionnaire. This was required to support the study concepts and to test the
Chapter 1

Research Programmes

Alma and Objectives

Methods of Investigation

Development of Research Questions

Development of Data Bases

Chapter 2

Desk Research Findings

Case Study 1

(Saudi)

Chapter 3

Case Study 2

(Sudan)

Chapter 4

Research Criteria and Concepts

Chapter 6

Chapter 7

Literature Evidence

Development and Testing of the Research Hypotheses

Field Survey Evidence

BORROWER'S STRATEGY

LENDER'S STRATEGY

HOST COUNTRY STRATEGY

Location-Specific Benefits

PF-Specific Benefits

Theory of Project Finance

Chapter 8

Summary of Implications and Conclusions

Chapter 9

Figure 3
A Model of the Research Organisation and Methods.
research hypotheses. It involved structuring and testing appropriate list of assertions relating to the attributes of the problems being investigated and which require validation by reference to expert opinions. The analytical methods used relied on earlier research experience (Fadhley, 1977) and involved morphological analysis of alternative possible investment strategies in terms of assertions as listed in the study questionnaire (Appendix 2.2). These assertions were then subjected to the test of acceptance or rejection by the experts.

The potential respondents had to satisfy certain qualifications. It was considered that the lists of potential respondents could satisfactorily be confined to a sample of major banks and non-bank institutions which carry a substantial business of project finance. However, a great deal of relevant data could be retrieved from the borrowing industry and a consideration was how to tap this information and where possible to relate it to the specifications of the case studies as discussed above.

It was also found necessary to consider other methods involving direct interviews and an unstructured questionnaire as a precursor to the above methods, in order to develop a working basis for problem definitions for investigation. The objective of the direct interviews was to provide a basis for guiding and structuring the mail questionnaire and to generate empirical evidence on related issues. In this case, it represented a programme of working meetings to collect and analyse expert opinions.

The data bases that have been generated by these methods will be outlined in the next chapter and will form part of the research findings.
Chapter 2

THE RESEARCH DATA BASES

2.1 INTRODUCTION

The research programme included the development and analysis of four different data bases to support the thesis objectives. Each of the data bases is described briefly in this chapter, leaving the analytical and test results of the research data for later chapters as the research findings.

2.2 DESK RESEARCH

Substantial data was amassed and analysed in order to review the trends, patterns and scale of investment in the petroleum industry, at world-wide, regional and country levels. Published sources (including industry, banking and government data on the capital expenditure of the petroleum industry), trade articles, annual reports and press reports were reviewed to retrieve data and to examine the distribution of capital investment in large petroleum projects. Included in this data base were the result of the following investigations:

1. Desk research investigation and analysis of Data on large projects in operation, under construction or under implementation in 20 Arab countries. The information were structured in a data base system to permit analysis of the pattern and trend of petroleum investments.

2. Analysis of Data on financial structures used in major petroleum projects in terms of debt capacity and credit support structure.

This data base was intended as the source for developing the factual inputs and empirical definition of the scale of investment and financial risks within the petroleum industry. The output of this data base is fully analysed in the next chapter.
2.3 **DIRECT INTERVIEWS**

Appendix 2-1 at the end of this Chapter exhibits the list of the questions used in direct interviews with major banks and financial institutions. These were approached for initial consultations and to help with the pilot survey. The responses and comments generated by this survey formed the basis for the study's initial assertions relating to the strategic objectives and motives of borrowers and lenders in choosing project finance. These responses also helped to finalise the questionnaire for the field survey and therefore helped to structure the empirical orientation of the study on the basis of comments and feedback.

The actual interview sessions were guided (by the list of pre-prepared questions) but the procedure was kept as informal and freewheeling as possible. It was recognised that the sessions had to be unstructured and to concentrate on those topics in which the respondent stood out as a specialist. For example, if the respondent was not involved in marketing PF for the petroleum industry then the focus of the interview was immediately shifted to discussion of general concepts and banking practice relating to financing other large projects and how these vary between lending on corporate and sovereign credits. The length of the interviews varied but typically lasted about 3 hours; three interviews took more than one day and four took less than 3 hours.

The selection of the major institutions was through direct contacts and recommendations. Having succeeded in arranging the first interview with one institution further contacts were developed by requesting direct recommendation and introductions. Other contacts were established by requesting the interviewee to answer two questions about the market; namely:

1. In your judgement, which are the top ten project lenders in the world with whom your institution currently competes?

2. Which financial institutions or banks, with whom you do not currently compete, are likely to become your direct competitors in project lending as a result of their future growth or international diversification effort?

Senior executives of 14 institutions were then approached to arrange meetings. Three institutions declined on grounds of heavy work schedules and one did not reply. It
was also not possible to interview 3 out of the remaining 10 institutions which had agreed to be interviewed owing to tight schedules of the key personnel and frequent absences from the office. The 7 completed interviews thus became part of the study. All of these 7 interviewees were widely acknowledged project lenders and have led or managed syndicated loans on major projects.

2.4 THE FIELD SURVEY

Appendix 2-2 at the end of this Chapter exhibits the finalised study questionnaire which was used in the field survey. The questionnaire design relates to the study need for empirical data to answer the research questions and to test the study hypotheses relating to determinants of project finance strategies and PF theory.

Originally the questionnaire was structured in the form of 22 major questions, each consisting of a list of statements or assumptions about one aspect of PF banking practice. This questionnaire was used as a pilot survey and was tested with the banks and financial institutions which were interviewed as outlined in the previous section.

The results of this pilot survey helped to re-design the questionnaire, making it more consistent and focusing it on the strategic issues rather than the analytical criteria. The initial number of questions imposed too heavy a burden on the respondents and it was anticipated that the response rate of the full survey would be poor: the pilot questionnaire consisted of 12 pages covering 22 major questions. Two respondents complained that it required over 2 hours of "thinking time" to provide reasonable answers to all the questions. The number of questions in the full survey was therefore reduced to 10 which reduced the questionnaire length to 6 pages plus 1 for comments and personal information on the respondent. The total time to complete the questionnaire was thus reduced to less than 30 minutes.

The questionnaire design was of the guided structured and close ended type having a central focus on multiple choice assertions and concepts that require verification. Senior executives and PF managers were asked to express their measure of agreement with the study assertions by circling the answer that best describes what they think. They were also given an opportunity to comment on the study assertions or propose alternative criteria.
The finalised questionnaire (shown as Appendix 2-2) covers the following four categories of related problem areas:

1. Definitional criteria of PF structures.
2. Motives and objectives of borrowers and lenders.
3. Linkage among sponsors, host country and the project entity, and the distribution of PF benefits among these participants.
4. Risks of alternative borrowing and lending strategies and their impacts on investors.

It was decided to send the final questionnaire to a large number of banks and non-bank institutions, (including their head offices and branches) which were considered likely to be involved in project finance. One hundred final questionnaires were mailed to such organisations. Fifty of these were UK-based and fifty overseas.

Of the total number of questionnaires sent, 29 were returned unanswered. These were returned with a polite note stating that PF was not an item of business carried by their bank and therefore they were not in a position to answer the questionnaire. Another 6 questionnaires were returned from overseas un-opened with a note on the envelope that the addressee could not be traced at the specified address. A further 18 questionnaires had to be discarded as duplicates. For example, 5 questionnaires were sent to the various major branches of National Westminster Banks in the U.K. All of these were re-routed to the head office which wrote back and explained that the Group would respond collectively on one copy of the questionnaire. Similar results were achieved with other major banking groups such as Midland, the Royal Bank of Scotland and Deutsche Bank. All of the large banking groups returned only one completed copy of the questionnaire. The effective sample population of the study survey was thus reduced to 47.

The questionnaire response rate achieved was 49% representing 23 out of the remaining 47 sent. While most of the respondents were based in the U.K. they included a number of major overseas banking groups. The distribution of the 23 respondents by location and nationality is illustrated in Table 2.1 below:
TABLE 2.1 DISTRIBUTION OF THE SAMPLE OF RESPONDENTS

<table>
<thead>
<tr>
<th>COUNTRY</th>
<th>BY NATIONALITY</th>
<th>BY LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>30%</td>
<td>4%</td>
</tr>
<tr>
<td>UK</td>
<td>26%</td>
<td>61%</td>
</tr>
<tr>
<td>GERMANY</td>
<td>13%</td>
<td>13%</td>
</tr>
<tr>
<td>BAHRAIN</td>
<td>13%</td>
<td>9%</td>
</tr>
<tr>
<td>JAPAN</td>
<td>9%</td>
<td>4%</td>
</tr>
<tr>
<td>CANADA</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>HONG KONG</td>
<td>4%</td>
<td>4%</td>
</tr>
<tr>
<td>SAMPLE TOTAL</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Originally, it was proposed to organise a second survey in parallel based on a modified questionnaire to assess the market from the perspective of principal prime borrowers; namely, the MNCs such as the petroleum companies and the construction engineering firms which have extensive activities in LDCs, and the state-owned corporations of developing countries which are known to employ PF strategy for major project development.

However, it was found too difficult to stretch the limited time and financial resources available for the research study into this field. Fortunately, the need for a second survey proved unnecessary as it was realised that the case studies would meet the study requirements reasonably well through the provision of empirical evidence on the borrowing situations of LDCs. In addition, the field interviews during the development of the case studies had shown that most borrowing managers and financial executives employed by the MNCs and national organisations in the LDCs were in fact either ex-bankers or employed the advisory services of a major bank. It was suggested that the overriding aim of the MNCs which sponsored major projects was to ensure that the project company's financial
and investment plans were acceptable to the lending banks. For this reason it was decided that it was not imperative to extend the questionnaire survey further.

2.5 THE CASE STUDIES

2.5.1 Objectives of the Case Studies

The purpose of case studies is to generate the empirical bases for the development of the study concepts and hypotheses. As such the case studies were intended to provide an insight into PF borrowing strategy in the lesser developed countries. This includes an examination of how PF impacts on the borrowing capacity of host countries and the MNCs which participate in international projects located in LDCs.

The study objectives also included examination of the influences of the host country on the credit rating of the project entity. It was recognised at the onset of the research that the study cases might not include all the factors that enter into the financing decision or the multitude of financing strategies that have been used in the petroleum industry. On the other hand, cases could be selected so as to be representative of poor and rich LDCs as well as a wide range of projects that have attracted project finance. In this way the case studies could provide a source of empirical data for supporting the study concepts and for ensuring a good fit with the field practice.

2.5.2 Choice of Case Studies

As the focus of the study is on the petroleum industry, the study first proceeded with the analysis of the pattern of investment in this industry and then selected the main sectors which have used PF extensively.

The desk research analysis found that the changed pattern of today's international investment is linked to the availability of PF. In particular, the MNC's are increasingly becoming minority shareholders and the international banks, which used to follow their multinational customers in the search for PF business, are now marketing their services competitively seeking to enrol national companies and other state-owned enterprises which host major joint venture projects. This follows the emergence of some new state-owned
companies which have themselves become transnational (Lall, 1983) investors and increasingly aware of the benefit of PF structures on their consolidated balance sheet.

The Arab petroleum industry is selected for this investigation. This choice partly relates to the researcher's working experience in this industry and partly because it is a very large and growing PF market and is expected to remain of considerable interest in the future. With two major wars in this region, the amount of required investment and bank finance over the next decade or two will be considerable more than could be indicated by this study.

2.5.3 Identification of Case Studies

The PF market of developing countries is concentrated in petrochemicals, refineries and pipeline projects. The study investigation and analysis of the Arab petroleum industry showed that the following state-owned industrial organisations stand out as major host partners of international projects:

1. SABIC (the Saudi Arabian Basic Industries Corporation).
3. QGPC (Qatar General Petroleum Corporation).
4. ADNOC (Abu Dhabi National Oil Corporation).
5. Sonatrach (State oil organisation of Algeria).
6. SGPC (Sudan General Petroleum Corporation).

From considerations of data availability, access to loan documentations and expert opinions as well as direct contacts with knowledgeable senior officials it was decided to concentrate on two candidates; namely the organisations numbered (1) and (6) above. These represented two countries; namely, Saudi Arabia and Sudan which represent a very rich and a very poor LDC country respectively.

The elimination of other candidates was the result of careful analysis and consideration of benefits to the study. Candidates number (1) and number (2) above have a similar financial policy and strategy and are subject to similar environmental factors. The activities of Petromin which involve PF are largely confined to export refineries which are
not different (from the financing point of view) than petrochemical projects which are being developed by SABIC. It was therefore concluded that SABIC would be a preferred candidate for a case study, because of its rich experience in completing and operating export projects of world-scale which extensively involve the multinationals.

Numbers (3) and (4) were eliminated because they represent very similar experiences (albeit on a smaller scale) to that of number (1). The nature of investment and country risk is also similar as these small Gulf states tend to follow the economic and development model of Saudi Arabia.

Number (5) was eliminated because it is similar to number (1) and (2) and in addition has more reliance on sovereign borrowing when funding industrial development.

Case number (6) of Sudan was selected because it represents a very poor and high risk country with experience of planning a major international development of oil reserves and pipelines. In this respect, number 6 can provide a useful contrast to the experience of Saudi. The selected candidates (case number 1 for Saudi and case number 6 for Sudan) are considered to provide rich experience of LDC host countries which support PF borrowing strategy.

The two case studies will be fully described and analysed in chapter 4 and chapter 5.

2.5.4 Data Collection Objective

Having chosen the host countries and corporate candidates as described above, the study next determined the structure of data collection for the case studies and define its objective.

The collection of data for the case studies involved two stages. The first consisted of a study of all available published data: annual reports, financial statements, prospectuses, information memorandums relating to recent project loans and press cuttings. The financial and technical periodicals were also screened for any articles, reports or surveys which may relate to the companies or their corporate activities and financial performance. The second stage relied on information and experience gained during several visits to the head offices of the selected organisations.
The focus of the research investigation and interviews was on the retrieval of the following information which formed the study structure for the desk research and other investigations:

1. A description of the overall corporate objectives and motives and the perceived mechanism of achieving these.


3. A description of the overall financial strategies and funding policies relating to investment in new project developments.

4. A description of criteria and methods used to identify and treat major risks relating to project investments.

5. An investigation of the objectives and motives for seeking commercial finance and whether alternative financing were possible and considered during the project implementation.

6. An analysis of the PF costs and benefits from both the owners' perspective and that of the project entity; and, the influence such cost-benefit had on the decision to seek PF loans.

7. A detailed description of the financing arrangements for major projects.

8. The impact of project's financial plan on the borrowing capacity of owners and on the level of investment in the host country.

The above list represents the guide-lines which were followed during the development of the data bases for the case studies.
Appendix 2-1

LIST OF THE QUESTIONS USED DURING THE DIRECT INTERVIEWS
1. In terms of your corporate policy and practice, why do you participate in Project Finance?

2. Of the key reasons you have specified, which have been the dominant for selecting a PF structure?

3. In which major way do you consider direct corporate or sovereign borrowing fails to produce the same desired results as Project Finance?

4. If the funding decision focuses on the viability of the project and its financial structure, why in your opinion the project entity is better placed (as a segregated entity) than its parent to raise proportionately more funds?

5. When lending for the purpose of a project development on a limited recourse basis, do you intentionally share risk or do you attempt to transfer the risk away to other parties?

6. It is generally recognised that the need to measure risk poses major problems. First, to quantify management's propensity to trade risk against return is difficult and in some instances impossible. Secondly, risk is not a stable concept; risk preferences are subject to change and reflect organisational as well as market or environmental conditions. Based on your own decision situation, what is really meant by "RISKS" in PF banking context?

7. With focus on your internal decisions, do you consider the management rules governing your financial portfolio (such as country limits, industry limits and
beta risk estimation) are alternative or supplementary to economic assessment and risk analysis of specific projects?

8. Is it possible to substitute other methods of evaluation to the ones you are using?

9. In your judgements, what conditions are necessary for banks to extend project finance structure and criteria to small and medium sized projects which hitherto do not use this type of finance?

10. Based on your own portfolio of Project Finance experience, what is your approximate percentage estimate of the number of projects seriously examined to the number actually commenced and funded?

11. Of those which you funded, what development characteristics tend to be common to all borrowing situations that have employed a PF structure?

12. How do such cases differ systematically from those instances where the project is financed directly by the parent?

13. In terms of the percentage of all nonperforming loans that have been rescheduled, or that your institution internally classify as likely to become non-performing, what percentage would you estimate to relate to PF structure?

14. In what proportion of these the availability of direct financial guarantees would have reduced the credit risk?
15. For the LDCs in which you have project loan assets, in which major aspects these assets differ from other forms of lending (sovereign or corporate) you have made to the same countries?

16. As a general rule do you consider Project Finance less or more risky than corporate and sovereign credit?

17. Is the dedication of cash flow for debt service of the project less or more important than the capital gearing ratio as a measure of financial risk?

18. Based on your past experience, what major aspects or attributes of the prime borrower do you incorporate in your decision to lend on project basis?

19. Is this less or more important than the results of economic analysis relating to the project being financed?

20. What factors could cause you to be willing to trade off higher project leverage for higher spread or fees?

21. Which major criteria do you use to determine the maximum amount of loan investment in a project and the loan tenure?

22. In what ways does Project Finance enables the parent company and the host country to obtain more debt capital for developments relative to the alternative options of straight corporate or sovereign borrowing?

23. It is often argued that both the prime borrower and the lender seek to establish a viable project and foster steady growth in development though sometimes by different means. What are the major principles which make up a common area or interest to all parties in a PF arrangement?
24. How does PF provide a basis for defining the investment linkage between the lender and the prime borrower?

25. Does this linkage arise out of the common interest in development or is it determined as a result of the mechanical application of PF structure?

26. Based on your own experience, how do you think the prime borrower in Project Finance relates its objectives and motives to the project entity?

27. In a great many PF transactions, long-term supplier and customer commitments appear to be an integral part of the financing arrangement. Are such contracts a deliberate part of the PF plan or would they have been undertaken by the venture partners regardless of the method of financing used?

28. Assuming that venture partners structure these contractual commitments in their prior knowledge that they are necessary for project-related borrowing, do all such contracts provide enforceable claims for the project lender?

29. In some LDC countries a new generation of financial institutions have by now sufficiently matured to participate or co-lead in project finance. How do you consider the impact of these institutions on the flow of funds into international development?

30. In relation to country or political risk, how important is the role of emerging financial institutions of which you have direct experience through syndicated loans? Any examples?
31. It is often argued that in some instances important projects will not be implemented for lack of Project Finance. In which major ways do you think Project Finance could offer clear benefits to the prime borrower?

32. Do you think these benefits impact on the propensity of LDCs to develop the more commercially viable projects and to discard the less viable ones?

33. Based on your experience and knowledge, in which major way PF results in greater investment?

34. Assuming you have identified a good opportunity for a PF transaction and to the extent that you manage to separate project risks from risk factors relating to the sponsor and the location, would you consider the PF transaction is completely free from corporate and country risk?

35. When considering lending to a major project owned by the state or a state-owned entity which is (assumed to your satisfaction) a creditworthy borrower but is not willing to issue a financial guarantee, how much importance do you give to the assumption that the public sector cannot go bankrupt?

36. When lending to a major project owned by the state, do you generally expect the government to act as a financier of last resort to cover losses in the event of financial distress?

37. If the loan agreement visibly excludes the government from the credit obligation, would you still consider the possibility of state support in the event of default?
38. Assuming the State is a good credit but your analysis shows that the project is not a good risk, is it likely that you still participate in project finance for some organisational or strategic objective?

39. Some governments participate as a joint venturer in a major development and contribute equity capital as well as debt capital. When lending to such projects do you treat such debts as equity or loans in the calculation of leverage?

40. Based on your experience of evaluating project plans as prepared and presented to you by the prime borrower, in which major aspects the borrower's investment decision differs from your financing decision? e.g.

   Motives?  _______________________________

   Capital Structure? _______________________________

   Business Strategy? _______________________________

   Financial Risks? _______________________________

41. Assuming the host country has no credit history of payment difficulties, is your organisation likely to accept lower equity to debt ratio than you think is analytically justifiable in exchange for a financial guarantee from the government or a state-owned enterprise? In this case, would you regard the loan a project finance or a sovereign risk?

42. Do you treat such guarantee as substitute for equity?
43. Assume the country has a credit history of payment difficulties, would you insist on a higher debt-to-equity ratio than analytically is needed as a way of mitigating country risk?

44. When providing Project Finance, do you analyse the accounts of the parent or the sponsor companies?

45. If yes, do you perform an analysis of the consolidated accounts?

47. If yes, do you also analyse the information provided on the footing of the balance sheet?

48. In your opinion, do other project lenders similarly analyse (or disregard) parent accounts?

49. Based on your own experience, do you find PF a branch of corporate lending or a specialised capital market?

50. Are you aware of a literature definition of Project Finance which provides a good fit to your banking practice?
APPENDIX 2-2

FIELD SURVEY QUESTIONNAIRE
Dear Sir,

SURVEY OF PROJECT FINANCING PRACTICE

The Banking Centre is currently concluding a programme of research into Project Finance practice. The research focuses on the strategic choices and decision criteria of both the borrowing industry and the lending banks when deciding to finance a major development project. This research will be of interest to multinational companies and banks which participate in financing international projects.

We have achieved interesting results through completion of our literature review, analysis of loan documents, development of case studies and conclusions of a pilot survey with major banks in the City of London. At this stage I am endeavouring to relate our findings to the wider field practice as perceived by bankers.

The purpose of this letter is to request your help through the participation of your Project Finance Manager in our field survey by completing the enclosed questionnaire.

The questionnaire consists of 10 questions with multiple choice answers. Project Finance Managers and Senior Financial Executives are asked to circle a number which corresponds to the answer that best describes what they think.

All contributions to this survey will be treated with care and on a confidential basis. In return for your co-operation I shall be pleased to send you our summary of the survey results.

Please, could you help us to conclude our study by completing the questionnaire and returning it to me at the Banking Centre, Loughborough University, Loughborough, LE11 3TU, UK. An addressed envelope is enclosed for your convenience.

Yours faithfully,

Sabah A. Fadhley,
Doctoral Research Programme,
Banking Centre.
**SURVEY OF PROJECT FINANCING PRACTICE**

THANK YOU VERY MUCH FOR GIVING YOUR OPINION IN THIS SURVEY. THE QUESTIONNAIRE IS EASY TO FILL IN... JUST CIRCLE THE NUMBER FOR THE ANSWER THAT BEST DESCRIBES WHAT YOU THINK. YOUR COOPERATION IS GREATLY APPRECIATED. ALL ANSWERS WILL BE TREATED CONFIDENTIALLY AND THE SURVEY RESULTS WILL BE MADE AVAILABLE TO YOU.

1. In the literature, there are many definitions of Project Finance. Please indicate the measure of your agreement with the following assumptions:

<table>
<thead>
<tr>
<th>STRONGLY AGREE</th>
<th>REASONABLE ASSUMPTION</th>
<th>STRONGLY DISAGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

- Project Finance is a structured lending package tailored for specific needs of a risky investment situation and designed so that both borrower and lender get the best possible deal out of the investment by linking loan repayment directly to the project’s own cash flow which may be supplemented by direct or indirect guarantees of performance.

- Project Finance is a technique of arranging off-balance sheet bank loans by linking Lender's primary security to the Project's earnings and may involve a measure of lender's direct control over the Project and or its assets.

- The core of Project Finance is the instrument of LIMITED RECOURSE which brings together various types of complementary commitments and guarantees from sponsors to ensure project performance.

- Project Finance differs from Sovereign and Corporate lending in that the project loans are not fully secured by guarantees or the value of the assets being financed; hence, the Lender must look to the performance and earnings of the project as a going concern and share major business risks.

What comments do you wish to make on any of the above assumptions? Alternatively, please suggest a definition which more closely fits your experience:
2. Please indicate how important the following market factors are to your organisation:

<table>
<thead>
<tr>
<th>INDUSTRIAL SECTORS</th>
<th>VERY IMPORTANT</th>
<th>FAIRLY IMPORTANT</th>
<th>LEAST IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Other mining</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TYPE OF CREDIT</th>
<th>VERY IMPORTANT</th>
<th>FAIRLY IMPORTANT</th>
<th>LEAST IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sovereign</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Corporate</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Project-related</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Trade related</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mixed</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOCATIONS</th>
<th>VERY IMPORTANT</th>
<th>FAIRLY IMPORTANT</th>
<th>LEAST IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>USA &amp; Canada</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Australia &amp; New Zealand</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Latin America</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Middle East &amp; Africa</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Far East &amp; Asia</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Eastern Block</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

3. The following statements relate to major international investments. Please circle one response for each to indicate your measure of agreement.

<table>
<thead>
<tr>
<th>STATEMENTS</th>
<th>STRONGLY AGREE</th>
<th>REASONABLE ASSUMPTION</th>
<th>STRONGLY DISAGREE</th>
<th>POTENTIALLY IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>The aim of sponsors in Project Finance is to overcome the limitations of</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>debt-raising capacity of project owners and mitigate the risk of debt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>service obligation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The main advantage of a PF structure to the lender is its facility to</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>control organisational and country risk through segregating project</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>earnings and priority claims.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is not necessary for project owners to shoulder all the debt obligations through direct guarantees, because the lender is generally able to look to project performance for its primary risk protection.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Project Finance permits a high ratio of debt-to-equity because its tight structure results in less risky investment than other financing methods which rely on direct financial guarantees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Most project loans are client driven and the lender is attracted by the promise of higher earnings through better margins and various fees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
4. Please rank the importance of the following factors assuming your bank is lending to a major international project which aims to exploit a natural resource in a developing country.

<table>
<thead>
<tr>
<th></th>
<th>VERY IMPORTANT</th>
<th>FAIRLY IMPORTANT</th>
<th>NOT AT ALL IMPORTANT</th>
<th>POTENTIALLY IMPORTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(a) THE SPONSOR:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A state owned company as joint venture partner.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>The host country's government as equity participant.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Financial guarantee from government of host country.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Supply and Sales agreements with Multinational companies.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Completion undertaking by a Multinational sponsor.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Partnership of a Multinational company (no guarantees).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>(b) THE PROJECT:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repayments tied to Counter-trade opportunities</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Repayments tied to the export earnings of the project.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Lender's control over Project's assets</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>High return on total Project's investment (Debts and Equity).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>High return on the loan investment</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>(c) THE LOCATION:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Host country risk factors.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Availability of major feedstock resource for the project.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Prospect of further lending business in the country.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Adequacy of Infrastructure</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>(d) INSTITUTIONAL:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syndication with other major commercial banks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>IFC and World Bank Co-financing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Availability of Export Credit insurance.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Participation of local banks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

5. Please rank the importance of the following loan structures. Please circle one response for each item listed.

<table>
<thead>
<tr>
<th>TYPE OF PROJECT FINANCE</th>
<th>(75%+)</th>
<th>(50%-75%)</th>
<th>(25%-50%)</th>
<th>(10%-25%)</th>
<th>(5%-10%)</th>
<th>0%-5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-recourse on signing?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Loan guaranteed during pre-completion?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>A form of Cash deficiency agreement?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Sponsor guarantee against failure?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Full recourse finance?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Some mixture of guarantees &amp; supports?</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>b</td>
</tr>
</tbody>
</table>
6. Assuming a well structured loan arrangement in place, how would you rank the following Credit Risks?

<table>
<thead>
<tr>
<th>Risk Description</th>
<th>Much Less Risky</th>
<th>(50-50) Average Risk</th>
<th>Much More Risky</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct loans to Multinational Cos. (MNCs).</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Direct loans to large national LDC companies.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Non-recourse project finance for MNCs.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Limited recourse project finance for MNCs.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Sovereign borrowing by resource-rich LDCs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Asset-based lending including financial leasing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

7. How would you rate the importance of the following factors from the point of view of the borrowers' objectives and motives when seeking project related finance?

<table>
<thead>
<tr>
<th>Factor Description</th>
<th>Very Important</th>
<th>Fairly Important</th>
<th>Not At All Important</th>
<th>Potentially Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Accounting considerations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(2) Borrowing limitations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(3) Yield on equity investment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(4) Fiscal benefits.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(5) Financing costs.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(6) Investment risks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(7) Political risks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(8) Force majeure risks.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(9) Need for additional finance.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(10) Product (Market) Risk.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(11) Completion Risk.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>(12) Financial Stability.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
8. How would you rank the credit-worthiness of the following transactions as bank investments?

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Very High</th>
<th>Somewhat Average</th>
<th>Not at All Acceptable</th>
<th>Potentially Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lending to a new captive financial company wholly owned by an industrial multinational corporation (MNC).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Lending to a new industrial project company wholly owned by an industrial multinational corporation operating within the same industry (horizontal or vertical integration).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Lending to a major joint venture in LDC country sponsored by one or more of the multinationals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Lending to a new major project in LDC which is wholly owned by the State or State-owned company.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

9. How do you rate the contribution of the following to the practice of project finance banking?

<table>
<thead>
<tr>
<th>Contribution</th>
<th>Very Important</th>
<th>Fairly Important</th>
<th>Not At All Important</th>
<th>Potentially Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Hedging.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Portfolio Risk Analysis &amp; Evaluation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Capital Asset Pricing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Option Pricing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Investment Appraisal.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Application of Accounting Ratios and Methods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Foreign Direct Investment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Corporate and Sovereign Lending.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Financial Leasing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
10. How do you rate the following sources of risk in terms of their importance to your organisation as a project lender? (Please see footnote before responding.)

<table>
<thead>
<tr>
<th>Risk Description</th>
<th>Readily Acceptable (a)</th>
<th>Negotiable (b)</th>
<th>Least Acceptable (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Uncertainty of reserve size or adequacy</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Producing difficulties not related to reserve</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Possible delay in production start-up</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Possible deficiency in working capital</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Possible rise in operating costs</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Uncertainty about contractual commitments</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Currency Exchange Variation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Rise in Inflation Rate</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Interest Rate Variation</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Possibility of cost overrun</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Uncertainty about project completion</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Uncertainty about quality of output</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Possible fall in market demand or prices</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Possible increase in debt to equity ratio</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Uncertainty about the reliability of technology</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Possible lengthening in repayment profile</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Adverse changes in the political environment</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>- Force majeure events</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes relating to definition of above columns:

(a) A "READILY ACCEPTABLE" risk is one which will not require a specific provision in the loan agreement. Its acceptance is based purely on analytical results and assessment of financial and technical data.

(b) A "NEGOTIABLE RISK" is one which will be acceptable to lender if the reward is adequate and related safety criteria are included in the loan agreement.

(c) A "LEAST ACCEPTABLE" risk is one which must be transferred to other more qualified party.
11. What other comments or observations do you wish to make? Please also give references if you (or your institution) have recently contributed to the literature on Project Finance banking.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

12. INSTITUTIONAL AND PERSONAL INFORMATION

Please tick the appropriate choices below to ensure our compliance with your wishes.

___ Please ensure that my name will NOT be disclosed in any of the research studies and reports.
___ Please ensure that the name of my organisation will NOT be quoted in relation to any specific contribution made to this field survey without prior written approval from me.
___ The name of my organisation may be listed among the general contributors to the general survey.
___ Please send me the RESULTS of this survey.

MY NAME IS: _______________________________ POSITION: _______________
COMPANY: ___________________________________________________________
ADDRESS: ___________________________________________________________

________________________________________________________________________
PHONE: _______________________________ FAX: ___________________________

THE OPINION IN THIS SURVEY IS CONFIDENTIAL AND WILL BE HANDLED ACCORDINGLY.

Thank you for your participation.

S.A. Fadhley, Doctoral Research Programmes, Banking Centre,
Loughborough University, UK, LE11 3TU.
Tel: (0509) 263171 (0283) 65556 Telex 34319 Fax (0283) 703593
Chapter 3

PETROLEUM FINANCING RISKS

3.1 INTRODUCTION

This Chapter presents the findings of the desk research. The aim is to assess the scale and pattern of investment being undertaken by the petroleum industry and the nature of technical and economic risks involved in petroleum projects. The study will examine how the petroleum industry and lending banks attempt to identify and evaluate these risks and to provide a conceptualised explanation of their implications for this study.

The starting point for the research must therefore be concerned with the development of the first of the six research questions which were identified in Section 1.7 of Chapter 1; namely:

What is the typical pattern of project financing risks in the petroleum industry and how important is bank debt capital in the development of petroleum projects?

3.2 SOURCES OF DATA

The principal objective of the research includes a special reference to the petroleum industry in developing countries. In this regard it was found reasonable to select the region of the Arab oil producing and exporting countries as a basis for the study investigation. This region accounts for over 60% of the world proven oil reserves and about 20% of the total world investment in petroleum projects and has a rapidly growing demand for project finance.

The petroleum industry of the Arab countries is one of the most internationalised industries in the world. The typical size of petroleum projects in these countries is also of world scale. The nature and pattern of project investment, financial leverage and risks relating to technical and economic factors associated with petroleum projects are also similarly distributed world-wide. It is therefore considered that the principles and concepts
which can be derived from analysis of the Arab industry will be of genuine interest and have a general application to the industry as a whole.

The approach to the analysis is to carry out desk research into data found in annual reports, trade journals and loan documents. It also includes the results of interviews with senior petroleum and banking executives and analysts. In addition, the study arrived at other results based on interpolation of cost estimates based on ratios and coefficients relating to installed capacities of similar plant and projects. This information is included in the study data base which includes the following:

1. Publicly available data and its analysis relating to major petroleum projects which have either been completed or still under construction.

2. Data interpolated by the study relating to cost of projects on which there is no published information.

The quality of industry data is tested to give high reliability at the 95% level of significance and is considered to provide accurate information on investment trends and the potential size of PF market in the region.

3.3 SCALE OF INDUSTRIAL INVESTMENT

Estimates published by the Chase Manhattan Bank as well as the data generated by this study are given in Table 3.1. This table shows that after the major surge in oil prices of 1973 and 1979, the yearly capital investment of the world petroleum industry responded with substantial rises reaching a peak by 1982 at US$ 139,000 million. The depression that followed this year resulted in a marked decrease in global investment but industry experts believe the annual investment will steadily increase and it is expected to exceed US$ 150,000 million by 1992.

The proportion of world-wide investment undertaken within the Arab region has steadily increased from about 6% in 1974 to about 15% in 1990 and is expected to rise to over 20% by 1995. The scale of investment in 1990 is estimated to exceed US$ 22,000 million compared with US$ 15,000 for the Middle East region. Analysis of global statistics are given in Table 3.1.
Table 3.1
CAPITAL INVESTMENT OF THE PETROLEUM INDUSTRY

<table>
<thead>
<tr>
<th>YEAR</th>
<th>WORLD WIDE</th>
<th>MIDDLE EAST</th>
<th>ARAB WORLD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US$</td>
<td>US$ (Ratio)</td>
<td>US$ (Ratio)</td>
</tr>
<tr>
<td>1974</td>
<td>43,700</td>
<td>1,770 4.1%</td>
<td>2,685 6.1%</td>
</tr>
<tr>
<td>1975</td>
<td>49,625</td>
<td>2,025 4.1%</td>
<td>3,348 6.7%</td>
</tr>
<tr>
<td>1976</td>
<td>56,725</td>
<td>4,675 8.2%</td>
<td>6,140 10.8%</td>
</tr>
<tr>
<td>1977</td>
<td>81,580</td>
<td>7,800 9.6%</td>
<td>9,805 12.0%</td>
</tr>
<tr>
<td>1978</td>
<td>68,375</td>
<td>7,650 11.2%</td>
<td>10,763 15.7%</td>
</tr>
<tr>
<td>1979</td>
<td>81,625</td>
<td>8,425 10.3%</td>
<td>11,515 14.1%</td>
</tr>
<tr>
<td>1980</td>
<td>105,525</td>
<td>11,525 10.9%</td>
<td>15,461 14.7%</td>
</tr>
<tr>
<td>1981</td>
<td>138,600</td>
<td>14,625 10.6%</td>
<td>20,953 15.1%</td>
</tr>
<tr>
<td>1982</td>
<td>139,425</td>
<td>12,950 9.3%</td>
<td>18,960 13.6%</td>
</tr>
<tr>
<td>1983</td>
<td>111,775</td>
<td>11,150 10%</td>
<td>16,344 14.6%</td>
</tr>
<tr>
<td>1984</td>
<td>106,775</td>
<td>10,875 10.2%</td>
<td>15,908 14.9%</td>
</tr>
<tr>
<td>1990E</td>
<td>150,000</td>
<td>15,000 10.0%</td>
<td>22,500 15.0%</td>
</tr>
<tr>
<td>1995E</td>
<td>180</td>
<td>27,000 15.0%</td>
<td>36,000 20.0%</td>
</tr>
</tbody>
</table>

E = Estimate

SOURCE: World-wide and Middle East data prepared by The Chase Manhattan Bank in a survey entitled: CAPITAL INVESTMENT OF THE WORLD PETROLEUM INDUSTRY, 1984. Arab world data are developed by the research through analysis of country data published by AOPEC Secretariate and the Arab Bank.

Over the eleven years, 1974 - 1984, the investment in the Arab countries increased by 5.9 -fold, representing an average growth of US$ 1,200 million per year. In 1990/92 total investment in the Arab world is expected to be in excess of US$ 15,000 million,
representing a considerable potential for new projects. This data excludes investment relating to geological and geophysical exploration which accounts for some 8% to 10% of the trend figures. This type of investment is purely speculative and not appropriate for bank financing.

3.4 PETROLEUM INVESTMENT RISK

A study of the petroleum and petrochemical industries in the Arab world by Zahlan (1977) showed that more than 600 small and large projects were developed in the period 1959-1976 and that by 1992 this total would reach 800. This research study identified and analysed 198 large and very large projects (25% of the total population). These projects were either operating, under construction or in the process of implementation through 1992 and covered the fields of refinery, petrochemical, fertilisers, gas and gas liquids and pipelines. The study sample excluded upstream exploration and production projects and all other projects which are of marketing or ancillary services or are too small for PF financing criteria. Analysis of the study population of major projects is given in Table 3.2 below.

Table 3.2

The Arab Petroleum Industry: Trend of Investment Cost in Major Projects

<table>
<thead>
<tr>
<th>CONSTRUCTION COMPLETION PERIOD</th>
<th>COST OF INVESTMENT (US$ Million)</th>
<th>NO. OF PROJECTS</th>
<th>AVERAGE COST (US$ Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR</td>
<td>Counted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pre 1975</td>
<td>7,240</td>
<td>48</td>
<td>151</td>
</tr>
<tr>
<td>1975-1980</td>
<td>19,475</td>
<td>41</td>
<td>475</td>
</tr>
<tr>
<td>1980-1985</td>
<td>25,325</td>
<td>49</td>
<td>517</td>
</tr>
<tr>
<td>1985-1992</td>
<td>11,454</td>
<td>60</td>
<td>191</td>
</tr>
<tr>
<td>ARAB INDUSTRY</td>
<td>63,524</td>
<td>198</td>
<td>321</td>
</tr>
</tbody>
</table>
Analysis of the 198 petroleum projects by type of plant and markets is given in Table 3.3. Some 73 of the 198 projects were constructed as export projects; the remaining 125 relate to import substitution products such as refinery products and fertilisers which aim at the domestic market. The domestic projects are comparatively small in size (95% of the population fall within the cost range of US$ 20 million to US$ 150 million). The major domestic projects represent 63% of the total number of projects being implemented but only 34% of the total investment deployed by the industry. This investment is generally provided by the State or a state owned organisation and often involve a great deal of conventional borrowing.

Table 3.3

Analysis of The Arab Petroleum Industry by Type of Plant
(Average Cost figures are in US $ millions)

<table>
<thead>
<tr>
<th>TYPE OF PLANT</th>
<th>DOMESTIC PROJECTS</th>
<th>EXPORT PROJECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Counted</td>
<td>Average Cost</td>
</tr>
<tr>
<td>Refinery</td>
<td>75</td>
<td>158</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>21</td>
<td>159</td>
</tr>
<tr>
<td>Petrochemical</td>
<td>23</td>
<td>79</td>
</tr>
<tr>
<td>NGL/LNG/LPG</td>
<td>1</td>
<td>63</td>
</tr>
<tr>
<td>Pipelines</td>
<td>5</td>
<td>871</td>
</tr>
<tr>
<td>ARAB INDUSTRY</td>
<td>125</td>
<td>171</td>
</tr>
</tbody>
</table>
All of the export projects were structured as international ventures and involved substantial debt finance. The total capital invested in export projects is US$ 42,121 million, representing 66% of aggregate investment by value with an average cost of US$ 577 million. The study counted 14 export projects plus 1 domestic gas gathering project with total cost falling within the range of US$ 1,000 million to US$ 7,000 million.

It was difficult to complete the financial data on all projects in the study sample. However, it was possible to retrieve data on debt ratios relating to a large number of export projects. This information is analysed in Table 3.4 below:

**Table 3.4**

**The Arab Petroleum Industry: Export Projects Analysis of Financial Structure**

<table>
<thead>
<tr>
<th>Type of Plant</th>
<th>No. of Projects In Sample</th>
<th>Aggregate Investment (US$ MM)</th>
<th>Loan Finance (US$ MM)</th>
<th>Debt Capital Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrochemical</td>
<td>22</td>
<td>9,205</td>
<td>6,824</td>
<td>74.1</td>
</tr>
<tr>
<td>Fertiliser</td>
<td>14</td>
<td>3,589</td>
<td>2,766</td>
<td>77.1</td>
</tr>
<tr>
<td>Refinery</td>
<td>12</td>
<td>9,765</td>
<td>7,308</td>
<td>74.8</td>
</tr>
<tr>
<td>LNG</td>
<td>6</td>
<td>5,350</td>
<td>3,848</td>
<td>71.9</td>
</tr>
<tr>
<td>NGL</td>
<td>3</td>
<td>1,950</td>
<td>1,473</td>
<td>75.5</td>
</tr>
<tr>
<td>LPG</td>
<td>3</td>
<td>1,320</td>
<td>938</td>
<td>71.1</td>
</tr>
<tr>
<td>PIPELINE</td>
<td>1</td>
<td>7,000</td>
<td>5,250</td>
<td>75</td>
</tr>
<tr>
<td>Study Projects</td>
<td>62</td>
<td>38,579</td>
<td>28,687</td>
<td>74.4</td>
</tr>
</tbody>
</table>

**SOURCE:** Table 3.2 refers

The input of debt capital on export projects ranges from 70% to 90% with a mean ratio of about 74% for all the 62 projects in the study sample. While in all of these projects the primary credit is project related, the study counted 34 projects which also included a
form of a financial guarantee from the State or the State-owned sponsor; the remaining 28 had some form of State support but no direct financial guarantee. Virtually all of the projects with State financial guarantee were located in Algeria, Libya, and Iraq where the participation of the multinationals is mostly of contractual nature with no shareholding interest. Saudi Arabia and the other Gulf states accounted for the rest of the projects which were self-financed and included the support of the multinationals as minority shareholders and providers of technology and marketing services.

3.5 ECONOMIC RISK OF PETROLEUM PROJECT

The assessment of a petroleum project's profitability and financing requirements, during its development phase as well as when the field is actually on-stream, is subject to substantial uncertainty. Apart from relatively infrequent but disastrous events, such as explosions and fires, the risks involved in undertaking a new petroleum project can be classified into five major groups:

1. Incorrect estimates of the productive reserves;
2. Technological uncertainties relating to producing efficiency, production rates, and field life;
3. Under-estimates of the capital requirements and operating costs;
4. Changes in future competitive conditions; and
5. Political or sovereign risks associated with the host country.

(1) Reserve Estimation Risks

The first step in estimating petroleum reserves is to obtain information on its classification and probability of recovery. These estimates are usually derived by methods of reservoir simulation which suggests probable variation in output depending on various assumptions about reservoir parameters. Estimates of variations will be used in economic sensitivity analyses and the results are compared with the most likely outcome (the base case). Although incorrect estimates of productive reserves will affect the choice of the production facility and profitability and could result in substantial investment risk, it is
usually possible to determine with a high degree of accuracy the extent and quality of the productive reserves.

(2) **Technological Factors**

The most significant component of production risks for a new petroleum project relates to the uncertainties about the reservoir pressure and the required system of water/gas injection to sustain output. In the North Sea oil field experience, for example, this was reported to have resulted in excessive amount of water production which in turn meant lower oil recovery at time of peak oil prices. Technological factors may also result in selecting a mismatched (larger or smaller) production facility. This would constitute substantial production and investment risks.

(3) **Investment and Operating Costs**

Discrepancies in the actual versus estimated costs are characteristics of large projects. A change in the scope of the original plan will shift the scale of the original budget. A change in exchange rate will affect the cost of procurement from non-dollar denominated sources of supply. Inflation, interest rates, changes in supply prices and other related factors could result in large cost overruns in the investment and operating costs budgets.

(4) **Competitive Conditions**

The projection of the profitability of a new petroleum project is contingent upon the future competitive conditions assumed for the industry. During the past 10 years, oil prices experienced dramatic changes which resulted in fundamental changes in the way the industry is evaluated. One consequence of these changes is the relocation of some sectors of the petroleum and petrochemical industries in the oil producing LDCs where the comparative cost advantage of feedstock gave birth to new world-scale projects and industries. Another consequence was the change in the choice of sales contracts, such as take-and-pay, and forward sales agreement which often represented a valuable security in support of debt finance.
(5) **Political Risks of Host Country**

A major risk for projects located in a developing country results from the possibility that future actions by the host government may impact negatively on the project's commercial profitability. The increased demand for local ownership and control have been matched by novel approaches to financing which permit participation of multinational companies as minority shareholders or as providers of services or as prime investors through production sharing agreements.

3.6 **PATTERN OF INVESTMENT RISK**

The study reviewed the pattern of risks in the petroleum industry in terms of five broad types or categories of major investment activities which have considerable international content:

(1) **Exploration:**

Defined as investment in activities related to the search (through geophysical, seismic and drilling) for possible and probable reserves of hydrocarbon deposits and to proving and sizing of identified prospects.

(2) **Development and Production:**

Defined as investment in plant, equipment and activities related to development and production of proven oil and gas reserves, including natural gas liquids (NGL).

(3) **Transportation:**

Defined as investment related to dedicated pipelines and tankers for the transportation of crude oil, natural gas, refined liquid products, liquefied petroleum gas (LPG) and liquefied natural gas (LNG).

(4) **Processing:**

Defined as investment related to refining of products from crude oil and includes related storage and terminals. Also petrochemical plants which include plastics and fertilizers.
(5) **Marketing and others:**

Defined as investment related to service stations, bulk plants, terminals and related transportation equipment used to deliver products to a marketing facility and other miscellaneous facilities not included in above categories of investment.

The first category of investment, exploration, is of a speculative nature and wholly financed either internally or by raising venture capital. The industry tends to plan on the assumption that a proportion of gross production revenue or profit should be invested in exploration in order to find new prospects aimed at maintaining or increasing the level of long-term production capacity. Taxation laws also provide an incentive for investing in exploration activities by permitting the oil companies to claim the cost against profit tax and production allowances on corporate and individual field basis. The accounting mechanism for these claims is usually through the depreciation provision which often amounts to 100% of the exploration costs and thus represents a claw-back against tax in the first year of investment.

Because of the purely speculative nature of exploration investment it has not been a suitable area for debt financing. A discovery of a new petroleum prospect that has been tested to be commercially feasible is typically the result of a substantial exploration activity that includes many unsuccessful seismic surveys and well drillings. Industry analysts typically estimate that only one in every 40 wells world-wide results in a find. Even if the initial studies indicates that the discovery is a very worthwhile one, it is only the beginning of a long effort to totally develop the reserve.

The fifth category in the above list (marketing services) is also of fringe interest to this study as the majority of projects in this group are too small and fragmented to permit financing on a project basis.

The other categories of petroleum investment listed as items (2), (3) and (4) above differ considerably in terms of their management and income generating life cycles but represent the main areas for PF financing. The nature of risk of each of these categories of investment will now be examined in turn.
3.7 **RISKS IN OIL AND GAS PROJECTS**

Once a hydrocarbon prospect passes the stage of its commercial appraisal and a decision taken to develop and recover the proven reserve then the potential for a bankable project is borne.

The economics of such a project therefore inseparably relate to the oil that could be recovered and sold economically by means of known technology and at market prices. The concept of risk in petroleum investment decision making must therefore primarily relate to the definition of what constitutes a "proven reserve".

In petroleum economics, the term "proven reserve" refers to the amount that is reasonably certain to be produced in the future under current economic and operational conditions from deposits established on known geological and engineering data (Ion, 1979). Senior petroleum and banking executives and analysts who were consulted during the study confirmed that this definition is a valid basis for the industry to make for planning and bank financing decisions.

Industry criterion of reserve risk thus implies that the financial worth of an oil field will depend on the risks associated with extracting the oil and the proportion thereof that could be "economically" produced and delivered at reasonable market prices. The risk in project financing is thus not rigidly definable because the proportion that can be economically produced will depend on a number of uncertain factors such as expected prices and marketability of the products that can be operationally produced and delivered.

This implies a requirement for analytical and decision making models to determine the economic life cycle of the project at different price levels. In this type of analysis there is a need to decide the production cut-off point of the oil field. Beyond a given cut-off point, total operating costs of production will exceed total gross revenue. This follows because, after a period of peak production is achieved, the rise in operating costs will be accompanied by a fall in production rates; hence, once the break-even level of depletion is achieved there will be no commercial incentive to continue production even though it may be technically feasible and possible to do so.

Industry analysts thus carefully differentiate between the "technical recovery factor" and "economic recovery factor" when evaluating risks for investment decisions.
The former concept in itself is of no commercial value until it is translated to an economic concept through cash flow analysis over the project life cycle. The industry therefore attempt to overcome this problem by differentiating the various levels of reserve risk which is inherent in petroleum projects. These are generally defined as follows:

(1) **Proved reserves:**

The definition of proven reserves by the industry includes one or more of the following:

(a) proved, developed and producing reserve;
(b) proved, developed but not yet producing; and
(c) proved, but yet undeveloped reserve.

Proved reserves are estimated quantities that geological and engineering data demonstrate with "reasonable certainty" (e.g. 90% confidence limit) to be recoverable in the future from known reserves and with known or existing production technology.

If the proven reserve is developed (termed by the industry as reserves "behind pipe") the oil is expected to be recovered through existing wells. In this case, there is factual knowledge of the productivity of the wells as well as their efficiency, the equipment being used and operating methods. Proven undeveloped reserves are thus by definition measurable with less accuracy than proved developed reserves.

(2) **Probable Reserves:**

Probable reserves are less well defined than proved reserves (by direct well control methods), but are still based on sufficient (though indirect) evidence of productive oil within the geological limits of a known productive structure or reserves.

(3) **Possible reserves:**

Possible reserves make a third category of productive structures which are often included in industry estimates of reserves. Estimates of possible reserves are even less well defined by direct well control methods than "probable reserves"; e.g. based on log interpretation without proof of technical productivity from production tests.
(4) Potential or geological prospects:

Potential or geological prospects are a fourth category of structures of reserves which oil companies often refer to in order to indicate a possibility for a further upside potential in ultimate recovery. The estimates are invariably defined through geological inferences of the general environment and are sometimes supported by some seismic data.

The field interviews with the experts confirmed that the general policy of most experienced lending banks is to lend against proven reserves only. In this case, reserve risk is not taken by lenders unless there is substantiated empirical evidence that the reserve will in fact be productive and costs of development and production from such prospects are confirmed by experts.

The oil companies use a method of discounting other reserves to adjust for their inherent risk in economic and financial analysis. The following weightings were observed in the petroleum industry when formulating investment planning decisions and it is believed to be typical of reserve discounting factors used for adjusting risk:

<table>
<thead>
<tr>
<th>Type of Reserve</th>
<th>Discount Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proved</td>
<td>0.90</td>
</tr>
<tr>
<td>Probable</td>
<td>0.50</td>
</tr>
<tr>
<td>Possible</td>
<td>0.30</td>
</tr>
<tr>
<td>Potential</td>
<td>0.10</td>
</tr>
</tbody>
</table>

The research interviews with bankers specialising in financing petroleum projects suggested that banks are not prepared to assume the risk of "probable" and "possible" reserves. Banks also consider "potential" prospects as not suitable for the immediate financing decision because the probability estimates that could be derived for this category is itself subject to substantial doubt. Lending banks prefer a more conservative approach than that used by the borrowing industry in analytical decisions as an element of their safety net or security structure. This suggests that the concept of reserve risk to the borrower is significantly different than to the lender as it involves different considerations for their investment decisions.
The purpose of applying statistical weights is to normalise the various categories of project reserve estimates to a single working figure of expected (or mean weighted) reserve size. This is more helpful in economic evaluations and is sometimes preferred to the discrete type estimates of proved, probable, possible, and potential reserves. However, the various classification of reserve risks is a useful analytical concept as it indicates the progressive reduction in estimation risk as one moves from "potential" prospects to "proven" prospects.

Investment decisions relating to oil and gas projects thus involve a major focus on the reserve risk. Economic and financial analyses of such projects generally relate to the full life cycle cash flow which can be substantiated by the profile of oil and gas depletion. The following risk factors are generally considered important by the industry and lending banks when evaluating petroleum projects:

1. The timing of the start of production and exports following project completion.
2. The length of time it takes to reach the anticipated peak production and the rate of production build-up during this period.
3. The level and duration of sustainable peak production.
4. The rate of decline through the point of economic cut-off.
5. Productive efficiency of the production, processing and off-take systems during peak production.
6. The level of prices that could be achieved for the products.

These factors are the empirical parameters of a generalised risk analysis model used within the industry and by project lenders to assess the economic viability of oil and gas projects. Project lenders need to make appropriate assumptions about these parameters in order to validate the cash flow estimates presented to them as a primary security for the project loans.
3.8 **RISKS IN TRANSPORTATION & PROCESSING PROJECTS**

Typical projects which qualify for project finance under this heading are pipelines and tankers, processing and refineries and petrochemical complexes. Transportation and processing projects share common risk characteristics in the sense that both types of project represent systems which are very sensitive to constraints of input and output types.

These constraints relate to the availability of sufficient volume of materials or feedstock and maintaining a level of tariff which can generate a minimum income to meet all cash costs as well as service and retire all debts within a reasonable period. These projects generally incorporate the following sources of risk:

- Ability to bring the project into working condition at reasonable time (i.e. placing of a completion guarantee).
- Ability to contract out dedicated capacities at the right fees (throughput agreement).
- Ability to maintain the transportation facility without excessive interruptions or breakdowns (operating management agreements with a reputable operator).

The ability to lay off the risk of failure to complete the project is of a critical importance to project lenders. The "delay factor" in project start-up and earning is also a common type of risk which concern both the borrower and the lender. Most experts thought that the difference between "failure to complete" and "delay in completion" may turn out to be the dividing line between the equity-holder's risk and the lender's risk. If the completion of the project is delayed the lender may find itself obliged to provide more loans and thus bear even greater risk.

The risk situation of transportation and processing projects is generally complicated by the fact that the throughput agreements are cost-dependent and may not relate to production and market conditions of the products being transported. For example, it is very difficult to establish and maintain a direct commercial or economic linkage between the pricing risk (the level of tariff for shipping crude oil through a pipeline) and the resource risk or market risk. This is particularly acute if the oil field is land-locked and the pipeline
is the only means of transportation available to the shippers. It is therefore not possible to rely on the assumption of long-term economic relations between the supplier and the buyer of the project's product simply on the basis of market projections and economic analyses.

For this reason, much of the risk analysis in relation to these projects is supported by contracts such as throughput agreements and off-take agreements. These legal contracts provide a form of risk hedging for the project lenders who are not able to assume market and pricing risks when lending to pipeline or processing projects. The following five reasons have been suggested by senior industrialists and bank executives during the study interviews as the basis for differentiating transportation and processing projects from other projects:

The project's economic viability is determined not by the absolute price level for the end products, but by a price differential (between input materials and output products). This differential underlies the primary motive and objective for the development of the project. It is possible for the differential actually to be negative; i.e. the refined products to be worth less in aggregate than the crude oil from which they were manufactured, and for products to be worth less at the output end of a pipeline than at the input end.

1. The expected value-added of the project may prove insufficient to cover all operating and financing costs of the facilities and sustain the financial incentive of the equity investors. This is most likely to be the case in developing countries where the project location may be decided on political rather than commercial considerations.

2. The dependence on the supply of raw material may be absolute in the sense that alternative sources will not be feasible. In this case, monopolistic pricing of the feedstock or input materials is unlikely to be consistent with competitive prices of the project outputs, particularly if the project is planned to target international markets.

3. The project may constitute an integral linkage between the supply source (e.g. a landlocked producing oil field) and the market. In this case the project is not a stand alone economic entity in the sense that the
economics of the oil field will impact directly on the economics of the project.

4. The tolls or fees required to cover the cash obligations of the project and service its debts may bear no relation at all to movements in market conditions for either the end-products, the feedstock or both. The liquidity and solvency of the project cannot be predictable because they are tied to external influences. In this case, the project structure is no more than a "cost company" set up to exploit the reserve and hence the only appropriate method of generating income for the project is through a rental agreement.

These empirical observations show that lenders require different sets of analytical and strategic decision criteria when lending to pipeline and processing projects than when lending to oil field projects.

3.9 CONCLUSION

The petroleum industry consists of many activities of varied investment risks and borrowing requirements and involves a great deal of interdependence in investment decisions and trade. A particular feature of the industry in developing countries is the heavy concentration of large and very large projects in upstream and mid-stream operations of production, processing and transportation. In these sectors the multinational companies play a leading investment role in one form or another in the provision of technology, organisational management and marketing of petroleum products. The intensity of bank lending to major projects in these sectors reflects their industrial maturity and the ability of lenders to identify and evaluate petroleum financing risks.

The study analysis of the petroleum industry suggests that project finance is largely concentrated in the mid- and downstream projects which aim to develop export capacities. Hence, the study reflected this pattern when selecting candidates for the case studies.

Seismic and exploration investment is generally funded by internal finance owing to its speculative nature. Development and production costs are suitable for project finance as has been illustrated in a number of North Sea and other international projects. However,
the study could not find sufficient data to permit their analysis in the context of LDC sponsored projects.

Other main LDC sectors which are well known to attract international bank financing are the export sectors of the petrochemicals, refineries, fertilisers, gas fractionation and pipeline transportation industries. On the basis of a sample of 62 major export projects, the average cost of investment was found to be in the order of US$ 577 million. These projects accounted for one-third of the study sample population but two-third of their aggregate investment. The input of bank capital in these projects was found to be within the range of 70% to 90% with a mean debt-to-equity ratio of 74.4%. This confirmed that in many instances bank financing accounts for the bulk of the industrial investment in major petroleum projects.

The type of risk inherent in these projects was found to vary depending on the nature of industrial activities. There is no empirical evidence to suggest that there is a universally agreed method of accounting for project risks. The risk perspective of the borrower also differs significantly from that of the lender. However, the starting point in risk analysis is the classification of oil and gas reserves in terms of their uncertainty. Empirical techniques of sensitivity analysis and risk simulation are also in general use to minimise the impact of financing risk through determining appropriate loan maturities and loan values in direct relation to the capacity of the project to generate revenue.

Transportation and processing projects are further complicated by input and output constraints which may not relate to market conditions. For this reason, project lenders generally rely on contract-based support from the principal sponsors as a means of mitigating supply and demand risks in this type of projects.
Chapter 4

PF EXPERIENCES IN SAUDI ARABIA - A CASE STUDY

4.1 INTRODUCTION

In the previous Chapter, the study determined the pattern, scale and nature of project financing risk from the general perspective of the petroleum industry. In this Chapter the objective is to re-examine the risk factors in more specific terms at the levels of the sponsoring organisation and the borrowing projects. The aim is to evaluate the available empirical evidence on PF practice in a more direct way that permits the development of the study concepts and hypotheses in terms of a good fit with actual and specific project investment experience of the less developed countries.

This task will be achieved through development of two study cases as was outlined in Chapter 2: one relating to a resource-rich and the other to a very poor host developing country. The first of these is the concern of this Chapter with the focus on the experience of Saudi Arabia.

4.2 THE SAUDI ECONOMY

Project development and financing in this country is facilitated by the endowment of the country with abundant reserves of oil and gas. Saudi Arabia is the largest oil producer and exporter among all developing countries. OPEC's estimate of the proven recoverable oil reserves is 168.8 billion barrels which represents 45% of the total Arab worlds proven reserves. About 80% of the oil produced is exported as crude and the remainder is refined. Of the refined products 78% is exported to the world market and 22% is consumed locally.

In addition, Saudi Arabia is a very large producer and processor of natural and associated gas. The proven recoverable gas reserves are estimated by OPEC at 125.1 trillion cubic feet which represents 20% of total Arab world proven gas reserves. The country is the third largest Arab producer with net output amounting to 534.8 million cubic
foot per day. Apart from some 6.5 million ton/year of LPG export, the country's main export is petrochemical products. The value of petroleum exports in 1983 was over US$ 47,800 million which is expected to increase steadily to US$ 100,000 million through 1992 according to OAPEC's estimates.

4.3 THE NATIONAL ORGANISATIONS
Major industrial projects in Saudi Arabia are generally sponsored and implemented by one of four major national organisations. These are:

- The Royal Commission for Jubail and Yanbu;
- Petroleum & Mineral Organisation (Petromin);
- Arabian-American Company (Aramco); and
- The Saudi Arabian Basic Industries Corporation (Sabic).

The Royal Commission is responsible for building the infrastructural facilities required by the projects implemented by the other organisations. Petromin's concern is with upstream projects (i.e. prospecting, exploration and drilling) and to set up a number of new oil refineries and a cross-country pipelines to supply the Yanbu projects with crude and gas. Aramco is responsible for crude oil production and gas gathering, treatment, transportation and marketing of crude oil.

SABIC is the national promoter of petrochemical industries. However, all projects interact and depend on the services and support of the other organizations for the provision of feedstock materials, fuel gas, water, communication, environmental and infrastructural services. The support base for the petrochemical projects is therefore much wider than that provided by the principal sponsors, namely SABIC and its multinational partners.

The volume of additional investment during 1987-1992 in refinery and petrochemical projects alone is estimated at US$ 2,745 million representing eleven new major projects with average investment of US$ 250 million. Four of these are refineries and implemented by Petromin; the remaining Seven are petrochemicals and implemented by SABIC.
4.4 THE CORPORATE STRUCTURE OF SABIC

SABIC was established in 1976 as a joint stock company with headquarters in Riyadh and authorised capital of US$ 2,700 million (SR 10,000 million). By the end of 1983, the paid up share capital was US$ 1,000 (SR 3,750 million) representing 37% of the authorised capital) and all shares were held by the Government. In 1984, the paid up share capital was increased to 50%, and 30% was sold to the private sector. According to Article 8 of SABIC's by-laws, the Government intention is to privatise 75% of SABIC to achieve ultimate ownership structure of 25% Government to 75% private. During 1986 and 1987 the private sector increased its share marginally by participating directly in the development of two of Sabic's projects. The ultimate objective of the government is thus to set up SABIC as a major privatised national developer of petrochemical projects.

At the end of 1986, the corporate net worth stood at US$ 1,900 million and total assets amounted to US$ 6,000 million. The corporation's financial structure is thus represented by 68% debt capital to 32% equity capital. This reflects the high average debt to equity financing of SABIC's 21 projects which are the main assets of the corporation. The component of debt capital will further increase as the remaining projects are being completed. Table 4.1 below presents selected data on SABIC's financial performance.

Table 4.1
Financial Performance of SABIC

<table>
<thead>
<tr>
<th>YEAR</th>
<th>% OF ASSETS</th>
<th>US$ MILLION</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR</td>
<td>CASH &amp; TIMES DEPOSITS</td>
<td>CAPITAL EXPENDITURE</td>
</tr>
<tr>
<td>1983</td>
<td>6.7</td>
<td>na</td>
</tr>
<tr>
<td>1984</td>
<td>10.2</td>
<td>26.8</td>
</tr>
<tr>
<td>1985</td>
<td>9.8</td>
<td>12.6</td>
</tr>
<tr>
<td>1986</td>
<td>9.9</td>
<td>6.4</td>
</tr>
<tr>
<td>1987</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
Source: Sabic's Annual Reports. An exchange rate of US$1 = SR3.75 assumed.

The total amount of debt capital refers to outstanding long-term debts and other liabilities taken by Sabic to fund the investment required by the new projects: total debt capital as proportion of total assets has steadily increased to a 70%. This gearing ratio reflects the financial structure of SABIC's individual projects which accounts for the bulk of total assets.

In 1990 SABIC operated through 21 major project companies and employed about 10,000 employees. Most of these projects are located in the industrial cities of Jubail and Yanbu and are incorporated as "independent" subsidiary of affiliated companies with Sabic holding the majority ownership.

4.5 THE CORPORATE OBJECTIVES

The business objective of Sabic has been stated in its various Annual Reports as

"...to set up, operate and market the products of basic industries and other downstream and supporting industries based upon natural hydrocarbon and mineral resources... by establishing capital and energy intensive projects."

Article 3 of the by-laws of Sabic defines the objective in terms of five types of activities:

1. Implementation of petrochemical, fertilizer and other hydrocarbon-based industries.

2. Implementation of iron and steel, and aluminium industries. Implementation of other basic industries which the private sector cannot undertake on its own.

3. Execution of projects necessary to supply the Corporation with its raw material requirements.
4. Marketing industrial products inside and outside the Kingdom of Saudi Arabia.

The formally stated objectives are activity oriented and relate more closely to the requirements of the country's emerging new industries than to the financial strategies of the corporation. The commercial and profit motives seem to be deliberately obscured as Sabic still sees itself as primarily an engine of industrial development. The petroleum minister, Hisham Nazer, stated the objective of the corporation more as a promoter and investor with a concern over the commercial performance of the project companies:

"The aim of Saudi Arabia is to capture a rising share of the world petrochemical market... The objective is to maximize returns on the (manufacturing) complexes themselves (and) encourage sellers to find the most profitable contracts."  

Sabic's Executives also consider that the commercial and profit motives as very important and necessary to attract and keep international participation in Sabic's major projects. The vice chairman and managing director, Mr. Ibrahim A. Salamah, considers these partnerships vital for the development implementation as well as for marketing and distribution of the products world-wide.

SABIC management believe that the partnerships with the multinationals involve exchange of substantial benefits which have contributed to the successful implementation of complex industrial projects. Sabic believes the objective of the MNC's participation in its projects is to seek opportunities to establish a new source for chemical feedstocks with guaranteed long-term availability. In return SABIC, as a new manufacturer and marketer of products, receives a number of benefits:

- Proven technological experience in the petrochemical industry.
- A demonstrated ability to operate projects profitably.
- Ready access to global markets for the products of the projects.
- Advanced (plant, process, and product) technology.

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3A speech made at the International Petrochemical conference of the National Petroleum Refiners Association in San Antonio (Oil & Gas Journal, 13th April, 1978)
• Orderly transfer of technology and training of Saudi nationals.

These benefits represent the main considerations in the credit rating of Sabic's projects when they seek to borrow from the private commercial sector. These benefits are considered of strategic importance to Sabic because the corporation is still a new producer and marketer and needs the support of its partners in its international activities and its internal operation and training plans.

A number of multinational companies participate in SABIC projects as prime investors and these are fully represented on the board of the project companies. The major MNCs which have participated in Sabic's existing projects include the following:

1. Celanese Corporation (USA);
2. DEG (The German Corporation for Investment in Developing Countries);
3. Exxon Corporation (USA);
4. Ecofuel of ENI (Italy);
5. Lucky Goldstar Group (South Korea);
6. Mitsubishi led group of companies (Japan);
7. Neste Oy (Finland);
8. Mobil Oil Corporation (USA);
9. Shell (USA) through subsidiary Pecten Arabian Co.;
10. Taiwan Fertilizer Co. (Taiwan);
11. Texas Eastern Corporation (USA); and
12. Toyo Engineering Co. (Japan).

Sabic management believe that the partnership with these multinational companies is a long-term strategy which can be duplicated profitably and successfully in other major developments.
4.6 SCALE OF INVESTMENT RISK

By 1985 Sabic had completed 12 major projects in the mid-stream sector with a total investment of US$ 10,600 million. The average cost per project was US $833 million. Three large projects were also completed in the downstream sector at an average cost in the order of US $300 million.

According to SABIC five year plan, total investment in projects during 1985-1990 was US$ 4,500 million and covered the following range of activities:

While the scale of investment risk remained typically very high its impact have been mitigated by the rise in sales revenue as newer capacities were brought into production. In 1985 and 1986 sales revenue from all products exceeded US$ 1,000 million of which 70% was export sales and 30% domestic.

However, in 1986 the corporation experienced two major problems: the impact of a very sharp fall in world prices for its export products and the imposition of custom duties on export to its major markets in the EEC countries. These problems resulted in actual performance for the year being much lower than anticipated.

Sabic was able to reduce the impact of these market factors by the substantial increase in output and volume export that resulted from higher capacity operation of the new projects. The product sales in 1986 increased by a 47% compared to 1985.

<table>
<thead>
<tr>
<th>INVESTMENT PROGRAMME</th>
<th>FUND ALLOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrochemicals</td>
<td>51.3%</td>
</tr>
<tr>
<td>Metals</td>
<td>18.3%</td>
</tr>
<tr>
<td>Plastics</td>
<td>15.5%</td>
</tr>
<tr>
<td>Fertilisers</td>
<td>6.7%</td>
</tr>
<tr>
<td>Other Products</td>
<td>4.2%</td>
</tr>
<tr>
<td>R &amp; D and Buildings</td>
<td>4%</td>
</tr>
</tbody>
</table>

Marketing problems in the petrochemical industries however were recognised as very serious and were accentuated by falling prices and the imposition of 12% to 13% tariff by the EEC on imported Saudi petrochemicals. This eroded much of the comparative operating economic advantage which the Saudi petrochemical industries previously enjoyed over other international industries. Sales through 1986 were "forced" by external factors to significantly lag behind capacity which had been developing and coming on production.

The overall profit position of Sabic through 1987 nevertheless continued to improve and the 1987 results leaped by five times compared to the results of 1986. The trend of profitability and the financial position of Sabic through 1992 is still one of a new producer in a developing country with heavy investment commitments in new projects rather than of a mature industrial company. This position suggests that lenders are somehow able to make their credit judgement about future earnings without the benefit of extrapolation from historical financial and performance records.

4.7 THE FINANCING STRATEGY OF SABIC

In 1983 three major projects were completed and qualified for commercial loan financing. Sabic went to the market for the first time to syndicate US$ 201 million and appointed one of the Saudi banks (Riyadh Bank) as agent to raise project loans.

In 1983, Sabic's borrowing requirement was the first lending opportunity for the over-capitalized Saudi and inter-Arab Gulf banks to invest in the public sector of the Saudi industrial loan market. The local and regional banks were highly liquid and were eager to participate in Sabic's investment.

Analysis based on a 1987 survey prepared by the Gulf International Bank is given in Table 4.2 below. This shows that the position of Arab banks in terms of assets and total credit exposure to the private sector is indicative of under-investment by international standards:
Table 4.2

ASSET AND CREDIT POSITION OF THE ARAB BANKS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>RATIO OF CAPITALISATION TO TOTAL ASSET</th>
<th>RATIO OF CAPITALISATION TO TOTAL CREDIT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SAUDI ARABIA</td>
<td>GULF STATES</td>
</tr>
<tr>
<td>1983</td>
<td>7.2%</td>
<td>8.7%</td>
</tr>
<tr>
<td>1984</td>
<td>7.6%</td>
<td>9.2%</td>
</tr>
<tr>
<td>1985</td>
<td>8.4%</td>
<td>10.2%</td>
</tr>
<tr>
<td>1986</td>
<td>7.9%</td>
<td>9.7%</td>
</tr>
</tbody>
</table>

Source: Gulf International Bank

The banking activities in the region have traditionally been concentrated in trade and construction which accounted for more than 50% of the regional banks' total credit exposure while lending to the productive sector of the industry continued to play a very minor role and accounted for about 6% of total exposure.

The credit exposure of the Saudi banks to the industrial sector is still well above this average in the order of 9% to 10%. However, until 1983 virtually none of this was in the industries of the public sector. The demand for project finance by Sabic thus offered the Arab banks a first opportunity to diversify their assets and sources of earnings away from the private sector which by 1987 has experienced a number of financial difficulties. Indeed, during 1983-87 the Saudi commercial banks have vastly increased their provision for bad debts, and in 1987 the Saudi Arabian Monetary Agency (SAMA) established a special committee to review some 500 cases of delinquent loans associated with the private sector.

In addition to the national and regional banks, the international banks were also very eager to lend to the industrial organisations owned by Sabic. In 1984 this market represented opportunities of project finance transactions worth US$ 1,200 million for direct
investment in some eight or ten major projects sponsored by Sabic and its sister organisation, Petromin\(^4\).

In this receptive capital market, Sabic was able to get commercial non-recourse project finance without even issuing a detailed information memorandum or prospectus on its borrowing projects or give details of how the cash flow prospects will develop for the borrowing projects. As one popular financial journal described the 1983 deal:

"For the banks that did participate, the technical features of the deal were probably less of a draw than the prospect of participating in one of the cornerstones of the Saudi development drive..... The possibilities of further loan business with Sabic as well as the fees and prestige associated with providing the funds were incentives for banks to participate.\(^5\)"

This statement explains why loans to Sabic projects seem to offer such an attractive banking proposition: Sabic's projects were new and there was no history of any commercial projects in operation in the country. One of the three projects which borrowed in 1983 (the Iron and Steel Co., nicknamed "Hadded") was in fact operating at a loss and continued so through 1985. Bank analysts in 1983 expected the iron and steel project to remain the least profitable of Sabic's projects yet it raised 75% of the total loan issue.

Interview with analysts of some of the principal lending banks failed to explain the merits of lending in terms of project economics. Most lenders seemed to link the credit of the project to the credit of SABIC and its international partners, the multinational corporations. Most lenders regarded Sabic as a Government entity rather than as a separate commercial company and assumed the credit of the government when lending to Sabic projects. The linkage between the sponsor and the project was assumed although the legal structure of the lending was strictly of non-recourse nature. The involvement of MNCs in providing technology, operating management and marketing services was also considered as major considerations in the credit assessment.

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\(^4\) Project Loans reported in the Middle East Economic Digest (MEED) Vol. 28, No. 52, 21-27 December 1984.

\(^5\) Arab Banking and Finance, July 1983.
Some senior bankers stated that project lenders assume a moral doctrine when lending to Sabic's projects. According to this doctrine, Sabic and its multinational partners are tied to the credit obligation of the borrowing projects. One banker explained that Sabic and the multinationals who stand out as the principal developers and sponsors will not risk their reputation by supporting the projects unless they really believe the projects will perform.

Through 1987, eight commercial loans amounting to the equivalent of over US$ 700 million were raised by Sabic's projects. These loans are listed in Table 4.3 and Table 4.4 following:

**Table 4.3**
*List of Commercial Loans Raised by Sabic's Subsidiary Project Companies*

<table>
<thead>
<tr>
<th>TERMS</th>
<th>EQUIVALENT US$ (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsecured SR 500 Million (for iron and steel project) due 1991. Priced at ¼% above inter-bank borrowing rate, and repayable in 11 semi-annual instalments.</td>
<td>137</td>
</tr>
<tr>
<td>Unsecured SR 10 million at 6% p.a. and a further unsecured SR 9 million at 7.5% p.a. both due 1987</td>
<td>5</td>
</tr>
<tr>
<td>Three-year revolving facility convertible to further 3-year term-loan. Priced at 1/3% over inter-bank borrowing rate</td>
<td>32</td>
</tr>
<tr>
<td>TOTAL LOANS</td>
<td>174</td>
</tr>
</tbody>
</table>
Table 4.4

List of Commercial Loans Raised by Sabic Joint Venture Project Companies

<table>
<thead>
<tr>
<th>TERMS</th>
<th>EQUIVALENT US$ Million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsecured. Variable Rates and repayable over 5 years.</td>
<td>265</td>
</tr>
<tr>
<td>Unsecured revolving credit convertible to term loan due 1993.</td>
<td>118</td>
</tr>
<tr>
<td>Unsecured loan at 8.75% p.a. repayable in semi-annual instalments starting 1986 and due</td>
<td>110</td>
</tr>
<tr>
<td>Loan used to support Italian export credit to finance purchases by the Saudi Petrochemical Co. (Yanpet)</td>
<td>110</td>
</tr>
<tr>
<td>Unsecured SR 120 Million at 3/8% over inter-bank borrowing rate to support the Saudi-European Petrochemical Co.</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL LOANS</strong></td>
<td><strong>528</strong></td>
</tr>
</tbody>
</table>

All of the above term-loans were provided on non-recourse to the shareholders. SABIC is also a minority in four project companies which have raised substantial amount of commercial credit in the international markets on project basis. Table 4.5 gives a profile of Sabic’s minority interest in major project companies.
Table 4.5
Profile of Sabic's Minority Ownership

<table>
<thead>
<tr>
<th>SABIC Minority Owned Project Companies</th>
<th>SABIC Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gulf Petrochemical Industries Company (GPIC) Bahrain</td>
<td>33.3%</td>
</tr>
<tr>
<td>2. Gulf Aluminium Rolling Mill</td>
<td>20.0%</td>
</tr>
<tr>
<td>3. Saudi Arabian Fertiliser Company (SAFCO)</td>
<td>41.0%</td>
</tr>
<tr>
<td>4. Bahraini-Saudi Aluminium Marketing Co. (BALCO)</td>
<td>25.7%</td>
</tr>
</tbody>
</table>

Since 1982 GPIC (equally owned by Saudi-Kuwaiti-Bahraini Cos.) raised US$ 300 million to finance its (1,000 ton/day methanol plus 1,000 ton/day ammonia) plant construction. It is also known that the Gulf Aluminium Rolling Mill Co. has raised some US$ 200 million.

Both of these companies were reported in the press to be experiencing problems in servicing their debts. In 1987 GPIC had to request its lenders to re-finance its maturing debt obligations owing to the financial impact of the 1986 sharp fall in prices for its products. The shareholders decided not to cover the debt obligations through provision of advances or of additional equity and the banks agreed to provide further (US$ 70 million) loan to help the borrowing project overcome its debt servicing problems.

Based on current financial structure, total commercial loans required by SABIC for its wholly owned and subsidiary projects is estimated to amount to US$ 2,000 million by 1992. It is currently widely accepted that an increasing proportion of Sabic's financing requirements will need to be met from the international capital markets.
4.8 FINANCING OF INDIVIDUAL PROJECTS IN SABIC

The financing of Sabic's projects is provided from three sources of fund, namely:

- Shareholders' equity capital;
- Government credit institutions; and
- Commercial banks.

The contribution of each source is typically as follows:

**Equity:**

This is provided by the joint venture partners and amounts to 25% or 30% of total project investment, depending on the classification of the project.

**Credit Institutions:**

A number of specialised credit institutions have been established by the Government to provide soft loans to different sectors of the economy. Of these Sabic has access to two industrial credit institutions: the Saudi Industrial Development Fund (SIDF) and the Public Investment Fund (PIF). SIDF loans are limited to 50% of total project investment and the PIF loans to 60%. Sabic and its multinational partners consider these loans as pure non-recourse project finance which require no formal guarantees from owners (7).

**Financial Leasing:**

In addition, Sabic projects may finance a substantial amount of their fixed assets (particularly land, buildings and very heavy lifting equipments) through arranging long-term financial leases with the Royal Commission for Jubail and Yanbu. The cost of the leases is not grossed with the cost of the investment but the assets are capitalised and consolidated in the corporate balance sheet. In this respect, the availability of asset leasing is also seen by Sabic and its multinational partners as a form of pure non-recourse project finance since no guarantee is sought from any of the project's owners.

**Commercial Loans:**

These loans represent the residual proportion of project investment which is not financed by either equity or loans from the credit institutions. Projects which do not
involve direct foreign equity participation (that is, all venture partners are nationals drawn either from the public sector or the private sector or both) qualify for SIDF loans of 50% and a capital base of 25%; hence, the proportion available for commercial funding by the banks is 25%.

Projects which qualify for PIF loans (typically those involving partnership with transnational companies) require 10% of total investment to be funded by commercial loans since in this case shareholders will up front 30% equity and PIF 60% loan finance. However, in January, 1988, the PIF ratio has been reduced to 50% so the amount sought from commercial banks has now doubled to 20%.

Any future investment expansion to the project will also be financed in the same proportion as the original project so the financial structure remains as per the original financial plan.

Commercial lenders view this type of financial structure as having a strong capital base since commercial loans are taken as senior debt and repayable in priority to PIF or SIDF loans. This results in lowering the financial risk to the banks and hence makes them ready to offer non-recourse project finance.

Equity is generally drawn simultaneously with the PIF/SIDF loans in proportion to their respective ratios while commercial loans are used at the end of the construction period and for financing working capital. This also has the effect of reducing the risk to the lending banks since the project implementation must first rely on equity and state loans before drawing on the commercial fund. This factor reinforces the seniority ranking of commercial loans and permits commercial private banks to accept non-recourse terms when lending to Sabic projects.

At the end of 1985, total facilities provided by PIF amounted to over US$ 6,700 million of which 42% was used up. Sabic receipts of gross loans from PIF/SIDF, however, are expected to approach US$ 8,000 million by 1992. Some senior managers within Sabic believe that this level of support may not be fully forthcoming in the future and therefore a greater reliance would need to be put on the commercial capital markets than at the present.
4.9 **TERMS OF SABIC OFFICIAL LOANS**

The terms of these loans are as follows:

**Maturity:**

Typical repayment schedule of 20 equal semi-annual instalments, commencing five years after starting commercial operations. PIF and SIDF loans are repayable over a maximum period of 15 years. The actual grace period, repayment instalment amounts and maturity dates are determined on the basis of the project's cash flow results when actually reached.

**Security:**

Mortgage on the property and equipment of the project company itself. There is no recourse to SABIC or its international partners as shareholders backers of the project.

**Interest:**

SIDF loan is non-interest-bearing but attracts financial charges at a fee of 2.5% of the eligible cost. This is charged up front once as a deduction from the principal at disbursement. The financial charges and fees are in effect equivalent to 5%-6% on the average loanable amount, depending on the maturity profile and grace period allowed. PIF interest is repayable semi-annually at rates up to 6% per annum depending on the project return on equity investment. Interest during construction is charged at 3% and re-financed by PIF loan and repaid together with the principal. However, in January, 1988, a decision was taken reducing this rate to zero percent. Interest rates applicable during operations are chargeable as follows:

<table>
<thead>
<tr>
<th>RETURN ON EQUITY</th>
<th>INTEREST RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>0%</td>
</tr>
<tr>
<td>Up to 10%</td>
<td>3%</td>
</tr>
<tr>
<td>From 10% to 15%</td>
<td>4%</td>
</tr>
<tr>
<td>From 15% to 20%</td>
<td>5%</td>
</tr>
<tr>
<td>More than 20%</td>
<td>6%</td>
</tr>
</tbody>
</table>
Once the applicable interest rate is achieved it will apply throughout the project life cycle irrespective of financial performance. For example, if the return on equity exceeded 20% the applicable interest rate over the project's life would still remain at 6%. Conversely, if the return on the investment turned out to be less than 20% the interest rate would not be reduced. That is, the risk of lower business performance will have to be borne by the owners.

The term "return on equity" is assessed on annual basis as "After Tax Income" divided by "Equity". Equity is defined as the sum of (1) Shareholders' paid-up capital + (2) Statutory and other reserves + (3) Retained earnings. "After-tax income" is defined as net income before tax less interests paid less taxes paid.

The above terms reflect the extensive support provided by the official financing sector of the host country when developing a major project.

4.10 SHARING OF PF RISK IN SABIC

The various financing arrangements used for SABIC projects points to a financing strategy which completely insulates SABIC and its international partners against many of the risks inherent in the ventures. To illustrate the impact of this strategy and the possible implications, the study assessed the financial investment risk and examined how this was being shared in practice by participants.

This assessment moves the analysis from the corporate level down to the specific borrowing projects which have been completed and operated as joint venture companies. In 1987 SABIC had 14 productive companies. Seven of these are 50-50 joint venture companies with the multinational companies. These seven projects are listed in Table 4.6 below:

Any of the seven projects listed in Table 4.6 could qualify for a case study since the financial structure and the nature of credit support from the international partners are similar in all cases. The characteristic features of the projects' technical, operating and marketing strategies are also similar.
**TABLE 4.6**

**ANALYSIS OF TOTAL INVESTMENT BY SABIC JOINT VENTURE PROJECTS**

<table>
<thead>
<tr>
<th>JOINT VENTURE PROJECT COMPANY</th>
<th>START DATE</th>
<th>COMPLETION DATE</th>
<th>GROSS INVESTMENT (US$ Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Saudi Methanol Co. (Ar-Razi)</td>
<td>1979</td>
<td>1983</td>
<td>300</td>
</tr>
<tr>
<td>7. Eastern Petrochemical Co. (SHARQ)</td>
<td>1981</td>
<td>1985</td>
<td>1,410</td>
</tr>
<tr>
<td><strong>TOTAL INVESTMENT</strong></td>
<td></td>
<td></td>
<td><strong>8,980</strong></td>
</tr>
</tbody>
</table>

For this reason, it was considered important to analyse in detail one of Sabic's major projects: the project selected being the Saudi Petrochemical Company. This project company has been in operation since 1984 and has become an important player in the international market. It is also representative of typical major project being developed in Saudi Arabia.
THE SAUDI PETROCHEMICAL COMPANY

The Saudi Petrochemical Company (SADAF) is owned equally between Sabic and Shell Oil of New York. Shell Oil is participating in this project as 50% venture partner through its wholly owned affiliate, PECTEN Arabia Limited, a company registered in Bermuda. Shell Oil is a member of the Royal Dutch/Shell Group of companies which own, directly or indirectly, investments in numerous companies engaged world-wide in the oil, natural gas, chemicals, metals, coal and other businesses. The net worth of the Group was US$ 23,000 million in 1979 and US $28,000 million in 1983. Sabic participated as a 50% venture partner in this project in its capacity as an industrial company independent from "acts or omissions of the government" of Saudi Arabia.

The objective of the joint venture was to develop, construct, own and operate a petrochemical complex on commercial principles. The duration of the joint venture company is 30 years which can be extended by agreement between the two partners. SADAF is one of three largest ethylene cracker plant in the world (656,000 ton/year). Of the others, one is located at Moss Moran in Scotland (600,000 ton/year) and the second at Priolo in southern Italy (also 600,000 ton/year).

The detailed feasibility study of this project was completed in 1977 and detailed negotiations between Sabic and Shell continued through 1980 when a joint venture agreement was signed.

The actual cost of the project investment at completion was in the order of US$ 2,900 million. The initial estimate of the net investment of the project was 3.5% below the actual cost and the scale of the required debt finance was very substantial; almost as large as the whole paid-up capital or net worth of SABIC at that time. If the project was to develop then Sabic had to rely on its partners and lenders to share the burden of finance and financing risk.

The funding structure of the investment was thus planned as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity - Sabic</td>
<td>15%</td>
</tr>
<tr>
<td>-Shell</td>
<td>15%</td>
</tr>
<tr>
<td>PIF Loans</td>
<td>60%</td>
</tr>
<tr>
<td>Commercial Debts</td>
<td>10%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>
The above ratios were to be maintained if actual costs turned out to be less than estimated or exceeded the estimates by a maximum of 20%. Cost overruns in excess of 20% were to be funded on the basis of 30% partners and 70% PIF or commercial loans unless alternative funding procedure were agreed by the partners. The PIF participation therefore maintains its risk sharing obligation in the event of any cost overrun.

If required, partners' guarantees were to be given severally, 50% each. However, if Shell Oil was required to give a guarantee then it would be provided directly or indirectly through any of its 100% subsidiaries. Any guarantees made by PECTEN (Shell Subsidiary) toward its obligation in the joint venture will be in full. Shell, the parent company of PECTEN, was insulated from the risks and obligations of the Saudi project.

Production of ethylene and industrial ethanol started in 1984. The entire production of ethanol (300,000 ton year) was marketed under long-term sales contract with Shell. In support of this contract, Shell entered into a separate supply and purchase contract with Union Carbide which processed the Saudi crude ethanol at its Texas City plant to produce synthetic alcohol for Shell and a variety of other materials for its merchant marketing divisions. As a result Union Carbide agreed to mothball the first-stage reaction system of its existing plant and switch entirely to Saudi ethanol as a feedstock.

Other downstream production units of the project complex came on stream in 1985 (e.g. 300,000 ton year styrene plant). Initially, most of the products were marketed under contracts to Japan, Korea, and Southeast Asia, but by 1987 a great deal of the output used to feed SADAF's own downstream units, mainly the 100,000 ton/year polystyrene plant at Jubail.

Styrene sales contracts have been signed with Japanese companies such as Mitsubishi and Mitsui, and some products have been marketed in Europe and the USA where Shell has captive demand.

SADAF received all of its ethane feedstock supply and methane fuel gas from two gas fractionation plants which were owned and operated by Sabic's sister organisation, Petromin, under a long term contract which entitles SADAF to pay US $0.50 per million

Btu. The comparable prices for gas in Europe at that time were US$ 2 to US$ 3 per million Btu.

The project cost of feedstock represents US$ 25 per ton of ethylene produced. The total cost of production at the plant gate in 1987 was estimated at US$ 200 per ton so the feedstock represent some 12.5% of total plant operating cost. This provides a significant comparative cost advantage against European plants whose feedstock cost in 1987 represented some 60% to 80% of production cost.

A similar cost advantage was maintained for the consumption of electricity and use of infrastructural facilities (land, buildings, steam and cooling water) which provided the Sabic projects with a cost saving estimated in the order of 50% as compared with the European competitors. These cost advantages were considered major factors in attracting the interest of the international partner.

4.11 RISK FACTORS IN SABIC

While SABIC is developing into a viable income generating corporation and can use its own credit-worthiness to raise funds in the capital markets its preferred strategy for entering the capital markets has been through its project companies. Sabic is not expected in the short to medium term to raise funds on a corporate basis. In this respect its financial strategy and approach to maximising debt is not significantly different from the financial strategy of the MNC's. Indeed, as Sabic also invests in projects located outside Saudi Arabia it could be considered as one of the new multinational companies.

Its accounting policy with regard to minority owned companies in which Sabic shareholding is less than 51% is also similar to that of the MNC's and results in off-balance sheet financing of all such investment. On all of the existing projects, neither partners nor the subsidiary project companies have so far found it necessary to provide guarantees for commercial project finance.

Lenders so far seem content to finance Sabic projects without seeking to establish direct guarantees from owners. It is therefore helpful to examine the potential risk situations from a credit perspective and assess whether there is a sound basis for lender's satisfaction when agreeing to "unsecured" project finance.
For this purpose, the analysis this time will be stratified into classes of risk as typically recognised in credit analysis, e.g. completion risk, cost overrun risk, feedstock supply risk, marketing risk, operating and management risk and political risk.

(1.) Completion Risk:

A major banking consideration that is evident from a risk analysis of Sabic projects is the "corporate maturity" of the development projects at the point of commercial credit assessment and disbursement. All of Sabic's projects were financed after they had been completed and commenced production.

The completion risk was very important in virtually all of Sabic's projects but the venture partners were generally resourceful and had proven experience in completing similar petrochemical projects. In the case of SADAF, Shell and Sabic had anticipated in their initial plans a maximum possible delay in production of 8 years maximum from the start of the joint venture agreement. If this period was exceeded then partners would renegotiate the agreement.

The whole risk of completion was fully absorbed primarily by the shareholders and secondarily by the Saudi official credit institutions up to the point when the project was banked commercially. Commercial project loans in this situation are mostly used to finance working capital which is disbursed after the project is technically completed. Financing of working capital has a predictable transformation cycle and pattern of payouts so the pure nature of credit risk is significantly different from the risk of development and construction borne by lenders prior to completion.

The completion risk was also minimised by the participation of Shell as a prime technologist, constructor, manufacturer and marketer of a very high international reputation. The development capabilities of the project complex are recognisably not outside the boundary limits of the venture partners.
(2.) Cost Overrun Risk:

The possibility of cost overruns in Sabic projects is very real given plant complexity and the size of the investment risk involved. However, a 20% contingency provision was built into the planning assumptions of the SADAF project investment. The incidence of any potential cost overrun was shared amongst participants in the financing ratios 30-60-10 as originally agreed in the venture agreement. Hence, the risk to commercial lenders was significantly mitigated as 90% of the impact was shouldered by equity partners and the official credit institutions.

Although in principle the commercial debt may run pari passu with the PIF loans the cost overrun risk is effectively regarded of an equity risk by the commercial lenders. The interest on the PIF loans was very elastic and the debt maturity was very long. This provided commercial lenders with a substantial ground for assuming that in most difficult situations, commercial loans would be treated as senior debts and repaid in priority to other debts.

(3.) Feedstock Supply Risk:

The feedstock of most of Sabic projects is dependent on the availability of ethane at the gas separation plants. These plants are owned and operated by Petromin which sells ethane feedstock and fuel gas under a long term contract and at guaranteed availability and prices. All such contracts are subject to "force majeure" clause which exempt Petromin from risks relating to supply or interruptions arising outside its control.

A shortage or a major interruption of feedstock gas to SADAF will have two types of impact on the company. The first type affects its operating efficiency resulting in lower production and higher total cost per ton produced. The second type affects the project company's obligations toward its customers.

These consequential risks are mitigated by the abundance of the gas reserves (both associated and non-associated) and by having in place a very sophisticated gas gathering and gas fractionation system to make the necessary supplies available.
In August 1987, however, an accident involving a fire and an explosion was reported at the main supplying gas separation plants resulted in 50% reduction in ethane feedstock supply. Press releases suggest that feedstock would not be fully available for some time. It was reported that a similar explosion in Italy resulted in a stoppage of 9 months. If the damage was very serious the separation plant would need to be rebuilt anew and it would take a year or two to resume full operation.

The actual impact, however, materialised as a fall in the level of the ethylene cracker plant. The risk was mitigated by having the supply source divided between two fractionation plants and one of these seems to have avoided the fire and was running normally. In the meantime all affected parties were experiencing forced reductions in operation due to the force majeure nature of the shut-down of the second fractionation unit. The losses were expected to exceed the insurable damage of the plant. The supply obligation to customers was not seriously affected. This risk was mitigated by the extent that SADAF had been able to rely on some 400,000 ton of ethylene storage capacity which formed part of its original plan concept. Export out of storage allowed its customers to be sheltered from the risk of supply reduction for some 6 to 7 months and also allowed SADAF to maintain its income during this period.

Owing to all these security provisions lenders were not seriously affected by the feedstock supply condition though the incident was very serious. However, given the size of the project and the scale of its overheads budget, it was considered most likely that the project profitability would reflect the impact of 50% loss in the feedstock supply through significant financial losses. Lenders would not remain immune from this risk, in particular, if it lasted for more than one year. However, the margin of security available to lenders in the case of SADAF was still very large and comforting for this type of projects.

(4.) Marketing Risk:

Given that Sabic itself is a new producer and marketer of petrochemicals the logical question for enquiry is how Sabic attempts to compensate for its deficiency of experience in
these fields and whether the means available to Sabic represent a source of comfort to project lenders.

The solution for Sabic's industrial and marketing problems is found in the capability of its international venture partners and advisers. In the case SADAF, the venture partner is Shell Oil Company. Shell is an international leader in production and marketing of project products and has a strong captive demand for its products in both Europe and the USA.

One of the first obligations of Shell Oil in the case of SADAF was to execute a marketing agreement and product off-take agreement between the project company and itself. A parallel sale agreement was also executed between the project company and another company (Sabic-Exxon Kemya project which produces polystyrene) for part of the produced ethylene so a base domestic market was established and developed. Shell also supported Sabic's marketing through other international contracts, e.g. contract with Union Carbide to process Sabic's crude ethanol in Texas.

Sabic and its project company were also covered by a marketing service agreement which permitted access and utilization of Shell's marketing divisions at Sabic's option. This permitted Sabic to develop and rely on its own marketing division but always having recourse to the experience and knowledge of its technical partners.

Marketing risk in virtually all of Sabic joint ventures was also mitigated by the nature and requirement of the venture partner. In the case of SADAF project, the requirement of Shell was to maximise its access to the project products (mainly ethanol and styrene) which it generally markets world-wide.

Product prices are also subject to indexation formula which were intended to be linked to market prices and to recover the full cost of production and transportation including movements in fuel cost, labour cost, and GNP deflator.

However, normal supply and pricing risk remained with the partners as they were not in a position to influence export markets if a new large source of supply became available at a time of over-capacity. Venture partners also considered that some of their comparative manufacturing cost advantage was being eroded by the higher transportation and distribution costs and tariff barriers that were imposed in the importing countries. A
report in the Financial Times (October 11, 1984) similarly suggested that there might be no cost advantage for Saudi petrochemicals if the analysis were made on a "delivered" cost basis.

Shell, however, had a strong vested interest in establishing long-term lifting contracts with the project company. This resulted from its commercial need for the project products, in particular crude industrial ethanol, for which it had captive demand from Union Carbide and other petrochemical companies in the USA. In 1984 Union Carbide completely switched to Saudi ethanol because of the long term linkage between Union Carbide and Shell Oil.

Lenders also obtained comfort from the nature of petrochemical products produced by the SADAF project company. These products were readily marketable due to the existence of large merchant type markets with a high number of potential customers world-wide. This has been evidenced by SADAF's export growth which since its start in 1984 has been very large. Sabic's own marketing experience for bulk petrochemicals has also proved positive in establishing this marketing position.

This market structure is typical of Sabic projects and seem to lend a great deal of comfort to joint venture partners and certainly helps them to establish whether a project company is commercially viable and balanced. In this respect it provided a sound basis for supporting a banking proposition involving project finance.

(5.) Operating and Management Risk:

For any project that is being located in a developing country technical operation and management risk is a serious consideration and must be evaluated by lenders. In the case of SADAF this risk is virtually eroded because of the partnership of Shell and its responsibility for the development, construction and operation of the projects. In addition to direct involvement in the management and operation of the project companies, Shell provide, under long term service agreements, all sort of assistance to Sabic in engineering, management, operations and training. These services also included provision of necessary patents, licenses, results of research and development and technical updating of manufacturing and marketing operations.
The attributes of the venture partners, in terms of their competence in operating and management of complex projects, formed the source of security for the project lenders.

(6.) Political Risk:

Lenders generally consider political risk as inherent in Sabic projects being directly linked to four sets of factors:

1. The planned objectives of Sabic as an industrial organisation and international marketer.
2. The planned objectives of the government as a central co-ordinator and financier of major industrial projects.
3. The general stability of the industrial environment and in particular the developing economic trend relating to the fiscal rules and applicable laws which regulate commercial transactions and arbitration amongst international investors and lenders.

The industrial policy of SABIC is emphasised in virtually all of the annual reports as being a committed industrialist and international marketer with a focus on ensuring that the industrial projects develop into successful commercial enterprises. In pursuing this objective Sabic aims to enter the petrochemical markets as a world wide producer with a reputation to and marketer of petrochemical products.

Most project lenders considered SABIC as a low risk borrower. It is considered most unlikely that SABIC would disturb the system it has so far developed in co-operation with the MNC's and project lenders. The strong linkage between Sabic and its international partners is reinforced by the strong financial position of the country. There are no exchange control problems and the Saudi currency has been a relatively stable one against the US dollar. Historically, the Saudi riyal has been pegged to the US dollar and moved
within a very narrow band around US$1 = SR3.65. This was supported by the oil dollar revenue of the country.

The government planning objectives also provided a good fit for improved prospects for technology-rich new industries based on cheap energy, large capital, and small population. These factors together with the country's economic philosophy of a free capitalistic enterprise model of development suggest that the role of government in centrally controlling the industrial and financial systems is having positive influences on the credit-worthiness of new projects.

However, some negative influences exist in relation to the problems of commercial law and arbitration which have not yet been fully solved. In particular, it is not clear what is the legal position of venture partners and lenders in giving and receiving guarantees and charging interest on loans. A sense of comfort is found in the fact that there is no instance of a MNC or a bank lending to the public sector or an industrial organisation having suffered as a result of the "deficiency" in the legal system.

It must still be a major concern to international lenders and venture partners that contracts may be subject to unprofessional judicial reviews of the Saudi courts with regard to commercial disputes. However, since early 1987 the concern of the government has been positive and there is increasing awareness in the Arab Gulf region generally that unless the legal system is adapted, the financial markets will be unable to develop further in support of industrial development and new projects will have to continue relying on the government for a substantial proportion of the investment.

(7.) Prepayment Risk:

One important risk factor identified during the development of this case study is related to the loss of lender's earnings due to early repayment or acceleration of major loans by the prime borrowers. In 1987 SADAF as well as other major project companies managed to repay or re-finance substantial amounts of project finance causing a substantial reduction in the portfolio of performing loan assets of the lending banks.

This risk is found to relate to the existence of unused liquidity in the international capital markets owing to the lack of viable investment opportunities in new projects. The
effect of this situation was to force the margins down and it provides a strong incentive for existing borrowers to re-finance old loans. Other loans were prepaid simply because the projects generated more cash than expected or because the credit institutions stipulated that dividends could not be distributed unless a substantial amount of the commercial debt was first repaid. This is the case with Sabic projects which have substantial amounts of either PIF or SIDF loans.

This problem implied that PF risk was essentially two-fold. Linkage with the project income involved the risk of default if the project failed and the risk of forgoing profitable investment if the project succeeded.

(8.) Risk Reduction Advantage:

As none of the venture partners provided any guarantee for the PIF and the commercial debts used by SADAF, the analysis of risk sharing benefit is a straightforward one to illustrate the impact of financial risk arising from a 50-50 joint venture partnership between Sabic and Shell Oil.

In order to analyse the impact on the maximum risk exposure to the venture partners two alternative financing possibilities is assumed:

1. The project may be assumed to be wholly financed by owners alone, and

2. The project financial risks are taken as shared by owners and lenders.

In the following analysis (Table 4.7) the final cost of US$ 2,900 million is assumed to include 20% cost overrun provision and 10% allocation for working capital. The results of the analysis relates to SADAF as outlined above.

The analysis provides the empirical results of a project finance structure. If the owners of the project rely on their own internal and direct borrowing capacity, the impact of financial risk will be excessive under completion risk, feedstock interruption risk, cost overrun risk, and marketing risk. Sabic and its partner, Shell, will each have to absorb 50% of the maximum risk exposure. Under the PF structure the maximum exposure to owners is reduced to within a 15%-17% range without any impact on the level of ownership advantage or the gearing structure of the parent company.
<table>
<thead>
<tr>
<th>Type of Project Risk</th>
<th>Risk Scale</th>
<th>Maximum Exposure</th>
<th>Risk Scale</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) All Risk is Taken by Project Owners</td>
<td>(2) Risk is Shared through Project Finance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SABIC</td>
<td>SHELL</td>
</tr>
<tr>
<td>1. Technical Completion Risk</td>
<td>Project Abandonment</td>
<td>$2,030</td>
<td>same</td>
<td>$338</td>
</tr>
<tr>
<td>2. Feedstock Interruptions</td>
<td>Reduced Profit/ Project Failure</td>
<td>$2,320</td>
<td>same</td>
<td>$348</td>
</tr>
<tr>
<td>3. Cost Overrun</td>
<td>+20%</td>
<td>$2,900</td>
<td>same</td>
<td>$435</td>
</tr>
<tr>
<td>4. Operating Risk</td>
<td>Reduced Profit or Carry over Loss</td>
<td>$2,320</td>
<td>Same</td>
<td>$348</td>
</tr>
<tr>
<td></td>
<td>Reduced due to Off-take Obligation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Market Risks</td>
<td>Reduced Profit or Project Failure</td>
<td>$2,320</td>
<td>Reduced due to Off-take Obligation</td>
<td>$348</td>
</tr>
<tr>
<td></td>
<td>+ Guarantees for new loans</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(9.) ACCOUNTING CONSIDERATIONS

Project finance is the preferred funding method to Sabic and its international venture partners. This is generally attributed to the off-balance sheet accounting treatment of the debt of the project company. According to the declared accounting policy of Sabic and its partners, the investment in the project is recorded by the application of the equity method of accounting. This method requires only a one-line entry on the balance sheet disclosing the amount of investment in the joint venture project. Similarly, only a one line entry is made on the profit and loss statement.

Where not more than 50% of the project venture is owned by a partner, the general accounting practice permits non-consolidation of the investment. By contrast, if the shareholding is less than 20% there is no need for disclosure while a full line-by-line consolidation of the accounts will be required if ownership exceeds 50%. The policy strategy of Shell Oil is to devolve the project liabilities to its subsidiaries so that these are not directly consolidated in the parent accounts.

The benefits of non-consolidation of accounts is seen in terms of substantially lower declared debt to equity ratio, higher earning to equity investment coverage ratio and higher net income to sales ratio. The management of Sabic partners consider the preservation of these statistics to be an important benefit of PF and relates directly to the company's overseas investment strategy.

4.12 CONCLUSION

The case study examined a number of major projects implemented and sponsored by the national industrial organisation of Saudi Arabia, Sabic. It has been shown that in each case project finance involves the arrangement of very high debt to equity investment without impairing the corporate gearing position of the principal sponsor.

It has also been shown that the key advantage of PF structures is the sharing of risks. This involved the establishment of a strong community of interest which incorporates a long-term commitment to the project by a resourceful host government and the multinational corporations. In the case study, the commitments of Sabic and its partners to the projects were visible to the lenders through official policies, long term
agreements, and the dependence of Sabic and the MNCs on the output of the project company. This position was reinforced by the local availability of abundant feedstock and access to world markets through the MNCs. The sources of funding also involved considerable amount of national official finance which directly contributed to reduce risks to the private commercial banks and the international partners.

These factors provided comfort to lenders and had the effect of mitigating the need for specific and formal guarantees. Non-recourse project finance was readily available even though most projects had no proven track record of performance.

The case study analysis also provided the basis for the credit assessment of banks when providing pure non-recourse project finance. The feasibility of non-recourse financing was found to rest on a number of related factors which included the resourcefulness and commitment of the host government and corporate sponsors and the ability of lenders to effectively hedge against country risks.

In Saudi Arabia, as a high income, resource rich, free market host country, the risks of project lending were considered to be minimal owing to the availability of adequate feedstock, extensive contractual and financial support from the government and its multinational partners.

Sabic projects also showed that the PF structure need not necessarily be complicated. The complication of the PF structure is a reflection of the risk situation rather than a generalised norm. As the level of country and political risk in the case of Saudi projects were considered acceptable, the focus of the credit assessment was on cost comparative advantage and price risk.

Major petroleum projects in Saudi are therefore illustrative examples of LDC projects which could be readily financed on non-recourse terms and with minimum complications.
CHAPTER 5

PF EXPERIENCE IN SUDAN- A CASE STUDY

5.1 INTRODUCTION

The previous Chapter discussed the PF experience from the perspective of a resource-rich and high credit rating host LDC country. This Chapter will provide the study simulation of the risk environment for major projects located in poor host countries such as Sudan.

Sudan is one of the poorest countries in the world. It has all the traditional problems of a poor credit rating and high risk associated with capital investment. The possibility of financing a very large new petroleum project is therefore of particular interest to the study. It can illustrate how PF structures can overcome problems of risk in the least developed countries.

This case study is a focus on a major petroleum project company which was promoted in Sudan, under the name of the White Nile Petroleum Company (WNPC), during 1982-86. The total required finance for the project was US$ 1,000 million of which 75% was initially required in the form of project debts and 25% equity finance.

5.2 COUNTRY RISK

Sudan is a very poor country and was classified by the UN as one of the least developed countries. The per capita income in 1983 was US$ 360. Since then this figure has further deteriorated in real terms owing to a sharp decrease in net export revenues and persistently worsening exchange rates against the US dollar.

One of the most immediate problems facing Sudan is the balance of payments crisis. A sharp decline in cotton production (Sudan’s major export) and a doubling of oil prices pushed the current account deficit to over US $900 million in 1980/81 and close to US $1,300 million in 1981/2. The payment arrears by 1988 increased to US $ 3,600 million, including about US $600 million to the IMF.
The Government tried a number of (IMF inspired and supported) policy measures, including a 44% devaluation of the Sudanese Pound in December 1982, to correct the balance of payments disequilibrium and improve the performance of the economy. However, the country's trade balance continued to show huge deficits, with a petroleum import bill absorbing ever increasing proportion of the country's foreign exchange earnings: about 28.7 per cent of foreign exchange earnings in 1978, rising to 47.7% in 1979 and reaching 63.4% in 1980 and over 80% in 1982-85.

Against this background the Government introduced policies in the seventies aimed at inducing the multinational oil companies to invest in exploration activities. It was hoped that these would result in some commercial finds which would then reduce the dependence on imports and also generate hard cash through the export of crude oil. These policies included the offer of very large exploration acreages and attractive production sharing schemes in the event of discoveries. Judging from the rising exploration activities that took place in Sudan by the oil companies the Government was relatively successful. Some ten major oil companies have acquired exploration licenses in Sudan between 1959 and 1983.

There was also an external factor which helped as a co-determinant of the flow of investment to Sudan. The World Bank in 1977 adopted a programme to encourage investment in energy and petroleum projects of least developed countries. This programme included direct financial participation in projects in the form of equity interests and the provision of loans. In 1982-1983, the International Finance Corporation (IFC), the commercial arm of the World Bank, sought this type of participation in WNPC and actually obtained a mandate to support and arrange the remaining portions of the debt finance required by the project company.

5.3 PARTICIPATION OF THE MULTINATIONALS IN WNPC

In 1975, Chevron Oil Company of Sudan, a subsidiary of Standard Oil of California (SOCAL), entered into a production sharing agreement with the Government of Sudan. The agreement is typical of the production sharing agreements of that period in the lesser developed countries.
The production sharing agreement defined the concession areas and provided for periodic mandatory relinquishment of areas in which discovery wells were not established.

After establishing a discovery well, Chevron was to undertake appraisal of the discovery and determine whether the discovery was worthy of commercial development. The agreement provided for a development period of 30 years, with a ten-year extension at the oil company's option, from the date of commercial discovery.

According to this agreement, oil production was to be shared 49% Government and 51% Chevron.

The production sharing agreement provided sufficient commercial incentive for the oil company to invest in exploration activities and petroleum development projects because Sudan was considered to have the potential for large oil fields. The prospects of finding oil were verified in July 1979 with Chevron announcing its first discovery. Subsequently, other fields were discovered and in 1980 Chevron declared that the discoveries were of commercial quantities.

Following Chevron's discoveries, the need arose for a state owned entity to represent the Government's interests in the petroleum industry. This led to the establishment of the Sudan General Petroleum Corporation (GPC) with responsibilities to monitor petroleum exploration contracts and act as a partner with the international oil companies.

By early 1984, when the project financing was being arranged, the proved and probable reserves in place were estimated to produce 50,000 barrels per day (bpd) at peak and support a production profile over 18 years.

At that time, Chevron was anticipating further discoveries and planned to invest more in exploration drilling. However, reservoir studies proved the oil field to be smaller than initially estimated and therefore the required capital investment in a facility to export the produced oil was considered very high. The remote location of the oil fields and the absence of a basic infrastructure for transporting, refining or exporting the productive oil were major impediments to the commercial exploitation of the oil reserves. The only commercial port, Port Sudan, was over 1,000 km away from the capital, Khartoum, and some 1,425 km from the main oil field in the south. There were no adequate highways
connecting the southern region of the country to the port. The region also has a history of political unrest and no indigenous labour force that could be directly used during the construction or operating phase.

The concept of a fully integrated development of the oil fields had to include a costly transportation system. This was considered highly risky and not economically attractive for the oil company to undertake on its own. Under the production sharing agreement, the anticipated return to justify risking the full project by Chevron was considered to require a minimum throughput in the order of 200,000 bpd, i.e. four times the plan figure.

Recognising that the discovered oil fields could not be economically developed for export under the terms of the production sharing agreement, the Government and Chevron negotiated an amendment to the agreement in January 1983.

The aim of the amendment was to permit the establishment of a separate pipeline company to transport the oil for export. This introduced a new strategy of segmenting the assets and liabilities of the downstream transport project from the upstream oil production field project and thus improved the economic viability and risk burden of oil production.

The full field development was thus divided into two project companies: one for the oil field and the other for the transportation pipeline. The first company was responsible for the development and production of the oil reserves within the boundary limits of the fields. These fields were to be financed and sponsored exclusively by Chevron in accordance with the terms of the production sharing agreement. The total cost of investment in upstream exploration and development was estimated at US$ 600 million.

The second company was to consist of the export pipelines and associated facilities. This company would require capital investment of over US$ 900 and was to be financed, constructed and operated entirely separately from the first company. It involved raising 75% of the total investment as project debts to 25% equity from partners.

In 1984, Chevron farmed out 25% of its interest in the full project to Shell Exploration and Production Company. Accordingly, Chevron and Shell became joint producers of the oil fields and principal sponsors of the downstream petroleum project financing.
5.4 THE PROJECT CONCEPT IN WNPC

In 1981, a new project company was formed to co-ordinate the planning and implementation of a financing plan for the petroleum pipeline project. This resulted in a new agreement to develop a 1,400 km export pipeline together with a new export terminal, a tank farm, a telecommunication system and associated facilities.

In January 1984, the cost of the project was estimated at US $910 million, and the project was scheduled for completion by the end of 1985 for commercial operation by January 1986.

The project company was to raise the required finance itself and for this purpose it was incorporated as a separate entity with a power to own all the facilities developed by the investment and to enter into contractual obligations with third parties. The equity in the project company was distributed among its shareholders as follows:

- GPC (for the Government) = 42%
- Chevron & Shell = 42%
- Apicorp = 8%
- IFC = 8%

This ownership structure helped to present the government of Sudan as a principal owner and thus to qualify the project for soft loans and for direct participation by the World Bank. The participation of the World Bank provided the necessary guarantee through the financing agreement against political and default risks.

5.5 COUNTRY RISK CONSIDERATION INVOLVING WNPC

The decision to build the crude pipeline was dictated by the immediate problems of Sudan's balance of payments crisis and its continuing inability to service its heavy debt burden. The pipeline project was expected to make Sudan a petroleum exporter and to generate incomes at the earliest. The concept of a pipeline was also considered safer and
commercially a more attractive investment than alternative project such as domestic refinery.

The export orientation was considered a positive attribute of the project. It would provide a greater guarantee to potential project lenders who might otherwise be deterred from participation owing to the very low rating of the country's credit-worthiness. The export pipeline was expected to generates foreign exchange directly and afforded lenders the mechanism of isolating export earnings from sovereign risk.

Because of the economic status of the Sudan as a poor less developed country, the project company was able to maximise the benefits of low cost financing available to it. The project entitlement to these benefits was made possible by including the Government as a principal owner and sponsor. The impact of soft loans was to reduce the level of risk borne by both the international partners and commercial lenders. In essence it improved the economic viability of the project investment by lowering financing costs and lengthening the repayment profile of the loans. It was also possible for the project company to raise commercial debt, because lenders did not classify the project as strictly a Sudanese risk but rather as Chevron/Shell risk. The corporate and financial structure of the project company provided a mechanism to separate the assets and incomes of the project from the assets and liabilities of both the Government of Sudan and Chevron/Shell. International lenders also found comfort in the co-financing arrangement by the IFC and operatorship of the project by Chevron.

The measures helped to separate the project from the country risk of the host government. This was confirmed by obtaining the agreement of the Paris Club that any export credits and commercial loans provided for the project would not be subject to future Paris Club re-scheduling as sovereign debt.

5.6 REPAYMENT RISK IN WNPC

The separation between sovereign risk and project risk was not considered sufficient in itself to remove the probability of non-payment of the project debts or payback of the equity capital contributed by the international partners. The risk that the investment in the project would not be paid back as arranged was a major concern to both the international
partners and the lenders. This concern followed from the poor credit rating of the country, weakening foreign exchange and the possibilities that a large part of produced oil would be used for domestic purposes or that export revenues would be diverted to other non-project purposes.

These problems were resolved by concluding five separate and rather complex contracts:

1. An Export Agreement
2. A Pipeline Transportation Agreement,
3. A Tariff Agreement,
4. A Sales Agreement, and
5. A Management Agreement.

The Export Agreement provided for the direct exportation of all the oil produced. This agreement included a guarantee from the Government that it would export all of its share of the produced oil with the exception of 5,000 bpd which could be drawn for Sudan's domestic use; all of the remaining produced and shipped crude was to generate export revenue and to be used as collateral for the project loan.

The Pipeline Transportation Agreement provided that all exportable oil would be through the project pipeline. This ensured that the pipeline project would have a captive user during its economic life and hence an ascertainable amount of throughput capacity and tariff income. Under the Tariff Agreement the transport tariff would be paid in kind out of the crude shipped in the pipeline. The Sales Agreement enabled the project company to sell out its tariff oil and receive hard currency through an escrow account in London.

The Transportation Agreement defined the amount of tariff to be charged by the project company and the method of calculating it. The amount of tariff due to the project company was to be calculated so that it would be sufficient to cover operating costs, debt service obligations and provide dividends. The dividends were to guarantee a 15% discounted cash flow return on equity investment in real terms irrespective of the market conditions for the products being transported. They were to be free of all taxes and were indexed for inflation. The nature of the project income was thus not related to the market
conditions and pricing of the crude oil (the product output) but to the costs of investment and operating expenses.

Under an f.o.b. oil Sales Agreement with the project company, Chevron International Oil Company, Inc. (Chevron International), another subsidiary of SOCAL, contracted to purchase the tariff oil which the project company received in payment of the transport tariff. The purchase price would then be paid into foreign exchange accounts domiciled in London. The arrangements included an escrow account which was required to hold a minimum balance equivalent to six months' debt service. These accounts would be used for payment of debt service, project operating cost and dividends.

5.7 RESOURCE RISK IN WNPC

The Export Agreement and the Pipeline Transportation Agreement required the shippers (the host Government and Chevron) to pay their transportation tariffs only if crude oil was shipped through the pipeline. The viability of the pipeline transportation company thus primarily depended on the amount of available crude oil for export through the project facilities. While it was possible to structure a separate legal entity for the project company (for the purpose of investment and financing) it was not possible to establish a separate risk structure for the resource. In this respect, the linkage of the project viability to the resource risk was inseparable.

The nature of the reserve risk was complicated and included considerations relating to

(a) the quality of crude which proved to be very waxy,
(b) a lower than expected recovery factor, and
(c) high uncertainty about the reserve estimates, and the possibility of the production estimates not being achieved, and
(d) the possibility of the production and delivery estimates not being achieved.

It was realised that these risks were of primary concern to the project lenders, and therefore they had to be covered by planning appropriate protection measures before going
to the market for finance. The measures taken represent a number of protection criteria which can be summarised as follows:

Firstly, independent consultants were employed to audit estimates of the recoverable reserves. This resulted in a figure which was 13% less than originally anticipated. The external audit in this respect provided a source of comfort to the lenders regarding the dependability of the reserve estimates.

Secondly, there was an undertaking by the major sponsor, Chevron, that the appropriate technology would be put in place to sustain a minimum quantity of oil production. A simulation study showed that the field would produce and deliver the minimum quantities which were used in a base case economic and financial evaluation. These measures helped to verify the soundness of the production technology used by the producer and confirm that the minimum anticipated level of throughput for the pipeline project could in fact be sustained.

Thirdly, a structure of production guarantee was put in place. According to this guarantee, Chevron would guarantee the availability and producibility of reserves or make up the deficiency of the project income until the project passed certain performance tests. This guarantee would take the form of an obligation to deliver to the pipeline the annual quantities of crude oil as specified in the production profile. If, in any year, the shippers were unable to deliver the specified amounts of crude oil, Chevron would pay the project company, in cash, the amounts necessary to satisfy its operating cost and debt service obligations not met by income from the sale of tariff oil in that year.

Fourthly, certain performance tests were specified to trigger the passing on of reservoir risk to project lenders. According to these tests the principal sponsor, Chevron, had to provide a production and shipping undertaking. This undertaking was in effect, a take-or-pay contract for the capacity of the pipeline until the certification of the reserves was complete. It was intended as a transitional guarantee to protect lenders while the performance of the project company was not proven. This guarantee was to lapse as soon as the performance test was completed. The performance test incorporated short and long-term indicators of viability and was of the following form:

"Production of 10 million barrels of crude oil has been completed and production averaged 50,000 bpd or more"
for six months; and a certification by independent consultants is supplied indicating that:

1. The proved and probable crude oil reserves and corresponding production rates are sufficient to sustain the production profile for eighteen years, and

2. The volume of proved, developed and undeveloped crude oil reserves, valued at current market prices, exceeds by 60% the total debt service and estimated operating costs for the remaining life of the project loans."

Fifthly, there was to be a continued commitment by the major partner and sponsor to the project which could not be terminated for any non-commercial reason. If the production undertaking of Chevron was terminated by completing the performance test criteria, (as described above), Chevron would still have an obligation to continue production at the oil fields provided crude oil reserves existed and were producible. This obligation would continue for the life of the production cycle unless either the field proved uneconomical or the production was prevented by an external cause. In the latter case, Chevron's production obligation would be suspended for the period of prevention and, if the prevention endures for more than 365 days, Chevron could elect to terminate the Pipeline Transportation Agreement.

5.8 TECHNICAL AND OPERATING RISKS IN WNPC

A major issue in the structuring of the project finance was the technical status and competence of the international partner. In this case Chevron was providing guarantees and accepting contractual obligations through its newly created subsidiary called Chevron Sudan which had only a nominal capital. Other partners and project lenders thus looked to the principal sponsor company, SOCAL, for tangible support.

SOCAL, however, was not in a position to underwrite the project risks directly owing to its fiscal, financial and operating strategies. Instead, the guarantees were provided through a chain of subsidiary companies. In this case, SOCAL guaranteed the trading obligations of Chevron International. The latter guaranteed the performance of Chevron Overseas Petroleum which agreed to lift and market the oil from Chevron Sudan. The latter guaranteed to produce ship and export all the oil from the oil fields.
Consequently, the obligations of SOCAL were of a normal business nature and therefore were not classified as debt obligations in terms of their accounting policy.

Other technical risks were covered by concluding a separate "Management Services Agreement" between the project company and Chevron Overseas. Under this agreement, Chevron Overseas provided management and technical services to Chevron Sudan which operated the project company throughout all stages of planning, construction, and operation in accordance with predetermined budgets, policies, and procedures and until the project loans were fully repaid.

Chevron Overseas was considered a technically competent and experienced company and thus provided an acceptable risk to project lenders. The management services agreement was considered an important credit protection facility by lenders against technical and operating risks and thus provided a cover for the technical deficiency of the other partners in the project.

5.9 PARENT GUARANTEES IN WNPC

In concluding all the contractual agreements, project lenders as well as the weaker partners looked to the strong technical partner to provide the necessary support. The guarantees of the subsidiary companies were not considered valuable in themselves and there was a need for strong parent support.

SOCAL and Shell in this case, provided unconditional guarantees to the project lenders and the Project Company. The guarantee covered the payment and performance by the various SOCAL subsidiaries of their obligations under the Pipeline Transportation Agreement, the f.o.b. Oil Sales Agreement, the Management Services Agreement, and the Project Funds Agreement. SOCAL and Shell were able to provide these guarantees to their subsidiary companies because they involved undertakings which fell within their normal course of business and thus did not constitute loan obligations in terms of their accounting policy.

SOCAL and Shell together had a substantial exposure in the project, amounting to US $1,000 million, in field development and equity investment in the pipeline project.
company. Potential lenders and other participants viewed this high level of financial exposure as indicative of serious commercial commitment to the project.

The lenders' view of the parent guarantee was that the obligations of the SOCAL subsidiary companies under the various agreements were essentially the credit of the parent company. From this followed considerations relating to the limitations on this credit support and the need to device appropriate lender protection mechanisms, particularly those relating to political and force majeure risks.

5.10 POLITICAL RISK IN WNPC

Prior to the completion of the performance tests relating to the production guarantee, the guarantor sought and obtained protection against substantive political risk. The protection mechanism was as follows:

(1) The production undertaking by Chevron will be suspended if crude oil production is effectively prevented by the occurrence of certain political risk contingencies, and

(2) If production is so prevented for one or more continuous periods of at least seven days which, within a period of five consecutive years, aggregate at least 365 the guarantor may elect to terminate the Pipeline Transportation Agreement.

Project lenders thus had to seek supplementary protection for political risk during the full period of the loans and for reserve risk during the post-certification period. This risk was covered by OPIC for the USA participants and by Lloyds insurance for the Eurodollar participants. The insurance premiums were paid by lenders and reimbursed by the project company.

5.11 CURRENCY TRANSFER RISK IN WNPC

The risk of currency transfer was a major concern to international partners as well as project lenders owing to the state of the economy of Sudan and its depreciating currency. To cover this risk a Retention Agreement was concluded between the project company, the World Bank and the commercial banks. Under this Agreement a system of bank accounts
was to be established and maintained in London to provide a centralised arrangement for the collection, retention and handling of the Project's funds. All disbursements under the financial plan, other than export credits, and all earnings of the Project company during the term of the project loans would be paid directly into this system of accounts. This device provided a mechanical hedging against the risk of redirecting funds for other purposes by the Government of Sudan.

Under the Retention Agreement, a cash reserve equal to six months' debt service would at all times be held available in the accounts, and thereby provide a form of security for the project lenders. Equity disbursements by the Project's shareholders under the financial plan would also be shown in the accounts, appearing as "shareholders advances". Such funds would be held, subject to the security interest of the project lenders, pending application to the costs of the project.

The Project company would be entitled to withdraw funds from the Retention Agreement accounts only to meet project construction expenses, current operating expenses, debt service obligations and dividend payment obligations.

The timing and amount of payments would be regulated by quarterly budgets, submitted by the Project. The Retention Agreement prohibited withdrawals for payment to sources in the Sudan in excess of 150% of the amounts previously budgeted for. Funds held under the Retention Agreement would be invested in high grade, highly liquid debt securities, with maturities matched to the project company's anticipated needs for funds.

This system of foreign exchange management was approved by the IMF and the Paris Club which provided that any rescheduling of Sudan's sovereign debts would not implicate the funds held by the project company.

5.12 COST OVERRUN AND COMPLETION RISK IN WNPC

The total financing required for the project was initially estimated at US $ 910 million. This total included a provision for inflation, a provision for changes in construction design, insurance, working capital, interest charged during construction, and a contingency element to cover possibilities of increase in the price of equipment. It was, however, considered important to protect the corporate partners and project lenders from
the risk of further cost increases and from the impacts of possible future funding insufficiencies.

The contingency plan for this risk involved the conclusion of a comprehensive Project Funds Agreement among the shareholders and the project lenders' trustee. Under this Agreement, a mechanism for providing additional finance was defined as follows:

First, the project company will attempt to raise additional loans for the project on terms within specified limits. If such financing is not obtained, the shareholder standby facility provided by the shareholders can be used to substitute for amounts which become unavailable under the loan financing.

In the event that the shareholder standby facility proves insufficient or unavailable, Chevron will fund the remaining amounts needed, either in the form of additional senior, secured debt or subordinated debt or equity.

The Project Funds Agreement permitted funding to be in the form of senior debt, secured on a pari passu basis with other project loans, up to an amount which would cause the project's debt to equity ratio to equal 79% to 21%. Thereafter, funds would be provided in the form of unsecured subordinated loans or equity. The equity portion should not fall below 21% of total investments in the project. This was intended to provide a stable equity base for the project and a form of security for the lenders in the sense that equity partners would maintain a minimum level of commitment to the project.

The Project Funds Agreement also provided that if the project was not completed by a certain date, Chevron would guarantee the Project's obligation to repay all project loans. However, Chevron also sought a protection against force majeure events which allowed it to terminate the Project Funds Agreement. Chevron's obligations under the Project Funds Agreement would also terminate if, pursuant to IFC's investment agreement, loan disbursements were withheld as a result of an imminent nationalization or any other occurrence materially and adversely affecting the project or its business prospects or financial conditions.
5.13 ECONOMIC AND PRICING RISK IN WNPC

The Project's financial plan assumed a 1983 price level of US$ 30 per barrel. It further assumed that prices of crude oil would be steadily rising in real terms. However, the demand and prices of crude oil were softening at that time and continued to fall. The immediate impact of the fall in prices on the economics of the project was to change the ratio of the pipeline transportation tariff relative to the export value of the oil. Under the initial assumptions, the cost of transport amounted to 38% of the revenue and provided adequate provision for debt service and operating expenses. As the price of oil continued to decline this ratio increased substantially making the oil field uneconomic to produce.

Given the limited recourse nature of the lender's protection under the various guarantees and contractual agreements, the price factor presented a real risk to lenders and also to equity participants. Under the Pipeline Transportation Agreement, the shippers were required to pay their transportation tariffs only to the extent that crude oil was shipped through the pipeline. If prices or oil production were to continue falling to uneconomic levels, as they actually did, the whole project would have to be abandoned.

The price and demand risk proved to be a major threat to the project, because the producing capacity was limited and the burden of transportation cost did not bear any relation to the value of the output. There was no possibility of diversifying away this risk as the oil field was land-locked and, therefore, completely dependent on the pipeline transportation system.

5.14 LENDERS' SECURITY

Under the project's financial plan, lenders would share pari passu a security interest in all of the project's assets, including the pipeline facilities, the project company's rights to tariff payments and tariff oil, and amounts on deposit under the Retention Agreement. Security interests would also be provided in the project's insurance and in the rights of the project company under the various project agreements. A trust arrangement covering all secured project lenders was to provide for the orderly administration of the security. None of the project lenders would be able to take control or administer the actual assets of the
project company and the view was taken that this type of direct security was merely of strategic, rather than financial, benefits.

5.15 **FORCE MAJEURE RISK IN WNPC**

Considerable difficulties were faced in the definition and agreement of force majeure clauses. The key sponsors wanted their obligations under the various guarantees and agreements to exclude events relating to political risk. They argued that their obligation should be terminated if, due to events of force majeure, they were effectively prevented from tendering as much oil as they were obligated to tender. The issue of force majeure thus directly underpinned all the financial arrangement for the project.

These events would include war risk, riot and civil commotion, expropriation, nationalization and governmental actions having a similar effect, actions by the U.S. Government preventing the sponsor from conducting activities in the Sudan.

The lenders’ solution to this problem was to seek outside insurance cover. This was provided by OPIC and Lloyds. The cost of the insurance premium was high but the borrowing company agreed to reimburse lenders for this cost. The cost of insurance was charged to the project cost as capitalised expense. The effect was that the cost of debt finance was substantially higher than otherwise would be the case.

However, in February, 1984, Chevron provoked the force majeure clause and suspended its exploration activities following a terrorist attack on the operation base. The collapse of oil prices between 1986-1990 also made the oil field and the pipeline projects uneconomic.

5.16 **CONCLUSION**

The risks of financing major projects in poor LDCs were shown to be very complex and costly. This was in complete contrast to the PF borrowing situation of the rich LDCs as was illustrated in the previous case study (Chapter 4). The credit problems of poor LDCs are both project- and country-specific and require joined solutions. In the case of the WNPC project in Sudan, the PF structure was necessarily complicated by several agreements, contracts and indirect guarantees aimed at mitigating project and country risks.
The actual financial structure reflected not only the complexity of the inherent risks in the project but also the host country risk and the poor credit of the government as a sponsor. However, the PF structure was able to utilise the support and commitment of the government as a strategy to attract soft loans from official sources and to reduce risk. It was also shown that the PF structure enabled the project debt obligations to be separated from the country's sovereign debts and this was endorsed by the Paris Club. This provided the advantage of enhanced borrowing and investment capacity for the host country.

The credit status of the project was inseparably linked to the support of the principal sponsor, the multinational oil company, which was obliged to provide direct and indirect guarantees and other forms of support. The reliance on the support of the multinational company suggested a benefit of credit transference to the other parties and to the host country. Lenders considered the project essentially the credit of the oil company and not that of the host country or the non-technical partners.

The involvement of the World Bank was complementary in that it enabled commercial banks to participate in spite of the poor credit rating of the host country. The project could not have been financed without the joint support of the World Bank and the MNCs. This suggested a further credit transference and risk sharing advantage which involved reliance on the credit of the official lending sector.

In the process of developing the PF structure, the project company provided strategically important intermediation functions. The most important of these was the transference of credit from the stronger sponsor and the funding institutions to the host country and the non-technical partners. The result was the ability of the host country to attract new finance which it could not have done on its own. The equity linkage of the State to the project in this case was not desirable or important in itself as the country was too poor to contribute any form of support. It was, however, possible to utilise the nominal participation of the host government to serve a useful purpose of raising soft loans and to seek the credit support of the World Bank. This reduced risk and lowered financing costs.

The more critical problems for the lenders was the need to establish a "community of interest" among the parties involved and resolve the issues relating to political risk. Only the MNCs among the sponsors had the operating and marketing technology that would
satisfy project lenders and it had therefore to bear the main responsibility for providing the performance guarantees required by lenders. Lenders were reluctant to take on reservoir risk and took the view that this risk should be assumed by the principal developer, the oil companies.

The effect of participation by the MNCs and the World Bank was to make it possible for the project to arrange debt finance of US$ 750 million. This represented a substantial amount of additive borrowing capacity for the host country. Sudan could not have arranged or raised this sort of finance on its own even if it had a very viable project.
Chapter 6

THE RESEARCH CRITERIA AND CONCEPTS

6.1 INTRODUCTION

A detailed screening of the literature showed that the lack of a precise definition or concept of "Project Finance" was a major problem for the study. The aim of this Chapter is to assess the literature approach with reference to the evidence generated by the case studies and the survey questionnaire, and to develop the research definition and related concepts. This task will include a discussion of the study findings and the testing of the hypothesis relating to two research questions (numbers 2 and 3 out of the six listed in section 1.7 of chapter 1); namely:

What is meant by the term "Project Finance"? Given that project finance involves lenders in essentially equity decision situations, how do lending banks reconcile project risks with their sensitive capital structure?

What is meant by PF risks, and what are these risks? Given these risks, how are they structured and how these structures provide the security needed by PF lenders?

6.2 THE RESEARCH HYPOTHESIS-1

In the development of the above two questions the study will attempt to test its main hypothesis relating to the strategic function of PF structures as analysed by the case studies:

HYPOTHESIS-1: The Concept of Project Finance

"The essence of the concept of Project Finance is its strategic advantage of risk sharing to both the borrower and the lender. This advantage results from the PF intermediation function which is project-specific and location-specific. Its purpose is to utilise the viability of a
major investment to mitigate the impact on sponsor's debt
gearing while protecting the lender against major business
and country risks. While the mechanism of Project
Finance involves the establishment of a legally
independent entity, the PF concept necessarily relates to
the establishment of a strong "community of interest"
among all participants. This is achieved by incorporating
long-term economic and commercial linkage between the
project and its sponsors. This type of structured linkage is
the source of security for the lender and invariably
involves the transfer of credit among participants and
forms the essence of definitional criteria."

6.3 THE LITERATURE CONCEPT OF PROJECT FINANCE

There are many attempts in the literature to define the term "Project Finance" and
these are not necessarily consistent with each other. Rendell (1980) states that the term has
several meanings including both "lending for a project" where the lender looks to the
general credit of project owners and "lending to a project" where the lender look purely to
the revenue of the project itself for repayment of the loan.

In a noted paper by Niehuss (1982) of Merrill Lynch it was suggested that the term
consists of five general characteristics:

1. The basic credit security is self-liquidating and relates to the project's
   own assets and future expected cash flow.

2. The cost of the project being financed is very high, and hence beyond the
   credit capacity of individual sponsors to finance.

3. The finance is raised against the needs of a specific development and
   hence drawn and disbursed as the project progresses; it cannot be used
   for other purpose.

4. The financing arrangement is generally "off-balance sheet" to the major
   sponsors; the project loan does not appear as a liability on the sponsor's
   balance sheet or come within borrowing limitations or debt service tests
   contained in the sponsor's outstanding loan agreements.
5. The financing tends to be complicated by extensive legal provisions to ensure:

(a) That the cash flow from the project will be sufficient to repay the debt raised for the project; or

(b) That debt will be serviced by some credit-worthy party in the event that the cash flow is inadequate or is interrupted.

Item 1 imparts the much popularised notion that the borrowing project entity should provide adequate intrinsic security value to the lender. Items 2, 3 and 4 describe typical features of PF transactions which can be argued to be conceptually not as important as item 1. In particular, a great number of project finance transactions are arranged by the multinational companies which are well within their credit capacity. The evidence of the study cases have also illustrated that MNCs provide non-financial capital as a means of lowering their exposure and commitment to the project while transferring risk to local partners and lenders. There is also a great deal of project-oriented financing arranged by the World Bank and its affiliates as well as by the private sector which fits the condition specified in item 3 but carries full recourse to project sponsors.

With the passage of time, item 4 of the above definition has also lost much of its significance, because accounting disclosures in many countries have eroded much of the benefit of disguising a loan obligation (Nevitt, 1989). The expression "off-balance sheet" financing per se seems to have lost much of its attractiveness as a general description, particularly from the perspective of project lenders. The accounting treatment also varies from case to case and country to country. The likelihood is that, as auditors' exposure to legal actions increases, more and more project lending methods (such as take-and-pay or forward sales arrangements of oil companies) will appear on balance sheets of the parent companies concerned in one form or another.

Item 5 is also not an absolute condition as PF transactions may include simple legal structures (case of Saudi in Chapter 4) as well as complex ones (case of Sudan in Chapter 5) depending on the type and nature of the project risks, and country and political risks being presented (Bulfield, 1980; Brealey and Myers, 1988).
According to Bulfield (1980), project finance may involve a single highly credit-worthy sponsor. In this case the PF structure will usually be fairly simple and straightforward. Indeed, one of the important attributes of project finance is its adaptability to the varying needs of borrowing situations. It is therefore neither useful nor strictly accurate to generalise on the basis of some complex financial structures.

This was confirmed in Chapter 4 of the study where the analysis of Sabic projects presented examples of PF structure which were not ordinarily complex yet involved very high volume financial transactions. On the other hand, the case study of Sudan (Chapter 5) gave an example of a very complex financial structure designed to overcome inherent risks.

The most important element of the above definition is therefore that of item 1 which relates to the much popularised aspect of "non-recourse" finance, with the project lender's "rights" relating only to the assets and future earnings of the project. Leeper (1979) for example argues that the concept of non-recourse is the essence of project finance because the theory of project finance is really concerned with spreading risks:

"Assessing the risk inherent in the deal and structuring a security package which spreads those risks among the parties concerned with the project in such a way as to produce a deal which is acceptable to a bank or banks."

This definition is helpful in that it suggests that the security structure involves the sharing of risks by a "community of interest" made up of the parties concerned. Though this definition is imprecise it does clearly recognise the phenomenon of credit transfer through the risk spreading function of PF structures.

Brealey & Myers (1988) argue that even when a PF structure is based on the notion of "no recourse" lenders may still require a general assurance from the parent company that it will do its best to ensure the success of the project. Indeed, the function of "risk spreading" is not exclusive to non-recourse financing and in Niehuss's fifth characteristic (as stated above), the element of parent or sponsor support can be strong and direct. Thus although the literature approach is generally vague in proposing adequate definitions of project finance it, nevertheless, incorporates the essence of the phenomena as indicated in hypothesis 1, namely that PF structures involve credit transfer within a community of interests.
The literature concept thus incorporates a recognition that even in the case of pure non-recourse financing, project finance always involves some form of linkage between the project and the sponsors as a basis for the credit consideration and risk assessment. This was confirmed through the analysis of Sabic projects in Chapter 4 were it was found that project lenders consistently relied on the "moral obligation" and "reputation" of the principal sponsor when lending to new projects.

Most literature definitions however have a focus on the mechanics of pure non-recourse financing assumptions. It is difficult to evaluate the goodness of fit of such definitions because the study desk research could not find any estimate of the market importance of this type of PF structure. The study therefore attempted to develop its own estimate of the various types of PF structures through the study survey questionnaire. Bankers were asked to estimate the importance of each PF structure in their own organisational portfolio. This question was represented by question 5 on the survey questionnaire (Appendix 2.2 refers) The results were as per Table 6.1:

Table 6.1

<table>
<thead>
<tr>
<th>TYPE OF PF STRUCTURES</th>
<th>MARKET DISTRIBUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-recourse on signing</td>
<td>7%</td>
</tr>
<tr>
<td>Pre-completion Guarantee</td>
<td>21%</td>
</tr>
<tr>
<td>Cash deficiency Agreement</td>
<td>15%</td>
</tr>
<tr>
<td>Sponsor Performance Guarantee</td>
<td>14%</td>
</tr>
<tr>
<td>Full Recourse Finance</td>
<td>21%</td>
</tr>
<tr>
<td>Mixture of Guarantees and Support</td>
<td>22%</td>
</tr>
<tr>
<td>ALL TYPES</td>
<td>100%</td>
</tr>
</tbody>
</table>
The study estimates suggested that non-recourse finance represents only about 7% of the total market and therefore does not provide a good basis for generalisation. The study also discovered that PF structures which include some form of performance guarantee (such as completion undertaking, cash deficiency make-up or sponsor performance guarantee) account for 50% of the market transactions. Other PF structures which either include sponsor guarantee against failure or full recourse represented about 35% of the market while another 22% included a mixture of guarantees and support. These estimates provide empirical evidence that 93% of the PF market is concerned with transactions which include some form of indirect or direct guarantees. This is clearly supported by the evidence of the case studies, in particular where the poor credit rating of the host country (e.g. Sudan) required visible support and formal legal guarantees from the principal sponsor.

Wynant (1977; 1980) addressed this problem by suggesting a broader definition; namely:

"A financing of a major economic opportunity which the sponsor has segregated from the assets and general purpose obligations of the company. The project borrowing is typically secured by the assets and repaid by the cash flow of the project itself, and may be supported by undertakings from the sponsoring companies and other third parties."

Wynant’s definition stems from his assertion that the key distinguishing characteristic of project finance is the ability of the project to stand alone in some significant respect from the viewpoint of the sponsor and, in a great many instances, also in the view of the lender. Similar assertion is put by Brealey and Myers (1988) who differentiate project finance by its capacity to be physically isolated from the parent and by its offer of tangible security to the lender. This "independence" needs not be perfect or complete but sufficient to permit financial evaluation and risk analysis. It can also be achieved with a varying measure of undertakings or guarantees from the sponsor.

This view seems to imply some useful concepts since if a project or a subsidiary company is somehow segmented from its parent, a number of important benefits can be accomplished. These benefits include improvement in the risk and return characteristics of the project, owing to tighter control or improved financial management plus an opportunity
to capitalise on the credit of other parties. This type of legal and economic structuring of the project could thus result in lower risk and tends to facilitate volume transaction as was evidenced by the study cases.

However, this also implies the risk that if the "independence" from the parent is complete or perfect the sponsor may walk away from the project in the event of a probable default situation arising, leaving the lender with all the risk. By definition, it is more likely that the sponsor could abandon a segregated project than a linked project, because the former may not affect other operations materially. A strong linkage between the project and the sponsor is therefore a source of security to the lender against the event of probable default. The study estimates of the market distribution clearly support this assertion with 93% of PF structures include some form of linkage involving undertakings or guarantees. The case studies have also shown that where the economic and commercial linkage is strong (as in the case of Sabic projects) lenders do not insist on complex loan structures. Conversely, the absence of linkage is of most concern to lenders as in the case of WNPC of Sudan where lenders insisted on visible guarantees and methods of hedging against project and country risks.

The implication of the study assertion is therefore that while the mechanics of Project Finance involves the legal and physical separation or independence of the project the main objective of a PF structure is to re-establish a long-term commercial linkage between the sponsor and the project. This linkage is found to be the essence of the lender's security in project finance with 93% of the cases. In the remaining 7% of the cases, the linkage is in a less explicit form such as the reliance on moral obligation of a credit-worthy sponsor or letters of comfort or long-term commercial contracts with third parties. These types of undertakings provide the basis for a long term economic and commercial linkage between the project and its sponsors and in some cases permit the lender to accept non-recourse credit risk on signing. As asserted in the study hypothesis 1, the concept of linkage is thus an important feature of PF structures and should be incorporated into definitional criteria.
Literature Support for the Concept of Linkage

The study assertion is well supported in the literature and suggests that risk management strategies which recognise only the mechanical process of achieving a physical or legal autonomy for the project do not provide a good fit for the actual PF banking practice. Over the last two decades or so most MNCs have adopted an investment strategy of expanding international productive capacities through establishing contractual relationships with other companies. Tindall (1975) shows that the advantage of contractual linkages is that they result in expanding the international horizon of industrial companies without the necessity of increased capitalisation. This is confirmed by the case study of Sabic/Shell joint venture (Chapter 4) where the use of long-term contracts was the basis for securing supplies of raw materials and basic products for marketing in the USA and Europe. These contracts were found to underwrite the success of the project company and provided the security required by the lenders.

Without the contractual linkages the intrinsic value of the project’s assets would be insufficient collateral to support project debts (Merkey, 1978; Wood, 1980). The main concern of lenders is therefore with the project’s actual performance and this must involve a strong long-term linkage between the project and the sponsors.

The principle of linkage is recognised in the literature on Project Finance though not very clearly. Nevitt (1989), for example, found it necessary to provide a supplementary assertion on what makes a potential lender satisfied with a project finance arrangement:

"The key to a successful project financing is structuring the financing of a project with as little recourse as possible to the sponsor, while at the same time providing sufficient credit support through guarantees or undertakings of the sponsor or third party, so that lenders will be satisfied with the credit risk".

At once we are thus told that project finance transactions are not necessarily completely self-supporting, entrepreneurial or independent as we might have thought as it requires credit support through guarantees or undertakings. This is a realistic assertion and presupposes the establishment of a community of interest as a basis for credit transfer and risk sharing.
Another noted writer on project finance is Castle (1979) of the Chemical Bank, New York. Castle defines PF as

"A type of loan whereby the payout of the financing is anticipated from the project's revenue stream. The loan is structured so that it is not backed up by the full faith and credit of the owner or sponsor of the project."

This definition while it emphasises the importance of the payout from the revenue stream of the project in the tradition of the general literature, suggests that project finance can involve varying degrees of possible recourse to project sponsors as long as they do not amount to a full financial guarantee of the loan. This is useful in that it recognises that most PF structures are of the limited recourse types which do not involve a complete dependence on a financial guarantee. This is possible if the project is supported by a community of interest among credit-worthy sponsors.

This interpretation seems to be confirmed by Bulfield (1980), of J. Henry Schroder Wagg (London). Bulfield states that the entire concept of project finance is based on the idea that some of the risks inherent in the project will be taken by the project sponsors while some risks will be shared to a degree with the lenders. To him project finance is a structure which "makes maximum use of the security that is available in a project including the intrinsic viability of the project itself". This clearly suggests that PF is a system of credit transfer among participants and thus supports the study hypothesis and related assertions.

A definition which includes the notion of risk sharing but clearly differentiates these from "unacceptable" risks is provided by the Chase Manhattan Bank (1979). Chase defines project finance as lending to

"An independent project whose financing is based primarily on its expected cash flows with unacceptable risks delegated to project participants."

Chase's definition is useful. It suggests that PF involves a structure of passing on unacceptable risks to other better qualified parties. It implies a framework of negotiation
and cooperation which can only be implemented through the creation of a community of interest.

It is very difficult, however, to generalise about what is meant by "acceptable" and "unacceptable" risks since lenders may differ in their perception of risk. Presumably unacceptable risks will be of an equity nature but banks are known to have accepted equity risk at times as reported by Jahnke & Webb (1983) of the Chemical Bank. During the study field interview it was possible to learn that the recent case of financing the European Channel Tunnel project company banks also seemed to have accepted equity risk. This is because the loan repayment profile extends over 15 years and involves no guarantees from a host country or a credit-worthy third party. The basis of lenders' security is the long-term contract between the project and the carrier companies such as British Rail. A somewhat interesting definition of Project Finance is provided by Sarmet (1980; 1981) of Credit Lyonnais, Paris. Sarmet's definition of the term is more in the nature of direct industrial investment:

"The financing of an economic unit which is viable technically, commercially and financially, and whose future generated cash flow is judged high enough, with a safety margin, to cover operating costs, debt servicing and an adequate return on investment."

According to Sarmet, project finance involves the lender primarily in ensuring that the project is self-liquidating through a concern about its viability rather than with the mechanics of legal guarantees. The lending security is primarily economic in nature and the concern is with the proper assessment of its technical and commercial viability. Sarmet's definition is helpful in that it implies that the credit assessment in Project Finance involves technical and commercial considerations. In the context of LDC projects, these considerations can be met only if the project is linked to experiences of the MNCs.

The concept of PF must therefore stretch beyond analytical criteria to establish a fall-back mechanism on a credit-worthy sponsor in the event of a probable default. Fidler (1982) for example explains that if the project is not self-liquidating then the lending bank must be satisfied that there are alternative sources of repayment. Fidler argues that the mere issue of a guarantee does not make a loan secured, and he regards the general reliance on the balance sheet of the parent as an unsecured loan. Thus PF structures which utilise
the benefit of long-term contractual linkages as a source of security can be considered less risky than comparable conventional loans which rely on financial guarantees.

6.4 THE STUDY DEFINITION OF PROJECT FINANCE

The above evaluation of the literature criteria referred to some useful concepts of Project Finance. However, the focus of the literature definitions was invariably on the mechanics of arranging PF structures or on the description of the primary recourse. Although most of the literature definitions were found useful they were nevertheless vague in explaining the concept of PF in terms of credit transfer.

The study investigation has demonstrated that Project Finance involves two inseparable objectives. The first relates to the legal or physical independence of the project in order to relate the credit to the project cash flow. The second relates to a long-term linkage in order to provide a safety net or a fall-back in the event that the project does not produce the projected cash flow.

Failure to achieve these two objectives simultaneously will imply that project lenders take substantial equity risk. In this case it will be imperative to relate such risk to the capital structure of the lender and to explain how the lending banks which operate on a very small equity base of 3.0% to 8.0% of total assets can justify this type of venture banking without taking excessive risk.

Wood (1980) for example explains that loans which rely on the project for their pay-out always involve a degree of equity risk. Definitional criteria which focus purely on the legal structure of incorporating the project into a separate entity seem to implicitly or explicitly assume that the lending banks take a major equity risk. If this is so then there is a need to device a fall-back mechanism of last resort in order to avoid the catastrophic impact in cases of large loans defaults. The study hypothesis-1 includes the assertion that lenders are generally not in business to assume equity risk, and therefore PF structures are designed to mitigate this risk through establishing strong linkage between the project and its sponsors. These sponsors provide the necessary credit support by assuming equity risks which the lender is not able to accept. In this regard the study hypothesis-1 which stresses
the "community of interest" as the essence of PF structures presents a completely different perspective than the literature approach.

This suggests that a simple mechanical definition of project finance may not explain its phenomenon and presents major problems. In particular, the realisable market value of fixed assets locked in a complex and very highly geared project is unlikely to be anywhere near sufficient to cover the loan value if the project fails to perform. The field evidence collected by the study, for example, has shown that all petroleum projects which qualify for direct borrowing are very large, immobile and their break-up market value is significantly less than their total value as going concerns. Without adequate "cushion of finance" to protect its lending, the participating bank can quickly become a project developer itself without the equity stake.

The study approach to solve this type of problem is to correlate the key elements of definitional criteria to the field practice. This is attempted by analysing the opinion of the experts through a structured questionnaire. Four assertions were thus tested, each incorporated a definitional criterion. Banks were asked to indicate their measure of agreement or disagreement with these assertions. Respondents were also asked to give information about their portfolio specialisation by indicating how important the various industrial sectors were in their organisation.

The four assertions were as follows:

1. "Project Finance is a structured lending package tailored for specific needs of a risky investment situation and designed so that both borrower and lender get the best possible deal out of the investment by linking loan repayment directly to the project's own cash flow which may be supplemented by direct or indirect guarantees of performance."

2. "Project Finance is a technique of arranging off-balance sheet bank loans by linking lender's primary security to the Project's earnings and may involve a measure of lender's direct control over the Project and/or its assets."
3. "The core of Project Finance is the instrument of Limited Recourse which brings together various types of complementary commitments and guarantees from sponsors to ensure project performance."

4. "Project Finance differs from Sovereign and Corporate lending in that the project loans are not fully secured by guarantees or the value of the assets being financed; hence, the lender must look to the performance and earnings of the project as a going concern and share major business risks."

The results were then examined within four stratified samples, each relating to the lending sector which was considered very important to the lending bank. The results of the questionnaire responses are given in Table 6.2 on the following page.

The survey results were consistently distributed among the four samples of specialisation and supported the following conclusions:

1. There was a very strong support for assertion No. 1 which states that PF is a customised structure designed to benefit both borrower and lender and involves direct or indirect guarantees of performance.

2. There was a very weak support for Statement No. 2 which asserts off-balance sheet bank lending is a major strategy objective. i.e. Statement No. 2 was virtually rejected.

3. There was a strong support for statement No. 3 which asserts the supporting function of sponsors within a community of interest to ensure project performance.

4. There was a fairly strong support for statement No. 4 which asserts the difference between PF structures and conventional lending in terms of the perfection of the security. In this case, most of the respondents which disagreed commented that they did so because of their objection to the phrase "sharing of major business risk" by the lending bank.
Table 6.2

Result of Survey Questionnaire relating to Definitional Criteria

<table>
<thead>
<tr>
<th>Study Assertion No.</th>
<th>Lender's Industrial Specialisation</th>
<th>Survey Results</th>
<th>Number of Banks in Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strongly Agree</td>
<td>Reasonable Assumption</td>
</tr>
<tr>
<td>1</td>
<td>Petroleum</td>
<td>68%</td>
<td>32%</td>
</tr>
<tr>
<td>1</td>
<td>Mining</td>
<td>64%</td>
<td>36%</td>
</tr>
<tr>
<td>1</td>
<td>Manufacturing</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>1</td>
<td>Others</td>
<td>74%</td>
<td>26%</td>
</tr>
<tr>
<td>2</td>
<td>Petroleum</td>
<td>21%</td>
<td>68%</td>
</tr>
<tr>
<td>2</td>
<td>Mining</td>
<td>21%</td>
<td>64%</td>
</tr>
<tr>
<td>2</td>
<td>Manufacturing</td>
<td>28%</td>
<td>50%</td>
</tr>
<tr>
<td>2</td>
<td>Others</td>
<td>26%</td>
<td>58%</td>
</tr>
<tr>
<td>3</td>
<td>Petroleum</td>
<td>63%</td>
<td>37%</td>
</tr>
<tr>
<td>3</td>
<td>Mining</td>
<td>64%</td>
<td>36%</td>
</tr>
<tr>
<td>3</td>
<td>Manufacturing</td>
<td>56%</td>
<td>44%</td>
</tr>
<tr>
<td>3</td>
<td>Others</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>4</td>
<td>Petroleum</td>
<td>47%</td>
<td>42%</td>
</tr>
<tr>
<td>4</td>
<td>Mining</td>
<td>43%</td>
<td>43%</td>
</tr>
<tr>
<td>4</td>
<td>Manufacturing</td>
<td>45%</td>
<td>45%</td>
</tr>
<tr>
<td>4</td>
<td>Others</td>
<td>39%</td>
<td>58%</td>
</tr>
</tbody>
</table>
These results helped the study to identify the most dominant elements of PF banking strategies, namely:

(1) A structure for independently viable investments.
(2) Primary reliance on projected future cash flow.
(3) A facility for high volume transaction.
(4) A need to preserve the borrower's credit rating.
(5) Risk sharing within a community of interest.
(6) Maintenance of a system of support.

The following study definition has thus been developed to more precisely reflect these elements and contribute to the theory of project finance:

"Project finance is a structured lending package designed for independently viable investments on a future cash flow basis which permits high volume transactions without impairing the sponsor's debt gearing and embeds the creation and maintenance of a community of interest among all parties as a source of security for the project and its lenders."

This definition has thus been adopted for the study as relating more closely to the empirical situation than the literature definitions and incorporates the essence of PF theory.

6.5. PF STRATEGIC ADVANTAGE:

The analysis of the previous two sections clearly suggested that the essence of project finance lies in the concept of credit transfer or risk sharing that is maintained within a structured community of interests. The possibility of separating the prime borrower from the risks of a project presents a powerful incentive to seek project finance and at the same time a powerful deterrent for the lender to maximise its lending (Johnson et al, 1983).

In order to assess and validate the strategic risk advantages of Project Finance the study developed five related assertions. These were subjected to the screening by responding banks as per item 3 on the survey questionnaire (Appendix 2.2) and are listed below:
1. "The aim of sponsors in Project Finance is to overcome the limitations of debt-raising capacity of project owners and mitigate the risk of debt service obligation."

2. "The main advantage of a PF structure to the lender is its facility to control organisational and country risk through segregating project earnings and priority claims."

3. "It is not necessary for project owners to shoulder all the debt obligations through direct guarantees, because the lender is generally able to look to project performance for its primary risk protection."

4. "Project Finance permits a high ratio of debt-to-equity because its tight structure results in less risky investment than other financing methods which rely on direct financial guarantees."

5. "Most project loans are client driven and the lender is attracted by the promise of higher earnings through better margins and various fees."

The results of the survey questionnaire are given in Table 6.3.

Table 6.3

Results of Survey Questionnaire Relating to Strategic Advantages of Project Finance

<table>
<thead>
<tr>
<th>Assertion Criteria No.</th>
<th>Response Distribution</th>
<th>Number of Banks in Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Agree</td>
<td>Reasonable Assumption</td>
</tr>
<tr>
<td>1</td>
<td>26%</td>
<td>52%</td>
</tr>
<tr>
<td>2</td>
<td>30%</td>
<td>47%</td>
</tr>
<tr>
<td>3</td>
<td>9%</td>
<td>74%</td>
</tr>
<tr>
<td>4</td>
<td>43%</td>
<td>26%</td>
</tr>
<tr>
<td>5</td>
<td>17%</td>
<td>48%</td>
</tr>
</tbody>
</table>
Most respondents preferred not to support assertion number 3. This confirmed that lenders do not generally assume business risks which are of an entrepreneurial type as they are more appropriate for project owners and other sponsors. It also confirmed that lending banks would participate in project finance only if the sponsor was willing to mitigate the risk. The test results show that lenders consider project performance per se is not a sufficient security for the loan.

The assertion that lending banks are simply client driven (statement number 5) is also poorly supported. The majority of the banks which responded to the study survey thought that project lenders undertake proactive function in finding, screening and evaluating project loans. This seems consistent with the observation that most project lenders have a specialised project finance department and undertake technical, economic and financial evaluation. It was also consistent with the field interview results which indicated that project finance has grown into a mature practice and was being marketed to new national organisations as well as to the multinationals.

The risk strategy advantage of project finance is therefore more adequately described by assertions numbers 1, 2 and 4. Of these the strongest support was for assertion number 2. Only 4% of the lending banks which responded disagreed with this assertion while the remaining 96% either strongly agreed with it (30%) or classified it as a reasonable assumption (47%) or a potentially important assumption (17%). This assertion relates to the strategic benefit of segregating the project entity to facilitate the control of organisational and country risks.

Assertion number 1 was second in importance; 9% of the responding banks disagreed while 91% supported its implications. This assertion concerned the sponsor's strategy and assumed that the strategic advantage to the prime borrower is the facility to "overcome the limitations of debt-raising capacity" and to "mitigate the risk of debt service obligation".

Assertion number 4 ranked third in importance with 22% of the responding banks in disagreement compared with 78% which either strongly supported it (43%) or considered it a reasonable assumption (26%) or that it could be potentially important (9%). This assertion was intended to predict the outcome of assertions number 1 and number 2 which
relate to the main advantage to the borrower and the lender respectively. This outcome was explained in terms of the "high ratio of debt-to-equity" investments which is made possible in project finance owing to the ability of lenders to achieve a direct control over the project as well as some form of performance guarantees; i.e. the high ratio of debt to equity reflects a low risk situation relating to the tight structure of project finance.

The above three study assertions (Nos. 1, 2 and 4) thus describe the strategic advantage of PF structures in terms of causes and effects. The results of the study test confirmed that the strategic advantage of PF structures related to risk management and benefited both the lender and the borrower as being asserted by the study hypothesis 1.

6.6 PF RISK STRUCTURES

Based on the study reviews of PF loan documentation and the evidence of the case studies, a "PF risk structure" may be defined as:

"A body of terms and conditions relating to the performance of debt obligations by the borrower and the rights of the lender in the event of a default on these obligations."

Brealey & Myers (1988) suggest a useful classification of PF risk structure according to the lender's recourse to the sponsor. Four groups of PF risk structure are distinguished; namely, (1) non-recourse finance; (2) completion-bonded finance; (3) limited recourse finance; and (4) full-recourse finance. This approach corresponds to grouping debt structures according to whether the lender:

1. Assumes all project risks,
2. Shares only post completion risks,
3. Shares limited amounts of risk during all phases.
4. Shares none of the project risk at any time.
i) Non-recourse finance

Rendell (1980) suggests that non-recourse finance provides a useful reference model representing an extreme case of risk taking by the lender. In the purest sense, non-recourse finance means that the lender will have "no recourse" right to the prime borrower (the sponsor) at any stage of the project development. The study survey estimated that some 7% of the PF structures are non-recourse on signing (See Table 6.1).

Brealey & Myers (1988) and Van Horne (1986) argue that the assumption of a complete break in linkage between the prime borrower and the project in non-recourse financing is incorrect. They explain that in non-recourse financing the lender obtains a general assurance from the parent company that it will do its best to ensure the success of the project. This assurance usually takes the form of "keepwell agreements" or "comfort letters" which though they may not be legally binding do represent a potentially embarrassing "moral" commitment on the part of the parent. A study by Sacasas and Wiesner (1987) also found that comfort letters may have serious legal implications. It is therefore possible to argue that in certain cases such as in the Saudi projects as examined in Chapter 4, lenders may have a good reason to consider reliance on the doctrine of moral obligation as adequate security.

Logan & Dorgan (1984) suggest that lenders may prefer asset-based collateral of the project when the credit risk of the prime borrower is less desirable. Wood (1980) and Fidler (1982) express a legal opinion in favour of asset-based non-recourse security if it carries a floating charge and the project is economically viable. This will be a preferred option to conventional guarantees from weak borrowers, such as poor LDC host governments, because the lender will at least have a working control over the project. However, according to White (1978), Weyer (1979), Wood (1980) and Mackenzie (1983), lending on the security of the project alone will involve taking equity risk. Rendell (1980), for example, argues that lenders are not expected to be venture capitalists and they are entitled to some further assurances of repayment beyond the success or failure of the borrowing project.

Jahnke & Webb (1983) of the Chemical Bank (London) express the view that there is a recognisable limit for borrowing and lending on a non-recourse basis. In particular, it
will be difficult for petroleum companies with limited financial strength to raise project-related finance at the usually very high debt-to-equity ratio. These companies, it is suggested, will have to sell or farm-out a proportion of their interest in order to increase the equity percentage and improve their credit support base.

This view has been confirmed by the experience of the Australian oil company, Woodside, with respect to the financing of their LNG project. As reported by Liddle (1986) of Morgan Grenfell, who acted as financial adviser for the project, the concept of non-recourse finance proved helpful to the financially weak borrower but its limitation on the amounts of debt that could be raised depends on the inherent viability of the project being financed and whether it could offer compensating security.

The analysis of the study case of Sudan seems to confirm this experience. The lenders in this case found the credit of the project more desirable than the credit of the host country as it provided a direct facility to overcome the problems of country and political risks. Cases reported by Stochmaver (1985) gave similar conclusion. Research by Wynant (1977) provided the conceptual basis for non-recourse finance. Wynant provided a probability analysis to show that the "risk and return" combination of a project improves with physical segregation or independence and hence could result in increased debt-raising capacity for the prime borrower without the traditional impact on gearing.

ii) Completion Bonded Finance

This type of PF risk structure represents an extension of non-recourse finance. It includes one or more direct linkages with the sponsor through a completion guarantee or performance guarantee. Under this guarantee, the risk relating to development, construction and commissioning are directly assumed by the sponsor but the lender will still look to the cash flow of the project as the source of repayment. The prime concern of the lender is that the project will not be abandoned for any such reasons as lack of funds or serious technical or economic problem.

The empirical evaluation of the study cases (Chapter 4 and Chapter 5) illustrated that there is a strong relationship between completion risk and sponsors' commitment to the project. In the case of Saudi projects, private commercial debt represented only 25% of
total investment and usually used to finance working capital. Private commercial lenders thus were not very concerned about the threat of completion risk. On the other hand, in the case of Sudan debt finance represented a very large ratio of 75% of the total capital needed for the project and the risk of non-completion was a serious threat to lenders on signing. Lenders therefore insisted on an explicit completion guarantee from the principal sponsor. Analytical tests by Ulatowski (1983) of Crocker National Bank have provided similar evidence that the higher the equity-to-debt ratio the less critical is the requirement of completion guarantee. This is because higher equity inputs represents greater commitments by owners to the venture and hence less risk of abandoning the project before completion.

Rendell (1980) and Logan (1980) suggest that completion bonded finance involves the sponsors in providing the necessary guarantees in the form of a separate agreement with the lenders; i.e. entering into conditional corporate loan agreement which oblige the prime borrower to either repay the project indebtedness or directly assume the repayment obligations on a corporate basis in the event of default under the project completion guarantee. Completion bonded project finance may thus be considered as a type of quasi-corporate lending. This follows from the objective of the completion tests which seems to permit the lender to rely on the general credit of the sponsors during the phases of construction development and commissioning and until the project is a proven corporate entity.

iii) Limited Recourse Finance

Limited recourse finance represents the largest class of project finance transactions. Wood (1980) defines limited recourse finance as a structure which involves the lender to expressly assumes certain of the commercial risks attaching to the project. The study estimated that some 72% of the PF structures are of limited recourse type (Table 6.1).

The basis of limited recourse financing is the provision of limited guarantee for the performance of the debt obligations. These guarantees typically include one or more of the following contractual agreements:
(a) The Throughput Arrangement:

The throughput arrangement is generally used when the project is a process plant or a pipeline system. The basis of financing of the Sudan pipeline project (discussed in Chapter 5) was of this type. The throughput agreement provides a capacity allocation to the principal sponsors. In the case of the Sudan project, the principal sponsors were the oil companies (Chevron and Shell).

As was evident from the Sudan case, this type of arrangement typically involves a form of "take-or-pay" contract with a minimum tariff-volume throughput calculated to generate sufficient cash to service the project loan regardless of whether the project is able to perform or not. A distinguishing feature of such contract is the unconditional nature of the sponsors' obligation to make payments for the project output. Because of this feature, lenders view take-or-pay contracts as equivalent to a "financial guarantee".

However, the nature of take-or-pay agreement in the case of Sudan pipeline project showed that this type of guarantee is not without risk to the lender. For example, the guarantor was exempt from force majeure risk and if for political reason the service of the pipeline was not available then no payment would be due under this guarantee.

(b) The Cost Company Arrangement:

Under this arrangement a project entity is set up to own the physical assets of the project and raise finance. The loan proceeds are passed on to the owners. The owners also receive all of the project's output free of charge. In return they agree to pro-rata sharing of all operating costs including loan service.

The "cost company" project does not sell anything and has no income or any assignment of rights to a product or service. Each parent firm simply includes in its income statement its share of the project's expenses on account of a "throughput right" or a "capacity right" which they may fully use or not. The North Sea oil and gas gathering pipelines involve this type of risk structure.

The parent undertaking to carry the cost company is again tantamount to a guarantee similar to the throughput contract as outlined above. The basis of these guarantees represents a direct linkage with the "physically separated" project. The study estimated
that some 14% of all PF structures include either throughput agreement or cost company arrangement (Table 6.1).

(c) Cash Deficiency Arrangement:

In this case the project's owners agree to provide the operating project company with enough funds to maintain a certain level of net working capital or ratio of current assets to current liabilities. This form of undertaking thus forms a direct linkage between the sponsor and the project and involves direct sharing of the project debt obligation. The study survey estimated that some 15% of the PF structures include some form of cash deficiency agreement (Table 6.1).

iv) Full Recourse Project Finance

Full recourse finance involves the lender's reliance on the sponsor to repay the loan in the event of default but the lender still looks to the project cash flow for repayment.

The general literature argue that this type of project loans will not qualify as project finance. However, these loans also do not strictly qualify as corporate or sovereign loans since the lender is providing the funds for the sole investment in the project and looks for repayment from the same. The loan repayment is related to cash flow performance and thus the lender assumes the risk of delay in repayment if the project does not perform as anticipated. The study survey questionnaire estimated that some 21% of all project loans are in fact supported by some form of guarantee which provide the lender with the right of full recourse to the sponsor (Table 6.1).

Much of the official funding of projects involves guarantees of this nature. The value of this security against financial risk is, however, contingent on the guarantor being credit-worthy and able to redeem the loan; otherwise, the lender's risk strategy is similar to that of a non-recourse or semi-recourse lender. This is the case when a guarantees of a poor LDC host country sponsor is sought as a legal hedge but has no proven economic or financial value in the case of real default.
6.7 RISK MANAGEMENT STRATEGY

The risk management strategy of lenders and borrowers may be analysed from the type of hedging techniques used to cope with project risks. These may be grouped into two categories:

1. Those which relate to portfolio management and its environment (exogenous or systematic risks); and

2. Those which relate to individual investment decision situations (endogenous, unsystematic or project-specific risks).

The first category of risk hedging relates to the capacity of the firm (borrower or lender) to participate in a project investment. The investor attempts to control its financial risk through the application of risk hedging theories which relate to rules of calculating mean expectation or average outcomes which may not be very sensitive to influences of marginal projects that could be undertaken and financed.

The main types of systematic risks that the lender can typically diversify away through the application of portfolio management include the following:

1. Credit risk: \( \sim \)

   The risk that a counter-party to a financial transaction will fail to perform according to the terms and conditions of the contract (i.e. will default), either because of bankruptcy or any other reason, thus causing the lender to suffer a loss. The loss relates to a portion of the aggregated loan assets of the lending bank. The items or components of the portion actually suffering the loss is unknown and cannot be predicted a priori; only the proportion of the overall portfolio value may be estimated and provisioned for.

2. Liquidity risk: \( \sim \)

   The risk that the bank will be unable to ensure the availability of funds to meet its financial commitments at a reasonable price and at all times.
3. Exchange Rate risk: The risk of loss arising from the movement in the relative rates of exchange between currencies.

4. Investment risk: The risk that the value of fixed-interest bearing assets will be devalued by a rise in interest rates.

5. Commercial risk: The risk of fraud, operational error and mistakes, incompetence or forgetfulness.

6. Country risk: The risk that a host country will find itself unable or unwilling to service all its international financial obligations.

7. Transfer Risk: The risk that a host country will suffer a shortage of foreign exchange, even though all or most economic agents within that country remain solvent.

In the study case of Saudi Arabia (Chapter 4) it was confirmed that lenders were able to share much of the above risks without insisting on placing complex contractual and legal hedging devices. However, in the case of poorer LDC country such as Sudan (Chapter 5) the threat of country risk, exchange rate risk and transfer risk were not considered acceptable to lenders. Lenders in this case negotiated an elaborate system of mechanical hedging (escrow account) and legal hedging (parent guarantees of performance) and other related assurances.

The second category of risk hedgings directly relates to individual investment situations. These are project-specific and referred to in the literature as unsystematic risks. As a general rule, these risks are considered more appropriately managed by the industrial sponsor than by the lender. Lenders would seek the appropriate type of PF structure to protect their position against these types of risk.

Traditionally, project-specific risks have been classified into post-completion risks and operational risks. The latter refer to resource risks, operating risks and marketing risks. Based on the experience of the study cases and the desk research these risks may be analysed in terms of source, type of risk and technique of risk treatment used in the
The petroleum industry. The analysis in the following Table 6.4 shows the linkage between the source and type of risk and the applicable technique of risk treatment which is typically used under each heading.

**Table 6.4**
**Profile of Project-Specific Risks in Petroleum Financing**

<table>
<thead>
<tr>
<th>SOURCE OF RISK</th>
<th>TYPE OF RISK</th>
<th>TREATMENT OF RISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Development &amp;</td>
<td>- Cost-overrun</td>
<td>- Completion Guarantee</td>
</tr>
<tr>
<td>Construction</td>
<td>- Delays in start-up</td>
<td>- Funding Agreement</td>
</tr>
<tr>
<td></td>
<td>- Abandonment</td>
<td>- Vetting of Contractors and Developers</td>
</tr>
<tr>
<td>2. Operations</td>
<td>- Size of Resource Estimates</td>
<td>- Independent Audit</td>
</tr>
<tr>
<td></td>
<td>- Production Efficiency</td>
<td>- Independent Certification</td>
</tr>
<tr>
<td></td>
<td>- Availability of feedstock energy fuel at economic cost</td>
<td>- Supply Agreements</td>
</tr>
<tr>
<td></td>
<td>- Maintenance of Profit margin and working capital</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reliability of process technology</td>
<td>- Marketing Agreements</td>
</tr>
<tr>
<td></td>
<td>- Fire, explosion, destruction</td>
<td>- Operating and Services Agreement</td>
</tr>
<tr>
<td>3. Markets</td>
<td>- Fall in product prices</td>
<td>- Assignment of Insurance policies</td>
</tr>
<tr>
<td></td>
<td>- Fall in demand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Product Substitutions</td>
<td></td>
</tr>
</tbody>
</table>

The above project-specific risks were met in the case studies (Chapters 4 & 5) and found to be of major concern to all participants. The case studies provided the empirical
data to illustrate how borrowers and lenders mitigate these risks through the use of various hedging techniques. In the case of Saudi projects the threat of project completion was virtually over by the time bank funds were called on. Reserve and feedstock risks were also not presenting significant threats because the country had proven experience of oil and gas resources. Marketing risk was covered by long-term contracts with the MNCs which participated as principal sponsors for the project development. This type of tight community of interest provided a source of comfort for accepting non-recourse PF structure by lenders.

In the case of the Sudan project (Chapter 5) the banks were not comfortable with any of the risks. The resource estimate was not proven and the involvement of lenders was up-front. Project lenders in this case sought as tight linkage with the principal sponsor as possible through a number of complex legal agreements and guarantees.

6.8 CONCLUSION

The literature evidence and the empirical data collected by the study have been found to support the study hypothesis-1 that a PF structure involves the re-arrangement of the project as a physically independent entity and that the essence of the project credit depends on the ability of participants to structure a long-term linkage with the project in terms of commercial and economic community of interests. The study thus proposed a definition of project finance which recognises this linkage as the basis for credit transfer among participants and as a source of the fall-back security to the lender.

The field survey evidence suggested that the main strategic advantage of project finance to the industrial borrower is to overcome the limitations of its debt-raising capacity when arranging a high volume funding transaction for a major new development. From the lender's perspective, it is to overcome the threat of unacceptable project-specific risks. The aim of a PF structure is to reconcile these two objectives by minimising the impact on the gearing of the borrower without endangering the position of the lender. The related study assertions and hypothesis-1 were thus confirmed by the field data which suggested that project finance results in strategic benefits to both the borrower and the lender.
Chapter 7

DETERMINANTS OF PF STRATEGIES

7.1 INTRODUCTION

In the previous Chapters the first three out of the six research questions which were developed in Chapter 1 (Section 1.7) were investigated. The aim of this Chapter is to build on the study concepts as developed so far by answering the fourth and fifth research questions:

- Why do borrowers and lenders prefer PF to conventional loans and why PF strategy results in higher ratio of debt finance than conventional loans?
- What factors, other than the obvious availability of debt capital, are important considerations in the strategies of host LDC governments when choosing to support a PF structure?

To answer these questions the study will test its assertions and hypotheses in relation to the strategies of the borrower, the lender and the host LDC government by analysing field experience.

7.2 THE RESEARCH HYPOTHESES 2-4

The study will test three of its major hypotheses concerning the related strategies of borrowers, lenders and host LDC governments. Attempting to resolve the questions raised by the hypotheses will help to provide an explanation for the strategies implicit in the motives and objectives of the PF participants:

Hypothesis-2: Determinants of Borrowing Strategy

"The preference of borrowers for the facility of Project Finance is substantially a function of its real or economic benefits. In addition to the usual benefit of debt finance to shareholders, the main benefit of project finance is its
contribution to the financial stability and increased borrowing capacity of the firm. If the major benefits of PF borrowing are defined and tested, then it will be possible to explain why the industry seeks high investment leverage through project finance."

Hypothesis-3: Determinants of Lending Strategy

"A major limitation of a lending strategy is that the bank is only able to accept certain risks and will therefore participate in project finance only if it can pass on other risks to more qualified parties. If the risk bearing capacity of specialised project lending banks can be defined and tested then it will be possible to define the rules for placing bank investment in essentially equity situations."

Hypothesis-4: Determinants of Host Country Strategy

"The basis for financing major projects in resource-endowed developing countries is the exchange of benefits relating to long-term access to real resources for project credit support of the multinational companies. The basis of this credit support is the mechanism of risk transference which involves both technology and marketing considerations. If the credit rating of LDC projects can be tested in terms of sponsor's linkage then it will be possible to explain how Project Finance results in enhancement of the credit rating and investment capacity of host LDC governments without the traditional increase in general debt obligation."

7.3 DETERMINANTS OF BORROWING STRATEGY

a) Conceptual Explanation:

One of the major decisions facing the petroleum industry is how to finance major international projects. The traditionally accepted view is that given two sources of funds, debt and equity, there should be benefits from the use of debt when debt is cheaper than equity, resulting in an increase in the yield on shareholders' investment. The opportunity to arrange a PF structure suggests that there is a second level of funding decision. Given that there are two alternative methods of raising debt capital, conventional versus project
finance, then there should be comparative benefits from the use of project finance when this is less risky and results in fewer leverage constraints to the prime borrower than conventional debt.

The basic difference between the two methods of raising finance is that conventional debt involves the sponsor in providing direct financial guarantees while PF tends to mitigate the need for such guarantees. The results of a PF structure are therefore expected to ease the borrowing limitation of the parent company and help to raise additional finance. In the case of conventional borrowing, the lender has a direct claim against the general incomes and assets of the prime borrower. There is no linkage between debt service and the cash flow performance of the project which utilised the loan. Given the scale of the investment risk in the petroleum industry, most borrowers will be financially very sensitive to the risk of non-performance or default by a major project. A probable default situation for the project will be immediately felt by its parent company.

This suggests that the most important motive for borrowing on a project basis is the need to mitigate investment risk and achieve financial and business stability. In addition, however, borrowers have a variety of internal and external considerations which result in a preference for project finance. For example, the opportunity to enhance the yield on equity is a typical internal advantage of debt financing. In general, when financing cost is less than the average yield on investment and the investment is predominantly of debt capital the residual profit as a ratio of equity capital is said to be maximised. However, given the relative independence of PF debt obligations, the enhancement in shareholders' earnings could be achieved without the usual impact on gearing.

The borrowing motives may thus be related to the desire to maximize borrowing capacity while maintaining the financial stability of the firm. Most of these are inter-related and may be considered important factors in the borrowing strategy. Financial stability is improved because of the loan repayment is tied to the cash flow of the project. The benefit of enhancing borrowing capacity is the result of removing or avoiding existing borrowing limitations through the innovational techniques of the PF structure.

The term "Borrowing Capacity" as used in this study refers to an important concept which is different from the term "Debt Capacity". The "Borrowing Capacity" of a firm relates to its ability to obtain debt financing and it is largely outside the control of the
borrower, being determined by the prevailing credit market conditions. If a PF structure results in improving the risk and return characteristics of a major investment this will be reflected in the enhancement of the borrowing capacity of the principal developer who sponsors the PF loan.

On the other hand, the term "Debt Capacity" is generally used to refer to a firm's internal capacity and willingness to take on a certain proportion of debt in its capital structure. Debt capacity is therefore internally determined by the financial structure (optimum debt-to-equity ratio) of the firm while borrowing capacity is externally determined and can be enhanced by improving the credit rating of the borrower (Wynant, 1977).

The aim of a PF structure is therefore to enhance the borrowing capacity of the sponsor and to conserve existing debt capacity for general corporate financing needs. For these reasons, most borrowers prefer to finance major petroleum projects by a PF facility which attempts to relate the debt obligation to project performance rather than to conventional financial guarantees.

(b) The Field Evidence:

The study hypothesis-2 relating to the conceptual explanation of the borrowing strategy has been tested through the field survey questionnaire. The method of testing involves analysis of the borrowing strategy in terms of 12 primary objectives and motives as possible determinants. These were initially determined during the field interviews and were tested by the pilot questionnaire. In the final questionnaire, the respondents were asked to rate the relative importance of these determinants from the point of view of the borrowers' objectives and motives when seeking project related finance (Item 7 on the survey questionnaire- Appendix 2.2).

The rating involved the respondents to decide whether the given determinant is "Very Important", "Fairly Important", "Not at all Important", or only "Potentially Important". The latter rating was intended to generate information on factors which are not ordinarily considered important by the responding organisation at this time but could become important due to future developments. The results of the survey questionnaire are given in Table 7.1 below:
### TABLE 7.1
RATING OF DETERMINANTS OF BORROWING STRATEGY

<table>
<thead>
<tr>
<th>Determinant of Borrowing Strategy</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
</tr>
<tr>
<td>1. Accounting Considerations</td>
<td>17%</td>
</tr>
<tr>
<td>2. Borrowing Limitations</td>
<td>39%</td>
</tr>
<tr>
<td>3. Yield on Equity</td>
<td>57%</td>
</tr>
<tr>
<td>4. Fiscal Benefits</td>
<td>17%</td>
</tr>
<tr>
<td>5. Financing Costs</td>
<td>22%</td>
</tr>
<tr>
<td>6. Investment Risks</td>
<td>70%</td>
</tr>
<tr>
<td>7. Political Risks</td>
<td>30%</td>
</tr>
<tr>
<td>8. Force Majeure Risks</td>
<td>13%</td>
</tr>
<tr>
<td>9. Borrowing Capacity</td>
<td>30%</td>
</tr>
<tr>
<td>10. Market Risks</td>
<td>44%</td>
</tr>
<tr>
<td>11. Completion Risks</td>
<td>13%</td>
</tr>
<tr>
<td>12. Financial Stability</td>
<td>52%</td>
</tr>
</tbody>
</table>

These results confirm that the top five most important determinants of borrowing are Investment Risks (70%), Desire to Improve Equity Yield (57%), Desire to Achieve Financial Stability (52), Sharing of Market Risks (44%), and Desire to Overcome Borrowing Limitations (39%).

In order to facilitate inter-comparison of the impact of the various factors, the study developed ranking merits by applying a weighting factor to the ratings. A score of "Very Important" is given a median weight of 75.0% compared with 37.5% for a score of "Fairly
Important", 12.5% for "Potentially Important" and 0% for "Not Important". The weighting assumptions used are as follows:

<table>
<thead>
<tr>
<th>RATING</th>
<th>RANGE</th>
<th>MEDIAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Important</td>
<td>50%-100%</td>
<td>75.0%</td>
</tr>
<tr>
<td>Fairly Important</td>
<td>25%-50%</td>
<td>37.5%</td>
</tr>
<tr>
<td>Potentially Important</td>
<td>0%-25%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Not at all Important</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

The sum of the weighted scores for each determinant is a representation of the overall (or average weighted) rank as shown in the last column of Table 7.1. A ranking index is then calculated for each factor by taking the factor with the least weighted average score as a base with a value = 100. The result is termed "relative merit" and used in Table 7.2 for inter-comparison of the borrowing factors being identified.

In the case of the 12 determinants of borrowing strategy, these are re-grouped according to whether the underlying objective or motive has a bearing on the risk position of the lender or not. The results are shown in Table 7.2 below:

The study results provide the empirical evidence to confirm that the borrowing strategy is dominated (58%) by considerations of internal financial factors which do not impact on the risk position of the lender. The achievement of these objectives are acceptable to the lender, because they do not involve taking additional risk, while there is generally above average earning margins to compensate for the complexity and management of the debt structure that might be required to satisfy the sponsor.

As was discussed earlier "Financial Stability", "Borrowing Limitations" and "Borrowing Capacity" advantages are inter-related factors and internal to the borrower. Financial stability is improved because of the flexibility in repayment which is generally tied to the cash flow of the project. The need to enhance borrowing capacity is contingent on removing borrowing limitations.
<table>
<thead>
<tr>
<th>BORROWING STRATEGIES</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RELATIVE WEIGHT</td>
</tr>
<tr>
<td><strong>1. DO NOT INVOLVE Risk sharing by the lender</strong></td>
<td></td>
</tr>
<tr>
<td>1.1 Yield on Equity</td>
<td>10.4%</td>
</tr>
<tr>
<td>1.2 Financial Stability</td>
<td>10.1%</td>
</tr>
<tr>
<td>1.3 Overcoming Borrowing Limitations</td>
<td>9.5%</td>
</tr>
<tr>
<td>1.4 Enhancing Borrowing Capacity</td>
<td>8.2%</td>
</tr>
<tr>
<td>1.5 Financing Costs</td>
<td>7.2%</td>
</tr>
<tr>
<td>1.6 Fiscal Benefits</td>
<td>6.9%</td>
</tr>
<tr>
<td>1.7 Accounting Considerations</td>
<td>5.5%</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>57.8%</strong></td>
</tr>
<tr>
<td><strong>2. INVOLVE significant Risk sharing by the Lender</strong></td>
<td></td>
</tr>
<tr>
<td>2.1 Investment Risk</td>
<td>11.6%</td>
</tr>
<tr>
<td>2.2 Market Risks</td>
<td>9.8%</td>
</tr>
<tr>
<td>2.3 Political Risks</td>
<td>8.3%</td>
</tr>
<tr>
<td>2.4 Completion Risks</td>
<td>6.5%</td>
</tr>
<tr>
<td>2.5 Force Majeure Risks</td>
<td>6.0%</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>42.2%</strong></td>
</tr>
</tbody>
</table>
The field survey results and the case studies confirm that the PF borrowing strategy is largely motivated by the desire to maximise the yield on equity investment. This motivation is ranked the second most important factor after the desire to mitigate investment risk by the survey respondents as shown in Table 7.2. A PF structure is considered the vehicle of achieving a high return on equity investment without impacting on the financial gearing of the sponsoring parent firms.

The evidence of the case studies confirmed this and showed that a great deal of the investment by the MNCs was in the form of non-cash capital while the debt finance was largely on non-recourse or limited recourse basis. Where the MNCs had to accept a limited obligation by way of providing performance guarantees these were invariably provided by way of normal business obligations of the local subsidiary companies of the MNCs. This ensured that none of the direct debt obligations of the project were consolidated by the parent company. Consequently, the parent company was able to (a) conserve its debt capacity, and (b) improve its borrowing capacity to finance its international investments.

The importance of other factors in the borrowing strategy, such as financing costs, fiscal benefits and accounting presentations, were recognised determinants but were considered significantly less important than the issues of borrowing limitations and borrowing capacity.

The study results were stratified in Table 7.2 into internal and external factors in order to distinguish the PF-specific advantages in terms of their risk sharing implications. Five external factors were isolated into a group which involves some risk sharing by the lender (Table 7.2). The study results confirm that "Investment Risk" is the most dominant factor in the borrowing strategy, followed by "Market Risk" and "Political Risk". This is consistent with the desk research findings (Chapter 3) where the scale of investment risk was found to be the dominant feature of petroleum investment and with the case studies (Chapters 4 & 5) where the investment risk found to involve a complex process of risk transfer among participants.

With regard to these risk factors the position of the lender is sensitive and requires innovational PF structures to avoid excessive risk taking. The risk bearing capacity of the
lender will be analysed and tested in the next Section. However, the evidence of the case studies and the study concepts have so far shown that risk diversification involves third party interests, through contractual and other undertakings, which results in risk reduction to both the borrower and the lender.

Third party contractual undertakings tend to provide the necessary risk sharing sought by the borrower and the lender. As discussed in the previous Chapter, these undertakings result in diversifying away some of the major risks and thus improve the credit rating of the borrower through the project entity. The source of these undertakings include construction engineering companies, suppliers of feedstock, marketing services companies, the host government as well as insurance companies and other financial institutions.

These companies are willing to share project risks and provide the necessary credit support, because the project represents a commercially necessary asset to their business while the services provided involve no real incremental investment of capital. This was confirmed by the study cases in Chapters 4 and 5 where the support of the major MNCs was analysed.

7.4 **DETERMINANTS OF LENDING STRATEGY**

(a) **The Conceptual Explanation**

The lender has a choice of two alternative investment strategies:

1. Restrict its lending to conventional loans whereby the security comprises the direct financial guarantees of the sponsor; or

2. Extend its business to innovational structures of project finance which put less emphasis on direct financial guarantees.

The first strategy will permit the lending bank to invest on the basis that it only indirectly and passively participate in the investment decisions. In this case, the lender assumes a passive financing strategy. Its main concern is with the overall credit of the borrowing company and there will be no real need to develop internal capability or experience to consider and analyse complex projects. In this case, the lender is necessarily
concerned with the quality of external (non-project) security for the protection of the loan investment. The project is purely client's risk and the business is "client driven".

If the industrial risks assumed by the lender are fairly priced and distributed by the market then the lender will earn an average margin as dictated by the market. The servicing of the debt is not linked to the performance of the project which uses the loan proceeds, and the lender has no control over how the investment should be used. Most of the experts interviewed by the study asserted that the lack of control or direct involvement renders conventional loans for major projects more risky than PF loans. This suggests that financing a major project on corporate or sovereign lending terms embeds elements of distortion in the financial capital market since the lender will not have full information on the investment situation and no effective form of direct control.

The second lending strategy tends to remove the constraints as outlined above. The lender is concerned about how the loan investment will be used, the viability of the investment and all its related risks as was explained in the previous Chapter. Accordingly, it will undertake a detailed study of project risks and decide whether these risks are acceptable or not. If the risks are not acceptable then the appropriate security devices will be put in place to protect the project entity and the lender. Given that most risks are not fairly priced or distributed by the market, the lender will be able to achieve an above average margin on its loan investment compared to conventional lending and also reduce its risk. In addition, the lender will be in a position to earn fees and commissions for the extra work being performed to assist the sponsor achieving its borrowing objectives.

(b) **The Field Evidence**

The above conceptual explanation of the lender's strategy assumes that the main motive of lenders in undertaking PF business is their ability to control risk of the borrowing industry, and at the same time earn above average return on the loan. To test this assertion the study analysed the lending strategy in terms of sources of project risks. A list of 18 risk factors were tested by the major lending banks which were asked to rate them in terms of their risk acceptability. This was included in the survey questionnaire (Appendix 2.2) as question number 10.
The rating involved deciding whether a risk factor is "Readily Acceptable", "Negotiable" or "Least Acceptable" to the respondent's organisation as a project lender. A "Readily Acceptable Risk" was defined in the questionnaire as one which will not require a specific provision in the loan agreement. That is, its acceptance by the lending bank is based purely on analytical results and assessment of financial and technical data. A "Negotiable Risk" was one which will be acceptable to the lender if the reward is adequate and related safety criteria are included in the loan agreement. On the other hand, a "Least Acceptable Risk" was defined as one which must be transferred to other more qualified party. The results of these tests are given in Table 7.3 on the following page.

These results represent estimates of lenders' risk-bearing capacity. They confirm that lending banks share certain risk either readily in the normal course of lending business or through negotiation and design of the PF security structures. The main risks which banks would readily accept on the basis of a satisfactory credit judgement are ranked in Table 7.4.

These results are consistent with the conceptual and empirical analysis of the previous Chapter which was based on the evidence of the case studies and results of the direct interviews. These showed that lending banks can share certain risks which they can diversify away through their organisational portfolio while their risk-bearing capacity with regard to project-specific risks is limited and require the protection of specific security.

The test results relating to those risks which are negotiable show that there are wider opportunities for bank participation in industrial development of LDC projects. Provided that the lender can arrange the appropriate security structure and agree adequate reward, the profile of risk-bearing capacity seems relatively elastic. That is, project lenders have a valuable role to play in the management of those risks which the lender can diversify away through its own portfolio management or through attachment to a qualified third party.

However, most responding banks expressly judged project-specific risks to be inappropriate for acceptance by the lender. The top five of unacceptable risks included "Project Completion" (91%), "Reliability of Technology" (91%), "Quality of Output" (86%), "Uncertainty of Contractual Commitments" (82%), and "Sizing of Reserve Estimates" (64%). With respect to these factors, the risk-bearing capacity of the lender is
found to be very inelastic. The ranking of unacceptable risks is given in Table 7.5 for the 18 factors which have been tested by the study.

The basis for rejecting these risks is the constraints of lenders' capital structures (which is based on a very narrow equity base) to absorb such risk, and the qualification of other participants to undertake them. These participants include the construction and producing companies, the marketers and buyers of the output, insurance institutions and the host government as was outlined above.
### Table 7.3
**Assessment of Lending Strategy**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Readily Acceptable</th>
<th>Negotiable</th>
<th>Least Acceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Reserve Size</td>
<td>0%</td>
<td>36%</td>
<td>64%</td>
</tr>
<tr>
<td>2. Producing Difficulties</td>
<td>0%</td>
<td>41%</td>
<td>59%</td>
</tr>
<tr>
<td>3. Production Start-up</td>
<td>4%</td>
<td>55%</td>
<td>41%</td>
</tr>
<tr>
<td>4. Working Capital Deferred</td>
<td>4%</td>
<td>73%</td>
<td>23%</td>
</tr>
<tr>
<td>5. Operating Costs Rise</td>
<td>0%</td>
<td>82%</td>
<td>14%</td>
</tr>
<tr>
<td>6. Contractual Commitments</td>
<td>0%</td>
<td>18%</td>
<td>82%</td>
</tr>
<tr>
<td>7. Currency Exchange</td>
<td>45%</td>
<td>55%</td>
<td>0%</td>
</tr>
<tr>
<td>8. Inflation</td>
<td>51%</td>
<td>45%</td>
<td>4%</td>
</tr>
<tr>
<td>9. Interest Rates</td>
<td>45%</td>
<td>55%</td>
<td>0%</td>
</tr>
<tr>
<td>10. Cost overrun</td>
<td>0%</td>
<td>77%</td>
<td>23%</td>
</tr>
<tr>
<td>11. Project Completion</td>
<td>0%</td>
<td>9%</td>
<td>91%</td>
</tr>
<tr>
<td>12. Quality of Output</td>
<td>0%</td>
<td>14%</td>
<td>86%</td>
</tr>
<tr>
<td>13. Market Demand/Prices</td>
<td>14%</td>
<td>68%</td>
<td>18%</td>
</tr>
<tr>
<td>14. Debt-to-Equity increase</td>
<td>14%</td>
<td>82%</td>
<td>4%</td>
</tr>
<tr>
<td>15. Reliability of Technology</td>
<td>0%</td>
<td>9%</td>
<td>91%</td>
</tr>
<tr>
<td>16. Repayment Profile</td>
<td>9%</td>
<td>77%</td>
<td>14%</td>
</tr>
<tr>
<td>17. Political Environment</td>
<td>14%</td>
<td>27%</td>
<td>59%</td>
</tr>
<tr>
<td>18. Force Majeure Events</td>
<td>18%</td>
<td>36%</td>
<td>46%</td>
</tr>
<tr>
<td>RISK FACTOR</td>
<td>BANKS SAID WOULD READILY ACCEPT THE SPECIFIED RISK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Inflation</td>
<td>51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Currency Exchange</td>
<td>45%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Interest Rates</td>
<td>45%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Force Majeure Events</td>
<td>18%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Debt to Equity Ratio</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Market Demand/Prices</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Political Environment</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Repayment Profile</td>
<td>9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Working Capital Def.</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Production Start-up</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Contractual Commitments</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Operating Costs Rise</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Cost Overrun</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Project Completion</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Quality of Output</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Reliability of Technology</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Reserve Size</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Producing Difficulties</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROJECT COMPLETION</td>
<td>BANKS SAID WOULD LEAST ACCEPT THE SPECIFIED RISK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Project Completion</td>
<td>91%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Reliability of Technology</td>
<td>91%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Uncertainty about quality of Output</td>
<td>86%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Uncertainty of Contractual Commitments</td>
<td>82%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Uncertainty of Reserve Size or adequacy</td>
<td>64%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Producing Difficulties</td>
<td>59%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Adverse Changes in Political Environment</td>
<td>59%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Force Majeure Events</td>
<td>46%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Possible Delay in Production Start-up</td>
<td>41%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Working Capital Deficiency</td>
<td>23%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Cost Overrun</td>
<td>23%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Market Demand/Price Deterioration</td>
<td>18%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Lengthening in Repayment Profile</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Operating Costs Rise</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Increase in Debt-to-Equity Ratio</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Rise in Inflation Rates</td>
<td>4%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Currency Exchange Variations</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Interest Rates Variations</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.5 **DETERMINANTS OF HOST LDC STRATEGY**

(a) **The Conceptual Explanation:**

One by-product of the involvement of the multinational companies in LDC joint ventures is the emergence of a new type of national oil company. These national companies began to negotiate on behalf of their government and often assumed a majority shareholding position and responsibility for management of joint venture projects.

The research interviews, desk research and the study cases identified four major factors which caused these new companies to prefer PF structures to conventional borrowing:

1. The preference of the MNCs, the minority partners, whose principal investment is largely in non-cash capital. These MNCs insist on financing their share of the development costs by the use of a financing facility which provides minimum recourse to them.

2. The competitive national demands for development fund by domestic projects in the infrastructure, welfare, social and defence sectors. These domestic projects reduced the availability of investable funds for international projects which aim to develop export capacities. The fall in oil revenue and the persistence of economic recessions have only accentuated these competitive pressures.

3. The sheer size and complexity of the new LDC projects being undertaken in order to develop export capacities presented disproportionate risk which cannot be covered by conventional guarantees. These projects are typically too large to be financed by the state alone and require considerable international co-ordination of marketing efforts.

4. The deterioration of the sovereign LDC credit rating in relation to capital- and technology-intensive projects which rely on export markets. The performance of these new projects require a new financing approach which the host LDC company is less equipped than the MNC to perform.
The study investigations show that the tendency of increasing number of LDC host
governments to support the strategy of PF borrowing is closely related to the need to
overcome these problems. The immediate effect of the host country adopting a PF strategy
is the preservation of its sovereign and other conventional borrowing capacities for the
development of domestic projects. This is being reflected in enhanced borrowing capacity
to finance the country's development plan and in particular the export sector of the
economy.

(b) The Field Evidence

In order to develop the empirical evidence relating to these issues and to test the
research hypothesis-4, the study attempted to analyse and test the determinants of host
country strategy from a number of credit perspectives. The aim of the study was to assess
how the flow of credit transfer among participants affect the host country and to identify
the PF-specific advantages secured by the host country. The study method was to analyse
the credit support from the following perspectives:

1. The Credit of the Sponsor.
2. The Security in the Project.
3. The Location advantage
4. Institutional Factors.
6. Legal entity of the Borrowing Project.

(1) Sponsor Credit Support:

The lending banks were requested to rank the importance of the sponsor support
when lending to a major international project which aims to exploit a natural resource in a
developing country. Six types of sponsor support were presented to the lending banks,
namely:

1.1 The credit of a state-owned company as a joint venture partner.
1.2 The credit of the host country's government as an equity participant.
1.3 Financial guarantee from the host government.
1.4 Supply and sales agreements with multinational companies.
1.5 Completion undertaking by a multinational sponsor
1.6 Partnership of a multinational company (no guarantees).

The aim of the test was to develop evidence of credit transfer and to measure the extent of such transfer. The test results are illustrated in Table 7.6.

The results show that most lenders (91%) prefer to rely on the supply and sales agreements of the MNCs and on their completion guarantees (77%) rather than on the direct credit of a host LDC government (41%). The overall merit is used to rank the relative importance of each factor. This is estimated by applying the study weights as explained in Section 7.3 above. The overall merit shows that the credit support of the MNCs to the project is relatively more important in the credit assessment of the project than the financial guarantee of an LDC host government. The credit support which relates to the MNCs is twice as important as that which relates to the host LDC country and its national company.

This evidence clearly confirms that the flow of credit support is from the MNCs to the LDCs. It also confirms that in the context of financing major projects and risk assessment, the credit of the MNCs is a more important factor than the ownership of a natural resource. This closely relates to the critical role of technology, marketing and management services which are provided by the MNCs in the credit assessment of borrowing projects.
<table>
<thead>
<tr>
<th>RANK OF THE CREDIT SUPPORT</th>
<th>RELATIVE CRITERIA</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VERY</td>
<td>FAIRLY</td>
</tr>
<tr>
<td>1. Supply and sales agreements with MNCs</td>
<td>389</td>
<td>91%</td>
</tr>
<tr>
<td>2. Completion undertaking with MNC Sponsor</td>
<td>222</td>
<td>77%</td>
</tr>
<tr>
<td>3. Financial Guarantee of host LDC government</td>
<td>144</td>
<td>41%</td>
</tr>
<tr>
<td>4. State owned company as Joint Venture Partner</td>
<td>133</td>
<td>23%</td>
</tr>
<tr>
<td>5. Partnership of a MNC offering NO guarantees</td>
<td>122</td>
<td>27%</td>
</tr>
<tr>
<td>6. Host LDC government as equity partner</td>
<td>100</td>
<td>23%</td>
</tr>
</tbody>
</table>

(2) Project-Specific Security Value:

The next set of determinants which have been tested by the study relates to the project-specific factors which represent the inherent security value of the project. As most literature definitions of project finance (discussed in Chapter 6) have suggested the primary security of the loan relates to the cash flow of the project and the collateral value of its assets, the study test should help to provide the empirical evidence needed to substantiate
definitional criteria. The test will also confirm the security value of LDC projects when arranging finance.

For this purpose, the study analysed security in the project in terms of five project-specific advantages. These were then tested through the survey questionnaire and the results are as per Table 7.7 below:

**Table 7.7**

*Assessment of Project-Specific Advantages*

<table>
<thead>
<tr>
<th>TYPE OF PROJECT</th>
<th>RELATIVE CRITERIA</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VERY</td>
<td>FAIRLY</td>
</tr>
<tr>
<td>1. Repayments tied to export earnings</td>
<td>800</td>
<td>73%</td>
</tr>
<tr>
<td>2. Lender's control over project's assets</td>
<td>650</td>
<td>55%</td>
</tr>
<tr>
<td>3. High return on total capital (debt+equity)</td>
<td>500</td>
<td>14%</td>
</tr>
<tr>
<td>4. High return on the loan investment.</td>
<td>450</td>
<td>14%</td>
</tr>
<tr>
<td>5. Repayment tied to counter trade.</td>
<td>100</td>
<td>0%</td>
</tr>
</tbody>
</table>

Of the responding banking groups, 73% confirmed that the most important security in project finance structures is the adequacy of the project's export earnings. This was followed by 55% who indicated that the ability of the lender to gain a measure of control over the assets is very important. The overall relative merit of these two factors dominate the decision process, representing 8.0 and 6.5 times the importance of income based on counter trading agreements.
The results also show that the overall viability of the project as measured by the return on total investment (equity + debt) is more important than the lender's earning as measured by the return on the loan investment. Counter-trade opportunities are not considered good security relative to direct export earnings which arise from free market trading.

These results seem to discount the argument, which sometimes appear in the popular journals, that the strategy of lending banks involves taking entrepreneurial risk in order to maximise their return on the loan investment. The study results suggests that if such strategies exists then they are not typical of bank lending strategy.

The field survey results also confirm that major LDC projects which aim to develop export capacities have inherent security and are therefore more suitable candidates for project finance than other projects which rely on political considerations such as bilateral trading agreements. The opportunities to export real resources which have substantiated markets represent the primary basis for developing joint ventures and for securing the advantage of credit transfer.

(3) **Location-Specific Factors:**

Four items relating to location strategy advantages were tested by the study. The results are given in Table 7.8 on the following page.
TABLE 7.8
ASSESSMENT OF LOCATION-SPECIFIC ADVANTAGES

<table>
<thead>
<tr>
<th>TYPE OF PROJECT</th>
<th>RELATIVE WEIGHT</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VERY</td>
</tr>
<tr>
<td>1. Host country risks.</td>
<td>900</td>
<td>96%</td>
</tr>
<tr>
<td>2. Availability of major feedstock resource</td>
<td>750</td>
<td>66%</td>
</tr>
<tr>
<td>3. Adequacy of infrastructure</td>
<td>675</td>
<td>39%</td>
</tr>
<tr>
<td>4. Prospect of future lending in the country.</td>
<td>100</td>
<td>0%</td>
</tr>
</tbody>
</table>

These results are ranked in terms of their relative merits or importance as assessed by the 23 lending banking groups which responded to the study questionnaire. Of the respondents, 96% considered the control of host country risks as a very important factor when designing a PF structure for a major LDC project. The availability of major feedstock resource was second in importance followed by the adequacy of the infrastructure. The prospect of seeking future lending business in the country is not considered important, and this again suggests that prudent lenders are not motivated by a desire to expand or grow without ensuring that the appropriate security is in place.

These results confirm that lenders and the international participants seek PF primarily to overcome the threat of host country risk which cannot ordinarily be treated by conventional loan structures. Without the facility to overcome the threat of country risks the host LDC will be unable to successfully develop its export capacities. Access to adequate feedstock resource and the quality of the infrastructure thus represent important ingredients of a PF structure but their exploitation is contingent on solving the threat of host country risks to lenders. This result is consistent with the evidence of the study cases.
The basis for financing major projects in resource-endowed developing countries is therefore largely determined by its location-specific advantages. These include the free exchange of real resources for substantial credit support in order to overcome host country and organisational risks. The basis of this support is the phenomenon of risk transference which has been shown to involve industrial and financial considerations.

(4) Institutional Factors:

Four institutional factors were tested by the study and the results are illustrated in Table 7.9 as follows:

<table>
<thead>
<tr>
<th>TYPE OF INSTITUTIONAL SUPPORT</th>
<th>RELATIVE MERIT</th>
<th>IMPORTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>VERY</td>
</tr>
<tr>
<td>1. Syndication with major commercial banks</td>
<td>389</td>
<td>83%</td>
</tr>
<tr>
<td>2. Availability of Export Credit Insurance</td>
<td>344</td>
<td>69%</td>
</tr>
<tr>
<td>3. IFC and World Bank Co-financing</td>
<td>278</td>
<td>41%</td>
</tr>
<tr>
<td>4. Participation of</td>
<td>100</td>
<td>4%</td>
</tr>
</tbody>
</table>

The participation of major private commercial banks was considered very important by 83% of the responding banking groups while 69% also thought export credit was very important. The participation of the IFC and the World Bank was considered less important than the services of the export credit agencies.

These results are consistent with the findings of the study cases and the field interviews. Acceptability of the project to the major commercial banks and the export
credit agencies permits a wider spread of risk, hence reducing the political risk in default situations.

Some executives during the field interviews asserted that the major international institutions have a longer-term and more intricate relationship with host LDC country than the industrial MNCs. The host country therefore would be under substantial pressure to honour its commitments to the project entity. Hence, the inclusion of institutional support not only improves the credit rating of the host country but also provides a source of comfort for the MNCs which otherwise would not participate in LDC projects. In the study case of Sudan it was seen that the participation of the World Bank and other financial institutions resulted in a major petroleum project being financeable in spite of the country's very poor credit rating.

However, the participation of the World Bank is typically restricted to LDC projects located in poor countries such as Sudan as was analysed in Chapter 5. Mid-income and rich LDCs do not qualify for World Bank participation (Chapter 4) and hence this type of linkage is not important in their credit assessment.

The role of the local national and regional banks was not considered important as these banks seem to follow in the step of the major commercials' or the IFC's guides. Most of the major banking groups which have been interviewed thought the role of the local LDC banks is largely "financial" rather than "innovational". This suggests a considerable technology transfer in the banking industry is being effected through participation of LDC banks in project finance.

These results confirm that PF structures which involve the support of major private commercial and official lending and insurance institutions tend to enhance the borrowing capacity of the host LDC government. The impact of such participation is reflected in increased investment as was evidenced by the study cases in Chapters 4 and 5.

(5) Type of Lender's Recourse:

The study attempted to assess the motives of LDC host governments when supporting a PF strategy by testing the advantage of PF structures in terms of its impact on credit rating of the sponsor. In this context, the study attempted to test the comparative
riskiness of conventional and PF methods of borrowing by LDCs and the MNCs and relate this to the type of recourse available to the lender. Question number 6 in the survey questionnaire (Appendix 2.2) gives the actual question which was put to the test. The results are summarised in Table 7.10 as follows:

**TABLE 7.10**

**COMPARATIVE RISK ASSESSMENT OF LOAN STRUCTURES**

<table>
<thead>
<tr>
<th>Ranking of Loan Structure/Recourse</th>
<th>Comparative Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Much Less Risky</td>
</tr>
<tr>
<td>1. Limited recourse PF for MNCs</td>
<td>59%</td>
</tr>
<tr>
<td>2. Direct loans to MNCs</td>
<td>50%</td>
</tr>
<tr>
<td>3. Asset-based lending</td>
<td>18%</td>
</tr>
<tr>
<td>including financial lease.</td>
<td></td>
</tr>
<tr>
<td>4. Sovereign loan to resource-rich LDCs.</td>
<td>9%</td>
</tr>
<tr>
<td>5. Direct loans to large national LDC companies.</td>
<td>4%</td>
</tr>
<tr>
<td>6. Non-recourse project</td>
<td>0%</td>
</tr>
</tbody>
</table>

These results show that most of the lending groups (59%) which responded to the questionnaire consider limited recourse PF to the MNCs is least risky. Limited recourse PF is also less risky than direct loans which rely on the financial guarantee of the MNCs. This confirms the conceptual study explanation and the findings of the case studies that the investment risks in major PF arrangements tend to exceed the risk-bearing capacity of the
individual sponsors. It also confirms that PF structures improves the risk-return characteristics of LDC projects.

Asset-based lending, such as financial leasing, ranked third in terms of riskiness while other conventional loans which rely on the financial guarantee of the state or a state-owned organisation were considered much more risky and therefore less desirable. Of the responding banking groups, 73% considered pure non-recourse finance to the MNCs to be of average risk compared with 59% for sovereign guaranteed loans and only 18% for corporate guaranteed loans to the state-owned national companies. None of the respondents considered that direct lending to the MNCs involved above average lending risk compared with 82% who considered that it did when lending directly to large state-owned national LDC companies (without external support).

These results confirm that the host LDCs (and their national organisations) tend to enhance their borrowing capacity considerably through PF structures which incorporate the credit of the MNCs. They also confirm that conventional methods of borrowing, which rely on financial guarantees of the state or its national organisation, are inadequate when financing major projects involving development of export capacities.

(6) Legal Structure:

As the strategy of lending on the credit of a major project involves the physical and legal separation of the project from its principal sponsors, the study attempted to test the importance of this separate legal entity in terms of its linkage with the sponsor. The study hypothesis-1 relating to definitional criteria and its conceptual explanation (Chapter 6) suggested that the sponsor linkage to the project was a very important consideration in PF structures and involved the phenomenon of credit transfer. The fourth major hypothesis relating to host country strategy similarly re-introduced the concept of sponsor linkage as a basis for credit transfer to the host country. If this was not the case then we should expect the credit rating of the project entity to be insensitive to the type of linkage, other things being equal.

To test this assertion the study requested the banking groups which responded to the field questionnaire to assess the credit-worthiness of four borrowing projects, each having
different type of linkage with the sponsor. The results are summarised in Table 7.11 as follows:

**TABLE 7.11**

**ASSESSMENT OF PROJECT CREDIT-WORTHINESS**

<table>
<thead>
<tr>
<th>RANKING OF PROJECT STRUCTURES</th>
<th>RELATIVE MERIT</th>
<th>CREDIT WORTHINESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VERY HIGH QUALITY</td>
<td>AVERAGE</td>
</tr>
<tr>
<td>1. A new industrial project company wholly owned by a MNC operating within the same industry</td>
<td>287</td>
<td>57%</td>
</tr>
<tr>
<td>2. A new captive financial company wholly owned by an industrial MNC</td>
<td>252</td>
<td>43%</td>
</tr>
<tr>
<td>3. A new major LDC joint venture sponsored by one or more MNCs.</td>
<td>173</td>
<td>13%</td>
</tr>
<tr>
<td>4. A new major LDC project wholly owned by the state or a state-owned company.</td>
<td>100</td>
<td>9%</td>
</tr>
</tbody>
</table>

The above study results confirm that lenders prefer to lend to projects which are sponsored primarily by the MNCs. Of the responding banks, 57% considered the credit-worthiness of industrial projects which are owned and sponsored by industrial MNCs
are very high. Another 43% considered captive financial companies which are owned and sponsored by the MNCs have similarly high rating.

On the other hand, projects which are wholly owned by the state or a state-owned organisation are considered the least acceptable risk. The sponsorship of a MNC is three times more desirable than the sponsorship of an LDC government if the project is of industrial type and 2.5 times more desirable if it is a financial vehicle company. None of the respondents rejected the risk of MNCs while 52% did so if the LDC project was not supported by the MNCs. This rejection rate would be reduced to 9% if the project is supported by one or more of the MNCs. The inclusion of MNC in project sponsorship substantially improves the credit rating of LDC projects.

7.6 CONCLUSION

This Chapter tested three inter-related hypotheses about the determinants of Project Finance strategy from the perspectives of the borrower, the lender and the host country. In each case, the preference for project finance was found to relate to PF-specific strategic advantages. Some of the major advantages of PF to the borrower included considerations which do not have a significant risk bearing on the lender. Others included advantages of overt risk sharing with third party interests as well as with lenders through the PF risk and security structure. The PF structure also provided the borrower with the benefit of enhanced borrowing capacity and financial stability as predicted by hypothesis-2. This benefit was found to be a major borrowing motivation when arranging a high volume loan transaction without the usual impact on gearing.

The main advantage to the lender was found in the form of risk control that is consistent with its risk-bearing capacity and narrow equity base as was asserted in hypothesis-3. The PF participation also provides opportunities for higher margins and fees for banking services relating to the borrowers internal and financial objectives. Other income-related motives include possibilities for certain negotiated risk sharing within acceptable security arrangement.

The prediction of hypothesis-4 was also supported as the advantage to the host LDC was found to be mainly in the form of credit transfer in exchange for assured access to the
real resources of the developing country. This type of mutual advantage was shown to relate to the type of sponsor linkage as well as to project-specific and location-specific advantages of the investment. This linkage was found to provide a major motivation or influence in choosing a PF strategy as the borrowing capacity of LDCs is limited due to their lack of appropriate technology and marketing capability. These factors were assessed to be the key considerations in the PF credit rating of a project.

The overall evidence has shown that Project Finance is additive investment which has its own additionality function and permits the placing of bank loans in essentially equity situation. This function is facilitated through PF structures which while helping the borrower and the host country to preserve their debt capacity gives the lender the required security for the loan without the reliance on direct financial guarantees.
Chapter 8

THE THEORY OF PF BANKING

8.1 INTRODUCTION

The investigations and analyses of the previous Chapters have furnished the empirical bases for a PF theory. The concept of the segregated entity of the project, the concept of sponsor linkage, the concept of strategic advantage and the concept of credit transfer are the essence of this theory and were discussed in detail. In this Chapter the study task is to investigate the sixth and last of the research questions (developed in Chapter 1) which relates to the theoretical foundation for the linkage between the project and its sponsor; namely:

• What are the conceptual or theoretical justifications for lending on the credit of a new project, and to what extent is a bankable project entity a substitute for the credit risk of its sponsor?

This research question will be assessed by placing it within the context of the PF theory and resolving the issues raised by the study's fifth research hypothesis.

8.2 THE STUDY HYPOTHESIS-5:

The basis of the research hypothesis-5 is that the practice of PF banking has its own functional criteria and mechanism of responding to strategic motivations and that these can be traced and validated by reference to established investment and financial concepts and risk theories. The research fifth major hypothesis may therefore be stated as follows:

Hypothesis-5:

"The essence of the theory of project finance relates to two strategic intermediation functions provided by the separated project entity, namely: credit transference and risk transformation. These two functions explain why the phenomenon of project finance results in the loan obligation and debt risk to the prime borrower being significantly less than the loan security and credit risk to
the lender. They also facilitate a valid basis for credit risk assessment by reference to established financial theories and concepts of finance and risk management. Credit transference is the phenomenon of capitalising on the credit of the stronger parties which partake in a community of interest. On the other hand, risk transformation is a function of the financial structure; it is achieved when lenders can rely on the credit of a new major project as a substitute for the credit of its sponsors. If the basic concepts of PF banking are defined it will be possible to relate these to proven theories of finance and risk management. This in turn will permit the definition of project finance in terms of an eclectic theory.

8.3 THE DEVELOPMENT OF PF THEORY

There is no formal theory of Project Finance lending in the literature. However, the basis of a PF lending theory can be traced to the experience of early British banking which was sometimes referred to as "the real-bills concept" (Graddy, 1985). The U.S. version of this concept was a modification known as the "commercial loan theory". This theory focuses on the need of commercial banks to maintain liquidity through avoiding taking loan assets that may result in the risk of mismatching assets with liabilities.

According to this theory, it was not considered sensible to commit depositors' funds to long term loans which could not be repaid quickly. This concept was justifiable because financial intermediation generally entailed both a substantial interest rate risk and a substantial funding risk for banks which did not observe a perfect matching of their assets and liabilities.

Accordingly, bank lending was not a very important source of funding to the petroleum industry (White, 1979) because it was essentially of a short-term nature. The concept of bank finance was rooted in the assumption that at any given time the aggregate amounts of outstanding loans should not exceed a level which reduces the ability of the bank to meet the demand of depositing customers for repayment of their funds. This follows, because commitment to borrowers involves liquidity risk. This is the risk that the lending bank will be called upon to provide funds at a time when it cannot easily do so, either because it cannot fund itself at market rates or because of the general conditions in the interbank market (B.I.S., 1986).
The method of maintaining the statistical improbability of a run on the bank and the ability of the bank to mitigate such a remote risk involved a prudential restriction of lending to short-term loans and only to credit-worthy industrial and commercial customers. This lending philosophy assumed that the financing of long-term capital investment should come from permanent sources such as retained earnings, new equity issues, and long-term debts; none of these was considered appropriate for the commercial banks.

The concept of maturity lengthening, however, developed as a result of the banks' experience in secured lending for property development. This concept derived its strength and validity from the "mortgage theory" which is often described as "asset-based theory".

This theory predicts the liquidity position of the lender if the borrower defaults in its repayment on the loan. According to this theory, the bank should consider lending only a proportion of the marketable value of the collateral that could be presented by the borrower (Merkey, 1979; Logan & Dorgan, 1984). Hence, if defaults in repayment result in threatening the position of the bank the collateral could be sold or auctioned to recover the loan with adequate margin for safety.

The theory of financial leasing is a sub-set of the theory of asset-based financing. Its popularity has grown rapidly due to it being off-balance sheet and without recourse to the borrower. Wynant (1977), for example, regarded financial leasing as indistinguishable from project finance, because both result in off-balance sheet debt obligation to the parents of the project company. Availability of tax benefits under a financial lease arrangement also made this form of debt more attractive than conventional corporate borrowing (Nevitt, 1989). However, the application of financial leasing remained rather limited being concerned primarily with the collateral value of specific plant and equipment rather than the needs of the whole project as a going concern.

The first significant innovation on the theory of asset-based lending came with the development of secondary financial markets for secured loan assets. In 1918 the "Shiftability Theory" was developed by Moulton (1918) which showed that the development of a secondary market for marketable loan assets substantially mitigates the problem of mismatching bank assets and liabilities. Accordingly, banks can increase average profitability by making longer term advances while reducing short-term risks.
The prediction of the shiftability theory is that lending banks will be able to mitigate liquidity risk by the timely sale of the loan assets in the money market. Stigum & Branch (1983) define the term "liquidity" as the "ability of the bank to ensure the availability of funds to meet commitments at a reasonable price and at all times". Liquidity risk arises when the bank is called upon to provide funds at a time when it cannot do so. Hence the liquidity risk associated with a longer term loan is reduced when a secondary market exists in which the loan can be sold.

A study by the Bank for International Settlement (1986) shows that the sale of participations in major loans have been greatly assisted by a new technique of incorporating "assignment" or "novation" clauses in loan agreements. The technique of "assignment" is based on the creation of transferable loan instruments whereas "novation" involves the replacement of one obligation and the creation of an entirely new one. These techniques thus further assisted the development of a secondary financial market for long-term loans.

In practice, it is also possible to control or limit the risks of maturity mismatching by discounting a proportion of the loan portfolio and hence shifting the potential problem of liquidity to the secondary financial markets. One implication of the shiftability theory is that a given proportion of the loan transactions can be assumed to be pre-sold or sold down after the transactions have been closed (Stigum & Branch, 1983; Bray, 1984).

One major factor in the popularity of project finance has been the use of inter-locking and complementary guarantees of credit-worthy sponsors in relation to the financing of major joint venture project companies. Qualified parties for direct or indirect guarantees include corporate owners, host government, and third parties such as suppliers, sellers, users, contractors, and government agencies.

The combination of guarantees and undertakings by several parties with vested interests in the project enhances the value of the security in the project and thus permits high debt-to-equity structure with minimum recourse to the promoters. Nevitt (1989) explains how the effect of combined guarantees results in reducing the direct debt obligation of the prime borrowers when financing a joint venture project company:

"The objective of many project financings is to so combine and amalgamate various kinds of guarantees and
undertakings from various interested parties that the financial burden or risk of any one party will not be onerous, but the combined guarantees and undertakings of all the parties will be a bankable credit."

This suggests that project finance results in spreading the debt obligation among several parties which are prepared to support the project through providing a form of guarantee. The availability of guarantees has enabled the lender to shift part of its focus from the value of traditional collateral in the assets of the project or the balance sheet strength of one borrower to the value of combined undertakings of multiple sponsors. This explains a major innovational feature of PF theory which permits individual prime borrowers in many instances to keep a PF debt liability off their balance sheet and outside their existing loan restrictions.

Another important contribution to the theory of project finance lending is the breaking down of the traditional barriers between "money markets" and "capital markets". This brought about the global integration of financial markets which in turn reduced the risk of liquidity and maturity mismatching. In particular, syndicated term loans are now complemented by a number of hybrid financial products such as Revolving Underwriting Facilities (RUF's), Note Issuance Facilities (NIFs) and Transferable Loan Instruments (TLI's).

These are examples of revolving facilities which enable a borrower to issue a stream of short-term notes (such as Euro-notes) over a medium-term period on the collateral of long-term assets. In addition, banks have made increasing use of bonds and floating rate notes (FRNs) to securitize long-term credits. These instruments have been used to obtain term funds at variable rates of interest and thereby reducing both maturity mismatching and interest rate risk (Harrington, 1987). This type of securitization has resulted in a massive linkage between international bank credit and international securities markets (B.S.I., 1986). The immediate impact of this linkage is to make the money market and the capital market interdependent.

These markets and products meet the lender's need for more liquid assets by involving re-current sales of short-term commercial papers (in the case of a RUF issue) or converting future commitments into transferable instruments which can be sold in a secondary market.
One consequence of these developments is the emergence of project finance as a truly multi-market approach to the need of the industry. Financial innovations permit the conversion of term loans to tradeable securities without significantly impacting on the interest and obligations of the original borrower. The B.I.S. study (1986) provided the empirical evidence to show that the use of a revolving facility results in separating the functions performed by a single institution in a traditional syndicated credit and allows them to be performed by different institutions and markets. That is, the function of funding the borrower's requirements is transformed from one of lending money on medium and long-term commitments into one of setting up borrowing mechanism: the function of maturity transformation is turned into one of underwriting.

A further contribution to the modern theory of project finance may be traced to the "anticipated income theory of loan liquidity" which was developed by Prochnow (1949). According to this theory, sound loans should be accompanied by appropriate repayment schedules adapted to the anticipated income or cash flow of the borrower. This theory is consistent with the other theories in that sound loans secured on anticipated cash flow would qualify as marketable securities and thus if necessary could be discounted in the secondary financial markets in order to raise fresh capital.

The theory of modern project finance also draws on the growing banking experience with swaps which permit banks to re-arrange their portfolio risk in order to adapt to changing circumstances. The swaps are financial transactions in which two counter-parties agree to exchange streams of payments over time according to a predetermined rule. All bankers in the study's interviews have recognised swaps as important credit-market instruments which can provide a very useful hedging against interest rate and currency risks.

The effect of the above financial innovations is to facilitate an increase in marketability of the lender's assets to adapt to anticipated or actual liabilities. As Pecchioli (1987) explains, these financial innovations simply involve packaging and sale of loans or inclusion of transferability clauses in loan contracts. The result of these innovations is to enhance the "marketability of the underlying claims of the lending banks, thereby making the assets side of a bank's balance sheet more liquid and amenable to more dynamic management."
A prominent influence on the theory of modern project finance can also be traced to the increasing use of currency and interest rate options. The basis of option pricing model, as a risk hedging technique, was developed by Black and Scholes (1973) and Merton (1973). An option is a contract conveying the right, but not the obligation, to buy or sell (call or put option) a specified financial instrument at a fixed price before or at a certain future date. With respect to market risk, the buyer of an option has the possibility of unlimited profit if prices moves in his favour but his loss is limited to the amount of premium paid (option price) if price moves adversely. The empirical literature (Guisinger, 1983; B.S.I., 1986; Harrington, 1987) show that the development of the options market provide a useful facility to transfer away credit risk and the options market is extensively used by banks and the industry to mitigate risks (Van Horne, 1986; Fitzgerald, 1987).

These developments resulted in a structural change in the policy attitude toward longer maturity debts. The traditional practice of keeping loans until their maturity has become amenable to what bankers and lawyers described as "maturity stripping" (Bray, 1984). The primary focus of lenders has changed from maturity considerations to the credit quality of the borrower and hence to problems of risk control and management. These considerations represent the central themes of modern project finance theory as was explained in the previous chapters.

The developing trend toward a theory of project finance is further supported by the application of portfolio management theory. In essence, the portfolio theory is concerned with conceptualising the risks confronted by investors and with developing techniques for maximising returns on investments for each level of risk being undertaken. Investment in major projects is generally amenable to such theory. The portfolio theory permits lending banks to relate spill-over risks of project finance to their overall capacity and thus to cushion such risks or avoid them through discounting in the secondary financial markets or providing appropriate hedging.

All of the above financial innovations have important ramifications for PF lenders, not just in their balance sheets, but also in their sources of funding and their management strategies relating to the intermediation of international financial flows in support of major investments in less developed countries.
8.4 THE CONCEPT OF CREDIT TRANSFERENCE

The core of project finance lending theory, as was evidenced by the case studies, relates closely to the mechanism of establishing a safety net by relying on the support of a credit-worthy sponsor or sponsors. Thus, the credit assessment in project finance is based primarily on the prospective cash flow of the project and secondarily on the commitment of its sponsors. While the cash flow of the project forms the primary source of repayment of the loan the commitment of a credit-worthy sponsor to the project forms the primary security for the lender.

The process of incorporating the credit of the stronger members of the sponsor companies in the PF structure is the phenomenon of "transference of credit". In the context of LDC projects, this phenomenon permits a poorly rated prime borrower (a local corporation or a host government of a poor country) to borrow on the credit of its stronger partner such as an experienced and resourceful multinational company. The criteria and techniques used to identify risks and implement the appropriate mechanism of credit transfer may be grouped under three headings of risk hedging devices; namely:

1. Economic hedging, pertaining to analytical and financial test criteria of evaluation.
2. Mechanical hedging, pertaining to the method and mode of repayment of the loan (the trust devices).
3. Legal and contractual hedging, pertaining to the terms and conditions of the loan agreement and related documentations.

These methods are often used in combination as was evidenced from the case study of Sudan (Chapter 5). Each approach will now be examined in turn.

(a) Economic Hedging:

The concept of economic hedging embodies criteria of covering risk positions through analytical testing of project viability and its inherent safety margins. From a lender's perspective this has two components.
The first component assumes that the project evaluation has no artificial or contrived support in that there exists a proven market and economically natural place for the project so that sufficient cash flow will be generated to cover debt service obligations. Harrington (1983) shows that the bank's attempts to manage assets will come to nothing if their actual performance differs, on a significant scale, from anticipated performance. This means that the lender's concern relate directly to the quality of the estimates and to a structure of security criteria which ensures that these estimates will be forthcoming e.g. that sales agreement are in place and that the sponsor has proven competence in distribution and marketing.

The second component of project viability assumes that a balanced support structure can be put in place. This means that each interested party is contributing credit support (by accepting obligations toward the project) relative to its anticipated derived benefit. The function of this support is to inject the necessary discipline into the project by fostering a community of interest based on long-term advantage of association with the project. In this case, project owners will have no incentive to walk away from the project on account of debt repayments or any other obligation.

This qualification is necessary because potential risks in project developments typically arise from conflicts of interest of participants which nearly always generate credit problems (Merkey, 1978). One or more of the major participants (technical or marketing partner) may walk away from its original obligation or the joint venture agreements and the contracts will have to be substantially re-negotiated at some point in the life of the project, possibly with a negative impact on lender's security.

The theory of project finance thus involves the allocation of risks to appropriate parties in proportion to derived benefits as a hedging device against the risk of abandonment. For example, equity risk is allocated to equity participants, technical and operating risks to engineering contractors and credit risk to loan participants. Each party must therefore determine its own appropriate level of prudence for each element of risk exposure in relation to its own organisational and financial capacity to absorb such risks.

A related conceptual explanation of the risk position of borrowers and lenders is provided by the option pricing theory. Under this theory the interest in the project could
be viewed as a type of a call option on the underlying assets of the project (Weston & Copeland, 1988). If the project is largely financed by debt, owners have a call option which can be exercised on redemption of the loans. If the value of the project's assets is above the nominal value of the project debt, owners may effectively exercise their option by repaying project lenders thereby gaining the value of the net assets of the firm. If, on the other hand, the value of the assets is below the nominal value of the debt at redemption, owners may effectively fail to exercise their option by simply abandoning the project. If the finance is provided on a pure non-recourse basis where there is no real compulsion on project owners to fully compensate project lenders for their loss in the event of a default situation the lender will have to bear all the risk.

The implication of such a possibility is that project lenders should attempt to re-distribute the value of the project entity such that at any time the residual value of the project on redemption is in favour of owners. This may be achieved analytically by ensuring that the project's aggregate debts will be maintained within a certain debt coverage ratio or that the equity-to-debt ratio is maintained at a minimum level or that adequate financial and contractual commitments by owners to the project are in place. Thus while the theory of option pricing provides an assessment of lenders' risk in the event of a default situation the theory of economic hedging suggests that this risk can be mitigated if the project is intrinsically viable to cover debt service obligation and the loan support is fairly distributed or balanced.

It follows from this conceptual analysis that while the borrower attempts to perfect the independence of its subsidiary project entity the lender's interest involves re-establishing a strong linkage between the sponsors and the project as a form of hedge against the risk of the project being abandoned. This linkage incorporate the basis of credit transfer to the weaker parties through the community interest in the project.

(b) Mechanical Hedging:

In the context of major petroleum projects located in less developed countries, the risk hedging of economic viability analysis may be frustrated by external interference or
political factors. In this case, a mechanical hedge may be deployed to provide a physical control over the collection and allocation of the project's revenue.

Mechanical hedging is a device which relies on trust arrangements to ensure that once the project produces cash, priority payment on the loan will be assured. The device is a payment mechanism and provides a mere mechanical protection to project lenders by ensuring that the cash (if and when) generated by the project is not claimed by the sponsor (or the host-government) for other uses before meeting debt service obligations.

Under this arrangement the key assumption is that the economic viability is not complete until it is perfected by mechanical means of payments. Mechanical hedging is thus a type of security criterion which does not create any additional credit or financial backing, either of primary or secondary quality, if the project does not produce cash.

In developing countries where the concern is with problems of transferring hard currency, the mechanism of payment is an important hedge in the credit safety net and represents a second line of protection for lenders. It provides the desired effect to agreed arrangements through the mechanism of segregating the earnings of the project and managing lenders' claims on earnings in priority to owners' right to project income and profit.

Trust devices are common arrangements when lending to export projects located in a developing country with a high likelihood of "currency transfer risk" and "foreign exchange risk", as was illustrated in the case study of Sudan in Chapter 5. Under a trust device, the sponsors agree to assign the export revenue of the project to a trust account in which a sufficient amount is segregated to service debt and meet other essential obligations in priority to the claims of the owners. The instrument of mechanical hedging is therefore a feature of financing high risk LCD projects.

(c) Legal Hedging:

The generalised function of legal hedging criteria may be defined as a mechanism which permits the lender to:

1. Point to specific obligations toward the credit; or
2. Step in and take control of the project entity should it get into serious trouble; or

3. Suggest or force corrective actions if the primary security proves deficient.

All bank lendings generally utilise a form of legal hedging through signing a loan agreement. However, the security value of a loan agreement is of a defensive quality and is complementary to the economic and mechanical hedging devices explained in the previous two sections. This implies that the enforcement of legal and contractual agreements serve as a third line of protection for the lender.

Virtually all of the loan agreements reviewed by the study included protection clauses which related to a uniform pattern of hedging devices against specified internal and external risks. These may be conveniently grouped and analysed under four headings:

1. Pre-Completion Risks;

2. Post-Completion Risks;

3. Marketing Risks; and


(1) **Pre-Completion Risks:**

These risks were referred to earlier when discussing completion bonding finance in Chapter 6. The prime concern of the lender during the pre-completion phases of project development is to put in place a mechanism which ensures that the principal sponsor will not abandon the project and will carry the ultimate risk if any thing goes wrong with the project.

The safety provision is provided through agreeing the source and extent of financing cost overruns and the placing of various supporting guarantees. In some cases the availability of capital for possible cost overruns may provide comfort to lenders that the project will be completed, particularly if the project involves proven technology and is supported by other security such as a take-or-pay agreement (Liddle, 1986).
In general, however, the mere availability of capital is not a sufficient guarantee as there may be some technical or economic factors which prevent the project from passing the completion test criteria. In the event of non-completion, the cash flow on which lenders rely for debt service will not be forthcoming at all; in the jargon of bankers, the project will become a "dead horse".

Lender's protection against this possibility is the placing of separate or parallel technical and completion guarantees. These provide assurance from one or more credit-worthy sponsors (usually owners and/or host country) that the loans advanced for the project will be repaid in full or guaranteed until maturity or re-negotiated if the project is not completed by a certain date.

The risk can also partially be mitigated by requiring equity participants to provide an investment guarantee to the effect that they will advance their funds before any loans are disbursed, or at least pro rata to debt capital (Chapter 4).

In most major projects, the construction contractors are often called upon to assume the technical and non-completion risk (Saunders, 1986). This type of undertakings is performance-related and thus its value is based on the ability of the sponsor to perform its obligation according to a specific contract. The risk involved is of technical nature as opposed to a financial guarantee which relates to collecting cash from the guarantor in the case of a default. In this case, the construction contractor functions as an active PF sponsor and its participation results in a credit transfer to other parties involved in the project.

(2) Post-Completion Risks:

Once a project passes the test criteria of completion and is operating according to design specifications, the investment and financing risks diminish substantially, because by definition the status of the project is effectively being transformed from a project concept into a going concern concept.

Still, it is always possible that unforeseen interruption or serious reduction in production or transportation takes place during the project's operating life. Sources of these risks include:
Technical difficulties (perhaps due to lack of operating experience).

Occurrence of a natural disaster (e.g., a flood or earthquake).

Deficiency in the supply of a critical feedstock or fuel input for the project.

Any of the above events will impact on the revenue flow of the project. Lender's legal protection against this type of risk include:

1. Assignment of benefits under insurance policies.

2. A requirement for technical and operating agreements between the project and a competent sponsor.

3. A requirement for a supply and pricing agreement with major suppliers of raw materials and fuel.

4. Assurances from the sponsors that the debt service will be met on a regular basis while repairs to the system are being made in the form of a cash deficiency agreement.

These devices are not different than those deployed in conventional corporate lending. The functional objective of risk treatment in project finance is thus essentially derived from existing and established corporate lending criteria. The only difference between the two approaches is the method of segregating project risk and re-allocating them to sponsors. The lending risk is greater when the project is segmented from its sponsor's risk and therefore the process of risk allocation is an attempt to re-establish a form of bondage. If the operating and marketing activities of the sponsor and the project company are less than perfectly and positively correlated, then a guarantee from the sponsor would provide the project lender an added protection. The supplement of an external guarantee may therefore permit the lender to accept a level of probable default risk that is greater than will be considered acceptable if the project is viewed in complete isolation.
support of credit-worthy sponsors thus involves a valuable credit transfer to other project participants.

(3) Marketing Risk:

The risk of under performing in terms of sales revenue is common to all projects. Where this is a major factor (the case study of the pipeline project in Sudan in Chapter 5) the general solution is to place a "Throughput and Deficiency Agreement.

Under this agreement a legal obligation is created for someone (usually the user of the project facility) to guarantee a minimum throughput for the project facility that generates revenues adequate to cover debt service. If the minimum required volume is not available from the designated source then the legal agreement provides for the guarantor to make up any difference in revenue through direct cash payments.

Problems of resource risk and availability of feedstock may similarly be dealt with by specific undertakings and deficiency agreements.

(4) Country Risks:

All loan agreements to LDC projects include a protection clause against the effects of politically motivated acts on the loan obligation of the project. Sources of political risk relate to acts of host government, factions within the host country, neighbouring and trading countries and include inconvertibility of currency, expropriation, war, revolution and insurrection (Shapiro, 1986). The links between political risks and PF strategies were analysed in Chapters 4 and 5 in relation to the case studies and in Chapter 6 in relation to the findings of the survey questionnaire.

The legal treatment of political risks is similar to conventional corporate or sovereign lending, requiring assurances from the principal sponsor or sponsors to assume the responsibility for the loan if the project fails to perform its obligation owing to a political event. This undertaking thus involves a credit transfer to other parties which benefit from the loan finance.
8.5 THE CONCEPT OF RISK TRANSFORMATION

As has been demonstrated from the empirical evidence of the case studies and the field survey questionnaire, the credit assessment in project finance legally involves the lender in considering the borrowing project company as a principal party in the loan agreement and not as an agent for the sponsor. Hence, the basic problem for the lender is how to establish the basis for a credit assessment when the project entity is still in its formative stage and therefore has no track record to permit a credit evaluation.

This is a major problem for the lending banks when considering participation in a major petroleum project because the protection mechanism must be very highly reliable to ensure timely payback of the loan irrespective of whether the project succeeds or not (Nevitt, 1989). Given that the borrowing project entity is a new development, the lender's best option is to look to the credit-worthiness of the sponsor and examine possibilities of its linkage with the project as was explained in the previous section. The empirical evidence of the case studies and the field survey has shown that the aim of a PF structure is to establish this linkage to the point where the credit risk of the project is a good substitute for the credit risk of the sponsor.

The empirical analysis involved in developing the mechanism of the linkage and establishing the credit of the borrowing project relates to a consideration of the life cycle risks of the project in terms of two time frames. These relate to periods when the risk exposure can be explained in terms of choices and risk-bearing capacity of lenders and borrowers when arranging project finance. The two time frames are:

1. Pre-completion period, consisting of

   (1) engineering and construction phase; and

   (2) start-up phase; and

2. Post-completion period, consisting of

   (a) settling down phase; and

   (b) normal operation phase.
Different contingent guarantees and undertakings of different sponsors may be used in each time frame to provide the credit support necessary for structuring a project finance. The generalised effect of the credit support is basically to have the loan obligations fully shared by owners and other sponsors during the period of pre-completion and to release sponsors from their obligation when the project is proven as independent source of security.

One important concept of PF theory that emerges from this analysis is that when financing a new venture, the lender's initial risk is effectively the corporate credit of the sponsors. This suggests that in the pre-completion phase, lenders rely on the identity, resourcefulness and competence of the sponsors as the primary basis for their project credit assessment. This was empirically confirmed by the case studies and the field survey findings. Only after being satisfied about the credit of the sponsor and its commitment to the project will a lender consider a non-recourse or a limited recourse finance to the project.

Once the project passes the completion test criteria, the lender will progressively assume more and more of the project's performance risk. The basis of the credit risk is thus transformed from the sponsor's credit to the credit of the project company. In this case the lender may accept the credit of the project as a fair substitute, because its operation and cash performance is proven in accordance with certain test criteria of performance defined in the loan agreement. This test establishes the capability of the project to meet its debt service obligation as a going concern.

This analysis suggests that the lender accepts project risk only when it is supplemented by the credit of its sponsor. It also suggests that the scope for risk sharing by the lender tend to increase from the point when the project proves its status as a going concern and establishes its own corporate credit worthiness, like any other established corporations applying for loans.

Accordingly, the lender's risk in project finance involves a process of a risk transformation from a corporate credit of the sponsor to a corporate credit of the project company. That is, a shift of focus from general credit-worthiness of the sponsor to the specific balance sheet of the project company. This process is re-inforced by the parallel process of transference of credit as was explained in the previous section.
One important aspect of the process of risk transformation in project finance may involve a risk break, to which some of the bankers during the interviews referred as the "point of semi-completion" guarantees. Under this arrangement, the prime borrower and the lender agree some points or stages in the project development life cycle after which the amount of debt guaranteed by the prime borrower (the sponsor) decreases. As these points are reached, the lender begins to accept a progressively greater link between the repayment of the loan investment and the cash flow performance of the project company. This implies that lender's effective reliance on the credit of a borrowing project becomes a true corporate risk only during the post-completion period when the project proves its position as a credit-worthy going concern.

8.6 PRUDENTIAL HEDGING THEORY

While it is difficult to define what is "excessive risk" for the lending bank it is possible to determine the general level of security desired by a lender. In general, the level of protection sought by a lender may be asserted as a zero risk objective of causing a loan loss greater than an amount that would seriously damage the capital structure of the lender.

This suggests that the risk-bearing capacity of a lender is limited not only by the quality of the project-specific and location-specific risks being assumed but also by the risk-absorbing capacity of the lender's capital structure (as signified by the equity to debt ratio or capital adequacy). The higher the quality of the risks being assumed by the lender (in terms of economic, mechanical and legal hedges) the greater the scope to transfer the credit risk to the secondary market through a prospective securitisation or other funding arrangement and thus the lesser the impact on the lender's capital structure. Conversely, the higher the risk-absorbtion capacity of the capital structure the greater the scope for assuming loan risk.

In this context, portfolio theory is considered to provide an explanation of why certain banks are able to provide project finance while others are not. An experienced project lender may diversify away the spillover risk of a major project loan by indirect
means and thus provide and maintain a system of ensuring its survival under worst conditions.

Portfolio theory suggests that project lenders should manage their loan assets by imposing internal limits on the amount of risk exposure their organisations are able to absorb in relation to each country and customer for similar projects without endangering their capital. The portfolio approach is thus an important factor in the determination of the lender's capacity to participate in major project financing.

Criteria of portfolio management are therefore considered complementary to the risk hedging structures that could be implemented through economic, mechanical and legal methods as explained in the previous sections. The portfolio approach merely aims to define the risk-bearing capacity of the lender to participate in a particular type of project lending. The theory of portfolio hedging derives its validity from mainstream financial theory as developed by Markwitz (1952, 1959) and Sharpe (1963). It has been subsequently been expanded by others and is supported by a great deal of empirical literature. Its application relates to the need of the investor to reduce market (systematic) risk and thus attain a measure of organisational security in the form of assured liquidity and continued solvency as was explained in Section 8.3 above.

The concern over the stability and solvency of the banking system is also generally recognised in statutory and regulatory provisions which exert external check over bank management's policies of risk diversification and its capacity to analyse country risks. For example, in the USA it is illegal for a bank to lend more than 15% of unimpaired capital and surplus funds to any single customer. The US Federal banking regulators also inform bank management if bank exposure in weak, moderately strong, or strong countries exceeds 5%, 10% or 15% of its capital respectively, or if any of the asset concentrations that are exposed to common risks exceed 25% of bank's capital and are contingent on the same essential repayment factor (Harvard Law Review, December 1985). Similar external checks and balances exists in the U.K. and other OECD countries (Friesen, 1986).

These prudential banking rules suggest that lending participation by a bank is unlikely to exceed 15% of the lender's capital for any major petroleum project or petroleum producing country or 25% for the global petroleum industry. These limits explain the
needs of lenders to participate in syndication with other banks in order to diversify sources of funding as a risk strategy.

In addition to the impact of portfolio management, there are some measures of security derived from insurance schemes and prudential supervisory and regulatory criteria (Pecchioli, 1987) relating to both the assets and liabilities of the bank balance sheet which result in mitigating the effect of lending risks.

8.7 TEST OF THE THEORY OF PROJECT FINANCE

(a) The Project Capital Structure and its Strategic Motivations:

The results of the field survey questionnaire relating to the strategic advantages of PF borrowing and lending were analysed in details in Chapters 6 and 7. The survey evidence confirmed that the relative independence of the projects capital structure results in a number of strategic benefits. It also showed that the enhancement of borrowing capacity, that could be achieved by project owners with a high degree of business stability, was the major advantage to the borrower while the control of risk was the main advantage to the lender. The test of the PF theory is, therefore, its ability to predict these advantages for the borrower, the lender and the host-country.

Given the consensus of the normative literature that the test of a desirable financial policy is a favourable impact on the market value of the firm, it is necessary to establish that the PF structure will produce positive effects for the owners. This could be analysed from two perspectives: first, assuming a perfect capital market and secondly, considering the real-world of debt-finance as in the traditional literature.

Assumptions of the perfectly efficient capital market model include costless financial transactions, no barriers to sources of finance and no risk of bankruptcy. The prediction of this market is provided by the Modigliani and Miller (1958) propositions that the value of the firm is not affected by changes in the debt-to-equity decisions apart from existence of a tax advantage. Shareholders can gain from corporate gearing only in the presence of taxes and if the interest on debt is tax deductible. In the presence of tax benefit,
the perfect market prediction is that a project's optimum capital structure is composed mainly of debt. Apart from the tax advantage, any increase in the proportion of low cost debt in the capital structure will only increase the required mean rate of return on equity to compensate shareholders (as a premium) for the increase in risk as has been shown by Hamada (1972). The assertion of this approach is that the market capitalises the value of the firm as a whole and as a result, the breakdown between debt and equity is unimportant (Van Horne, 1986).

The implication of this theory is that if an independent project entity is a profitable concern then it can rely on debt finance if its owners are not willing or able to provide the funds. This follows because the relationship between gearing of the project firm and the cost of capital is influenced only by the net operating income. The application of the Modigliani and Miller approach thus seems to provide a plausible explanation of the very high debt-to-equity structure of the project firm, including an implied suggestion that project gearing may be taken as a substitute for the parents' gearing. In this case, the main motivations for project finance must be the preservation of the parents' debt capacity. The prediction of the perfect capital market in terms of lower cost of capital due to tax advantage, however, is very restrictive and we need to explain the other motivations which underlie the project capital structure.

The traditional literature on the theory of capital structure, both before and after Modigliani and Miller, asserts that there is an optimum level of gearing and that a firm can increase its total value through judicious use of debt finance because it is cheaper than equity. Up to a point the firm can lower its cost of capital and raise its total value through gearing. The cause of this effect is the positive impact of the tax allowance on the one hand and the negative impact of increasing risk of debt on the other.

The field survey study showed that the fiscal advantage is a recognised determinant of PF borrowing but the risk factors were significantly more important. The case studies showed that the needs to mitigate investment risk and achieve financial stability were more important motivations than the fiscal benefits when borrowing on the credit of a project company. Given that different LDC projects qualify for different packages of low cost debts from national and international agencies, the PF borrowing also presents the best
cost-minimising and risk-reducing approach as was evidenced from the case studies (Chapters 4 and 5) and the conceptual analysis of Chapters 6 and 7.

An increase in borrowing capacity would also be beneficial in those cases where a company has imposed constraints on its total capital budget and is consequently forced to reject projects that are economically attractive. In imperfect markets, firms do not always have ready access to funds for financing all potentially viable projects. It is not uncommon for a firm to decide against new equity issues and to limit its total annual capital expenditures to the sum of internally generated funds plus new debt financing. At any point in time available funds may be rationed, and in such cases marginal internal rates of return may not be capable of being equated with the marginal cost of funds. This means that the firm is not able to optimise its investment and financing decisions.

The fact that funds are rationed may arise either because a firm has internally imposed constraints on the funds it will use or because the firm cannot obtain funds at market rates of return. The availability of project finance thus represents a significant motivation to increase the borrowing and investment capacity of corporate investors and host countries in successive projects until the marginal returns are finally brought into equality.

Project finance as such is a useful facility to expand external funding and to undertake additional capital programmes and hence provide a net benefit to owners. Research by Wynant (1977) analysed the benefit of project finance in terms of risk and return profile and concluded that the increase in borrowing capacity associated with PF can result in real benefits through improvements achieved at the project level. Wynant's assertion is that the PF structure presents an alteration in the risk and return characteristics and therefore the project is better able to service its debt. The field survey confirmed that most lenders consider structured project lending to be less risky than lending on direct corporate or sovereign credit.

It has been shown (through the case studies, the field survey data and the literature evidence) that the motivations for sponsoring a PF strategy are largely the result of market distortions. In the context of the LDC petroleum projects, major market distortions are caused by a number of factors such as the problems of unequally distributed (technical, marketing and financial) information on the project investment and its prospective cash
flows, divergence in the objectives and expectations of sponsors (host governments versus MNCs) and lenders, risk-averse position of the participants and their preference for non-guaranteed finance. The immediate implication of these imperfections is that there are different ways of distributing risk. The study has shown that the function criterion of a successful PF structure is to achieve a distribution which is most consistent with the objectives and risk-bearing capacity of its participants. In this context, a major test of the PF theory lies in the justification of the unusually high geared capital structure of the project firm in terms of its strategic advantages to project participants.

A major risk of conventional debts which the PF borrower attempts to avoid is the possibility of creating a fixed charge burden on the parent company (in terms of debt service). Excessive debt could force the company into a position of technical insolvency if earnings fall to low levels and thus could endanger the very survival of the firm.

The scale of project finance sought by the major international projects would, in the traditional sense, require the firm to absorb debts beyond its optimum level of gearing. For this reason, the parent companies, as in the case studies, were not able to directly support, finance or guarantee the needs of an LDC project. These functions were generally delegated to the local subsidiary companies and often such guarantees that the subsidiaries did provide were in the nature of performance, rather than financial, guarantees. They result in increasing normal business and trading obligations, but not debts for the purpose of consolidation.

The mitigation of the legal recourse to the parent company in effect results in the PF loans being considered inferior to conventional debts, at least from the standpoints of a parent company and its conventional lenders. That is, the parent company perceives its debt obligation as one of very last resort and therefore differs significantly from those financial obligations which are covered by direct loan guarantees. The case study of Sabic projects (Chapter 4) showed that the repayments relate to performance of the borrowing project itself and not the general performance of the venture partners. When some of Sabic's projects experienced repayment problems the lenders were prepared to re-organise the loan to fit the new situation of the individual projects.

Some bankers indicated that this type of flexibility is generally accepted by project lenders and expected by the project borrowers as a feature of project finance and seems to
pose equity risk to the project lenders. However, lender's defences are that innovational
devices in the form of appropriate risk hedging would be in place including a mechanism
of direct control and monitoring which compensate for the disadvantage.

A very high level of debt finance for the project is thus considered beneficial, less
risky and has a different policy implication than parent guaranteed debts. In the case of a
joint venture, the borrowing on a project basis is an indication that the project is viable and
can stand alone. Field interviews with senior industrialists and bankers also suggested that
the ability of a project to be self-financed is a good indication of its viability. When other
partners are unable or unwilling to provide a valuable counter-guarantee, PF also has a
distinct advantage of avoiding over-financing the weaker partners.

The literature attributes most of these motivations to the off-balance sheet nature of
PF debt. The assumption is that non-guaranteed debt would not be included in the parent
company's world-wide debt ratio, whereas guaranteed debt, as a contingent liability would
affect the parent's debt-raising capacity. Given that existing loan agreements would
preclude the issue of such guarantees, PF structures which rely on non-financial or
performance guarantees would provide a distinct advantage.

The field interviews confirmed that the parent companies do not feel excessively
threatened by the inroad of project finance and thus permit its use by overseas subsidiary
companies. The study conceptual explanation of this policy is that the expansion of
"borrowing capacity" by the subsidiary is a completely different concept than the increase
in "debt capacity" by the firm. This was explained in section 7.3 of Chapter 7 when the
determinants of borrowing strategy were analysed. It was shown that the "borrowing
capacity" was considered external to the capital structure of the firm and was largely
determined by market factors while "debt capacity" was internally determined by the
amount of debts and guarantees which the firm can absorb.

The analysis of section 7.4 of Chapter 7 has shown that project lenders are
sufficiently motivated to permit project owners to expand their borrowing capacity. In
addition to the high level of return on their loan investment the lender is not necessarily
involved in taking excessive risk. However, project finance was found to involve the
lender in equity risk situations and thus required specialised knowledge of the industry and
techniques of project risk appraisal. That is, there is the risk of adverse selection and adverse incentives that could result from the market imperfections.

Adverse selection refers to the possibility that the opportunities to expand borrowing capacity on a non-recourse basis would cause industrial investors to select project finance only for high-risk projects and thus cause banks to underwrite excessive risk. With the possibility to structure very highly geared and independent project companies, owners will be strongly motivated to engage in highly risky investments where they will benefit greatly if successful. If the investments pay off, the owners gain handsomely; if the investments are unsuccessful, the lenders bear most of the risks.

The impact of adverse selection on lenders may be reinforced by a further problem of adverse incentives that might be caused by the unequal distribution of information. By assisting the industry to spread the risks of investments, lenders may actually prompt firms to promote and sponsor projects with a higher probability of failure than would generally be the case. During the field interviews, some bankers actually thought that the financing of what then appeared to be unprofitable projects was the result of "soft" approaches by some project lenders. The causes of the erosion of traditional bank lending criteria (Jahnke & Webb, 1983) during the 1970's also seem to be explicable in terms of adverse incentives.

The problems of adverse selection and adverse incentives suggest that in the absence of appropriate risk-taking criteria the risk-reduction motivation afforded by project finance could increase the possibility of default. The aim of a PF theory is therefore to provide a solution to these problems through definition of structured criteria and through prediction of appropriate risk structures.

The conceptual analysis of this study showed that the security to the lender is enhanced by strengthening the commercial and economic linkages between the project entity and the sponsor companies and by the establishment of a community of balanced vested interests. The parallel to the concept of linkage in the empirical literature is the concept of agency costs. There is a great deal of empirical analyses in the literature (Levy & Sarnat, 1986; Shapiro, 1986; Van-Horn, 1986) on the theory of capital structure which show that variations in agency costs could provide a structured motivation for borrowers and lenders to avoid excessive risk. Provided that the PF linkage causes the participants to suffer a proportionate loss of strategically important benefits if the project fails, the project
entity can provide a substitute collateral for the credit of its sponsors. In this context, the project will be an extension of the sponsors' business and thus provides a reasonable basis for assessing its credit-worthiness for a major loan.

Given that the PF linkage is viable and balanced and that the sponsors are credit-worthy, it could be argued that project lenders may consider the legal and accounting independence of the separate capital structure for the project as wholly illusory unless the parent is really willing and able to allow the project to default on its debt. As long as the sponsors have a legal or moral obligation or sound business reasons for preventing the project company from defaulting, the project company has no real independent capital structure in the eyes of the project lender. This is confirmed by the case study projects (Chapter 4) where lenders motivation was clearly the resourcefulness and the moral obligation of the sponsors.

The linkage of the project to resourceful sponsors can thus provide a strategic advantage to host LDCs. In particular, the willingness of credit-worthy multinational companies to participate in the development and financing of major LDC projects has been found to result in major benefits to the host-country. The field survey provided evidence that the host developing countries, however resourceful they may be, lack sufficient credit when financing, major technology- and capital-intensive projects and therefore seek the participation of the MNCs to make-up this deficiency. On the other hand, the participation of the MNCs, which are the proven sources of technology and marketing experience, is limited by the need to avoid LDC country-specific and certain project-specific risks.

A major consequence of this strategy is that the MNCs either completely avoid direct investment in LDCs or participate only as a minority owner/sponsor with the capital investment largely in non-cash form. This type of defensive investment strategy is further reinforced by developing external financial vested-interests in the project's success as was evidenced from the case studies. This involved the project company raising debt capital from national and international financial institutions and banks with repayment provided out of production rather than employing funds supplied or guaranteed by the parent company.

A major empirical study (OECD, 1987) into international investments explains that this type of investment participation is often prompted by the LDC host-country policies in
order to achieve a greater degree of local control and attract only those parts of the traditional international direct investment package (production, finance, marketing, managements, technology) not available domestically. This is consistent with the study's findings that PF strategy is the result of a convergence of interests between the MNCs and the LDC host-country in that the resulting divisions of costs, risks and responsibilities associated with project finance can also reduce cost, risk and exposure to the multinationals while preserving the advantages of majority ownership to the host-country.

The empirical evidence on motivations thus supports the research hypotheses and assertions and show that the PF borrowing and lending strategies are interdependent and inseparable. This clearly implies that a study of PF theory must combine both investment and financial concepts as stated by the research hypotheses.

(b) Theoretical Linkage of PF Criteria:

In the previous section the theory of capital structure was explained in terms of the strategic motivations of PF participants to show the interdependence between investment and financial decisions when formulating a strategy to maximise project-sourced debts. Given that a leveraged project capital structure results in strategic advantages to project owners, host country, and lenders as explained above, it remains to be shown how the practice of project finance banking draws on, and relates to, established and proven investment and financial theories as asserted by the research hypothesis-5.

To test this hypothesis the study attempted to collect evidence on how the PF practitioner perceives the linkage between his practice and established theories. This is done through the structured survey questionnaire. Question 9 of the field survey (Appendix 2.2) requested the responding banks to rate the contribution of nine major investment and financial theories or concepts to their practice of project finance banking. The results of the field test are illustrated in Table 8.1.

The results confirm that the theory of project finance represents innovations on existing and related investment and financial theories. The contributions of these theories to the practice of project finance are very significant. Of the responding banks, 74% considered investment appraisal theory was the most dominant contributor followed by risk
hedging theories (65%), portfolio risk theory (57%), accounting methods (30%), corporate and sovereign lending techniques (26%) and capital asset pricing theory (17%). These results provide the empirical evidence that the theory of project finance is necessarily eclectic in the sense that its criteria of decision analysis are derived from other theories. The implications of this dependence may now be analysed in order to test the study's conceptualised linkage between the PF theory and its underlying theories of investment and finance as a basis for the credit assessment of projects.

Table 8.1.
Contributions of Existing Financial & Investment Theories

<table>
<thead>
<tr>
<th>RANKING OF CONCEPTS</th>
<th>IMPORTANCE OF THE CONTRIBUTION TO PROJECT FINANCE BANKING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VERY</td>
</tr>
<tr>
<td>1. Investment Appraisal</td>
<td>74%</td>
</tr>
<tr>
<td>2. Risk Hedging</td>
<td>65%</td>
</tr>
<tr>
<td>3. Portfolio Risk</td>
<td>57%</td>
</tr>
<tr>
<td>4. Accounting Methods</td>
<td>30%</td>
</tr>
<tr>
<td>5. Corporate/Sovereign Lending</td>
<td>26%</td>
</tr>
<tr>
<td>6. Capital Asset Pricing</td>
<td>17%</td>
</tr>
<tr>
<td>7. Option Pricing</td>
<td>4%</td>
</tr>
<tr>
<td>8. Foreign Direct Investment</td>
<td>4%</td>
</tr>
<tr>
<td>9. Financial Leasing</td>
<td>4%</td>
</tr>
</tbody>
</table>

(i) Investment Appraisal:

The theory of investment appraisal was rated the most important contribution to the practice of project finance banking. The concern of this theory is with the normative
criteria of maximising some objective function, subject to some constraints. For the firm this is typically taken as a profit maximisation objective for a given level of acceptable risk. Analytical methods of evaluation are used to decide whether to select or reject a given investment, and for those selected to rank them in such a way that the total portfolio of investments yield maximum possible profit for the owners.

The methods of analysis used in the petroleum industry vary but the most widely accepted methods involve discounting future cash flows and estimating the net present value (NPV) at some pre-determined rate of discount. This rate is taken as an approximation of the cost of capital to the borrowing firm. According to the theory of evaluation, projects which yield a positive NPV should be selected while those with a negative NPV should be rejected. A related method uses the criterion of internal rate of return (IRR). This is the discount rate which equates the present value of the streams of cash outflows and inflows; i.e. reduces the NPV to zero. The firm should accept a project investment proposal only if the calculated IRR is greater than the cost of capital.

While the rate of discount could include a premium for risk, most industrial analysts and executives who were interviewed showed a preference for a parameter sensitivity analysis. The projects economic analysis is repeated several times, each time one of the components of the cash flow is varied. Those components which results in disproportionate variations in the NPV are considered project-sensitive and identified as the sources of risk.

Project lenders use the same approach to identify sources of inherent risk in the project. The objective function in this case is to verify that the assumptions of viability provided by the borrower are robust and will give both tangible security and a yield sufficient to service the debt. However, the PF lender's approach involves considerable innovations to the traditional methods used by the industry as explained above. Since the objective function of the lender's approach is more specifically in terms of developing a robust safety net then in maximising the return on loan investment the mere evidence of a positive NPV is not a sufficient comfort. In terms of the study's explanations and analyses of Chapter 6 (sections 6.6 and 6.7) and Chapter 8 (sections 8.4 and 8.5), the main focus of the lender is on the need to analyse risk over the life cycle of the project (i.e. pre-completion, post-completion, technical and marketing) and to identify the appropriate risk structure that closely fits the situation and the risk-bearing capacity of the participants.
Some bankers commented that the traditional method of investment appraisal is a useful starting base in the evaluation of investment feasibility but "the key objective of credit evaluation is risk unbundling": to identify risks and to design structures for their allocation to the appropriate parties in order to minimise the risk of default. The banker's approach is thus considered as an extension of the appraisal methods as used in the industry (Chapter 3). Other bankers explained that their concern with the methods of evaluation used in the petroleum industry stem from the fact that they have a narrow focus on wealth maximisation (as symbolised by NPV) while in banking practice the concern is with wider issues relating to the capacity of the project to service its debts. These differences represent the value-added innovations introduced by banking practice in order to respond to the needs of the industry. The PF expanded approach to the method of investment evaluation has been fully confirmed by the literature on the subject as was explained in Chapter 6 (section 6.3).

(ii) **Risk Hedging Theories:**

The field survey respondents considered risk hedging theories to be the second most important contribution to the practice of PF banking, after investment theory. Once a key risk is identified it becomes important for the investor to evaluate the methods and costs of treating such risk. The treatment could involve methods of avoidance, control, transference or funding the risk, depending on costs as well as a number of other factors. Many types of pure risks which could involve the project with loss could be transferred to the insurance companies. Other forms of risk exposure which could threaten the profitability of a transaction could be hedged through dealings in the financial and capital markets. The case studies have provided examples of the multinationals using project finance as the principal means of achieving their corporate risk exposure management objective when investing in LDC projects.

The earlier conceptual explanation in this Chapter showed that project finance involves the lender in a risk hedging process over the life of the project loan as a means of mitigating its lending risk. Once the key risks are identified, the lender's main concerns are with risk reduction and hedging. The risk hedging devices used in project finance banking
were analysed in section 8.4 and were shown to involve a combination of analytical, mechanical and legal methods of protection. During the field interviews most bankers confirmed the objective of risk hedging management as a means of reducing the residual risk of the project loan to the risk-bearing capacity of the lender, as measured by its capital adequacy.

In addition to the direct risk hedging of the PF, credit bankers seek to develop a safety net for risky PF transactions through indirect hedging. This is done by dealing in the secondary financial market or by entering into a swap or other similar financial transaction to transfer risk, as explained in section 8.3 above.

(iii) **Portfolio Theory:**

The portfolio theory was considered the third most important contribution to the practice of PF banking. The literature coverage of this theory is often couched in terms of investment in shares, but its concepts are of much wider relevance and used by both the petroleum industry and the major banks. The central thrust of the portfolio theory is to provide a process of spreading risk by the investing firm. One of the key objectives of the multinationals when participating in the development of an LDC project is to diversify their portfolio in order to reduce their corporate risk in relation to expected return. This follows from the assumption that the economic cycles of different countries do not tend to be completely correlated, so it is possible to reduce risk relative to expected earnings by investing across countries.

Given that in project finance both borrowers and lenders are risk-averse, the portfolio theory provides a useful guide to establish risk-return criteria for the investment opportunities being presented and to select only those projects with the least risk for a given level of return or prefer those projects with maximum returns for a given level of risk. Such investments were designated efficient by Markowitz (1952; 1959). The interdependence amongst the projects and their returns is also recognised as a major factor. For example, the returns on petroleum investments are largely influenced by common factors of global supply, demand and prices, country and industrial risks. The aim of the
investor is thus to prudently diversify its portfolio into various types of projects for each
countries and industries and to determine a maximum limits for each area.

The risk reducing strategy of a diversified portfolio was formulated by Sharp (1963). He suggested that the variability in possible returns from a particular investment (i.e. the risk of that investment) could be analysed in two components: one due to general market conditions dictated by economic, political, and other factors common to all investments (to various degrees); and the other a component characteristic of that particular investment and therefore related to the nature of, for example, the underlying firm's management, products, and location. Sharpe named the former component systematic (or market) risk, and the latter unsystematic (individual, characteristic) risk. He further argued that because of their individual character, the unsystematic risks of any two investments would be independent of one another. Any covariance (risk linkage), therefore, between the returns from two investments could arise only from their common dependence upon general market conditions. If this latter market-based source of risk could be extracted from the total risk of individual investments, only individual risks, (independent across investments), would remain.

The concept of linkage between the portfolio theory and the risk management strategy of project finance was introduced in sections 6.7 and 8.6. Project lenders consider project-specific risks as unsystematic risks and therefore more appropriately managed by the industrial sponsor. The lenders thus seek to minimise the impact of unsystematic risks through the various devices of risk hedges (i.e. introduction of economic, mechanical and legal structures). On the other hand, project lenders were found able to diversify away certain exogenous risks such as credit risk, liquidity risk, exchange rate risk, interest rate risk and country risk. The application of the portfolio theory results in the project lenders adhering to internal limits on the amount of risk exposure to each type of projects, in each country and in each industry.

(iv) **Accounting Methods:**

The contribution of accounting methods was considered the fourth most important factor in the practice of PF banking, according to the field survey responses. Most
respondents thought that once the viability of a project is confirmed in principle as being suitable for addition to the lender's portfolio, the credit perspective will be assessed with the aid of accounting ratios, such as the coverage of net cash flow to debt service and debt to equity ratio. The application of accounting methods is seen to provide decision rules relating to the inherent risks of the capital structure (i.e. long-term debts and equity financing) and liquidity considerations (relating to short-term assets and liabilities) of the borrowing project.

The literature evidence seems to confirm that decision rules based on accounting systems are an integral part of the industry's and the bank's risk management system (Van Horne, 1986; Wilson, 1988), and are related to the need to evaluate the full array of assets and liabilities which contain risk and comprise the firm's balance sheet. A number of the experts who were interviewed thought that accounting ratios were the appropriate tools for identifying the underlying risks and for deciding on the appropriate hedging structures. Cash deficiency agreements, the placing of contractual off-take agreements, undertakings to maintain a minimum equity to debt ratio and other protective covenants were cited as examples of risk hedging that results from analysis of the projected balance sheet of the project.

Most project lenders who were interviewed by this study considered the accounting system to provide the appropriate tools for assessing the collateral value of the borrowing project based. For example, the concept of lender's margin of safety is an accounting concept which relates the annual amounts of unencumbered cash flow (the market value) available to service the debt to the amount of debt service. Techniques of analysing the life profile of this coverage ratio and its variability (riskiness) are also derived from the accounting system.

The study findings are consistent with the literature approach (Dyer, 1985; Wilson, 1988) which shows that the practice of bank lending, supervision and control principally involves the skill of marshalling accounting methods of structuring data and interpreting results. The decision rules applied to the PF strategy are similar to those applied to the corporate parents except in project finance the balance sheet and income statements items are of a predictive or projected quality with no track record of validation while in the latter case all items are supported by the historical trends.
Conventional Methods of Lending:

Results of the field survey questionnaire showed that conventional methods of lending on the direct credit of corporate and sovereign borrowers also have a direct bearing on project finance practice. Of the respondents 26% asserted that the contribution of these methods to the practice of project finance banking was very important. This is shown to be consistent because the analytical tools of evaluation, portfolio management and accounting are fairly similar.

In conventional financing the focus of the credit assessment is on the consolidated financial structure of the multinational firm, because the risk of default is assumed to be associated with the overall debt ratio of the firm. The thrust of the credit analysis is thus related to the capital structure of the firm as seen from its consolidated balance sheet. This follows because bankruptcy, and other forms of financial distress, in a major subsidiary is considered to seriously impair the operation of the parent company.

In project finance the lending is primarily secured by the borrowing project. The main focus of the credit assessment is thus principally related to the balance sheet of the project to ensure that the loan is self-liquidating. The tools of analysis and interpretation are similar to those used in traditional corporate and sovereign lending. If the analysis results in identifying risks which cannot be taken by the lender these would be resolved through the application of economic, mechanical and legal hedging devices as explained in section 8.4. These hedging devices were found to result in establishing a secondary line of recourse to the promoters and owners and in that way the loan structure resembles traditional financing.

Some PF lenders asserted that in some instances the supply of project finance can be arranged as a contingent finance on the assumption that if the new project does not prove its capacity to service the debt, the credit structure will revert to a traditional sovereign loan. A major project lender to petroleum projects in the Middle East expressed the concept as follows:

"In essence project finance is raised largely on the strength of the project cash flows. If the project does not generate the required currency, is a public sector entity and in a centrally planned economy, then it is likely that we may perceive it as a sovereign credit."
A similar concept of risk break was explained in section 8.5 within the context of the risk transformation of projects supported by the provision of "semi-completion guarantees". Under this arrangement, the corporate promoters or owners agree some points or stages in the project development life cycle as landmarks. Up to a point (e.g. during the pre-completion phase) the financing is completely supported by a traditional financial guarantee; thereafter, the amount of direct guarantee is decreased and the lender begins to accept a progressively greater link between the repayment of the loan and the cash flow performance of the project entity.

The implication of credit assessment in this type of transaction is that the PF lender takes a traditional view of the collateral value of the sponsor's guarantee and yet assists the sponsor to mitigate its debt obligation through financial innovations. The study evidence that PF lending accommodates some combinations of project-based and traditional guarantees was analysed in Chapter 6 where the distribution of market estimates of PF risk structures was shown to include 21% full recourse finance and 22% mixture of sponsor guarantees and indirect support (Table 6.1).

(vi) **Capital Asset Pricing Model:**

The sixth most important contribution to the PF banking practice, according to the field survey questionnaire, was the capital asset pricing theory. Of the respondents 17% considered it very important, 66% only fairly important while 13% thought it was potentially important. The overall rating of the contribution of capital asset pricing theory was assessed at 39%. This indicates that this theory is a fairly important parameter variable in PF banking practice.

The basis of this theory is that the value of an asset depends both on the expected cash flows and the cost of capital. The extensive literature evidence shows that the contribution of the capital asset pricing model (CAPM) has been important to the theory of finance in general and more specifically to Modern Portfolio Theory (Copeland & Weston, 1983; Brealey & Myers, 1988) which has already been shown to be a significant factor in the risk management strategy of project finance. The complex mathematical formulation of the CAPM is attributed to Sharpe (1964) and Lintner (1965) who have shown its
applicability to the securities markets, through use of variables and parameters which can be computed directly from market price data and which do not depend upon any subjective investor preferences.

However, it has also been utilised in a great variety of other ways, including the evaluation of investment performance, the determination of investment hurdle rates, and the assessment of stock market's reaction to various kinds of new information. The CAPM incorporates two fundamental assumptions: (a) investors dislike risk and require a premium for taking it and (b) the risk that is priced is the risk that cannot be diversified away. These two assumptions are also characteristic of PF participants. As long as the investor is content to hold a portfolio of diversified projects, the prediction of the CAPM is that the value of each asset has a linear relationship with its beta relative to that portfolio.

The evidence of the study, however, shows that PF practitioners do not consider the contribution of the CAPM to be directly relevant in any important or empirical way in identifying the underlying risk or in determining the hedging devices. The results of the interviews suggest that it is more likely that the CAPM is important in indirect way through use by other departments of the lending banks.

(vii) Other Contributions:

The field survey questionnaire confirmed the contributions of other theories such as option pricing, foreign direct investment and financial leasing. For example, the Black and Scholes (1973) model of option pricing was found useful in valuing the contingent claims of shareholders and lenders. Examples in the literature on the subject show that since 1973 the Black and Scholes model has been extended to value warrants, convertibles, currency options, bond options, corporate bonds, underwriting agreements, deposit insurance, and so on. The application of option pricing theory seems potentially and conceptually important to project finance and seems to justify in-depth study. Brealey and Myers (1988), for example, show that every issue of a corporate security creates options.

As with the CAPM, the direct application of option pricing theory was considered much less important than the theories of investment discussed above. On the first analysis, this seemed to be largely due to the restrictions of the theoretical model and the need for
specialisation of a different kind. That is, the respondents considered the options market as another major financial market and thus related it to a different form of banking expertise and a different department of the bank. Closer analysis of the comments on the questionnaire, however, suggests that the respondents considered options pricing theory as a hedge theory and therefore already rated it as important. Likewise, some bankers commented that the CAPM is inseparable from portfolio theory.

The theory of direct foreign investment was considered relatively unimportant because it was based on ownership and therefore more useful to the MNCs than to the lending banks. Even in the case of MNCs investing in LDCs, the evidence shows that the relative importance of direct foreign investment has declined over the past two decades as the multinational companies have increasingly opted for new forms of investment such as project finance. The industry's needs to overcome the problems of investment and country risks are now widely accepted as being more important than the benefit of direct ownership. However, most of the principles, concepts and techniques involved in identifying and mitigating project-specific and country-specific risks are conceptually relevant to the theory of project finance.

The theory of financial leasing was, similarly, relatively unimportant. Most PF lenders considered leasing to be a sub-set of the PF structure that is secured by specific plants and equipment and which, therefore, differs from the concept of relying on the performance of the project as a going concern. Some PF bankers also thought that excessive reliance on financial leasing would reduce the credit-worthiness of the project for direct borrowing on its general collateral because some of its assets would no longer be available as collateral for the project lenders.

8.8 CONCLUSION

This Chapter tested the assertions of the research hypothesis-5 which relates to the conceptual bases and empirical functions of the PF theory. The method of testing included conceptual analyses and explanations based on the study investigations and also related established financial and risk theories to the subject of project finance.
The empirical justification for the theory of project finance was shown to relate to its strategic advantages when arranging a high volume financial transaction for a major project. These advantages cause a firm to maximise its demand for project-related debts while providing an incentive for bank participation in proportion to its risk-bearing capacity.

The nature of PF theory was found to be essentially an eclectic development on existing proven investment and financial concepts. The financial innovations of project finance involve the joint utilisation of tools, concepts and theories provided by existing investment and financial theories which include the application of traditional lending rules with regard to credit assessment and use of information.

The study explained the conceptual and strategic importance of project finance in terms of two functions which underlie the theory of project finance and which were suggested by the research hypothesis-5, namely: the transference of credit and risk transformation.

It has been shown that these functions reinforce each other and involve the extensive support of the sponsor and other third parties such as contractors and host governments which underwrite the credit-worthiness of a major new petroleum project. A segmented project entity is found to initially transfer credit from the stronger members to the weaker members which participate in a community of interest linked to the project entity: and secondly, it transforms the debt obligation of the sponsor from a direct corporate risk of a prime borrower to indirect risk of a subsidiary project company.

The corollary of these PF intermediation functions is two generalised concepts which relate to the implicit nature of credit risk; namely:

i) When financing a new project, lender's risk is effectively the corporate credit of the sponsors; and

ii) At the point where the new project matures to a stand-alone credit-worthy corporation, lender's risk is increasingly the credit risk of the new project.

All other concepts relating to the management of PF risks and the rules relating to the development of the lending package are not significantly different from those used in
conventional corporate lending approaches. However, the complementary inter-play of these related theories and concepts have been shown to explain project finance as a specialised market and an eclectic theory.

It has been shown that these functions result in a strategic advantage of high debt raising capacity for the project without a corresponding impact on the gearing of the prime borrower. The immediate effect of the PF arrangement is thus an increase in the borrowing capacity of project owners and the host country.
Chapter 9

SUMMARY OF RESEARCH FINDINGS AND CONCLUSIONS

9.1 THE STUDY INVESTIGATIONS

The overall objective of the research was to investigate the strategic choices and decision criteria involved in project finance and to examine the impact of PF on the borrowing capacity of developing countries which host major petroleum projects. This objective involved both empirical analysis of PF banking practice and development of normative criteria and concepts.

The research investigated the motives and objectives of borrowers, lenders and host LDC governments when choosing to support or adopt a PF strategy. The outcome of the logical intersection of established criteria and concepts of investment, finance, risk and bank lending which underlie the practice of project finance provided the conceptual explanation of the subject in terms of an eclectic theory. This theory provided the basis for linking proven concepts to the practice of project finance as a specialised branch of banking. The study investigations were guided by the following six research questions:

1. What is the typical pattern of project financing risks in the petroleum industry and how important is bank debt capital in the development of petroleum projects?

2. What is meant by the term "Project Finance"? Given that project financing involves lenders in essentially equity decision situations, how does the lending bank reconcile project risks with its sensitive capital structure?

3. What is meant by PF risks and what are these risks? Given these risks, how are they structured and how these structures provide the security needed by PF lenders?

4. Why do borrowers and lenders prefer PF structures to conventional loans, and why does PF strategy result in a higher ratio of debt finance than conventional loans?
5. What factors, other than the obvious availability of debt capital, are important considerations in the strategies of a host LDC government when choosing to support a PF structure?

6. What are the conceptual or theoretical justifications for lending on the credit of a new project, and to what extent is a bankable project entity a substitute for the credit risk of its sponsor?

These research questions were fully developed by the study and gave rise to five research hypotheses relating to definitional criteria, the functional strategies of the participants (borrower, lender and host country), and the theory of project finance.

Five sources of information were used for developing the above questions and testing the research hypotheses. Firstly, the study assessed the relevant literature on financial concepts and theories as well as journal articles and reports on project finance. Secondly, extensive desk research analysis was undertaken which identified the pattern of investment and financing structures used in the petroleum industry. The desk research identified 198 major LDC projects of which 73 were in the export sector and included debt capital input of 70% to 90%. Thirdly, interviews were held with major banks which are acknowledged market leaders in structuring and managing large project financing.

The fourth stage of the research involved the development of two case studies, representing project finance experiences in very high income and very low income LDC countries. The case studies included 22 world-scale projects with aggregated cost of investment in excess of US$ 18,000 million. The fifth stage involved the sending of a mail questionnaire to 100 major financial institutions and banks (including branches) in the UK and overseas. About one-half of the questionnaires sent were eventually discarded because the recipients departments did not specialise in PF banking or returned unanswered because the recipient bank was not a PF lender. The final and effective response rate was 49%. The questionnaire survey provided the empirical evidence for validating the research hypotheses and related assertions concerning the PF strategies of the borrower, the lender and the host developing country.
9.2 THE CHANGING STRUCTURE OF LDC PETROLEUM INDUSTRIES

The research investigations have shown that during the past two decades or so the LDC petroleum industry has undergone a structural transformation. It has become highly internationalised and has undertaken numerous projects where the capital requirements have been massive in terms of impact on corporate balance sheet and host country's balance of payments obligation. The study identified 73 projects with an average cost of US$ 577 million. These included 14 projects with costs between US$1,000 million and US$7,000 million. All of the 73 projects were in the export sector of the petroleum industry with a marked concentration in petroleum and petrochemical production, processing and transportation.

These projects included a considerable involvement of the multinational companies (MNCs) as partners and providers of technology and marketing services. The form of participation by the MNCs in LDC projects is found to vary depending on the resourcefulness and maturity of the local industry. In a capital surplus and resource-rich LDC countries (such as Saudi Arabia) this role is performed through a combination of minority shareholding in joint ventures and long-term service contracts. In the poorer LDC countries which have recently made discoveries of commercial reserves (such as Sudan) this role is generally performed through the use of a production sharing agreement.

These forms of investment participation by the MNCs are significantly different than the system of direct ownership and control which prevailed in the 1960s and 1970s. One outcome of this structural change in ownership and organisation of the LDC petroleum industry is the PF approach to funding major new projects. The international petroleum industry has displayed considerable ingenuity in designing financing arrangements for the LDC projects that permit increased external financing and at the same time minimise the multinational sponsor's exposure to the risks associated with major new projects.

While this helped to preserve the newly achieved ownership advantage of the host LDC country it facilitated the participation of the MNCs which are mostly based on the provision of non-cash capital resources and regulated by service contracts and
agreements. The availability of project finance has thus provided a good fit for the strategic needs of both the state and the MNCs when participating in a major LDC project. One result of such financial innovations has been a more frequent use of joint ventures between the MNCs and national organisations of varying financial strengths and credit ratings.

The need of the LDCs to diversify their economies into value-added export industries has resulted in even larger joint ventures. A joint ownership arrangement not only permits a pooling of the diverse skills, resources and expertise necessary for developing a complex petroleum project but also spreads the financing requirements and the risks of project failure across several international participants.

9.3 THE ROLE OF MULTINATIONAL COMPANIES

As most local and national companies lack depth of experience, the MNCs have invariably been able to play a major role as promoters of project finance in addition to their traditional functions as providers of technology and marketing expertise. The services of the MNCs were vital for the project and were found to largely underlie the credit rating of the borrowing projects.

The legal segmentation of the projects has been the main vehicle for the LDCs to develop major export capacities. This resulted in the benefit of long-term access to major sources of raw materials and basic products for the MNCs in exchange for the benefit of project credit support to LDC projects. The exchange of a real resource of the LDCs for the credit support of the MNCs is necessary because PF credit rating is sensitive to the technological and marketing considerations of project sponsors. Projects which depend on the participation of the MNCs thus permit increased reliance on project-related borrowing structures which include no recourse or a minimum direct recourse by the project creditors to the sponsors, use of multiple sources of funds, and indirect support provided by owners and other third parties based on economic and commercial interests.
9.4 DEFINITION OF PROJECT FINANCING

The linkage between the project and its sponsors is found to underwrite the commercial performance of the project and hence the primary security available to project lenders while the primary recourse is closely attached to the cash flow of the project.

The term "Project Finance" has been used in the literature to refer to this type of financing arrangement where the project itself is legally performing the function of the principal borrower and thus absorbing debt risk, independently from its parents.

The study evidence on PF practice showed that the legal segmentation of the project is not an absolute criterion in the sense that the PF structure attempts to re-establish strong interdependence between the project and its sponsors through a variety of undertakings and performance guarantees. The study estimated that only 7% of the PF structures may be classified as non-recourse on signing as would be suggested by most literature definitions. This compares with 93% of the PF transactions which incorporate some form of indirect or direct performance or a mix of financial and performance guarantees and thus do not fit the literature definitions. There is also a diversity of objectives, types of recourse agreements and other features of such financing which render most of the literature definitions too vague.

Therefore, the study asserted its own definition of the term based on analysis of the field practice. Hence the study definition was found to provide a good fit with actual criteria used by PF lenders and borrowers while it contributes to the development of a project finance theory. The study definition is as follows:

"Project finance is a structured lending package designed for independently viable investments on a future cash flow basis which permits high volume transactions without impairing the sponsor's gearing and embeds the creation and maintenance of a community of interest among all parties as a source of security for the project and its lenders."
9.5 DETERMINANTS OF PROJECT FINANCE

(a) The Borrower:

The field interviews, the questionnaire survey and the case studies showed that PF involves financial and risk strategies of the borrower in securing benefits associated with volume financial transactions for investment in new projects. The study survey showed that this motivation is related to internal financial and fiscal benefits as well as to investment and external risk factors.

The result of these benefits is a PF structure which results in enhancing the borrowing capacity of the project's parents. This was analysed in terms of overcoming the limitations of the debt capacity of the prime borrower to take on direct credit on its balance sheet. Of the respondents, 91% considered the need of borrowers to overcome their borrowing limitations to be very important.

The result of this strategy is a higher return on equity investment without endangering financial stability due to the debt obligations. The support of third parties (through a variety of undertakings such as completion agreements, purchase contracts, operating agreements, etc.) also results in diversifying away some of the major risks of the investment as well as market and country risks.

The borrowing motivation is also reinforced by the ability of lenders to assume risks which are appropriate to their risk-absorption capacity. The study tested 18 risk factors through the survey questionnaire and found that most lenders would readily assume those risks which they can diversify away through their organisational portfolio (e.g. inflation, currency exchange, and interest rate fluctuations). The study also found that increasing number of lenders would be prepared to negotiate project-specific risks if the reward was adequate and related safety criteria were included in the loan agreement. For example, 82% of the respondents confirmed that they would be prepared to negotiate the risk relating to rising operating costs and falling equity to debt ratio, 77% would negotiate lengthening of the repayment profile or adjusting for the impact of rising operating costs, 68% would negotiate more serious risks relating to market demand and prices.

This evidence suggested that the risk-sharing and risk-bearing capacity of project lenders is not very highly inelastic as in conventional lending and hence lending banks
can play a significant role in the management of project risks. However, most responding banks expressly judged major project-specific risks to be inappropriate for acceptance by the lender. The top five of unacceptable risks included "Project Completion" (91%), "Reliability of Technology" (91%), "Quality of Output" (86%), "Uncertainty of Contractual Commitments" (82%), and "Sizing of Reserve Estimates" (64%).

The opportunity to spread risk, however, is a real phenomenon and is found to involve all parties. This results in the debt obligation and risks to the prime borrower (the project parents) to be significantly less than the credit security and risk undertaken by the lender. This mismatch between the debt obligation to the borrower and the credit risk to the lender is found to distinguish project financing from a conventional corporate borrowing which relies solely on the general credit of the borrower through the provision of direct financial guarantees.

One important consequence of the financial strategy is the enhanced ability of the industry and the host LDC country to consider and finance much larger projects than they could with traditional financing. The outcome of enhanced borrowing capacity is testified by the typically high ratio of debt to equity which characterises project investments. Of the respondents, 78% thought that the phenomenon of high gearing is a reflection of a lower risk situation which is achieved by the application of project finance techniques.

The results of the field survey questionnaire confirmed that the borrowing strategy in project finance is dominated (58%) by considerations of internal financial factors which do not impact on the risk position of the lender. The achievement of these objectives are acceptable to the lender, because they do not involve taking additional risk while there is generally above average earning margins to compensate for the complexity and management of the debt structure that fits the borrower's objectives.

However, the risk aversion of the borrower also represents important determinants which account for 42% of all factors. These involve some direct risk sharing by the lender or risk diversification away to third parties (e.g. contractors).

(b) The Lender:

The main motive of banks for lending on the credit of a new petroleum project is their ability to control project risks as well as related organisational and country risks and
at the same time earn above average return on the loan investment. The field evidence confirmed this motivation as the dominant determinant in the lending strategy. Of the banks which responded to the study questionnaire, 96% considered the control of host country risks as very important factor in the lending motivation. Lenders seek PF primarily to overcome the threat of host country risks which cannot ordinarily be treated by conventional loan structures.

The survey also confirmed that PF structures resulted in less risky investment than other financing methods which rely on direct financial guarantees.

(c) **The Host Country:**

With respect to host developing country, the main motivation for supporting or adopting a PF strategy is the desire to retain ownership advantage and to overcome the deteriorating sovereign LDC credit rating in relation to capital- and technology-intensive projects. The performance of major petroleum projects require a new financing approach which the host LDC company is less equipped to perform than the MNCs. Lack of appropriate technology and global marketing capacity imposes a serious limitation on the credit rating of LDCs when financing a major petroleum project.

The study obtained empirical evidence which confirmed that lenders consider LDC credit much less desirable than the credit of the MNCs. The study survey results showed that most lenders (91%) prefer to rely on the supply and sales agreements of the MNCs and on their completion guarantees (77%) rather than on the direct credit of a host LDC government (41%). The credit support of the MNCs is relatively more important in the credit assessment of the project than the financial guarantee of an LDC host government. The responding banks rated the credit support of the MNCs as twice more important than the combined credit of the host LDC country and its national company. The need of the LDCs to improve their credit rating in relation to technology-intensive and market-sensitive projects is thus concluded as a major motive for supporting or adopting a PF strategy.

The sources of credit transfer to the host LDC country are assessed and tested by the study from the following perspectives:

1. The Credit of the Sponsor.
2. The Security in the Project.

3. The Location advantage.

4. Institutional Factors.


6. Legal entity of the Borrowing Project.

The survey results provided conclusive evidence that the host LDC country benefits from the higher credit rating of the MNCs. The support of the multinational companies was found to be a dominant factor in the credit assessment of projects in relation to development and marketing of export capacities. The project entity also permits segmentation and control of organisational and country risks. Of the responding banks, 96% confirmed that this factor is very important in their strategy of lending to the LDC projects. The project entity also facilitates a credit transfer to the host LDC country as a result of the participation of major private commercial banks, the export credit and insurance institutions, and the World Bank.

The study evidence showed that the concept of "Project Credit" results in a substantial transfer of credit benefit to the host country largely due to the participation of the MNCs and the financial institutions. Projects which exclude the support of multinational companies and financial institutions are considered least acceptable risk for project finance. The sponsorship of a MNC is rated as three (3) times more desirable than the sponsorship of an LDC government if the project is of industrial type and 2.5 more desirable if it is a financial vehicle company. None of the responding project lenders rejected the risk of MNCs while 52% did so if the LDC project is not supported by the MNCs. This rejection rate would be reduced to 9% if the project were supported by one or more of the MNCs. The internationalisation of LDC projects thus results in substantial credit transfer to the host LDC government.

This evidence clearly confirms that the flow of credit support is from the MNCs to the LDCs. It also confirms that in the context of financing major projects and risk assessment, the credit of the MNCs is more important factor than the ownership of a real resource when considering a major development which relies on the reliability of
technology and marketing experience. Project Finance thus contributes to LDC industrial development through facilitating the exchange of real resources for financial credit.

9.6 PF THEORY AND ITS IMPLICATIONS

The study provided a conceptual explanation of project finance in terms of an eclectic theory. The basis for a PF Theory is traced to modern innovations on established concepts of bank lending. These innovations were explained by the "Shiftability Theory" and the "Anticipated Income Theory of Loan Liquidity" which explained how lenders can overcome problems of liquidity by discounting loans in the secondary financial markets.

The break-down of traditional barriers between "money markets" and "capital markets" has also resulted in funding term loans by a number of hybrid financial products such as Revolving Underwriting Facilities (RUF's), Transferable Loan Instruments (TLI's), etc. Securitisation of debt has, therefore, introduced a multi-market approach to project financing which in turn has increased flexibility of finance available for industrial investment.

One outcome of these financial innovations is that banks no longer have to retain loan assets on their books until maturity. The primary focus of lending banks has therefore changed from maturity consideration to credit quality of the borrower and hence to problems of financial management and risk control. The field survey evidence showed that these concepts represent the essence of modern project finance theory. The research study has also explained the theory of project finance in terms of proven concepts of risk management and finance. The following concepts were judged to be most dominant in PF banking, as indicated by the confirmation response rates of the study survey:

Investment Appraisal (74%),
Risk Hedgings (65%),
Portfolio Risk Management (57%),
Accounting Methods (30%),
Corporate/Sovereign Lending (26%), and
Capital Assets & Options Pricing (21%).
The empirical evidence thus confirmed that the theory of project finance is truly eclectic.

The study analysed the PF-specific advantage of PF theory in terms of its function. This was defined in terms of PF criteria of reconciling the risk aversion strategies of borrowers and lenders with the ownership advantages of LDC countries without endangering anyone's financial position.

9.7 THE DEBT RAISING CAPACITY OF LDC PROJECTS

One outcome of the conceptual explanation of the theory of project finance was the concept of credit based on the vehicle of a new project entity. It has been shown that the debt carrying capacity of a segregated viable project is generally greater than that of its parents and results in strategic advantages to both the borrower and the lender. The desk research analysis and the case studies have illustrated a debt financing of 70% to 90% of total capital employed which is significantly higher than the 30% or so carried by the balance sheets of the major petroleum companies.

The study identified the main source of the enhanced debt capacity of a project to be the improvement in the risk-return characteristics of the investment due to its segregation from the sponsor's and country's risks and the facility of control. In addition, the risk to the lender is reduced as a result of risk sharing by the stronger members of the sponsors.

The conceptual explanation of the project credit has been further developed into two major intermediation functions of the segregated project entity; "Transference of Credit" and "Risk Transformation". These concepts are found to be the results of the project's linkage to its sponsors through commercial contracts, agreements, undertakings and guarantees of performance. A segmented project entity is found to serve two useful functions: Initially it transfers credit from the stronger members to the weaker members which participate within a community of interest linked to the project; and secondly, it transforms the debt obligation of the sponsor from a "Direct Corporate Risk" of a prime borrower to "Indirect Corporate Risk" of a subsidiary project company. The
evidence has shown that these functions define the relation between debt obligation and credit risk:

1. When financing a new project, lender's risk is effectively the corporate credit of the sponsors; and

2. At the point where the new project matures to a stand alone credit-worthy corporation, lender's risk is increasingly the credit risk of the new project.

It has been shown that these credit concepts result in a strategic advantage of high debt raising capacity for the project without a corresponding impact on the gearing of the prime borrower or the host country.

9.8 PREDICTIVE FUNCTIONS OF THE PF THEORY

The theory of project finance points to a basis for interconnecting the various PF concepts into a predictive model of a self-contained financial market. The basis of the predictions is the conceptual explanation of the causes and effects which relate to the credit concepts and portfolio management theory. The first set of predictions follows from the concept of "Transference of Credit", for example:

1. PF structure results in the debt obligation and risk of the prime borrower being significantly less than that generally assumed in traditional borrowing.

2. Partnership of credit-worthy sponsors results in enhancing the credit rating of financially weak borrowers and host LDC governments.

3. The greater the possibilities to diversify away equity risk the less the borrower's debt obligations outstanding compared with the credit protection sought by the lender.

4. The greater the commercial viability of the project entity the greater the scope for a non-recourse credit structure to mitigate the direct debt obligations of the prime borrower and the host LDC country.
The second set of predictions follows from the concept of "Risk Transformation" and includes the following:

1. The credit of a viable project entity is the surrogate risk of its principal sponsors and results in additive borrowing capacity.

2. The wider the credit support base for the project the greater the scope for lenders to accept the deficiency in the debt obligations of the prime borrower as compared with the total package of credit risk protection sought and obtained.

3. The project lender is able to equate its marginal risk-return of project lending with its marginal risk-cost of funding because the PF can be structured to fit the risk-bearing capacity of the lender to produce less risky investment than in alternative methods of lending on the general credit of LDC sponsors.

The third set of predictions relates to the concept of portfolio risk management and includes:

1. A PF lender will seek to ensure that the security in the project and the lending margins are not inferior to the security and price it offers for its continued funding. The lenders portfolio of project loans will therefore be such that its marginal risk-reward for holding loan assets will be equal (or at least comparable) to its marginal risk-cost of funding the project loan asset.

2. The less the availability of direct financial guarantees in a PF structure the more indirect performance guarantees will be required in order to firm up the project's inherent financial viability and collateral value.

3. A prudent lender will seek to enhance the value of its "lending safety net" until the residual risk is reduced to credit risk only (i.e. the probability of financial loss will not exceed a predicted ratio of the asset portfolio).
All of the above predictions are derived from the conceptual explanation of PF theory and these were validated by the case studies and the field survey.

9.9 RELEVANCE OF PF THEORY TO LDC INVESTMENT STRATEGY

The field survey, the case studies and the study's conceptual analysis have shown that the increasing demand for project finance is a manifestation of new opportunities which benefit all participants jointly though for differing motives and objectives. These opportunities relate directly to the increasing interdependence between banks and industry when financing major LDC projects.

The study has shown that the less developed countries which are endowed with rich resources but lack the necessary technological and organisational inputs of the multinationals, can and should benefit from project finance banking owing to its functions of credit transference and risk transformation. These functions are shown to result in financial discipline and a higher quality of investment. It is only logical that host governments should aim to encourage the application of PF structures for industrial development. LDC government which have not tapped this source of finance will benefit by re-formulating their strategies to attract PF investments for the development of major export capacities. The LDCs will find the contribution of this study directly relevant to their industrial development policies and strategies.

The study also addresses the needs of bankers and industrialists who wish to diversify their business internationally through PF participation in LDC projects. The research results should also be of interest to students of international banking and finance who wish to advance the subject through further research.

The study has shown that the PF market is international and includes LDC projects. In the future, the market for project finance is expected to be further strengthened through financial innovations. The subject will become even more important both as a proven tool for international investment strategy and as a theory of direct banking participation.
The major concern of this study has been with the development of the theory of project finance and its implications for the less developed countries. Project Finance is explained in terms of an eclectic theory which attempts to reconcile the essentially conflicting aims and objectives of borrowers, lenders and host countries.

The essence of the PF theory is shown to relate to its credit concepts which distinguish it from other forms of lending and involves the process of "Transference of Credit" and "Transformation of Risk". In relation to LDC petroleum projects, the credit structure is found to be sensitive to the quality of technology, global marketing capability and management experience of the sponsor companies as well as to the size and adequacy of the reserve.

It is shown that a PF structure results in a transfer of credit to host countries as a result of involvement by experienced and resourceful multinational industrial companies and banks which are more willing to rely on project performance risks than assume direct LDC sovereign and organisational risks. The result of this process is the transformation of a new project venture into a virtual credit-worthy corporate borrower with a capacity to manage high volume debt obligations independently from its parents.

The study has shown that resource-rich LDCs, which lack the needed technology and managerial inputs of the multinationals, can and should benefit from a PF strategy. A study of project finance is thus directly relevant for the industrial policies and investment strategies of the LDCs which have a capacity to develop major export capacities.

The increasing demand for project finance is also a clear manifestation of new opportunities which benefit all participants jointly though for differing motives and objectives. These opportunities relate directly to the increasing interdependence between banks and industry through the vehicle of project finance. They also signify a new role and accelerated trend for bank direct investment in major LDC projects.

The theory of project finance is thus shown to point to a basis for interconnecting the various elements of the subject into an integrated investment and financial system. This system is found to be dynamic, has its own causes, mechanisms of risk hedging and predictive functions and to result in real advantages to its participants.
The subject of project finance, however, is a very rich field for investigation and conceptual analysis. There is a need for more research work to expand more fully on the study's many assertions and hypotheses than is possible in the scope of this thesis.

A rich field for investigation will be the applied techniques and benefits relating to the application of the Capital Asset Pricing or Option Pricing theory in assessing risk sharing schemes and choices among capital structures for major projects. The study survey has shown that the potential of these theories has not been fully appreciated by bankers.

It will also be useful to further develop the concept of the lender's safety net in project finance and analyse the empirical evidence. In particular, there is a need to correlate the successes and failures of PF structures with the types of security devices being devised or implemented in less developed countries. In this respect an analytical survey of guarantees used in project finance will be very useful. This could show the role of the moral doctrine and other concepts of linkage which do not rely on conventional guarantees. There is hardly any empirical evidence of any MNC that has allowed its projects to default on their loan obligations. Another area which could be studied is the efficacy of financial and non-financial guarantees as used in project finance.

With the focus on the LDCs, useful research could be undertaken to investigate the different approaches being used to finance major development. For example, the progress achieved by countries such as Saudi Arabia which have active strategy favouring PF structures might be compared or correlated with the successes and failures of those other LDC such as Algeria which rely largely on sovereign debts.

The relative position and role of politically funded banks and financial institutions as well as the borrowing capacity of state-owned enterprises could similarly present useful and interesting research work. In this regard it might be an empirical issue to test whether there is a significant difference between the lending criteria of commercial banks and those of politically funded or politically managed LDC financial institutions when participating in international project finance.

There are hardly any empirical studies covering these topics. Given the increasing number of joint ventures based on partnership between the MNCs and LDC state-owned entities, there is a need for a great deal of research work to examine these issues.
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