PROJECT FINANCE: ANALYSIS AND CASES

by

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Abstract

This thesis was conceived of as a first attempt to relate the growing new field of project finance to the formal models and analysis of modern finance theory. Initially, a cursory description of project finance as it is currently seen by the major United States financial intermediaries is developed and comments are made on this exploration. Three cases of project finance and a flowchart of project financing activities are provided to give the reader a working exposure to the field and to provide a basis for the unfolding of some descriptive models. Finally, some tentative steps are made at explaining in formal terms what is really happening in a project financing with an eye towards eliminating many of the myths that currently surround this useful but poorly understood financing technique.

Thesis Supervisor: Stewart C. Myers

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Finally, a special note of appreciation is due my wife, Sandra, for her near-heroic toleration of the outrages of having a husband more closely associated with his typewriter than his wife for too many weekends and evenings.
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Project finance is the providing of funds to a particular economic unit where the lender looks principally to the cash flows of the unit to repay the loan and where the credit of the parent company or companies is not directly supporting the loan. Project finance is also a relatively new term in banking, and an idea which has attracted much attention in the last year. Unfortunately, project finance is also a poorly defined concept that is misunderstood by a large proportion of its potential users.

It is not unnatural that project finance would develop a mystique that has acted to cloud the realities of the concept. The name itself has a grand, larger-than-life ring to it, and full color multi-page advertisements in the major business magazines that are done in a sort of Neo Art Deco-Social Realism are not the sort of thing to keep a cold ordinariness in the minds of managers. The projects themselves are often huge\(^1\) and located in exotic climes and geographies. It is hard indeed to think of these financings in the same context as such prosaic things as term loans and construction

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\(^1\) It helps put project finance into perspective when one realizes that $100 million deals are common, $500 million deals not unknown, and several multi-billion dollar deals are in the proposal stage.
financing.

If there is such a thing as a "popular" concept of project finance, it is definitely associated with huge natural resources projects in the lesser developed nations. Two other important features would be the idea of near 100% debt financing combined with a stand-alone packaging where only the cash-flow from the project is available for repayment of the loan and the idea that there is no risk to the parent company that the banks can come back to them in the case of failure. The final element involved is the idea that somehow banks can be made to accept almost all of the risks of a project, leaving the owners with a nearly cost-free right to the remainder profit after debt service. Unfortunately, these delightful ideas are just not so.

The purpose of this thesis has been to blend the observations of individuals active in project finance with insights drawn from modern finance theory; the specific application of this has evolved continually over the span of its research. Initially, the objective was to find out what project finance was and to gain a perspective on how banks engaged in the activity. As time wore on, however, it became clear that there was no simple definition of project finance, and the problem shifted very much to understanding what sort of things were called "Project Financing" and what sort of theoretical justification could be found for those financial activities. In the end,
it became apparent that the best that could be hoped for were a few simple ideas about why project financing can be done and a limited exploration of those circumstances that might make a firm wish to use the general idea.
Two Caveats

This thesis has been written very much from a theoretical standpoint, and, as such, there is considerable variance with respect to what the real world perceives as project finance. The most important variance has to do with the value of the project, which is assumed in this work to be determined by the adjusted present value method: the value of the project is the present value of the future cash flows discounted by a rate that depends only on systematic risk of the project and adjusted by the present value of the tax shield. Bankers and others tend to accept discounting either by a weighted average cost of capital or by a weighted average adjusted by "feel" for all risk. Since these rates tend to be much lower than APV rates, the result is a quite high present value. This difference of viewpoint is not well accepted by many individuals in the real world and has led at times to a very negative reaction to certain of the ideas.

The second caveat is simply a reminder to the reader that this paper is neither a survey of current project finance practice nor an introduction to the field. In the intention of developing a theoretical understanding of project finance, much descriptive material has been left out. There are many complex business issues

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2 Myers (24)
not covered by finance theory that are quite important in project finance, and it would be most unwise to believe that this somewhat simplistic paper is a complete introduction to project finance activity.

Nevertheless, this thesis will hopefully provide a well-prepared individual with some insight into project finance. This is hardly the last word in the theory of either project lending or financial intermediation, yet at the same time, it is to be hoped that some small insight can be gained by looking at the area in the light of modern theory. If nothing else, this thesis hopes to demythologize the field of project finance and to begin to subject this field to a more rigorous analysis than has heretofore been the case.
The financial institutions, especially banks and insurance companies, are the key elements in what is currently regarded as "project finance." These private sector lenders are the source of a great deal of the money and much of the organizational talent that is applied to these efforts in the mid-1970s. This paper is oriented towards looking at project finance through the eyes of an institution-oriented theorist rather than from the viewpoint of either the host government or the equity participants. The essential question throughout this work will be what is "project finance" as it effects the intermediaries.

Definitions

As bankers see it, project financing is the providing of funds to a particular economic unit where repayment is principally expected to come from the cash-flows of the unit and where the credit of the parent or parents is not directly involved. Structuring a financing so as to provide adequate credit support while minimizing the parent's
exposure is the prime problem in arranging a project financing. It is
of particular, but not exclusive, use in funding very large or inter-
national projects where the sponsors wish to reduce the exposure of
their capital structure to the risk of mammoth investment and new ac-
tivities.

The international part of international project finance has
been much better covered in the literature than other elements of this
activity. The interested reader is referred to the abundant materials
on political risk, foreign exchange, and direct investment. What is
at issue here will be the core of the project financing, the project
loan, net of the foreign questions. The previously given definition
of a project financing gives a good base for narrowing the scope of en-
quiry, although anything that gets called a project financing will have
some claim to being discussed. What is specifically excluded, however,
is anything that can be viewed as an ordinary term loan with a direct
credit and a large number of "extraordinary" financial arrangements,
where the credit does not come directly from the parent organization
yet which are not financed and are not supported by an autonomous pro-
ject. Oil production "carve-outs" are the best known example of this
class of financings.

3 See, for example, Rodriguez and Carter (10)
Something very explicitly not included in project finance are leases. There have been a few projects that have been almost completely financed by a lease: The Anaconda aluminum reduction plant is the classic example. Under current tax law, however, there must be a substantial residual value at the end of the life of the assets' life. The essence of a project financing is that the owner equity somehow carries its own weight, but may give the impression of being extremely levered. Obviously, there is something of an artificiality in separating lease from project loans, but it is essential if project finance is to be a meaningful term and not a zero-content buzzword.

An important issue in project finance that is not very clear to non-bankers is the difference between direct credit and adequate credit support. If the loan is a direct credit obligation of the corporation, then any cash flow of the firm must be available for the repayment of the obligation. It is a debt as it is commonly understood. Adequate credit support has to do with the existence of contracts or other agreements that make the project viable and the degree of faith that the lender can put on them. In an oil-production project, for example, a take-or-pay contract by Exxon would be an acceptable credit backing if it covered enough of the costs of the project to make cash flows secure. Credit support is essentially having someone to fall back on if the basic project does not work out. Credit support can be an
important issue when a parent cannot give direct credit backing to a project due to limits imposed by other debt covenants or related constraints.

History

Project finance is nothing very new. Most bank loans are made on the basis of an adequate cash-flow in a company that has no external credit backing. Most construction financing, for example, can be considered as a form of project financing. What is unique about project finance and why it has come into the public view recently has been its use by major corporations to finance massive foreign investments. Non-recourse financing of some sort has been used by major U.S. corporations since at least the end of World War II, and there are some marginal cases throughout the history of banking. The first event that is well recognized as a "modern" project financing was the British Petroleum Development funding for the Forties Field of the North Sea Oil find, initiated in 1971. By 1973, Project Finance was a recognized issue in commercial banking, and a few of the largest and most sophisticated banks were beginning to develop
guidelines for integrating it into their ordinary lines of service. By late 1975, project financing was becoming one of the newest fads of commercial banking, and several major seminars were held to explain to all comers how project financing was done. Educated guesses are that in 1976 about 1000 "deals" will be done that could vaguely be called project financing.  

Criteria

Over the last year or so, certain criteria have developed as to what kind of opportunities are viable possibilities for project financing. Unspoken, but inherently a part of the list, is the insistence that the project be an entirely independent economic unit and not simply a part of the ordinary business of the parent company. These basic and almost universally accepted characteristics are:  

1. There is a strong credit backing up the cash-flow

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4 1000 was a fairly consistent guess by several bankers and investment bankers asked. Major projects were thought to run from 30 - 50 with major defined as more than $70 million. Of these, about half will be international.

5 All of these criteria are grossly generalized and overstated, but they reflect important considerations to project lenders.
projections, either from the sponsor or from a third party, such as an important customer. While the guarantee need not be too direct, in the end banks and other institutions require someone they can fall back on if all goes wrong. Optimistic cash-flow projections and the collateral of the project itself are not adequate backing.

2. Lenders are lenders, and they only take credit risks, not equity risks. No matter what compensation is offered, in the financial markets of the mid-1970's no lending institution is going to be interested if asked to take "excessive" risk. In particular, market risks, raw material risks, and new technology risks cannot be accepted.

3. Projects must not only be financially and economically viable, but robust. There are far more projects available than there are funds to support them. Anything that cannot support a major cost overrun, a technical crisis, and a serious decline in the market and still come up looking like a gold mine probably will get a very cold reception when the time comes to finance it.

4. Management, financial, and technical resources must be available in the sponsoring company or companies to make the project work. Project finance is not venture capital, and there are just too many risks in start-up situations to warrant adding them to an already risky proposition.
5. There must be a balance of economic benefits to the parties. Creating a situation where one participant can either benefit from not playing along with the others or can spoil the project at little cost to itself is an invitation to blackmail at best and total anarchy at worst. Contingencies must be planned for and an incentive structure devised that directs all participants toward the same end.

6. The project must be able to pay itself off over the life of the financing. Refinancings are always tricky, and it is a poor bet to be placing one’s faith in the capital markets five to ten years from now unless there are major justifications available, such as a fall-back credit of a substantial government.

7. For most international financings it is not reasonable for the lenders to take a significant exchange risk. Projects should have their income in major convertible currencies and preferably in the same currencies as its obligations.

Lender's Analysis

The analysis of a proposed project loan is usually a complex combination that involves everything from the most sophisticated of
computer analysis to a classic use of traditional character analysis and reputation. Some of the analysis that takes place will not be discussed below, principally the foreign exchange exposure risk and the development of sources for concessionary cost funds such as Export-Import Bank money and World Bank development loans. It is not that these are in any way insignificant, but better studies of what goes on in these realms have been made and they obscure the issues of the principal thrust of this work.

The first task faced once the possibility of doing a project financing has been submitted to a lending institution is the simple determination of whether or not the bank or other organization is interested in taking this particular piece of business. The character of the proposed borrower, the nature of the venture, and other commitments of the lender have to be taken into account, and a policy decision made on whether or not this is "their kind of business." The decision process is often very informal at this stage; yet, at the same time, once this stage has been passed, there are many intermediaries for whom the remaining analysis is principally a formality. While this tends to suggest that there is a large subjective element in these financings, it is likely that what has been happening is a very intuitive analysis based on experience and a knowledge of the
character of the borrower.

Once a decision has been made to take the business, the almost universal next step is to determine exactly what are the potential risks, the significant risk variables, and to run a cash-flow sensitivity analysis on the projects. The risk analysis is usually broken down into marketing risks, principally price and quantity; input risks, including reserve risks in a natural resources project, raw material, labor, and material; and operating risks, including costs and "will it work" questions. Other major risks commonly looked at include taxation, government regulation or expropriation, and completion. Financial risks, especially the consequences of increases in interest rates and the inability to raise further capital at times of need are often also explored, although usually separately from the "real" analysis. Many decisions are made at this preliminary level, including a general feeling for what are acceptable risks, and tentative plans for ameliorating unacceptable risks.

Cash flow analysis can run from very simple straight line single value pro forma worksheets to complex dynamic simulations with up to fifty variables. 6 The most common approach is to generate

6 The major New York City bank that has this computer system is not too happy with it. After putting a project through the machine analysis, they usually end up putting a bright young MBA to work with an adding machine and slide-rule (they claim not to trust electronic calculators!) to grind out a very simple paper and pencil alternative analysis with 10 to 20 "likely cases."
by computer a large number of cash-flow tables by iterating through five to ten of the most important variables over "reasonable" ranges, and assigning some implicit probabilities to each of the proposed alternatives. A Management Sciences expert from another New York bank suggested that one of their analyses with 220 alternatives should capture 85 per cent of the possible "futures", and the less formal risk analysis would capture most of the remaining traps.

Once the sensitivity analysis, of whatever form, has been done; the bankers should feel secure about whether or not the deal can be "done." While a few financings have been consummated on the basis of a paper and pencil simulation done overnight by a junior lending officer, in most cases the risk analysis takes from a few weeks to a few months, and the results of the first crude measurements are refined through the expansion of data and a developing "feel" for the problems. Most banks tend to devote twice as many man hours and sometimes three times the time to a project financing than they do to an ordinary term loan of equal size and complexity.

Managing a Financing Package

Once the viability of a project financing has been established
the next task is to prepare the loan package. Usually this is on a captive client basis with only the client's ability to negotiate or refuse the package as a constraint; but for the extremely large project financings that attract the most notice, there is a substantial amount of competition between the top twenty U.S., U.K., and European banks. Many of the issues are indistinguishable from any ordinary loan, but there are a few very important areas of differences:

Pricing

The pricing of a project financing depends a great deal on the attitude of the lending institution. Some banks, such as Citibank and Chase Manhattan, charge separately for "consulting" services of analysis and structuring. Most banks, however, "wrap in" the costs of preparing the loan. There are basically three elements that go into the pricing of a loan. The first is the actual "cost" of the money: essentially the return expected on securities of equal risk in the market. In a world with default, it should be noted that there will be a difference between the expected rate and the stated rate. The stated rate will be higher than the expected rate because in some states the bank will receive less than the stated amount, so the stated
rate will have to be set to allow for this. The second element of pricing a loan is the cost, expressed as a percentage of the face value of the loan, of generating the loan and servicing it. A third cost, related to the second, can be seen as a sort of insurance premium against the expected costs of default in terms of additional servicing costs.  

There is little systematic evidence on the cost of project finance, and none on the breakdown of charges on the above morphology. By 1974, however, there was evidence of about a 3½ per cent to a 4½ per cent spread above prime on domestic dollar financings. It has been estimated by individuals at Chemical Bank that 1½ per cent to 2½ per cent was explained by risk factors and that most of the remaining 2 per cent could be explained as the costs of organizing the financing. Since the average life of the financings studied here was about five years, these figures are not inconsistent with 6 per cent to 8 per cent estimates received from Morgan Stanley and Citibank for "consulting and organization" costs.

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7 The costs of foregone interest and capital in the case of default is covered by the difference between the expected rate and the stated rate.

8 Castle (15)
Syndication

For a variety of reasons, including risk spreading, legal lending limits, and simply the awesome amounts of money involved, many project financings have to be syndicated. In general there is a lead banker, who handles the problems of administering the loan, and a large number of participant banks who provide money and simply collect interest. The structuring of a syndication may be a complex problem if there is strong divergence between the best interest of an individual member of a syndicate and the syndicate as a whole.  

The forming of a syndicate is itself one of the more obscure artforms of modern banking. The structuring must be such that no one bank has a role that is more important than the lead bank, and at the same time it is important that the success of the financing does not become dependent on some small "spoiler" bank which can blackmail the major participants by threatening not to "go along" with the actions of

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9 One of the most frequent sources of conflict in any bank loan syndication is the division of the returns from the loan. In general, the lead bank gets a substantial "fee" expressed as a per cent of the annual interest for organizing and managing a loan, a few other large banks get a smaller interest bonus for "advice to the lead bank," and the remaining participants get essentially "clean" interest plus a small participation bonus. In a project financing with a prime plus 4% loan, the lead bank will get 125 basing points on the money provided by major banks and up to 175 basing points from the smaller participants, assuming that the cost of organizing the loan is 2% on an annualized basis.
the majors. There is no really objective way to describe the process of putting a syndicate together. Syndication officers of major banks almost always describe what they do as "feeling out the market," and further investigation almost always leads to descriptions of many questions asked of other participants in the relevant markets, review of previous experience, a lot of gauging the enthusiasm and seriousness of the responses of various "sources," plus a great deal of just plain intuition. Syndication works, but even the participants are not sure why or exactly how.

Loan Terms

The setting of the terms and conditions of a loan is much more an issue of negotiation than rational analysis. In general, it is possible to see two kinds of terms and conditions in a project financing. The first are what can be called "real constraints"; in doing the analysis it becomes apparent that there are some conditions that will have to be met if the financing is going to be viable. The other set of conditions are what can be described as "lawyers limitations," clauses that are imposed by the legal requirements of "completeness and specification." While the real constraints arise out of the analysis
that leads to the loan and are the province of the business field, legal limits are usually negotiated around if they start to become binding, and as often as not the lenders spend as much time as the borrowers trying to minimize the legalism. The most often used conditions in project finance are guarantees of completion and maintenance of working capital by the parents and a limiting of the project to specific activities.

In addition to the specific covenants affecting a project financing, loan covenants have another important effect on the existence of the form. Many of the firms which have done project financing have been under pressure due to the constraints from other borrowing agreements. Project financings, like leases, often are not covered by general constraints against other borrowing by the firm. If outside funds are needed to make a project viable, this format may be the only open route.

The Roles of the Intermediaries

There are four general categories of financial intermediaries that are involved in project finance. Commercial banks are the dominant institution and provide both most of the money and most of the organizational skills. Investment bankers also have tried to take a role
in the structuring of project financings, but since they must end up using the commercial banks they are in general at a competitive disadvantage. The insurance companies, partially due to legal limits but also due to a lack of quality management, have avoided playing much of a role in the field. Concessionary finance groups, usually government sponsored, have had a small but important role in the international field.

Commercial Banks

Commercial banks provide the most complete line of project finance services. Several of the major money center banks in both the United States and abroad have organized separate project finance departments, some of which are actual lending units while other are fee-for-service consultants and co-ordinators. The major banks involved in this field are quite capable of doing all the required work to bring a financing from a rough idea to a completed, paid-off project. The most important function, of course, is the analysis of the project and the securing of funds for the borrower, including providing assistance in accessing other commercial sources and the government agencies.
Almost every bank in the top fifty has had some involvement in project financing, but a not unreasonable guess is that the top ten American banks provide 80 per cent or more of the U.S. loans in terms of being a lead banker. This same group of ten probably has a 50 per cent share of the world's project loans. Of the loans that go through the U.S. banks, it is likely that 30 per cent to 40 per cent of the funds are derived through the Euro-currency market through London Merchant Banking subsidiaries. In International Project Finance, it is likely that the commercial banks of all nations provide 95 per cent of the commercial funds and about 70 per cent of total funds. In domestic projects, it is likely that banks provide well in excess of 90 per cent of all fund borrowed. While focusing on the importance of the major banks in project finance, it must be remembered that through syndication and correspondent bank arrangements there are some quite small institutions that have participated in project financings, and $25 million dollar banks have been known to take a flyer on organizing a project financing themselves.

Investment Bankers

Investment bankers are the traditional source of assistance for "major" financings in this country, and they have taken some role
in structuring project financings, especially those of a very large size. They are crucially important in those unusual cases of a project financing using a public issue, and can be very useful in assisting with bank or private placement funding. They are at a serious disadvantage, however, in these two areas, due to the necessity of adding their own charges onto the fees of the intermediaries. Knowledgeable individuals in both banking and investment banking have suggested that an investment banker suffers about a 30 per cent to 50 per cent price disadvantage\(^\text{11}\) over a commercial bank in arranging a project financing, and it is becoming clear that potential customers see no real product differentiation in this market.

Because banks will always do their own analysis and in one way or another charge for these services, it is not clear that investment bankers will ever be in a position to eliminate the cost disadvantage due to redundancy. It is interesting to note that in the process of researching this work, a substantial degree of resistance was encountered in researching the investment banker's view of project finance, and a very defensive attitude was exhibited by most of those few individuals

\(^{10}\) These figures are very unofficial estimates from the World Bank, which have to be corroborated by other sources.

\(^{11}\) About 25 per cent of the cost disadvantage is caused purely by redundant analysis and 75 per cent by higher costs of doing a specific piece of work, mostly the result of higher salaries and lower specialization of the personnel used.
spoken to. Except in very extraordinary situations which may require the expertise of the investment banker in public issues or creating new forms of financial securities, it is not clear that investment bankers have much of a future in project finance.

Life Insurance Companies

Legally, life insurance companies cannot invest more than a very small fraction of their assets overseas, and as a result have more or less been totally excluded from international project finance. On the domestic scene, however, there are no real constraints that would prevent the insurance companies from taking an important role in project financing. One of the most commonly recognized problems in project finance is the lack of a good source of long-term funds, and the insurance companies are well positioned to provide the answer to this gap. Unfortunately, the lending authorities in the insurance companies seem to suffer from a lack of vision as regards project finance. No need is seen for a marketing function in any of their lending, and as far as project financing goes, they are willing to consider only a "golden few" laid at their feet by bankers and investment
bankers. 12 Except as passive providers of money, these institutions seem to have little interest in project finance, and are totally unwilling to make the major contribution of time and talent that would be required to make them active participants in the area.

An entirely plausible scenario involves an increase in the participation of insurance companies through the offices of the investment bankers. This is currently how most of the insurance money available for project financing is obtained. The insurance companies, even more than the bankers, are unwilling to accept an outside analysis of a prospect, and none of the companies seem to be willing to invest the time or talent required even to make a review of an outside recommendation.

Concessionary Finance

There are two principal categories of concessionary finance organizations involved in project financings, export-support banks and development banks or funds. Export-support banks are institutions such as the U.S. Export-Import bank that exist to facilitate or provide

12 By chance, the author was able to interview an investment banker and the insurance company lending officer working on the same deal. The mutual animosity was remarkably high.
financing of exports. Almost every developed nation has such an institution, and, depending on the policy of the respective government, these banks provide funds for specific exports at anything from pure commercial rates on down to extremely low rates, intended to stimulate sales. They have a very important role in international project finance in that they can cover a good deal of the costs of industrial machinery, and usually at something of a savings. It is not at all uncommon for export credit agencies to cover 25 per cent to 40 per cent of the costs for a capital-intensive project. The availability of this kind of money is one of the first things that a bank will look at when investigating the viability of a project.

Development banks, such as the International Bank for Reconstruction and Development (World Bank), have a very important role to play in project financing in the less developed nations. While they are seldom major sources of funds, the participation of these institutions is often structured so as to provide insurance to commercial equity holders and lenders. If a nation's credit at these institutions depends upon their good behavior with respect to a project, it is less likely that they will behave in a totally self-interested way and expropriate or otherwise impair the value of the project. Development banks can also be of significant importance in structuring a financing by providing assistance and resources that otherwise either might not be available or which would be quite expensive for a commercial partner to acquire.
Chapter 3

CASES

There is no such thing as a characteristic or representative case in project finance. There is always a vast difference between even relatively similar examples, and the field is too young for even procedural standardization to have set in. What are presented here are three cases that for one reason or another reflect much of what is going on in project finance in the middle of this decade. While there is no pretence that these cases are a reliable guide to either how a financing is run or should be run, they do tend to reflect successful experience rather than the heroic disasters of the field. If these cases provide enough background to the reader so that he can recognize a project financing if he trips over one, then they will have fulfilled their objective.

The cases are followed by a "Project Finance Financial Activities Flow Chart." This is included essentially in lieu of another case and should be seen as such. In no sense is this an absolute "must follow" procedure, but rather one possible way of dealing with the process.
Case I

The Foxhead Warehouse Project

The Foxhead Warehouse project is a relatively small real estate project which took on many aspects of the classic project financing due to both technological innovation and the complex economic needs of the participants in the eventual financing. This case is particularly interesting in that it shows in a microcosm the forces at work to lead to complex financial arrangements, while at the same time being on the scale of ordinary business activities in a common situation, so as to dispel much of the aura of the exotic which has come to surround the idea of project financing. In this particular case only the names of the participants, the exact numbers regarding the financing, and the geographical detail have been altered to maintain the confidentiality of the transaction.

The central figure in the Foxhead project was James Richards, a 43-year-old vice president of Cenplex, Inc., a commercial construction contractor of Cleveland, Ohio. Due to the death of a wealthy relative, Mr. Richards had inherited a sizeable amount of money and was investigating possible investments in the $50,000 to $70,000 range, with a preference for industrial or commercial real estate. While on a business trip to Toledo, he had occasion to discuss with several executives of
the Holt Machine Tool Company the problems that they were having finding adequate high-bay, high-bearing strength floor warehouse space. After further discussion with other area executives, he discovered that there was in fact a serious shortage of these facilities in the Toledo area, and that several companies were having to ship goods to Detroit for storage. From his knowledge of heavy construction he estimated that an adequate structure could be built for about $350,000, including interest, plus the cost of land, and that banks would commonly lend about 85 per cent of the costs of construction. With leased industrial land at a rate of $64,000 a year, the going rate for this type of warehouse space in Toledo ($9.25 per square foot per year) yielded a cash breakeven utilization rate of less than 40 per cent. A brief discussion with his boss convinced Mr. Richards that this was a viable investment opportunity, and he arranged for meetings with a number of Toledo bankers.

William S. Reed was a senior lending officer with Ohio Westshore National Bank, specializing in industrial construction loans. He met with Mr. Richards on the afternoon of February 4, 1974, to discuss the loan for the warehouse. While it became readily apparent that the bank would not be especially interested in funding the project, Mr. Reed did suggest that Mr. Richards should talk to
the AirRider Corp. about its latest development in materials-handling equipment. Several days later, Mr. Richards returned to Cleveland convinced that while the installation of AirRider equipment would cost close to $100,000 more than the simpler equipment he had originally planned (financed over five years), it would place him in a situation where he could substantially reduce operating costs while at the same time increase the potential utilization by close to 25 per cent.

Mr. Richards had hoped to arrange a 15-year industrial mortgage to cover all of the costs of construction, but he had found nothing longer than seven years, and that at a floating rate almost 3 1/2 per cent above prime. He was becoming somewhat disenchanted with his project, and was considering abandoning it all together. On February 19th he received a report from the soil geologists he had hired which indicated that the land he had intended to lease probably was not adequate to sustain the loading he was proposing for the warehouse, and on that basis terminated the project.

In early April, 1974, the planning staff of Holt Machine Tool submitted their capacity report to the Board of Directors, which included a strong recommendation that provisions be made for substantial expansion of high-bay, heavy load warehouse facilities. Unfortunately, and efficiently sized unit would have almost 50 per cent excess capacity, and at the same time it was unlikely that other local firms would be
willing to use "captive" warehouse space. After some discussion with the executives of the company, it was decided to contact Mr. Richards and to put him in touch with Holt's Chicago Banker, Mid-American Trust.

Jay Sanchez, Mid-American's representative, met with Mr. Richard and the Holt executives on April 14, and arranged for a meeting with the Special Projects group in Chicago on the 19th. The Mid-American people thought that they could arrange financing without too much difficulty after listening to the plans; and, after a few days, Sanchez called a meeting in Toledo to lay out the basic plan. Holt would buy a site for the warehouse on the Foxhead Industrial Park, which had been previously shown to be adequate for the load, and lease it to Richards at its fair market value. Mid-American would finance the land through its mortgage group for ten years, but the lease would be for twenty years, with a renewal option, and the lease payment would be subordinated to other debt. The bank would finance the construction of the building itself, with 65 per cent of the cost covered by a twelve-year mortgage and another 20 per cent, the cost difference between this structure and an ordinary warehouse of the same size, covered by a seven-year floating-rate term loan. These loans were to be secured by a lease to Holt for twelve years whereby that company was obligated to take 40 per cent of the available capacity at the now current $9.25
rate. Cenplex would build the structure and guarantee that it would be completed on time and at the cost specified. Meanwhile, Ohio Westshore would lend 100 per cent of the cost of the AirRider equipment on a floating-rate five-year term loan secured only by a lien on the equipment but with a guarantee by AirRider to cover any deficiency between the resale price of the equipment and the outstanding balance of the loan, up to a limit of 20 per cent of the loan balance. The papers were signed on May 3, 1974, and construction began on June 6.

The structure was completed in January of 1975, and by May of that year utilization was running an average of 55% with peak utilization in April hitting close to the 85% physical limit. Foxhead warehouse was extremely successful, and there were no doubts that all the loans would be paid off. Interest rates had in the meantime eased off significantly, resulting in a significant reduction in expense and increase in cash-flow. On May 27th, however, the AirRider Corp. filed Chapter 11 bankruptcy. While Ohio Westshore had no intention of calling their loan, Mr. Reed was desirous of changing some of the clauses in the contract. Initially, he requested an acceleration of the payments to his bank, which Mr. Richards was agreeable to, but Holt objected on the grounds that this would seriously hinder the "cushion" that they felt was protecting the payments on the land lease. Holt in fact was rather unhappy with the entire deal, as their business was in the middle of a
slowdown and their expected utilization of the warehouse for the next twelve months was projected to drop to about 30 per cent. Jay Sanchez was called in to coordinate the renegotiation and to represent Mid-American's interests. Mr. Richards did not have much need for current cash and was willing to meet whatever reasonable terms Ohio Westshore could arrange, but he was unwilling to allow Holt to be relieved of its contract for space. Holt, Mr. Reed, and Mr. Sanchez quickly came to an agreement whereby Mr. Richards would use 70 per cent of his cash-flow over and beyond what was required to pay the lease to accelerate the payoff of the Ohio Westshore loan in exchange for Holt's lease being reduced to 35 per cent of the available space. Mr. Richards remained adamant, however, that he had no sane reason for sacrificing $23,000 in lease payments, and that Ohio Westshore could go ahead and call the loan and that he would go borrow funds elsewhere. Sanchez, who considered Holt an important customer and was more interested in aiding them than Mr. Richards, noted that Mid-American had a right to refuse Foxhead warehouse permission to borrow from another source, and that he would invoke that right in this situation if he had to to make Mr. Richards behave more considerately towards Holt. Richard's counteroffer was that Holt should continue to pay for 40 per cent of the warehouse space each year but could accrue credit for unused space to offset against future uses. This formulation was generally acceptable to all parties and was entered into officially on June 19, 1975.
Foxhead Warehouse

Cash Flow and Income Analysis: First Plan

<table>
<thead>
<tr>
<th>Item</th>
<th>40% Utilization (Guaranteed)</th>
<th>40% with AirRider</th>
<th>60% Utilization (Guaranteed)</th>
<th>60% with AirRider</th>
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<tbody>
<tr>
<td>Land Lease</td>
<td>$64,000</td>
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<tr>
<td>Mortgage (8%)</td>
<td>34,757</td>
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<td>Taxes (Property)</td>
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<td>Loan on AirRider</td>
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Foxhead Warehouse

Cash Flow and Income Analysis: First Plan (continued)

**INCOME**

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<th>Item</th>
<th>40% Utilization (Guaranteed)</th>
<th>40% Utilization with AirRider</th>
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<th>60% Utilization with AirRider</th>
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<td>Land Lease</td>
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<td>Depreciation (15 years)</td>
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<td>Taxes (property)</td>
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### Foxhead Warehouse

Cash Flow and Income Analysis: As Done

#### CASH FLOW

<table>
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<tr>
<th>Description</th>
<th>40% with AirRider (Guaranteed)</th>
<th>60% with AirRider (Expected)</th>
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<tr>
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<td>Term Loan (12%)</td>
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<td>Operation and Maintenance</td>
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<td>Income</td>
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<td>Available for Subordinated Land Lease ($70,000)</td>
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<td>Cash Surplus After Land Lease</td>
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Foxhead Warehouse

Cash Flow and Income Analysis: As Done

<table>
<thead>
<tr>
<th>INCOME</th>
<th>40% with AirRider (Guaranteed)</th>
<th>60% with AirRider (Expected)</th>
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<tr>
<td>Land Lease</td>
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<td>Depreciation</td>
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<td>Interest (mortgage &amp; term) (one year)</td>
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<td>28,600</td>
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<tr>
<td>Interest on AirRider Loan (yr. 1)</td>
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<tr>
<td>Taxes</td>
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<tr>
<td>Operation and Maintenance</td>
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<td>Total Expenses</td>
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<td>Rental Income</td>
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<td>Profit before Tax (loss)</td>
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<tr>
<td>Profit after Tax (loss)</td>
<td>($10,433)</td>
<td>$38,033</td>
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Comments on Foxhead Warehouse

Foxhead warehouse is a very small project that came into existence to exploit the externalities available in what would otherwise have been an ordinary real estate deal. A detailed picture of the evolution of the financing gives us a chance to see the resolution of the conflicts between various parties and the sharing out of the benefits that arise from the building of the structure, including the benefits to the supplier of some equipment to the project. The key issue in arranging the financing was making sure that every party stood to gain more than the cost of its contribution. The breakdown of the financing and its reformation is a classic case of well aligned powers that make it impossible for one party to damage the other without suffering the consequences.
Case II

Pfeiffer Coal Mine

New West Coal Mines was a moderately successful Chicago-based holding company that was put together in the early 1950's to produce and market steam coal in the Midwest. Net worth was about $46 million with no debt outstanding in the early 1960's, with profit and sales of $1.6 million and $86 million, respectively. In 1964, New West began a wide ranging diversification program into chemicals, food-processing, defense-related electronics, and motels, financing a great deal of the expansion via public offerings of conventional and convertible debt. While profits were acceptable in the late sixties, there was not sufficient management skill to operate the diverse interests of the firm, and 1970 and 1971 were unmitigated disasters. Frank Thomson became Chairman of the Board in February of 1972, and quickly became convinced that a turn around of the company required the divestiture of several subsidiaries. By April of 1973, the motel, electronics, and food processing groups had been sold off but at a substantial write-down of net worth. While there was no problem in covering the debt service with the income from coal and chemicals, there was only $17 million in book equity covering $96 million in book debt.
Among the assets of New West were several large tracts of land which had not been profitable to mine due to the very thick over-burden. One of the largest was in Pennsylvania, the Pfeiffer tract, which was somewhat unusual in that while it was not true low-sulphur coal, its sulphur content was significantly lower than most eastern soft coal. Planning had been going on for the last several years to put these lands into development, but no real urgency was felt by the company. The Arab oil embargo suddenly changed all of that, and the environmental protection movement had put a substantial premium on any significant reduction in sulphur content. Accessible reserve was estimated to be in excess of four million tons.

In March of 1974, Mr. Thomson had a competed engineering study of the proposed Pfeiffer Mine, and a rough financial plan that suggested that the project would cost about $40 million. With this information in hand, he placed a call to New West's investment banker, Tarn, Alexander, and Co. On March 12th, Mr. Weston and Mr. Killen of Tarn, Alexander met with him for lunch for some preliminary discussion of the possible ways to finance the project. Mr. Thomson's first suggestion was a private placement of $30 million of debt, but the investment bankers did not feel that any of the lenders would be willing to even consider a company with as weak a balance sheet as New West's. They suggested instead that a project financing might be in order.
Mr. Thomson was unfamiliar with this activity, but after some explanation from Mr. Killen, he authorized Tarn, Alexander to go ahead and begin a study of the feasibility of this kind of financing.

Tarn, Alexander's first act was to second one of their analysts to the New West Finance Group. Jeff Yadin flew in from New York on March 18th and by the end of the month had developed a working simulation of the cash-flows of the project. The most important document produced by the simulation was a detailed sensitivity analysis of the various factors that would affect the cash flows, principally the prices of various inputs and outputs, the percent of potential output saleable in any given year, operating efficiency, interest rates, and the possible delays and stoppages which such a project could be subject to. Using this data and a knowledge of the financial markets, Yadin was able to prepare a list of recommendations to New West of what the requirements would be to successfully syndicate various sized loans on a project basis.

Of the various proposals available to them, Messrs. Thomson, Weston, and Killen quickly eliminated the majority as either to restrictive on the firm or impossible to arrange. The most promising of the lot was a plan which required a guaranteed sale of 60 per cent of the output of the mine at a price of at least $45.00 a ton, about 10 per cent less than the current long term contract price of equivalent coal. It was decided that this would be the proper plan to start circulating for
developing sales contracts and for contacting potential lenders. On April 15th, the plan was formally approved by the Board of Directors and contacts were initiated by Tarn, Alexander and New West's marketing group to put the project into action.

New West's marketing staff was not entirely pleased to be committing themselves to twelve-year contracts and had some serious doubts about their ability to find customers for this kind of offer. After taking the proposal to various customers, they had found a large number of companies willing to take three- to five-year commitments, but only one firm, Bay Power and Light, willing to sign a twelve-year contract, and that only for 65,000 tons a year. The report to the Board of Directors on May 14th suggested that it would be unlikely that buyers could be found to meet the requirements of the plan. On May 16th, however, Mr. Thomson received a call from Jake Baccardi, President of Argon Electric, who had learned of the proposed project in Coal Week. After some discussion, Mr. Baccardi stated that while he was unwilling to buy in for twelve years, he could commit the corporation for seven years for 200,000 tons at $45.00. While Mr. Thomson need to talk with his Board before finalizing the agreement, he agreed in principle over the phone, contingent on an agreement by the investment banker that this did create a financeable situation.

Tarn, Alexander had shopped the basic proposal and had found
several interested insurance companies that were willing to bite the entire $25 million. They were rather upset when New West brought forward the new proposal with a mixed seven- and twelve-year guarantee. A rerun of the sensitivity analysis showed a large "cash excess" over requirements, and they gave their assurances that $10 million could be raised for twelve years and another $15 million in the form of term loans from the banking system. The lawyers were put to work to draw up drafts of the two contracts and Messrs. Weston and Kilien formally issued the proposal to various banks for bids.

It was apparent from the start that the banks were not entirely enthusiastic about the project. While the numbers were extremely sound, there were some almost immediate questions about the Argon contract and the New West guarantee of completion. Argon's credit rating was not too highly regarded by the banks, mainly because they regarded Argon's balance sheet as somewhat over-extended, while at the same time Argon suffered from a rather hostile public utilities commission in its state of operation. Similarly, they were concerned with New West and the viability of a guarantee of completion in a corporation so obviously in financial trouble. The insurance companies being more willing to wait out any delay associated with opening the mine, were still interested, and were quite comfortable with the Bay Power contract as security. On an off chance, Mr. Weston called on Argon's principal bank in early June. While Mid-Nation Trust said that they had not to date been involved in a project
finance situation, they could indeed be interested in this instance. They had a significantly better opinion of Argon's ability to support the obligation than other banks and were quite interested in developing a relationship with New West. Columbia Insurance of New Jersey won the bid for the long-term debt.

The final negotiation session was set for July 9th, but by mid-June it was apparent that the only real sticking point would be the validity of New West's guarantee of completion. Mr. Thomson was arguing at this point that if a very conservative $1.00 a ton was assigned as the value of the coal in the ground, this $4 million plus the $18 million value of the moveable property in the second-hand market should indicate that the project itself should be able to stand as its own collateral even if New West could not follow through on its guarantee. Mr. Weston was insistent, however, that the real question was whether or not New West could bring the project to completion in the face of a serious cost overrun. There seemed to be a threat of a dead-end to the financing until Mr. Killen, who was also working on an oil-drilling financing, encountered completion bonding, essentially an insurance policy covering the time and cost of completion. Within a week, representatives of the Hadrian Insurance Company had arrived and negotiated a contract which guaranteed that they would replace the management and provide the funds for completion of the project if New West would not, and furthermore, Hadrian guaranteed that
if completion were delayed for more than six months, that New West would
begin to pay interest on the outstanding debt and continue work on the
project. In exchange for this, Hadrian would take a fee of $112,000 and
would have the power to appoint a trustee at any time to assure that all
expenditures of funds of Pfeiffer Mine were proper and needful.

The final negotiating session went quite well, and due to the
previous contacts, there was very little to discuss. Several financial
constraints were finalized, and Mid-Nation Trust formalized its intent
to syndicate their portion of the deal. An acceleration of the bank
loan was arranged by mutual consent and a non-retireability clause was
added to the insurance loan. The start date was officially set as August
1, 1974, with completion scheduled for no later than November 15, 1975,
and expected in July of that year. East City Trust was established as
the trustee for the various indentures, and Edel, Webster, Young, and
Company selected as the auditors. The various contracts were signed
July 18, 1974, and equipment orders were signed the next day.

Pfeiffer Coal Mine was formally declared completed on September
3, 1975. Due to the decline in interest rates, it is expected that the
bank loan will be closed out no later than December, 1979. An additional
40,000 ton a year contract for three years was arranged in May of 1975.
While the UMW contract settlement has increased operating costs somewhat,
there has been no substantial degradation in the project's financial
viability.
Pfeiffer Coal Mine: Important Contract Elements

The Corporation

Pfeiffer Coal Mines, Inc., is a wholly-owned subsidiary of New West Coal Mines, Inc. There shall be a representative on the Board of Directors from the bank, the insurance company, Hadrian, East City Taust, and each of the long-term clients. No officer of New West may be an officer of the Mine, except for the president and CEO.

All rights in the land and all environmental clearances become the separate property of the corporation, and all transfers of property are irrevocable.

The Contracts

The contracts are the separate property of Pfeiffer and are assigned severally as security for the loans. Payments will be made to East City Trust who shall make the appropriate distributions to debt holders and pass the remainder on to the corporation.
The contracts are simple price and quantity accords running for their stated length beginning on the official date of completion. There shall be no grounds for cancellation as long as a good-faith effort is being made to bring the project to completion.

The Financing

New West will transfer the land and all right on August 1, 1974, and its contribution of $15 million in cash or liquid securities shall be completed no later than October 1st. At such a time as the liquid funds of Pfeiffer shall fall below $5 million, and in no case later than December 31, 1974, the entire $10 million shall be drawn from Columbia Insurance in a single payment. At whatever time liquid assets again fall to $5 million, Mid-Nation, or whatever syndicate that bank wishes to form, shall allow Pfeiffer to being to draw against it's line of credit, up to a limit of $15 million. New West will inject further money to keep the working capital at $5 million from that point on.

Interest will be accrued on funds outstanding until completion or November 15, 1975, whichever is sooner. Interest will be paid by New West after November 15, 1975, even if project is not yet complete. Upon completion, Pfeiffer will make quarterly payments on both loans so as to retire them in twelve and seven years, as appropriate. In
addition, one half of the net "excess" cash flow will also be used to retire the principle of the bank loan at an accelerated rate. No acceleration of the long-term loan will be permitted.

Financial Constraints on Pfeiffer

Working capital must remain above $5 million. No dividends may be paid while the bank debt is outstanding. Pfeiffer Coal Mines, Inc., is prohibited from engaging in any business other than the operation of the mine and appropriate related activities. No assets of the corporation may be transferred without the consent of the Trustee, except mined coal at the stipulated contract price or at the fair market value of that coal. All assets must be properly maintained or replaced at need, all taxes must be paid, and all reasonable and proper insurance for this type of operation must be maintained in force.

Guarantees Made by New West

New West guarantees that it will maintain working capital of $5 million in Pfeiffer. It further guarantees that it will complete the project in the face of any cost overruns, time delays, or other
impediments other than force majeure. If the project cannot be completed because of technical impossibility, New West will become liable for the total debt outstanding. A bond by Hadrian Insurance was to be maintained to insure New West's performance.

Risks Assumed by Lenders

The lenders accepted formally and without reservation all risks associated with the reserve of coal in the Pfeiffer tract and all possible force majeure risks.
Project: Pfeiffer Mine

Size: $40,000,000  
Production Design: 320,000 tons per year

Contract:  
$10 million at 10 per cent for twelve years  
$15 million at 12 per cent (floating at one per cent above prime) for seven years

Guaranteed by:  
Twelve-year contract for 65,000 tons a year at $45 a ton  
Seven-year contract for 200,000 tons a year at $45 a ton

Cash:

Debt Service

| Twelve year | $1,458,000 |
| Seven year  | 3,287,000  |
|            | $4,745,000 |

Fixed Cost $2,000,000

Total $6,745,000

265,000 tons @ 33.25 contrib.

| 200M tons | $6,650,000 |
| 65M tons  | 2,161,000  |
|           | $8,811,000 |

Cash Excess $2,066,000
Project: Pfeiffer Mine (continued)

Twelve-year debt covered about 1.5 times.
Seven-year debt covered about 2 times.

Cash excess could cover an increase in operating expenses of $7.80 a ton (66%).

### Income:

<table>
<thead>
<tr>
<th></th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Cost</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Interest</td>
<td>2,800,000</td>
</tr>
<tr>
<td>Depreciation</td>
<td>4,000,000</td>
</tr>
<tr>
<td></td>
<td>8,800,000</td>
</tr>
<tr>
<td>Net Contribution</td>
<td>8,811,000</td>
</tr>
<tr>
<td>Gross Profit</td>
<td>11,000</td>
</tr>
<tr>
<td>Depreciation</td>
<td>1,100</td>
</tr>
<tr>
<td>Tax</td>
<td>4,950</td>
</tr>
<tr>
<td>Profit After Tax</td>
<td>6,050</td>
</tr>
<tr>
<td>Return on Investment</td>
<td>0.4%</td>
</tr>
</tbody>
</table>
Project: Pfeiffer Mine

Proposal: 60% guarantee at $45.00

Borrow $25 million at 10% (average) for 12 years

Cash:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt Service</td>
<td>$3,669,000</td>
</tr>
<tr>
<td>Fixed Cost</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Total</td>
<td>$5,669,000</td>
</tr>
</tbody>
</table>

60% of capacity 192,000 tons

Price  $45.00 per ton

Variable Cost per ton  $11.75

Contribution  $33.25

Net Contribution  $6,384,000

Cash Excess  $715,000

Cash excess will cover

1. An increase in interest rates up to 2.86%
2. An increase in operating expenses of $3.74 (32%) per ton
3. A pay-out of the loan in only 6 years
**Project:** Pfeiffer Mine

**Income:**

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Cost</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Interest</td>
<td>2,500,000</td>
</tr>
<tr>
<td>Depreciation</td>
<td>4,000,000</td>
</tr>
<tr>
<td><strong>Net Contribution</strong></td>
<td><strong>6,384,000</strong></td>
</tr>
<tr>
<td>Gross Loss</td>
<td><strong>$2,116,000</strong></td>
</tr>
<tr>
<td>After Tax</td>
<td>($1,058,000)</td>
</tr>
</tbody>
</table>

**Breakeven (Year 1) = 235,000 tons**

= 80%

**Breakeven (Year 13) = 120,000 tons**

= 37.5%

Depreciation = 2,000,000

Interest = 0

These figures do not allow for depletion at 10% of gross income or any cost depletion method.
Comments on Pfeiffer Coal Mine

Pfeiffer Coal Mine is a very clear example of the use of project finance in the face of a "weak" balance sheet. The important consideration in the determination of the financeability was to reduce the possible variance of cash-flows down to a level where lenders were willing to consider the financing. This took the form of truncating the possible outcomes by providing a guarantee of completion plus a reduction in the variability of the possible outcomes through the pre-sale of much of the output.

Note that there are two interesting side issues that are presented in this case. The first is a fairly good rendition of the dynamic process of arranging a project financing and the effects of differing opinions about a firm's credit worthiness. Secondly, this case gives a good picture of how the credit worthiness of a firm's project can be built up, including a rather unusual use of insurance. It is obvious that at the time this case transpired, there was very little formality associated with the arrangement of a project financing: the field was too new to have developed something like "standard procedures." In 1976, it can be assumed that this financing would have taken place with considerably more pre-planning.

A comment on the use of an investment banker to arrange the financing: it cost New West almost a million dollars to arrange this
financing in 1974, and we can assume that an investment banker would charge something in that range today. Two major New York banks have estimated independently that they could have arrange everything for about $600,000. This is further evidence of the competitive disadvantage of investment bankers, and it is interesting to note that on a project being done this year, New West has sought competitive bids from these two banks and two in Chicago.
WAI Ltd. (West African Iron) is a complex joint venture involving U.S., Japanese, and EEC partners in a massive iron mining and pelletizing facility on the West Coast of Africa. The mine site itself is more than 100 miles inland, and the successful completion of the project will require the development of a substantial power and transportation infrastructure. The host government will take a substantial role in the project and has focused on it as the principal item of national economic development for the 1970's.

The ore body to be exploited was discovered in the late 1930's and is of particularly good quality and easy to extract. The region is blessed with a tremendous potential for hydroelectric power but is almost totally undeveloped and extremely difficult to put roads or railways into. McKenzie Steel, Inc., a major U.S. producer, had begun investigating the commercial potential of the site in the late 1960's and concluded that despite the difficulties in developing the region, pelletized iron ore could be competitive at the dock with the new Australian plants. Potential output would be far in excess of McKenzie's foreseeable need, and it was obvious from the probable cost of an
efficient-sized facility that there might well be problems in financing the project. By 1970, McKenzie was putting out feelers on the possibility of developing the project as a joint venture.

Pelletizing is a relatively new technology that concentrates even low grade iron ore into pellets that can be more than 60 per cent pure iron. This has obvious advantages for transporting the output of a mine, and there are significant additional advantages with respect to refining in terms of capital costs and environmental regulations. Pelletizing is quite capital intensive, however, and more importantly, it is very energy intensive, involving about 8.3 gallons of fuel oil and 62.5 KWH of electricity per ton of pellets. Net of transportation and reduction to pig iron, however, there is an energy savings to pelletizing.

McKenzie had been making slow but definite progress on arranging the joint venture, with the basis of the government relations established and the membership of the commercial group agreed upon by November of 1973. The Arab oil boycott plus the price actions by OPEC suddenly catapulted the WAI project with its low-cost hydroelectric power into a spectacularly profitable position. Since all of the partners were financially strong, it was decided to go forward with the project in the most expeditious manner.

McKenzie, acting as the coordinator of the group, went to its lead banker, Manhattan Trust, and asked them to begin work on developing a
financing for the project. The ownership structure, owners, and their proportional contribution was to be taken as given, and each was to be assumed to be competent to arrange its own financing. Manhattan Trust was instructed to assist the development of funding for the host government, and to maximize the financing available to the project itself so as to minimize both financing costs and the required contribution of the venture partners. As a general measure, they would be interested in $250 million in term bank loans and $200 million in subsidized export financing for equipment, and as a guess they proposed that the host government should be able to get about $175 million in World Bank and other very low cost funds.

A cash-flow analysis was run and the bank quickly came to the conclusion that such a financing was close to impossible, except with an iron-clad take-or-pay contract. To the surprise of the bankers, the McKenzie representatives were not at all perturbed by this, and in fact suggested that if it would make matters easier they were sure the venture group would be willing to write take-or-pay for future delivery contracts for up to 9 million tons a year at the greater of $21 a ton or cash costs plus $10. On the basis of these arrangements, Manhattan Trust was more than willing to give their assurances of the availability of financing if the low-cost funds for the government were arranged.

Negotiations with the World Bank and other sources of concessionary loans were initiated, and it became readily apparent that there
would be little trouble securing $125 million, but that much more than that probably would not be forthcoming. Working with the project engineers, the export credit specialists at the bank simultaneously began to shop for credit financing for satisfactory equipment. By May of 1974, preliminary commitments had been arranged for $185 million at a rate averaging 7 per cent for ten years.

Manhattan Trust syndication specialists began "feeling out" the market in April of 1974, with an eye toward syndicating the loan between U.S., European, and Japanese banks. All of the commercial members of the group were regarded as "A" quality or better. Their West African desk had given its approval to expose the bank for $35 million at most, so the syndication group was looking for $215 million in Dollars, Joint Float European Currencies, and Yen. The first review of the market showed that at the price offered there was roughly $320 million in interest, so the price was shaved slightly until only $225 million in funds were available, but in the proper currencies and with a reasonable margin of flexibility. Since this was a better than average deal, there was little difficulty holding the consortium together.

A preliminary principals' meeting was held May 4, 1974, to lay out the basic details of the financing, and on May 5 a preliminary commitment was signed by the host government, the World Bank, the WAI Ltd. group and the Bank Consortium. This agreement was used by the
various parties to arrange for the commitment of other financings over the next two weeks, while the legal representatives prepared the formal documents. There was substantial eleventh hour negotiation about some nuances of the contract, but there were no important differences of opinion on the basics. The individual elements of the overall agreement were signed between May 20 and May 29, 1974, and the general accord wrapping all elements of the financing together was signed May 30, 1974, to go into effect June 1 of that same year.

The economic viability of the project is not strictly recognized by the contracts and legal specification. The return to the firms involved is in fact quite high, but for a substantial portion of the life of this project they will not be recognized at the pelletizing plant. At an estimated basing price of $11.00 the bbl. for crude, McKenzie engineers expected in January, 1974, that the cost of Australian 64% pellets in June of 1977 would be about $36.00 the ton against the West African project cost of $21.00 the ton.

The host government was willing to accept the relatively low cash returns that they would receive from the project in its early years because they will be receiving, essentially free, a massive infrastructure while providing substantial improvements in the opportunities for its labor force and a very healthy net flow of foreign exchange.
Basic Elements of the WAI Ltd. Financing

The Corporation

WAI Ltd. shall be the owner and operator of the mine and facilities in question. It will be a limited liability association under the laws of the host country and with all the rights and privileges of a domestic corporation. The ownership in private hands shall be 20 per cent held by McKenzie West Africa Ltd., a Bahaman association; Red Sun Steel, a Japanese corporation, 30 per cent; and EuroFeric AG, a Swiss corporation, 50 per cent. In lieu of taxes, the government of the host country shall have a 50 per cent interest in the corporation.

The sole purpose of the corporation is to develop and exploit the ore body specified in the technical addenda to the agreement, and the corporation shall engage in no activity not directly associated with this purpose except as needful to the over-all success of the project.

The Host Government

The host government, in exchange for a 50 per cent interest
in the project and $0.10 (U.S.) per ton in land-use fees shall provide to the corporation access to the specified ore body, sites for the development of hydroelectric power and dams, port facilities, and plants, and those rights-of-way for roads, railroads, and power cables most proper for the completion of the project. For this consideration, it shall also guarantee and accept loans from the World Bank and other such agencies and deliver the proceeds whole and intact to the corporation.

The host government and all succeeding governments shall pass no law imperiling the rights of the private investors in this project or the free transfer of the outputs into foreign hands. In the light of the consideration in ownership and fees, the host government shall levy no taxes on the income, property, or values of the corporation, and shall set no wages or wage tax so as to render the corporation disadvantaged with respect to any other domestic corporation. All imports by the corporation not for resale shall be without duty, and all exports of iron pellets shall be without duty, quota, or other restrictions.

No restrictions on the transfer of monies for the repayment of debts shall be imposed, and foreign private investors shall be allowed to freely repatriate profits up to 20 per cent of their invested capital per year. Foreign investors are guaranteed the right to keep income in the corporation in the form of its receipt, and further are guaranteed the right to buy local currency for the purchase of local labor, supplies, and equipment at a rate that reflects the world price.
of that currency. The unit of accounting for this project shall be the United States Dollar.

Facilities

The corporation shall build and develop an iron-ore mine or mines of the open pit type to supply the needs of a pelletizing plant of ten million tons output capacity, a pelletizing plant of no less than ten million tons output capacity, harbor and dock facilities to handle ten million tons of iron pellets per annum plus ancillary cargos both inbound and outbound, dams and hydroelectric plants to produce 130 per cent of the peak energy requirements of the project, an electrified railway running from the mine-site or sites to the processing plant and thence to the port facilities capable of carrying the appropriate loads, and all appropriate roads and power transmission facilities as specified in the technical addenda. All transportation and power facilities shall be open to the use of the residents of the area to the extent that this does not interfere with the safe and normal operation of the project.
Operations

WAI Ltd. intends to operate the mine, pelletizing plant, and related facilities in a manner consistent with the best commercial practice, and no single party or combination of parties to the agreement shall be permitted to cause any variation from this intent. The facilities will be completed with all due expediency, and the parties to this agreement declare severally and as a group that this is their intent.

Full operation of the facilities is planned for January 1, 1977. Full operations are defined as the completion and shipment of no less than 750,000 tons of pellets within the preceding calendar month.

It will be the practice of WAI Ltd. to make the greatest use possible and economical of domestically-produced materials and equipment and local labor. By 1982, no less than 80 per cent of the workforce and 50 per cent of the managerial and technical personnel shall be citizens of the host country.

Contracts

There are three sets of contracts which are an integral part of the agreement covering the sale of iron pellets produced by this
contract. Three of these contracts are of the form of an unconditional pay and take or take credit. Under these contracts, the commercial members of the corporation are required to pay on a monthly basis for a specified quantity of pellets at a specified price. If the mine is producing they must take delivery of the pellets and dispose of them as they see fit. If an insufficient amount of pellets or no pellets are being produced, then the commercial members will be given credit for the specified quantity to be delivered at some future date on demand if capacity exists to produce them in excess of current contractual requirements.

In all three of the contracts, the price specified is the greater of $21 per ton or costs$13 plus $10 per ton for delivered pellets and $21 per ton for credit pellets.

<table>
<thead>
<tr>
<th>Contract</th>
<th>McKenzie</th>
<th>Red Sun</th>
<th>Euroferic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/77-12/83</td>
<td>1.8MM tons</td>
<td>2.7MM tons</td>
<td>4.5MM tons</td>
</tr>
<tr>
<td>(9MM tons total)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/84-12/86</td>
<td>1.0MM tons</td>
<td>1.5MM tons</td>
<td>2.5MM tons</td>
</tr>
<tr>
<td>(5MM tons total)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1/87-12/96</td>
<td>0.2MM tons</td>
<td>0.3MM tons</td>
<td>0.5MM tons</td>
</tr>
<tr>
<td>(1MM tons total)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13 "Costs" in this matter are defined as the "cash" expenses of producing the actual amount of pellets as defined by a preagreed formula. Essentially, cash costs are labor, supplies, and "expendables" such as cables and working surfaces of excavation equipment. Engineering estimates are that in 1977 these costs will be about $9.00 per ton.
The final contract commits the commercial partners to give "first preference" to WAI Ltd. in their purchases of iron pellets and commits WAI Ltd. to give them "first preference" in selling all non-contracted output. These transactions are to take place at "the going fair commercial rate." All other sales are to be to the "best available buyer" at the "best business price."

**Financing**

There are four "layers" to financing involved in this project. The first is a simple equity contribution by the various participants. The second layer is funds provided by the World Bank and other concessionary sources for twenty years at an average rate of three per cent. The third source of funds is concessionary agreements associated with the foreign purchase of U.S., French, Japanese, Dutch, and other equipment; ten-year terms were standardized for all agreements, and the average rate was 7 per cent. The remainder of the required funds was provided by a consortium of banks at a rate equivalent to the prime plus 2 per cent.

The bank debt is "superior" to the World Bank loan and any new debt taken on. The rate on the debt is specifically set as the weighted
average of the "basic borrowing rate" of each participating bank for the currency involved\textsuperscript{14} plus two per cent.\textsuperscript{15} These loans are secured by the assignment of the seven-year contracts for pellets to Manhattan Trust for the beneficial interest of the 18 banks involved. These funds could be drawn down at need by WAI Ltd. up to a limit of $245 million. Interest would be rolled into the loan until the first payment under a pellet contract, at which time repayment is to begin, so that the loan will be paid off by December, 1983. If the entire line of credit is drawn down before the facilities are actually capable of producing pellets, WAI Ltd. and the venture partners singly are obliged to "Take all reasonable action to see that the project is completed, including, if necessary, an appropriate use of existing resources or an injection of more capital subordinated to all other loans."\textsuperscript{16}

\textsuperscript{14} For U.S. banks lending dollars this is their prime rate, for most banks it is defined as "the lowest rate available to an ordinary commercial borrower for a current loan."

\textsuperscript{15} Consider the 70 million Swedish Krona element of the loan. Bank A, the government bank, charges 9.4\% on its k 40 mm while Bank B, a private bank, is charging 10.2\% on its k 30 mm participation. The rate paid will be 9.4 40/70 + 10.2 30/70 + 2\% = 11.74\%. 

\textsuperscript{16} A very bad translation of the applicable clause in French. In legalistic English, the clause is almost half of a page long.
The export finance credits are in fact incorporated in 28 separate contracts at a wild diversity of rates and under an enormous number of limitations. Basically, these funds cover part of the costs of specific packages of equipment and are "secured" by a lien on the equipment itself and a position as a general creditor of WAI Ltd. Aside from the uniform life of the agreements and the reduction in negotiation efforts stemming from presenting packages to the various agencies, there is very little to distinguish these loans from any other export financing.

The World Bank loan is in fact a complicated package coordinated by the World Bank that includes a large amount of "other government" foreign aid money. Technically, it is a loan to the host country that has been assumed by WAI Ltd., but this is only a legal fiction that is recognized by all parties involved. It is also interesting in that it contains a "protection of other interests" clause, essentially an agreement that that World Bank will not accept payment on a loan if other debt is not being serviced. If one is willing to impute at least some measure of sanity to any potential government of a nation, it can be assumed that a threat to the credit rating of the country with the World Bank will inhibit any action that would endanger the other debt holders.
Other agreements

All parties to the agreements signed contracts in French, English, and Japanese, but accept that the French version shall be regarded as "most authentic" in case of any disagreement over wording or meaning. As related to this contract, all parties have agreed that the Civil Code of Sweden shall apply and that any disputes arising under this contract shall be settled by judgement of the Civil Court of Stockholm under procedures outlined by the Concordance between the Courts of Sweden and WAI Ltd.

Insurance for the project relating to nationals of the host country shall be arranged through the National Insurance Board of that country. All other policies shall be made payable only to WAI Ltd. and must be arranged through the acceptability list provided by joint agreement between the World Bank, the host government, and Manhattan Trust as lead banker for the bank consortium, except as provided in addenda to various export agreements.

The commercial partners to this venture agree jointly and severally that the management of the project will be maintained at a level equal to ordinary business practice and that no management failure shall be construed as a relief from any obligations or responsibilities under any contract.
WAI, Ltd.

Cash Flow (First Year)

<table>
<thead>
<tr>
<th></th>
<th>9MM tons</th>
<th>10MM tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue ( @$21/ton)</td>
<td>$189,000,000</td>
<td>$210,000,000</td>
</tr>
<tr>
<td>Expense ( @$11/ton)</td>
<td>99,000,000</td>
<td>110,000,000</td>
</tr>
<tr>
<td>Gross Cash</td>
<td>$ 90,000,000</td>
<td>$100,000,000</td>
</tr>
</tbody>
</table>

Debt Service

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$125MM @ 3% for 20 yrs.</td>
<td>$ 8,400,000</td>
<td>$ 8,400,000</td>
</tr>
<tr>
<td>$185MM @ 7% for 10 yrs.</td>
<td>26,400,000</td>
<td>26,400,000</td>
</tr>
<tr>
<td>$245MM @ 12% for 7 yrs.</td>
<td>53,700,000</td>
<td>53,700,000</td>
</tr>
<tr>
<td>Total</td>
<td>$ 88,500,000</td>
<td>$ 88,500,000</td>
</tr>
</tbody>
</table>

Net Cash

|                        | $ 1,500,000  | $11,500,000   |

Income

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue @ $29</td>
<td>$189,000,000</td>
<td>$210,000,000</td>
</tr>
<tr>
<td>Expense @ $11</td>
<td>99,000,000</td>
<td>110,000,000</td>
</tr>
<tr>
<td>Gross Profit</td>
<td>$ 90,000,000</td>
<td>$100,000,000</td>
</tr>
</tbody>
</table>

Interest

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$125MM @ 3%</td>
<td>$ 3,750,000</td>
<td>$ 3,750,000</td>
</tr>
<tr>
<td>$185MM @ 7%</td>
<td>12,950,000</td>
<td>12,950,000</td>
</tr>
<tr>
<td>$245MM @ 12%</td>
<td>29,400,000</td>
<td>29,400,000</td>
</tr>
</tbody>
</table>

Depreciation

|                        | $ 37,500,000 | $ 37,500,000 |


WAI, Ltd.

Cash Flow (First Year) (continued)

<table>
<thead>
<tr>
<th></th>
<th>9MM tons</th>
<th>10MM tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit</td>
<td>$6,400,000</td>
<td>$16,400,000</td>
</tr>
<tr>
<td>Return on Sales</td>
<td>3.4%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Return on Investment ($750)</td>
<td>0.8%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Return on Equity</td>
<td>1.6%</td>
<td>4.2%</td>
</tr>
</tbody>
</table>
## WAI Ltd.

### Balance Sheet

**January, 1977**  
*(Projected)*

*(In Millions)*

<table>
<thead>
<tr>
<th>ASSETS</th>
<th>LIABILITY</th>
<th>EQUITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash</td>
<td>Bank Debt $245</td>
<td>Euroferic $97.5</td>
</tr>
<tr>
<td>Inventory 15</td>
<td>Export/Import, Etc. 185</td>
<td>Red Sun 58.5</td>
</tr>
<tr>
<td>Receivables 5</td>
<td>World Bank 125</td>
<td>McKenzie 39</td>
</tr>
<tr>
<td><strong>Total Current Assets</strong> $30</td>
<td></td>
<td><strong>Total Private Equity</strong> $195</td>
</tr>
<tr>
<td><strong>&quot;Infrastructure&quot;</strong> $265</td>
<td></td>
<td><strong>Host Government</strong> $195</td>
</tr>
<tr>
<td>Mine 210</td>
<td><strong>Total Debt $555</strong></td>
<td><strong>Total Equity</strong> $390</td>
</tr>
<tr>
<td>Plant 145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powerplants 90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land &amp; Rights 195</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Assets</strong> $945</td>
<td></td>
<td><strong>Total Liability and Equity</strong> $945</td>
</tr>
</tbody>
</table>
Manhattan Bank Consortium
(18 Banks) $245

Various Foreign Trade Banks
(8 Nations) $185

Los Angeles N. L. Bank Consortium
(7 Bks $27)

Boston Trust
(5%)

Florida Gulf Sulpher
(10%)

McKenzie Steel Inc. (U.S.)

McKenzie West Africa Ltd.
10%

Euro Feric
25%

Normandy Steel
50%

NethSteel
50%

Osaka Bank
($30)

Red Sun Trading Co.
(60%)

All Nippon Land Bank
(40%)

World Bank, Etc.
((9125)

Red Sun Steel
15%

McKenzie Government
50%

Debt

Equity

WAI Ltd.
WAI Ltd.

Debt Service Analysis

Reserve Estimate: 300 million tons

Price = $21.00 / ton  
Capacity: 10 million tons per year

Cost = $11.00 / ton

Contribution = $10.00 / ton

Debt:

$125 million @ 3% for 20 years  $ 8,400,000
$185 million @ 7% for 10 years  26,400,000
$245 million @ 12% for 7 years  53,700,000

Total Debt Service in years 1-7  $88,500,000

Cash at 90% of capacity (guaranteed)  $90,000,000

"Free" cash in years 1-7  $ 1,500,000

Contracts:

Take-or-pay of 9MM tons @ $21/ton or cost + $10, Starts January 1, 1977
Take-or-pay of 5MM tons @ $21/ton or cost + $10, Starts January 1, 1984
Take-or-pay of 1MM tons @ $21/ton or cost + $10, Starts January 1, 1987
The West African Iron Project is the only case presented that covers what is commonly thought of as "project finance," a very large, international joint venture in the extractive industry. In fact, its size and complexity tend to over-awe the reader, and its basic simplicity can get lost in the detail. What was happening here was that a joint venture had come into existence to exploit a good, but not outstanding, opportunity. A sudden change in the external environment, the huge jump in the price of petroleum, made the project extremely attractive, and the venture partners were eager to put the project into development as soon as possible. Since there would be problems raising adequate capital internally in a short period of time, and because there were extraordinary risks associated with being in a less developed nation, the project finance vehicle was used to get around some of the obstacles. The only distinctly "project finance" advantage was that the expropriation or impairment of value by the host government would have a cost to the host nation that might inhibit them from taking these actions.

To make the project financeable, the parent companies, all very strong credit risks, absorbed most of the commercial risks, reducing the possible variance of cash flows to a very low level. This is the extreme case of "adequate credit backing." Access to some
relatively low cost sources of funds also had the beneficial effect of increasing even further the cash-flow available for debt service.

An important feature of this project that did not come out of the case is the fact that a neighboring country also has a similar ore body and hydroelectric potential. It was unlikely that two major iron projects in that part of the world could have been commercially viable or could have been financed on the world market. The two nations were very much competing with each other and the two sponsoring groups were racing to get a "ready to go" project to the market. Much of the accommodating behavior by both the host government and the partners can be attributed to this competition.

It is estimated that WAI Ltd. "won" by about two weeks and a factor of .2 in their debt coverage ratios. As a result, this nation will have a rapid industrial growth starting in the late 1970's, while its competitor may well have its development retarded by as much as twenty years. It is this sort of issue that makes these huge international investments such a critical issue in today's complex political economy.
A Note on the Project Finance Flow Chart

There is nothing sacred about this way of going about organizing a project financing. It is a good generalization of the way project financing was often being done in late 1975. It is intended only to be reflective in a general way of the more common approaches to a financing, and every real case will show many variations from this pattern.
Conceive of Project

Develop Venture Partners

Define Project

Initiate Financing Activity

Develop Capital Cost Estimates

Alternate Procurement Sources (worldwide)

Contact Relevant Government Elements
Analyze Strategies, Select Best

Define Alternative Financing Strategies

Develop Detailed Plans Based on Financing Sources

Determine Objective Function for Computer Modeling

Develop Computer Financial Model

Prepare Cash Flow Estimates

Prepare Sensitivity Analysis

Update Procurement Sources

Capital Cost, Expenditure Update
Select lead bank to form financing consortium

Revise prospectus

Negotiate preliminary commitments from government agencies

Lead bank contacts for commercial loan consortium

Negotiate price (interest rate)

Negotiate terms

Negotiate shares
Obtain Preliminary Commitment from Consortium

Modify Financial Model

Determine Sensitivity of Specific Project Financial Structure to Changes in Project Variables

Select Optimum Financing Plan

Renegotiate Bank Terms unacceptable to Project Viability
Commitment Fees Begin

Government Export Credit Agencies
Prepare Loan Agreement

Borrower(s) Sign Loan Agreements

Draw Down Approval Received

Banking Consortium Prepare Loan Agreements

Borrower(s) Sign Loan Agreements

Draw Down Approval Received

Borrower(s) Begin to Prepare "Conditions Precedent" data for Financing Institutions

Borrower(s) Complete and Submit "Conditions Precedent"
Equipment Shipped

Cash Payments Made

Monitor Draw-Down Procedures. Certification: Administer Loan

Project Completion

Monitor Repayment of Loan

Renegotiation on Basis of Changed Circumstances

Modify Contracts

Renegotiation on Basis of Changed Circumstances

Modify Contracts
Input to Refinancing of Project, if Project Paid Out any
Chapter 4
THEORETICAL INSIGHTS ON THE NATURE OF PROJECT FINANCE

This section of the thesis will deal with an assortment of theoretical models that may apply in the context of project finance. It should be kept in mind that none of these pictures are complete and self-sufficient to explain what is happening in any given situation. At best, they can be viewed as two-dimensional "cuts" at what is in reality a multi-dimensional problem, analytical schematics that must be viewed together to secure something of a vision of the true nature of the problem at hand. Many of these models are developed only to show what is going on in a project financing, not to give a motive for using the form. In almost every case, what is presented is a necessary condition, but very seldom will there be a single explanation for a project finance that can be regarded as a sufficient condition. In looking at these models, it is important also to remember that the purpose for the financing can vary and that consistency between all reasons for using the project format is just too much to expect.

All of the models to be presented here are very much abstracted from reality in that they do not account explicitly for taxes nor are they designed to recognize various legal formats that might be used. Because the single most noticeable effect of project finance developing as a separate technique has been its massive use in the international
milieu, such a a detailed study is impossible to present within the limits of this type of paper. It is left to the reader's own contemplation to consider tax costs or benefits as part of the allocation to be done by a project financing, and to evaluate how much difference it might make if a given project were structured as a lease rather than a loan.\footnote{\textsuperscript{17}}

A Theory of Pure Project Financing

The "popular" concept of a project financing, as was shown earlier, is a 100 per cent financing of an investment opportunity by non-recourse debt, secured solely by the future cash-flows of the project. While it has been noted before that bankers and such are rather hesitant to have nothing but their money at risk, under certain circumstances this kind of "pure" project finance might in fact be financially sensible. This can be easily demonstrated for a one period case. While a multi-period extension is substantially more complex, the simpler example can be intu-\footnote{\textsuperscript{17} It should be noted that there is a great deal of talk about using leasing as a component of a project financing. In fact, the utility of this approach is not so clear. Yes, there have been many projects structured as "leases" but in almost every example, the lease has not been a true lease, but simply complicated structures to effectively sell the value of the tax shield to a higher marginal rate lender. See Chapter 2 of this paper.}
itively seen to give validity to the real-world application of the concept.

Consider a project whose value in one year is the random variable $X$ with expected value $E(X)$, and which would cost $C$ (see Figure 1). The present value of $E(X)$ is, according to the Capital Asset Pricing Model, $\frac{E(X)}{1 + Z_1}$ where $Z_1 = r + \beta_m(Z_m - r)$, and the value of the project is $V_p = \frac{E(X)}{1 + Z_1} - C$. To finance this project, the firm that holds the opportunity could sell risky debt which guarantees to pay the holders $P$ if $X > P$ or $X$ otherwise, such that $\frac{E(D)}{1 + Z_d} = C$. Since the capital market would be indifferent between this and any other debt issue of similar risk, it would be possible to go to the market and finance this project via a "pure" project financing.

This is not to say, however, that it was costless to the firm to finance this project. Unless there are unique circumstances, the opportunity to make extraordinary profits is by itself valuable. If we assume perfect markets for securities, then it would be possible to set up a company with no other asset than this opportunity and sell if for $V_p$. The cost to the parent firm of taking the project is the foregone cash from the sale of the spun-off firm. From an economic standpoint, this is their equity in the firm.

There is not much of a market for new issues of risky debt, but
Fig. 1 Pure project finance

Fig. 2 One form of "impure" project finance
if the probability that $\hat{X} < P$ is small, it would not be unreasonable to expect that little difficulty would be found in arranging this kind of a project financing. In the rather confused world of the 1970's, there seems to be very few projects that are so robust as to have appropriately small probabilities that their value will be less than the required payout. Of the few that have been financed this way, it is apparent that there was a serious misjudgment in quite a few cases; almost every pure project financing has had problems in the recent recession.

By itself, this model of a "pure" project financing does not explain why this format would be used rather than taking the project as part of the ordinary investment portfolio of the firm. What is critical in this model is that it explains what is going on when people talk of sky-high debt/equity ratios in some project financings. While it is true that the book value debt/equity ratio is quite high, the market value ratios will be in line with other equally risky projects. Hopefully, this buries the myth of the 100 per cent debt-financed project.

Impure Project Finance

The construction of opportunity equity provides a useful insight into the general structuring of a project financing. As previously noted, a "pure" project financing could occur if and only if the value of the
opportunity equity was such as to leave a very low probability of default.
The structuring of all project financings could be seen as simple attempting
to bring such a situation into existence. One way, of course, is simply to
add cash equity and reduce the amount of borrowing needed. In essence,
this reduces the entire operation down to a process and structure that looks
very much like an ordinary term loan: cash equity "protecting" the debt.
This is not a particularly elegant or original solution, but
probably the most common (see Figure 2).

A second solution is what might be called "variance" equity, in that
it is an attempt to reduce the likelihood of failure by changing the distri-
bution of possible outcomes. One way of doing this is by changing the shape
of the distribution so as to truncate the lower end of the distribution.
Guarantees of completion, minimum price and/or quantity supports, working
capital maintenance supports and related "lower bound to value" arrangements
tend to have this effect. Alternatively, the total variance of return can
be reduced, usually by the pre-sale of contracts for part of the output of
the project. The ultimate form of this is a cost plus fee contract for
the total output of the project (see Figure 3). The WAI, Ltd. case (Chapter
3) is a perfect example of this kind of "impure" project finance.
Variance Reduction

Truncation

Natural Project

Fig. 3 Other types of "impure" project finance

Fig. 4 State dependent outcomes
Isolated Opportunity

The concept of "opportunity equity" is itself an interesting way of looking at the entire problem of why project finance occurs. Presumably, there is some element of opportunity equity in every financing. Theory suggests that unless there is an opportunity to make super-normal profits, a firm would be indifferent to investing a project. This simply suggests, however, that the firm would take the project; and, to date, there would seem to be no real differential impact, both a project financing and an "in-house" investment use up opportunities.

The great advantage of a project financing is that it splits off the using-up of an investment opportunity, and the project depends only on that specific opportunity. More importantly, if the project fails, the opportunity is lost, but only that specific one. By separating out the exercise of an opportunity, it may become possible to kill something if it goes wrong, or at least to minimize its impact on the total firm. This may not be true of an investment taken in-house. A catastrophe with a significant-sized project could very well reduce the ability of a firm to go into the capital market for debt because of a reduction of coverage of interest charges or a feeling of distrust of the operating management by the various intermediaries. One of the more common reasons given for going to a project financing arrangement is that the firm is unwilling to
"risk debt capacity needed for ordinary operations."\textsuperscript{18}

This view that project finance is a useful way of isolating the exercise of an opportunity is generally well supported by the comments of persons actively engaged in the field. Besides isolating the financial effects, a project structuring can act as a shield to the reputation of a company entering a non-regular line of business. By cutting off a project, there is a substantial feeling that the parent is somehow less responsible than if it were an integral part of the firm. The Value-Additivty Theorum states that there are no "interactions" within a company that holds a portfolio of independent projects. To the extent that this is not believed by managers, they will be hesitant to "take a flyer" on an activity outside their ordinary realm of competence. A project financing may thus increase the value of the firm by making it more willing to take opportunities with a positive present value.\textsuperscript{19}

\textsuperscript{18} Castle (15)

\textsuperscript{19} Another advantage that accrues to the separating out of a project from its parent has to do with the monitoring of performance. If the project were an integral part of the ordinary line of business of the parent, it is very hard to get a measure of how well the project itself is doing. Only if there are very few interactions with other economic units under the same management can a lender safely ignore the moral hazard problems and feel secure that the project won't be "ripped-off" by transferring profits or losses. An extraordinary opportunity also is more amiable to alternative forms of financing than ordinary investments; it requires new analysis and a different control system anyway, reducing the amount of extra costs associated with the new form of funding.
A Morphology

From the concept of "opportunity equity" it becomes possible to develop a tentative morphology of what projects should be financed as a project financing rather than as a part of the ordinary portfolio of the firm. If the firm "dedicates" an opportunity which is exclusive (e.g., has no other opportunities that arise from it) then presumably the present value of this opportunity will become part of its equity in the project. The value of the firm should, therefore, remain equal, as they have traded an opportunity for what amounts to an equity. 20 If, however, the opportunity which is transferred to the project vehicle is really a package of opportunities or options some of which can only be exercised if the first venture is a success, then there will be a new loss of value. The holders of fixed payment securities will pay nothing for opportunities that cannot benefit them, yet they do have a value to the equity holder which must be foregone if the base opportunity is transferred to the project vehicle. 21

Consider a world with three time periods, T1, T2, T3; three states

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20 If the reader wishes to view this equity as lottery ticket with some random payoff at some future date, the outcome is the same: value is exchanged for a different format of value.

21 This is not an unreasonable picture. Most project financings have included among the debt covenants a statement to the effect that the project vehicle will not engage in "any other activity not directly related to the project."
of nature in T2 and T3, and an equal probability of each state in a given time period (see Figure 4). A dollar in T2 is worth $0.90 and in T3, $0.80. A firm has a project which will payout $80.00 if T2a, $120.00 if T2b, and $150.00 if T2c. Moreover, if state T2c occurs, and the firm invests $10 in a second project that depends on the first, then this project will also pay out $90.00 if T3c. To finance the first project, which will cost $84.00, the firm can borrow the money itself, guaranteeing to pay $93.50 in any state, or alternatively the firm could form a separate project and offer to pay $80.00, the whole value of the project, in T2a or $100.00 in T2b or T2c. As a part of the project financing, however, the firm signs an agreement that they will engage in no other business (ie. not take the option). If there is no option in T2c, both the firm and the securities market would be indifferent between the two alternatives. With the option, however, the present value of the project is $120.00 as opposed to $105.00. if it cannot be exercised. The cost of using project financing then would be the $15.00 foregone.\footnote{Note that the "no other activity" clause does have a value to the lender. If the project borrower could take "appropriate options" then in essence it could make any investment it felt like, which is obviously not the reason why a lender would put its money into a project loan rather than an ordinary term loan.}
Making a Growth Opportunity "Bankable"

It has been shown elsewhere\textsuperscript{23} that embodied value in a firm (real assets plus commitments) is worth far more as a basis for debt capacity than the present value of growth opportunities. The reason for this is that the value of an option depends significantly upon the amount borrowed against its future value. Consider, to begin with, the simple case of a firm with no assets except one investment opportunity. This opportunity has a fixed cost of exercise and outcomes that vary with respect to the states of nature at the time of exercise. It is logical that at $T_1$ when the option of exercising happens, the management of this firm will observe which state obtains and make the investment only if the value of the project is greater than the required cash expense. If we allow for complete financial markets, the value of the firm is

$$V = \int_0^\infty q(s)x(s) [V(s)-I]ds$$

where $q(s)$ is the value of a dollar delivered in $T_1$ if state $s$ occurs

\textsuperscript{23} Myers (30)
and \( x(s) \) is the decision variable where \( X(s) = 0 \) if \( v(s) \leq I \) and \( X(s) = 1 \) else. Since \( x(s) = 1 \) only for \( s > s_a \) then the value of the firm can be rewritten

\[
V = \int_{s_a}^{\infty} q(s) [V(s) - I] ds
\]

(see Figure 5).

Consider what happens when the one opportunity firm borrows in TO, exercising its investment option in T1 (see Figure 6). It borrows part of the cost of the investment in TO, promising to repay \( P \) when the value of the project is realized. When \( T_1 \) arrives, the firm will make the investment \( I \), combine it with the borrowing, and exercise its option only if \( V(s) > I + P \). Unless \( V(s) < I \) the investment would lead to an increase in societal wealth and the debt holders would get part of their money back, but the equity holders will not exercise the option, because they see no gain from it. The value of the firm\(^2\) is

\(^2\) Note that these arguments apply to the value of the firm with many growth opportunities also. The more debt outstanding, the fewer states in which it is worth while exercising any growth option, and the lower the value of the firm.
Fig. 5 Decision rule for projects

Fig. 6 Decision rule for projects with debt
\[ V = \int_{s_b}^{\infty} q(s) [V(s) - 1] ds \]

where it is obvious that \( s_b \) depends on \( P \). The creditors will receive nothing if \( s < s_b \). The value of the debt then is

\[ V_D = \int_{s_b}^{\infty} Pq(s) ds \]

Consider instead a company which has a specific real asset whose value in any given state is also \( V(s) \) (see Figure 7). If again the firm borrows \( P \) but there is no investment required in \( T_1 \), the value of the firm will be

\[ V = \int_{s_0}^{\infty} q(s)V(s) ds \]

and the value of the debt is

\[ V_D = \int_{s_0}^{s_c} q(s)V(s) ds + \int_{s_c}^{\infty} q(s)P ds \]

It is obvious that the value of the debt in the case of a real asset is greater than that of a growth opportunity. This particular demonstration in fact can explain a great deal of lending behavior, such as why banks will not finance on the basis of future growth prospects.
Fig. 7 Value of debt for project with no optionality
and why various bookvalue ratios (a measure of real assets in place) are used as primary criteria by banks and related institutions. An alternative terminology for real asset in this context is committed investment, or a project whose completion in T2 is not dependent upon a decision made by surveying the states in T1.

Consider again Figure 6. If the firm went to the market to borrow funds for the project in question, promising to pay P when the value of the project is realized and promising that the project would be completed independently of what state obtains at T1, then if the market has faith in the firm's promises, it would be indifferent between this security and one on a real asset. The value of the debt is once again

$$V_D = \int_{s_0}^{s_c} q(s) V(s) \, ds + \int_{s_c}^{\infty} q(s) P \, ds$$

While the value of the equity is

$$V_E = \int_{s_0}^{\infty} q(s) [V(s) - I - P] \, ds$$

25 Note that it is not rational for the firm to really act this way. If, in fact, any state less than s obtains, the firm will lose less if it pays off the creditors directly than if it makes the investment.
The cost to the firm of this guarantee is

\[ \int_{s_0}^{s_b} q(s) [I+P-V(s)] \, ds. \]

Almost all project financings can be seen as a way of financing a growth opportunity by committing a firm to an investment at the time the loan is taken out. Sometimes it is a formal element of the contract, a guarantee of completion, but in addition, there are quite a few possibilities of less formal but equally effective commitments such as take-or-pay contracts.

Capturing Externalities

If there is a "party line" about project finance in international banking, it is that such a financial structuring exists as a way to transform what is fundamentally an economically viable project into a financeable one. This is usually regarded as taking place through the capturing, combination, and reallocation of the costs and benefits of a project. It is not too far wrong to regard these arguments as a defence of project finance that hinges upon the improvement of economic efficiency, resulting from the recognition of "neighborhood effects" of Neo-classic theory.
Clearly, there are costs and benefits of extremely large projects which are not captured by the ordinary accounting models of an enterprise. Assurance of a supply of a critical raw material, expansion of the development of a host nation, or a reduction of the volatility of a particular product's price are often cited as among the most important benefits, while pollution and the loss of other investment options are among the costs. From a practical standpoint, the two most frequent examples of incorporation externalities into a project occur when less-developed countries contribute money or assets or their credit backing to a project because of its impact on development, and where external customers provide a credit backing, usually in the form of a take-or-pay contract, in order to assure a supply of a particular service or product.

A second interesting way in which neighborhood effects can lead to a project financing occurs when the value of an asset depends in part on who owns it.\(^{26}\) Consider for example a copper mine. If it is owned by one of the oligopolistic major copper companies, its output can be integrated into their production and sold at the oligopoly price. If, however, an independent producer owns the mine, there can be three

\(^{26}\) Lessard (29)
potential solutions, each of which yields a substantially lower value to the mine. If the independent producer only owns a mine and no refining facilities, then he will have to sell his mine's ore to the major producers, yielding only some oligopsonistic price, which will of course be less than the "fair" value of the ore and substantially less than the oligopoly value of the ore to the producers. If the independent does have an integrated production facility for primary copper, but his production is very small vis-a-vis the majors, he will become a marginal producer, with limited market access, getting a fair value for the metal, yet unable to extract the monopoly profits that a large producer can extract by dealing in long-term contracts with large segments of the market as part of an oligopoly. If the output of the new mine is significant with respect to the world market, then this new entry will have the effect of breaking down the oligopoly, reducing prices, and lowering the value of all copper mines.

It is obvious that if the value of an asset depends upon its ownership, then the ownership function itself has value, and in complete markets it should be possible to sell this value. It is possible to see project financings in which the owner of an asset can get financing to develop that asset only by purchasing something that looks very much like the value of being owned by a major member of a product cartel. Usually this takes the form of various purchase contracts, whereby
the major firm promises to use the output of the project just as if it were the output of one of its own assets in exchange for price concessions and a guarantee not to compete in its markets. An interesting variation of this type of project financing occurs where there is a project with a definite cost advantage over most equivalent assets and members of a cartel agree to share the project as a joint venture rather than run the risk of having the oligopoly break down due to a single owner having an incentive to increase volume at the expense of price.

The reverse of the "captured benefits" argument presented above is what can be conveniently called "the rotten apple" effect. It is somewhat axiomatic in business that while there are a few things that can make an investment work out well, there is a near universe of things that can make a project go sour. These can run the gantlet from suppliers who suddenly stop making spare parts for a critical machine to foreign governments who nationalize all non-domestic assets to celebrate the "revolution." One of the strongest motivations for a project financing can be a desire to "wrap-in" some of these actors so that they will be subject to some of the costs of their actions. In the international area, for example, project financings are often structured so that a hostile action by the host government will jeopardize their relationship with the major international banks and the World Bank or
other sources of developmental funding. By forcing as many possible actors to bear the costs of their detrimental actions, there can be a substantial improvement in the funds available for investment in a project.

Risk Reduction

It is obvious that the specification of limits upon the values of the independent variables in a function reduces the "risk" associated with that function, at least so far as risk is measured by the variability of the value of the function. It should also be obvious from observation that there are a large number of financial institutions, such as banks and insurance companies, which have a tendency to be extremely risk-adverse. In fact, in the United States and most other developed nations, there exists a very large pool of funds which are held by these institutions which are legally restricted in the kind and degree of risk they may take. In many cases, project finance can be seen as a way to structure a security in such a way as to make it conform to the policy and legal restrictions of the institutions.

It is not clear that the restrictions placed upon commercial lending are economically or financially rational in many situations, but to the degree the constraints are binding, they impose a cost on
the securities. While it is almost impossible to develop an adequate model of this sort of behavior, it is interesting to note that there is a substantial amount of time spent in structuring these loans in such a way that they can be "allowed" by various rules and requirements. One project finance officer of a major New York City bank estimated that he spent "15 to 25 per cent of (his) time fixing up the cosmetics of the agreements so that they will fly past the Lending Policy Committee and the bank examiners." Other persons have confirmed that this is a fair estimate of the time spent in making a project's risks look acceptable. Another bank's definition is also rather telling in this regard: "A project financing is anything we think is a reasonable loan but which we can't make fit our ordinary structures. Calling something a project financing makes what are otherwise rather screwy terms and conditions seem acceptable." To the extent that project financing allows access to otherwise unavailable funds, it will continue to be used by firms which perceive the amount of funds available as a constraint.

Backward Diversification

One of the basic concepts of the Capital Asset Pricing Model is that the capital markets will not "pay" in terms of expected return for
a reduction in non-systematic risks, yet it is known that banks in fact do charge for non-systematic risk. It is not unreasonable then that a firm wishing to finance a project might in fact arrange to have someone other than a bank absorb some of the non-systematic risks. Consider a product X whose market price, \( P_x \), is a random function with a normal distribution, mean \( \bar{P}_x \), and a variance. There is a project which will produce X at a cost \( C<P \) which will be financed partially by bank debt, and produce output Q. To the extent that

\[
\text{Probability } \left[ (Q \times (P_s - C)) < \text{Cash flow to service debt} \right] > 0
\]

the banks will charge a risk premium. To an X trading company, however, the value of the expected loss due to \( P_x < \bar{P}_x \) is exactly offset by the expected extra profit due to \( P_x > \bar{P}_x \). For a guaranteed price \( \bar{P}_x \), the trading company would be indifferent about buying the output of the project; so at a price \( \bar{P}_x - g \), where \( g \) is quite small, the trading company would be willing to buy the output of the project. If \( Q \times g \) is less than the premium charged by the bank, then the owners of the

\[27\] See Chapter 5, Debt Capacity of a Project, and Chapter 2, with respect to pricing.
project would be better off making the trade and the owners of the trading company would also be better off and, due to diversification, indifferent to the added risk.\(^2\&\)

Sharing Declines in Value

There have been arguments presented that project financing came into existence in part to restore the prioritization of the debt of a firm in reorganization. While there have been some projects where this may have been a factor in the design of the financing, the legal validity of this has yet to be firmly tested. An interesting way to look at project finance is to consider it as nothing more than a complicated form of secured lending, in many ways similar to Railroad Equipment Trust Certificites, but with a "going concern" rather than an item of personal property as the item in mortgage. Unfortunately, this interesting bit of law has not been fully explored, and as of yet there is no indication as to how the courts may rule.

\(^2\&\) While no price issue is totally non-systematic, there are quite a few cases where there is an extremely large non-systematic element. The backward diversification onto trading company shareholders is not all that uncommon. Many oil and other natural resources projects are structured with a trading company taking all of the price risk.
From a theoretical viewpoint, there should be no difference in the way the debt of a project behaves in the face of a decline in the value of the firm from the behavior of ordinary corporate debt. This would change if there were no limited liability on the part of the equity holders, and there are a few projects which are structured with substantial variations on the classic limited liability corporation.

Differential "Credit Ratings"

Where there is a definite difference in the "credit rating" of a parent and the probable rating of the project, then a good case for a split-off financing can be made. It is generally thought that a high-variability-of-cash-flows firm (low credit rating if a "reasonable" amount of debt is outstanding) would have to pay for its "average" variability when it tries to issue debt on a low-variability project. There would be a reduction in the total risk of the firm and an increase in the value of the debt once the project is completed, but most of this would accrue to the current debt holders at the expense (debt costs of the new project) of the shareholders. On the other hand, while it would be possible for a high-credit-rating firm to "rip-off" its current debt holders to the benefit of the stockholders in financing
a high-variability project, there are strong social and professional pressures against the management doing this. The firm may very well have to pay a substantial "rip-off risk" premium on its next issue to finance ordinary operations over and beyond the increase due to the increment in average risk. In many instances of project finance, this has been an important, if not dominant, consideration.

Capital Constrained Firm

There has been some reference made already in this thesis to the idea that project finance is a way of making a growth opportunity bankable. For completeness sake, it is worth discussing the other side of the coin: financing an investment opportunity when a firm does not ordinarily have access to the capital markets. In essence, the arguments here are "financial" in the narrower sense of the term. Managers and bankers have a tendency to be ratio watchers independent of whether or not the book ratio has any particular content. An "off balance sheet" financing does prevent an impact on debt/equity and other ratios, and usually (for different reasons) a project financing will not significantly impair the firm's debt capacity. Many firms think it unwise to use up debt capacity that is necessary to support operations to finance
a new project. In some situations, bond indentures are written so as to restrict certain book ratios, or restrict additional direct borrowing. In either case, a project financing may be the only way to secure funds to finance a worthwhile opportunity.

Project Finance as a Marketing Artifact

Project finance is one of the "sexier" terms to come out of banking in recent years. When trying to puzzle out what about a given situation makes it a "project financing," it is worthwhile to remember that if it takes calling something that is really nothing more than an ordinary term loan a "project financing" to get a potential borrower to sign the papers, there are few bank calling officers who would hesitate to change a few lines of type. Even if the agreement is not quite so transparent, it is obvious that many "project financings" come about as a fancy way of packaging ordinary bank services. To whatever extent the financing looks first to the revenue of the project and not the firm as a whole for repayment, it is probable that there is at least some element of true project financing going on.
A significant issue in project finance is the debt capacity of the project. Now it has been shown in Chapter 4 that while the book value of the project has been up to 100 per cent debt financed, the market value of the project as a whole will not likely have a particularly high debt/equity ratio. In this section of the thesis, a few of the factors that limit the absolute dollar amount of financing will be quickly explored.

Residual Value

The classic criterion for bank lending is to "lend no more than you can get back."\(^2^9\) Presumably this refers to "get back" under the worst conditions, or the residual value of the borrower under conditions of distress. Now there are a wide number of things that can go wrong with

a financing, and no one really demands that the loan be able to pay out under all circumstances; who will be around to collect after Armageddon? On the other hand, it is not unreasonable to set out a large number of possible conditions that the bank sees some reasonable possibility of happening, and to lend no more than the value of the firm given the "worst case." Likely problems might include price declines, technological problems with the plant or the product, labor problems or managerial incompetence. In banking, this last issue is usually considered to be the crux of the problem, and residual values are defined around this issue.

One residual value that banks look at is the value of the borrower at the point of technical default on the loan covenants. These covenants represent the intervention point where a bank or other institution can begin to take an active part in the running of the firm if the value of the firm starts to fall. They can almost always be seen as presenting conditions under which there is still a comfortable margin for turning things around. While the negotiation of loan covenants is a very important element in project finance, in almost no case is much weight placed on them in defining how much can be borrowed.

The "fundamental" residual value of a project is the scrap or open market value of the assets. The liquidation value of a project is again very seldom at issue in what is commonly known as project
finance. The critical element of many projects is their uniqueness, but it is not unknown for the alternative use value of parts of a project such as trucks or general purpose machinery to be used to support an element of the debt.

The real debt limits for a project are determined by the minimum value established by contractual obligations and the probabilities that those contracts will be worth something in times of difficulty. The various output purchase contracts, guarantees of completion, and take-or-pay arrangements are in this category. This is where bankers look for the repayment of a project loan and is what they are referring to when they say that a strong credit must support such a financing. Much of the work that goes into a project financing is efforts to maximize the contractually obligated value of the project.

Worst State Value

From the arguments on non-optionality in Chapter 4, it should be obvious that there is a "worst state" concept that would give a natural minimum value for the debt capacity of the project, \( D_m \). It is obvious from the inspection of almost any financing
that in fact something more than the minimum value of the project is financed. There is some risk taking by the financial intermediaries. More money can usually be found for financing a project if the loan is diversified through syndication, so it is clear that banks and so forth are not looking for a purely riskless security. On the other hand, there is a great deal of evidence\textsuperscript{30} that suggests that increasing the stated rate will not coax too much additional money into a project from the ordinary lenders.\textsuperscript{31} There is no good model of how the limited degree of risk that is acceptable is generated, and it is not even particularly clear what the level of risk exposure of commercial banks in the U.S. really is. Observation does suggest that there is some sort of limit that banks feel towards lending to a particular economic actor. In short, banks lend what they think they can get back "in most cases," but beyond that the evidence for decision making is not too clear.

\textsuperscript{30} Unfortunately, this is all anecdotal and peoples' "feel" for the market.

\textsuperscript{31} This should not be confused with the large number of institutions that might bid for a share of a specified debt package on a project. Just because there is $350 million offered against a $200 piece of a $500 package at 7 1/2% does not mean that you could get all $350 committed.
It is worth noting in passing that there is more than one relevant concept of default. To the finance theorist, it is when the value of the firm is less than the par value of outstanding debt. In any other case, the firm can (costlessly) issue new equity and pay off the creditors with the proceeds. The financial institutions, however, are inclined to think of two kinds of default, technical and cash-flow. Technical default, as previously noted, comes about as a warning that all is not well with the firm and gives the bank a justification for stepping into the situation. This is not costless to the bank; there is a great deal of expense in terms of legal fees and management time involved in a work-out. Cash-flow default is a much more serious issue than technical default, and is itself divided into cyclical and chronic categories. A cyclical cash-flow default simply means that while the value of the firm is still greater than the outstanding debt, the firm cannot at this time generate enough cash to make a required payment. The solution here is simply for the bank to make another loan, equal to the required payment, and expect repayment when cash comes available. In a chronic default, it is apparent that the firm will never be able to raise adequate cash, which corresponds
in essence to the theorist's definition.

Measuring the cost of default to a lending institution is a very complex task which has to date not been well addressed.\textsuperscript{32} The components of the cost of default are relatively obvious. The first element that comes to mind of course is the loss of income and capital associated with the default. Secondly, there is the costs in terms of management time and talent that is absorbed by a default. These represent the basic economic costs of default. Additionally, there are a number of not well defined but very real costs associated with making a mistake in the banking environment. Bank examiners tend to dislike anything that looks like a default, and can be downright uncivilized if they find a problem associated with a non-ordinary loan, such as a project finance. Secondly, project financings are large, rather public transactions, and as a result, banks tend to find that their reputation to some degree "rides" with the project. A default impinges upon the reputation

\textsuperscript{32} The American Bankers' Association has an on-going study that hopes to define the explicit costs of a default on a commercial loan and to generate some range of values to use as criteria. The individual contacted there requested that his name not be cited, but a twenty-minute phone conversation yielded the following closing remark: "We can give you a number, but it is pure \ldots. We have too many people who will tell us exactly what the cost is but none who can produce a justification that could hold up in an Introduction to Finance course. If I could find another job, I'd declare the whole project hopeless and go on to something else."
of the bank for "well managedness" or general competence, and it is obvious that it is worth something to a bank to protect their reputation. Conversations with bank officers suggest that these non-economic points are very much considered when the question comes up: "How much can we lend them?"

"Agency Costs"

Recently, there have been developed theories that might explain part of the structuring of a corporation's finances based on the concept of agency costs. Consider a firm where the management has some ownership interest and there are additional outside owners. In pursuing their own objectives, the management can either increase the value of the firm or somehow transfer part of the worth of the firm from the outside owners to themselves. The outside owners, of course, will want to protect themselves from this happening, so they will either monitor the on-going operations of the firm or alternatively establish in advance limits to what the

33 Jensen & Meckling (28)
management can do. There are costs to monitoring the actions of the firm, and there are costs to the management of having their actions limited. Either of these two costs of limiting the risks to outside owners can be called agency costs. It should be noted that if we assume that it is management that initially sells the securities, then the new owners will reduce the price they will pay for their claims by however much it will cost them to monitor the firm, so in either case, the management will bear the agency costs.

As the operations of the firm become more diverse and complex, the agency costs will increase. Moreover, as the opportunity for expropriating outside ownership value increases or the gain to be had by management by expropriation increases, then there will also be an increase in the agency costs. Theory suggests that a firm's finances should be structured so that the costs of all external sources of funds are equal, where "costs" are defined as required return plus agency costs.

It is possible that financing through a project format could substantially reduce agency costs and thus increase the debt capacity. As a separate entity, there would be less cost to the firm of appropriate local restrictions on action than restrictions on the whole firm might impose, and at the same time the increased visibility of the project would be likely to reduce the monitoring costs for the
outside debt holders. Agency cost arguments also would tend to explain why independent and extraordinary projects are financed this way as opposed to projects that will be an integrated part of an existing line of business.
Modern finance theory has produced the Value Additivity Theorem, which states that the value of the firm is equal to the value of its separate projects plus the present value of its growth opportunities. If, as this paper intends, one wishes to stay within the boundaries of modern finance, then one would expect that the value of the growth opportunity that is being exercised in the project is converted into the project at about its fair value and that the value of the firm as a whole will be left unchanged. In most cases, this is probably true.

There are a number of inconsistencies in the idea that the Value Additivity Theorem holds exactly for project finance, and some of the ideas that have previously been developed. The most important consideration revolves around the fact that a firm sometimes has to "give up" part of the value of its opportunity to secure funding; this should lead to a reduction in the value of the equity part of the firm. On the other hand, it has been proposed that a project financing would reduce the agency costs of financing a project. If the project had been valued under the assumption that ordinary cost capital had to be used to finance it and it turned out that a less expensive source had
been found, then it would be expected that the value would increase
and there would be a consequent increase in the value of the firm.
It might be nice if one could see a firm trading off some of the
value of its project in exchange for less expensive funds in such
a way that the value of the project either remains the same or in-
creases. It would not be surprising if this were sometimes the case,
but a full investigation of this is beyond the scope of this paper,
and the first-look evidence is not at all conclusive.

There is one small additional insight on the impact of project
financing on the value of the firm. If the securities market has
a negative view towards debt, then there might be some informational
benefit to financing through a project vehicle. Individuals active
in finance tend to believe that if a company borrows a large chunk
of money, despite all public protests that the funds are for a new in-
vestment, that in fact there is some element of covering up a cash-
flow problem that might be involved. As such, information on a large
borrowing tends to decrease confidence in the firm and reduce its
market price. By going through the project finance vehicle, the
investment end of the transaction is very clearly pointed out and
there is no negative impact. The validity of this concept is not
clear in the context of the perfect market hypothesis, but it is
interesting to note that this is an idea that is very much believed
by participants in the market. In well over 70 per cent of the cases studied, this reason was cited as important or "a factor" in financing via a project loan.
This thesis has presented the concept of project finance as a way of financing a separate economic unit in such a way as to minimize the credit exposure of the parent or parents by depending to as great an extent as possible on the cash flows of the project being adequate to repay the debt. The principal focus has been on the financial intermediaries' view of project finance, on how they evaluate the proposed financing, and on some of the basic management problems that have to be faced. Cases and a flow-chart were presented to give a better understanding of the actual process.

A theory of project finance was developed in which it was shown that the basic problem in this type of loan was to structure the income from the project in such a way as to reduce to acceptable levels the probability of insufficient cash-flow. Beyond this, justifications of the use of project finance were found to lie in the advantages of separating some projects from the parent, in the increase in the amount that can be loaned to a project that is committed as opposed to optional, and in the advantages of using the financial structure as a vehicle for capturing economic externalities. Some
tentative ideas on the debt capacity of a project were brought forward, and the possible impacts of using project finance on the value of the firm were briefly explored.

The Future of Project Finance

This thesis has established that there is some validity to the distinction between project finance and other forms of lending, and as such, it is a useful addition to the repertoire of the financial institutions. In the minds of some managers, project finance has taken on an almost mystical air as the "solution" to financing huge projects in a world of growing economic complexity and increasingly scarce capital. To the extent that it represents a way of increasing the flexibility of financing economically viable opportunities, this is true; but there is no magic in the concept. To be viable, a project financing must have at its base a project that is extraordinarily valuable and is associated either with limited risks or risks that can be readily transferred to others. Far from every worthwhile investment opportunity can meet these requirements.

It is likely that there will be more use of project finance in the future. There are some very real advantages in certain circumstances to split-off financing, and as time passes, it is to be
expected that it will become better understood and more accessible to potential borrowers. There is no doubt that this is a useful way of coping with real financial needs and that it will continue to be so under changing circumstances.

Further Research

There are obviously very many potential lines of research that could be followed regarding project finance. This thesis is a first look at a very complex field, and has as its objective nothing more than the determination that there is justification for considering project finance as something distinctive and studiable. It is hoped as a minimum that this work has provided a framework to begin studying from.

Probably the biggest single area which needs study is the entire area of bank lending and related activities. The process, the inputs, and the problems are not that well understood, and there is little available in the literature that relates this very significant activity to modern capital theory. Risk analysis by the banks themselves would be a particularly fruitful line of research to one interested in the problem of rational decision making under uncertainty.
Arising from the paper itself, the entire problem of risk-shifting represents an interesting problem in capital market theory: If a firm's equity owners are diversified and thus indifferent to non-systematic risk, could the firm costlessly assume risk from another actor which is for some reason risk-averse? The effects of a change in riskiness of the firm itself as it changes assets could also be explored, along with the problem of wealth transfers between debt and equity holders. Last, but far from least, a useful model of the debt capacity of a firm or project that fully matches modern capital market theory could be developed, possibly as an extension of the models developed in this thesis.
Resources

Bibliography

Books


Bibliography (continued)

Periodicals


Bibliography (continued)

Periodicals (continued)


Manuscripts


Bibliography (continued)

Other Printed Material


38. Myers, Stewart C. Teaching Notes Nos. 1-5.

Other Resources


Interviews:


Other Individuals:

Close to fifty other people from over thirty different organizations were spoken with in the process of preparing this thesis. At least as much of the information and ideas gathered on project finance came from these informal but very helpful contacts.
A Note on Sources

This was very much an interviewing thesis, and the real intent was the blend the observations of individuals active in project finance with insights drawn from the general body of modern finance theory. Many of the sources cited have been used to extend that general background rather than specifically to develop ideas in the thesis. They are given, however, to establish the basis of the author's analysis and as a guide to at least some of the relevant literature.

Of the literature specifically on project finance, all of it, as of May, 1976, was flawed and potentially quite misleading, in my opinion. Of the material, only the Castle (15) article is readily available and a worthwhile introduction to the field. It is recommended strongly as preparatory reading to this thesis.