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Throughout most of the history of the industrialized world, much of the funding for large-scale public works such as the building of roads and canals has come from private sources of capital. It was only toward the end of the 19th century that public financing of large “infrastructure” projects began to dominate private finance, and this trend continued throughout most of the 20th century.

Since the early 1980s, however, private-sector financing of large infrastructure investments has experienced a dramatic revival. And, in recent years, such private funding has increasingly taken the form of project finance. The principal features of such project financings have been the following:

- A project is established as a separate company, which operates under a concession obtained from the host government.
- A major proportion of the equity of the project company is provided by the project manager or sponsor, thereby tying the provision of finance to the management of the project.
- The project company enters into comprehensive contractual arrangements with suppliers and customers.
- The project company operates with a high ratio of debt to equity, with lenders having only limited recourse to the government or to the equity-holders in the event of default.

The above characteristics clearly distinguish project finance from traditional lending. In conventional financing arrangements, projects are generally not

incorporated as separate companies; the contractual arrangements are not as comprehensive, nor are the debt-equity ratios as high, as those observed in the case of project finance; and the vast majority of loans offer lenders recourse to the assets of borrowers in case of default.

Our purpose in this paper is to explore some possible rationales for the distinctive characteristics of project finance, from the viewpoint of both the project sponsor and the host government. We do so in the specific context of infrastructure investments. After providing some information about the growth of project finance in funding such investments, we note that project finance is but one of several mechanisms for involving the private sector in funding and managing infrastructure projects. We show how project finance, and the complex web of contractual arrangements that such funding entails, can be used to address “agency problems” that reduce efficiency in large organizations, private as well as public. We also view the contracts among the multiple parties to project financings as risk management devices designed to shift a variety of project risks to those parties best able to appraise and control them. In closing, we discuss what we believe are some common misconceptions about the benefits and costs of project finance—particularly, the notion that project finance represents “expensive finance” for governments—and we contrast project finance with other private-sector options such as privatization and the use of service contracts with private-sector companies.

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THE GROWTH IN PROJECT FINANCE: SOME EVIDENCE

Comprehensive data on the financing of infrastructure projects do not appear to be available. Table 1 does, however, provide information about the growth in the value of those projects in developing countries that have been partially financed by the International Finance Corporation (the World Bank's private sector affiliate).

TABLE 1
VALUE OF PROJECTS INVOLVING IFC PARTICIPATION IN DEVELOPING COUNTRIES

Year of approval	No. of projects	Value of projects \$ million
1966-1987	7	517
1988	2	409
1989	6	704
1990	4	1279
1991	6	1103
1992	8	1384
1993	15	3699
1994(1st 6 months)	30	5512

Source: G. Bond and L. Carter, "Financing Private Infrastructure Projects; Emerging Trends from IFC's Experience," International Finance Corporation, Discussion Paper 23, 1994.

Over 80 percent (by value) of the projects involving the IFC have been in the power and telecommunication industries, with the remainder in transportation (roads, railroads, and ports), water, and pipelines. About 50% of the projects have been in Latin America, with the bulk of the remainder in Asia.

The use of project finance has not been restricted to infrastructure investments in developing countries. Indeed, over 40 percent of the project finance loans reported in the 1995 survey conducted by *IFR Project Finance International* were for projects in the United States, Australia, or the United Kingdom. In the United States, the passage of the Public Utility Regulatory Power Act (PURPA) in 1978 provided a major stimulus to the use of project finance by requiring that electric utilities purchase power from independent power produc-

ers. This encouraged the formation of stand-alone power producers able to borrow large sums on the basis of the long-term power purchase agreements they had entered into with electric utilities. Since these projects do not directly involve a government or a government agency, they are somewhat beyond the scope of this article. So are projects in Australia, which have primarily been in extractive industries rather than in infrastructure.

In the U.K. by contrast, the government has been directly involved in a growing number of infrastructure projects since it announced in 1992 the establishment of the Private Finance Initiative (PFI). The PFI is designed to involve the private sector in the financing and the management of infrastructure and other projects. Private finance has so far been used principally for transportation projects such as the £320 million rail link to Heathrow airport, the £2.7 billion Channel Tunnel Rail Link, a £250 million scheme to build and maintain a new air traffic control center in Scotland, and projects worth more than £500 million to design, build, finance, and operate (DBFO) trunk roads. But the potential scope of the PFI is wide. Over 1,000 potential PFI projects have been identified, and the government has signed contracts to build and maintain such diverse assets as prisons, hospitals, subway cars, and the National Insurance computer system.¹

SOME ALTERNATIVES TO PROJECT FINANCE

A government need not involve the private sector in either the financing or the management of projects, and may choose to undertake both itself. As we will argue below, the desirability of private-sector involvement in infrastructure projects depends in large part on the extent to which (1) the provision of high-powered incentives is necessary to the success of the project and (2) such incentives can be specified in a verifiable contract.

It is important to note that high-powered incentives need not always be beneficial. For example, consider the hypothetical case of privatized parking enforcement agencies. Such organizations would probably be subject to severe moral hazard problems if provided with high-powered incentives, for they may then have an incentive to claim an offence has been committed even where none has.

1. See Standard & Poor's, *Global Project Finance*, July 1996, pages 24-28, and OXERA, *Infrastructure in the UK*.

The desirability of private sector involvement in infrastructure projects depends in large part on the extent to which the provision of high-powered incentives is necessary to the success of the project. The dominant reason for the growing importance of project finance in funding infrastructure investment is that it addresses agency problems in a way that other forms of financing do not.

It should further be noted that public-sector organizations are not entirely devoid of incentives, and that these are often of the same nature as the incentives found in private-sector companies. Both voters and shareholders have an interest in efficient management, the former as taxpayers and the latter as owners. Both use their votes to discipline inefficient management, the former by voting for a new government, and the latter by voting for a new management. Nonetheless, the greater power and prevalence of incentives in private-sector organizations suggests an important role for these organizations when high-powered incentives are desired.

A government that uses project finance to fund a project obtains both private-sector funding and private-sector management. Project finance therefore reduces the need for government borrowing, shifts part of the risks presented by the project to the private sector, and aims to achieve more effective management of the project. But, as we indicate in Table 2, there are a number of other means of involving the private sector in infrastructure investment. The government can do so through privatization, for example, in which case the private sector provides capital and management services to an entire industry rather than to individual projects. Thus, the government can privatize a public utility that generates and distributes electric power, rather than grant a concession to a private company to generate power that is then sold to the public utility.

If the government simply wishes to benefit from private-sector management expertise, it can contract with the private sector for the provision of management services while continuing to finance the project and retaining ownership of the project's assets. Conversely, the government can simply secure finance by leasing the project's assets from the private sector, while continuing to be responsible for the management of the project.

TABLE 2
WAYS THAT INFRASTRUCTURE PROJECTS CAN BE FUNDED AND MANAGED

Arrangement	Finance	Management
Project finance	Private	Private
Privatization	Private	Private
Service contracts	Government	Private
Leases	Private	Government
Nationalization	Government	Government

In view of these alternatives to project finance, it is natural to ask why it has developed into such an important mechanism for funding infrastructure investments. We argue that the dominant reason for the growing importance of project finance in funding infrastructure investment is that it addresses agency problems in a way that other forms of financing do not.

PROJECT FINANCE AS A RESPONSE TO AGENCY PROBLEMS

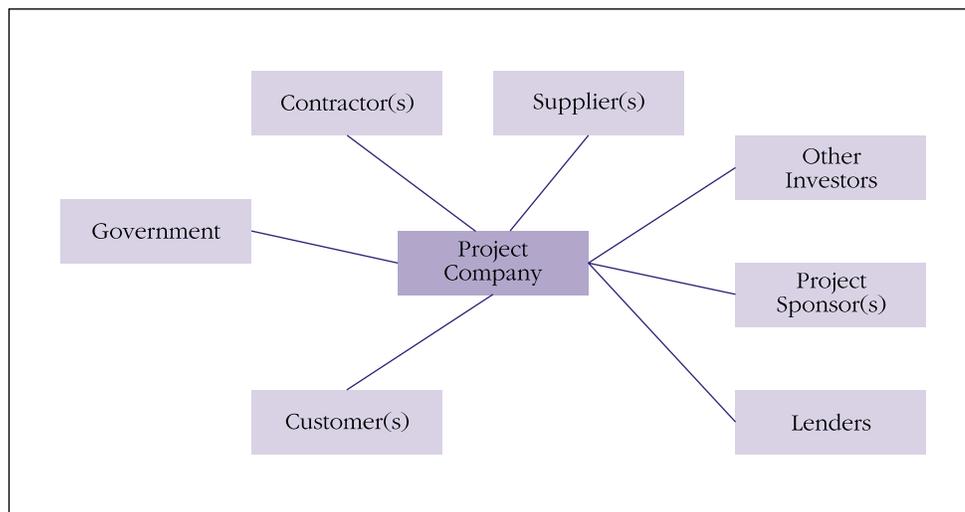
Agency problems arise from the differing, and sometimes conflicting, interests of the various parties involved in any large enterprise. Success of the enterprise therefore requires that these parties be provided with incentives to work together for the common good. This can be achieved, to some extent at least, by the appropriate choice of a company's financial structure.

Consider, for example, the problem faced by shareholders in a public corporation who wish to motivate the CEO to work hard to increase firm value. Shareholders would like the CEO to do her utmost to increase shareholder wealth, and they may wish to write a contract that specifies what she should do in all the various circumstances that she may encounter. But such a contract would be impossible to write, if only because of the difficulty of envisaging and describing these various circumstances. Any contract between shareholders and corporate managers will therefore inevitably be incomplete. Furthermore, even if it were possible to write a complete contract that specified exactly what the CEO were to do in every circumstance, it would be very costly for shareholders to monitor the manager to ensure that she was keeping to the contract.

One solution to these problems of incomplete contracting and costly monitoring is to arrange for the manager to take an equity stake in the business. Such a stake ties the manager's wealth to her actions, thus rewarding her for hard work and penalizing her for sloth. The "residual claimancy" associated with the ownership of equity therefore serves to motivate the manager, to some extent at least, in the cases where contracts fail to do so.

The above example illustrates the role of financial structure in solving agency problems. Notice that the CEO's equity stake in the business provides her with the incentive to act in the shareholders'

FIGURE 1
PARTIES TO PROJECT
FINANCING



interest by exposing her to part of the risk of the business. The creation of incentives and the transfer of risk from the shareholders to the manager are therefore two sides of the same coin. This transfer of risk is not beneficial in itself; for the manager, unlike the shareholders, does not hold a diversified portfolio. She therefore requires a higher return than do the shareholders for bearing this risk. The transfer of risk is beneficial *only* to the extent that it improves efficiency.

In the case of project finance, a complex series of contracts and financing arrangements distributes the different risks presented by a project among the various parties involved in the project. As in the case of our simple example of the management compensation contract, these transfers of risk are rarely advantageous in themselves, but have important incentive effects. To see how this occurs, we need to look at the structure of a typical project financing.

THE MAIN PARTIES

There are numerous parties involved in the structuring of a typical project financing. As shown in Figure 1, besides the lenders and the project company, these parties typically include one or more project sponsors, contractors, suppliers, major customers, and a host government.

Sponsors and Investors. A separate company is established for the purpose of undertaking the project. A controlling stake in the equity of that company will typically be owned by a single project

sponsor, or by a group of sponsors, who will generally be involved in the construction and the management of the project. Other equity-holders may be companies with commercial ties to the project, such as customers and suppliers, or they may be financial investors. For example, the shareholders of the PT. Paiton Energy Co. (PEC), which is building the Paiton 7 and 8 power stations in Indonesia, are Edison Mission Energy (40%), General Electric Capital Corp. (12.5%), Mitsui & Co. Ltd. (32.5%), and PT. Batu Hitam Perkasa (15%). As is typical of such projects, the main shareholders of the project company are the main contractor of the plant, Mitsui, and its operator, Edison Mission Energy, which will operate and maintain the plant through PT. MOMI Indonesia, the local affiliate of Mission Operation & Maintenance Inc. General Electric Co., of which General Electric Capital Corp. is the finance affiliate, will supply the steam turbine generators. The Indonesian company PT. Batu Hitam Perkasa appears to have no operational involvement in the project, but may carry political clout.

Lenders. Infrastructure projects involve substantial investments. A large fraction of the needed finance is generally raised in the form of debt from a syndicate of lenders such as banks and specialized lending institutions and, less frequently, from the bond markets. In the case of PEC, for example, equity-holders provided \$680 million in equity and subordinated debt. \$1.8 billion was provided in the form of senior debt, of which 90 percent was bank debt and 10 percent was senior secured bonds.

Most infrastructure projects are financed by bank loans. The concentrated ownership of bank debt encourages lenders to devote considerable resources to evaluating the project, and to monitoring its progress on a continuing basis. It also facilitates the renegotiation of the debt should the project company experience difficulties in servicing it.

Project companies will sometimes enter into production payment arrangements instead of issuing ordinary debt. These arrangements are functionally equivalent to borrowing: a bank provides cash up-front as advance payment for a project's output, and the project company undertakes to deliver the output to the bank and arranges for the output to be repurchased at a guaranteed price.

Most infrastructure facilities have very long lives. This suggests that they should be financed with long-term debt. Yet, most infrastructure projects are financed by bank loans, which have maturities that rarely exceed 10 to 12 years, rather than by long-term bonds.

Some observers have suggested that the difficulty in arranging long-term bond financing is due to the fact that bondholders are particularly risk-averse. But, since most bondholders also hold substantial portfolios of equities, this seems improbable. Our explanation for the widespread use of bank finance, and the correspondingly limited role of bond finance, focuses instead on the ownership structures of these two forms of financing. The concentrated ownership of bank debt encourages lending banks to devote considerable resources to evaluating the project, and to monitoring its progress on a continuing basis. It also facilitates the renegotiation of the debt should the project company experience difficulties in servicing it. By contrast, the more diffuse nature of bond ownership reduces the incentives of bondholders to evaluate and monitor the progress of the project, and makes it difficult to take concerted action if covenants are breached or require modification. Thus, it does not seem surprising that many bond issues, such as the \$180 million issue made by PEC, have been privately placed under rule 144a. This ensures that ownership remains in the hands of a limited number of qualified institutional buyers (or QIBs).

A bond issue to fund a green-field project is likely only in the case of a low-risk project. Even then, it is commonly enhanced by a credit guarantee from an insurance company, or a political risk guarantee from a national or supranational agency. For example, a project company established to upgrade two major roads in England was able to raise the majority of its debt by an issue of bonds that were enhanced by a Aaa/AAA guarantee from AMBAC Indemnity Corporation.

Bonds are also commonly used in project finance in one other set of circumstances. Once construction is completed and project facilities become operational, bond financing is often used to replace existing bank debt. This can be explained by the fact that the need for monitoring falls upon completion of the construction phase.

Government. The project company will in most cases need to obtain a concession from the host government to build a road or a railway, for example, or to operate a telecommunication service. The government may also need to establish a new regulatory framework, guarantee currency convertibility, and provide environmental permits.

In many cases, the project company retains ownership of the project's assets. Such arrangements are known as "build-own-operate" projects (BOOs). In other cases, ownership of the project's assets is transferred to the government at the end of the concession period. These arrangements are known as "build-operate-transfer" projects (BOTs).²

Contractors. As noted above, the main contractor of the plant will often hold a stake in the equity of the project company. Other contractors may also do so, although generally to a lesser extent.

Suppliers and Customers. Once the project facility has been built and has become operational, the project company will need to purchase the supplies it requires, and to sell the products it produces or the services it provides. Sometimes, as in the case of a pipeline, there will be in effect only one customer. Often in this case the customer will be a government-owned utility, or the government itself. For example, the sole customer for the electricity produced by the Paiton 7 and 8 power stations will be the Indonesian state-owned electric utility. In other cases, as in that of a toll road, there may be many possible customers.

CONTRACTUAL ARRANGEMENTS

Although a project company is unusual in that it is established to undertake a single project, there is nothing unusual about the identity of the parties involved in the project. All companies have owners, lenders, suppliers, and customers, and all have dealings with the government. The difference in the case of project finance lies in the overriding impor-

² It should however be noted that the terms BOO and BOT are sometimes used interchangeably.

tance of the contractual and financing arrangements that exist between these various parties. These are more than a series of independent bilateral arrangements. In particular, the complete package of contracts needs to be put in place before debt finance can be secured.

We discuss the contractual arrangements first. These are designed to allocate every major risk presented by a project to the party that is best able to appraise and control that risk. Because a party to a project will agree to bear a given risk at a non-prohibitive price only if it has a clear understanding of that risk, most projects involve established technologies, as is the case for power stations, roads, and airports. Project finance is less appropriate for projects that involve complex or untried technologies, as evidenced by the failure of the U.K. government to secure project financing for research and development projects.

Let us look briefly at the various ways in which contractual arrangements distribute risk among the various parties to a project:

- The project sponsors bear the risks of project completion, operation, and maintenance. This is achieved through a facility management contract that includes guarantees that the project facility will be completed on time, and that it will be built and operated to the desired specifications. The project sponsor may also enter into a “working capital maintenance” agreement or a “cash deficiency” agreement with the lending banks. Such agreements ensure adequate funding for the project in its early years.
- The lenders to the project will require the usual assurances from the project company, including security for their loans. But, especially in the early stages of the project, lenders will also have recourse to the project sponsors in the event of specific problems such as cost overruns. Lenders will particularly want to ensure that cash that can be used to service the debt is not paid out to equity-holders. The amount of debt service may therefore be linked to the project’s output, and any earnings in excess of debt service requirements may be placed in a “reclaim” account and drawn on if subsequent earnings do not suffice to service the debt.
- The main contractor is obviously best able to ensure that construction is completed within cost and on schedule. He will therefore often enter into a turnkey contract that specifies a fixed price and

penalties for delays, and he will usually be required to post a performance bond.

- When there is a major supplier to the project, there will be a contract with that supplier to ensure that (1) he does not abuse his possible monopoly power and (2) he produces efficiently. For example, if the project company is a major purchaser of energy from a monopolistic state-owned enterprise (SOE), the project company will enter into a long-term supply contract with the SOE. The contract purchase price will often be fixed, or indexed to inflation or some other variable that affects project revenues; and the contract may require the SOE to compensate the project company if the SOE fails to supply the contracted energy.

- When there are only a few potential customers for the project’s output, revenue risk is likely to be transferred to those customers by means of long-term sales contracts. These will often include a take-or-pay clause or, as in the case of a pipeline, a throughput agreement that obliges the customer to make some minimum use of the pipeline. Another arrangement for transferring revenue risk to a customer is a tolling contract, whereby the customer agrees to deliver to the project company materials that it is to process and return to the customer. Some power projects, such as Navotas in the Philippines, have been structured in a similar way: the purchasing utility provides the fuel and the project company is simply paid for converting it to electricity. The purpose of transferring revenue risk to customers is to provide them with the incentive to estimate their demand for the project’s output as carefully and honestly as possible.

The contract between project company and customers will as much as possible seek to ensure that the prices of the product are indexed to its costs; and, where there is considerable currency uncertainty, prices may also be indexed to exchange rates as in the case of the Paiton power project.

- When there are many customers, as in the case of a toll road, long-term purchase contracts with these customers may be impossible. Indeed, if alternative routes are not subject to a toll, it may be infeasible to set a price that provides the project company with a satisfactory return. For example, one of the problems in attracting private finance to the funding of rail projects within central London has been that the revenues from such projects are likely to be highly dependent on transport policy towards *other* means of transportation in the capital. In such cases, it may

In project finance, the complete package of contracts needs to be put in place before debt finance can be secured. This web of contractual arrangements is designed to allocate the various risks presented by the project to those parties that can best appraise and control those risks.

be possible to attract project finance only if the government guarantees some minimum payment to investors.

■ When the government grants a concession to a project company, there will need to be a concession agreement that gives the company the right to build and operate the project facility. The concession agreement may also require the government to construct supporting facilities such as access roads. Failure to do so may lead to the failure of the project, or may decrease the return on the project. For example, the profitability of Eurostar, the company that operates rail services through the Channel Tunnel, has suffered from the delays in the construction of a promised high-speed rail link in England and a new railway station south of London. The government may also need to guarantee the performance of state-owned companies. For example, if a project sells electricity to a state-owned power utility, the government may need to guarantee the contractual obligations of that utility.

The project company will also be concerned about currency convertibility, in particular its ability to service its foreign currency debt and pay dividends to its equity-holders. The government may therefore be asked to provide guarantees or comfort letters; and, if the project has hard currency revenues, it may have to consent to having these revenues paid into an offshore escrow account.

As we have already observed, this web of contractual arrangements, which may vary over time in line with the progress of a project, is designed to allocate the various risks presented by the project to those parties that can best appraise and control those risks. An attempt to allocate a given risk to a party that is not best able to control that risk will generally fail. For example, the private financing of prisons in the U.K. ran into difficulties when the government sought to link its payments to private prisons to the number of prisoners that were sent to these prisons. The problem, of course, was that the number of prisoners was outside the control of the project companies, but at least partially within that of the government. Conversely, failure to allocate a given risk to the party that is best able to control that risk will lead to a loss in efficiency. As one example, government guarantees of fair rates of return to utilities or project companies remove any incentive for these organizations to reduce their costs.

OWNERSHIP, CAPITAL STRUCTURE, AND INCENTIVES

We now turn to the financing arrangements observed in the case of project finance. Among the questions we address are the following:

- Why are projects incorporated in separate companies?
- Why are the operators and the main contractors of the project typically the main equity-holders in that company?
- Why are project companies highly leveraged?
- Why does this leverage take the form of non-recourse financing?

The object of the contractual arrangements that we have described above is to ensure that a project company is not exposed to an abuse of monopoly power, and to provide all parties to the project with the incentives to act efficiently by transferring the risk of poor performance to those best able to manage it. Construction risk is thus borne by the contractor, the risk of insufficient demand by the purchaser, and similarly for the other risks presented by the project.

But this does not explain the widespread practice of incorporating the project in a separate company, and tying the management of a project to its financing. Indeed, a government could easily raise money directly for infrastructure investment and contract with each party to provide the required services. But, as we pointed out earlier, there is a limit to how much can be written into a contract and how efficiently that contract can be monitored. Contractual arrangements therefore need to be complemented by financing arrangements.

Think, for example, why the operator and the main contractor of a project should be made to be equity-holders in the project. These equity holdings would not be needed if it were possible to write and monitor complete contracts with the contractor and the operator. The operation of the project could then be separated from its financing. This sometimes happens—most recently, in the case of a South African road project. But it is usually not possible to write and monitor sufficiently comprehensive contracts. In such cases, the equity holdings that the contractor and the operator have in the project company provide them with an incentive to be efficient by making them residual claimants whose profits depend on how well the project facility is built and operated.

Project companies are highly levered: the average debt ratio for IFC-financed projects, for example,

is around 60 percent. Such leverage is used despite the fact that there is reputed to be a shortage of potential lenders for project finance, and that it is costly to structure the project to make these high debt levels possible. Furthermore, lenders lend directly to the project company rather than to the sponsors, and they have only limited recourse to the sponsors in case of default by the project company. This last observation suggests that the motive for the high leverage observed cannot be that debt is a “cheap” source of finance. If that were the case, the loans could equally well be made to the sponsors.

In their classic paper on capital structure, Miller and Modigliani showed that, in perfectly competitive

capital markets, company value would be independent of the degree of leverage. Similar arguments can be used to show that, under the same restrictive set of conditions, value cannot be enhanced simply by concentrating debt in a subsidiary or an associated company. As illustrated in Exhibit 1 below, the total cash flow to all security holders is independent of whether debt is located in a project company or in its parent company.

Why, then, do we observe a high concentration of debt in the project company? As happens so often in discussions of capital structure, there is an abundance of possible explanations, none of which appears to be capable of explaining all the facts.

EXHIBIT 1 ■ THE IMPACT OF PROJECT FINANCE IN AN M&M WORLD

The example below illustrates (a) that, in a Miller-Modigliani world, project finance does not affect the total value of the firm and (b) that project finance can potentially affect value when debt default is costly.

Panel 1 shows a firm with existing assets and debt undertaking a large project. Both the assets and the project give a single cash flow and have pure discount debt. Panel 2 shows the payoffs in different states of the world to debt and equity if the project is undertaken as part of the general activities of the firm. Panel 3 shows the payoffs to project debt, existing debt, and parent equity if the project is undertaken as a separate entity (project finance).

In a Miller-Modigliani world without taxes, project finance has no impact on the total value of the firm. This can be seen by comparing the final columns of Panel 2 and Panel 3, where the total cash flows accruing

to all security holders are identical in all states. In a complete securities market, this guarantees that the total value of the firm is independent of the way that financial claims on the firm are structured.

The impact of project finance on default risk can be seen by comparing Panel 3 (project finance) with Panel 2. The net impact of project finance on default is to:

- A. Prevent the existing assets bringing down the project in state 2.
 - B. Prevent the project bringing down the existing assets in state 3.
 - C. Make the project default in state 5 because the coinsurance of the existing assets is lost.
- By thus rearranging the states of the world in which default occurs, project finance can change the associated costs of default.

State	CHARACTERISTICS OF EXISTING ASSETS AND PROJECT				SECURITY PAYOFFS IN THE CASE OF TRADITIONAL FINANCE			SECURITY PAYOFFS IN THE CASE OF PROJECT FINANCE					
	PANEL 1 Debt Face Value: Existing Assets	Debt Face Value: Project	Cash Flow: Existing Assets	Cash Flow: Project	PANEL 2 Debt	Equity	Total Cash Flow	PANEL 3 Project Debt	Project Equity	Total Cash Flow to Sponsor	Parent Debt	Parent Equity	Total Cash Flow: Project Debt + Existing Debt + Parent Equity
1	100	100	50	50	100*	0	100	50*	0	50	50*	0	100
2	100	100	50	130	180*	0	180	100	30	80	80*	0	180
3	100	100	130	50	180*	0	180	50*	0	130	100	30	180
4	100	100	130	130	200	60	260	100	30	160	100	60	260
5	100	100	300	50	200	150	350	50*	0	300	100	200	350
6	100	100	300	130	200	230	430	100	30	330	100	230	430

*Indicates default.

If the bankruptcy costs of the sponsor are higher than those of the project company, it could be more efficient to isolate the debt in the project company to ensure that the sponsor's business is not damaged by a possible bankruptcy of the project.

Many of these explanations are related to the incompleteness of contracts. We discuss below some of the more common explanations (and summarize in Exhibit 2 four of the principal theoretical models of project finance).

Bankruptcy Costs. The example in Exhibit 1 shows that the total cash flows to investors are independent of whether the firm employs project financing when bankruptcy costs are assumed to be zero, as in an M & M world. The example also shows, however, that project finance changes the states of the world in which the debt is in default. In so doing, project finance changes the expected costs of default.

The projects undertaken by project companies typically have low bankruptcy costs. This is because their assets are largely tangible assets, which are likely to go through a bankruptcy process largely unscathed. For example, a change in ownership is unlikely to affect the efficiency with which a power station or a toll road is operated. In addition, if the bankruptcy costs of the sponsor are higher than those of the project company, it could be more efficient to isolate the debt in the project company to ensure that the sponsor's business is not damaged by a possible bankruptcy of the project.³ A trading and construction company such as Mitsui, for example, is likely to lose much more of its operating value than the project company building the Paiton power stations, and it should therefore attempt to contain the effects of a possible project failure through the use of project finance. The low cost of bankruptcy for project companies may therefore help to explain why project companies carry heavy, non-recourse debt loads, but it does not explain why these companies enter into a variety of credit-enhancing contracts, such as insurance and hedging contracts (we return to this issue later).

Taxes. When a project is located in a high-tax country, and the project company in a lower-tax country, it may be beneficial for the sponsor to locate the debt in the high-tax country. The company maximizes its interest tax shields in so doing. But the difference in tax rates does not explain why the debt has limited recourse, nor does it explain the concen-

tration of debt in the project company when both the sponsor and the project company are located in the same jurisdiction.

Myopia. Some of the arguments for placing the debt in the project company assume that the lenders are blinkered. For example, it is sometimes suggested that the limited recourse of the debt holders to the project sponsors provides the sponsors with a free lunch, and that project finance allows the debt to be "off-balance-sheet" to the sponsors (for example, by structuring the contractual obligation as a production payment rather than as a loan). However, it is very doubtful that lenders are misled by such stratagems.

Political Risk. We have argued that the difficulty of writing complete contracts with operators and contractors provides the motive for tying project financing and management. Similarly, the difficulty of writing a comprehensive and binding concession agreement with a host government provides the need for financing arrangements that make it difficult for the government to take actions that may render the project unprofitable.

One such arrangement is for the host government to take equity in the project company. Another is an extensive reliance on limited recourse financing. By arranging for the project company to issue such debt, the sponsors ensure that the cost of adverse government action falls directly on the lending banks and agencies. These generally consist of a syndicate of major banks from a wide range of countries, together with national or supranational bodies such as the export-import banks of the main industrial countries, the World Bank, the International Finance Corporation, the Asian Development Bank, and the Inter-American Development Bank. All have considerable political clout, and can bring pressure to bear upon the host government if necessary. Moreover, the national and supranational agencies commonly hold subordinated debt that further exposes them to the consequences of adverse government actions. In contrast, the commercial banks tend to hold senior debt in the project.

In addition, the national and supranational agencies also provide loan guarantees, which are

3. See Michel Habib and D. Bruce Johnsen, "User Specialisation and Asset Financing," working paper, London Business School, 1996. It may not simply be the sponsor's business that is damaged by bankruptcy. The management of the sponsoring company may have valuable control rights such as perquisites and an enhanced reputation, and the project may have synergies with other projects run

by the same management. Management may therefore wish to isolate the project to protect its control rights. See T. Chemmanur and K. John, "Optimal Incorporation, Structure of Debt Contracts, and Limited-Recourse Project Financing," working paper, New-York University, 1992.

generally intended to protect lenders against political risk, but rarely provide protection against commercial risk, again illustrating the principle that risk should be allocated to those that can best manage it. For example, the World Bank may assist the project company in raising debt by offering a partial risk guarantee that covers the host government's contractual obligations and political *force majeure* risks, as in the case of the Hub power project in Pakistan. Similarly, one level of government may guarantee the performance of another. For example, the Indian central government was contractually liable for any loss to the sponsor of the Dabhol power project that was a consequence of government action. This encouraged the Indian central government to put pressure on the state government of Maharashtra to resume construction of the plant, in spite of the

electoral promises of the new state government to cancel the project.

Protection against political risk may go far towards explaining the debt structure of project companies in developing countries. It does not explain why projects in politically stable countries are also heavily levered. Of course, such countries are not free from political risk. Environmental legislation or court awards in liability suits may sometimes pose serious threats to business. However, these risks generally threaten the sponsors of the project as much as the project company, and are therefore unlikely to explain the concentration of debt in the project company.

Information Costs. The granting of a loan clearly requires that the lenders evaluate the creditworthiness of the borrower, and monitor his use of the assets financed by the loan. A possible benefit of

EXHIBIT 2 ■ THEORETICAL MODELS OF PROJECT FINANCE

Model	Benefit of Debt	Cost of Debt	Benefit of Project Finance	Cost of Project Finance
Habib and Johnsen (1996) ^a : Asset specific investment by the initial user and the alternative user of an asset.	Induces both users to make the first-best investment in case the asset is to be transferred over some range of states.	May distort the asset-specific investment made by the initial user in case the asset is not to be transferred.	Avoids the distortion of asset-specific investment in the case of many assets and many alternative users.	
Chemmanur and John (1992) ^b : Private benefits of control	Avoids selling outside equity, thus lowering the probability of losing control to outsiders	Increases the probability of bankruptcy and the monitoring of management by debt-holders.	Avoids having a high-risk project bankrupt a low-risk project.	Loses the coinsurance property of debt.
John and John (1991) ^c : Tax benefits and agency costs of debt.	Tax savings.	Foregone growth opportunities (Myers underinvestment).	Enables trade-offs between the costs and the benefits of debt that are specific to the project and to existing assets.	
Shah and Thakor (1987) ^d : Signalling with debt.	Tax savings.	Signals high risk.	Lowers the cost of information gathering by creditors. Avoids the joint credit evaluation of the projects and existing assets.	Precludes optimal leverage for the entire firm.

a. M. Habib and D.B. Johnsen, "User Specialization and Asset Financing," Working Paper, London Business School, 1996.

b. T. Chemmanur and K. John, "Optimal Incorporation, Structure of Debt Contracts, and Limited-Recourse Project Financing," Working Paper, New-York University, 1992.

c. T. John and K. John, "Optimality of Project Financing: Theory and Empirical Implications in Finance and Accounting," *Review of Quantitative Finance and Accounting* 1 (1991), 51-74.

d. S. Shah and A. Thakor, "Optimal Capital Structure and Project Financing," *Journal of Economic Theory* 42 (1987), 209-243.

By arranging for the project company to fund itself heavily with debt, the sponsors ensure that the cost of adverse government action falls directly on the lending banks and agencies. These generally consist of a syndicate of major banks from a wide range of countries, together with national or supranational bodies like the World Bank with considerable political clout.

project finance, and of the associated lack of recourse, is that it allows lenders to the project to confine their evaluation and monitoring to the project only, and saves them from having to evaluate and monitor the sponsors as well.

Free Cash Flow. Michael Jensen has argued that companies with a surplus of cash and a lack of worthwhile projects have a tendency to invest this cash in negative NPV projects rather than return it to shareholders. Leverage ensures that cash is needed to service debt, and is not frittered away. That is, heavy debt financing can provide stronger incentives both to generate more cash, and to pay out what cash cannot be profitably reinvested in the company.

The above argument leaves open the question as to why the debt is located in the project company rather than in the parent companies. After all, if the parent companies assumed the debt, they would have an equally great incentive for ensuring that cash was distributed to them rather than reinvested unproductively.

There are two possible reasons why the location of the debt could matter. One is that the parent companies may find it difficult or costly to monitor the efficiency with which cash is used within the project company, and therefore cannot prevent the waste of free cash flow. The other is that, when there is more than one parent company, the owners may have different views about how to use cash. For example, if one parent is a potential supplier to the project company while another has a purely financial interest in it, the two parents may disagree about the desirability of having the company reinvest its free cash flow. By ensuring that cash flows are used to service debt, such disagreements are avoided.

INSURANCE AND HEDGING

The risk transfer contracts that we described earlier have the effect of transferring many of the project risks from the project sponsor to the other parties to the project. Further risks are transferred by a variety of insurance contracts, such as completion insurance, insurance against *force majeure*, and insurance against political risks.

Although an insurance company may have particular expertise at pricing these risks and may

possibly be skillful at monitoring them, it has no control over them. An insurer cannot control whether there will be a flood, a hurricane, or other natural catastrophes. Insurance contracts therefore should have no beneficial effect, and may well have detrimental effects, on incentives, as they reduce the incentives of the project company to exert effort that would minimize the effects of such disasters. Therefore, the probable purpose of such risk transfers is simply to enable the project company to operate at higher debt ratios than it otherwise could.

In addition to the protection against firm-specific risks they purchase from insurance companies, project companies may also undertake to hedge themselves against market risks, such as any remaining currency risk, interest rate risk, and commodity price risk. These contracts too enable the project company to operate at high debt ratios.

BIDDING

Project finance is expensive to arrange. It involves establishing the project company, forming a consortium of equity-holders and lenders, gaining agreement to a complex set of contractual arrangements between the parties involved, and arranging costly documentation.

Governments commonly advertise for competing bids. Of course, in preparing their bid, companies recognize both the cost of doing so and the probability that they will not be awarded the contract. For this reason, an open auction will not necessarily result in the optimal number of bidders, or the lowest cost to the government. For example, a common complaint by contractors in the U.K. has been that they have incurred large bidding costs under the Private Finance Initiative, with a low probability of success. Bidding costs are reputed to have been up to five times higher than for private sector projects.⁴

Where each potential bidder has access to the same technology and is equally well-equipped to undertake the project, there is no gain in social welfare from inviting a large number of bids. The government needs to invite only a sufficient number of bids to avoid collusion or the exercise of monopoly power.

4. *The Financial Times*, 10 November 1995.

BUILD-OPERATE-TRANSFER

In the case of BOT (build-operate-transfer) as opposed to BOO (build-own-operate) projects, ownership of a project's assets is transferred to the government at the end of the concession period. For example, ownership of privately financed toll roads and bridges is often eventually transferred to the government.

Of course this is not a free lunch: sponsors will recognize the limited nature of the concession in their bidding. Since project sponsors need to recover their investment within the limited period of the concession, it may not be possible to arrange BOT finance even for projects that provide a satisfactory return over their complete life. An often-cited example is the early Mexican toll road program, where a 10-year concession period obliged sponsors to charge such high tolls that motorists avoided using the roads. The other danger with BOT contracts is that, as the end of the concession period approaches, there is little incentive for the sponsor to invest more in the project, and every incentive for him to take as much cash out as he can. For example, oil rights with a limited life encourage the franchisee to extract oil earlier than may be desirable.

Why, then, are some projects organized as BOT contracts? We suggest that such an arrangement makes sense where there is a need for the government to support the project by continuing infrastructure investments that cannot easily be specified by contract. Knowing that the project will eventually revert to government ownership provides an incentive for the government to invest in the supporting infrastructure.

The government sometimes has an option to terminate the concession before the end of the concession period. This may be particularly important when the original concession agreement may prevent government policy changes in (say) the regulatory framework.

CONCLUDING REMARKS

We conclude this paper by discussing what we believe are some common misconceptions about

project finance, and by briefly contrasting project finance with the alternatives of privatization and service contracts.

It is sometimes argued that project finance is attractive simply because "the mobilisation of private capital is the only way in which public service is likely to be maintained,"⁵ or because it saves the government money by transferring the investment expenditure from the public to the private sector. For example, the British government recently agreed to sell homes occupied by military personnel to private firms which would manage those homes and lease them back to the government. This, it was asserted, would reduce government spending by £500 million, thus cutting the government's borrowing requirements. While this is literally correct, the sale of the homes also makes the government liable for a series of future rental payments. Unless the private sector is more efficient at managing these homes, the cash flows paid out by the government in the sale-and-leaseback arrangement can be exactly replicated by government borrowing. Of course, by using project finance rather than direct government borrowing, a government may reduce its apparent deficit and avoid contravening IMF requirements on borrowing, or rules for admission to European Monetary Union. But it is difficult to believe that such transparent dodges provide a reliable long-term basis for the use of project finance.⁶

Some *critics* of the use of project finance for infrastructure investment argue that the cheaper financing available to the government could well outweigh the gains in efficiency made possible by private-sector management. The government is said to have a lower cost of capital than do private-sector companies because it is able to borrow at blue-chip rates, whereas a project company is likely to pay a higher rate of interest on its debt and may need to offer the project sponsors a prospective return of 20 or 30 percent on their equity investment in the company. For example, *The Economist* quotes a report on a Scottish water project by Chemical Bank, which estimates that "if the works were privately built, owned and operated, interest rates and the need to achieve a return on equity investment would make the finance costs 50% more expensive than the

5. As Ross Goobey argued in *The Times* (22 June 1996).

6. It may however be the case that project finance, by allocating the revenues from a project to the project company, serves to remove these revenues from the reach of the government, which may otherwise divert them to uses other than the

repayment of the debt. This may justify the view of project finance as "off-balance-sheet" finance in the case of governments, but it does not explain why such projects should be highly leveraged.

While governments can borrow more cheaply than corporations and do not have to provide a return to shareholders, this does not imply that the total cost of capital is lower to governments than it is to the private sector. Indeed, because the capital markets share risk better than does the tax system, the cost of capital for the government could well be *higher* than for corporations.

£201 million costs that would be incurred under the normal public-borrowing rules. There would be no chance... to recoup the higher financing costs through the greater efficiency of a private operator, because the costs of running a £100m sewage work is only about £5m a year.⁷ The World Bank, too, appears to subscribe to the view that governments have a lower cost of capital than private sector companies, commenting that “[i]n infrastructure projects, the cheaper credit available to governments needs to be weighed against possible inefficiencies in channeling funds through government.”⁸

The notion that the government enjoys a lower cost of capital than private sector companies is misleading. While it is certainly the case that governments can borrow more cheaply than corporations and do not have to provide a return to shareholders, this does not imply that the total cost of capital is lower to governments than it is to the private sector. The lower interest rate paid by a government simply reflects the guarantee provided by taxpayers to lenders. In the case of private sector companies, the bulk of the risk presented by a project is borne by

the equity-holders, who demand a correspondingly higher rate of return. A smaller part of the risk goes to the debt-holders, who bear the risk that the firm may default on its debt payments. In contrast, government debt is risk-free in nominal terms, a characteristic that is reflected in the low rate of interest on the debt. But the risk presented by the projects does not disappear when the project is financed by the government. If cash flows from the project are unexpectedly low and do not suffice to service the debt raised by the government to finance the project, the shortfall is met by taxpayers, who play a role similar to that of equity-holders in a private sector company (but without the benefit of limited liability). Indeed, because it seems likely that the capital markets share risk better than does the tax system, the cost of capital for the government could well be *higher* than for corporations.

We believe that the argument for transferring ownership as well as management revolves around the difficulty of writing contracts that ensure that managers maximize efficiency. We have described above how contractual arrangements provide incen-

7. “Something Nasty in the Water,” *The Economist*, 9 September 1995, page 32.

8. World Development Report 1994, World Bank.

EXHIBIT 3 ■ THE BENEFITS AND COSTS OF PROJECT FINANCE*

WHEN PROJECT FINANCE MAKES SENSE

AGENCY EFFECTS:

- Specializes and decentralizes management.
- Makes possible the provision of separate incentives for project managers.
- Precludes the waste of project free cash flow.
- Increases the outside scrutiny of projects.
- Improves incentives for the production of information.

OWNERSHIP STRUCTURE:

- Permits joint ventures without requiring the exhaustive mutual evaluation of the creditworthiness of potential partners.
- Limits the liability of parents to projects.
- Limits the exposure of creditors to well-defined project risks.
- Allows project-specific debt ratios.

OTHER EFFECTS:

- Crystallizes project costs for regulatory purposes.
- Allows the provision of services to several companies rather than just to sponsors.
- Partially transforms a sponsor from an equity-holder in the project into a supplier to the project, thus improving the sponsor’s priority ranking in case of default.
- May avoid double taxation.

WHEN PROJECT FINANCE

DOES NOT MAKE SENSE

- There are complex interactions of the project with the rest of the firm.
- Default of the project is costly (lost coinsurance).
- The optimal leverage of the project is low.
- The costs of contracting for the project are high.

*This exhibit, along with some of the arguments presented in this paper, adapt and extend arguments made by John Kensinger and John Martin in “Project

Finance: Raising Money the Old-Fashioned Way,” *Journal of Applied Corporate Finance* Vol. 1 No. 3 (Fall 1988).

tives for efficiency by transferring risks to those best able to control them. At the same time, we have also argued that, because the vast majority of contracts are incomplete and imperfectly monitored, an exclusive reliance on service contracts is unwise. The ultimate incentive for project managers to maximize efficiency is for them to be made residual claimants who capture the benefits of any improvements they make. Thus, it is desirable to tie ownership and the provision of management services whenever it is difficult to specify *ex ante* the required level of services, or the acceptable level of costs, and to monitor them. This can be achieved through the use of project finance.

Rather than hiving off individual projects in order to attract private-sector funding and management expertise to a given industry, a government can do so by privatizing the industry. Indeed, it seems likely that the growth in privatization and in the use of project finance for infrastructure investments have

both been prompted by the same concerns about the efficiency of government-owned enterprises and the appropriateness of government funding for large, risky investments. However, while the recent popularity of project finance and privatization may have similar causes, there are three reasons why project finance may sometimes be preferred to privatization. First, privatization is a more complex undertaking, particularly since it involves both existing and new plant. While project finance relies on a one-off set of contractual undertakings for each plant, privatization needs a regulatory framework for the entire industry. Second, there are a number of areas, such as health or education, where it may be possible to involve private funding for particular projects but where full-scale privatization is deemed inappropriate. Third, unless the industry is to be entirely foreign-owned, privatization requires a large local capital market, in contrast to project financings, which take place piecemeal and over a period of time.

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