Structured Finance for Hybrid Infrastructure Models:  
The Application of Project Finance into Public-Private Partnerships for the  
Construction and Operation of Infrastructure  
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Submitted to the Engineering Systems Division
on May 19, 2006

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ABSTRACT

This thesis studies the application of project finance as the most efficient financing method for the construction and operation of infrastructure projects such as motorways, airports, power plants, pipelines, wastewater/sewage plants, dams, landline or cellular networks, and natural resources mines. These are large-scale, complex, and capital-intensive engineering systems, which until recently, were developed and operated either by the public or the private sector. The latest model for the construction and operation of an infrastructure project is Public-Private Partnerships ("PPP"), a hybrid structure that is becoming widespread. PPP employ private companies to construct and then operate infrastructure assets, which historically have been financed with public resources and operated on a not-for-profit basis. Through PPP agreements such as concessions, governments shift construction and operating risks to the private sector, which is usually more efficient in building and then running the assets.

Project finance is a large and rapidly growing subfield of finance, yet one where academic theory and research distantly lag current practice. Project finance relies on private capital sources for financing the PPP infrastructure project, as opposed to direct government financing or corporate financing. The thesis hypothesis is that project finance constitutes the most robust and sophisticated financial mechanism for maximizing return on investment and mitigating risk in PPP infrastructure projects. It is the goal of this thesis to provide the organizational methodology, financial application, risk management techniques, and explain all relevant aspects of project finance so that public policy makers, developers, bankers, contractors, and other decision makers will be in a position to holistically evaluate this financial instrument and accordingly proceed to its adoption for financing infrastructure projects.

Thesis Supervisor: Fred Moavenzadeh
Title: James Mason Crafts Professor of Systems Engineering
Director, Center for Technology, Policy, and Industrial Development
Dedication

To my family:

My brother, Thomas, for his brilliant, astute wit,
    and his character that can always depend on.
My mother, Artemis, for her unconditional love.
We are proud of you as much as you are proud of us.
My father, Konstantinos, a child prodigy, an engineer, an entrepreneur,
a leader, a support for hundreds, a visionary, a man ahead of his time.
Acknowledgements

I am indebted to many individuals at the Massachusetts Institute of Technology for their extraordinary assistance to complete this work. Many heartfelt thanks to Professor Fred Moavenzadeh for agreeing to serve as my thesis supervisor and his scholarly guidance. His profound knowledge of the construction and engineering world is unparallel. Professor Moavenzadeh is among the few academics I know that have managed to bridge the intellectual research in the academia with the need for obtaining pragmatic results in infrastructure construction and finance. I thank Professor David Marks for introducing us.

I would also like to thank several people from the Technology and Policy Program I was so fortunate and proud to attend. Professor Dava Newman, our program director, for her creative leadership and tireless commitment to develop our leadership skills by teaching one of the best classes I have attended, organizing the amazing Thompson Island leadership experience, and bringing distinguished leaders to address TPP students. I thank her for the opportunity to write an essay on leadership lessons I draw from Shakespeare’s Henry V.

I am also grateful to Sydney Miller for her exceptional friendship, patience, as well as for her constant support ever since I came to TPP. I cannot stress how much she has contributed to making what TPP is today. Sydney is always there for each one of us, ready to deal with our simplest to most difficult requests, always with a big, warm smile, that only her heart is bigger than it. We all considered her the pillar of TPP.

My colleagues, friends, and classmates at TPP and MIT for their friendship and good times we had together. They made these years unforgettable. Our philosophical discourses on policy, technology, and science will always be a point of reference. Cambridge is indeed the center of the world. I wish them all best of luck in their future endeavors.

TPP was influential in instilling in me the need for a holistic approach of complex, large-scale engineering systems that takes into consideration the perceptions and goals of all stakeholders. Coming from a business background, I learned at TPP that the interaction of technology and policy can create innovative public-private partnerships in
infrastructure construction that will provide industrial, social, and economic development for the transition of developing states. Completing this program, I now feel more up to task to lead and excel in my career, providing value for my organization and ethical leadership for the society.

Finally, my father, who despite all his commitments, work, and business concerns that never seem to end, is always standing by to listen to me talking about the exciting things I learn every day in an environment such as MIT. He continues to amaze me with his intellectual depth and how he has already conceived or implemented in his business some of the latest concepts to emerge from a place like this. I hope one day I will successfully continue from where he left off.
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INTRODUCTION

This work grapples with public-private partnerships in infrastructure and the application of project finance as their financing mechanism. Public-private partnerships (PPP) are arrangements whereby private parties participate in or provide support for the provision of infrastructure, and a PPP project results in a contract for a private entity to deliver public infrastructure-based services. What makes PPP so singular is the involvement of the private sector in the delivery of infrastructure services, which traditionally we have always associated them with the public sector. People view PPP as a recent phenomenon, which emerged in the end of the twentieth century as a by-product of privatizations, availability of private funds looking for investment, governments' limited budget, as well as the professionalism and accountability that the private sector can bring in public services.

According to current literature, PPP is a recent model for delivering infrastructure and the United Kingdom was the first to launch a PPP development policy in the 1990s, with many other countries following suit. The arrangements can take many forms like concessions or off-takes; however, the majority of PPP that are structured in countries as we speak, incorporates key provisions such as: the public sector entity transfers land, property or facilities that it controls to the private sector entity (with or without payment in return); the private entity builds, renovates or extends a facility for a defined period of time and collects revenues from its operation; and the private entity transfers the facility to the public entity (with or without payment) at the end of the arrangement. These examples probably make clear what we have in mind by a PPP in infrastructure: wastewater/sewage treatment works, toll roads, bridges, tunnels, airports, ports, pipelines, power plants, schools, hospitals, etc.

The following are excerpts from a PPP contract from my country of origin, Greece, that sets out the rights and obligations of a municipality (public authority) and a contractor (private entity):
Project: Drainage and development of lake

Contract Summary:

1. A contract is signed between the municipality and the contractor for the drainage and development of the lake.

2. The contractor has to drain the lake, build sewage lines, sewers, manholes, subterranean pipes to carry off wastewater, and metal or wooden barriers around the tank.

3. Construction of a tank to hold water for irrigation purposes. The lake’s water will be used by farmers to irrigate their farms in spring.

4. The construction period is four years. It can be extended in case of wartime, during which the contractor was prevented from completing the facility.

5. The contractor is awarded the right of exploiting and developing the drained land for ten years, beginning right after the drainage works are completed.

6. The contractor is not subject to any tariffs for importing timber, stone, and other materials. The contractor is not allowed to tax any output produced from the development of the lake and sold in the city.

7. The contractor is obliged to:
   
   A) Inform the municipality free of charge about the project’s expenses so that citizens are taxed accordingly to fund the project.

   B) Pay lease during the ten years of the lake’s development. The lease will be paid monthly.

   C) Maintain the drainage and irrigation works during the time period that he develops the land (10 years) so that they are in good condition after the termination of the contract.

   D) Compensate the owners of land that he must acquire to carry out the execution of the necessary works. The compensation will be in drachmas/foot of acquired land.

   E) Build on non-farmed land the necessary canals, ducts, ditches, and trenches to avoid any damages on private property and private economy.

8. In case of the contractor’s death, he is substituted by his heirs and associates with regard to his relationship with the city.

9. There are penalties against any person, who for any reasons or pretext tries to annul the contract. The penalties will be ethical or material.
10. The contractor must post a performance bond guaranteeing the good completion of the project.

This “PPP agreement,” which is as staggeringly detailed as a current concession contract, took place twenty-five centuries ago in Greece, between the city-state of Eretria, and Herefanis, a Greek contractor, and it concerns the drainage and development of the Ptehai Lake, near the city of Dystos, around 336-323 BC. The lake, which still exists today, is 66 km from the city of Halkida. The slate that details the project and the concession contract was discovered by archaeologists in 1860, and for me, it symbolizes the timeliness and relevance of PPP across centuries of human civilization.

Indeed, PPP are based on society’s fundamental need to accommodate the interests of all its members. In the case of infrastructure development the stakeholders are: the people that want reliable, robust, and cost-effective public infrastructure; the government that among its duties is to guarantee such infrastructure; and the private sector that can bring its expertise and funds, and deliver the infrastructure asset in exchange for a profit. In my opinion, PPP can fulfill the interests of all three stakeholders and lead to a “win-win-win” outcome, to paraphrase the well-known principle of game theory.

I decided to choose project finance and PPP as my thesis topic for many reasons. First, my main motivation was my family background in construction and engineering. My brother and I were literally raised at a construction site because our father would take us to experience firsthand the construction of a bridge or a motorway. This has helped me to develop a fundamental understanding of the necessary resources, requirements, and limitations of a construction project. Second, I studied engineering as an undergraduate, and at TPP my area of specialization is international construction. Third, over the years, I have observed the rising importance of the role banks play in financing large-scale infrastructure projects. Banks and other financial institutions are now as indispensable as constructors for the delivery of a project. Finally, there are other intellectual stimulations that I will discuss below.

Currently, there is increased demand for infrastructure projects in both developed countries and emerging economies. The advanced industrial countries of the West will need to modernize their infrastructure as it is getting older or obsolete. Furthermore,
developed countries are focusing on keeping tight budgets and closing their budget deficit, which traditionally was used to finance public infrastructure. The European Union requires from member states to keep their budget deficit under 3% of GDP. This means that public infrastructure will have to find other funding sources for its construction and operation than only public money. On the other hand, developing countries neither have the funds nor the expertise to undertake infrastructure projects alone so they need to bring in private entities to share risks in development, ownership, and operation.

The construction and engineering community is also worried about the future of the construction industry. According to a KPMG report on construction, securing financing for projects and managing the associated risks are among the top three challenges currently facing the construction industry. Cordell Hull, former Chairman of Bechtel Enterprises and Executive Vice President of the Bechtel Group, had this to say at a lecture at MIT on infrastructure in the 21st century: “Public-private partnerships are very complex but indispensable to meet the infrastructure requirements of the 21st century.” He also raised the question, “where will funding come from to build infrastructure?”

As far as I am concerned, project finance is the most sophisticated and viable financial method to provide solutions to these concerns. In fact, as I will show later, two of the strongest attributes of project finance are private funding and risk sharing. Furthermore, globalization has promoted the internationalization of investments. Project developers now manage global portfolios that are on the look for projects that guarantee optimum risk and reward trade-off. Consequently, project finance, as an appropriate method of long-term financing for capital-intensive industries where the investment financed has a relatively predictable cash flow, will play an increasingly important role in providing the funding required for PPP infrastructure projects.

It is worth mentioning that project finance maintains probably the strictest confidentiality among the finance community. One of the reasons so little academic research has been conducted on project finance deals is that detailed information is very difficult to obtain. As we will examine later on, project finance allows the pooling of diverse source of funds under a project company that isolates the project assets, contracts, and cash flow from the investors’ other operations. Hence, only people that are involved in the project have access to this information. During my meeting with investment
bankers and financiers that work in the project and structured finance practices of banks, I was exposed to project data after signing a confidentiality agreement of not releasing any information. Therefore, this work provides a broad roadmap for structuring a project finance transaction, but with detailed information on certain key aspects such as PPP, the project company or risk assessment.

We begin Chapter 1 with what constitutes infrastructure, the various infrastructure delivery models, and examples of financing mechanisms for funding infrastructure projects. Chapter 2 deals with PPP, the rationale behind them, their characteristics, advantages and disadvantages, challenges, PPP contracts and agreements, and project delivery systems for PPP. In Chapter 3, a definition of what is project finance is provided, followed by its historical development, its relationship with other types of structured finance, the advantages of project finance for the stakeholders of the project, its disadvantages, and the chapter finishes with the combined benefits of project finance and PPP. Chapter 4 describes the development of a PPP infrastructure project with project finance and analyzes thoroughly the role of sponsors, project company, lenders, advisors, government, the rights and responsibilities of each of the project stakeholders as well as the main project contracts. The different types of risks in project finance and PPP are systematically examined in Chapter 5. Finally, Chapter 6 summarizes the key concepts of this thesis and presents recommendations for strengthening the application of project finance into hybrid infrastructure models.
REFERENCES

1 I am indebted for this observation to my father, who is a civil engineer and he has always been interested in the works of ancient Greek engineers. The Greek newspaper “Archaelogiki,” Issue: II’, Halkida (1869): 317-319, mentioned the discovery of the slate for its archaeological importance.


1.1 Infrastructure

Large-scale engineering projects, such as motorways, airports, bridges, power plants, and telecommunication networks constitute of what is known as the infrastructure of a country. These are complex, capital-intensive systems necessary for the smooth function of an industrial economy, a community or society. Indeed, a strong link exists between productivity, national competitiveness, and infrastructure investments. According to studies on economic development, infrastructure investment is associated with one-for-one percentage increases in gross domestic product (GDP) of a country. Similar reports on development find that inadequate infrastructure severely hinders economic growth by reducing GDP by 1% to 2%.

Infrastructure can be classified into eight major categories:

1. Transportation: motorways, urban-transport systems, airports, bridges, tunnels, harbors, and rail networks
2. Energy: fossil fuel power plants (coal-fired, gas-fired), nuclear power plants, renewable energy (photovoltaic plants, hydropower plants, wind farms)
3. Environment: dams, wastewater/sewage treatment plants, urban sewage networks, solid waste management, sanitation facilities
4. Natural resources: oil fields, offshore oil platforms, refineries, pipelines, petrochemical plants, natural gas extraction, mining (gold, silver, copper, zinc, nickel, and other industrial minerals)
5. Industries: production plants for steel, aluminum, cement, chemicals, pulp and paper
7. Public institutions: schools, hospitals, courts, prisons, athletic facilities
8. Urban development: housing, water supply, utilities

Robust infrastructure, along with investments in research and development, the caliber of the educational system, the adoption of new technologies such as the internet, and a legal framework that promotes and supports entrepreneurship contribute greatly to the growth of a country and the quality of life of its citizens. It would be really difficult to imagine living without infrastructure or how seriously it affects our daily activities when a motorway is closed or the power supply is interrupted. Infrastructure is extremely important not only because it influences our lives or changes the physical landscape, but because it provides the foundations on which new activities and forms of development are based. The creation of new institutional arrangements, the shaping of business partnerships and social collaborations, the transfer of knowledge, the manufacture of products, the delivery of services, all depend on strong and efficient infrastructure systems.

1.2 Infrastructure Models

There are numerous infrastructure models along a spectrum from full public to full private ownership. However, until recently, the two methods for delivering infrastructure projects were only through the public or private sector, where the construction and operation of the asset rest on the government or a private company.

Governments have been the traditional providers of public infrastructure. Usually, a large public organization identifies, develops, and executes an infrastructure project such as a motorway or an airport. The public entity undertakes the construction and operation internally or it organizes competitive biddings among specialized private contactors. The construction company with the lowest bid is awarded the contract, often on a fixed-price basis. Under the traditional way, the government retains overall control and ownership of the infrastructure project. This organizational arrangement creates value through the use of specialized suppliers and the economic pressures of competitive bidding and fixed-price contracts. It also allows the public authority to manage the project by progressively letting out contracts, while maintaining tight control over the quality of the execution.
In the second half of the twentieth century, privatization and deregulation have spurred the involvement of the private sector in the development of infrastructure in both developed and developing countries. Privatization of state-owned companies became common as governments found it increasingly difficult to sustain the financing, development, and operation of critical infrastructure projects, thus private sector companies stepped in to fill the void. Government agencies exited businesses by taking them public through Initial Public Offering (IPO) or by selling them directly to private investors. Concurrent deregulation of key industrial sectors, such as power and telecommunications attracted the bulk of the investment by the private sector.

The latest model for the construction and operation of an infrastructure project is Public-Private Partnerships ("PPP"), a hybrid structure that is becoming widespread. PPP use private capital and private companies to construct and then operate assets such as roads, hospitals, and schools, which historically have been financed with public resources and operated on a not-for-profit basis.

Through PPP structures such as concessions, governments shift construction and operating risks to the private sector, which is usually more efficient in building and then running the assets. The private company charges a price to the users of the facility (e.g., tolls for a motorway, cents/kWh for a power plant) and collects the revenues from the operation. However, many times governments assume the market risk because a local government or municipality is better suited than a private company to bear many large, long-term risks. In an off-take agreement, the off-taker or the government agrees to buy from the private company a certain quantity and quality of the project output, for a certain period of time and at certain pre-established prices. For example, in a PPP motorway instead of drivers paying tolls the government may pay directly the private company from government revenues such as gasoline tax, a structure known as "shadow tolls."

As PPP are used to in the future, the role of the government and the private sector in developing and operating infrastructure assets will continue to be defined. Chapter 2 provides a more thorough analysis of PPP, as well as justification for adopting them and the challenges that are associated with this hybrid model.
1.3 **Mechanisms for Financing Infrastructure**

Funding for infrastructure projects can be obtained from various sources. The charts below demonstrate the difference between public finance, corporate finance, and project finance using an example of a power production project.

1.3.1 **Public Finance**

Traditionally, governments fund large-scale infrastructure projects through their budget and mostly by public-sector debt. In developed countries, public financing makes use of the issuance of government or municipality bonds to raise the necessary capital to finance the project. These bonds are repaid over a specific period. In addition, a significant portion of taxes is used for the maintenance, modernization, or development of new public-sector projects. In developing countries, projects are financed by the government borrowing from the international banking market, multilateral development institutions such as the World Bank, or through export credits.

However, governments have found gradually more this funding to be less attractive, as it strained their own balance sheets and therefore limited their ability to undertake other projects. This concern has stimulated the search for alternative sources of funding.
1.3.2 Corporate Finance

Private-sector infrastructure projects are funded by corporate financing. Large companies raise capital by issuing corporate bonds and equity or by obtaining commercial bank loans. In connection with a conventional direct financing, lenders to the firm look to the firm’s entire asset portfolio and balance sheet to generate the cash flow to service their loans. However, as with public finance, private companies are starting to avoid this option, because it strains their balance sheets and capacity, as well as limits their potential participation in future projects.
1.3.3 Project Finance

Because of the considerable financial requirements that are necessary to fund PPP projects, structured financing has been adopted that pools together debt, equity, syndicated loans, and mezzanine borrowing. A major breakthrough in the construction and operation of infrastructure assets came in the 1970s with the increasing use of project finance, which relies on private funding sources as opposed to direct government financing or corporate financing.

Project finance is a financial mechanism by which lenders agree to look initially to the projected revenues and to the assets given as a collateral of the project as their basis of their credit analysis and as the main source of repayment of their loans. Project finance differs from more traditional corporate lending practices such as corporate financing, in which creditors provide financing to a creditworthy company by looking at its credit rating, making their credit analysis based on the borrower’s historical financial statements and their projections, and are satisfied to have full recourse against all of the assets and
cash flows of the borrowing company. In contrast, what distinguishes project financing from conventional direct financing is that, rather than looking to the firm's entire asset portfolio and revenues to repay the loan, project finance is based solely on the project's cash flows and the project's assets. The lenders' assumption is that the project's revenues and assets will provide enough resources to repay the debt financing. In project financing, the project, its assets, its cash flows, and the project contracts are segregated from the other operations of the developers, called the "sponsors," with the creation of a distinct legal entity, called the "project company." The newly created company usually has the minimum equity required to issue debt at a reasonable cost, with equity generally averaging between 10% and 30% of the total capital required for the project.

The project company is then responsible for the construction, operation, and revenue collection of the project. This permits the lenders to perform their credit analysis of the project on an isolated basis from the sponsors' credit rating, which means an off-balance sheet treatment of the debt financing. Therefore, the lenders have recourse against the project company and no recourse at all or limited recourse to the assets and revenues of the sponsors. Such a financing structure can yield a more efficient allocation of risks and returns than conventional financing, but careful financial engineering is critical.

The final legal structure of each project is different. Generally, the legal vehicle (project company) frequently has more than one sponsor because:

- The project exceeds the financial or technical capabilities of a single sponsor.
- The risks associated with the project have to be shared.
- A larger project achieves economies of scale that several smaller projects will achieve.
- The sponsors complement each other in terms of capability.
- The project requires or encourages a joint venture with certain interests (e.g., local participation or empowerment).
- The legal and accounting rules stipulate a maximum equity position by a sponsor, above which the project company will be considered a subsidiary.
The following chart illustrates how the power plant could be developed and funded by project finance. Of course, there can be several variations on the type of contract and the payment method (e.g. users pay directly the project company).

Figure 1.3: Project Finance

- A consortium of private firms establishes a new project company to build, own, and operate a specific infrastructure project. In this case it is a power plant. Each of the sponsors contributes equity to the new project company.
- The project company borrows funds from lenders. The lenders look to the projected future revenue stream generated by the project and the project company’s assets to repay all loans.
- The government under an off-take agreement pays the project company for the services the plant provides to the users.
- The government does not provide a financial guarantee to the lenders. Sponsoring firms provide limited guarantees. “Off-Balance Sheet” financing.

Finally, the table below summarizes the three infrastructure models based on the types of ownership and operation, financing, as well as examples of public, private, and PPP projects.
Table 1.1: Infrastructure Model Comparison

<table>
<thead>
<tr>
<th>Ownership Operation</th>
<th>Government Public Authority</th>
<th>Public-Private Partnership</th>
<th>Private Company</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full risk and control by government</td>
<td>Customized, contract based, shared control</td>
<td>Full risk and control by private companies</td>
</tr>
<tr>
<td>Financing</td>
<td>Public financing from budget, government bonds, public-sector debt, multilateral development banks</td>
<td>Structured finance, syndicated loans, subordinate debt, mezzanine funding, export credit loans, <em>Project finance</em></td>
<td>Corporate finance, bonds, equity, commercial bank loans <em>Project finance</em></td>
</tr>
<tr>
<td>Examples</td>
<td>Hoover Dam, Golden Gate Bridge, Panama Canal, Amtrak, Athens 2004 Olympic Stadium, Alps Tunnel, Big Dig</td>
<td>Channel Tunnel, Trans-Alaska Oil Pipeline, Airbus 380, Athens airport, Indiana toll road, Petronas Towers</td>
<td>Cell phone networks providers, internet providers, utilities, North Sea oil platforms, Areva, E.ON</td>
</tr>
</tbody>
</table>
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1 The World Bank, *World Development Report: Infrastructure for Development* (New York: Oxford University Press, 1994), 2-4. The report notes that the endogenous nature of investment creates an econometric problem: Does increased infrastructure result in economic growth, or does economic growth result in increased infrastructure spending?


CHAPTER 2

PUBLIC-PRIVATE PARTNERSHIPS IN INFRASTRUCTURE

2.1 Public-Private Partnerships/Private Finance Initiatives

A new infrastructure model has gained momentum over the years, which is located between full public to full private models. This hybrid model for delivering an infrastructure project has been named Public-Private Partnerships (known by the acronym "PPP") and calls for the shared control and risk spreading between the two entities. According to the Organization for Co-Operation and Development (OECD), “Public-private partnerships refer to the private sector financing, designing, building, maintaining and operating infrastructure assets traditionally provided by the public sector.”

PPP were first developed in 1992 when the United Kingdom established the Private Finance Initiative (PFI), to involve the private sector in financing and managing infrastructure projects. PFI was a fundamentally new approach to infrastructure developments that bridged together the two corners of public and private models. The first major contracts were let in 1995. The number of projects has increased steadily since then. Nearly 500 had been signed by September 2002, involving the construction of assets costing nearly £22 billion. As of March 2006, the total number of PFI in the UK was 751, ranging from schools, hospitals, prisons to parking garages, street lighting, IT and telephony services with a total budget of £48 billion. PFI has become an important part in financial deals making up around 15% of total investment each year.

In recent years, many countries including Australia, Austria, Canada, France, Greece, Hungary, Ireland, Italy, Mexico, Norway, Poland, Portugal, Spain, South Africa, and Turkey have established similar PPP projects. The range of projects spans from airports and motorways to natural gas pipelines and power plants.
Most projects involve substantial private sector finance. In all but very exceptional circumstances this finance in itself will be more costly than public sector borrowing. The argument in favor of the PPP is that the underlying risks of a project are the same, whether it is undertaken by the public or the private sector; so if the private partner brings new skills, more innovation and better management of risk to the implementation of public projects, the benefits can outweigh the higher cost of private finance and deliver better value for the public sector.

Figure 2.1: Delivery of Services and Operating Models

2.2 The Rationale for PPP

The key drivers behind the PPP approach are:

- Better value for money than traditional procurement methods, arising from optimal transfer of risk from the public to the private sector; the benefits of competition; the adoption of whole life costing of services; innovation in designing, building and the operation of assets; incentives to higher standards and performance and an enhanced focus on the customer; and in improved efficiency.4
- Faster delivery of individual projects from the creation of incentives by linking payment to the provision of the asset or service, particularly in relation to more complex capital projects.
- Better utilization of assets through extended third party usage; better regulation as government agencies can focus on the role of regulator, planner and monitor rather than on day to day service provision.
- Create single-point responsibility for the timely delivery of projects to a stated specification.
- Allow the private partner greater freedom to determine the means of delivering the public sector requirement.
- Making the recovery of private sector investment in PPP projects conditional on sustained performance over the whole life of the project.
- Enhanced competitiveness through the opening up of effectively sheltered sectors to competition.

2.3 Characteristics of PPP

Different models can evolve to suit different applications; therefore there is no narrow definition of PPP projects. However, they tend to have the following common characteristics:

- A long term arrangement between the public and the private sector, with the private sector being responsible for construction and operation of assets and provision of services relating to those assets. An example would be awarding a 30 year contract for the provision and maintenance of a hospital facility and the delivery of certain support services (such as maintenance, cleaning and catering) associated with the facility.
- Public sector requirements will be defined as outputs, without being too prescriptive about the means of delivery of the asset and associated services.
- Public sector payments for the service will be linked to performance. No payments would be made until the asset was delivered and working, and subsequent payments would be subject to reduction if performance standards were not met.
The private sector will finance all or substantially all the investment necessary to deliver the asset and service.

A related benefit of the PPP approach is that long-term cost factors are recognized in addition to the initial capital expenditure. There are real incentives to focus on a holistic approach in the amalgamation of the design, construction, finance and operation in the creation of an asset from a whole life perspective. A further advantage of PPP is that the taxpayer only pays for the services actually delivered. The private-sector firms and their bankers take the risk that where they are unable to provide the required level of service they do not get paid.

Finally, for small open economies, an additional benefit of a developed PPP program is that PPP can facilitate bigger and more complex infrastructure projects than would have been possible under other arrangements. These larger projects become more attractive to major international design, construction, and engineering firms. The entry of overseas competition to a smaller market can generate the transfer of competencies, know-how, and management skills through cooperation and joint ventures.

2.4 Challenges of PPP

These advantages are compelling arguments in favor of developing a PPP approach. However, public authorities will weigh the benefits of public-private partnerships and analyze the potential difficulties and problems to be overcome in rolling out a wide PPP program. In doing so governments should recognize that there are obstacles which, if not overcome, can create disadvantages in adopting PPP. For example, the initial phase of project selection, appraisal and procurement in PPP projects can be lengthy.

PPP can present difficult and complex contractual issues for both public and private sector partners. The public sector has to ensure that the business case for proceeding with a project on a PPP basis is sound when compared with the conventional approach of direct build and finance. Governments are faced with the tempting possibility to bypass budget constraints that would prevent them from undertaking the project under the traditional method of public finance and instead opt for PPP. Moreover, there is the
strategic vulnerability of the government tied to a private monopolist at future renegotiations of the contract.

For the private sector, the costs associated with bidding for PPP projects can be substantial. For example, under the current PFI scheme in the United Kingdom, the bidding requirements force private companies to bear high front-end costs that can be only partly recuperated by the winner. It requires bidders to present detailed technical and financial proposals so that the government can compare innovative low-cost solutions, pick the best proposal, and negotiate an improved version with any of the contestants. PFI is at times perceived as a procurement path to force the private sector to finance public investments and carry public risks. Hence, PPP can sometimes lead to increased capital costs because private financing is more expensive than government’s borrowing. Furthermore, PPP involve numerous contractual complexities because of the demanding task to regulate potential future outcomes.

Finally, for the trade unions significant human resource issues can arise where public service staff is transferred to the private sector under PPP.

2.5 Contracts and Agreements for PPP

Contracts and agreements between the public and private sector, which provide a basis for PPP in construction and operation of infrastructure, can take several different forms:

- An Off-take Contract, based on which a project will be constructed by a private entity to sell its output on a pre-determined price and pre-determined volume to a public-sector body (e.g., construction of a power station to sell electricity to a state-owned power company).
- A Concession Agreement under which a project will be constructed by a private entity to provide a service to a public-sector body (e.g., provision of a public-sector hospital building and facilities).
- A Concession Agreement under which a project will be constructed by a private entity to provide a service to the general public normally provided by the public sector (e.g., a toll road).
A Concession Agreement or license under which a project will be constructed to provide new services to the public (e.g., a mobile phone network).

2.6 Project Delivery Systems for PPP

A variety of public-private structures has been suggested for infrastructure projects. These structures differ in the manner in which the public sector and private companies share the responsibilities, risks, and rewards associated with the project. This section briefly describes some possible public-private delivery systems.

For each project, a judgment as to the most appropriate partnership structure depends on providing concrete answers to the following questions:

- Who will be responsible for the design and construction of the project?
- Who will provide the construction funds?
- Who will arrange the financing?
- Who will hold legal title to the project’s assets, and for how long?
- Who will operate the project facility, and for how long?
- Who will be responsible for each source of project revenue?

A PPP infrastructure project would normally have a mixture of public and private responsibilities. There are at least ten models for PPP, and each is briefly discussed. These delivery systems are also known as concessions because of the PPP contract they are based on. The government or public authority concedes the rights of construction and operation of the project to a private company or group of private investors, hereafter named “Concessionaire.” The list of models is not exhaustive but it includes the principal structures.

Build-Own-Operate-Transfer (BOOT)

The private company constructs the project and owns and operates it for a set period of time, earning the revenues from the project in this period, at the end of which ownership is transferred back to the public sector. For example, the private company
builds a power station, owns it for 20 years during which time the power generated is sold to a state-owned electricity distribution company. At the end of that time ownership is transferred back to the public sector.

**Build-Operate-Transfer (BOT)**

Also known as *Design-Build-Finance-Operate (DBFO)*. In this type of project, the private company never owns the assets used to provide the project services. However, the private company constructs the project and has the right to earn revenues from its operation. The company operates the project for a fixed period of time, after which ownership would revert to the government. This structure is used where the public nature of the project makes it inappropriate for it to be owned by a private-sector company, and therefore ownership remains with the public sector. Ownership reversion would be planned to occur only after the private company had received the return of, and a satisfactory return on, the capital it had invested in the project. The BOT structure is attractive to governments because of the ownership reversion feature. It is becoming commonplace for transportation infrastructure (road, bridge, tunnel).

**Build-Transfer-Operate (BTO)**

A private entity designs, finances, and builds the project. It transfers the legal title to the government (or some local public authority) immediately after the construction of the project facility is completed and it passes its completion tests. The private company then leases the project facility back from the public authority for a fixed term. A long-term lease agreement gives the private entity the right to operate the project facility and to collect revenues for its own account during the term of the lease. At the end of the lease term, the public authority operates the project facility itself or hires someone else (possibly the private company originally involved) to operate it. This model can avoid some of the legal, regulatory, and tort liability issues that can arise from private ownership and, in the US, offers favorable tax treatment (tax free bond finance). The California Department of Transportation employed the BTO model in its partnerships.
with private toll road operators. This model is also widely used in Greece for wastewater/sewage treatment plants and other environmental projects.

**Build-Own-Operate (BOO)**

These are projects whose ownership remains with the private company throughout its life. Examples are a power station in a privatized electricity industry or mobile phone network. The private company therefore gets the benefit of any residual value in the project. The long-term right to operate the facility ideally provides the developer with sufficient financial incentive to maintain and improve it.

**Build-Lease-Transfer (BLT)**

A government lacks the resources to finance the development of a project facility, thus under the BLT model, a private company may build the project and then lease it for a fixed number of years to the government agency that will operate the facility under such period. After the investment cost, the debt, and the required return on investment are recovered through the lease receipts by the private investors, the plant ownership is transferred to the government agency.

**Build-Own-Operate-Sell (BOOS)**

Under the BOOS model, a project facility is built, financed, owned, and operated by a private entity and, at the end of the concession period, is transferred back to the government in consideration for a residual value payment.

**Buy-Build-Operate (BBO)**

A private firm buys an existing facility from the host government (taking legal title), modernizes it or expands it, and operates it as a regulated profit-making public-use facility. Underdeveloped, deteriorating or congested roadways, bridges, and airports are
good candidates for this type of system. The BBO model may prove to be popular in coming years because of many existing public facilities that require repair or expansion.

**Lease-Develop-Operate (LDO)**

A private firm leases an existing publicly-owned facility and surrounding land from the government. It then expands, develops, and operates the facility under a revenue-sharing contract with the government for a fixed term. The government holds legal title. The LDO model is attractive when private entities are not able to raise the full purchase price of the existing facility (e.g. as the BBO model requires). The LDO model is also very useful for public-private risk sharing when the project is currently losing money. The developer agrees to invest in facility improvements, and can recover the investment plus a reasonable return over the term of the lease.

**Wraparound Addition**

A private developer finances and constructs an addition at an existing public facility. The private developer operates both the existing facility and the addition for either a set period of time or until the developer recovers costs plus a reasonable return on investment. The private firm holds legal title to the addition only. The SR91 highway project in California in which private toll lanes were added to a congested freeway, and many bridge dualizations in the UK are examples of the wraparound addition model.

**Operate and Maintain**

A company operates a facility under contract with the sponsoring government or private owner (computer and electronic data processing services, toll collection, water and sewage plant operation, port stevedoring and janitorial services, etc). Operation of a facility under such arrangements, typically termed “outsourcing,” can result in improved service and efficiency and are commonly used by local governments to provide municipal services such as solid waste removal.
There are other variations on these acronyms for different project delivery structures, and parties involved in project finance do not always use them consistently. For instance, BOT is occasionally used to mean Build-Own-Transfer, the same as BOOT. However, PPP project delivery systems are often grouped under the generic term BOTs.

2.7 Project Finance and Concessions/BOTs

Concessions have become the new approach for building roads, power plants, and other infrastructure projects. Public-policy makers stress that the prospects of high returns to private investors justify the shifting of public risks to private sponsors. On the other hand, there is skepticism about two issues that can pose serious setbacks to a PPP in infrastructure funded by project finance.

First, it is clear that the private company would always prefer to own the project assets, but whether or not the ownership of the project is transferred to the public sector in the short or long term, or remains indefinitely with the private company, or it is never held by the private company, makes little difference from the project finance point of view. The reason is that in project finance, the real value is not in the ownership of the assets, but in the right to receive cash flows from the project. But although these different ownership structures are of limited importance to lenders, any long-term residual value in the project (as there may be in a BOO but not at BOOT/BOT/BTO project) may be of relevance to the sponsors in assessing their likely return.

Second, sponsors and bankers are hesitant to participate in concessions in which private parties assume investment risks but are at the mercy of legislative changes. Shifts in regulation, for example, have caused problems in the Eurotunnel project. Because a number of concessions have resulted to losses for private investors, bankers may hesitate to lend. Sponsors and bankers want concessions to be secured through government guarantees such as shadow tolls or volume commitments. Therefore, the project finance market expects governments to become more involved.
REFERENCES


4 Value for money has been defined as “the optimum combination of whole life cost and quality (or fitness for purpose) to meet the user’s requirement.” Based on experience with PFI projects in the UK, there are six main determinants of value for money: risk transfer; the long-term nature of contracts (whole-of-life cycle costing); the use of an output specification; competition; performance measurement and incentives; and private sector management skills. Of these, competition and risk are seen as the most important. See Darrin Grimsey and Mervyn K. Lewis, Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance (Cheltenham, UK: Edward Elgar Publishing Limited, 2004) 135.


6 2nd Annual Public Private Partnership / Private Finance Initiative Global Summit, 10-12 October 2001, Dublin, Ireland. Keynote Address by the Republic of Ireland’s Minister of State at the Department of Finance, Martin Cullen.


8 Wolff.

CHAPTER 3

WHAT IS PROJECT FINANCE?

3.1 Definition

Project finance involves raising funds to finance an economically and legally independent project company for the purpose of developing a capital investment project by issuing equity and incurring debt that are designed to be serviced and redeemed exclusively out of the project's cash flow and assets.

The term of project finance is generally used to refer to different kinds of financial structures, in which the debt financing is not based on the credit rating of the developers or their strength of their balance sheet but primarily on the success of the project itself. The project's debt depends, at least partly, on the profitability of the project and on the collateral value of the project's assets. Therefore, the terms of the debt and equity securities are tailored to the characteristics of the project. Specifically, they depend on a detailed evaluation of the project's construction, operation, and revenue risks, and their allocation between investors, lenders, and other parties through contractual and other arrangements. Project finance requires careful and meticulous financial engineering to achieve a mutually acceptable allocation of the risks and rewards among the various parties involved in the project.

This definition recognizes three key components related to the use of project finance. First, there is an investment component involving an infrastructure project. The capital-intensive requirements of a large-scale, complex, engineering system, such as an infrastructure asset justify an investment on a standalone basis. These are projects like toll roads, ports, hydroelectric plants, refineries, pipelines, power plants, or telecommunication systems.

Second, the definition also highlights an organizational component to create a legally and economically independent entity to own and operate the asset. Project assets, project-
related contracts, and project cash flows are segregated to a substantial degree from the sponsors’ other operations. As a result, project finance represents a form of off-balance sheet finance, meaning that project assets and liabilities do not appear on the sponsors’ balance sheet.

Finally, there is a financing component, in which the project’s debt service depends only on the project’s cash flow, which is the main source of repayment. This a fundamental aspect of project finance because the debt is structured without recourse to the sponsors, which is known as non-recourse debt. Hence, in case of default of the project company, the lenders will not have the right to seize the sponsors’ revenues from other operations and ventures besides those related to the project. In most cases of project finance, however, the sponsors provide, at most, limited recourse to cash flows from their other assets that are not part of the project. In addition, they typically pledge the project assets to secure the project loans.

### 3.2 Historical Perspective and the Development of Project Finance

Project finance as a sophisticated modern financing mechanism started to be actively used in the 1970s. However, one of the first recorded applications of project finance is from the 13th century, when the English Crown negotiated a loan with a Florentine bank for the development of the Devon silver mine. In the 19th century many infrastructure projects were financed using project finance techniques, such as the Suez Canal (1850), railways in Argentina (1860) and India (1880).

In the United States, some of the earliest applications of project finance were in the natural resources sector and real estate. In the 1930s, some oil explorers used project finance to fund oil-field exploration. Similarly, real estate developers built and financed standalone commercial properties through much of the twentieth century on a project basis. In both cases, the lenders had recourse to the project only.

During the 1970s, project finance began to develop into its modern form in response to two reasons. First, the soaring energy prices of 1973 and the international banking crisis of 1974 caused a dramatic change in the financial markets and in the ways of
financing infrastructure and in the ways of financing infrastructure and other types of projects. Second, several large natural resources discoveries such as the North Sea oil fields and the subsequent demand for lower energy prices and alternative (nonfossil fuel) energy sources further boosted project finance as a financial tool. In fact, the modern version of limited-recourse project finance was first pioneered for developing the North Sea oil fields when British Petroleum raised $945 million on a project basis in the 1970s to finance the “Forties Field.” Another noteworthy natural resource project of that era that used project finance was the Trans Alaska Pipeline System (TAPS), which was a joint venture of eight of the world’s largest oil companies and involved the construction of an 800-mile pipeline at a cost of $7.7 billion.3

In the 1980s, project finance was really established, by most accounts, when the United States scrambled to build new power plants. The persistence of high energy prices motivated Congress to pass the Public Utility Regulatory Policy Act (PURPA) of 1978 as a way to encourage investment in the development of cogeneration plants and alternative energy sources. This act required local electric utility companies to purchase all of the electric output from qualified power producers under long-term contracts. Project finance became the structure of choice for financing new generating plants with long-term power purchase agreements. Equity investors created new, standalone companies to own and operate power plants and financed them with non-recourse debt. These plants were known as independent power producers (IPP). Project finance became synonymous with US power plant finance until the 1990s.

In the last twenty years, the worldwide process of deregulation of utilities and privatization of public-sector companies drove the growth of project finance. This has taken place both in the developed world and the developing countries. Newly privatized companies such as YPF (the former state-owned oil and gas company in Argentina) have used project finance to fund much of their growth. Concurrent deregulation of key industrial sectors such as power and telecommunications has also created new opportunities for investment by the private sector. Calpine Corporation, an American energy company, used project finance to fund its aggressive growth strategy. Furthermore, much of the explosive worldwide growth in mobile telephone networks in the late 1990s was developed using project finance.
Finally, project finance for public infrastructure (roads, hospitals, schools, etc.) was especially developed through the United Kingdom’s Private Finance Initiative (PFI) from the early 1990s. Projects of this type are now usually known as Public-Private Partnerships (PPP) and project finance has become the main financial instrument. In fact, project finance is now considered the indispensable financial strategy for any PPP infrastructure project.

### 3.3 Structured Finance and Project Finance

Structured finance describes any non-standard way of raising money. Companies resort to structured finance techniques for a variety of reasons. For example, conventional loans or equity may be either unavailable or too expensive. As such, structured solutions tend to be tailor-made to suit a borrower’s needs.

Many lenders deal with project finance as part of their “structured finance” operations, covering any kind of finance where a special-purpose vehicle (SPV) like a project company has to be put in place as the borrower to raise money, with an equity and debt structure to fit the cash flow, unlike corporate finance, which is made to a borrower already in existence.

Examples of other types of structured finance and their differences from project finance include:

- **Acquisition finance.** Probably the largest sector in structured finance, acquisition finance enable company A to acquire company B using highly leveraged debt.

- **Leveraged buyout (LBO) or management buyout (MBO) finance.** This highly leveraged financing provides for the acquisition of an existing business by portfolio investors or private equity funds (LBO) or its own management (MBO). It is usually based on a mixture of the cash flow of the business and the value of its assets. It does not normally involve finance for construction of a new project, nor does this type of financing use contracts as security as does project finance.

- **Asset finance.** This type of structured finance is based on lending against the value of assets easily saleable in the open market, e.g., real estate (property) or aircraft...
financing, whereas project finance lending is against the cash flow produced by the asset, which may have little open-market value.

- **Leasing.** Leasing is a form of asset finance, in which ownership of the asset financed remains with the lessor (i.e., lender), and the lessee's obligation has recourse unlike project finance.

- **Securitization.** Security refers to a publicly traded financial instrument, as opposed to a privately placed instrument, thus securities have greater liquidity than otherwise similar instruments that are not traded in an open market. In recent years, procedures have been developed to securitize various types of debt instruments thus increasing their liquidity, lowering the cost of capital to borrowers, and generally enhancing the efficiency of the financial markets. 4 For example, a bank can securitize its project finance loans as bonds by bundling them into a pool. The debt repayments from the cash flow of the projects the bank has financed are used to make interest and principal payments on the bonds.

- **Asset Securitization.** This type of securitization involves creating publicly traded financial instruments from specific assets, e.g., Real Estate Investment Trusts (REITs) or the creation of asset-backed securities. Asset securitization is based on lending against the established cash flow of a business. The oldest type of asset securitization is mortgage-backed bonds. Here, individual home mortgages are combined into pools, and then bonds are created that use the pool of mortgages as collateral. 5 The main difference between asset-backed securities and project finance is that the latter is based on a projection of cash flow from a project yet to be established. Moreover, asset-backed securities hold financial not single-purpose project assets.

### 3.4 Advantages of Project Finance

Project finance confers certain advantages to the sponsors of the project, the lenders, and the investors of the sponsoring firms.
3.4.1 Advantages for Sponsors

Project finance is usually chosen by project developers in order to:

- **Non-recourse or limited recourse finance**

  The advantage of non-recourse or limited recourse finance is usually the main reason project developers are interested in employing project finance to structure the financing of their project. As we have mentioned, the core of project finance is securing debt for a capital-intensive project whose debt service is based exclusively on the projected cash flows of the project. Non-recourse project finance provides a structure that prevents lenders of the project's debt from having claims to the other operations and assets of the sponsors if the project revenues are insufficient to cover principal and interest payments on the debt. Lenders have recourse only to the cash flows or/and assets of the project company. A limited recourse structure, however, requires from sponsors to provide limited guarantees that may involve commitment of cash flow and assets besides those of the project company. A common project finance structure sits somewhere in the middle of non-recourse and limited recourse financing. This structure limits non-recourse to certain specific predetermined events; for anything that is outside this list limited recourse applies.

- **Off-balance sheet treatment of the debt financing**

  The off-balance sheet treatment of the project debt is an important advantage of project finance. In project finance, the debt of the project is exclusively annotated in the financial statements of the project company and does not affect the consolidated financial statements of the sponsors. A project finance structure may allow the sponsor to keep the debt off the consolidated balance sheet, but usually only if the sponsor is a minority shareholder in the project. This is why many project companies are structured as joint ventures. Generally, in order to obtain an off-balance sheet accounting treatment, none of the sponsors shall individually own more than 50% participation in the capital of the project company. Naturally, the accounting standards applicable to sponsors will vary from country to country.
- Maximize the leverage of a project

A major advantage of project finance is that it allows the use of highly leveraged capital structure for financing a project. Debt levels acceptable in project finance structures vary between projects, but in general debt-to-equity ratios of 70%-30% or even more are commonly accepted. This is a real advantage for project sponsors because a high level of debt financing reduces the amount of equity necessary for financing a project, and also leads to higher return on equity for the sponsors. However, lenders and bankers require from sponsors to contribute a reasonable amount of equity to the project company to ensure a sufficient degree of involvement and commitment to the success of the project. Moreover, satisfactory equity contribution reduces the project’s debt service obligations to acceptable levels according to the project’s economics. Financiers want to ensure that sponsors will not abandon a project when the first setback occurs and reasonable equity commitment on behalf of the sponsors is the best way to mitigate this risk.

- Long term finance

Project finance loans typically have a longer term than corporate finance loans. Long-term financing is necessary if the assets financed have a high capital cost that cannot be recovered over a short term without pushing up the fee that must be charged for the project’s end product or service. Long term finance, which means longer repayment periods, makes project finance very attractive to developers because they can charge a lower fee for their product or service thus making the project commercially viable. Thereby, loans for power projects often run for nearly twenty years, and for transportation projects such as toll roads even longer.

- Project Isolation

Project finance avoids any negative impact of a project on the credit standing of the sponsors. Since lenders of project debt have no recourse or limited recourse against the sponsoring firms’ other assets and cash flows, project finance insulates the sponsors’ other assets and operations from the risks associated with the project being financed. Managers may be more willing to take on a very large, risky project if they know that their firm’s existence would not be threatened if it fails. Conversely, the credit risk of a
Project finance may be sometimes better than the credit standing of its sponsors. In such a case, project finance may allow the sponsors to obtain cheaper financing than a corporate loan based upon their own creditworthiness.

- **Tax benefits**

Project finance makes high leverage even more attractive because interest is tax deductible, whereas dividends to shareholders are not. This makes debt cheaper than equity and thus encourages high leverage.

- **Risk spreading/Joint Ventures**

Project finance permits the sponsors to share a project’s risks. If a project is too large for one sponsor to undertake, others can be brought in to share the risk in a joint venture project company. Similarly, a project may involve major expenditures and risks for a country to finance from its treasury. Therefore, the government can cooperate with private companies to establish PPP that will reduce the total risk exposure. Creating a joint venture also enables project risks to be reduced by combining expertise (local expertise plus international expertise; construction expertise plus operation expertise). In such cases the relevant project contracts are allocated to the partner with the relevant expertise.

- **Reduce political risks affecting a project**

The number and range of project participants (domestic and international, public and private sector, etc.) in project finance deals usually reduce the amount of political risk associated with a project. The reason is that if the host country government intends to negatively affect a project in any way, it will have to face pressure not only from the sponsors but also from various entities that have a stake at the project and therefore are interested in its success.\(^9\)

- **Partnership fairness**

Projects are often put together by a developer with an idea but little money, who then has to find investors. Project finance structures, which usually require less equity, make it
easier for the weaker developer to maintain equal partnership, because if the absolute level of the equity in the project is low, the required investment from the weaker sponsor is also low.10

- Reveal proprietary information to small group of investors
Project finance permits managers to reveal proprietary information to a smaller group of investors whereas in corporate finance the company would have to release much more data about its operations, technology, and investments to a wider audience. Hence project finance deals increase the ability of a firm to maintain confidentiality.

- Provide incentives for managers
Finally, project financings can improve incentives for key managers by enabling them to take direct ownership stakes at the operations under their control. By establishing separate projects, companies can provide incentives that are much more directly based upon individual performance than is typically possible within a large organization.11

3.4.2 Advantages for Lenders

On the other hand, project finance offers also two significant benefits to the lenders:

- It restricts the use of project’s cash flows (depends on the contract)
Project finance usually restricts the usage of the project’s cash flows, which means that the lenders, rather than the managers, can decide whether to reinvest excess cash flows or to use them to reduce the loan balance by more than the minimum required. Conferring this power to the lenders reduces their risks.12 This option of controlling the project cash flows, however, will depend on the project contract and agreements between the sponsors and the lenders.

- It allows appraising the project on a segregated and standalone basis (Project Isolation)
The segregated and individual nature of project finance confers project isolation. This permits lenders to appraise a project on a stand-alone basis and to carefully identify, quantify, and manage all the various risks associated with the construction, start-up, and operation of a project. It also allows lenders to exercise a thorough, on-going supervisory
and monitoring control of a project on an isolated basis. Project finance structures generally provide lenders with strict control and supervision powers in respect of a project. However, lenders must exercise such powers in a reasonable fashion to avoid exposure to lender’s liability. As a general principle, lenders should abstain from having abusive control of the day-to-day operations of a project and pursuing any act that may be interpreted as active intervention in the management of the project company.

3.4.3 Advantages for Investors

The benefits of project finance to investors are twofold:

- Increase availability of investment markets

Project finance deals increase the number and type of investment opportunities, thus they make capital markets “more complete.” Investment banks, commercial banks, equity funds, pension funds, and other investment vehicles have more options available to allocate their money.

- Project isolation shields sponsoring firm’s investors

At the same time, project finance deals reduce the costs to investors of obtaining information and monitoring the borrower’s operations. To illustrate, consider an oil and gas exploration project that is funded using project finance. If the project were financed as an integral part of the sponsoring firm’s normal operations, investors in all the firm’s outstanding securities would need information on the project. By isolating the project, the need for information is confined to the investors in the project finance structure, and they need to monitor only the project’s operations, and not those of the entire firm.

3.5 Disadvantages of Project Finance

Project finance also has disadvantages. In general, using project finance techniques implies a long, complex, and cumbersome structuring process, expensive transaction costs, comprehensive and costly insurance coverage, and in some cases higher financial cost than conventional financing supported by the sponsors’ credit standing. In specific:
**Complexity of Project Finance**

Numerous constituents are usually involved in the structuring process of a project finance transaction, such as sponsors, financial and legal advisors, technical consultants, tax advisors, auditors, banks and other lenders, off-takers, constructors, operators, and government agencies. Consequently, project finance takes more time to arrange than conventional finance. Such deals typically also require a greater investment of management’s time than conventional financing.

**Higher Transaction Costs**

The total cost of a project finance deal must be calculated taking into account the transaction costs such as the fees of financial advisors, the legal expenses involved in designing the project structure, fees for hiring technical consultants to evaluate the feasibility of the project, tax advice, loan documentation, etc. Because of the greater complexity, project finance involves higher transaction costs than comparable conventional financings.

**Indirect Credit Support**

The cost of debt is typically higher in project finance than in a comparable conventional finance because of the indirect nature of the credit support. The credit support for project finance is provided through contractual commitments rather than through a direct promise to pay. Lenders to a project will naturally be concerned that the contractual commitments might somehow fail to provide an uninterrupted flow of debt service in some unforeseen contingency. As a result, banks typically require a yield premium to compensate for this risk. This premium is generally between 50 to 100 basis points, depending on the contract negotiated.

**3.6 When to Use Project Finance?**

The ideal candidate for project finance is a capital investment project that satisfies five requirements:
1. It is capable of functioning as an independent economic unit.
2. It can be completed on time and on budget.
3. It is technically capable of operating as designed.
4. There will be enough net cash flow from the project’s operation to cover the debt service adequately.
5. The project’s economics are robust enough to cover any temporary problems that may arise.

If the project satisfies the above requirements then two additional factors should be considered:

**Risk Sharing**

Often, the risks associated with a project are so great that it would not be prudent for a single party to bear them alone. Project finance permits the sharing of operating and financial risks among the various parties, and does so in a more flexible manner than financing on the sponsors’ general credit. Risk sharing is advantageous when economic, technical, environmental, or regulatory risks are of such magnitude that it would be impractical or imprudent for a single party to undertake them. A financing structure that facilitates multiple ownership and risk sharing is particularly attractive for infrastructure projects.

**Expansion of the Sponsors’ Debt Capacity**

Financing on a project basis can expand the debt capacity of the project sponsors. First, it is often possible to structure a project so that the project debt is not a direct obligation of the sponsors and does not appear on the face of the sponsors’ balance sheets. Second, because of the contractual arrangements that provide credit support for project borrowings, the project company may be able to achieve significantly higher leverage than the sponsor would feel comfortable with if it financed the project entirely on its own balance sheet.¹⁵
The selection of project finance as a financing structure for a project will depend on an adequate and careful comparative analysis of the advantages and disadvantages of such financial structures vis-à-vis all other existing financial alternatives available for such particular project. Thus far, many project developers have preferred the project finance mechanism as it has often proved to justify the special considerations described above.

3.7 The Combined Benefits of Project Finance and PPP

Infrastructure projects delivered under PPP and financed through project finance structures provide significant benefits to the end user of the product or service as well as to the government of the country where the project is located:

Additional Investment in Public Infrastructure

Project finance can provide funding for additional investment in infrastructure that the public sector might otherwise not be able to undertake because of economic or financial constraints on the public-sector investment budget.16

Risk Transfer

A project finance structure transfers risks of, for example, project cost overruns from the public to the private sector. It also usually provides for payments only when specific performance objectives are met, hence, also transferring to the private sector the risk that these are not met.

Lower Project Cost

Project finance is now widely used for projects that would previously have been built and operated by the public sector. Apart from relieving public-sector budget pressures, such PPP projects also have merit because the private sector can often build and run such investments more cost-effectively than the public sector, even after allowing for the higher cost of project finance compared to public finance.17 This lower cost is a function of:
- The general tendency of the public sector to "overengineer" or poorly plan projects.
- Greater private-sector expertise in control and management of project construction and operation (based on the private sector being able to offer incentives to good managers).
- The private sector taking the primary risk of construction and operation cost overruns, for which public-sector projects are notorious.
- "Whole life" management of long-term maintenance of the project, rather than ad hoc arrangements for maintenance dependent on the availability of further public-sector funding.

**Third-party due diligence**

The public sector may benefit from the independent due diligence and control of the project exercised by lenders, who will want to ensure that all obligations under the project agreement are fulfilled and that other project contracts adequately deal with risk issues.

**Transparency**

As project finance is self-contained (i.e., it deals only with the assets and liabilities, costs, and revenues of the particular project), the true costs of the product or service can more easily be measured and monitored. In addition, if the sponsor is in a regulated business (e.g., power distribution), the unregulated business can be shown to be financed separately and on an arm's-length basis via a project finance structure.

**Additional Foreign Direct Investment**

For a developing country, project finance opens up new opportunities for infrastructure investment, as it can be used to create foreign direct investment (FDI) that would not otherwise occur. Furthermore, successful project finance for a major project, such as power station can act as a showcase to promote further investment in the wider economy.
Know-how and Technology Transfer

For developing countries, project finance provides a way of producing market-based investment in infrastructure for which the local economy may have neither the resources nor the skills.
REFERENCES

1 The Florentine bank received a one-year lease for the total output of the mines in exchange for paying all operating costs without recourse to the Crown if the value or amount of the extracted ore was less than expected. Today, this type of loan is known as a production payment loan. See J.W. Kensinger and J.D. Martin, "Project Finance: Raising Money the Old-fashioned Way," *Journal of Applied Corporate Finance* (1988): 69-81.


3 The Alaskan pipeline transports crude oil and natural gas from the North Slope of Alaska to the port of Valdez in southern Alaska. TAPS involved a greater capital commitment than all the other pipelines previously built in the United States combined.


5 Brigham and Dave 630.

6 Depending on the expertise, brand name, and past record of the sponsors some debt-to-equity ratios can even reach 90%-10%.

7 By providing less equity sponsors can make "more bung for their buck" because their return on equity (ROE) is increased: $ROE = \frac{\text{NetIncome}}{\text{Equity}}$.

8 Natural resources projects such as oil, gas, and minerals usually have a shorter term because the reserves extracted deplete more quickly. Telecommunications projects also have a shorter term because the technology involved has a relatively short life.


11 Brigham and Dave 629.

12 Brigham and Dave 628.

100 basis points equal 1%.

Finnerty 9-10.

Of course, if the public sector pays for the project through a contract, it could be said that a project financed in this way is merely off-balance sheet financing for the public sector, and should therefore be included in the public-sector budget anyway. Whether this argument is valid one depends on the extent to which the public sector has transformed real project risk to the private sector.

However, this cost benefit can be eroded by "deal creep," i.e., increases in costs during detailed negotiations on terms or when the specifications for the project are changed during this period.
CHAPTER 4

DEVELOPING A PPP INFRASTRUCTURE PROJECT WITH PROJECT FINANCE

4.1 The Project

A stand-alone, revenue-generating infrastructure project that is technically, financially, and commercially sound (the "Project") is proposed for development, construction, and operation in a certain host country (the "host country").

The Project is awarded to the offering bidders (the "developers"), who have tendered the best offer in a bidding process organized by the government of the host country (the "government"). Under a PPP agreement, a concession or license (the "concession") for the construction, operation, and maintenance of the Project is typically granted by the government to the developers or usually to a special-purpose legal entity incorporated or created for purposes of developing the Project (the "Project Company").

The stakeholders of the Project Company may be the parent companies of each of the developers of the Project or special-purpose corporate subsidiaries of each of them (the "sponsors"). The project company is financed by equity committed by the sponsors and debt that is raised from banks and other financial institutions (the "lenders"). The Project Company retains financial, technical, legal, and tax consultants (the "advisors") to assist it with the formation and successful completion of the Project.

The life of the Project can be divided into three phases:

- Development

This is the period during which the Project is conceived, the Project contracts are negotiated, drafted, and signed, and the equity and the project finance debt are put in place and are available for drawing.

- Construction
This is the period during which the project finance is drawn down and the Project is constructed.

- Operation

This is the period during which the Project operates commercially and produces cash flow to pay the lenders’ debt interest and principal repayments and the sponsors’ equity return.

### 4.2 The Sponsors

The sponsors are the active equity investors in the Project. They are also referred to as developers or promoters because their role is promoting, developing, and managing the Project. Typical sponsors in PPP projects using project finance include:

- Contractors interested in the construction and procurement of the Project facilities.
  Construction companies use the investment in a project as a way of further developing contracting business.

- Companies that have an extensive experience in operating similar projects.

- Equipment suppliers.

- Input suppliers (e.g., fuel suppliers), who use the project as a way of selling their products (e.g., a company supplying natural gas to a power project).

- Passive institutional investors willing to make a minority capital investment offering a high yield.

- Companies that wish to improve their return on equity or spread their risks among a wider portfolio in the relevant industry instead of financed with corporate debt and appear on their balance sheet.

- Companies in industries that are regulated in their own market, or in which there is limited room for expansion into other industries, thus they seek to expand upstream or downstream (e.g., power utilities participating in a power production project).

- Off-takers of the project’s services or products (e.g., electricity) that do not wish or are not able to fund the construction of a project directly, or who are constrained from doing so by government policy, but who have the resources to invest in part of the equity (or are offered equity in return for signing an off-take contract).
The presence of local sponsors may be advisable for purposes of maintaining good relations with the local government and other actors in the domestic market as well as for providing knowledge of the local market and local management input. In certain strategic areas such as transportation, natural resources or power the participation of local partners may be imposed by local law. ¹

Foreign sponsors should establish friendly contacts with local partners and avoid a provincial approach that may alienate them. Local contractors are an excellent source not only for manpower and subcontracting but also for building relationships with the local communities. It is very important for sponsors to have every stakeholder on board so that the Project runs smoothly and locals provide their support. After all, it is the locals who are going to use the project delivered by PPP. ²

Sponsors may bring in other types of investors to participate into the Project Company also as sponsors:

- Investment funds specializing in project finance equity.
- Institutional investors, such as insurance companies and pension funds.
- Governments, government agencies, or other public authorities.
- Shareholders in quoted equity issued by the Project Company on a local international stock exchange (usually this occurs after the Project is successfully operating for some years).
- Multilateral institutions such as the International Finance Corporation.

The lenders of the Project Debt will be uneasy if a significant share of the equity is held by passive investors because the latter may not take an active role in its promotion, development or operation. However, this concern is minimized when the Project has been completed and is operating successfully.

As a rule, a viable Project would have sponsors with:

- Experience in the industry concerned, thus ability to provide the technical or operating support required by the Project.
- A reasonable amount of equity invested in the Project, which gives them an incentive to provide support to protect their investment if it gets into problems.
- A reasonable return on their equity. If the return is low there may be little incentive for the sponsors to continue their involvement with the Project Company.
- Arms-length contractual arrangements with the Project Company.
- An interest in the long-term success of the Project.
- The financial ability (although not the obligation) to support the Project if it runs into difficulty.

In sum, the sponsors generally consist of one or more entities with certain specific interests in the development of the Project based upon their respective areas of specialization or business strategy. A feasible project requires sponsors with technical capability, financial solvency, and a vested interest in the project success.  

### 4.3 The Project Company

The Project Company is the focal point of all the financial and contractual relationships in project finance. The sponsors create the Project Company, which is a special purpose vehicle (SPV) that will own, develop, construct, operate, and maintain the Project. The sponsors use a SPV to ensure that the Project Company carries out solely and exclusively the business, contracts, financing, and risks that are part of the Project. The SPV structure also helps lenders to evaluate the Project on a stand-alone basis.

The precise nature of organization for this entity depends on myriad factors. In most cases, a new company is incorporated specifically to carry out the Project. Lenders prefer a corporate form for the Project Company for security and control reasons. Common types of legal entities suitable for a project company include:

- Corporation
- Limited-liability company
- Partnership
- Unincorporated joint venture
- Trust
However, the determination of the best type of legal entity for the Project Company usually depends upon certain significant factors:

- Local law of host country
- Tax considerations
- Accounting rules
- Foreign exchange rules of the host country
- Proportion of debt and equity investments
- Regulatory issues

Some features that are commonly found in project companies include: 6

- The Project Company may not always be directly owned by the sponsors. For tax reasons the sponsors often use an intermediary holding company in a favorable third-country tax jurisdiction.
- The Project Company is usually incorporated in the country in which the Project is taking place, although it may be possible and beneficial for tax purposes to incorporate it outside the host country.
- In certain projects the Project Company takes the form of limited-liability company (LLC) rather than a corporation. In this case, the income of the Project is taxed directly at the level of the sponsors rather than taxed in the Project Company level first and then individual sponsors are taxed again. In addition, the sponsors liability remains limited in the same way as if they were shareholders in a company. Under LLC, the liability of the sponsors is limited to the extent of their equity contributions to the Project Company.

Once the Project Company is formed, the sponsors draft a shareholders agreement to cover issues such as:

- Percentage share ownership
- Procedures for future equity issuance
- Board representations and voting
- Voting of shares at the annual shareholders meeting
- Provisions to deal with conflicts among sponsors
4.4 The Lenders

Lenders are private sector financial institutions such as commercial banks, insurance companies, credit corporations, equity funds, and pension funds. However, sometimes intergovernmental development banks like the World Bank and the European Investment Bank, national export credit agencies like USAID or US Exim Bank, and other public-sector fund sources are also referred as lenders because they provide loans for the development of infrastructure in developing countries.

The amount of debt required in many large project financings necessitates that several lenders join to provide the debt facility. The lenders join because any one lender individually does not have the capacity to provide the entire project loan alone or because it wants to limits its risk exposure in the financing. The resulting group of lenders is often called a syndicate, while the entire process is referred to as loan syndication.

The lead bank(s) that arranges and manages the project finance loan and its syndication is called the lead arranger(s) (or lead manager). The lead arranger will ultimately underwrite the debt and place it in the market. Sponsors have to consider when to bring the lead arranger into the transaction. Ideally, to ensure the maximum competition between banks on the financing terms, the entirety of the Project package should be finalized and then a number of banks are invited to bid in a competition to underwrite and provide the loan as lead arrangers. This means either that the sponsors use a financial advisor to prepare the financial structure of the Project or do it themselves if they have the experience.

4.5 The Advisors

The advisors provide financial, legal, technical, and other advice to sponsors, the lenders, and the public sector in structuring PPP. The sponsors use financial advisors and
technical consultants to prepare their bid for projects. The lenders rely on their own advisory group to assess the financial viability of the Project and the risks attached to the revenue stream that will service their loans. However, lenders hire outside technical advisors to evaluate the technical feasibility of the Project. Finally, the government relies on its advisors to implement and provide an independent check on the PPP structure.

4.5.1 The Financial Advisors

Sponsors without in-house project finance expertise need financial advice to develop the Project financial structure and make sound judgment of its financial merits. Financial advisory services are provided to sponsors by major commercial banks, investment banks, banks with a specialized knowledge of a particular market or industry, as well as major international accounting or management consulting firms, boutique project finance advisory firms or individual advisors.

Financial advisors in project finance have a more wide-ranging role than would be the case in corporate finance. The structure of the Project must meet the requirements of project finance principles as we examined them in previous chapters. Therefore, the financial advisor must anticipate all the financing issues and risks that might arise. The scope of work of the financial advisor includes:

- Advising on the optimum financial structure for the Project.
- Preparing the financial plan of the Project.
- Advising on sources of debt and likely financing terms.
- Preparing the financial model of the Project with sensitivity analysis that includes base case, best case, and worst case scenarios.
- Advising on the financial implications of the Project contracts and assisting in their negotiation.
- Preparing an information memorandum to present the Project to the financial markets.
- Advising on assessing proposal for financing.
- Advising on selection of bank lenders or placement of bonds.
- Assisting in negotiation of financing documentation.
**Financial Model**

The financial advisor develops a financial model for the Project and then it is passed on to the lenders for their use. The development of the model should ideally be a joint operation between the financial advisor and the sponsors. When the financial model is complete the lenders appoint a *model auditor*, usually one of the major international accounting firms to review the model, including tax and accounting assumptions, and confirm that it properly reflects the Project contracts, the financing structure of the Project, and that it calculates the effects of various sensitivity scenarios.

### 4.5.2 The Legal Advisors

The Project Company hires project finance lawyers for structuring the legal aspects of the Project as well as local counsels for all legal matters relating to the laws of the host country. Together, they are the Project Company’s legal advisors. Project finance lawyers provide advice on all aspects of the Project, including laws and regulations; permits; and negotiating and drafting of Project construction, operation, and supply contracts. On the other hand, the lenders also retain project finance lawyers for structuring the legal matters of the debt financing, and local lawyers for all local law matters.

In most transnational project finance transactions, project finance lawyers are reputable international law firms, mostly American and British legal offices, which have built up the necessary expertise. In addition, an experienced and international oriented local counsel is equally important for the success of the Project. Because so much of project finance is about the structuring of contracts legal advisors play a key role.

### 4.5.3 The Technical Advisors

Technical experts such as engineering firms, environmental consultants, market consultants, insurance consultants, and accounting and tax consultants are retained to advice the Project Company and lenders on high technical matters, about which the sponsors and lenders have limited knowledge, or they want to confirm. These technical advisors will each prepare reports, such as feasibility studies, for the sponsors and the
lenders. During the Project, these experts might be retained by the Project Company or the lenders to confirm the progress and provide independent advice in case of technical disputes.

**Engineering Consultants**

An outside engineering firm is employed by the Project Company to assist in all technical matters related to the design, engineering, construction, and start-up of the Project. Another engineering firm is often retained by the lenders in order to act as their engineering consultant. One of the major international engineering firms provides this type of service and it is known as the “independent engineer.” Usually, the initial task of the lenders’ independent engineer is to perform due diligence, to evaluate the technical feasibility of the Project, and subsequently it acts as independent checker for certifying that the various stages of work have properly completed.

**Environmental Consultants**

Most countries now require an environmental impact assessment before any infrastructure project can proceed, and thus, sponsors hire specialized consultants. Environmental and social impact studies typically analyze, among other things, the following environmental and social studies: sustainable use of natural resources, protection of human health, protection of local ecosystem, protection of local culture, protection of endangered species, use of dangerous and toxic substances, contamination issues, etc. Environmental issues are of major importance for both sponsors and lenders, who do not want to be associated with projects causing environmental harm for fear of financial penalties or damage to their reputation.

**Market Consultants**

Market advisors are needed both from sponsors and lenders to determine the market price and risk of the Project’s service or product. For instance, a market consulting firm will develop a model to forecast the traffic flow for a toll road, or energy prices for a power plant so that sponsors can incorporate this information into their bids and projected
financial statements. Market consultants perform a thorough analysis of the Project’s output market, price dynamics, and competitors, because a variety of circumstances may arise that can negatively affect market demand or prices for output. Moreover, changes like new technologies or product obsolesce might affect the Project’s viability. Concrete market analysis is essential because market conditions influence the Project revenues and consequently the capacity of the Project Company to service its debt and distribution of profits to its sponsors.

**Insurance Consultants**

The Project Company retains an insurance broker or risk management consultant that will design and produce an insurance package to limit Project risks at an economical price. The lender’s insurance advisor will review and approve the insurance package.

**Accounting and Tax Consultants**

Accountants are often retained to advice the Project Company on the accounting and tax aspects of the Project.

**4.6 The Government**

The government of the host country in which the Project is located is known as the host government and it usually also includes local governments, public-sector authorities and agencies, and state-owned entities. In PPP in infrastructure, the host government retains a permanent interest in the delivery of the Project. It is ultimately responsible for determining the objectives, seeing that the Project’s product or service is delivered to the required standards, and ensuring that the public interest is safeguarded.¹⁰

In some projects, the government is an owner of the project, whether majority or minority, or will become the owner of the project at the end of a specified period, such as in a BOT structure. It might be also be involved as an off-take or as a supplier of raw materials or fuel.
While the Project Company undertakes the development, construction, operation, and maintenance of the Project, the public sector remains accountable for many aspects. These include:

- Providing the enabling environment.
- Cooperating with the Project Company to ensure stability and commitment to the Project’s pre-defined objectives.
- Defining the business and the services required, and the public sector resources available to pay for them.
- Specifying the priorities, targets, and outputs.
- Executing a carefully planned procurement process.
- Determining the performance regime by setting and monitoring safety, quality, and performance standards for those services.
- Governing the contract by enforcing those standards, taking actions if they are not delivered.
- Managing community expectations.
- Taking control of the Project if it is inefficiently operated or otherwise fails (this option depends on the Project contract).
- Limiting restrictions on its ability to enact new laws and promulgate new rules that may damage the Project and its sponsors.

Public sector authorities and other public entities play an important contributing role in that they issue permits, licenses, authorizations, and concessions, as well as they design the PPP regulatory framework to which the Project will operate.

The host government’s ability to benefit from the Project varies with its economic stability, tax regime, economic growth, and other factors. In general, the host country achieves the following objectives in a PPP infrastructure project:

- Efficient development of needed infrastructure provided by the Project.
- Proper, safe, and professional operation of the Project.
- Economic development.
- Satisfy multilateral institutions of its development success and economic growth.
- Minimize use of its own funds and decrease budget deficit.
• Obtain Project ownership after sponsors receive an agreed equity return.

4.7 Project Development

The use of project finance in a PPP infrastructure project requires systematic and well-organized project development. As with any new investment, the sponsors will undertake a feasibility study to consider the investment and its risks. Furthermore, because of the nature of project finance, the Project’s contracts such as loan contracts or construction contracts also need to be considered at this early stage since these may affect the commercial approach to and hence the feasibility of the project.

Therefore, the sponsors should set up a development team with a mixture of disciplines, depending on the nature of the project:

- Engineering and construction
- Operation and Maintenance
- Legal (Project contracts)
- Tax and Accounting
- Financial modeling
- Financial structuring
- Public relations (government, local community, investors)

It is important that the development team is well coordinated. The development process of complex, large-scale engineering systems like infrastructure projects runs into months, and the project itself into years. The development team’s staff will be working long periods of time on the project, traveling extensively, and setting up a local office. Development costs normally reach 2.5%-5% of the project cost (including the fees for financial advisors, technical consultants, etc.) and there is always the risk that the project may not move forward and all these costs will have to be written off. Therefore, cost-control mechanisms should be included early in the development process.13
4.8 Project Contracts

In PPP, besides the off-take contracts and concession agreements with the government that we examined in Chapter 2, there are also several other contracts and agreements signed by the Project Company. These include the construction contract, the operation and maintenance contract, and the supply contract.

4.8.1 The Construction Contract (EPC Contract)

The design, engineering, procurement, construction, installation, and commissioning of the Project facilities is usually contracted by the Project Company under an engineering, procurement, and construction contract (the "EPC contract", or "construction contract") with one or more construction companies (the "EPC Contractor"). An EPC contract generally provides for the obligation of the EPC Contractor to build and deliver the Project facilities on a turnkey method. The EPC Contract is normally by far the largest cost item in the budget of the project, usually 60%-75% of the total.\[14\]

The turnkey project delivery method requires from the EPC Contractor to complete the Project facilities at a certain pre-determined fixed price, by a certain date, in accordance with certain specifications, fully equipped and ready for operation, with certain performance warranties. The term turnkey comes from the fact when the EPC contractor delivers the Project facility, the Project Company is required to do nothing more than “turn a key” in order to start the Project’s operation. Consequently, a turnkey construction contract provides all the engineering, procurement, and construction services necessary to complete the Project facility.

Such a fixed-price, date-certain turnkey EPC contract transfers a significant amount of responsibility—and thus risk— to the EPC Contractor. Usually, the EPC Contractor is a large engineering and construction firm, with significant technical capabilities and financial prowess, extensive experience in the industry, which has successfully completed similar projects. Many times, these construction firms participate as sponsors in the Project Company and are also involved as EPC Contractors by signing an independent EPC contract with the Project Company for delivering the Project. Fixed-price, fixed-date...
EPC contracts are standard in infrastructure projects such as power plants, refineries, and transportation.

4.8.2 The Operation and Maintenance Contract (O&M Contract)

It is common for the Project Company to delegate the operation and maintenance of the Project to a reputable operator with expertise in the industry (the “Operator”) under the terms of an operation and maintenance contract (O&M contract) in order to ensure that the Project will be operated, managed, and maintained according to prudent industry practices. When the Project Company has no track record of operating a project of this type, lenders often prefer established companies, with the necessary experience in similar projects and financial substance, to take this responsibility.

Under the O&M contract, the Operator agrees to perform for a fee all operation, management, maintenance, and repair services of the Project. Even if the Project is going to be operated by one of its sponsors that is also an operating company (a fairly common practice), a separate agreement between the Project Company and the Operator for this purpose is necessary, to define the scope of the sponsor’s involvement.

4.8.3 The Supply Contracts

The Project Company enters with one or more suppliers (the “Suppliers”) into one or more long-term supply contracts (the “Supply contracts”) for the provision of the critical supplies necessary for the start-up and operation of the Project such as raw materials, gas, coal, feed stocks, fuel, etc. (the “supplies”). Supply contracts provide certainty in respect of the availability, transportation, and the price of the key supplies needed to produce and deliver the Project outputs in accordance with the terms and conditions of the off-take or concession agreement.

The terms and conditions of supply agreements inevitably vary depending upon the type of supply needed for the operation of the Project. For example, a power project would require natural gas or coal as supplies in order to produce electricity whereas a motorway may require concrete and aggregates for its construction. A Supply contract
generally requires a term of at least as long as the tenor of debt financing and is executed prior to financial closing.

4.9 Graphical Representation of Project Finance

The following graph illustrates the application of project finance into PPP infrastructure projects. Naturally, each project has its own unique structure, which may include different delivery methods or diverse project contracts and agreements. However, the project entities and project contracts we discussed in this chapter are commonly found in most of project financing structures.
Figure 4.1: Typical Project Finance Structure of PPP in Infrastructure
REFERENCES

1 Buljevich and Park 95.

2 For example, Bulgaria, Greece and Russia signed an agreement in April, 2005 to build the 285-km-long Burgas-Alexandroupolis pipeline that will allow Russia to export oil to Europe through the Black Sea, bypassing the busy Bosporus Strait in Turkey. The sponsors of the $700 million oil pipeline include, among others, Gazprom from Russia, Prometheus Gas from Greece, Chevron from the United States, as well as the governments of Bulgaria, Greece, and Russia.

3 The financial credibility of the sponsors matters even if the project is non-recourse. They may have to fill up any gaps in the project risk by providing limited-recourse guarantees. See Yescombe 36.


5 Buljevich and Park 94.

6 Yescombe 40.

7 Hoffman 113.

8 Buljevich and Park 96. See also Yescombe 37.

9 The extensive use of contracts in project finance made some people to refer to it as “contractual finance.” See Esty 27.

10 Grimsey and Lewis 112.

11 Grimsey and Lewis 112.

12 Hoffman 114.

13 Yescombe 37.

14 Yescombe 147.
5.1 Risks in Project Finance and PPP

Project finance and PPP arrangements are founded on the transfer of risk from the public to the private sector in infrastructure projects where the private sector is best placed to manage the risk. The general principle is to shift risk from the public sector to the sponsors and offer a profit incentive to the private sector in return. We examined the complexity of major infrastructure assets that use project finance for their funding and we observed different private entities undertaking the financing, technical, legal or other project requirements under sub-agreements and separate contracts. In many ways, project finance has to be complex to handle adequately the large number of risks inherent in such projects.¹

A PPP infrastructure project must meet the public sector’s value-for-money test and the private sector’s need for robust revenue streams to support the financing arrangements. The government seeks an effective way, such as using PPP, to integrate the design, financing, construction, and operation of an infrastructure asset under a project company, which in turn, transfers key risks in design, construction delays, cost overruns, finance, and insurance to other private sector entities, e.g., the EPC contractor, the operator, the lenders, insurance companies, etc.

In principle, the risks of PPP projects seem little different from those of some other project finance transactions, and can be evaluated using much the same techniques.² As a general rule, the possibility that the predicted revenues do not materialize poses the greatest risk to the commercial viability of a PPP project.³ This risk largely is borne by those providing financing or financial guarantees. A financial structure needs to be engineered with as little recourse as possible to the sponsors while at the same time providing sufficient credit support so that the lenders are satisfied with the credit risks.
At least eight categories of risks in project finance and PPP in infrastructure projects exist. These include:

- **Completion risk**, which entails design, engineering, and construction risks because of faulty construction techniques, cost escalation, and delays in construction.
- **Operation risk**, as a result of higher operating costs and maintenance costs.
- **Revenue risk (Market risk)**, because of traffic flow shortfall or failure to extract resources or the volatility of prices and demand for products and services sold, which lead to revenue deficiency.
- **Supply risk**, supplies or raw materials become depleted or unavailable during the life for the project.
- **Environmental risk**, because of adverse environmental impacts and hazards.
- **Economic risk (financial risk)**, because of changes in inflation, interest rates, and exchange rates that may adversely affect the project.
- **Political risk**, resulting from planning changes, legal changes, and unsupportive government policies.
- **Force majeure**, resulting from events outside the control of the project’s stakeholders.

Successful project finance in PPP requires expert analysis of all these risks and the design of contractual arrangements prior to competitive tendering that allocate risk burdens appropriately. On the other hand, with such a long list, it is important “not to lose sight of the wood for the trees.”

### 5.1.1 Completion Risk

Completion risk, which also includes design, engineering, and construction risks, entails the risk that the project might not be completed. This risk generally results in time and/or cost overruns that will require a substantial increase in capital and/or interest expenses during construction. Lenders to a project are particularly sensitive to becoming creditors if certain circumstances may prevent or render impossible its completion. Such a project is typically called a “dead horse.”
Therefore, to minimize the likelihood of occurrence of a non-completion scenario, a project company should use proven technology and enter into a turnkey contact with a reputable construction company.\(^6\) With an EPC contract, a project company allocates the completion risk to the EPC contractor. The contractor and other parties providing engineering and construction services are often required to post a performance bond that may be drawn on should certain commitments not be met.\(^7\)

5.1.2 Operation Risk

Once the project has been completed and is demonstrated to be operating to specification, a new risk phase begins; that of long-term operation. Increased costs in the operation and maintenance of a project not foreseen in the financial structure may negatively affect the financial performance of such project and may even jeopardize its ability to cover debt service.

Some typical reasons for the occurrence of operating cost overruns are: poor management performance; mechanical, technical or technological failures; inadequate maintenance; low productivity of the labor force or strikes. If the project is not able to operate as projected due to negligent operation or failure to maintain the asset, there is likely to be a loss of revenue or higher operating costs. Therefore, an O&M contract with an experienced operator provides the greatest comfort to lenders in this respect, especially if the operator is also a sponsor of the project company. Operating cost overruns are usually allocated to the operator by means of various penalties, liquidated damages, performance bonds, and other risk distribution mechanisms established under the O&M contract.

5.1.3 Revenue Risk (Market Risk)

The risk that the project company may not earn sufficient revenue to cover its operating costs, repay its debt, and leave an adequate return for investors is at the heart of project finance. Lenders typically require a level of certainty as to the future demand and the sales price of the output produced by a project. Moreover, lenders usually verify the
existence of a long-term need for a project output and confirm that the project is capable of delivering its output at market prices. 8

If the project output is a product, the risks are whether the project company can achieve:

1) The volume of unit sales projected: the volume risk

2) At the projected unit sales price: the price risk

These risks may be covered by an off-take contract or a long-term sales contract, which secure expected cash inflows. Hence, in off-take contract both volume and price risks are transferred to the off-taker. Other times, future project revenues are based on the existence of a well-developed and efficient market for the project’s product. If the product is a commodity (oil, minerals, etc.), the project company may seek protection against a drop in the international prices of such a commodity through hedging, such as forwards, futures, options, swaps, etc.

If the project is providing a service under a concession agreement, the risk is whether the project company can achieve the volume of usage of the service projected at the toll or fare – the usage risk. These risks may be covered by the public authority under the concession agreement or the project company may take the usage or toll risk directly. Specifically, projects with usage risk are divided into two categories:

1) Real toll-based projects, in which the project company’s revenues are derived from the general public paying tolls, fares, mobile phone charges or a similar payment for usage.

2) Shadow toll-based projects, in which the end-user (usually the general public) does not pay directly for the service, but payments are made by the public authority to the project company based on the general public’s usage of the services provided.

To the extent the usage risks are covered contractually, the project company is just left with the operation risks. 9
5.1.4 Supply Risk

There is a risk that supplies, natural resources, raw materials or other factors of production necessary for the successful operation of the project may become depleted or unavailable during the life of the project. Therefore, the availability, transportation, and prices of critical supplies must be secured in a manner consistent with the operating and financial plans of a project.\(^\text{10}\)

A delay or shortfall in the delivery of supplies to a project may prevent the project company from complying with its obligations under the off-take or concession agreement. Additionally, it may affect the cash flow generation of such project and it may make the project company liable for penalties under these agreements. On the other hand, an increase in the prices of project supplies or in their transportation costs may cause operating cost overruns. However, the project company seeks to pass such supply risks to the suppliers through the supply contracts (e.g., supply-or-pay contracts).

Lenders also need to ensure that the project company has a structured a supply strategy that is commercially realistic and satisfies lenders’ concern in respect of supply availability and prices. In that sense, lenders commission an independent study to establish the adequacy of supplies, alternative sources, the strengths and weaknesses of suppliers, the characteristics of the supplies’ markets, the existence of monopolies, the means and costs of transportation available for supplies and related installations (e.g., warehouses, ports, airports, roads, etc.), and the expected availability and future prices of supplies.\(^\text{11}\)

The financial markets may also provide security for the project’s supplies. If the critical supply is a commodity, the project company may seek protection against an increase in the international prices of such commodity through hedging, such as forwards, futures, options, swaps, etc.\(^\text{12}\)

5.1.5 Environmental Risk

The protection of the environment is currently a matter of significant public concern in the international community. Countries have increasingly issued stricter environmental and social regulations and laws; consequently, environmental and social matters are
playing a critical role in today’s project finance practice. New projects must be carried out in an environmentally responsible manner, which in turn often requires greater capital investment to meet environmental standards, and therefore, more equity and debt financing.

Environmental risk is present when the environmental effects of a project might cause a delay in the project’s development or disruption of operation or necessitate a costly redesign. Environmental risk is not just the risk a project poses to the environment itself, but also the risk the project may be subject to new environmental and social regulations enacted by the local government or international organizations. To the extent environmental objections are voiced through the political process, they give rise to political risk.\textsuperscript{13}

Large-scale infrastructure projects are particularly sensitive to environmental risks because of their nature to alter the physical landscape. The project economics may be negatively affected by environmental taxes, supervision programs and procedures, cleaning up pollution, penalties for environmental liabilities, and loss of revenues due to business interruptions caused by environmental reasons.

Environmental and social issues pose a serious concern for a project’s debt financing. Lenders may be exposed to lenders liability for having financed a project that was not environmentally sound. In order to minimize the probability of environmental risks, lenders must conduct environmental and social due diligence of the project –usually provided by an independent consultant- to determine whether the project complies with the applicable environmental and social regulations. As a general rule, a project should comply with the more stringent of the applicable local legislation and internationally accepted policies and guidelines for the protection of the environment in the particular industry.\textsuperscript{14}

Recently, the International Finance Corporation, which is the investment arm of World Bank, issued a voluntary set of guidelines to ensure that social and environmental issues are fully addressed in the project finance business. Under these principles, known as the Equator Principles, financing is provided only to projects whose sponsors can demonstrate that those projects will be conducted in a socially and environmentally responsible manner. The type of projects that fall into this category are: transportation,
dams, energy, natural resources, telecommunications, commodities, and everything that has to do with infrastructure works. So far, twenty-nine leading banks have adopted these principles, which have become the new standard in project finance. To successfully arrange a project financing, compliance with the Equator Principles has become almost essential.

5.1.6 Economic and Financial Risks

External economic risks (also known as financial risks) are inflation, interest rates, and currency exchange rate movements. These risks do not relate to the project in particular, but in the economic environment in which it operates.

5.1.6.1 Inflation Risk

Unanticipated high inflation rates may adversely affect a project's feasibility. This risk represents the possibility that the actual inflation rate will exceed the risk projected during the development of the feasibility study. Consequently, financial projections of a project must incorporate realistic inflation rate assumptions.

During the construction period, if inflation leads to higher project costs than projected, cost overruns result to completion risk. Hence, most of the construction costs should not be vulnerable to inflation-based increases. The EPC contract price, financing costs, and most advisers' costs should be all fixed. During the operating period, if inflation leads to higher operating costs than projected, then the level of lenders' repayment and the return for sponsors may be reduced.

In some cases, inflation risk may be allocated to the off-taker or the government by means of certain price escalation mechanisms included in the off-take agreement or the concession contract, such as periodic adjustments of the output price or tariff based upon a certain inflation index.
5.1.6.2 Interest Rate Risk

If the project is being financed with fixed-rate loans or bonds from lenders providing fixed-rate funding, then the project company has no interest rate risk. However, projects are usually financed using variable ("floating") interest rates. In the international market, the most important floating rate benchmark is the London Interbank Offered Rate (LIBOR), in which interest rates are quoted by banks for borrowing from and lending to each other in all the major international currencies. Banks basing their lending on LIBOR quote their interest rate for financing as a margin over the LIBOR rate, with the interest rate usually refixed against the then current LIBOR rate every 3 or 6 months.

The financial projection of the financial advisor of the project company must include realistic interest rate assumptions and the projected cash flows of the project must accommodate statistically reasonable increases in interest rates so that debt service is always guaranteed. If the financial model indicates that there is a risk that increase in interest rates may threaten the success of a project, lenders will require the hedging of risk by using derivative instruments such as interest swaps, collars, caps, etc.

The most common derivative used for mitigating interest rate risk in project finance is the interest rate swap ("coupon swap"), where the project company swaps its floating-rate interest payment obligations into fixed-rate. Under a coupon swap, one party exchanges an obligation for payment of interest on a floating rate basis to payment at fixed rate, and the other party does the opposite. In project finance, a project company that has an obligation to pay interest at a floating rate under its loan agrees to pay its counterpart (a bank or banks—the "swap provider") the difference between the floating rate and the agreed-upon fixed rate if the floating rate is below this fixed rate or will be paid by the swap provider if the floating rate is above the fixed rate. The coupon swaps are usually arranged on behalf of the project company by the lead arranger of the debt financing.

In some cases, interest rate risk may be passed through to the off-taker or the government, who assumes such risk by means of certain adjustment formulas of the output price or tariff, intended to reflect increased financial costs due to high interest rates.
5.1.6.3 Currency Exchange Rates

When a project generates income in one currency (usually the local currency of the host country) but has a portion if its costs denominated in one or more foreign currencies, it is exposed to the risk of fluctuations in the exchange rate between the foreign currencies and the local currency. If the project revenues are in the local currency, which is depreciated against the foreign currency that is used for operating and financing costs, this will affect the project net revenues, and hence the ability to repay its debt. 15

Ideally, finance should be arranged in the local currency, hence eliminating such long-term currency risks, but in practice this may not be possible in developing countries where the domestic financial markets are not able to provide project finance. 16 Lenders must always perform a detailed analysis of devaluation and depreciation risk and verify that the exchange rate assumptions used for the financial projections are reasonable to ensure that the project will be capable of resisting unexpected currency rate fluctuations. 17

The currency exchange rate can be managed by: (1) borrowing an appropriate portion of project debt funds in local currency, (2) hedging using currency forwards or futures, or (3) arranging one more currency swaps. 18 In the case of countries with weak monetary systems and policies, lenders should employ other techniques in order to manage devaluation and depreciation risks, such as off-shore project accounts into which payment in respect of export receivables are directly deposited; credit enhancements from the sponsors or other participants in the project; and price-adjustment mechanisms for the project output price or tariff based upon foreign exchange fluctuations. 19

5.1.7 Political Risk

Political risk appears when the project company is subject to political actions relating to the project’s presence in a particular country and its relationship with the host government. Particularly for PPP, political consequences may have considerable impact on the success or failure of the project because the government plays a very important role through the concession contract or off-take agreement. There are two definitions of political risk in project finance. The first one refers to political risk as the possibility that
political authorities in the host country might interfere with the timely development and/or long term viability of the project through actions such as imposition of burdensome taxes or onerous legal restrictions. The second definition considers political risk as country risk; that is when a lender makes a loan to a company incorporated in, and with business and operations in, a country different from the lender’s country of incorporation.

Clearly, more stable political conditions and legal systems in a country will stimulate more investor interest in a project. In addition, the lower the political risk, the lower the cost of capital (e.g., interest rate of debt financing). The main political risks associated with transnational project finance structures and PPP are the following:

- Currency Inconvertibility and Transfer
- Expropriation and Nationalization
- War and Civil Disturbance
- Change of Laws

5.1.7.1 Currency Inconvertibility and Transfer

Inconvertibility risk arises when the government of the host country establishes currency exchange controls, and consequently, adopts convertibility restrictions that prevent the project company from converting its income (usually in local currency) into the hard currency required for the payment of debt service. If the country gets into economic difficulties and so runs short of foreign currency reserves, it may totally forbid either the conversion of local currency amounts to foreign currencies or the transfer of these foreign currencies out of the country. In effect, at this point the host country has defaulted on its foreign currency debt.

Lenders must carefully determine the likelihood of occurrence of foreign exchange controls or restrictions in the host country by examining its macroeconomic position, balance of payments, and foreign debt levels. Inconvertibility and transfer risk can be reduced or distributed by using the following mechanisms: political risk insurance coverage, guarantees by the host country, and use of offshore reserve accounts.
5.1.7.2 Expropriation and Nationalization

The risk of expropriation and nationalization of a project is realized when the government of the host country decides to nationalize or expropriate the assets of the project or the shares of the project company in discriminatory or arbitrary manner without a just payment or fair compensation to the sponsors or the project company. In a PPP project where the host government may also be an investor in the project company, then the government does not even need to deprive the project company of its assets or the sponsors of their shares. For example, it could pass a law giving it the right to appoint a majority of the directors of the project company and so gain control in that way.

The expropriation and nationalization of a project may occur by virtue of one administrative act of the host country government (direct expropriation) or as a consequence of series of hostile acts intended to force the sponsors to abandon the project (creeping expropriation). The latter may be caused by various political actions affecting the economies of the project such as: changes in laws, unreasonable increases of taxes, imposition of new taxes, import and export restrictions, failure to grant or renew the project’s required permits and authorizations, and price control interferences.22

The nationalization risk is of particular relevance in the case of high-profile projects in certain strategic sectors (natural resources, energy, and transportation) in developing or political unstable countries. The existence or the blooming of nationalist policies may tempt governments to expropriate those projects.23

Lenders must evaluate this risk within the general analysis of the political risks associated with a project. Appropriate risk reduction techniques include political risk insurance coverage and government guarantees. Specifically, the PPP agreement should treat expropriation as a default by the off-taker or the contracting authority, and therefore provide for compensation through a termination sum accordingly. The termination sum must be enough to compensate first the lenders for the remaining debt repayment, and second the sponsors for their dividends payment, which will equal the net present value of future cash flows that the project would generate if it continued its operation.
5.1.7.3 War and Civil Disturbance

Political violence occurs when a large scale violent act or series of civil unrest arise in the host country, such as war, civil war, terrorism, sabotage, and general strikes. This type of risk may cause physical damage to the project or prevent its operation, and thus causing additional capital costs or loss of revenues.

The project company uses appropriate risk management techniques like political risk insurance or commercial insurance. Provisions should be included in the PPP agreement but there is an obvious risk that when the time comes the off-taker, contracting authority or host government may not be able to fulfill their obligations.

5.1.7.4 Change of Laws

The political risks discussed so far (currency inconvertibility and transfer, expropriation and nationalization, war and civil disturbance) are risks that mainly cause concern in developing countries. The risk of change of laws, however, is of a much wider application that may affect developed countries as well. Changes in the set of rules may adversely affect the success of a project and may render it unprofitable. There are many types of government actions that can dramatically interfere with the operation of a project:

- Changes in the regulatory framework applicable to the project
- Increases in the applicable taxes
- Creation of new taxes
- Increases in applicable import and export tariffs or quotas
- Creation of new import and export tariffs or quotas
- Changes in employment, health and safety regulations
- Deregulation or privatization of a previously regulated or state-owned sector, increasing competition or risk for the project company.

In the case of a project with a tight debt service, the occurrence of any of such circumstances may seriously threaten the success of such project. Consequently, lenders usually require that changes in laws and taxes risks be transferred to a creditworthy party by way of support mechanisms providing for the transfer or mitigation of such risk.
In general, this risk cannot be adequately covered through political risk insurance because most political insurance companies only offer plans covering changes in law and taxes on a limited basis. However, either the off-taker or the government may assume such risk by means of agreeing to certain adjustment mechanisms to the project output’s price, taking into account the adverse impact in the project’s economics caused by these changes in conditions.

5.1.7.5 A Note on Political Risk

PPP structured with project financing and political risk go hand-in-hand and they can affect both developing and developed countries. Because PPP projects are based on the interaction of public and private sectors, managing political risk becomes one of the most critical tasks for project managers.

The financial approach to managing political risk is for sponsors to increase the company’s hurdle rate and accept only those projects that generate sufficiently high returns. However, this approach can actually increase project risk because it makes the sponsors appear as if they are profiting excessively at the expense of local citizens. The idea that high returns can actually induce high risk is known as the “paradox of infrastructure investment.” Examples of this phenomenon can be seen in the Dabhol power project in India, where allegation of excessive returns to Enron prompted the state government to abrogate the power purchase agreement.

Even very developed countries like the United States are sensitive to political risks. For instance, Calpine’s power plants in California experienced loss of revenues and the risk of default on their debt when the California state government unilaterally cut its contracted price for power when rates dropped. Especially, in developing countries or when contracts are unenforceable, property rights are uncertain, and project cash flows are high, there is a serious risk of expropriation.

The political risk of nationalization is substantially decreased when the country itself takes a clear stance on the subject of foreign investments from the very beginning. Greece was a developing country in the 1950s and 1960s and in order to increase foreign direct investment forbid nationalization under its constitution. This meant that even if the
government attempted to nationalize a project, neither a change of laws nor expropriation acts would be adequate, but it would have to amend the Greek constitution; this is a very arduous process, thus acting as deterrence.

5.1.8 Force Majeure

Force majeure (French for “superior force”) occurs when the construction, operation or maintenance of a project is affected temporarily or permanently by a circumstance outside the control of the project company and/or other participants in the project. The traditional definition of force majeure includes those circumstances outside the control of the project parties, which could not be anticipated nor could they be avoided by exercise of due care, and which render impossible or extremely difficult the ability of the parties to comply with their respective contractual obligations.

Technically, force majeure events come in two forms that fit in separate categories. The “Acts of God” (floods, earthquakes, hurricanes or other natural disasters) can be considered operating risks, while wars, strikes, and riots are political risks. In general, acts of God typically are managed through commercial insurance policies especially designed for such purposes. Political force majeure is usually managed by means of political risk insurance coverage or transferring such risks to different project participants.

Force majeure can affect the project either in its construction phase or operation period. The adverse consequences of a force majeure event during the construction phase are significant. In addition to any physical losses or damages caused by force majeure, the construction period and the expected completion date will be extended; consequently the project company will incur construction cost overruns, delays, and increased capital costs. If a force majeure event takes place during the operating phase, the project company will typically cease to generate the necessary income to support the operating costs and debt service.

In order to prevent any misunderstanding among project participants, lenders must perform a thorough analysis of all project contracts for purposes of checking that any force majeure event affecting any of the parties to such agreements is similarly considered as force majeure in the other project contracts. Furthermore, each of the
project's stakeholders must clearly understand the mechanics and the consequences of applicable force majeure risk allocation tools. In other words, they all must clearly know and understand who is assuming what risk.

Undoubtedly, the variety of circumstances that may constitute force majeure and the fact that some of those circumstances may be hard to predict in most cases, makes this risk one of the most difficult ones to identify, evaluate and distribute in any project finance structure.30

5.2 Risk Management in Project Finance and PPP

Risk management techniques for project finance and PPP structures consist of a combination of five different but interrelated steps:

- Risk identification
- Risk assessment
- Risk reduction
- Risk spreading
- Hedging and insurance

First, risks must be identified and understood at an early stage. Second, risks must be quantified and assessed to determine their magnitude. Third, to the extent possible, risks must be reduced. Fourth, risks must be distributed among the parties best capable of assuming and managing them, and naturally who will gain the highest reward for this risk. Fifth, if possible, risks must be further allocated by means of insurance –commercial and/or political- and derivative instruments.
REFERENCES

1 Grimsey and Lewis 171.

2 Grimsey and Lewis 172.

3 For projects in countries with political instability, one can argue that political risks such as government nationalization or expropriation of the project are a more significant source of risk.

4 Grimsey and Lewis 174.

5 Finnerty 41. See also Buljevich and Park 147.

6 The departments of project and structured finance of banks and other lenders usually prefer to finance projects that use proven technology. In cases of unproven or novel technologies, specifically in the case of information technology, lending is provided by venture capital firms that are willing to assume more risk. For example, an offshore wind farm may be a good candidate for project finance; however, because it uses off shore wind turbines that are a relatively new technology, lenders may regard it as unproven technology.

7 Other completion risks include bad weather, labor strikes, and late acquisition of site and permits.

8 Lenders hire outside market consultants to verify the market demand. See Chapter 4.

9 Yescombe 161, 167.

10 Particularly in connection with natural resources projects, as a general rule of thumb, minable reserves should be expected to last at least at twice as long as the reserves that will be mined during the project debt servicing period. See Finnerty 43.

11 Water and wind can also be considered as supplies for a project. Hydroelectric power plants depend on significant quantities of water from rivers, lakes or canals. The availability of this water may vary significantly during the life of the project. To enable them to accept this kind of water risk, lenders need to be provided with long-term statistics demonstrating the volume and reliability of the water supply. The same principle applies to projects using wind power for power generation, such as wind farms and wind turbines. The sponsors need to provide statistics on wind volume, direction, and fluctuations at the project site location over a number of years. See Yescombe 173.

12 The project finance departments of certain banks have even developed the first "wind derivatives," which are financial instruments for hedging the wind supply of a wind farm. Personal communication with Thomas Priermeier, Head of Financial Risk Advisory,
Aggressive lobbying by environmental groups and legal challenges mounted by grassroots activists may give rise to significant environmental risks for environmentally sensitive projects. See Finnerty 49.

A developing country may play down environmental regulations, because it offers a cost incentive to sponsors to locate their project in its territory, and thus to attract foreign investment. However, the World Bank and European Bank have their own environmental standards mandated by their member-states and may require these to apply to projects even if local law does not require this. See International Finance Corporation, *Lessons of Experience # 7: Financing Private Infrastructure* (Washington, DC: The World Bank, 1999), 52-57. This could place the project company into default under the financing if it violates these standards, even though it is not breaking the law in the host country. Moreover, the sponsors or lenders may find themselves under attack in their home countries for supporting a project that is perceived to be threatening to the environment.

If the project in the host country is export-oriented, which usually involve a product or commodity to be sold in international markets (oil, gas, gold, silver, etc.) then the project revenues are generated in hard currency. Such projects have less exposure to currency exchange risks. See Buljevich and Park 155.

Yescombe 195.

Depreciation refers to a decline in the value of one currency relative to another currency because of market operations. In antithesis, devaluation refers to a deliberate downward adjustment to a country's official exchange rate relative to other currencies initiated by the country’s government.

Finnerty 46.

Buljevich and Park 154.

Finnerty 47.

Buljevich and Park 158. Political risk is distinct from sovereign risk. The latter arises when a lender makes a loan to the government of a country different from the country in which such lender is incorporated.

Buljevich and Park 159.

In the spring of 2006, Venezuela and Bolivia announced the nationalization of their oil industries after the rising in power of leftist parties.

Buljevich and Park 160.
Hurdle rate is the required rate of return in a discounted cash flow analysis, above which an investment makes sense and below which it does not. Often, this is based on the firm's cost of capital or weighted average cost of capital, plus or minus a risk premium to reflect the project's specific risk characteristics.


Excessive profits are the reason the governments of developing countries claim when they nationalize or expropriate projects owned and operated by foreign sponsors. This may be true in some cases where the project contracts were particularly egregious in favor of foreign investors and local elites.

Esty 10.

Buljevich and Park 166.
6.1 Financing Strategy

The sponsors are responsible for developing the financing strategy by usually hiring a financial advisor (investment bank or international accounting and advisory firm) to design the strategy. Advisors must have the technical expertise, contacts, track record and innovative thinking necessary for planning and implementing complex strategies. In conjunction with the sponsors, they explore and contact potential sources of finance, and analyze the opportunities and methods from diverting risk from the sponsors while maximizing the project’s ability to leverage.

The financing strategy is based on the cash flow requirements of the project and includes multiple sources of funds. The following issues should be considered in developing a financing strategy:

- What does the investment market want?
- What should be the average maturity of the project securities?
- What should be the gearing (leverage) ratio of the project capital structure?

6.1.1 Needs of the Investment Market

Investment strategies are dynamic and can change on a daily basis. Investors aim at maximizing their returns while minimizing their risks. Therefore, their preference for investment may vary between the following options:

- Fixed vs. variable rates
- Long-term vs. short-term investment
- Industry type
- Location
- Economic expectation
- Development of a relationship ("foot in the door")

### 6.1.2 Average Maturity of Securities

As a rule, the (real versus) accounting average life of a project’s assets should determine the average life of its capital structure. This is important for two strategic reasons:

- The amortization of project debt should reflect the depreciation pattern of the assets, therefore achieving the proper schedule of depreciation expense to payment of principal.
- Matching the life of the project’s capital with that of its assets may reduce the cash flow implications of the repayment of the debt principal.

This condition is particularly critical in highly capitalized infrastructure projects, where ratepayers will benefit from the operations of the asset throughout the project life. Therefore, the cash flow requirements of interest payments and of repaying the principal should be carried equally by ratepayers who benefit at different stages of the project life.

### 6.1.3 Gearing Ratio of the Capital Structure

Sponsors aim at minimizing the level of equity in favor of debt. However, as the equity level decreases, the unit cost of debt increases as the debt investors take on additional risk. The debt service coverage ratio (DSCR) is the most important ratio for debt lenders. It is defined as the earnings before interest, taxes, depreciation, and amortization (EBITDA) divided by the debt service (the payment of interest and repayment of principal): \( DSCR = \frac{EBITDA}{DebtService} \). The DSCR is usually calculated semianually, on a rolling annual basis.

In their base case projections, the lenders look at the projected DSCR for each period throughout the term of the loan and check that this does not fall below their required
minimum at any time. The actual DSCR is reviewed (and projections may be recalculated) once the project is in operation.

The minimum DSCR requirement obviously varies between projects, but approximate levels for an infrastructure project are around 1.5:1.¹
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1 Yescombe 273.
Public Private Partnerships (PPP) are used to describe a wide range of working arrangements between the public and the private sector. The aim of these partnerships is to use the skills and the know-how of the private sector for the provision of a public service, particularly the construction and operation of infrastructure such as toll roads, airports, power plants, schools, hospitals, etc. PPP deliver better value for money; whole life costing of design, construction, and operation and maintenance under one party; innovation on behalf of the private sector; and risk allocation from the government to a private entity that has more incentives and is better equipped to assume the risk. The project’s revenues are obtained from the government or the off-taker or fees (tariffs) are charged to the users of the project’s output.

This thesis has attempted to show that project finance is the optimal financial instrument for the financing of PPP in infrastructure. The objective of using project finance to raise capital is to create a structure that is bankable (of interest to investors) and to limit the stakeholders’ risk by diverting some risks to parties that can better manage them.

In project finance, the project, its assets, its cash flows, and the project contracts are included under the project company, a special purpose vehicle that is responsible for the construction, operation, and revenue collection of the project. This allows the lenders to perform their credit analysis of the project on an isolated basis. The lenders’ assumption is that the project company’s revenues and assets will provide enough resources to repay the debt financing. Such a financing structure can yield a more efficient allocation of risks and returns than conventional financing, but careful financial engineering is critical. Figure 6.1 illustrates the essential principles of project finance.
Figure 6-1: The Four Fundamental Characteristics of Project Finance

| Special Purpose Company (SPC) | Project Company (Private Entity): The Project Company is carrier of all rights and duties in connection with the project and its financing. It is a legally and economically isolated entity |
| Relevance of Cash-Flow | Relevance of Cash-Flow: The sponsors' financial standing depends significantly on the Project Company's expected Cash-Flow and not on the common rating criteria |
| Non/limited Recourse | Recourse options for banks: After project completion the banks have non-recourse or only limited recourse to the project sponsors |
| Risk Sharing | Structuring of risks: Project risks are structured in a way to adequately allocate them among the involved parties. Risks are identified, assessed, reduced, spread, and finally managed with derivatives hedging |
| Project Finance | The Project Company is responsible for the construction, operation, and revenue collection of the project. Debt repayment comes solely from the cash flows of the project and the assets of the Project Company |

There are some concerns that the involvement of the private sector in the financing and operation of infrastructure is, in reality, privatization through the back door. However, this is not true. In a privatization, the ownership, management, financing, operation, and everything that concerns the asset, are handed over to the private sector in perpetuity. With PPP, ownership returns in the public sector, in most of the cases. In addition, the public sector retains a substantial role in the project, either as an off-taker, contracting authority, or partner. More importantly, the public sector monitors the project to ensure that the services specified are delivered to an appropriate standard, and guarantees that the asset to be returned to public sector ownership is properly operated and maintained.
With regard to project finance, sponsors, lenders, and the government are faced with three challenges. First, project finance requires extensive contracts and risk spreading among the project stakeholders. This is a time-consuming and complex procedure that usually leads to high transaction costs. The project stakeholders should be ready to invest the time, money, and energy in order to come up with the optimum risk allocation mechanism that will protect the project in case a serious problem arises. Indeed, in times of trouble, the money saved from a well-thought risk management plan will render any transaction costs insignificant.

Second, the decision of lenders to accept a non-recourse or limited recourse debt financing must be knowingly taken based on the understanding that any risk that has not been distributed or neutralized would be assumed by them. Formulating lenders criteria for selection of projects is among the hardest challenges in any project finance transaction. The lenders should set both quantitative and qualitative criteria for determining the feasibility of a PPP infrastructure project:

- The strength and experience of the project sponsors and the government or public authority responsible for the project is usually the most important criterion.
- The project fundamentals and economics should satisfy certain critical financial ratios, such as liquidity, leverage, activity, and profitability ratios. These important ratios are derived from the projected and eventually actual financial statements (balance sheet, income statement, and cash flow statement).
- The legislative environment should guarantee that the likelihood of a negative revision of tax rates, labor and property ownership laws and other factors related to the project is very limited.

Third, investment in infrastructure projects is not as liquid as other forms of investment such as stocks and bonds. However, there are several steps that if taken can lead to increased liquidity for project finance structures:

- Develop a portfolio of investments in PPP infrastructure projects. The portfolio should include projects in different industries and different countries, so that the diversification among projects reduces the total volatility of the portfolio.
- Other financial tools that will provide predictability, exit strategy, and liquidity on one hand and will reduce uncertainty and abrupt changes on the other.

Some of the recommendations above have already been tried by lenders and financial institutions. Nevertheless, as Professor Fred Moavenzadeh notes, there is currently a large demand for infrastructure in emerging economies, and simultaneously, substantial global capital is in search of investment. However, these two are not in synch with each other. Therefore, capital formation for investment in infrastructure is an objective of paramount importance. The construction and financial communities should work closely together to develop a financial vehicle that has an in-built incentive system to bring about this objective by injecting the discipline and motivation of the marketplace into infrastructure investment policies.

The need to develop and modernize infrastructure greatly exceeds the financial capacity of our public resources. We cannot afford to ignore the PPP model. All of us, whether in the public or private sector need to recognize this fact and find innovative ways to develop and finance the timely and effective delivery of needed infrastructure. The application of project finance into PPP for the construction and operation of infrastructure is one of them.
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