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Project Finance Recent Applications and Future Trends: The State of the Art

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Abstract

This paper provides a review of the state of the art of project finance methodology. The growing body of literature in this field serves to emphasize the increasing use and new areas of application of project finance techniques. The paper attempts to describe the main features of project finance, to explain the role of the participants, and the main contractual arrangements. Reviewing the state of the art of project finance provides a special opportunity to draw attention to the main challenges of this technique and to identify new trends.

Key words: project finance; public-private partnerships; literature review

JEL classification: D53; F30; G15; G30

1. Introduction

This article will present and discuss selected research in fields related to project finance. In this work, the term "project finance" is used according to Finnerty (2007), who defines it as "the raisings on a limited-recourse or nonrecourse basis to finance an economically separable capital investment project in which the providers of the funds look primarily to the cash flow from the project as the source of funds to service their loans and provide the return of and a return on their equity invested in the project."

Project finance has emerged as a leading way to finance long-term and large-scale infrastructure projects around the world over the last 40 years. Nowadays, especially in Europe, project finance principles have been applied to other types of

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public infrastructure under public-private partnership (PPP) schemes. PPP is a specific form of project finance where a public service is funded and operated through a partnership of government and the private sector using a long-term concession arrangement. According to European PPP Expertise Center (EPEC), the value of PPP transactions in the European market totaled 11.7 billion EUR in 2012. This is the lowest volume and number of transactions in a decade (EPEC, 2013). However, project finance has been a growing financial technique in the last four decades, ranging from 100 to 150 loans annually in the 1980s; project finance loans reached 213.5 million USD in 2012.

There is no consensus on project finance superiority over other forms of traditional finance. The main advantage of project financing is that it is a non-recourse financing, which allows high levels of leverage for the firms and permits an off-balance sheet treatment of the debt. The wide set of agreements allows risk sharing and provides efficient returns in comparison to conventional financing techniques. The shortcomings of project financing are related to the complexity of the process due to the increase in the number of parties. Project finance involves higher transaction costs and project debt is more expensive due to its non-recourse nature than traditional finance. The bank requirements imply broad financial, technical, and risk analyses.

According to Gatti (2012), despite the increasing use of project finance and its significant share of the global syndicated debt market, attention of academics and researchers in the field of finance is still very limited from both theoretical and empirical perspectives. The dominant view of the existing literature is that there are too few studies focusing on the field of project finance methodology.

A recent in-depth review of the literature in this area should be of interest to corporate financial managers, bankers, large private investors, regulators and host governments, sponsors, and financial researchers.

The purpose of the present paper is: (a) to describe the main features, participants, and contracts of the project finance technique; (b) to review the state of the art in the theory and practice of project finance; and (c) to identify main recent applications and trends for project finance methodology.

This paper is organized as follows. An overview of project finance is developed in Section 2, including main features, participants, and contracts. In Section 3, some representative examples of main applications are described. An updated review of the literature for project finance in Section 4 identifies main applications and future trends. From the information in the previous section, we identify future applications to project finance in Section 5. The paper closes with concluding remarks.

2. Project Finance Overview

There is no single agreed-upon definition of project finance. Ballestero (2000a) describes project finance as a sound technique which involves performing a set of security arrangements to reduce risk in large infrastructure investments or capital-intensive projects, such as roads and highways, railways, pipelines, dams, electric

power generating facilities, large-scale fiber optic networks, mineral processing facilities, and many others in industrial areas and developing countries. These arrangements are made between the project sponsors and the clients or their agencies, a host government, a supplier, a constructor, an operator, a bank or lenders. According to Nevitt and Fabozzi (2000), project finance can be defined as "financing of a particular economic unit in which a lender is satisfied to look initially to the cash flow and earnings of that economic unit as the source of funds from which a loan will be repaid and to the assets of the economic unit as collateral for the loan." Esty (2004) defines project finance as "the creation of a legally independent project company financed with equity from one or more sponsoring firms and nonrecourse debt for the purpose of investing in a capital asset." In conclusion, there is not a single definition of project finance, rather it is common to describe project finance through some distinguishing features, such as the following:

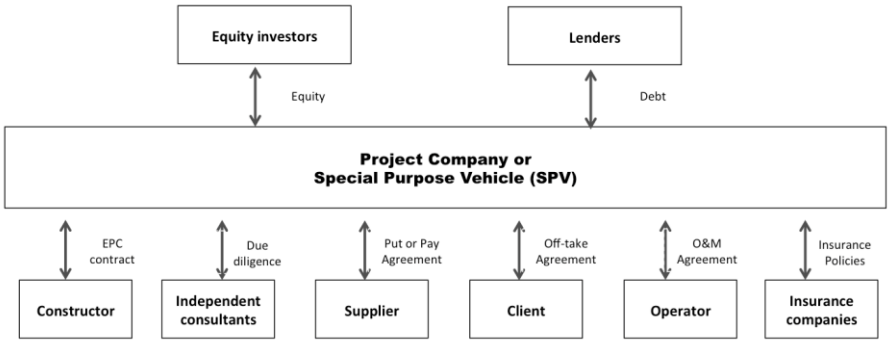
1. The sponsors create a legally independent company, the so-called special purpose vehicle (SPV) or project company, with a finite life whose only business is the project.
2. There is a high ratio of debt to equity, up to 90% in some cases. The SPV borrows funds from the lenders and these look to the future cash flows and the assets as collateral to repay all loans.
3. The future cash flows of the project must be sufficient to fund operating costs and the debt service, since they are the basic guarantee for raising funds. Usually, project finance assets involve either a strategic asset with high barriers to entry, or a monopolistic position, or the certainty of demand and price that comes with a long-term off-take contract or revenue agreement. As a result, the cash flows are sufficient, stable, and predictable.
4. Project risks are allocated among all the participants involved in the project. Through a wide range of commercial and legal issues, the SPV is linked to the numerous participants, such as, for example, the constructor, the operator, the clients, and the suppliers, in order to assure the anticipated cost or the future revenue.
5. The lenders have either no recourse or limited recourse to the SPV; in other words, the lender has only a limited claim if the collateral is not sufficient to repay the debt.

An essential target of project finance is to mitigate risk for sponsors and lenders. There are several types of risk, such as random sales and supplies (off-take and shortage risk), construction and completion risk, operating risk, political, legal, and current risk. These risks should be allocated to the different participants of the project (Beenhakker, 1997). The parties are the concession authority (either a central/regional government or municipality), the purchasers, the suppliers, the contractors, and the operators along with lenders and sponsors. The main participant is the project company or SPV that enters into risk allocation agreements with the other parties. In this contractual framework, the risk of random sales is allocated either to a buyer or to a host government (for example, a municipality) interested in

the project. These parties act as guarantors or off-takers through the off-take agreement. The robustness of project finance is based on these agreements, which assures the return of the project (Ballestero, 2000b). The rationale of such an agreement relies on the fact that the guarantor is the best at managing sales risks. The off-take agreement between the project company and the client plays a central role in most project finance structures. In this agreement, the client assures a minimum level of sales, paying for the balance if the amount of sales remains below this minimum level. Another significant agreement is the engineering, procurement and construction (EPC) contract, in which the project will be designed and built for a fixed price on a fixed date. In a "put-or-pay" contract, the supplier is committed to purchasing a minimum amount of inputs at a fixed price for a specific period, or to pay for the shortfall. A project is generally covered by several types of insurances. The coverage of these insurance policies is related to several kinds of risks, such as force majeure events, employer liability, contractor insolvency, and delays in obtaining permits. Other arrangements with the supplier ("supply-or-pay" agreement), the operator ("operating-and-maintenance" (O&M) agreement), or the government enhance the project (Ballestero et al., 2004).

In Figure 1, the basic structure of project finance, with some participants and the corresponding agreements, is represented.

Figure 1. Basic Structure for Project Finance: Participants and Agreements



3. Project Finance Market: Applications and Sectors

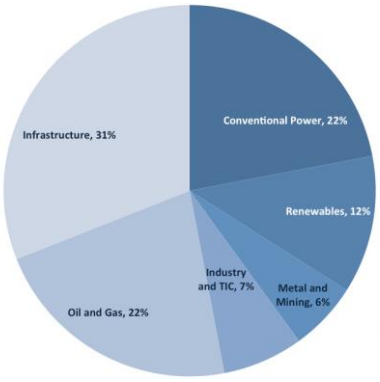
In this section, we review the historical evolution of project finance, particularly in the last three decades of the 20th century and the first decade of the current century. This historical perspective provides us with a basis for a better understanding the current main applications of this financial technique.

Several authors agree that modern project finance dates back to the US power market following the 1978 Public Utility Regulatory Policy Act (Finnerty, 2007). During these years, the main applications were related to low-risk technological projects, such as industrial plants, mining, oil and gas, and power generation. At the

beginning of the 1970s, project finance spread to Europe in the petroleum sector using long-term contracts with buyers (off-takers). Over the next ten years in Europe, project finance was used for similar low-technological-risk-level projects (Gatti, 2012). In the 1980s and 1990s, project finance evolved towards a new era in which two trends can be identified. (i) First, project finance was introduced in developing countries as a way to transfer a significant share of the financing burden to the private sector (Yescombe, 2002). This implied that this financial technique was exported by developers in the industrialized countries to less developed countries to construct basic infrastructure. (ii) Second, project finance began to be used in new sectors as a new off-balance sheet financial technique. As a significant fact, in 1992 the UK government implemented the Private Finance Initiative as a way to involve the private sector in the provision of public services. These new applications were, for example, schools, military, roads, hospitals, street lighting, and prisons.

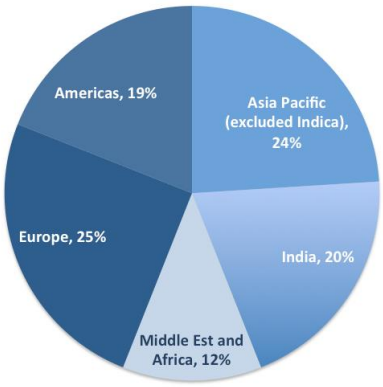
The project finance market has traditionally focused on Europe, Middle East, Africa, and North America. This is due to the increasing use of PPP schemes as a method of funding infrastructure. The Asia Pacific project finance market has been reduced by half as a consequence of the Global Financial Crisis Sector assessment for project finance applications as shown in Figure 2.

Figure 2. Project Finance Market by Sector (2011)



Source: Dealogic.

Figure 3. Project Finance Market by Region (2011)



Source: Dealogic.

In 2011, the majority of transactions occurring in the infrastructure and energy sector, and only a minor percentage is devoted to other applications, such as metal and mining (6%) and industry and TIC (7%).

As shown in Figure 3, Western Europe and North America are strongly active in both PPP and project finance followed by Latin America and Southeast Asia. The emerging market regions that received the most project finance dollars were Asia Pacific, India, and the Middle East and Africa (24%, 20% and 12%, respectively).

This is consistent with the number of projects implemented during these periods. That is, in 1997 there was a large increase in the number of projects and the amount of investment, but subsequently until 2007 no recovery was observed. So are we talking about another lost decade?

It is true that since the global financial crisis started, the project finance situation changed around the world, and Asia Pacific transaction volumes made up nearly half of the total global project finance market in 2010, representing a significant shift in the balance of trade flows in the infrastructure market. According to the World Bank and PPI database, 2012 represented an increase in private investment in infrastructure comparing to 2011, but not enough to say that the situation is reversed.

On the other hand, the forecast from the European Union is very hopeful for the PPP market in the coming years. The average transaction size stood at 264 million EUR, a 25% decrease over first half of 2013, but it is considerably higher than the average transaction size over the last 10 years (191 million EUR). Moreover, in accordance with the EPEC market update in 2014, over the first half 2014, 34 PPP transactions reached financial close. The number of deals being closed in Europe has grown steadily since 2012, and even for countries like Greece, the Attica Schools projects have been the first PPP deals to reach financial close in the country since 2009.

4. Literature Review

We have conducted a basic bibliometric study of project finance using the ISI database, which is updated weekly. Regarding project finance, the ISI database covers over 148 papers. We report basic statistics regarding how the field of project finance has developed during the period 1969–2013. According to this database, the results of a search using the keyword "project finance" are organized in the following sub topical areas: business economics, computer science, engineering, energy fuels, and environmental sciences (ecology).

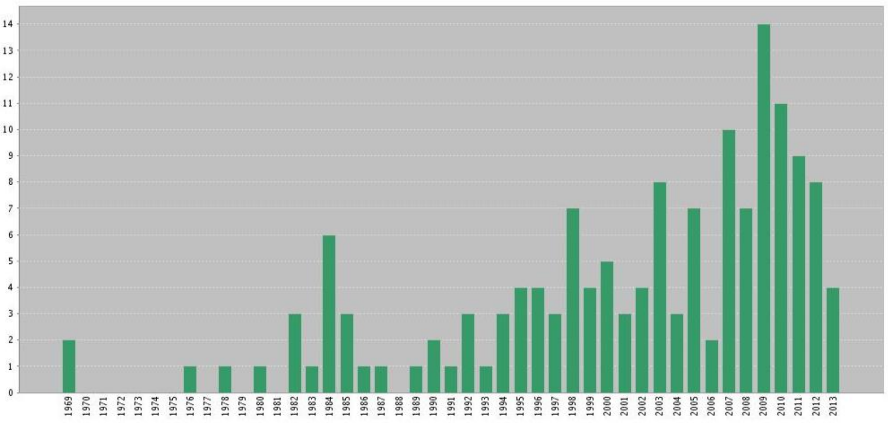
In Figure 4, the number of publications over the 1969–2013 period is shown. Growth in the number of publications and in the number of citations has been rapid since 2003. Regarding published items, there is a peak in the year 2009, but it slows down from then to 2013.

Information about publications by country of residence of the first author and sub topical areas within the project finance fields is provided in Tables 1 and 2. Although authors from the US and England have been most prolific (43.9% of the total), the other 56.1% have come from all over the world, highlighting the international nature of project finance research.

Among the sub topical areas within project finance, business economics is listed first, reflecting its potential applications. Also, engineering and energy fuels are important, reflecting the broad, interdisciplinary nature of our field. We also compared ISI publications for the periods 1992–2007 and 2008–2013 by sub topical

area and found that business economics and engineering and energy fuels were the most popular in both periods.

Figure 4. Published Items in the Period 1969–2013



Source: ISI Web of Knowledge.

We classified the 148 items found under the heading "project finance" according to our own classification, which is divided in two main areas: (1) theoretical approaches and (2) case studies. The first one is also divided in four subgroups: (a) general overviews, (b) financial analysis, (c) risk management, and (d) operational research. The area "case studies" is divided in two areas: (a) regional studies and (b) sectorial applications. Among the 148 papers found in the ISI database under the topic "project finance," 87 can be considered theoretical approaches, which represent 58.7% of the total number of studies. The other 42.1% are considered empirical cases, so we have named them case studies. Among the 87 theoretical studies, 34.5% are related to risk management, which indicates that this is a very important issue inside the project finance technique. In fact, one basic principle of project finance is that it has been used for high-risk infrastructure schemes. The next category is general overviews, which represents 24.1%, while operational research is in the third position, with 23.0% of the theoretical approaches. Last, financial analysis arises 18.4% of the theoretical studies. Regarding the 61 case studies, 57.4% are considered sectorial applications and only 42.6% are regional studies.

The top 30 cited papers are shown in Table 3. A big difference between the first and last one is noticeable. The most cited paper is Esty and Megginson (2003), in which the authors examine the relation between legal risk and debt ownership structure. There is also a significant difference compared to the second paper, Leland (2007), in which the author considers activities with no synergistic operational cash flows and examines the purely financial benefits of separation versus merger. The results are interesting because they provide a rationale for structured finance techniques, such as asset securitization and project finance.

Among the five top-rated articles by citation, only one of them, the third one, is considered non-theoretical. The objective of this paper, Bakatjan et al. (2003), is to present a simplified model to determine the optimum equity level for decision makers at the evaluation stage of a build-operate-transfer (BOT) power plant in Turkey.

Table 1. Number of Publications by Country, May 2013

	Number	Percentage
United States	37	25.0%
England	28	18.9%
China	18	12.2%
Australia	10	6.8%
Italy	8	5.4%
Spain	3	2.0%
Others	44	29.7%

Source: ISI Web of Knowledge Database.

Table 2. Number of Publications by Sub Topical Areas, May 2013

	Number	Percentage
Business economics	63	42.6%
Engineering	36	24.3%
Energy fuels	24	16.2%
Environmental sciences ecology	16	10.8%
Computer science	9	6.1%

Source: ISI Web of Knowledge Database.

The most recent published papers are: Gatti et al. (2013), which is included in operational research, Nelson and Simshauser (2012), which belongs to sectorial applications, and Vecchi and Hellowell (2013) and Donkor and Duffey (2013), both of which are financial analyses.

In the case of Spain, the most cited author is Ballestero (2000a), with the paper titled "A multicriteria approach to arbitration for project finance" and published in Journal of the Operational Research Society.

By year of publication, 35.8% of the papers were published between 2008 and 2013. During this period, 30 were theoretical approaches and the remaining 23 were empirical approaches.

The main limitation of this study is the number of papers provided by the ISI database, since the total number is only 148. Entering other keywords, such as "public private partnership," we can get a total of 1302 results, and using "project financing," we get 297 results.

A further analysis taking into account our own classification and considering other publications not included in the ISI database can highlight the main contributions in these fields. This analysis is developed in the following subsections.

Table 3. Top 30 Citations

Number	Area	Times Cited	Year	Author
1	Risk Managment	56	2003	Esty
2	Financial Analysis	20	2007	Leland
3	Regional Study	18	2003	Bakatjan
4	Operational Research	17	2003	Raskovich
5	Risk Managment	15	2003	Doh
6	Financial Analysis	11	1998	Dailami
7	Regional Study	10	2001	Beaverstock
8	Financial Analysis	10	1998	Huang
9	Sectorial Applications	9	1996	Kahn
10	Regional Study	8	2005	Wibowo
11	Operational Research	8	2005	Schweik
12	Operational Research	7	2007	Park
13	Regional Study	6	2011	Marino
14	Regional Study	6	2009	Kann
15	Financial Analysis	6	2007	Kaivanto
16	Sectorial Applications	5	2007	Scholtens
17	Risk Managment	5	2007	Gatti
18	Sectorial Applications	5	2001	Michaelson
19	Operational Research	5	1999	Bjerre
20	General Overview	5	1998	Pollio
21	Risk Managment	5	1989	Hoffman
22	Regional Study	4	2012	Haack
23	Financial Analysis	4	2010	Jun
24	Risk Managment	4	2008	Kong
25	Sectorial Applications	4	2004	McGovern
26	General Overview	4	1999	Merna
27	Sectorial Applications	4	1999	Keller
28	Sectorial Applications	4	1992	Barnett
29	Risk Managment	4	1990	Beidleman
30	Operational Research	3	2000	Ballestero

Source: ISI Web of Knowledge database.

4.1 Theoretical Approaches

For general overviews, there are several works providing a complete description of project finance, such as Nevitt and Fabozzi (2000), Finnerty (2007), Yescombe (2002), and Gatti (2012).

Theoretical microeconomic approaches, related to principal-agency problems or moral hazard, are undertaken in Farrell (2003), Shah and Thakor (1987), Sorge (2011), Hainz and Kleimeier (2011), and Leland (2007). Other authors analyze the fact that project finance appears in developing countries as a way to transfer a significant share of the financing burden to the private sector (Yescombe, 2002). For example, Kleimeier and Megginson (1998), Wang et al. (2004), Griffith-Jones and Lima (2004), Hainz and Kleimeier (2004), and Vaaler et al. (2008) discuss a great deal about project finance in Asia and Latin America and, therefore, emphasize the ability of project finance to mitigate the corresponding political risk.

The financial analysis of the project is of interest for lenders and investors. Therefore, there is a huge body of literature on financial issues related to project finance. Although previous general overviews include several chapters on financial problems, we here add other specifics works, such as Chen et al. (1989), John and John (1991), and Leland (2007). A cumbersome problem is to determine the optimal leverage of a firm (John and John, 1991). The literature mostly focuses on project finance in relation to other issues, such as financial synergies (Leland, 2007).

As project finance deals with large-scale high-risk projects, risk management is a key area of research. The essence of project finance arrangements is to allocate risks to the parties who are best able to manage them. As a result of this allocation, project finance creates value to the project by improving project risk management (Sorge, 2011; Kong, 2008). In a recent paper, Byoun et al. (2013) find that "project companies use less leverage and instead rely more on off-take agreements when the control benefits of cash flow from the project are high, suggesting that leverage and contract structures in the project company are important hedging mechanisms."

Many researchers stress that one of the key comparative advantages of project finance is that it allocates the specific project risks, such as completion and operating risk, revenue and price risk, and the risk of political interference or expropriation, to the parties who are best able to manage them (Kleimeier and Megginson, 2000; Sorge, 2004, 2011). Ballestero (2000a) comments that the agreements made under project finance make a project less risky and less expensive to perform by allocating the risks to the different participants with specific risks. Projects in developing countries usually face greater country risk, political risk, currency risk, and business risk. Esty (2004) states that, despite the importance of mitigating completion and operating risks, the function of project finance in mitigating sovereign risks cannot be replicated under conventional corporate financing schemes.

As far as we know, there are hardly any operational research (OR) models aimed at the computation of critical variables (e.g., limited recourse interest rate) or OR models to help make quantitative decisions concerning project finance arrangements. A compromise programming approach is Ballestero (2000a). Other

contributions in the field of OR are Raskovich (2003), Schweik et al. (2005), Ballestero (2000b), and Ballestero et al. (2004), in which the authors introduce a binomial probability distribution model to determine the guaranteed minimum amount of revenues in order to bargain the off-take agreement.

Main contributions in each area are displayed in Table 4.

4.2 Case Studies

There are many works involving project finance empirical case studies like Esty (2004), where it is possible to find carefully selected cases which reflect actual use of project finance in recent years in terms of geographic location and industrial sectors. Others publications, like Davis (1996) and Fabozzi and Nevitt (2000), consider the wider world of project finance by showing several practitioner case studies to present many complex and real issues.

The project finance technique has been used traditionally in Europe, the Middle East, and Africa; therefore, a large number of studies focus on these regions, like Marino et al. (2011), Akbiyikli et al. (2011), Ludeke-Freund and Loock (2011), or Nikolić et al. (2011), but there are also numerous studies in which project finance is applied to deal with different regions across the world, such as Wibowo and Kochendörfer (2005), with their financial risk analysis of project finance in Indonesian toll roads. Others, like Kann (2009), talk about overcoming barriers to wind project finance in Australia, or like Mathavan (2008), about the power sector in one of the most important emerging countries, such as India. Risk and capital structure are major aspects when project finance must be applied, and this is discussed in Asian regions by Vaaler et al. (2008). In Latin America, project finance issues are mainly related to gas-fired power development in Brazil; see Hirst (2001).

Project finance methodology has been analyzed and used in many sectorial applications, such as electricity supply (McGovern and Hicks, 2004; Jechoutek and Lamech, 1995); renewable and alternative energy (Mills and Taylor, 1994; Richter, 2009); mining industry (Braun, 2009); high-speed railway financing (Xie, 2010); hospitals (Contarino et al., 2009); wind power (Wei, 2011); biotechnology projects (Keller and Plath, 1999); desalination projects (Wolfs and Woodroffe, 2002; Wenner, 1996); oil and gas (Khatib, 1997); and even financing software projects (Michaelson et al., 2001; Uzal et al., 2009).

Relevant regional and sectorial case studies are summarized in Table 5.

Table 4. Main Theoretical Contributions on Project Finance Literature

Area	Times Cited	Year	Author	Comments
Risk Management	56	2003	Esty	Evidence from the Global Syndicated Loan Market where, using a sample of 495 project finance loan tranches (worth 151 billion) to borrowers in 61 different countries, they examine the relation between legal risk and debt ownership structure.
Risk Management	15	2003	Doh	This article reviews data and surveys recent cases that underscore the emergent threats faced by companies seeking to develop and manage infrastructure projects. It proposes strategies for investors to assess and mitigate these continuing risks. Its recommendations include leveraging international agreements and drawing on multilateral project finance.
Financial Analysis	20	2007	Leland	The author considers activities with no synergistic operational cash flows and examines the purely financial benefits of separation versus merger. The results are interesting because they provide a rationale for structured finance techniques, such as asset securitization and project finance.
Financial Analysis	11	1998	Dailami	This paper emphasizes the role of private infrastructure investment as a vehicle for attracting foreign capital to developing countries in the 1990s. The paper provides tentative quantitative evidence of the importance of macroeconomic and project-specific attributes of project risk. The key finding is that the market seems to impose a high risk premium on loans to countries with high inflation.
Operational Research	17	2003	Raskovich	If other buyers' payments fall short of costs, a pivotal buyer must cover the shortfall or forfeit consumption. This affords leverage that the supplier lacks when bargaining with non-pivotal buyers. The analysis illuminates contracting in markets with high fixed costs.

Table 4. Main Theoretical Contributions on Project Finance Literature (Continued)

Area	Times Cited	Year	Author	Comments
Operational Research	8	2005	Schweik	This paper has two purposes. First, it describes OS and OC licensing, dispenses with some myths about OS, and relates these structures to traditional scientific processes. Second, it outlines how these ideas can be applied in an area of collaborative research relevant to the study of social-ecological systems. It identifies some key issues that need to be considered, including project initiation, incentives of project participants, collaborative infrastructure, and project finance.
General Overview	5	1998	Pollio	This paper explores the preference for and the features unique to project finance, one of the favored vehicles for funding energy development. The main focus is on the interests of project sponsors, commercial banks, and host governments. Risk management, long recognized as one of the primary reasons for choosing project finance over rival debt structures, is affirmed as a key explanatory factor.
General Overview	2	2009	Sawant	In this paper, a theoretical framework is developed to explain why multinational enterprises invest in infrastructure through the model of project finance instead of using corporate finance. Corporate finance-based foreign direct investment cannot fully mitigate these threats. However, project finance-based foreign direct investment through strategic use of capital structure improves the bargaining position of firms in ex post recontracting negotiations.

Source: ISI Web of Knowledge database.

Table 5. Main Practical Contributions (Case Studies) on Project Finance Literature

Area	Times Cited	Year	Author	Comments
Regional Study	18	2003	Bakatjan	The objective of this paper is to present a simplified model to determine the optimum equity level for decision makers at the evaluation stage of a build-operate-transfer power plant in Turkey.
Regional Study	10	2001	Beaverstock	Numerous European and North American banks began to restructure their organizational capabilities in capital markets, foreign exchange, securities, and project finance, as they became exposed to bad debts and reductions in the volume of trading. Unfortunately, the plight of the Asian banks was far worse than their non-Asian counterparts.
Sectorial Applications	9	1996	Kahn	This paper argues that the impact of the wind turbine production tax credit will be minimal. The argument depends entirely on the nature of the project finance structure used by the private power industry for wind turbine development. The authors show that tax credits can only be absorbed by equity investors if there is a large fraction of equity in the project capital structure.
Sectorial Applications	5	2007	Scholtens	The authors analyze the performance of banks that adopted the "equator principles." The "equator principles" are designed to assure sustainable development in project finance. The social, ethical, and environmental policies of the adopters differ significantly from those banks that did not adopt these principles.

Source: ISI Web of Knowledge database.

5. Areas for Future Research

Considering the previous analysis, we can observe that in the beginning project finance has been used in low technological risk level projects involving high risk investments. Later, project finance was exported to less developed countries to construct basic infrastructure. At the same time, in the industrialized countries, project finance principles have been applied to other types of projects, such as public infrastructures (e.g., PPP schemes) in which there is an increasing use of public funds.

In the last few decades, project finance played a key role in telecom projects and in the field of renewable energies. Based on the European experience, where limited bank lending capacities and high public debts make the governments unable to fund large projects with public capital, project finance is poised to rise in the near future as an innovative financial instrument. According to the European Commission, by 2020 investment needs will focus on the following sectors: information and communication technology (ICT), infrastructure, transport, and energy (Scannella, 2012). Moreover, volumes in project and infrastructure debt reached around 350 billion USD in 2011 and in the next 20 years, OECD countries will require over 50 trillion USD in capital investment for roads, water, energy, airports, and telecommunications, so the need for project financing will continue to grow (OECD, 2011).

The ICT sector and new technology based firms are going to be the future of industrialized countries. Due to budget constraints in public administration, new and innovative ways to fund projects are needed. As an example of the future relevance of private and public instruments, the European Union has been conducting a new program since 2010, the so-called "The Future Internet Public-Private Partnership." The program has two clear objectives: (a) to increase the effectiveness of business processes and infrastructures supporting applications in areas like transport, health, and energy and (b) to derive innovative business models that strengthen the competitive position of European industries, such as telecommunication, mobile devices, software and services, and content provision and media.

Thus, we have identified project finance trends taking into account future investment needs in large and risky projects. In Europe and OECD countries, project finance could be an interesting tool for high technological companies if additional support is given by the financial authorities to promote the development of a project bond market and encourage private sector investments. As an example of this support, we can refer to the initiative of the European Investment Bank and the European Union creating the European project bond market.

6. Concluding Remarks

In this study, we have reviewed recent evolution of the project finance technique as an innovative financial tool applied in large investments projects. During the last decades of the 20th century, new public-private partnership schemes enabled large infrastructure, energy, and environmental projects. In these sectors, project finance has been used to reduce cost agency conflicts and achieve better risk management. Therefore, project finance has been introduced when costs and risks are relevant issues to manage and has been chosen by project developers to reduce lender's recourse to the sponsors, permit off-balance debt, and especially to reduce all type of project risks. The current financial crisis, and government difficulties in raising funds for new projects, has led to an increase in private capital demand in both developed and developing markets. In this sense, project finance will play an important role in financing future large investment projects.

Through the literature review, we have identified the main interest areas for project finance researchers from both theoretical and practical points of views, and we can conclude that project finance became a rapidly growing field of finance as shown in Figure 4. Financial analysis and risk management are the most relevant areas in theoretical papers. Regarding applications, infrastructures and energy have been the main topics in recent years. Also, we observe that, as new funding needs are identified in future strategic sectors, such as new technology based firms (Michaelson et al., 2001; Uzal et al., 2009) and biotechnology projects (Keller and Plath, 1999), project finance could be a new instrument to be considered.

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