RISK SHIFTING THROUGH NONFINANCIAL CONTRACTS. EFFECTS ON LOAN SPREADS AND CAPITAL STRUCTURE OF PROJECT FINANCE DEALS*

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Abstract

Do nonfinancial contracts delineating the rights and obligations of counterparties of special purpose vehicles in project finance deals mitigate risk for lenders? Empirical evidence from two samples of more than 2,000 project finance loans demonstrates that a well-designed set of contracts that pre-commit the actions of all the involved counterparties actually matters, particularly in influencing debt-to-equity ratios. The data indicate that project sponsors face a trade-off between financial leverage and interest rate levels when they negotiate the loan terms with lenders. The results have important managerial implications for capital structure decisions outside project finance settings as well.

Keywords: project finance, contractual arrangements, long-term contracts, loan pricing, capital structure

JEL Classification: G21, G32, F34, K12

RISK SHIFTING THROUGH NONFINANCIAL CONTRACTS. EFFECTS ON LOAN SPREADS AND CAPITAL STRUCTURE OF PROJECT FINANCE DEALS

1. Introduction

In the last few years, the number and amount of project finance transactions have increased dramatically. According to Hainz and Kleimeier (2003), the total amount of project finance transactions closed between January 1980 and March 2003 was about US$960 billion, about 5% of the total syndicated loans in the same period. Esty and Sesia (2005) report a 24% compound annual growth rate (CAGR) for project finance bank loans and a 22% CAGR for project finance bonds between 1994 and 2004. Some of these deals are concentrated in developing countries where project finance is increasingly considered an efficient method of narrowing the infrastructure gap with developed countries. In addition to infrastructure, available statistics indicate a concentration of project finance in the oil and gas, power, telecom, and transportation sectors.

Notwithstanding the importance of project finance in international financial markets, theoretical literature and empirical evidence that examine the nexus of contracts on which a project finance deal is structured are particularly scarce, basically because of the limited availability of data on the contractual structure of the deals. We overcome this problem by using a database specifically dedicated to project finance, ProjectWare (Dealogic).

One of the basic features of project finance is the existence of a complex network of nonfinancial agreements, defined here as contracts that generate cash inflows or outflows that affect the unlevered free cash flows of the project; for example, construction, purchase, supply, operation and maintenance (O&M), and sale contracts. These contracts are signed by a special purpose vehicle (SPV) either with different counterparties or with SPV's own shareholders, which are often called project sponsors.

These contracts are powerful mechanisms to reduce agency problems between shareholders and creditors, pre-committing the actions of the management of the SPV and the obligations of every key counterparty in a very detailed way. Creditors favor financing a project whose main obligations are predefined, as nonfinancial contracts can allocate risks to the parties best able to bear and manage them.

Esty (2004) agrees on this point. He argues that SPVs challenge Modigliani and Miller's (1958) irrelevance proposition and represent an useful research environment. The determinants and impacts of different managerial decisions—particularly extensive contract negotiations with a large set of counterparties—can be more transparently observed through SPVs than in corporate finance settings. Structural attributes such as separate incorporation, complex contractual negotiations, high leverage, and concentrated equity ownership are, in fact, distinctive features of project finance deals.

An analysis of the contractual network around a project also sheds light on two much broader key questions in corporate finance literature, already addressed in part by Fama (1990): Do the characteristics of a firm's nonfinancial obligations influence the cost of debt funding? Do the same contracts influence the debt-to-equity ratio chosen by the management and the creditors of a firm?

In this paper, we investigate whether the presence of nonfinancial contracts, whose primary function is the transfer of risks from the SPV to its counterparties, affects the level of interest rate spreads on project finance loans and the choice of a given capital structure for a project finance transaction. Nonfinancial contracts constitute the basis on which project finance transactions are financed. Such contracts include those to construct industrial plants, toll roads, or telephone networks; agreements for their O&M; and long-term sale agreements to third parties, often known as off-taking agreements.

We believe that the characteristics of nonfinancial contracts affect not only the pricing of debt contracts in terms of spread and fees, but also the financial structure design: the higher the level of ex ante reduction of risks, the lower the cost of debt funding and the higher the

leverage. We also seek to verify the behavior of loan spreads and debt-to-equity ratios when the sponsors of the SPV also act as counterparties. As we will show later, this situation clearly allows shareholders to control many of the variables affecting the cash flows of the project, although it is not exactly clear whether lenders look favorably upon this situation or not. Do lenders appreciate sponsors' involvement as contractual counterparties as well as sources of equity, or does increasing the power of shareholders hurt them?

We test our assumptions on two samples, comprising almost 2,200 and 3,500 project finance loans signed between January 1998 and May 2003. The two samples are extracted from the same database, ProjectWare (Dealogic), which includes more than 9,000 loans closed between January 1994 and May 2003. Drawing on preceding empirical research, we estimate the influence of nonfinancial contracts, microeconomic loan variables, location of the transaction and sector on both the debt-to-equity ratio and the loan spread. We use a simultaneous equation method to disentangle the connections between spread and capital structure, as well as simple multivariate ordinary least squares (OLS) regressions

We find that, while Standard and Poor's country rating and project sector play a determinant role in defining the level of spread and the debt-to-equity ratio, contracts can help align the behavior of shareholders and sponsors to the interests of lenders and reduce agency problems. Our findings demonstrate that nonfinancial contracts have a strong influence on the debt-to-equity ratios and furthermore that sponsors negotiating project loan terms with lenders face a trade-off between financial leverage and spread level. We do not find evidence that sponsors as contractual counterparties help the SPV improve this trade-off, either in terms of a lower loan spread or a higher debt-to-equity ratio.

We can generalize our findings outside of project finance settings to draw important consequences for firm capital structure decisions.

The first implication of our findings is that low cash flow volatility allows management to negotiate a higher debt-to-equity ratio with lenders. Therefore, suitable analysis and

allocation of risks through a pervasive set of contracts allow sponsors to fund projects at a lower cost and mitigates risk exposure for banks.

The second implication of our findings is that lawyers are crucial in carefully designing the nexus of contracts; rating agencies, likewise, must thoroughly analyze the nexus in assigning a rating to project bonds issues.

Finally, from a regulatory point of view, the demonstration of a negative correlation between spread and risk allocation amount to a criticism of the New Basel Capital Accord's assumption of higher risk for project finance transactions than for comparable corporate exposures in similar industries (Basel Committee on Banking Supervision, 2001a, 2001b and 2004). The Basel Committee's focus on the relationship between credit risk and loan pricing has highlighted the importance of understanding the sources of risk in these deals and the effect of risk on loan interest rates (Moody's, 2000, 2001a and 2001b). Our analysis reinforces the financial community's request that the Committee reduce its capital requirements for project finance deals when they are funded on the basis of a carefully designed network of contracts.

The rest of our article is organized as follows. Section 2 reviews the theoretical and empirical literature to uncover the ways in which nonfinancial contracts can affect the pricing of financial agreements and introduces our testable hypotheses. Section 3 provides information about the sample and the data as well as some descriptive statistics. Section 4 reports the results of the two-stage least squares regressions analyzing the determinants of loan pricing and capital structure in project finance transactions. Section 5 summarizes the results and discusses the implications for management and further directions for research.

2. Literature review and hypotheses

It is well known that a firm willing to start a new project collects new money from shareholders and lenders to start the venture. These new initiatives add to the firm's existing portfolio of assets; the combination of the two becomes the collateral for lenders to insure the payment of interest and principal. Secured lenders (Stulz and Johnson, 1985) have first claim on

the value of collateralized assets, but if their liquidation value is lower than the amount due, the creditors have a call option on the remaining assets.

However, in some cases, shareholders and lenders prefer to incorporate the new venture as a separate legal entity—an SPV, or special purpose company (SPC)—and to fund it on a project finance basis. Existing firms, often defined as project sponsors, provide a small amount of funding through the equity capital of the SPV. A larger fraction of funds is provided by the debt capital from lenders, often joined in a bank syndicate, or more rarely from bond investors. Lenders or bond investors have full recourse to the cash flows of the new project, but no or limited recourse to the other assets of the sponsors.

Once established, the SPV negotiates a complex set of contracts with different counterparties. Esty (2003) points out that this contractual structure is one of the peculiar features of project finance. It can sometimes be very complex, including as many as 40 or more agreements. Of these agreements, four of them are particularly important for the soundness of the venture. Construction contracts and engineering, procurement, and construction (EPC) contracts are closed on a turnkey basis to make plant and equipment available to the SPV, usually at predefined prices, times of delivery, and standards of performance. Purchasing agreements guarantee raw material to the SPV at predefined quantities, quality, and prices. The selling agreements, often defined as take-or-pay or off-taking agreements, enable the SPV to sell part or all of its output to a third party that commits itself to buy unconditionally, again at predefined prices and for a given period of time. These contracts are particularly common in the oil/gas and power sectors, but are absent in sectors such as transportation and hotel/leisure, where it is not possible to pre-commit the behavior of a large group of buyers (such as car drivers or travelers and tourists). O&M agreements are designed to provide the SPV with efficient and effective plant maintenance, compliant with predefined service-level agreements. The entire set of contracts is managed and coordinated by the board of directors of the SPV. The directors are appointed by the SPV sponsors and are actually “grey directors” of the shareholders (Esty, 2003).

The literature has identified several different reasons for sponsors and lenders to incorporate a new project as an SPV. For lenders, it is easier to distinguish project performance from firm performance, monitor project behavior, and determine the cash flow available for interest and principal repayment (Shah and Thakor, 1987). Monitoring is improved by including a very detailed set of debt covenants that force lenders to commit to continuous control of the behavior of management (Smith and Warner, 1979; Rajan and Winton, 1995). The separate incorporation of a new venture also allows lenders to better assess the value of collateral. Project finance assets are usually single-purpose with limited economic life (Esty, 2003) and creditors are entitled to recover their rights by disposal of project assets, both present and future, that constitute collateral to the loan (Nevitt and Fabozzi, 2000). Habib and Johnsen (1999) show that the low redeployment value of most project financed assets explains why lenders dedicate thorough attention to the valuation of revenues from the asset's current use and pay less attention to the estimate of the resale value of the collateral.

Sponsors find it convenient to use project finance to exploit leverage while avoiding the contamination effect a project default can have on their other asset portfolios (Chemmanur and John, 1996). The higher the correlation between the cash flows of the project and the existing flows of the firm's assets in place, the higher the size of the new venture compared to the size of the firm's assets, and the riskier the new venture, the more likely the contamination effect is to appear (Leland and Skarabot, 2002). Yet, project finance also allows sponsors to choose to allocate a given amount of debt to the existing firms and the new venture according to their expected performance (John and John, 1991), using higher leverage and benefiting from higher tax shields on interest payments (Shah and Thakor, 1987). Special incorporation also enables using contracts to allocate risk among and create incentives for all the relevant counterparties of the SPV. Indeed, the nature of project finance is to be a nexus of nonfinancial and financial contracts, though the effect that the former can exert on the latter has not been completely analyzed by the literature, particularly empirically.

Rights and obligations included in nonfinancial contracts, however, can shape the future behavior of project unlevered free cash flows—and if cash flows can be made less volatile through long-term contracts between the SPV and its key counterparties, then the network of nonfinancial contracts can affect the contractual conditions included in the financial ones. More specifically, if the obligations included in the nonfinancial contracts are not breached, the difference between ex ante estimated cash flows and actual cash flow will be very low, making the project less risky for lenders and, ultimately, for sponsors (Lessard and Miller, 2001). We believe therefore that the existence of contracts delineating rights and obligations in project finance deals can strongly mitigate risk for lenders and possibly reduce the spreads asked over leading interest rates and the increase of leverage.[1] Obviously, lower spreads and higher leverage do not mean that sponsors do not bear any cost. Project finance contracting takes longer and is more expensive than a standard corporate finance loan agreement: Esty (2004) indicates a closing interval of 6 to 18 months and transaction costs between 5% and 10% of the total project.

All things equal, the mitigation effect is stronger for lenders in common law systems. La Porta, Lopez De Silanes, Shleifer, and Vishny (1998, 2002) have demonstrated that common law systems protect investors better than civil law systems, which expose lenders to higher risks of contract repudiation and wealth expropriation by shareholders or other parties.

Our belief about the risk mitigation made possible by nonfinancial contracts also draws on the view of the firm as a contract web originally formulated by Alchian and Demsetz (1972) and Jensen and Meckling (1976), later extended to the study of project finance by Brealey, Cooper, and Habib (1996), Esty (2002), and Esty (2003).

[1] Fama (1990) suggests some testable hypotheses to uncover the effects that the contractual structure of a firm can have on its capital structure choices. Some of them can easily apply to the special case of project finance.

In a project finance transaction, one agent (the SPV) acts on behalf of two principals: the shareholders and the creditors. This situation generates potential conflicts of interests, but these can be solved through behavioral schemes incorporated into contracts that force the agent to align its interests to those of the principal. Indeed, it is very likely that the contractual nature of project finance creates such an alignment of interests among the parties involved in the transaction. SPV sponsors very often own the majority of the shares of the SPV (the agent) and control its board of directors through grey directors. Furthermore, sponsors can also be key contractual counterparties of the SPV. Thus, the interests of principal and agent tend to coincide. At the same time, project finance can reduce agency costs between an SPV and its creditors, as the contractual design of the deal and the inclusion of detailed covenants in the loan agreement mitigate the problems of over- and underinvestment, asset substitution, and opportunistic behavior by the SPV and its sponsors.

2.1 Hypotheses

The literature leads us to test three hypotheses.

The first is that specific risk-sharing nonfinancial contracts designed to reduce the volatility of project cash flows also reduce loan spreads. According to the economics of transaction costs, the bilateral monopoly inherent in many project finance deals makes it essential to avoid the emergence of opportunistic behavior by upstream or downstream counterparties (Williamson, 1988). Detailed contracts signed with key actors can regulate and prevent ex post opportunistic behavior by allocating the risks ex ante to the parties likely to engage in it.

On the other hand, an entity that is both an SPV sponsor and counterparty should already have sufficient incentive to honor the agreements. If so, the project will perform properly and the dividend paid to the shareholder will be less volatile, since the project's cash flows will be exposed to less opportunistic behavior. Project finance can also reduce agency costs between sponsors and creditors, as the contractual design of the deal and the inclusion of

strict covenants in the debt contracts strongly limit managerial discretion as well as the problems of asset substitution.

In his study on the determination of capital structure, Leland (1998) measures agency costs by comparing two opposite cases. In the first case, investment risk choices are made after the debt is in place and cannot be credibly pre-committed in the debt covenants. In the second case, investment risk choices and debt structure can be pre-committed. The agency costs lie in the difference in maximal firm values between the two cases. In a project finance setting, such a difference is certainly low. Rigid debt covenants and careful contract design limit the possibility of ex post investment risk choice by management by forcing it to pre-commit to the future strategy. Berkovitch and Kim (1990) arrive at similar conclusions, arguing that project finance can optimally reduce the agency costs of debt and perverse management incentives toward over- and underinvestment (Myers, 1977).[2] Meanwhile, Cameron's (2000) empirical study of the awarding of power purchase agreements (PPAs) to independent power producers in the United States between 1986 and 1989 finds that without at least one large buyer for large-scale capital investments—an implicit form of insurance against market risk—many developers would not have started production in the 1980s. Considering the nature of "dedicated assets" of such plants throughout the 1980s, an off-take agreement was also critical.

[2] Stulz and Johnson (1985) argue the same in their analysis of secured debt. When lenders obtain assets as collateral, they have first claim on that value and are only partially affected by the outcome of the other projects of the borrower. In this way, the problem of underinvestment is reduced. The only difference in project financing is that the secured debt is written on a single project and not on an asset that is a part of the borrower's wider portfolio of assets. This difference becomes important in extremely bad situations. If the borrower goes bankrupt and the value of collateral falls below the value of the outstanding secured debt, the lender may recover only a part of the credit because other projects have performed badly (risk contamination). In project finance, the loan is secured by all of the assets of the project and risk contamination is avoided.

Both the theoretical and empirical literature support our hypothesis that, when pricing a loan, creditors might charge a lower margin if contractual agreements are in place that lower risk.

Our second hypothesis is that the agency problems of agents and principals, as well as sponsors and lenders, are reduced if sponsors are also contractual counterparties to an SPV. Lenders should react to the reduction of agency costs by lowering loan spreads.

Although contracts can prevent ex post opportunistic behavior, it is impossible to write a complete state-contingent agreement. As Jensen and Meckling (1976) and Grossman and Hart (1986) argue, allocating residual cash flow and asset control rights to key counterparties of an SPV can be a further incentive to align the interests of shareholders and contractual counterparties. We are very close to Esty's (2003) intuition about the simultaneous use of long-term contracts, joint ownership, and separate incorporation as an "institutional" risk management tool special to project finance.

Our hypothesis has also been addressed empirically. Dailami and Hauswald (2003) use a sample of emerging markets project bonds to show that at-issue spreads over T-bond yields are influenced by both project characteristics (i.e., idiosyncratic risk) and institutional and environment variables (i.e., systematic risk). An important finding for our work is the presence of covenants for minimum ownership requirements for key counterparties of the SPV (operators, suppliers, contractors, and off-takers) in 19% of analyzed cases. The authors argue that such provisions can solve agency problems by aligning the interests of lenders with those of key stakeholders. Dailami and Hauswald (2001) also study the Ras Gas Liquified Natural Gas Company project, finding that the movements of the spread paid by the project bond are strongly correlated with the rating of the off-taker. They conclude that this correlation shows the

relevance of nonfinancial contracts to the characteristics of the financial ones, as Fama (1990) argues.[3]

Our final hypothesis is that the stipulation of risk-sharing nonfinancial agreements influences the capital structure of the project by reducing cash flow volatility. In other words, less volatile cash flows enable lenders to grant higher debt-to-equity ratios, and sponsors to reduce their equity contributions.

This argument has been discussed in detail by Fama (1990), who affirms that capital structures are likely to involve a larger fraction of equity in projects whose revenues are much more volatile than fixed payoffs promised to labor and suppliers. John and John (1991) similarly conclude that the amount of debt allocated to a project depends on the characteristics of the financed assets (tangible or intangible), the level of managerial discretion, and technology. Projects receive more funding with high tangible-capital intensive ventures, proven and experienced technologies, and a low level of managerial discretion. Contracts in project finance attempt to reduce managerial discretion, and consequently, the volatility of revenues and costs, stabilizing the amounts of free cash flow. Limiting volatility, associated with a predefined amount of capital expenditures made possible by fixed-price construction agreements, allows for higher leverage.

Unfortunately, little empirical evidence is available on this point. Esty (2002) compares the leverage ratios of 121 combined-cycle gas turbine (CCGT) generating plants operating under PPAs with those of 14 merchant power plants with no shelter against market risk. The results show that the average leverage ratios for plants with PPAs and merchant plants are 95%

[3] Yet, the existence of long-term agreements in which the parties pre-commit their obligations is only a partial remedy to renegotiation problems. The SPV is exposed to the risk of renegotiation demanded by the off-taker. This risk is obviously higher when contract enforceability is low. The threat of renegotiation, reflected in the off-taker rating, is transferred on the bondholders.

and 85%, respectively. However, Esty is unable to test whether there are differences in the leverage ratios of plants with PPAs when the agreements are signed by one of the sponsors.

3. Data and methodology

Our sample of project financed ventures and project finance loans comes from the ProjectWare database which includes information on more than 9,000 project finance loans closed between January 1994 and May 2003. Previous empirical literature has often been based on a similar database called LoanWare, also maintained by Dealogic. But, while LoanWare provides precise details about the structure and pricing of syndicated loans, ProjectWare is almost completely focused on loans awarded to project finance transactions, and thus is more relevant to our inquiry. ProjectWare also includes rather detailed descriptions of the most important characteristics of each project, together with details about key SPV counterparties and sponsors. This information is crucial to analyze the contractual structure of a given transaction.

Studying the features of project finance deals is, however, a very tricky affair. Esty (2004) argues that projects have idiosyncratic features, so that lessons learned are of limited utility for other projects. On the other hand, to the best of our knowledge, no study has investigated how the nexus of nonfinancial contracts shapes capital structure choices and the cost of debt funding. We think that our sample, with its complete coverage of sectors and geographical areas, can shed some light on contract issues for long-lived assets in the presence of agency conflicts and extensive transaction costs. The argument is similar to the standard case in credit risk analysis. While specific aspects of debt issuers should be taken into account when assessing credit risk, the analysis must also be based on system- and sector-wide screenings, which are useful in identifying the system-level drivers of credit deterioration. This idea underpins all the field of credit scoring methods, as well as most credit derivative pricing models. It could be argued that driving factors identified by a screening analysis such as ours would still be relevant at the single-deal level; however, it is quite possible that other, more idiosyncratic factors may be relevant at a single-deal level, but not at a screening level.

ProjectWare certainly suffers from some remarkable drawbacks. The first is that its descriptions of the main characteristics of projects are in text format; hence, the content of the field is never standardized, and the relevant information for our analysis must be extracted manually by reading the descriptions one project at a time. Second, a complete description of the projects and its "nonbank roles" is available systematically only from 1998. Third, although ProjectWare includes some fields dedicated to the fee structures of the deal—gross fees, participation fees, and commitment fees—data are missed for the majority of projects. A knowledge of the all-in cost of a loan would be much more informative than spread, since borrowers can trade-off spread for fees. These limitations force us to restrict our analysis of project finance loans to those that closed after January 1, 1998—clearly reducing the sample size. Also, many project loans do not have information about either the contractual network or the SPV sponsors.

Initially, we extracted all of the project finance loans included in ProjectWare using the financial close date as the reference year for each loan. The flag used to identify the loans has been "project finance" regardless of the number of financing banks. In other words, we accepted both syndicated loans and bilateral loans, that is, loans awarded by a single lender. We then applied a series of filters to select samples by information regarding the dependent variables, spread over various base interest rates and debt-to-equity ratios. Information about debt-to-equity ratios is contained in the "D/E ratio" field in the database, although for many projects, this field was blank. To overcome this, we checked the calculation rules of the database and manually computed debt-to-equity ratios from the data on loan amount, bond amount, and equity amount.

Unfortunately, even with these measures, not all the projects included in ProjectWare had the information needed for our regressions. In many cases, information about spread was available while the value of the debt-to-equity ratio was missing. Thus, we created two

subsamples, the first to analyze the determinants of loan spread and the second to analyze the determinants of the debt-to-equity ratio.[4]

Both samples use a single loan tranche as a unit of observation. Since many projects are financed with more than one loan tranche, multiple tranches appear as separate observations in our samples. Information about project size—that is, total SPV assets—was often missing.

For the project finance loans included in the two subsamples, we collected information about project location and industrial sector, country risk rating, and microeconomic loan characteristics.[5]

Next, we collected information about the sponsors[6] and key contracts of each project. ProjectWare allows the analysis of six contracts that are widely used in project financing.[7] We tracked down the loans for projects where one or more of the six contracts were signed, then sorted out the projects in which one or more key contracts were signed by one or more sponsors.

Table 1 presents the industrial breakdown of project finance loans for each of the two subsamples, the first consisting of loans with spread information available, the second with debt-to-equity ratio data available. Panel A includes all of the project finance loans from January 1, 1994 with information available on spread or debt-to-equity ratio. Panel B restricts the analysis to the loans closed starting January 1, 1998 (our sample).

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[4] The two samples are very similar in the distributions of the different variables considered in this study. Detailed analysis is available upon request.

[5] Country risk rating is based on Standard and Poor's rating. Microeconomic loan characteristics included financial close date, tranche amount, maturity, whether the loan was subject to currency risk, and whether it was part of a refinancing of an already-financed project.

[6] The information available in ProjectWare simply reports sponsors' names and numbers. However, we lack an important piece of information, namely, the percentage composition of the SPV's equity capital.

[7] The six key contract categories are O&M agreements, construction agreements, EPC agreements, take-or-pay/off-taking agreements, supply agreements, and equipment supply agreements.

Subsample 1, Panel B indicates that the largest share of loans was awarded to electricity/power and other energy utility industries (about 47% of the total amount and 51% of the total number of loans), followed by telecommunications (32.1% and 22.4%) and transportation (12.4% and 11.1%). This is not remarkably different from the data in Subsample 2, Panel B, where electricity and energy account for about 58% of the total loan amount and 58% of the total number, telecommunications for 29% and 18%, and transportation for 13% and 14%. The data in Panel B mirror the whole set of loans included in the database without major differences.

Our findings are also in line with Megginson's and Kleimeier's (2000). Although they use a longer time horizon and a different sample, they find that electricity and other energy, oil/gas and transportation receive the most funds for project finance.

****** Insert Table 1 about here ******

Table 2 shows the geographic breakdown of project finance loans. Again, Panel A includes all of the project finance loans in ProjectWare starting from January 1, 1994, while Panel B restricts the data to loans closed starting on January 1, 1998 (our sample). Project finance has a worldwide diffusion despite strong concentration in some areas. Subsample 1, Panel B indicates three relevant geographic areas for project finance transactions—North America, Western Europe, and Southeast Asia—which account for about 23%, 31%, and 15%, respectively, of the total amount of project finance loans (21%, 28%, and 14%, respectively, of the total number of loans). This is not remarkably different from the data of Subsample 2, Panel B, in which the shares on total value are, respectively, about 14%, 20%, and 16% (13%, 20%, and 13% of the total number). These values in turn are similar to those included in Panel A, with the exception of Southeast Asia. The currency crises in that region in the second part of the 1990s are one possible explanation for the redistribution of project finance loans toward the

safer countries of North America and Western Europe. Our data confirm the results presented in Hainz and Kleimeier's work (2003).

****** Insert Table 2 about here ******

Table 3 presents the distribution of project finance loans according to the rating of the borrower's country. Following the rating scale proposed by Altunbas and Gadanecz (2003), we have reclassified the Standard and Poor's country ratings into five groups ranging from best to default, unrated, or undisclosed.[8] Although other measures of political risk are available and have been used in other studies—such as the monthly data compiled by the International Country Risk Guide (ICRG) or Institutional Investor (II)—the use of the Standard and Poor's country ratings is justified by their strong correlation with the other measures. Erb, Harvey, and Viskanta (1996) find that the Standard and Poor's and Moody's ratings have a 95% rank-order correlation with the II credit-risk measure, and 90% with the ICRG financial rating.

Subsample 1, Panel B shows a polarization toward the first class, which accounts for more than 68% of the value of project finance loans and 60% of the total number of loans signed. The situation does not change in Subsample 2, Panel B, where the best class accounts for 47% of total value and 44% of loans. In both the subsamples, poor or speculative rating countries, arguably the developing ones, receive a lower amount of project finance loans. Again, the Asian crisis of the second part of the 1990s reasonably explains the shift toward high-rated countries: comparing it with data included in Panel A demonstrates the redistribution. Again, our results are consistent with the evidence reported by Hainz and Kleimeier (2003).[9]

[8] Our rating system is as follows: 5 = best (from AAA to A+); 4 = investment grade (from A to BBB); 3 = speculative (from BBB- to BB); 2 = poor (from BB- to CC); and 1 = default, unrated, or undisclosed.

[9] This, however, does not necessarily mean that developing countries are receiving less money in the form of project finance loans. As Hainz and Kleimeier (2003) show, the absolute number of project finance

****** Insert Table 3 about here ******

We now turn to summary statistics, limiting our analysis to the sample of loans closed after January 1, 1998.[10] Table 4 contains two groups of data: project variables (group A) and loan variables (group B).

****** Insert Table 4 about here ******

3.1. Project variables

Table 4, Group A has information about the characteristics of the projects included in the two samples. Subsample 1 contains 1,145 projects. Data for project size are available for 306 operations, with an average amount of US$588 million (median value US$269 million). The values are lower than the ones reported in Esty and Megginson (2003), very likely because their study focuses on syndicated loans, implying a different sample structure that excludes smaller bilateral loans. The average value of the debt-to-equity ratio is 4.6, with a median value of 2.84, consistent with the average values found by Esty and Megginson (2003). The average number of sponsors is 3.1 (median value 2). Again, the data are similar to those found by Esty (2003), who reports that more than 65% of the projects studied have three sponsors or less.

Subsample 2 contains 1,278 projects. For the 1,234 for which the project value is available in the database, we found an average size of about US$490 million (median value US$250 million), lower than those reported in Subsample 1. The average debt-to-equity ratio is

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loans in their sample decreases monotonically from the low-risk country quartile to the high-risk country quartile, but the relative volume of project finance loans as a percentage of total syndicated loan volume does not. This indicates that developing countries make more use of this technique for their funding.

[10] Data referred to the whole database are available upon request.

4.6 (median value 2.5), while the SPVs included in the subsample have an average number of sponsors of 3.18 (median value 2.0), similar to the values reported in Subsample 1.

3.2. Loan variables

Table 4, Group B contains information about the characteristics of the project loans included in the three samples. The tranches in Subsample 1 have an average value of US$194.8 million (median value US$97 million), higher than both the average (US$160 million) and median values (US$78 million) of the tranches in Subsample 2. Our results are consistent with the findings of Megginson and Kleimeier (2000) for both the average and median value, and with the median values found by Esty and Megginson (2003).

The ratio of the single loan to total loan size (eventually, bonds included) is 49% on average (40% median) for Subsample 1. This means that, on average, Subsample 1 shows 1.92 tranches for a single project, each accounting for almost one-half of total borrowed funds (not shown in the table). For Subsample 2, the values are 43% (average) and 38% (median), implying an average number of 2.7 tranches per project (value not shown). The business practice of funding a project with multiple loans is clearly supported by the data, as already documented by Esty and Megginson (2003) who, in fact, report slightly higher values (69.4% average and 70.0% median).

For the spread level, Subsample 1 has an average value of 183 basis points (137.5 basis points median), slightly lower than the values in Subsample 2 (193 basis points average and 138 basis points median). Our findings are higher than those of Megginson and Kleimeier (2000), likely due to the longer time span analyzed by the authors.

The average maturity of loans varies between a mean of 9.3 years for Subsample 1 and 11.6 years for Subsample 2 (median values are 8.5 and 10.0 years, respectively). This is consistent not only with Megginson and Kleimeier (2000) and Esty and Megginson (2003), but also with the Dailami and Hauswald (2003) study of the project bond market.

A final result, not found in previous empirical research, pertains to the tranches of refinanced projects. Although the mean value of refinancing loans is lower than the mean value of all the loans, their median value is higher. This reflects the business practice of accompanying the refinancing of troubled projects with a renegotiation of the contractual terms of the loan agreement, a higher spread, increased debt, and more than proportional additional equity from sponsors. Our findings on refinanced loan spreads and debt-to-equity ratios, discussed in the next section, also seem to confirm this market practice.

4. The determinants of loan pricing and capital structure in project finance transactions

We use a system of two simultaneous equations to analyze the determinants of the spread and the debt-to-equity ratio of project finance loans, following Esty (2004). Project finance is, by its nature, characterized by endogeneity problems. For the purpose of our paper, it is very likely that spread and debt-to-equity ratios are determined simultaneously during the negotiations between sponsors and lenders. From an econometric point of view, it is necessary to estimate the two regressions simultaneously and to introduce suitable identification restrictions.

In the first regression, the spread is the dependent variable, explained by a series of variables related to both the loan characteristics and the contractual structure of the project. The second set uses the same independent variables to explain the value in the debt-to-equity ratio. In both models, the dependent variable of the other equation is used, and this creates a simultaneity problem.

Data for the first and second set of regressions are included in Subsamples 1 and 2, respectively. For both of the dependent variables, we first test a complete model using all of the independent variables discussed below and six reduced models, each including one key contract at a time to test its influence on the dependent variable.

The first group of independent variables considers the risk of the country where the project is located and the effect of the project sector. Country Rating is a dummy linked to the

Standard and Poor's country rating, reclassified in five groups following the methodology proposed by Altunbas and Gadanecz (2003); Sector is a dummy variable divided into eight categories as proposed by Megginson and Kleimeier (2000). As we will notice later, these two variables are the main drivers that define pricing for most project finance arrangers. In author-conducted interviews, international bank officials argued that the spread level is often defined by comparing projects in similar locations and sectors. Once the spread has been set, a project arranger tries to push the debt-to-equity ratio up to the point where the free cash flow generated by the venture allows lenders to rely on adequate levels of cover ratios.

The second group of independent variables controls for tranche characteristics, already partly examined in previous empirical studies. Refinancing is a dummy variable indicating the status of the loan in question. It takes a value of 1 if the tranche is refinancing an existing project and zero otherwise. Currency Risk is a dummy variable equal to 1 if the loan currency is different than the currency of the borrower's country and zero otherwise. Tranche Amount is the value of the loan expressed in millions of US dollars. Tranche Final Maturity gives the duration of the loan in number of years.

The third group of independent variables controls for and tries to depict the contractual structure of a deal by tracking the existence of key contracts and identifying the parties that sign them. The party can be either one of the sponsors or a third party that is not an SPV shareholder. ProjectWare allowed us to track six contracts. O&M Agreement is a dummy with value 1 when the contract exists and zero otherwise. A second dummy, O&M Sponsor, verifies whether the contract is signed by one or more sponsors. If it is, the dummy takes a value of 1; if not, its value is zero. Construction agreements and EPC agreements are treated the same way.[11]

[11] ProjectWare assumes that "construction contract" indicates a general agreement obliging a contractor to build a plant or a tangible asset, while "EPC contract" more precisely indicates an agreement between the SPV and a general contractor in which the latter engages itself in designing, providing parts and materials, and building up the asset, usually on a turnkey basis.

Construction Agreement and Construction Agreement Sponsor are dummies with value 1 when, respectively, the contract exists and is signed by one or more sponsors. The value of the first dummy is zero if the contract is not present. The second is zero if the contract is not signed by one of the sponsors.

Dummies are also used for the other four key contracts,[12] and as above, in all these cases, the agreement dummies assume a value of 1 if the contracts exist, while the sponsor variables take a value of 1 if the agreements are signed by one or more sponsors. Finally, we use a numeric variable, Percent Number of Contracts Signed by Sponsors, which measures the ratio of the number of agreements signed by the sponsors to the six contracts considered for every loan tranche.

Before presenting the results of the regressions, two remarks are necessary. The most relevant point concerns the structure of our dataset. The dataset is not to be considered as a sample of the project financing deals, but as a full record of those events (with the arguable exception of the smallest deals, for which participant banks do not signal the data to ProjectWare). This helps to understand some characteristic of the data set. For instance, if our analysis were based on a sample, one possibility could be a balanced sample with respect to the contractual variable with, maybe, a weighing for the actual frequencies of each contractual mode in the full population. As we are considering the full population, this procedure is unnecessary and the empirical unbalance between contract combinations is automatically satisfied. In fact, the data are polarized on combinations of 0-0 (the contract does not exist and, perhaps obviously, is unsigned by sponsors) or 1-1 (the contract exists and is signed by sponsors). A smaller number of cases have the combination 1-0 (the contract exists but is signed

[12] The dummy variables corresponding to the remaining four types of contracts are Put or Pay Agreement and Put or Pay Agreement Sponsor, Off-taking Agreement and Off-taking Agreement Sponsor, Supply Agreement and Supply Agreement Sponsor, Equipment Supply Agreement, and Equipment Supply Agreement Sponsor.

by a party other than one of the sponsors). Clearly no case can have the combination 0-1—a nonexistent contract cannot be signed by anyone. This situation is shown in the correlation matrices of Table 5 and Table 6, which indicate that some of the highest correlation coefficients, all statistically significant at the 1% level, correspond to the combinations between the contract and the sponsor dummy for the same contract.[13]

****** Insert Table 5 about here ******

****** Insert Table 6 about here ******

The second remark is that, as suggested above, there exists a possible simultaneity problem concerning the loan tranche spread and debt-to-equity ratio variables, in that these could be conceived as simultaneously defined when an SPV receives a loan. If so, it could be difficult to decide which of the two variables should be endogenous in our models.

As a possible first solution to this identification problem, we investigated whether the simultaneity problem could be solved by a more in-depth analysis of the deal structuring. Opinions we collected in interviews with top arrangers in the international loan market suggested that they tend to consider the spread as an exogenous variable, mainly driven by country and sector specifications, and the debt-to-equity ratio as a variable iteratively adjusted

[13] While quick and easy to read, a correlation index can sometimes be misleading for an asymmetric case, such as the one that we consider in Tables 5 and 6. In our analysis, the second dummy of each pair can take a value of 1 only if the first dummy does. This asymmetry creates dependence in itself. The problem can be avoided by simply remembering that a correlation coefficient, in our case, is a measure of the frequency with which the second dummy variable has a value of 1 given that the first does. However, it is very easy to split the dependence into two parts by first assessing how many cases take a value of 1 for the first variable and, second, how many among these cases take a value of 1 for the second variable. Results of this analysis are available upon request.

to reach acceptable levels of financial covenants. This behavior could effectively solve the simultaneity problem and it is upheld by standard exogeneity tests.[14]

However, for the sake of consistency with similar studies in other fields and based on Esty's (2004) suggestions, we decided to estimate a joint model consisting of both a spread equation and a debt-to-equity ratio equation. Since the two datasets with data on spreads and on debt-to-equity ratios do not fully overlap, we considered for each dataset a similar system and estimated the relevant equation with a single equation method: two-stage least squares (Davidson and MacKinnon, 1993, Ch. 8 and 12). The identification restrictions of these equations are based on the reasonable hypothesis that the tranche amount variable can be an instrument for the debt-to-equity ratio in the trance margin equation and that the tranche maturity can be an instrument for the trance margin variable in the debt equity ratio equation.The identification of the variables that could be used as instruments for the spread and debt-to-equity ratio was again based on opinions collected during our interviews with project finance arrangers.

We point out that the joint model estimated with two-stage least squares and simple OLS regressions return very similar results, confirming that the simultaneity problem is not a big issue in our dataset. It also confirms, in the logic of the standard Durbin-Wu-Hausman test (Davidson MacKinnon (1993) Ch.8.7), the arrangers' opinion about the exogeneity of the spread variable.[15]

4.1. Determinants of loan spread

Table 7 shows the relation between loan spread and the three groups of independent variables discussed in the previous section. We first present the results of the complete model (regression 1), and then continue to the findings for the six reduced models (regressions 2 to 7).

[14] For the sake of brevity, we do not include the exogeneity tests in this paper, but they are available upon request.

[15] The regressions obtained with simple OLS are not included in the text but are available upon request.

*** * * Insert Table 7 about here * * ***

The complete model confirms the importance of country risk in defining the loan spread, as the relationship is statistically significant at the 1% level. The positive signs of the Country Rating dummy indicate an increase in spread in situations of higher country risk. Among sectors, telecom projects are the most expensive for sponsors, followed by commercial, utilities, transportation, and power. In Table 7, we find that telecom projects cost about 84 basis points more than power sector projects, 54 more than commercial projects, 70 more than utilities, and 73 more than transportation. The relation is again statistically significant at the 1% level except for telecom (10% significance).

The relation between spread and loan microeconomic variables indicates a higher cost for refinanced loans. The sign of the Refinancing dummy is negative, meaning that a project that has not been refinanced costs 23 basis points less than a refinanced loan. As we noted when discussing loan variables, refinancing is required to overcome problems that arose during the life of the project. This avoids bankruptcy of a deal that retains economic value only as a going concern. As a compensation for restructuring, lenders require a higher spread remuneration. Table 7 also shows a lower cost if sponsors accept currency risk (the Currency Risk dummy is positive, which means that a project without currency risk is about 17 basis points more than a project exposed to currency fluctuations). These relations are all statistically significant at the 5% level.

The leverage of the project shows a positive, statistically significant relation with the loan spread in the complete and reduced models. An increase of 1 point in the debt-to-equity ratio of the project leads to an increase in the spread level, which varies from a minimum of 83 basis points in regression #3 to a maximum of 93 basis points in regression #6. This is an evident signal of the existence of a trade-off for sponsors between cheaper credit and lower equity contribution.

The relation between loan spread and contracts and between loan spread and sponsor involvement as SPV counterparties is not as clear, and shows mixed results. By the signs of the agreements dummies, projects without contracts covering construction, supplies, and equipment supply risks are more expensive for sponsors (the signs of the dummies are all positive, meaning that a project without a construction agreement, supply agreement, and equipment supply agreement costs, respectively, 32, 9, and 12 basis points more than projects that have these contracts in place), even if only the coefficient for construction agreements is statistically significant at the 1% level. On the other hand, projects without O&M, EPC agreements, and off-taking contracts pay slightly lower spreads to lenders than projects with these contract signed (1, 9, and 12 basis points, respectively, with all negative dummies). However, none of the coefficients is statistically significant.

As long as sponsors' involvement as SPV counterparties is considered, the positive signs for the dummy variables EPC Construction Sponsor, Off-taking Agreement Sponsor, Supply Agreement Sponsor, and Equipment Supply Agreement Sponsor demonstrate that lenders tend to price loans cheaper when sponsors play an active role in these key contracts. For example, a project in which sponsors do not sign an EPC agreement is financed with a spread of about 24 basis points higher than an equivalent project with an EPC agreement signed by one of the sponsors. However, the coefficients are not statistically significant. Likewise, the low statistical significance of the negative coefficients for O&M Sponsor and Construction Agreement Sponsor, and the positive sign for the Percent Number of Contracts Signed by Sponsors coefficient, do not allow us to affirm that lenders prefer projects with a sponsor counterparty.

To confirm the findings about the mitigating effect on spread of contracts and the role played by the sponsors, we run six further regressions (see Table 7, regressions 2 to 7) with the same independent variables, but including one contract at a time. The intuition behind this methodology is to test the effect that a given agreement can have on the project finance loan spread, whether the agreement is signed or not.

The results confirm the findings of the complete model. More specifically, we find a positive and statistically significant relation between loan spread and the absence of a construction agreement, and positive (although statistically insignificant) relations with the off-taking, supply, and equipment supply agreements. The findings support our first hypothesis, which states that the existence of key contracts that transfer risks from the SPV to third parties mitigate the level of the loan spread. On the other hand, given the positive sign of the debt-to-equity variable, even a robust network of contracts cannot enable sponsors to achieve lower spread and higher leverage—as argued by our third hypothesis—simultaneously.

Less convincing are the conclusions regarding the role played by sponsors. Although we find positive signs for the sponsor dummies of four agreements (EPC contract, supply, equipment supply, and off-taking), only the coefficient for the off-taking agreement is statistically significant. Hence, we cannot fully confirm our second hypothesis that resolving agency problems by involving sponsors as counterparties to an SPV's nonfinancial contracts also reduces spread.

There are a number of possible explanations for this. The first and most trivial is that, without more information about the rights and obligations included in each contract in the sample, we cannot assume that two contracts with the same name have equivalent effects on the spread of two different project loans. In power generation plants, there is a profound difference if a sponsor signs an off-taking agreement for 100% of the output produced by the plant or only 50% of the output, with the remainder sold on the market (as with a merchant plant). In a toll road construction contract, it is one thing if the sponsor guarantees up to 20% of the value of the works by letter of credit and up to 25% for liquidated damages in cases of construction defects; it is another if there is a guarantee of 100% of the value of the works (as happens for projects awarded in some Middle Eastern countries) and up to 40% for liquidated damages. The contracts have the same name, but they are valued very differently by bank lenders. The second explanation is that the best projects—that is, the ones with lower spreads—do not need to be strengthened by involving sponsors as key contractual counterparties. This reasoning assumes

that lenders are indifferent as to who signs the contract, but pay particular attention to the existence of the contract as a mechanism to reduce managerial discretion. The third explanation for lenders being uninterested in sponsors involved as SPV counterparties could stem from excessive concentration of managerial control in the hands of sponsors. If sponsors are also SPV counterparties, they fully control the free cash flows of the project, and thus can set the rights and obligations of the SPV to maximize their private gain. Lenders could prefer the presence of third parties other than SPV shareholders to avoid this effect. A fourth explanation is that what lenders really care about is not the presence of an agreement, but the financial soundness of the counterparty. This follows the findings of Dailami and Hauswald (2001), but unfortunately, it cannot be tested with our sample, since ProjectWare does not provide data on sponsor ratings.[16] Finally, an unclear effect of sponsor involvement on the loan spread could be related to the variable enforceability of different contracts. This important institutional feature goes beyond the scope of this paper, but a great deal of literature has addressed the problem, although from different standpoints than ours (La Porta, Lopez de Silanes, Shleifer, and Vishny, 1998 and 2002).

4.2. Determinants of the debt-to-equity ratio

The same methodology used to analyze the determinants of loan spreads is employed to value the determinants of capital structure in project finance transactions, using the data in Subsample 2. The results are summarized in Table 8.

[16] One could argue that the lack of data about sponsor rating could be easily overcome by collecting the missing data from sources other than ProjectWare. This is certainly true for some of the projects of our sample, but not for all. In project finance deals, firms commonly create joint ventures, often under fantasy names, to start an initiative as a single sponsor together with other sponsors. The newly created joint venture-sponsor can then play other roles in the same deal. In these cases, information about the joint venture-sponsor can be tracked down using ProjectWare, but it is impossible to assign it a rating unless the database cites the shareholders of the joint venture.

*** * * Insert Table 8 about here * * ***

Again, we begin with a complete regression model (regression 1) including all the dependent variables, and then add six more regressions (regressions 2 to 7) to test the influence of each contract on the debt-to-equity ratio of each transaction. As in the case of the loan spread, the complete regression model indicates that country ratings and project sectors are highly significant in defining the capital structure. Lower ratings determine lower debt-to-equity ratios, as the negative sign of the dummy variable indicates. For example, a project located in an investment-grade country has a 1.5-points lower debt-to-equity ratio than a best-grade country; this difference becomes 2 points lower for a speculative-grade country. Higher leverage ratios—in decreasing order—are found in transportation, commercial, power, telecom, and industrial projects. Table 8 indicates that a transportation project has a 1-point higher debt-to-equity ratio than a commercial project, 1.5 points higher than a power project, 2 points higher than a telecom deal, and 2.2 points higher than an industrial project. However, we must interpret these results with care, since a very low number of projects are classified in the commercial and industrial sectors (see Table 1).

A difference from the results obtained in the spread regressions is the role played by the microeconomic features of the loans. None of the variables (Refinancing, Currency Risk, Tranche Final Maturity, and Tranche Amount) shows a statistically significant relation with the dependent variable.

The absence of key contracts reduces the level of the debt-to-equity ratio, as shown by the negative sign of the dummies for O&M, EPC, supply, and equipment supply agreements, although only the coefficient of the supply agreement is statistically significant at the 1% level. In other words, the absence of an O&M agreement reduces the ratio by half a point; this reduction is 0.35 points for the absence of the EPC contract, and almost 1 point and 0.4 points for the absence of supply and equipment supply contracts, respectively. The absence of sponsors

as key SPV counterparties has statistically significant effects only for construction agreements where debt-to-equity ratios fall by 1.8 points. On the other hand, when sponsors do not sign an O&M agreement, SPVs benefit from a 1.6-point increase in leverage, and the relation is statistically significant at the 1% level.

The reduced models generally support these findings: the absence of O&M, EPC, off-taking, supply, and equipment supply agreement is negatively and significantly correlated with debt-to-equity ratios. This comfortably confirms our third hypothesis, which suggested a positive relation between reduced cash flow volatility due to the presence of long-term contracts and the level of debt-to-equity ratios. It also supports the theoretical conclusions of John and John (1991), who argue that project finance deals with higher debt-to-equity ratios are associated with high tangible capital intensity, mature technologies, and low levels of managerial discretion. Our results also bolster Fama's (1990) argument that a higher fraction of debt in the capital structure is compatible with firms with low revenue volatility.

Much less clear is how sponsor involvement as an SPV counterparty affects the capital structure of the projects. All of the sponsor dummy coefficients are positive, indicating that projects have greater leverage when the contracts are signed by third parties. Although the low level of statistical significance tends to smooth the findings, this result contrasts with data from interviews with arrangers of project finance deals, who usually appreciate strong involvement of the shareholders in project contracts. It seems to us that the reasons for such a counterintuitive finding are the same as those described for determinants of loan spreads.

5. Summary and conclusions

Contracts are the basis on which firms work. They set rights and obligations between the firm and its financial and nonfinancial counterparties, from banks and bondholders to suppliers, purchasers, and workers. The nature of the firm as a nexus of contracts (Jensen and Meckling, 1976) is even clearer in project finance transactions in which a specially incorporated new firm, an SPV, is created to manage them. In these cases, it is crucial that contracts are

designed with the dual objective to pre-commit, when possible, the future behavior of SPV management and its numerous counterparties and to avoid agency problems between SPV shareholders (or sponsors) and lenders. Pre-committing future obligations has the further advantage of reducing the volatility of the cash flows available for debt service and dividend payments, allowing sponsors to negotiate higher debt-to-equity ratios for the deal. Past empirical studies have pointed out the differences between project finance loans and regular (corporate) loans, particularly regarding spread levels and capital structure ratios, but none of them has focused on how contracts influence loan pricing and debt-to-equity ratios.

Using two subsamples of project finance loans closed between January 1998 and May 2003, taken from the ProjectWare database, we demonstrate that key nonfinancial contracts signed within the SPV can either reduce the spread or increase the debt-to-equity ratio of the transaction. This piece of evidence has important consequences for capital structure decisions outside a project finance environment as well. As suggested by Leland (1998), agency costs that reduce firm value can be lowered when management makes investment risk choices that can be credibly pre-committed in debt covenants or reinforced by a set of predefined obligations included in long-term contracts.

On the other hand, our study fails to confirm a common belief in the business of project finance, which holds that banks more favorably evaluate projects in which sponsors are heavily involved as key SPV counterparties. However, the coefficients contradicting this belief are ambiguous and very often not statistically significant, so these results must be interpreted with care. The available data do not allow analysis of the detailed contents of each key contract, the financial soundness of the sponsor, or the protection that a country's laws may give lenders once the project has breached one or more covenants in the event of default (La Porta, Lopez De Silanes, Shleifer, and Vishny, 1998 and 2002). Nevertheless, there are some implications that deserve attention.

First, the results highlight the importance of carefully designing the contractual structure with the aid of lawyers. A sound legal risk analysis of the project is essential to attract

lenders. If a contract is weakly designed, the pre-commitment of behavior is not credible, resulting in spreads that are too high or debt-to-equity ratios that are too low. This makes it difficult to sponsor the financing of the deal on a project finance basis. Similar reasoning holds for rating agencies and the attention that they must devote to legal risk when determining if a project is creditworthy. The most important implication for management, however, echoes the conclusions argued by Fama (1990). The characteristics of nonfinancial contracts effectively shape debt-to-equity decisions, allowing higher leverage when cash flow volatility is low.

Our study sheds some light on the relation between nonfinancial contracts and the cost of financial contracts and leverage, but it also opens up further avenues for research. The effect of the financial soundness of sponsors on project finance loan spreads and debt-to-equity ratios could be investigated. While lenders certainly evaluate a project based on its cash flows and not sponsor soundness, sponsors can also be SPV counterparties, and we were not able to verify whether lenders favor this situation. Further research could also explore the microeconomic features of contracts. We simply tracked down the existence of a contract, but the available data are not particularly detailed. With a smaller sample of project finance loans in a definite sector, and with data taken directly from information memoranda, one might better understand how nonfinancial contracts are linked to spread levels and debt-to-equity ratios—assuming confidentiality problems could be overcome. Finally, future studies could include regressions of the differences in the legal and institutional settings of a country to examine the level of protection that the law guarantees to creditors. Empirical evidence in this direction has already been provided by Esty and Megginson (2003) in their study of the effect of contract enforceability on the structure of syndicated loans for project finance transactions, but the same hypothesis could be included in the study of the effect of nonfinancial contracts on spreads and leverage.

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Table 1
Industrial distribution of project finance loans

This table presents the sample breakdown by industry according to the classification of Megginson and Kleimeier (2000);
the number of loans refers to the number of tranches for which information about spread or debt/equity ratios is available.
Panel A includes all loans closed in the period January 1994-May 2003. Panel B (our sample) includes the loans closed in the period January 1998-May 2003

Panel A (January 1994 - May 2003)	**Sample 1: loan tranches with spread available (number of projects 1643)**				**Sample 2: loan tranches with Debt/Equity ratio available (number of projects 2037)**			
Industrial category of borrower	**Value (US$/000)**	**Percent**	**Number**	**Percent**	**Value (US$/000)**	**Percent**	**Number**	**Percent**
Commercial	11,136,373.0	1.9%	73	2.5%	7,123,448.0	0.8%	96	1.8%
Industrial	31,174,620.0	5.4%	274	9.2%	37,824,085.0	4.3%	362	6.7%
Utilities (Electricity/energy excluded)	14,801,147.0	2.6%	183	6.2%	22,626,612.0	2.6%	390	7.2%
Electricity/energy utility	275,855,496.0	47.7%	1,464	49.3%	523,338,130.0	59.7%	3,140	58.3%
Transportation	68,776,818.0	11.9%	312	10.5%	120,434,530.0	13.7%	684	12.7%
Telecommunication	174,033,552.0	30.1%	635	21.4%	159,957,567.0	18.2%	658	12.2%
Others	2,352,816.0	0.4%	27	0.9%	3,251,540.0	0.4%	44	0.8%
Undisclosed					2,133,000.0	0.2%	12	0.2%
Totals:	**578,130,822.0**	**100.0%**	**2,968**	**100.0%**	**876,688,912.0**	**100%**	**5,386**	**100.0%**
Panel B (our sample) (january 1998 - may 2003)	**Sample 1: loan tranches with spread available (number of projects 1145)**				**Sample 2: loan tranches with Debt/Equity ratio available (number of projects 1278)**			
Industrial category of borrower	**Value (US$/000)**	**Percent**	**Number**	**Percent**	**Value (US$/000)**	**Percent**	**Number**	**Percent**
1 Commercial	5,174,067.0	1.2%	31	1.4%	3,003,640.0	0.5%	44	1.3%
2 Industrial	15,500,484.0	3.6%	133	6.1%	13,771,637.0	2.5%	146	4.2%
3 Utilities (Electricity/energy excluded)	12,749,673.0	3.0%	160	7.3%	16,536,585.0	3.0%	305	8.8%
4 Electricity/energy utility	200,754,126.0	46.9%	1,120	51.0%	315,582,051.0	57.8%	2,015	58.3%
5 Transportation	53,244,386.0	12.4%	245	11.1%	76,563,945.0	14.0%	455	13.2%
6 Telecommunication	139,220,324.0	32.5%	492	22.4%	116,729,638.0	21.4%	443	12.8%
7 Others	1,579,526.0	0.4%	17	0.8%	2,096,603.0	0.4%	35	1.0%
0 Undisclosed					2,133,000.0	0.4%	12	0.3%
Totals:	**428,222,586.0**	**100.0%**	**2,198**	**100.0%**	**546,417,099.0**	**100%**	**3,455**	**100.0%**

Source: Dealogic Projectware

Table 2

Geographic distribution of project finance loans

This table presents the sample breakdown by region using the classification of Megginson and Kleimeier (2000);
the number of loans refers to the number of tranches for which information about spread or debt/equity ratios is available.
Panel A includes all loans closed in the period January 1994-May 2003. Panel B (our sample) includes the loans closed in the period January 1998-May 2003.

Panel A (january 1994 - may 2003)	**Sample 1: loan tranches with spread available (number of projects 1643)**				**Sample 2: loan tranches with Debt/Equity ratio available (number of projects 2037)**			
Geographic location of the borrower	**Value (US$/000)**	**Percent**	**Number**	**Percent**	**Value (US$/000)**	**Percent**	**Number**	**Percent**
North America	118,594,471.0	20.5%	558	18.8%	104,165,438.0	11.9%	615	11.4%
Caribbean	17,240,523.0	3.0%	118	4.0%	38,196,850.0	4.4%	324	6.0%
South America	40,724,277.0	7.0%	240	8.1%	78,330,569.0	8.9%	621	11.5%
Western Europe	170,634,426.0	29.5%	719	24.2%	148,927,424.0	17.0%	902	16.7%
Eastern Europe	25,470,001.0	4.4%	218	7.3%	78,143,801.0	8.9%	617	11.5%
Africa	21,555,914.0	3.7%	142	4.8%	63,236,110.0	7.2%	460	8.5%
Australia & Pacific	43,180,078.0	7.5%	245	8.3%	56,819,110.0	6.5%	339	6.3%
South East Asia	102,830,276.0	17.8%	557	18.8%	184,835,301.0	21.1%	893	16.6%
Indian Sub Continent	8,142,056.0	1.4%	67	2.3%	77,703,847.0	8.9%	423	7.9%
Middle East	29,727,800.0	5.1%	102	3.4%	41,407,962.0	4.7%	170	3.2%
Other	31,000.0	0.0%	2	0.1%	345,500.0	0.0%	5	0.1%
Undisclosed					4,577,000.0	0.5%	17	0.3%
Totals:	**578,130,822.0**	**100.0%**	**2,968**	**100.0%**	**876,688,912.0**	**100.0%**	**5,386**	**100.0%**
Panel B (our sample) (January 1998 - May 2003)	**Sample 1: loan tranches with spread available (number of projects 1145)**				**Sample 2: loan tranches with Debt/Equity ratio available (number of projects 1278)**			
Geographic location of the borrower	**Value (US$/000)**	**Percent**	**Number**	**Percent**	**Value (US$/000)**	**Percent**	**Number**	**Percent**
1 North America	100,843,500.0	23.5%	459	20.9%	78,360,288.0	14.3%	464	13.4%
2 Carribean	12,931,622.0	3.0%	85	3.9%	25,321,817.0	4.6%	196	5.7%
3 South America	31,010,317.0	7.2%	181	8.2%	53,855,719.0	9.9%	394	11.4%
4 Western Europe	132,296,334.0	30.9%	609	27.7%	112,595,044.0	20.6%	702	20.3%
5 Eastern Europe	12,675,545.0	3.0%	128	5.8%	62,932,909.0	11.5%	444	12.9%
6 Africa	14,451,885.0	3.4%	108	4.9%	33,627,761.0	6.2%	282	8.2%
7 Australia & Pacific	33,532,269.0	7.8%	208	9.5%	31,645,651.0	5.8%	225	6.5%
8 South East Asia	65,815,467.0	15.4%	313	14.2%	86,932,331.0	15.9%	435	12.6%
9 Indian Sub Continent	4,718,724.0	1.1%	36	1.6%	36,366,755.0	6.7%	198	5.7%
10 Middle East	19,915,923.0	4.7%	69	3.1%	20,201,824.0	3.7%	98	2.8%
11 Other	31,000.0	0.0%	2	0.1%		0.0%		0.0%
0 Undisclosed					4,577,000.0	0.8%	17	0.5%
Totals:	**428,222,586.0**	**100.0%**	**2,198**	**100.0%**	**546,417,099.0**	**100.0%**	**3,455**	**100.0%**

Source: Dealogic Projectware

Table 3

Distribution of project finance loans - breakdown by country rating

This table presents the sample breakdown by country rating; we used the Standard and Poor's scale as reclassified in Altunbas and Gadanecz (2003): 5 - Best (from AAA to A+), 4 - Investment grade (from A to BBB), 3 - Speculative (BBB- to BB), 2 - Poor (BB- to CC), 1 - Default, unrated or undisclosed

Panel A includes all loans closed in the period January 1994-May 2003. Panel B (our sample) includes the loans closed in the period January 1998-May 2003.

Panel A (january 1994 - may 2003)	**Sample 1: loan tranches with spread available (number of projects 1643)**				**Sample 2: loan tranche with Debt/Equity ratio available (number of projects 2037)**			
Rating of the borrower's country	**Value (US$/000)**	**Percent**	**Number**	**Percent**	**Value (US$/000)**	**Percent**	**Number**	**Percent**
5 - Best	369,106,061.0	63.8%	1,605	54.1%	354,230,778.0	40.4%	2,007	37.3%
4 - Investment grade	53,061,667.0	9.2%	361	12.2%	150,295,330.0	17.1%	825	15.3%
3 - Speculative	66,209,838.0	11.5%	434	14.6%	172,035,728.0	19.6%	1,149	21.3%
2 - Poor	57,872,296.0	10.0%	359	12.1%	108,925,221.0	12.4%	737	13.7%
1 - Default, unrated, undisclosed	31,880,960.0	5.5%	209	7.0%	91,201,855.0	10.4%	668	12.4%
Totals:	**578,130,822.0**	**100.0%**	**2,968**	**100.0%**	**876,688,912.0**	**100.0%**	**5,386**	**100.0%**
Panel B (our sample) (january 1998 - may 2003)	**Sample 1: loan tranches with spread available (number of projects 1145)**				**Sample 2: loan tranche with Debt/Equity ratio available (number of projects 1278)**			
Rating of the borrower's country	**Value (US$/000)**	**Percent**	**Number**	**Percent**	**Value (US$/000)**	**Percent**	**Number**	**Percent**
5 - Best	294,746,732.0	68.8%	1,323	60.2%	257,511,944.0	47.1%	1,529	44.3%
4 - Investment grade	32,292,715.0	7.5%	201	9.1%	80,990,635.0	14.8%	449	13.0%
3 - Speculative	40,345,377.0	9.4%	307	14.0%	93,689,017.0	17.1%	700	20.3%
2 - Poor	38,074,301.0	8.9%	212	9.6%	57,320,964.0	10.5%	356	10.3%
1 - Default, unrated, undisclosed	22,763,461.0	5.3%	155	7.1%	56,904,539.0	10.4%	421	12.2%
Totals:	**428,222,586.0**	**100.0%**	**2,198**	**100.0%**	**546,417,099.0**	**100.0%**	**3,455**	**100.0%**

Source: Dealogic Projectware

Table 4
Univariate analysis of project finance loans

This table presents an univariate analysis of the main variables used in the study. The variables are classified in two groups: project variables (Group A) and loan variables (Group B) Only data of Panel B (our sample) are reported.

January 1998 - may 2003)	Sample 1: loan tranches with spread available (number of projects 1145)				Sample 2: loan tranches with Debt/Equity ratio available (number of projects 1278)			
	Number	Mean	Median	Std. Dev.	Number	Mean	Median	Std. Dev.
Group A: project variables								
Project size (US$ thousands)	306	588,313.4	268,539.0	1,102,543.1	1,234	489,960.6	250,000.0	793,008.5
Leverage: Debt/Equity ratio	308	4.62	2.84	6.05	1,278	4.57	2.49	6.01
Number of sponsors	1,027	3.11	2.00	2.89	1,174	3.18	2.00	0.50
Group B: loan variables								
Tranche size (US$ thousands)	2,198	194,823.7	97,182.5	357,873.5	3,422	159,677.7	78,314.5	288,268.1
Tranche/Total loan size (%)	2,150	48.9%	40.0%	18.2%	3,422	42.8%	37.5%	32.8%
Spread (basis points)	2,198	182.5	137.5	99.5	1,136	193.3	137.5	336.7
Maturity (years)	2,126	9.3	8.5	6.9	1,924	11.6	10.0	7.1
Tranche size with currency risk	570	193,949.3	184,007.5	399,814.7	750	184,984.4	77,609.5	463,148.4
Refinancing	221	183,977.6	132,938.0	204,511.2	121	155,331.4	122,347.0	177,726.1

Table 5
Correlations among contracts and contracts signed by sponsors

This table shows the correlation coefficients among contracts and contracts signed by sponsors for the spread model. It is worthwhile to notice that given the structure of the dummies used in the paper, for the most part, the six key contracts will fall in the combination 0-0 (contract absent, hence cannot be signed by sponsors) or 1-1 (contract is present and signed by sponsors). A limited number of combinations will be 1-0 (contract exists but it is signed by a party different than the sponsors); the combination 0-1 is empty by definition. The statistically significant correlation coefficients shown in the table demonstrate the situation.

		Kendall's tau_b Correlation Matrix											
		OP_DUM Operator Dummie Variable	**OP_SP Operator-Sponsor**	**CON_DUM Contractor Dummies**	**CON_SP Contractor-Sponsor**	**EPC_DUM EPC Dummies**	**EPC_SP EPC-Sponsor**	**OFF_DUM Offtaking Dummies variable**	**OFF_SP Offtaker-Sponsor**	**SUP_DUM Supplying Dummies**	**SUP_SP Supplier-Sponsor**	**EQ_DUM Equipment supplier dummies variable**	**EQ_SP Equipment supplier-sponsor**
OP_DUM Operator Dummie Variable	Corr. Coeff.	1.000	**.777(**)**	.041	.056(**)	.184(**)	.123(**)	.206(**)	.117(**)	.202(**)	.059(**)	.061(**)	.022
	N	2198	2194	2198	2193	2198	2193	2198	2194	2198	2193	2198	2193
OP_SP Operator-Sponsor	Corr. Coeff.		1.000	.074(**)	.085(**)	.127(**)	.130(**)	.217(**)	.165(**)	.233(**)	.062(**)	.045(*)	.041
	N		2194	2194	2192	2194	2193	2194	2194	2194	2193	2194	2193
CON_DUM Contractor Dummies	Corr. Coeff.			1.000	**.353(**)**	.164(**)	.062(**)	.086(**)	.198(**)	.199(**)	.218(**)	.119(**)	.042(*)
	N			2198	2193	2198	2193	2198	2194	2198	2193	2198	2193
CON_SP Contractor-Sponsor	Corr. Coeff.				1.000	.045(*)	.056(**)	-.051(*)	-.022	.031	-.014	.051(*)	.129(**)
	N				2193	2193	2192	2193	2192	2193	2191	2193	2191
EPC_DUM EPC Dummies	Corr. Coeff.					1.000	**.405(**)**	.325(**)	.148(**)	.383(**)	.162(**)	.274(**)	.067(**)
	N					2198	2193	2198	2194	2198	2193	2198	2193
EPC_SP EPC-Sponsor	Corr. Coeff.						1.000	.121(**)	.038	.129(**)	-.029	.162(**)	.209(**)
	N						2193	2193	2193	2193	2192	2193	2192
OFF_DUM Offtaking Dummies variable	Corr. Coeff.							1.000	**.373(**)**	.586(**)	.069(**)	.220(**)	.007
	N							2198	2194	2198	2193	2198	2193
OFF_SP Offtaker-Sponsor	Corr. Coeff.								1.000	.248(**)	.080(**)	.014	.054(*)
	N								2194	2194	2193	2194	2193
SUP_DUM Supplying Dummies	Corr. Coeff.									1.000	**.274(**)**	.286(**)	.009
	N									2198	2193	2198	2193
SUP_SP Supplier-Sponsor	Corr. Coeff.										1.000	-.007	-.012
	N										2193	2193	2193
EQ_DUM Equipment supplier dummies variable	Corr. Coeff.											1.000	**.282(**)**
	N											2198	2193
EQ_SP Equipment supplier-sponsor	Corr. Coeff.												1.000
	N												2193

** and * denote significance at the 1% and 5% (2-tailed) levels, respectively

Table 6
Correlations among contracts and contracts signed by sponsors

This table shows the correlation coefficients among contracts and contracts signed by sponsors for the debt-to-equity model. It is worthwhile to notice that given the structure of the dummies used in the paper, for the most part, the six key contracts will fall in the combination 0-0 (contract absent, hence cannot be signed by sponsors) or 1-1 (contract is present and signed by sponsors). A limited number of combinations will be 1-0 (contract exists but it is signed by a party different than the sponsors); the combination 0-1 is empty by definition. The statistically significant correlation coefficients shown in the table demonstrate the situation.

		Kendall's tau_b Correlation Matrix											
		OP_DUM Operator Dummie Variable	**OP_SP Operator-Sponsor**	**CON_DUM Contractor Dummies**	**CON_SP Contractor-Sponsor**	**EPC_DUM EPC Dummies**	**EPC_SP EPC-Sponsor**	**OFF_DUM Offtaking Dummies variable**	**OFF_SP Offtaker-Sponsor**	**SUP_DUM Supplying Dummies**	**SUP_SP Supplier-Sponsor**	**EQ_DUM Equipment supplier dummies variable**	**EQ_SP Equipment supplier-sponsor**
OP_DUM Operator Dummie Variable	Corr. Coeff.	1.000	**.696(**)**	.048(**)	-.007	.165(**)	.113(**)	.123(**)	.087(**)	.138(**)	.040(*)	.145(**)	.076(**)
	N	3455	3451	3455	3454	3455	3455	3455	3454	3455	3454	3455	3451
OP_SP Operator-Sponsor	Corr. Coeff.		1.000	.111(**)	.029	.111(**)	.184(**)	.092(**)	.075(**)	.157(**)	.080(**)	.097(**)	.097(**)
	N		3451	3451	3450	3451	3451	3451	3451	3451	3451	3451	3448
CON_DUM Contractor Dummies	Corr. Coeff.			1.000	**.438(**)**	.020	.054(**)	.032	.113(**)	.070(**)	.085(**)	.071(**)	.083(**)
	N			3455	3454	3455	3455	3455	3454	3455	3454	3455	3451
CON_SP Contractor-Sponsor	Corr. Coeff.				1.000	-.032	.033	-.021	-.035(*)	-.032	-.018	.006	.106(**)
	N				3454	3454	3454	3454	3453	3454	3453	3454	3450
EPC_DUM EPC Dummies	Corr. Coeff.					1.000	**.388(**)**	.238(**)	.124(**)	.261(**)	.112(**)	.176(**)	.076(**)
	N					3455	3455	3455	3454	3455	3454	3455	3451
EPC_SP EPC-Sponsor	Corr. Coeff.						1.000	.047(**)	.008	.090(**)	-.028	.129(**)	.240(**)
	N						3455	3455	3454	3455	3454	3455	3451
OFF_DUM Offtaking Dummies variable	Corr. Coeff.							1.000	**.320(**)**	.526(**)	.069(**)	.170(**)	.049(**)
	N							3455	3454	3455	3454	3455	3451
OFF_SP Offtaker-Sponsor	Corr. Coeff.								1.000	.266(**)	.199(**)	.141(**)	.087(**)
	N								3454	3454	3454	3454	3451
SUP_DUM Supplying Dummies	Corr. Coeff.									1.000	**.142(**)**	.231(**)	.065(**)
	N									3455	3454	3455	3451
SUP_SP Supplier-Sponsor	Corr. Coeff.										1.000	-.035(*)	-.010
	N										3454	3454	3451
EQ_DUM Equipment supplier dummies variable	Corr. Coeff.											1.000	**.244(**)**
	N											3455	3451
EQ_SP Equipment supplier-sponsor	Corr. Coeff.												1.000
	N												3451

** and * denote significance at the 1% and 5% (2-tailed) levels, respectively

Table 7

Determinants of Spread - Contractual structure of the deal and loan microeconomic variables

This table shows the results of OLS regressions on tranche Spread. The independent variables are different features of the loan contract, country rating, project sector and relevant contracts used in the project finance deals. Besides regression # 1 that includes all the contract available in ProjectWare, we include 6 other regression models (regression from #2 to #7) in order to account for the relevance of the inclusion of each contract in influencing the Tranche Margin. T-tests are shown in parenthesis under each independent variable

		Contractual structure of the deal and microeconomic loan variables						
	Expected sign	**All contracts**	**O&M contract**	**Construction Contract**	**EPC Contract**	**Offtaking Contract**	**Supply Contract**	**Equipment Supply Contract**
		Reg. #1	Reg. #2	Reg. #3	Reg. #4	Reg. #5	Reg. #6	Reg. #7
Constant		84.363	**218.881 *** **	**206.206 *** **	**162.630 *** **	**135.569 *** **	**131.666 *** **	**142.598 ** **
		(.154)	**-4.104**	**(3.549)**	**(3.039)**	**(2.491)**	**(2.321)**	**(2.371)**
Country rating dummy: Default, not rated, undisclosed	+	**81.828 *** **	**84.405 *** **	**85.589 *** **	**83.459 *** **	**85.210 *** **	**83.153 *** **	**82.265 *** **
		(7.162)	**(7.632)**	**(7.737)**	**(7.442)**	**(7.653)**	**(7.504)**	**(7.398)**
Country rating dummy: Poor	+	**168.631 *** **	**166.483 *** **	**166.366 *** **	**164.282 *** **	**163.892 *** **	**165.336 *** **	**163.977 *** **
		(17.104)	**(17.097)**	**(17.138)**	**(16.863)**	**(16.887)**	**(16.923)**	**(16.821)**
Country rating dummy: Speculative grade	+	**77.144 *** **	**75.435 *** **	**76.825 *** **	**75.086 *** **	**76.005 *** **	**75.179 *** **	**74.480 *** **
		(9.200)	**(9.110)**	**(9.248)**	**(9.038)**	**(9.158)**	**(9.033)**	**(8.964)**
Country rating dummy: Investment grade	+	-2.091	-1.212	.015	-.104	-1.411	-.040	-.264
		(-.215)	(-.125)	(.002)	(-.011)	(-.145)	(-.004)	(-.027)
Country rating dummy: Best	+	0(a)	0(a)	0(a)	0(a)	0(a)	0(a)	0(a)
Sector dummy: Commercial	?	**-109.789 *** **	**-116.766 *** **	**-110.529 *** **	**-115.520 *** **	**-114.120 *** **	**-114.384 *** **	**-115.002 *** **
		(-2.846)	**(-3.046)**	**(-2.868)**	**(-2.987)**	**(-2.973)**	**(-2.979)**	**(-2.995)**
Sector dummy: Industrial	?	**-141.311 *** **	**-146.008 *** **	**-142.112 *** **	**-144.454 *** **	**-142.689 *** **	**-142.783 *** **	**-142.973 *** **
		(-4.281)	**(-4.427)**	**(-4.316)**	**(-4.369)**	**(-4.324)**	**(-4.324)**	**(-4.330)**
Sector dummy: Utilities (power/energy not included)	?	**-126.265 *** **	**-127.024 *** **	**-125.627 *** **	**-126.664 *** **	**-127.356 *** **	**-126.842 *** **	**-125.733 *** **
		(-3.924)	**(-3.947)**	**(-3.906)**	**(-3.928)**	**(-3.954)**	**(-3.936)**	**(-3.901)**
Sector dummy: Power/energy	?	**-139.791 *** **	**-149.025 *** **	**-142.780 *** **	**-148.392 *** **	**-144.964 *** **	**-143.297 *** **	**-145.199 *** **
		(-4.449)	**(-4.780)**	**(-4.581)**	**(-4.743)**	**(-4.622)**	**(-4.569)**	**(-4.645)**
Sector dummy: Transportation	?	**-128.844 *** **	**-131.372 *** **	**-126.834 *** **	**-128.157 *** **	**-128.343 *** **	**-127.981 *** **	**-127.451 *** **
		(-4.055)	**(-4.132)**	**(-3.996)**	**(-4.023)**	**(-4.035)**	**(-4.021)**	**(-4.004)**
Sector dummy: Telecom	?	**-55.946 ***	**-61.540 ***	**-57.618 ***	**-61.383 ***	**-59.738 ***	**-59.586 ***	**-58.236 ***
		(-1.763)	**(-1.942)**	**(-1.820)**	**(-1.932)**	**(-1.882)**	**(-1.877)**	**(-1.833)**
Sector dummy: others		0(a)	0(a)	0(a)	0(a)	0(a)	0(a)	0(a)
Refinancing dummy: not-refinanced loan	-	**-23.291 ** **	**-25.355 *** **	**-24.541 *** **	**-26.595 *** **	**-26.017 *** **	**-25.554 *** **	**-25.251 *** **
		(-2.487)	**(-2.734)**	**(-2.651)**	**(-2.846)**	**(-2.803)**	**(-2.752)**	**(-2.711)**
Currency risk dummy: no currency risk	-	**16.516 ** **	**14.800 ** **	**15.569 ** **	**15.083 ** **	**15.269 ** **	**15.148 ** **	**15.775 ** **
		(2.506)	**(2.260)**	**(2.381)**	**(2.297)**	**(2.322)**	**(2.304)**	**(2.397)**
Debt-to-equity ratio	?	**85.411 *** **	**91.877 *** **	**83.413 *** **	**91.779 *** **	**89.771 *** **	**93.260 *** **	**90.743 *** **
		(2.828)	**(3.056)**	**(2.771)**	**(3.046)**	**2.978**	**(3.095)**	**(3.013)**
Tranche final maturity (years)	?	.377	.179	.337	.138	.168	.187	.155
		(.821)	(.397)	(.744)	(.306)	(.369)	(.413)	(.344)
O&M agreement dummy: absent	+	-1.398	-3.594					
		(-.091)	(-.238)					
O&M sponsor dummy: contract not signed by sponsors	?	-19.618	**-44.264 ** **					
		(-.212)	**(-2.079)**					
Construction agreement dummy: absent	+	**32.091 *** **		**37.498 *** **				
		(2.859)		**(3.470)**				
Construction agreement sponsor dummy: contract not signed by sponsors	?	-48.623		**-67.858 ** **				
		(-.514)		**(-2.422)**				
EPC Construction agreement: absent	+	-9.221			-1.543			
		(-1.145)			(-.207)			
EPC Construction sponsor dummy: contract not signed by sponsors	?	23.970			10.564			
		(.269)			(.655)			
Offtaking agreement dummy: absent	+	-.907				1.423		
		(-.093)				(.167)		
Offtaking agreement sponsor dummy: Contract not signed by sponsors	?	34.730				**34.476 ** **		
		(.379)				**(-2.066)**		
Supply agreement dummy: absent	+	9.608					10.092	
		(.956)					(-1.174)	
Supply agreement sponsor: Contract not signed by sponsors	?	25.929					25.003	
		(.279)					(1.088)	
Equipment supply agreement dummy: absent	+	12.485						13.617
		(1.205)						(1.402)
Equipment supply sponsor: Contract not signed by sponsors	?	26.546						13.784
		(.275)						(.425)
% number of contracts signed by sponsors	?	.137	**-1.522 *** **	-.568	-.485	-.148	-.368	-.482
		(.025)	**(-3.325)**	(-1.531)	(-1.144)	(-.357)	(-.971)	(-1.275)
Number of observations		2187	2.190	2.189	2.189	2190	2189	2189
Adjusted R-squared		.215	.212	.214	.209	.211	.210	.210

Note: (a) the parameter is set to zero since it is redudant. ***, ** and * denote significance at the 1%, 5% and 10% level respectively

Table 8

Determinants of Debt-to-equity ratio - Contractual structure of the deal and loan microeconomic variables

This table shows the results of OLS regressions on the value of debt-to-equity ratio. The independent variables are different features of the loan contract, country rating, project sector and relevant contracts used in the project finance deals. Besides regression #1 that includes all the contracts available in ProjectWare, we include 6 other regression models (regression from #2 to #7) in order to account for the relevance of the inclusion of each contract in influencing the debt-to-equity ratio. T-tests are shown in parenthesis under each independent variable

		Contractual structure of the deal and microeconomic loan variables						
	Expected sign	**All contracts**	**O&M contract**	**Construction Contract**	**EPC Contract**	**Offtaking Contract**	**Supply Contract**	**Equipment Supply Contract**
		Reg. #1	Reg. #2	Reg. #3	Reg. #4	Reg. #5	Reg. #6	Reg. #7
Constant		5.316	4.345	7.195	5.854	5.532	5.678	6.023
		(0.781)	(.65)	-1.077	(.876)	(.827)	(.845)	(.892)
Country rating dummy: Default, not rated, undisclosed	-	**-1.512 *** **	**-1.419 *** **	**-1.417 *** **	**-1.535 *** **	**-1.510 *** **	**-1.491 *** **	**-1.417 *** **
		(-4.747)	**(-4.532)**	**(-4.531)**	**(-4.858)**	**(-4.784)**	**(-4.769)**	**(-4.523)**
Country rating dummy: Poor	-	**-1.396 *** **	**-1.345 *** **	**-1.286 *** **	**-1.379 *** **	**-1.349 *** **	**-1.370 *** **	**-1.363 *** **
		(-4.252)	**(-4.125)**	**(-3.944)**	**(-4.218)**	**(-4.130)**	**(-4.205)**	**(-4.165)**
Country rating dummy: Speculative grade	-	**-2.026 *** **	**-1.901 *** **	**-1.967 *** **	**-1.879 *** **	**-1.895 *** **	**-1.905 *** **	**-1.843 *** **
		(-7.760)	**(-7.368)**	**(-7.565)**	**(-7.281)**	**(-7.334)**	**(-7.397)**	**(-7.140)**
Country rating dummy: Investment grade	-	**-1.528 *** **	**-1.476 *** **	**-1.517 *** **	**-1.547 *** **	**-1.498 *** **	**-1.504 *** **	**-1.499 *** **
		(-5.149)	**(-4.997)**	**(-5.140)**	**(-5.229)**	**(-5.072)**	**(-5.104)**	**(-5.069)**
Country rating dummy: Best	-	0(a)	0(a)	0(a) .	0(a)	0(a)	0(a)	0(a)
Sector dummy: undisclosed	?	**-5.962 *** **	**-6.200 *** **	**-6.176 *** **	**-6.114 *** **	**-6.196 *** **	**-6.218 *** **	**-6.289 *** **
		(-2.953)	**(-3.068)**	**(-3.056)**	**(-3.024)**	**(-3.064)**	**(-3.081)**	**(-3.111)**
Sector dummy: Commercial	?	**-4.793 *** **	**-4.881 *** **	**-4.987 *** **	**-4.991 *** **	**-4.941 *** **	**-4.941 *** **	**-4.950 *** **
		(-3.946)	**(-4.009)**	**(-4.121)**	**(-4.121)**	**(-4.058)**	**(-4.066)**	**(-4.066)**
Sector dummy: Industrial	?	**-6.009 *** **	**-5.989 *** **	**-6.001 *** **	**-5.948 *** **	**-5.966 *** **	**-6.005 *** **	**-6.073 *** **
		(-5.913)	**(-5.886)**	**(-5.903)**	**(-5.845)**	**(-5.862)**	**(-5.911)**	**(-5.964)**
Sector dummy: Utilities (power/energy not included)	?	-.220	-.353	-.282	-.380	-.409	-.412	-.414
		(-.231)	(-.370)	(-.296)	-.397	(-.428)	(-.432)	(-.434)
Sector dummy: Power/energy	?	**-5.269 *** **	**-5.121 *** **	**-5.016 *** **	**-5.233 *** **	**-5.312 *** **	**-5.406 *** **	**-5.267 *** **
		(-5.701)	**(-5.561)**	**(-5.439)**	**(-5.682)**	**(-5.748)**	**(-5.865)**	**(-5.713)**
Sector dummy: Transportation	?	**-3.840 *** **	**-4.001 *** **	**-3.915 *** **	**-4.021 *** **	**-4.040 *** **	**-4.038 *** **	**-4.049 *** **
		(-4.066)	**(-4.241)**	**(-4.141)**	**(-4.257)**	**(-4.280)**	**(-4.286)**	**(-4.290)**
Sector dummy: Telecom	?	**-5.774 *** **	**-5.779 *** **	**-5.664 *** **	**-5.875 *** **	**-5.806 *** **	**-5.832 *** **	**-5.934 *** **
		(-6.080)	**(-6.101)**	**(-5.967)**	**(-6.197)**	**(-6.128)**	**(-6.166)**	**(-6.251)**
Sector dummy: others	?	0(a)	0(a)	0(a)	0(a) .	0(a)	0(a)	0(a) .
Refinancing dummy: not-refinanced loan	-	-.330	-.167	-.086	-.186	-.150	-.185	-.147
		(-.656)	(-.332)	(-.171)	(-.369)	(-.298)	(-.368)	(-.293)
Currency risk dummy: no currency risk	+	.360	.370	**.399 ***	**.395 ***	.354	.343	.356
		(1.529)	-1.581	**(1.706)**	**(1.685)**	(1.509)	(1.465)	(1.516)
Tranche amount (US$ mil.)	?	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
		(-1.184)	(-1.316)	(.202)	(-1.281)	(-1.295)	(-1.212)	(-1.324)
Tranche margin (b.p.)	?	.065	.071	.072	.069	.077	.067	.070
		(.629)	(.685)	(.699)	(.670)	(.749)	(.653)	(.673)
O&M agreement dummy: absent	-	-.511	**-.682 ***					
		(-1.253)	**(-1.699)**					
O&M sponsor dummy: contract not signed by sponsors	?	**1.655 *** **	**1.815 *** **					
		-2.997	**(2.921)**					
Construction agreement dummy: absent	-	.162		.174				
		(.504)		(.544)				
Construction agreement sponsor dummy: contract not signed by sponsors	?	**-1.857 *** **		**-2.124 *** **				
		(-2.834)		**(-3.162)**				
EPC Construction agreement: absent	-	-.354			**-.513 ** **			
		(-1.486)			**(-2.238)**			
EPC Construction sponsor dummy: contract not signed by sponsors	?	.521			.254			
		-1.132			(.485)			
Offtaking agreement dummy: absent	-	.024				**-.446 ***		
		(.087)				**(-1.757)**		
Offtaking agreement sponsor dummy: Contract not signed by sponsors	?	.366				.045		
		(.764)				(.087)		
Supply agreement dummy: absent	-	**-.950 *** **					**-.988 *** **	
		(-3.235)					**(-3.772)**	
Supply agreement sponsor: Contract not signed by sponsors	?	1.250					1.132	
		(-1.481)					(1.319)	
Equipment supply agreement dummy: absent	-	-.412						**-.653 ** **
		(-1.370)						**(-2.235)**
Equipment supply sponsor: Contract not signed by sponsors	?	.660						.263
		(.620)						(.237)
% number of contracts signed by sponsors	?	0(a)	.007	**-.024 ** **	-.017	-.016	-.018	-.017
			(.533)	**(-2.106)**	(-1.274)	(-1.324)	(-1.586)	(-1.439)
Number of observations		3441	3444	3448	3448	3447	3447	3444
Adjusted R-squared		.115	.109	.110	.108	.108	.111	.109

Note: (a) the parameter is set to zero since it is redudant. ***, ** and * denote significance at the 1%, 5% and 10% level respectively