Determinants of Project Finance Loan Terms

by

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Dedication

To my fiancée Henrietta Korlekie Osieku and parents Emmanuel and Elizabeth Ahiabor

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Abstract

Project finance has become a vital financing vehicle for undertaking capital-intensive and infrastructure investments. In 2017 alone, the value of deals signed using project finance was estimated at approximately $229 billion. Despite its increasing importance, little is known regarding the impact of project-level, and country characteristics on the loan terms. This thesis proceeds in examining these determinants along three empirical essays. The first essay (Chapter 3) focuses on how domestic lead arrangers' certification (in emerging markets) impact the pricing of project finance loans. Using a sample 1270 project finance loan tranches signed between 1998 and 2011, and worth over $300 billion, the chapter posits that domestic lead arrangers' certification reduce search and information cost, which in turn, reduces the financing cost. The results, after controlling for endogeneity of certification decision, indicate a reduction of 47 basis points in the spread offered on PF loans. The magnitude of this reduction differs across industries, geographic region, and income classification of the project countries. The second essay (Chapter 4) examines the relationship between PF contractual structures and loan outcomes, using a sample of 5872 project finance loan tranches signed between 1998 and 2013, and worth approximately $1.2 trillion. The chapter hypothesises that (i) non financial contracts (NFCs) (that is, contracts used to manage the various project functions), reduces overall project risk, (ii) the involvement of project sponsors as key counterparties to the non-financial contracts is an additional signal of project's potential worth, and (iii) the effects observed in (i and ii) are stronger, if sponsor counterparties have verifiable credit ratings. After matching loan tranches with NFCs to those without, the results indicate that the use of NFCs reduce both the loan spreads and leverage ratios. This impact is higher if the sponsors counterparties are credit-rated. The results are also stronger for developing countries. The third essay examines the impact of country-level institutions on project finance loan spread and leverage ratio, using a sample of 3,362 loan

tranches signed between the year 1998 - 2012. The chapter investigates whether political and legal institutions are substitutes (or complements), that is, if improvement in one absorbs the weakness of the other, and vice versa. Further, the essay examines if project finance *network of contracts* substitutes for these institutions. The results indicate that political and legal institutions are substitutes. Specifically, improvements in political institutions lead to a reduction in both the loan spread and leverage ratio for countries with weak legal and governance institutions. The chapter also finds that where NFCs are included in PF, the impact of political institutions on loan spread reduces. On the other hand, the impact of political institutions on leverage ratio is higher when NFCs are used. The findings from the three research chapters provide interesting insights on how lenders and sponsors create value through contract design.

Keywords: Project finance, sponsors, mandated lead arrangers, certification, non-financial contracts, loan spread, leverage ratio, counterparty risk, credit rating, political institutions, legal institutions, governance institutions.

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List of Acronyms

ATET: Average Treatment Effect on the Treated

BPS: Basis Points

FDI: Foreign Direct Investment

FI: Financial institutions

MLA: Mandated Lead Arrangers

NN: Nearest Neighbours

NFCs: Non-Financial Contracts

NPV: Net Present Value

O&M: Operation and Management

PPP: Public Private Partnerships

PSM: Propensity Score matching

PF: Project Finance

SPV: Special Purpose Vehicle

Chapter 1 Introduction

1.1 Background

Project finance (hereafter, PF) is a financial technique that involves raising funds to undertake a single indivisible large-scale capital investment project, where cash flows are the sole means to meet financial obligations and to provide returns to investors (Dailami and Hauswald, 2007). PF has become an essential source of financing for capital-intensive and infrastructure investments globally. Data from Thomson Reuters' Project Finance International indicate that between 1994 and 2013, PF grew by a factor of ten (10) from $41.3 billion to $415 billion (Esty et al., 2014). Recent statistics also show that on average PF deals closed between 2011 and 2016 were approximately $232 billion per annum (Thomson Reuters, 2017a).[1]

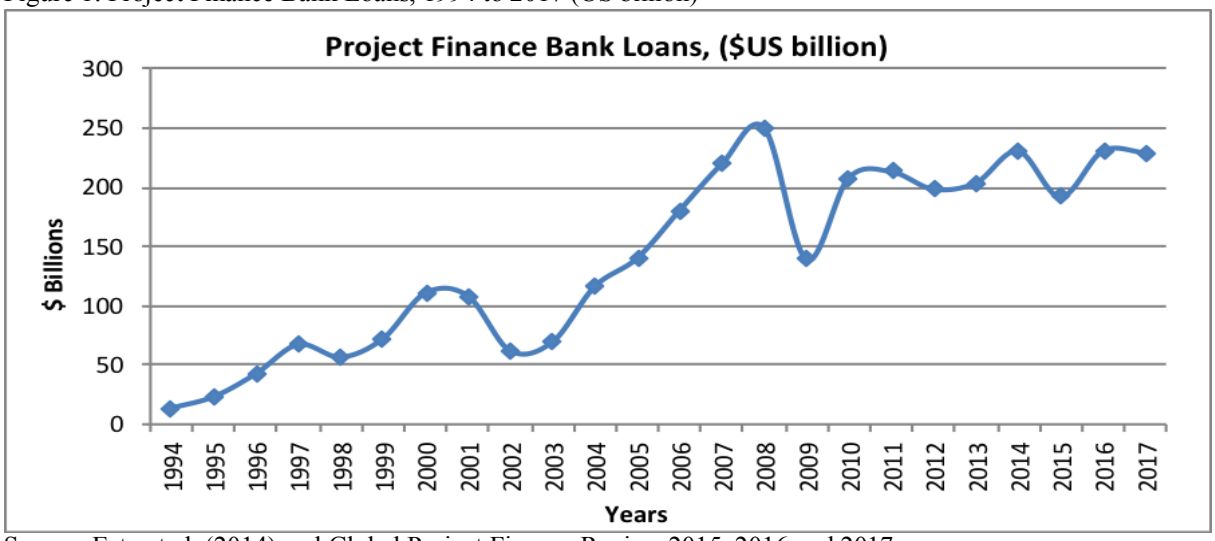
PF lending however reduced after the 2007 global financial crises. Figure 1 shows a sharp decline in PF lending in 2009, representing a 44.5% year-on-year reduction (see Table 1). The market has since recovered, albeit at lower volumes (and values) compared to the pre-crisis period.[2] Another notable change in PF lending is the emergence of emerging market mandated lead arrangers, especially from Asia (an issue examined in Chapter 3 of the thesis). For instance, between 2012 and 2017, the league table of global lead arrangers (by amount underwritten) was dominated by banks headquartered in Japan (Bank of Tokyo-Mitsubishi UFJ & SMBC), India (State bank of India), China (China Development Bank) and Korea

[1] Statistics on total volume of PF deals for January - September 2017 is estimated at US$157.3 billion (Thomson Reuters, 2017b).

[2] The wide variation in the year-on-year values of PF investment means that estimated results are likely to be biased. To control for this, year dummies are included as additional controls in all regressions in the thesis. These year dummies reported in the appendix are statistically significant, especially in the financial crisis period (2007-2009).

(Korea Development Bank). This trend is in sharp contrast to what prevailed prior the financial crisis when global lead arrangers were headquartered in Western Europe and the USA (Esty et al., 2014).

Figure 1: Project Finance Bank Loans, 1994 to 2017 (US billion)



Source: Esty et al. (2014) and Global Project Finance Review 2015, 2016 and 2017

The growth in PF investment is partly due to its deployment in infrastructure investments. Traditional use of PF lending is mainly in resource-rich projects, such as mining, pipelines, oil fields, and power plants. However, the last three decades have seen its extension to public infrastructure projects like transportation, water, and sewage and telecommunication (Girardone and Snaith, 2011; Esty et al., 2014).[3] With an investment of $4 trillion required per annum until 2030 to reduce the global infrastructure deficit, PF is expected to become an essential financing vehicle to meet these demands (World Economic Forum, 2013).

Despite its burgeoning growth and increasing importance in the global financial system, PF remains relatively under-researched, especially in economics and finance literature. For instance, there is limited knowledge on what motivates the use of PF and how it creates value

[3] For public infrastructures initiatives, PF is often "christened" public-private partnerships (PPPs) or public finance initiatives (PFIs). PPPs/PFIs are contractual agreements that delegate the responsibility over the design, build, and operate or a combination of these functions, from the public sector institutions to the private sector, allowing the latter to share in the risk and return of these arrangements (Yescombe, 2014; Finnerty, 2013).

for parties.[4] From a theoretical standpoint, the structural attributes of PF, that is, separate incorporation, high leverage, and concentrated equity ownership, provide effective mechanisms to maximise asset value and minimise managerial discretion - a common problem in corporate finance (Esty, 2004). Corporate finance is plagued with deadweight costs arising from managerial discretion and agency costs. These costs arise because managerial behaviour and risk aversion often prevent firms from undertaking risky but positive net present value projects - underinvestment and debt overhang (Stulz, 1984, Myers, 1977). Other costs include the allocation of free cash flows, signalling cost of new capital issues and asymmetric information between firm managers and capital providers (Jensen, 1986).

Table 1.1: Project Finance Investment, 1994 to 2017

Year	PF loan value ($US Billion)	Year to Year change
1994	13.7	13.60%
1995	23.3	70.1%
1996	42.8	83.7%
1997	67.4	57.5%
1998	56.7	-15.9%
1999	72.4	27.7%
2000	110.9	53.2%
2001	108.5	-2.2%
2002	62.2	-42.7%
2003	69.6	11.9%
2004	116.4	67.2%
2005	140.3	20.5%
2006	180.6	28.7%
2007	220	21.8%
2008	250.6	13.9%
2009	139.2	-44.5%
2010	208.2	49.6%
2011	213.5	2.5%
2012	198.7	-6.9%
2013	204	2.7%
2014	230.9	13.2%
2015	192.11	-16.8%
2016	230.9	20.2%
2017	229.6	-0.6%

Source: Esty et al. (2014) and Global Project Finance Review 2015, 2016 and 2017

[4] Though earlier studies like Shah and Thakor (1987), John and John (1991), Esty (2003); Chemmanur & John (1996) attempt to conceptualise the motivation for using PF, there are limited empirical evidence to support these earlier works.

Thus, PF is seen as a panacea to most of the problems identified in the corporate finance literature. For example, the separate incorporation of the new investment under PF limits potential spillover effects from the new investment onto the sponsoring firm. Also, the high leveraging in PF act as a disciplinary tool in preventing misallocation of free cash flows by the managers and related parties (Esty, 2004). Further, the extensive use of project contracts reduces managerial discretion, which in turn, reduces the tendency to misapply project cash flows.

For parties to PF lending, an understanding of the fundamental loan terms is essential to determine when to use it, how to structure it to suit project and country characteristics, and how to deliver value. The thesis attempts to provide some insights into these issues. The thesis contains three research chapters on the determinants of PF loan terms. These chapters explore how PF institutional features like concentrated debt ownership, separate incorporation, management by contracts, and country-level institutional characteristics affect the loan terms. The findings from these chapters offer both academic and policy insights on PF and how they deliver value.

Chapter 3 examines the impact of domestic lead arranger certification on the pricing of PF loans. Given the increasing involvement of domestic financial institutions (FIs) in the design and funding of PF loans across emerging market economies, this chapter seeks to quantify the economic benefits or otherwise of these certifications. Specifically, the chapter examines whether the involvement of domestic lead arrangers provides a remedy to asymmetric information. Using a sample of PF syndicated loans, signed across 53 emerging market economies between 1998 and 2011, the chapter accounts for the possibility that certification by domestic lead arrangers is endogenous to loan outcomes. Hence, the distribution of loans with and without domestic lead arranger certification is likely to be non-random or systematically different. The study utilises the endogenous switching regression procedure proposed by

Maddala (1986a & 1986b) to address this bias to estimate the impact of domestic lead arranger certification on loan pricing (loan spread).

Chapter 4 explores the potential benefits (or costs) of sponsor involvement as counterparties to the project contracts. Though theoretical and empirical evidence has established some benefits in using NFCs to manage project risks, little is known about how sponsor (promoters) involvement as contractual counterparties affect these benefits. Secondly, existing studies have usually treated the use of NFCs as exogenous; a claim the present chapter challenges. In this regard, the study conjectures that the involvement of sponsors as counterparties can either be beneficial (by better aligning the interest of the sponsors to that of the project) or costly (by introducing a conflict of interest between the sponsors' financial rewards as a counterparty and that as an equity holder). The chapter tests these hypotheses using a sample of 5,872 PF loans signed from 1998 and 2013.[5] The propensity score matching (PSM) procedure is used to control for any potential endogeneity in the decision to use NFCs by matching loan tranches with NFCs to those without based on a set of pre-contract variables. The matched sample from the PSM procedure is then used to estimate the impact of sponsor counterparty involvement on the loan spread and the leverage ratio.

Chapter 5 investigates how political and legal institutions shape PF loan terms. Though existing literature identifies political and legal institutions as essential determinants of loan contract terms, the effect of these factors in the context of PF remains under-researched. The chapter uses a sample of PF loans signed in over 100 countries to estimate the effect of both political and legal institutions on PF loan spread and leverage ratio. Chapter 6 discusses the

[5] Data samples for all three empirical chapters show some notable variations. These variations are attributable to two main reasons - data unavailability and sample selection. First, the thesis relied on Dealogic Projectware dataset, of which the School of Business and Economics (Loughborough University) discontinued the subscription in June 2013. Thus, the author is unable to update the study sample, limiting the sample to this period. Second, sample selection strategies, especially in Chapter 3 restricted the sample loans to earlier years (2011) relative to the dataset's sample period (2013).

empirical relevance of the results, offers policy implications and directions for future research.

Chapter 2 Overview of Project Finance and Type of Risks

2.1 Introduction

The chapter provides background and review of PF lending. It begins with definitions of PF and the rationale for its use. It then discusses the various parties involved and their roles. Following this is a review of the risk evaluation and allocation processes that precede the design and structuring of NFCs. The section ends with historical background on PF and a summary of research gaps.

2.2 Definition and Characteristics of Project Finance

PF has often been utilised to fund investments in capital-intensive industries like mining, oil & gas and energy-related projects (Yescombe, 2014; Sawant, 2010). Recent years have however seen it extended to economic infrastructure projects like telecommunication, transportation, and social infrastructures like schools, prisons, and recreational facilities. Infrastructures delivered using PF are often referred to as public-private partnerships (PPP); where private sector entities are contracted to fund and undertake projects hitherto were provided by government (Gatti, 2012; Esty and Sesia, 2007).

One of the earliest definitions of PF is that of Shah and Thakor (1987). They defined PF as an arrangement where there is the separate incorporation of the project to isolate its cash flow and to enable an independent evaluation of the projects. Similarly, Gatti (2013) defined PF as the structured financing of a single economic asset through a special purpose vehicle (SPV) created by sponsors using equity capital and debt capital from lenders, who have to rely on the project cash flow as the primary source of loan repayment and assets as collateral. Finnerty (2013) also describe PF as the incorporation of capital investment as a separate

entity with equity and debt capital, whereby repayment is structured to suit cash flow characteristics of the project. Lenders can only rely on cash flows for reimbursement and the project assets as collateral. The definitions of Finnerty (2013) and Gatti (2013) emphasise the abilities of parties to design financing based on the evolution of project's cash flows, which in turn, ensures that debt servicing does not threaten the project's viability.[6]

Yescombe (2014) provides a slightly different perspective, stressing the importance of detailed evaluation of project risks and subsequent allocation to contractual parties. According to the author, PF is a structured financing technique that involves rigorous assessment of a project's construction, operation, demand and other relevant risks to determine cash flow against which to secure funds. Though the definition of Yescombe (2014) shares similarities with earlier ones, it also extends the definition to cover risk evaluation and allocation, a crucial aspect of these financing agreements.[7] Gardener and Wright (2011) emphasise the use of high leverage in PF. They define PF as the funding of a capital investment project through limited or non-recourse loans to the project company, with the expectation that repayments are made through project revenues. [8]

These definitions highlight the following features of PF. First, it entails the incorporation of a separate legal entity (SPV or project company) to carry out an investment separately from its sponsors. The SPV usually has a limited life that coincides with the lifespan of the

[6] A typical PF loan contract charges different interest rates at various stages. For instance, during construction and operational phase of the project, lenders may charge a lower rate, which then increases once the project begins to generate cash flow (operations). Lenders may also charge higher interest during the project's construction phase to incentivise SPV and construction counterparty to complete the construction on schedule (Gatti, 2013).

[7] A study by Corielli et al. (2010) emphasised the relevance of these contractual agreements in influencing loan terms - price and debt-to-equity ratios of PF loans.

[8] One of the main distinguishing features of PF from other forms of financing is the limited or non-recourse nature of the loan agreements. Limited-recourse loan agreement typically allows for some form of compensation (indemnity) from the project company and sponsors in the event of project failure or difficulty. These compensations usually take the form of additional equity contribution, reduction in dividend payment or royalties among others. On the other hand, non-recourse loan agreements provide lenders no compensation from the project company and sponsors in the event of project failure (Hainz and Kleimeier, 2008; Gardener and Wright, 2011).

project. The sponsors, together with the SPV, undertake a comprehensive evaluation of project risks and return to determine economic, technical, financial and legal viability. After these, risks are managed through various contracts between the SPV and its counterparties (Corielli et al., 2010). Lenders are approached to provide funding for the project. The lenders evaluate project documents and contracts to determine the risk level, and the amount of debt they are willing to provide the SPV. Debt capital is typically higher, relative to the sponsor's equity, often ranging between 70% and 100% of total project cost (Sorge and Gadanecz, 2004; Esty, 2002). Debt capital is provided on a limited or non-recourse basis through the syndicated loan. PF is a form of a syndicated loan and varies from others loan types in some ways. Kleimeier and Megginson (2000) in their paper, document these differences by showing that PF loans typically have a longer maturity, third-party guarantees, and are likely to be extended to more risky borrowers. The syndicate banks in PF are also more relative to other loan types, with the majority of these loans extended to resource-rich industries, such as oil and gas, utilities and real estate. [9] In return for increased exposure to project risks, lenders demand more control and monitoring of the project than would be in conventional corporate debt finance.

2.3 Rationale for Project Finance

The motivation for the use of PF has dominated debates among academics and practitioners. This section attempts to present a systematic review of these arguments, to provide a foundation for its use and relevance.

2.3.1 Signalling Benefit from Risky Projects

One of the earliest theoretical works on PF is that of Shah and Thakor (1987). The authors are the first to provide an economic motivation for PF and its high levered nature. They show

[9] More details on syndicated lending in PF is offered in Chapter 3 of the thesis.

that in equilibrium, risky firms prefer high leverage and are willing to pay a higher interest rate. According to the authors, PF benefits from information production, which reduces signalling cost and increases lenders' willingness to commit debt capital to the project. Chen, Kensinger and Martin (1989) cited in Finnerty, (1996) contested Shah and Thakor (1987) assertion on the signalling benefits of PF and its preference for risky projects. They note that PF is utilised for projects less sensitive to information asymmetry. Using Myers and Majluf's pecking order theory, Chen, Kensinger, and Martin (1989) indicate that firms are likely to use PF for more transparent projects to preserve financial stability (Finnerty, 2013). This in turn, allows them to fund internally projects that are more information sensitive, without giving away valuable information to competitors.

In Chapters 3 and 4 the thesis examines a strand of asymmetric information and signalling effect in PF, albeit from lenders and sponsors perspective. In these chapters, I show that arranger certification by domestic lenders in emerging economies generates economic benefits through a reduction in asymmetric information among syndicate banks. Further, the thesis demonstrates that sponsor involvement as counterparty to some of the project contracts provide signals on project quality, and hence lowers the financing costs on these deals.

2.3.2 Contamination Risk

Gatti (2013) also notes that PF is more appropriate when the new project is risky. However, unlike Shah and Thakor (1987), the author argues that PF reduces exposure to contamination risk; that is, the risks that failure of the new project is likely to curtail the continuation of existing businesses. Thus, financing new projects on the firm's balance sheet makes them susceptible to contamination risk, in case the project fails. Creditors, before extending financing, typically evaluate how the new project affects existing businesses of the

borrower. With PF, firms can separate the new investment from its existing activities and allow for independent evaluation of project risks.

2.3.3 Underinvestment

Another rationale provided in the literature for PF is the reduction of leverage-induced underinvestment. According to John and John (1991), PF enables creditors to evaluate lending decisions on a project-by-project basis, which reduces agency costs. Agency costs arise because of difficulties on the part of lenders to verify a firm's portfolio of investments. Debtholders will often have access to the firm's aggregate investments, but not the individual projects. In response, debtholders are likely to charge higher interest costs when lending to the firm. The firm, aware of this increase in the cost of funding, abandons or postpones positive net present value (NPV) projects – underinvestment. John and John (1991) suggest that through PF, lenders verify firms' actions on a project-by-project basis, which in turn, informs appropriate risks evaluation and pricing. Therefore, firms can reliably invest in positive NPV projects due to reduced agency costs.

2.3.4 Agency Cost from Free Cash Flow

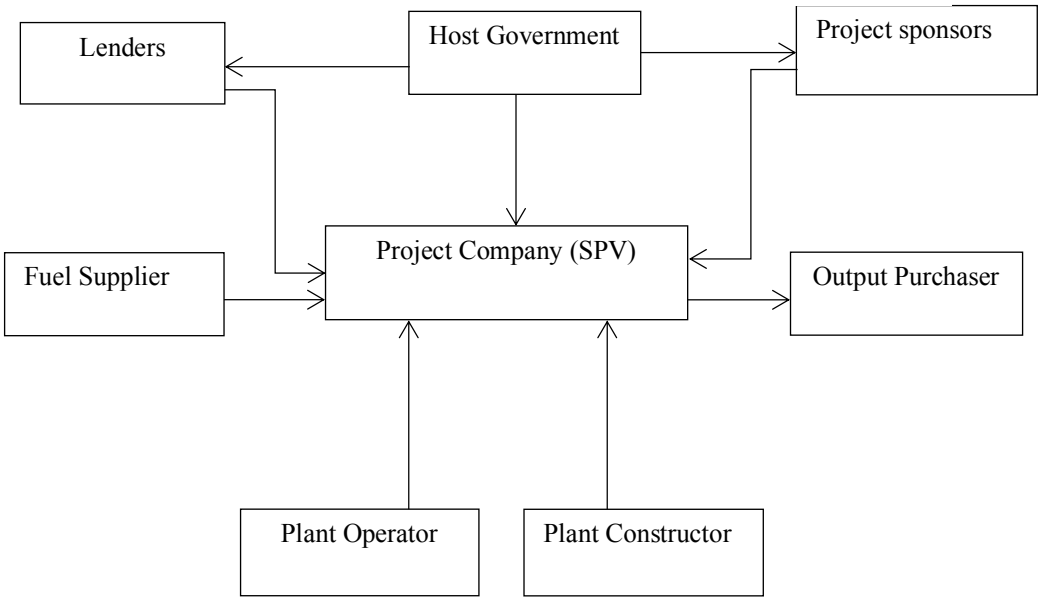
PF also minimises managerial discretions on how free cash flows are utilised (Finnerty, 2013). The separation of shareholders and debtholders from the directors (and managers) means that the former cannot verify the actions of the latter, especially on the use of free cash flows. Moreover, corporate finance literature acknowledges the difficulty investors have in verifying how much free cash flow firms generate at any point in time. PF, on the other hand, allows lenders to determine beforehand, how free cash flow will be allocated (Finnerty, 1996; Gatti, 2008). By specifying in contractual terms, how cash flows generated by the project are distributed, PF reduce these agency costs. A common contractual tool is the cash flow waterfall, where there are specific allocations of all cash flows that the project generates

(Gatti 2012). Other contracts include the NFCs, which also specify parties entitled to cash flow disbursements.

2.4 Parties in Project Finance

PF is an intricate financing arrangement that involves numerous parties that play several critical roles in the feasibility study, the design of the deal, and delivery of the project's intended outcome (Gatti, 2013). Figure 1 illustrates a typical PF structure with the main parties, such as the project company, sponsors, lenders, contractual counterparties (Product Purchaser, Fuel Supplier, Plant Constructor and Plant operator). This party forms the core of PF structure and exemplifies the nexus of contract used to manage the project venture (Dailami and Hauswald, 2007). An essential principle in PF design is the alignment of the parties' interest and that of the project's outcome. It ensures there is sufficient incentive for each party to fulfil their obligations (Finnerty, 2013).

Figure 2: Typical Project Finance Structure



Source: Author's sketch (adapted from Gatti, 2012)

2.4.1 Special Purpose Vehicle (Project Company)

The formation of a separate legal entity with the sole responsibility to manage the new venture is often the first step in PF (Gatti et al., 2013). The new legal entity, also known as special purpose vehicle (SPV) or project company, is legally distinct from its sponsors. The SPV must form, build and manage the new venture as well as sign contracts with relevant counterparties. These contracts are usually negotiated in a vertical chain from construction to the sale of output (Corielli et al. 2010). It is also common for sponsors to act as counterparties to some of these contracts.[10] The SPV must also decide how much debt capital and equity to be provided by lenders and sponsors respectively. At the projects' operational phase, the SPV manages day-to-day activities. Crucial among these responsibilities is the disbursement of project cash flows to lenders and other counterparties, such as supplier and equipment suppliers. As depicted in Figure 1, the SPV is the central party in PF. It is responsible for managing various operational and financial details with other parties.

2.4.2 Sponsors

Sponsors are promoters of PF ventures and take up responsibilities of the project until an SPV is in place. There are four categories of sponsors. The first category, industrial sponsors, are corporations that directly benefit from the activities of the new project. Second, are public sponsors that are state or government institutions that promote the project in fulfilment of social welfare and public interest. There are contractor sponsors who typically have an economic interest in the project, such as, building or operating the project infrastructure or supply equipment to the project. The last categories are financial sponsors who are investors hoping to earn good returns on their investments (Gatti, 2013).

[10] In Chapter 4, the thesis examines the economic impact of sponsor involvement as key counterparties to project contracts. Specifically, the study examines whether such involvement align sponsor interest to that of the project or increases the tendency for opportunistic behaviours.

Sponsors, as shown in Figure 1, provide SPVs with equity capital, though there may be instances where they do not contribute any capital towards the project.[11] Further, the proportion of equity to debt capital is small, relative to an average leverage ratio (usually 60-80%). Despite the low percentage of equity funding in these ventures, contracts are often designed to provide sufficient incentive for sponsors to remain committed to the project. For instance, an integrated energy company such as British Petroleum (BP) may be the sponsor of an oil exploration and drilling project in Angola. BP as the primary sponsor may only be required to provide a relatively small proportion of capital, with the lenders providing most of the financing. However, the output from this oil filed may still be of vital importance to BP. In this instance, it is sufficient to assume that BP's incentive is aligned to that of the project. Corielli et al. (2010), examine the involvement of sponsors as counterparties to the project contracts. They show that lenders are not in favour of sponsor involvement as counterparties in PF. In particular, they find that lenders are reluctant when sponsors are counterparties in construction and supply equipment because of the potential for conflict of interest. On the other hand, lenders favour deals with sponsors' counterparties to the off-take (sales) agreements.

In Chapter 4, the thesis examines how sponsors' counterparty affect PF loan outcomes. However, unlike Corielli et al. (2010), I hypothesise that the decision by sponsors to act as counterparties to project contracts is non-random and depends on the project risk level and loan outcome. The chapter also argue that any measure of the sponsors' impact must consider this potential endogeneity.

[11] The sample PF projects deals analysed in Chapter 4 of the thesis indicate that about half (49%) of deals have 100% debt financing, indicating no capital contribution from sponsors. However, the majority of deals with 100% funding are brownfield projects. Beyond these, the rationale for equity contribution is an empirical consideration that is not addressed in the current thesis.

2.4.3 Lenders

The majority of PF funding is provided in the form of debt capital, with the syndicated loan market being the primary source of project finance capital (Ansar, 2012; Gatti, 2012). The capital market through project bonds also serv as a vital source of loan capital for PF ventures. However, project bonds' market share of total funding has reduced since the onset of the financial crisis (Abadie, 2008). This section provides an overview of lenders' role in PF.

Lenders provide SPV with debt capital, generally on non-recourse or limited recourse terms. Unlike corporate finance loans, PF loans are often not claimable on sponsors' existing assets (non-recourse). Lenders have to rely on project cash flows for repayment and project assets as collaterals. In instances, where loan is limited recourse, liabilities only extend to specific assets of the sponsor in case the project fails. On average, lenders provide 60 - 70% of total project capital and thus, stand to lose more in the event of project failure (Esty et al., 2014; Sorge and Gadanecz, 2008).

There are two main categories of PF lenders. The first category is made up of banks and FIs that usually lend to the SPV via the syndicated loan market (Byoun et al. 2013; Gatti et al. 2013). Syndicated lending ensures that single lender exposure to the borrower (SPV) is minimised (Sufi, 2007). The loan amount is segregated into smaller financing packages - tranches. Tranches usually vary, based on maturity or their purpose. Thus, PF loans can be distributed into multiple tranches like term loan, credit facilities, bridge loans and standby facilities. These tranches differ not only in their maturity and purpose but also in the banks that finance them. For instance, Maskara (2010) argues that risk management motivation underlines tranching in syndicated loans. The authors show that riskier borrowers that use multiple tranche are likely to reduce their overall borrowing cost.

The deal structuring is led by lead bank(s) also known as mandated lead arrangers (MLA). The MLA deals directly with SPV and sponsors on behalf of other syndicate banks – delegated monitoring (Nini, 2004). The MLA is expected to conduct due diligence on the project and contract to determine its viability and bankability (Gatti, 2013; Nini, 2004). The due diligence also covers details on various project contracts and their counterparties. For performing this role, the MLA is expected to underwrite the issue by taking up a relatively significant proportion of the loan capital. Gatti et al. (2013) show that PF syndicated loans certified by prestigious (reputable) lead arrangers have lower the loan spread. They attributed this finding to the arrangers existing network and scale that allow them to study these deals at a lower cost. In Chapter 3, I extend this argument and examine whether domestic FIs, acting as MLAs in emerging markets' PF deals, provide any valuable certification benefits.

The second category of lenders are investors on the capital market who invest in the project company through project bonds. These bonds are targeted at institutional investors like pension funds and insurance companies who have the financial resources and are willing to hold these bonds over the long run. These bonds are often underwritten by reputable monoline insurers, which provide some certification for investors. However, the 2007 financial crisis brought the reputation of most of these monoline insurers into question; leading to a sharp reduction in the number and volume of PF bond issue.

2.5 Risk Evaluation and Allocation in Project Finance

Risk evaluation and management is at the core of PF. The SPV, sponsor(s) and their advisors dedicate much time at this stage to evaluate and allocate risks to counterparties with the requisite expertise and financial resources to manage them (Esty, 2004; Finnerty 2013). The evaluation and allocation stages are preceded by the due diligence process, leading to the identification of all relevant risks.

A key component at this stage is the design and signing of project contracts with counterparties to transfer key project risks. Corielli et al. (2010) referred to these contracts as *risk shifting non-financial contract (NFC)* since they help the SPV transfer risks to its counterparties. Further, Esty (2002) refers to the extensive contracting process as '*an institutional tool of risk management'*.[12] The process ends with a determination of what level of risks the SPV should retain.[13]

2.5.1 Risks in Project Finance

Risks in PF can be classified into pre-completion: those occurring at the project construction phase; post completion: occurring at the operational phase of the project, and risks overlapping both pre-completion and post-completion phase of the project (Gatti, 2013).

2.5.1.1 Pre-Completion Risks

Pre-completion risks comprise events that occur before, and throughout the construction phase of the project. During this phase, the project does not generate any cash inflow and any investment at this stage is high risk. Lenders thus require some protection from SPV and its sponsor, against these risks (Gatti, 2012; Finnerty, 2013). These risks range from activity planning, technology, construction, and completion risk.

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[12] The emphasis on detailed identification and management of risk is because there is limited collateral available to lenders in the case of default. Also, the susceptibility of these investments to hold-up, and opportunistic behaviour by the sponsor makes risk management essential (Dailami and Hauswald, 2007). As a result, lenders are demanding and would insist on comprehensive risk assessment and analysis of the project to ensure that all potential risks are identified and appropriately dealt with. Esty (2004) estimates that it takes on average 18 months to close a deal.

[13] Yescombe (2014) underscores the need for the project company to retain only a reasonable level of risk, since excessive exposure of SPV to these risks is likely to pose problems at the financing stage. This is because any risks the SPV retains is priced by the lender in determining the financing cost (Blanche-Brude and Strange, 2007; Dailami and Hauswald, 2007). Where lenders deem these risks to be excessive, they may be reluctant to commit capital to the SPV or completely back-out of the deal. In some instances, SPV may be required to provide guarantees or credit supports to reassure lenders. Thus, effective risk evaluation and management strikes a fine balance between risks managed through contractual relationships and those retained by the SPV.

Activity planning risk: Planning risk is the risk that a project phase or activity is not captured or not well planned, thus delaying the project operation phase. Projects are complex undertakings and require SPV and sponsors to carefully identify critical stages or activities throughout the entire project phase. Project planning is carried out by breaking projects into smaller phases and creating a logical link between each of them. Afterwards, time and deadlines are specified to each phase.

Technology risk: It is related to technology design and processes that will be used for the proposed project. Project engineers are required to evaluate the proposed facility's technical feasibility. If the technology is unproven or underdeveloped, a lot of testing and piloting is required to ensure that there is reasonable assurance over its feasibility. It is also imperative that proven technological processes are tested and reassessed on their ability to accommodate future expansion and changes. The assessment must also incorporate the impact of environmental factors on the proposed facility design or processes (Finnerty, 2013; Gatti, 2012).

Construction Risk: Construction or completion risk is the risk that the project will not be ready at the scheduled date. Common factors that determine construction risk include force majeure cost overrun, performance deficiency or delayed construction schedule (Gatti, 2013). Since project profitability hinges on timely construction of project infrastructure, management of these risks is essential.

The convention is for lenders to charge a lower rate during construction, since the project will not be in a position to generate any cash flow at this stage. Once operation starts, this charge is reviewed upwards. This process is essential to ensure that SPV is not cash flow distressed during construction period. Construction cost overrun is the most common cause with the infamous Eurotunnel Project in the 1990's a classic example. Construction risks are

mitigated through either construction contracts or Engineering Procurement and Construction contracts (Gatti, 2013). Other mechanisms may include a contingency fund or line of credit (Ruster, 1996).

2.5.1.2 Post-Completion Risks

This category of risks covers all risk factors that arise upon the completion of the project. At this stage, the facility is ready for operation. Potential risks range from availability of raw material (supply), plant meeting operational expectation, to the sale of output (Gatti, 2013). Similar to pre-completion risk, failure to adequately manage post completion risks can lead to cash flow shortfall and undermine long-term viability of the project. The main post-completion risks include supply, operational and market risks.

Supply risk: Supply risk is related to the quantity and quality of the input as well as their cost. It arises because the SPV is unable to obtain the input needs for operation on a day to day basis. Supply risks if not properly managed can lead to poor functionality of plants, lower margins and unexpected increase in production cost (Gatti, 2008). Lenders usually require the SPV to determine the source, quantity and quality of input available to the project Finnerty (2013). The main risk tool available for managing this is the Supply contract, which pre-specifies the quantity and quality of inputs to be supplied to it.

Operation Risk: It arises when the when project infrastructure function is below its optimal or post-completion test level. It is essential that project facilities, once the project becomes operational, work according to technical specification and predetermined output levels. This is because underperformance or mismanagement of the facility can potentially jeopardise the projects economic viability. It usually entails identification of likely operational factors such as emission and environmental impact. It can also arise due to reduction in input-output

levels or lower efficiency. Operation of the project is managed using Operation and Management (O&M) agreement.

Market Risk: market risk arises if the project is unable to meet sales and revenue projection due to market fluctuation or volatility. It is important that at the design stage, revenue estimates and projections are carefully made to prevent over estimation, which can cause distress to the SPV in terms of paying project cost, lenders and sponsors as well. Demand fluctuation can also be due to introduction of new technology or product, which can lead to a sharp decline in demand for project output. An off-take (sales) agreement is usually signed with customers to guarantee a ready market when output is ready.

2.5.1.3 Risks Overlapping Pre-Completion and Post-Completion Phases

The category covers risks overlapping the pre-completion and post-completion phases of the project. It is important that parties identify and manage these risks at all levels to guarantee project viability. These risks include political and country risks, legal risks, and market or macroeconomic risks.

Political and country risk: Political risk is a central concern for PF ventures because these investments are long-term and overlap multiple political regimes. For example, a power-generation project that provides electricity households may last generations. Political risk can jeopardise a viable project that stands to be derailed if the political environment does not promote political stability, policy transparency or prevent government intervention (nationalisation) and civil unrest. Political risk arises because the project under consideration exists in a political regime or involves a government agency. The main political risk factors include investment risk, change-in-law risk and quasi-political risk. Investment risks arise from government policies, such as foreign exchange restriction, international capital transfer restriction and macroeconomic measures that are detrimental to the operation of the project.

It can also be triggered by civil war, coup d'état. Change-in law (regulation) risks arise when there are modifications to a country's legislation to the detriment of the project. Quasi-political risk relates to factors such as contract enforcement and judicial independence that can affect the operation of a project.

Political risks are mitigated through government support agreements, such as guarantees, escrow accounts, tax reliefs and exemptions from bureaucratic procedures. Project sponsors can also assess the commercial insurance market to cover political risk partially or fully. Multilateral banks mostly provide these insurances. These banks often use their influence and resources (guarantees) to drive private capital investment into a politically volatile environment. They also act as direct financiers and risk guarantors in PF and usually provide: (i) *direct loans*: granted through co-financing with a private sector and structured as A and B loans. These guarantees allow the private sector to enjoy the same privilege as the multilateral in these transactions. In effect, the multilateral bank takes the A-loan and private sector, the B loan; (ii) Partial guarantees are offered to cover political risks when a private sector is lending directly to the government or a government body. Partial guarantees cover all the types of risks mentioned above, except for political force majeure. (iii) Partial credit guarantees are used to resolve issues of long-term repayment for which the private sector might be unwilling to accept.

PF involving the provision of public infrastructure or service are more susceptible to political risk. It thus requires support from governments and international agencies like developmental banks and multilateral institutions (World Bank and IMF) to reassure lenders of project viability. Hainz and Kleimeier (2006) in a study demonstrate that availability of political risk guarantees in developing countries stimulates PF investment in infrastructure.

Market risks: PF ventures, like any financial transactions, are exposed to a series of market risks. The main market risks include credit risk; that is, the probability that the project will not return sufficient cash to meet capital and interest payment obligations to lenders. Lenders thus require reasonable assurance from SPV in the form of an off-take contract and or a credit guarantee. However, the use of off-take agreements introduces another risk, referred to as counterparty risk. Counterparty risk is the risk of default due to inability of the off-taker to fulfil their obligation. Lenders thus assess off-takers creditworthiness to estimate their exposure to counterparty risks in these agreements. In a study of the Ras Lafan project in Qatar, Dailami and Hauswald (2007) find that bond spread of the project company to be positive and significantly correlated with the ratings of the off-taker (Korea Electricity Power Company) - an indication of counterparty risk exposure.[14] Other market risks, like interest rate risk, exchange rate or currency risk and inflation risk are usually mitigated through various financial instruments, such as derivatives, interest rate swaps, inflation indexing and exchange rate swaps (Ruster, 1996; Gatti 2012).

Legal risk: Legal risk comprises legal quality measures related to enforcement of laws, protection of creditors' rights, effectiveness of commercial laws, legal origin and institutional quality. At the project structuring, lenders usually seek legal counsels from domestic lawyer and justice ministries to understand the legal risks inherent in the host country (Beenhakker, 1997).

2.5.1.4 Project Risks and its Relationship with Loan Maturity and Pricing

The average maturity of PF loans is approximately twice that of syndicated loans (Kleimeier and Megginson, 2000). Empirical evidence by the authors indicate a negative and significant relationship between maturity and the spread on PF loans - a finding that

[14] Project finance bonds are bonds issued on the capital market by the SPV to raise debt capital.

contradicts syndicated loans. This negative relationship is thought to be due to the long-tenor of PF loans, for which a positive relationship would be uneconomical. Building on this finding, Sorge and Gadanecz (2008) examine whether long tenor of PF carry lower risk than short-term deals. Sorge and Gadanecz (2008) note that peculiar features of PF loan contracts, that is, short-term liquidity concerns, high leverage ratios and sequential resolution of risks over project life means that the relationship between spread and maturity is non-linear. Consistent with their argument, they find a hump-shaped relationship between PF loan spread and maturity, with long-term loans relative cheaper than short-term deals.

2.6 Non-Financial Contracts

As discussed in section 2.4, project contracts are the main tools available to SPV and sponsors to manage project risks. A number of these contracts exist for managing both pre-completion and post completion risks. Corielli et al. (2010) identified four of these contracts as the most important. They include Engineering, Procurement and Construction agreement, Supply/raw material agreement, Operation and Management agreement, and off-take/sales agreement. The SPV, before approaching lenders, is expected to secure some form of contract or commitment with various counterparties regarding how the project risks will be managed. Together these contracts are called non-financial contracts (NFCs). Corielli et al., (2010) define NFCs as "contracts that generate cash inflows or outflows that affect the unlevered free cash flow of the SPV".

As to whether these contracts are secured before approaching lenders or afterwards remain a debate in PF literature. While Corielli et al. (2010) and Gatti (2013) assume that these contracts have to be signed before lenders are approached; Blanche-Brude and Strange (2007) hold a different view. They believe that these contracts are only signed during or after negotiation with lenders. They indicate that lenders potentially influence the final terms of

these contracts and only agree on the financing details when they are happy with these contract terms.

In the thesis (Chapter 4), we adopt the argument of Blanche-Brude and Strange (2007) and assume that the signing of the NFCs goes hand-in-hand with the negotiation of the financing package. Specifically, we argue that finalising NFCs before approaching lenders is likely to make the financing stage onerous. This is because where lenders disagree with counterparties or feel aspects of project risks are not fully covered, sponsors will have to go back and renegotiate these contracts. As a result, we assume that a logical approach would be to sign these contracts after lenders have indicated their agreement to these terms.[15]

2.6.1 Engineering Procurement and Construction Contracts

EPC contracts are used to transfer project construction risks to the contractor counterparty. EPC contracts are written as turnkey agreements: where the contractor counterparty assumes all risks related to the engineering, procurement and construction of the project infrastructure. Thus, they effectively transfer all construction related risks from SPV and sponsors to the contractor counterparty. The SPV will require the EPC to provide performance guarantees on the technology used in the construction (also known as *wrapping*). Wrapping provides a form of assurance to lenders regarding the project's construction technology. It certifies the contractor's familiarity and confidence with the project's construction technology. Also, there are minimum performance standard provision clauses that are usually the theoretical minimum performance level of the plant. For assuming these risks, the contractor

[15] The overlap between securing NFCs counterparties and the financing package is likely to induce an endogenous relationship between the NFCs terms and that of the financing package. If lenders significantly influence how these contracts are designed and/or who they are signed with, then one would expect the financing terms to reflect these biases. For instance, one option available to lenders is to request that sponsors take up responsibilities as NFC counterparties, if it is likely to align sponsors' interest with project outcome. On the other hand, they can also require sponsors to relinquish such roles where they (lenders) infer conflict of interest. In Chapter 4 of the thesis, we examine these issues and thus assume that the involvement of lenders as project counterparties is non-random and likely to be determined by a number of pre-contract characteristics.

counterparty is compensated through regular fixed payment by the SPV (Gatti, 2008; Corielli et al., 2010).

There are instances, where the contractor only assumes the risk of construction risk but not engineering or procurement of material for setting up the infrastructure. In other words, the contractor counterparty's liability, in this case, is limited to meeting pre-determined post-completion specification of the facility. Gatti (2013) notes that the proportion of construction risks that a contractor is willing to assume is influenced by the construction technology adopted, that is, whether it is proven or not. Where proven technology is adopted, contractor counterparty is likely to agree on a turnkey contract with the SPV. Where this is not possible, the SPV may either retain the risks or seek alternative means to manage them

Once the construction of the plant is completed, an independent engineer is required to perform initial tests on the commercial operating date. When this initial test reveals that the new facility meets the minimum performance standard, a provisional acceptance certificate (PAS) is issued. Next, a series of test runs is conducted over a period, to determine if the plant meets operational specifications. Where the plant does not meet the optimal (operational) level, the contractor is required to make a commitment, *buy-down damage*; which is the difference in revenue if the plant had operated at the optimal level and the minimum performance standard level. If the plant, however, meets the operational expectation, the final acceptance certificate is issued. After which the plant becomes formally operational and handed over to the SPV.

2.6.2 Supply contracts

The supply contract is signed to ensure raw material, and other critical inputs needed by the SPV to operate are available unconditionally. These agreements are usually drafted as a put-or-pay agreement, which imposes an obligation on the SPV to purchase from a supplier

(s) for the supply of inputs stipulated in the contract. In the same way, if the supplier fails to deliver the raw materials on time, the supplier is required to make alternative arrangements for the delivery of raw materials in specified quantity and quality. To ensure fairness, the price of the input is usually adjusted to the Market Price Index to ensure that there is sufficient economic interest for the supplier to fulfil contractual obligations. If the input needs transportation from to the SPV plant location, then sponsors would have to arrange for transportation, either as part of the supply contract or through a separate transportation agreement.

2.6.3 Operation and Management Contracts

Operation and Management contracts are signed to manage operational and management risks that could adversely affect the project. For the SPV to generate the requisite cash flow to pay its costs and investors, the SPV must ensure that the plants are running efficiently to guarantee project profitability and viability. In this regard, the O & M contracts are signed with experienced and reputable management firms. In return for managing a projects' day-to-day operation, the O&M contractor must be compensated through payments directly from the SPV, which can be either a fixed-price contract or pass-through contract. In a fixed price contract, the operator takes up all costs relating to operational cost overrun. On the other hand, a pass-through contract pertains to fixed payment and performance related incentives, made to ensure the operator takes the necessary steps to reduce cost.

2.6.4 Off-take Contracts

Off-take agreements are contracts signed with the project counterparty to secure ready market for the project outputs. These contracts specify delivery of specified quantities of goods or services to the counterparty at a pre-agreed or market determined price (Gatti, 2013). The market price is often indexed to consider inflation. Off-take contracts can take

several forms, with the most common being take-or-pay, take-if-offered, and hell-or-high water. Under take-or-pay agreements, the counterparty is obligated make payment to the SPV, whether they take delivery of output or not. Cash payments for non-delivery are usually credited against future deliveries. However, this is conditional on the SPV fulfilling specific requirements related to pre-agreed quality and standard (Ruster, 1996). Take-if offered agreements requires the purchaser of the SPVs output to only pay for the output, only if the project delivers. Thus payment is only expected if the SPV delivers the output. Hell-or-High Water provides no opt-out clauses for the purchaser of the output. The project counterparty must pay the SPV in all circumstances, regardless of adverse conditions that might affect the purchaser's ability to take deliveries (Finnerty, 2013).

2.7 Historical and Market Trends of Project Finance

2.7.1 History of Project Finance

Before the 1970s PF was mostly used to finance natural resource projects such as oil field exploration and mining (Davis, 2003). Natural resource projects are traditional low risk investments with regard to country, market and technology risks; hence the possibility of lenders financing them against its stream of future cash flows (Gatti, 2008). Some of the landmark natural resource projects for which this technique was applied include the $7.7 billion Trans Alaska Pipeline Project in 1969 and the Hibernia Oil Field Projects at a cost of $4.1 billion (Finnerty, 1996).

The use of PF to the power generation sector was boosted by deregulations and privatisation initiative in advanced countries like the U.S and the UK. Finnerty (1996) noted that the passage of Public Utility Regulatory Policy Act (PURPA) in the U.S in 1978, allowed independent power producers (IPP's) to sign long-term contracts with domestic

electric utility companies that guarantees the purchase of electric output from the IPP's at a guaranteed price (usually commensurate with the marginal cost of electric production).

From 1980 to 1990s, the emergence of PF took two trajectories; the replication of natural resource projects in developing countries and the use of PF by advanced economies in non-traditional PF markets (Gatti, 2008). Developing countries at the time had weak infrastructural profiles. With the saturation of investment opportunities in advanced economies, investors are turning to projects in emerging and developing countries. One major catalyst for this trend was the involvement of international and multilateral agencies like the World Bank, Regional Development Banks and Export Credit Agencies from the home countries of the contractors who supported these transactions by providing guarantees for political, sovereign and other project risk.

The second trajectory from advanced countries' perspectives, is the extension of PF techniques to new project sectors, such road and rail transport infrastructure, leisure, telecommunication, water and sewage among others. The distinct feature of these new projects is the relatively high market and country risk involved. Unlike the natural resources and power, generation projects where long-term contracts can be written to mitigate market risk, it is more difficult to do so in these new project sectors. In place of these long-term contracts, a public fund is set up by the sponsor or has a stake in the project. The involvement of government or public sector is often referred to as public private partnership (PPP).

2.7.2 Project Finance Market

The size and volume of PF markets have both increased greatly over the past three decades, and PF is now seen as the main finance vehicle for capital intensive and infrastructural investment projects. Data from Project Finance International (cited in Yescombe, 2006) puts the total value of PF loans as at 2005 at over $165 billion, from a

value of a little over $131 billion in 2000. Similarly, Infrastructure Journal also estimated total value of PF loans to be $212 billion in 2006. More recent data from Thomson Reuters' Project Finance International indicates that PF lending grew by a factor of ten (10) from $41.3 billion in 1994 to $415 billion in 2013 (Esty et al., 2014). Between 2011 and 2016 alone, the average volume of deals structured using PF is approximately $232 billion per annum (Thomson Reuters, 2017a).

Regarding project sectors, power, energy & natural resources sectors commanded a higher portion of project loans. The power sector, however, suffered a downward trend after the Enron scandal but recovered strongly from 2004 and remains a key driver of PF initiatives. Gatti (2008) found that nearly 50% of all PF loans executed between 2003 and 2006 were for energy and power sector. This was followed by infrastructural and transportation sector accounting for 25% of all PF loans. The telecommunication sector, after experiencing active use of PF in the early 2000s, drastically reduced by 2005 from $36.7 billion to $ 10 billion as at 2005 (Yescombe, 2007). Estimates from Gatti (2008) put this total market share for telecommunication sector at 6.5% as at 2006.

In Chapter 4, the sample data show that Electricity and Power generation projects account for 30% of total deals between 1998 and 2013. Following this are Oil & Gas and Transportation projects with 21% and 16% respectively.

Regarding geographical distribution of PF loans, Gatti (2008), using a dataset from Thompson One Banker, reported a geographical concentration of projects funded using this technique in Europe, North America and Asia. Africa only accounted for 18% of the total financing over the sample period (2003-2006). The dataset, however, revealed a higher proportion for these loans were used to finance natural resource and energy projects in developing economies. For instance, Africa/Middle East and Asia region saw an increase in

their total share of PF from 10.5% and 15.4% in 2003 to 30% and 43%, respectively, as at 2006. Over the same period, there was a reduction in Europe's share of PF loans from 52.1% in 2003 to 38.8% in 2006. This clearly shows that PF is now more deployed in emerging and developing economies than it was some decades ago.

2.8 Summary

This chapter reviewed key principles and concepts in PF lending. The chapter focussed on the evaluation and allocation of project risks, and how it offers superior means to deliver long-term and capital intensive investments. The review shows that the main motivations for using PF are related to risks. Specifically, the review show that asymmetric information and agency costs of free cash flows are the main arguments advanced for the growth of PF lending. Further, the review shows that by separating the new venture via an SPV, both sponsors and lenders benefit from information production and pricing of project risks. At the heart of PF lending is the nexus of contracts-NFCs - used to manage the relevant project risks. The review shows that NFCs are crucial to managing risks and the relationships between the various parties in PF. Further, the review examined how political and legal risks influence contractual design in PF.

Chapter 3 Impact of Domestic Lead Arranger Certification on the Pricing of Project Finance Loans: Evidence from Emerging Market Economies [16]

3.1 Introduction

Over the past two decades, project finance (PF) has become a popular vehicle for chanelling capital into emerging markets (Gatti et al., 2013). In 2017, the total value of global PF transaction was worth $229.6 billion, based on data compiled by Thomson Reuters Deal Intelligence (Thomson Reuters, 2017). Approximately $80.6 billion (35%) of these deals were signed in emerging market economies to financed long-term infrastructure projects in transportation, water and sewage, power, oil and gas and mineral explorations. The increase in PF investments is partly because of the increasing involvement of home-grown and often state-backed financial intermediaries (FIs) (Ansar, 2012).

Domestic FIs usually have easier access to their markets and can navigate complexities.[17] For instance, domestic FIs can easily access "soft information", that is, information which is difficult to completely summarise in a numeric score (Peterson and Rajan, 2002). They can also rally support and utilise their connections with host governments for the projects (Mian, 2006). The literature on foreign banking also notes that foreign banks face informational disadvantages in emerging market economies (Giannetti and Ongena, 2012). Foreign banks typically have less local, market or firm-specific information than their domestic counterparts, and must overcome cultural and bureaucratic barriers in the host country

[16] A revised version of this chapter titled "Domestic Lead Arranger Certification and the Pricing of Project Finance Loans" (with Gregory James) is accepted for publication in *The International Journal of Finance and Economics 2018, 1-18.*

[17] In this chapter, domestic FIs refers to FIs that are ultimately owned by shareholders domiciled in the same country as the project country and are not a subsidiary of a foreign parent company.

(Khanna and Palepu, 1999; Buch, 2003; Petersen and Rajan, 2002; Mian, 2006). Empirical evidences indicate that cost of borrowing is increasing in the geographical distance between borrowers and lenders, due to the difficulty in obtaining and verifying soft information over distance (Knyazeva and Knyazeva, 2012). The chapter in line with these studies argue that the superior ability of domestic FIs to assess projects and its underlying network of contracts, credibly communicate the project's true value, and provide effective monitoring of the project company. As a result, loans can be arranged at lower risk premium by domestic FIs (with or without the involvement of foreign counterparts).

PF is defined as the financing of long-term capital investment through a project company with equity from sponsors and debt capital from lenders on a limited or non-recourse basis (Esty, 2014; Gatti, 2012). PF typically starts with the formation of the project company as a separate legal entity, from its sponsors, and tasked with the responsibility to design, construct and manage the project venture (Corielli et al. 2010). The project company then signs contracts with counterparties to manage the various project risks from construction to sale of output. Esty (2003) describes the contractual feature of PF as *institutional risk management tools*, due to its ability to reduce agency cost and cash flow volatility.

These project contracts and other relevant documents are submitted to lenders to secure debt funding. Lenders, then undertake due diligence on the project to determine an appropriate risk premium (Gatti et al., 2013). The loan contract is usually structured as a form of syndicated loans led by one or more mandated lead arranger (MLA). The lead arranger is appointed by the sponsor through a competitive bidding process (Della Croce and Gatti, 2014) and is principally responsible for undertaking due diligence on the project venture. The lead arranger first examines the project company's network of contracts and relevant documents. After that, participating lenders are invited to provide a share of the loan. However, the non-involvement of participating lenders in the due diligence induce

asymmetric information at the level of the lead arranger. The lead arranger is an informed lender who can monitor and learn about the firm through unobservable and costly efforts, whereas potential participant lenders in the syndicate are uninformed lenders who rely on the information and monitoring provided by the informed lender to make profitable investment in firms (Holmstrom and Tirole, 1997). To overcome the problem of moral hazard, at the lead arranger level, given that informed lender effort is unobservable, the lead arranger must retain a stake in the borrowing firm to reassure the syndicate members that the firm will behave diligently, otherwise referred to as certification. The only study that examine the lead arranger certification in PF is Gatti et al. (2013). The authors explore the relationship between prestigious lead arranger certification and the spread on PF loans. They argue that "the ability to certify arise from the superior ability of the arranging bank to structure and screen the deal set up by the sponsors, as well as to later monitor the loan contract or resolve financial distress situations." Using a sample of 4,122 PF loans arranged from 1991 to 2005, they find that spread on PF loans are significantly lower when arranged by prestigious arrangers (banks that have a high market share in the PF loan market in the year prior to the signing date of the loan), compared to those arranged by non-prestigious lead arrangers. Further, they find that participating lenders, rather than the project sponsors, "pay" for the certification provided by prestigious lead arrangers by allowing them to keep larger fractions of arranging fees.

This chapter builds on the work of Gatti et al. (2013) by examining the causal impact of domestic FI certification on loan spread, using a sample of 1,270 syndicated PF loan tranches signed between 1998 and 2011 and worth over $300 billion. The study merges market data on PF loans from Dealogic Projectware database with ownership data on the lead arrangers and global ultimate owner information from Bankscope and Zephyr databases (Bureau van Dijk), to determine the origin of lead arrangers. Specifically, data from Bankscope and

Zephyr are used to categorise lead arrangers in the sample as domestic or foreign. To derive the causal estimate of certification by domestic FIs, the endogenous switching regression is used to control for potential self-selection of domestic lead arranger into these deals. Specifically, the endogenous switching regression model is used to estimate (i) the determinants of certification by domestic FIs; (ii) the determinants of loan spread for deals with certification by domestic FIs and those without; and (iii) the causal impact of certification by domestic FIs on the loan spread. The main advantage of the endogenous switching regression relatively to other treatment effect models is the explicit estimation of the conditional and counterfactual outcomes.

The main findings are that certification by domestic FIs are less likely when the loans are signed in foreign currencies, have political risk guaranteees included, and are issued by Export-Import bank (EXIM).[18] The study also finds the spread on the loans to be negatively related to currency and sovereign risks. Overall, the causal impact of certification by domestic arrangers is -47 basis points (bps). This impact is economically and statistically significant across the industrial, geographical and income classifications.

The chapter contributes to the literature in various ways. To the best of the author's knowledge, this study is the first to examine the pricing effect of certification by domestic lead arrangers specifically in the context of PF syndicated loans.[19] Using Projectware dataset, the study identifies domestic FIs that act as MLA's as opposed to those who only provide funding to the syndicates. This treatment enables the author to measure the benefits of using

[18] EXIM loans are credit facilities issued by export credit agencies to firm's from that country (usually developed), to undertake businesses in other countries (developing countries). These facilities usually provide political and business risk covers/guarantees.

[19] A domestic arranger can also be a prestigious arranger, for instance if it succeeds in exploiting a *home advantage* to build profitable market share over the long run. However, only six domestic arrangers in the sample can be categorised as prestigious according to the league table of the top 25 PF lead arrangers published in Gatti (2013, pp. 175-178) These arrangers are Gulf International Bank (Bahrain) and Chiao Tung Bank (China) for the period 1998-2005, and State Bank of India (India) Axis Bank (India) IDBI Bank (India), and Korea Development Bank (Koera) for the period 2006-2011.

domestic lead arrangers in both the deal-structuring and the financing phase of the project. The chapter also contributes to the syndicated loan literature on delegated monitoring. The non-involvement of lending banks in the due diligence carried out by the lead arranger on the project company, induce asymmetric information (Focarelli et al., 2008). Specifically, the lead arranger is an "informed lender" who is able to monitor and learn about the firm through unobservable and costly effort whereas potential participant lenders in the syndicate are "uninformed lenders" who rely on the information and monitoring provided by the informed lender to make profitable investment in firms (Holmstrom and Tirole, 1997). The chapter's findings indicate that, in the presence of asymmetric information, domestic FIs help to ameliorate the search and information costs, resulting in an economic reduction in the loan spread.

The rest of the chapter proceeds as follows. Section 3.2 describes the PF syndicated lending process and related literature. Section 3.3 presents the testable hypothesis, while Section 3.4 details the empirical model, variables and how the estimation procedure. Section 3.5 presents the empirical results and Section 3.6 concludes.

3.2 Institutional Features of Project Finance and Syndicated Lending

3.2.1 Project Finance

PF refers to the incorporation of capital ventures as stand-alone investment with equity financing from sponsors and debt financing from lenders, where repayments are tailored to suit the cash flow characteristics of the project (Finnerty, 1996). Three important characteristics distinguish PF from standard corporate finance loans. First, there is a legally distinct project company given the responsibility to design, construct and manage the project venture (Corielli et al. 2010). Second, the project company signs complex network of contracts to manage the various risks of the project. Third, majority of capital (usually 70%

and above) is provided by lenders on a limited or non-recourse basis, which absolves sponsors from any future liabilities in the event of project default (Yescombe, 2006; Gatti, 2008; Esty and Sesia, 2009).

Some studies have examine PF loans and its features. Blanc-Brude and Strange (2007) explore the pricing PF loans for public-private partnerships (PPP) initiatives in Europe. They find that lenders only price systematic risks (risks that affect the probability of default), and manage other risks at the project-level through contracts and project design. Corielli et al. (2010) focus on the contractual mechanism used to manage the project risks. They examine whether NFCs (that is, contracts that generate inflows and outflows that affect the unlevered free cash flows of the project company) affect the loan spread and leverage offered by lenders. They find that NFCs reduce agency costs and cash flow volatility of the project, which in turn reduce (increase) the spreads (leverage) on these loans. Sorge and Gadanecz (2004) show that the term structures of PF loan spread are hump-shaped unlike other loan types. The authors attribute the hum- shaped term structure to effective long-term risk management provided by PF such as short-term liquidity resolution, high leverage, sequential resolution of risk, and the availability of political risk guarantees. Kleimeier and Versteeg (2010) show that PF investments promote economic growth in countries where financial development and governance are weak. Similarly, Hainz and Kleimeier (2012) examine the loan contracts for financing project in countries with high political risk. They conclude that the characteristics of PF (separate incorporation of the project company, high leverage, non-resource lending and the participation of development banks) make it more suitable for developing countries projects.

3.2.2 Syndicated Lending and the Role of Mandated Lead Arrangers (MLAs)

Lending for PF ventures is often carried out through the syndicated loan market. Syndicated lending involves two or more FIs jointly granting a loan to a single borrower Sufi, 2007). This process reduces the duplication of efforts by the borrower in negotiating individually with each lender. It also reduces lenders exposure to a single borrower (Dennis and Mullineaux, 2000; Esty, 2004; Carey and Nini, 2007). The syndication process is typically led by small number of FIs, known as lead arrangers. The lead arrangers negotiate the terms and conditions of the loan with the project company on behalf of the syndicate members. Lead arrangers perform three primary functions. These include conducting due diligence on the project company and its counterparties, forming syndicate to provide the project company with debt capital and monitoring the project company to prevent moral hazards (Gatti et al. 2013). These functions are performed at various stages of the syndication process, which starts once the lead arranger is appointed. Before syndication, there is typically a competitive tendering, where FIs or consortia of them tender their proposals to act as lead arrangers.

The syndication process can be divided into three phases: pre-mandate, post-mandate and post-signing (Sufi, 2007; Chaudhry and Kleimeier, 2013). The pre-mandate phase begins with negotiation and drafting of preliminary loan terms and conditions between the project company and the lead arrangers. The lead arrangers review the project company and the counterparties to obtain information needed for determining an appropriate risk premium. Lead arrangers typically rely on technical experts like engineers, lawyers, financial analyst and accountants to assess these activities. If successful, a preliminary lending agreement is signed between the lead arrangers and the project company (Sufi, 2007). Next at the post-mandate phase, lead arrangers together with the project company produce an information memorandum containing relevant details on the project company and terms of the loan

contract. These are then sent to prospective lenders to invite them to take part in the syndication. Lenders with prior and existing relationships with project company sponsors as well as those within the geographic reach of the project country are more likely to be invited to form the syndicate. However, there are times where new lenders are invited to join the syndicate all together. There is often a road show as part of this phase, where prospective lenders are offered the opportunity to engage the project company and sponsors on details contained in the information memorandum. The phase concludes with the allocation of the loan to each syndicate member and the signing of loan agreements between the project company and syndicate members. The lead arrangers would usually underwrite the loan issue and retain a higher portion. These actions by the lead arrangers convey credible signals on the project creditworthiness (Nini, 2004; Sufi, 2007).

The post-signing phase involves monitoring of the project company by the lead arranger to ensure compliance with the loan agreements. The lead arrangers are usually paid an arranging fee for undertaking these monitoring. There are often multiple FIs (deposit and non-deposit) involved in the transaction structuring and syndication process. These FIs include commercial banks, investment banks, insurance companies, pension funds, private equity funds and sovereign wealth funds (Gatti, 2008). Further, multilateral financing agencies, development banks and export credit agencies (ECAs) play the role of lead arrangers and usually provide guarantees against certain political risk events (Hainz and Kleimeier, 2012).

3.2.3 Asymmetric Information in Syndicated Lending

The chapter relates to two broad areas in the finance literature. First is asymmetric information in the syndicated loan market (Diamond, 1984; Holmstrom and Tirole, 1997 and Sufi, 2007). Second is the role of domestic FIs in financial intermediation (Berger, Klapper and Udell, 2001; Main, 2005 and Degryse and Onega, 2005). Syndicated lending, by design,

induces asymmetric information between the lead arrangers and the participating lenders. This situation is because the efforts of the former are unobservable to the latter as there are no credible way for their actions to be verified. This scenario is similar to Diamond (1984), who referred to banks as *delegated monitors* - by performing costly verification and monitoring on behalf of uninformed creditors (depositors). In the context of syndicated lending, the delegated monitor is the lead arranger, and the uninformed creditors are the participating lenders (Sufi, 2007). As Holmstrom and Tirole (1997) note uninformed lenders only commit to syndicated loans if the lead arrangers take up a higher portion of the loan amount. Thus, with each additional amount of fund provided by the lead arrangers, there is a reduction in their incentive to shirk, which decreases moral hazard. Further, the reputation of lead arrangers can communicate valuable signals to the participating lenders about project creditworthiness. As a result, participating lenders interpret certification by reputable lead arrangers as an indication of project soundness and increase their willingness to join the syndicate (Gatti et al., 2013).

Studies on asymmetric information in syndicated lending support the earlier discussions. Dennis and Mullineaux (2000), Sufi (2007) and Chaudhry and Kleimeier (2013) examine the effect of asymmetric information on syndicate structure. They find that syndicated is more likely when (i) the loan size is large (ii) it is arranged by repuatable lead arrangers, and (iii) borrowing firm is public. Similarly, Lee and Mullineaux (2004) demonstrate that syndicates are smaller and concentrated when borrowers have little public information and have high credit risks. Other studies including Vu and Skully (2008), Ivashina (2009) and Nini (2004) also came to similarly conclusion. Vu and Skully (2008) find that information disclosure by lead arrangers reduces the spread for participating lenders and increases the arranging fee charged by the lead arrangers. Ivashina (2009) finds that the spread on syndicated loans reduce when the lead arrangers retain a higher proportion of the loan size. This reduction is

because lead arrangers in taking-up higher portion of the loan, communicate valuable signal to participating lenders on the creditworthiness of the deal. Nini (2004) also show that certification by domestic banks lowers the observed loan spread. The author attributes this reduction in spread to the certification benefits of domestic lenders who are perceived to be better informed relative to their foreign counterparts.

Studies on PF syndicated loans by Esty and Megginson (2003) and Gatti et al. (2013) came to similar conclusion. Esty and Megginson (2003) demonstrate that the loan syndicates are larger creditor rights protection in the project country is weak. Gatti et al. (2013) show that the loan spread is lower if the lead arrangers are prestigious with participating banks rather than borrower firm paying for the certification via lower upfront arranging fee.

3.3 Testable Hypotheses

The institutional features and related literature discussed in the previous section provide the context to develop the following testable hypotheses on the certification effect of domestic FIs. The main priori is that certification by domestic FIs enhance the loan deal by reducing asymmetric information. The following hypotheses are thus formulated.

Hypothesis 1: Certification by domestic FIs reduces search and information costs, which in turn reduce the loan spread.

Uninformed lenders can mitigate asymmetric information by involving informed lenders as lead arrangers in the loan syndicate. Studies by Berger et al. (2001) and Mian (2006) underscore domestic FIs as informed lenders compared to their foreign counterparts. Other studies have also documented a negative relationship between lenders' geographical proximity and spread on loans (Degryse and Onega, 2005). Domestic FIs are usually better-informed on domestic market conditions, have political connections and can navigate easily the bottlenecks in their local markets. Thus, the inclusion of domestic FIs as lead arrangers

provide an effective mechanism for reducing asymmetric information and project risks. Domestic FIs can reduce search and information cost, due to superior access to so called "soft information" (information that is difficult to completely summarise in numerically score (Peterson and Rajan, 2002).). It is to be expected that the certification by domestic lead arrangers will reduce loan spread. The remaining hypotheses are corollaries to the main hypothesis above.

Hypothesis 2: The reduction in loan spread from certification by domestic FI differs across project industries because of heterogenous industry risks.

In the second hypothesis, the chapter notes that heterogeneity in industry risks should influence the certification effect of domestic FI certification on the loan spread. In emerging market economies, industry-specific risks are pervasive, in part, due to the inadequacy of industry information needed to do effective project due diligence (Jones and Viros, 2014). Thus, it is expected that lenders in certifying PF loans would evaluate these industry-specific risks. However, domestic FIs help to overcome these these difficulties through their knowledge and connections in these markets. Further, project industries differ based on how much risks can be transferred through written contracts. While it is easier to manage raw material and demand risks in an oil and gas or power generation projects, it is however difficult in the case of transportation projects. This difference is because the latter has traffic risks - the risk that actual traffic will be lower or higher than actual forecast (Bull et al., 2017), which is absent in the former. Further, it is easier to write contracts to manage demand risks in power-generation projects, a task that is difficult in transport projects because of difficulties in accurately estimating future traffics.[20]

[20] Bull (2017) notes that a number of toll road projects have ended in high-profile bankruptcies, renegotiations and government bailouts due to inaccurate forecasts whereby actual traffic flows (and associated toll revenues) have turned out to be much lower than forecast. The crystallization of this traffic risk has led to many project

Hypothesis 3: The reduction in loan spread from domestic FI certification differs across projects geographic location due to differences in country risk profile.

The chapter also expects variation in the spread impact of certification by domestic arrangers due to the geographical location of the project. Projects in more developed geographical locations such as Europe are likely to vary from those in less developed regions like Sub-Saharan Africa. Also, these regions differ based on the strength of the financial system. Therefore, the study expects domestic FI certification to differ in line with these heterogeneities.

Hypothesis 4: The impact of certification by domestic FI on the loan spread is higher in countries with lower income classification due to the pervasiveness of asymmetric information.

Lastly, the study expects domestic FI certification to vary across income classification of project countries. Deals located in lower income countries are more likely to have higher risks and asymmetric information when compared to those in high-income countries. Thus, the study expects the impact of certification by domestic arrangers to be higher for lower-income countries.

3.4 Methodology

3.4.1 Data

Data for the study comes from Dealogic ProjectWare. The dataset covers global PF loans provided by transacting banks, agents and project companies. It contains information on loan and project specific characteristics such as tranche spread, tranche amount, tranche maturity, debt to equity ratio, project sponsors, project financiers, project contracts and project

failures. Financiers, now significantly more cognitive of the risk, have a reduced appetite for such projects or are aggressively pricing the risk in their cost of finance.

counterparties. The dataset also categorises project lenders based on their roles, that is, lead arrangers, participating banks, book-runners and agent banks among others. A main drawback, however, is the unavailability of comprehensive pricing variables on these loan contracts. Though data on loan spread is available for a sizeable number of deals that of arranging fees is largely unavailable. This constraint limited the analysis to the loan spreads as the only measure of risk premium in the study. The full dataset covers over 24,000 PF loan tranches (14,000 PF loan deals) signed between January 1997 and March 2013. The study sample is retrieved by extracting all tranches for which the loan spreads are available. This filtering reduced the observation from 24,000 tranches to approximately 5,000 tranches. Next, the study filters out deals not signed in emerging market economies using four emerging market country list: the IMF World Economic Outlook, the FTSE Annual Classification Review, the S&P Dow Jones Country Classification Consultation Results, and the Russell Construction Methodology. This classification reduces the sample to approximately 2,000 loan tranches. To obtain a sample of syndicated loan tranches the study filters out bilateral agreements and club finance loan tranches. The final sample comprises 1,270 syndicated loan tranches (921 PF loan deals) arranged across 53 emerging market between 1998 and 2011 and worth over $300 million.

3.4.2. Endogeneity of Domestic Financial Institutions Certification

The chapter assumes that certification by domestic FIs is endogenous to the outcomes of the loans. In other words, domestic lenders self-select to certificate based on the expected loan outcomes.[21] Self-selection is induced by the domestic FIs superior knowledge on the domestic markets and ability to manoeuvre information opacities. Hence, domestic FIs are

[21] Domestic FIs have connections and networks, that can enhance deal structuring. These networks are valuable when it comes to raising additional capital from the domestic market or generate political support to the venture (Mian, 2006). This is because host governments are likely to be reluctant in intervening or taking actions that jeopardise projects viability, especially when domestic FIs own a substantial share of the domestic financial market or is a state-owned institution (Esty, 2004).

more likely to determine the creditworthiness of deals in order to decide whether to certify or not. Foreign lenders are also likely to include domestic counterparts as lead arrangers in other to benefits from their superior knowledge of the project country. Given that emerging market economies have less developed financial markets, lack credible data across project sectors, have high political, sovereign and regulatory risks, foreign lenders are more likely to use capitalise on the valuable expertise of domestic FIs to manage these risks (Ansar, 2012; Jones and Viros, 2014; Dailami and Leipziger, 1998). Nevertheless, certification by domestic FI in emerging markets is not without costs (Nini, 2004). Emerging market FIs have less capacity to fund large-scale projects consistently and thus have to weigh the opportunity costs of investing these projects compared to their short-term lending functions.

3.4.3 The Model

The chapter draws on studies by Nini (2004), Sorges and Gadanecz (2004), Corielli et al (2010) and Gatti et al. (2013), to develop a model that measures the determinants and impact of certification by domestic lead arrangers. Self-selection by domestic lead arrangers means that ordinary least square (OLS) estimates of certification would be biased. This is because the error term of the loan spread for deals with domestic lead arranger certification and those without are likely to differ. In line with this, study utilised the endogenous switching regression model developed by Maddala and Nelson (1975) and Maddala (1983). The endogenous switching regression model controls for endogeneity using the error term of the selection and outcome equations since unobserved characteristics that influence certification by domestic lead arrangers are likely to be correlated with the loan outcomes.

The basic model is composed of (i) a selection equation that determines which of the two regimes (domestic vs foreign) a loan tranche belongs to and (ii) two loan spread equations for

deals certified by domestic and foreign lead arrangers respectively. The lead arranger's selection equation is specified as

$$I_i = \alpha Z_i + \mu_i \quad (3.1)$$

where I_i is a binary variable, which equals 1 if for loan tranche i a domestic FI is a mandated lead arranger, 0 otherwise. This can be summarised as

$$I_i = 1 \text{ if } \alpha Z_i + \mu_i > 0$$

$$I_i = 0 \text{ if } \alpha Z_i + \mu_i \leq 0$$

The loan spread equations are specified as

$$y_{1i} = \beta_1 X_{1i} + \varepsilon_{1i} \quad (3.2)$$

$$y_{2i} = \beta_2 X_{2i} + \varepsilon_{2i} \quad (3.3)$$

where y_{1i} (y_{2i}) is the loan spread for loan tranche i if it is arranged by one or more domestic lead arrangers (by foreign arrangers only). Z, X_{1i} and X_{2i} are sets of overlapping explanatory variables; α, β_1 and β_2 are the coefficients; μ_i ε_{1i} and ε_{2i} are the error terms of the equation and assumed to have trivariate normal distribution with mean vector zero and covariance matrix shown below.

$$\text{cov}\ (u_i, \varepsilon_{1i}, \varepsilon_{2i}) = \begin{pmatrix} \sigma_\mu^2 & \sigma_{1\mu} & \sigma_{2\mu} \\ \sigma_{1\mu} & \sigma_1^2 & \sigma_{12} \\ \sigma_{2u} & \sigma_{12} & \sigma_2^2 \end{pmatrix}$$

where σ_μ^2 is the variance of the error term in the selection equation (which can be assumed to be equal to 1 since α is estimable to a scale). σ_1^2 and σ_2^2 are the variances of the error terms of the loan spread equations 3.2 and 3.3. $\sigma_{1\mu}$ is the covariance of μ_i and ε_{1i}, σ_μ^2 is the covariance of μ_i and ε_{2i}. σ_{12} is the covariance between ε_{1i} and ε_{2i} and is not defined as y_{1i} and y_{2i} are never observed simultaneously (Lokshin and Sajaia, 2004).

Endogeneity of certification by domestic FI mean the expectation of the error term for equation (3.2) and (3.3) conditional on the selection process will be non-zero, that is,

$$E(\varepsilon_{1i} \mid X, I=1) = -\sigma_{1u} \frac{F(\alpha Zi)}{f(\alpha Zi)} \neq 0$$

$$E(\varepsilon_{2i} \mid X, I=0) = \sigma_{2u} \frac{F(\alpha Zi)}{f(\alpha Zi)} \neq 0$$

where F is a cumulative normal distribution function and *f* is a normal density distribution function. An OLS estimate of equation (3.2) and (3.3) should therefore yield inconsistent estimate of β_1 and β_2.

The model is thus estimated using logarithmic likelihood function with full information developed by Loskin and Sajaia (2004). Ameriya (1973) show that the maximum likelihood estimates of the model is consistent and asymptotically efficient. The log likelihood form is shown as:

$$\text{InL} = \sum (I_i [\text{In}\{(F(\Phi_{Li})\} + \text{In}\{f(\varepsilon_{1i}/\sigma_1)/\sigma_1\}] + (1 - I_i)[\text{In}\{1 - F(\Phi_{N,i})\} + \text{In}\{f(\varepsilon_{2i}/\sigma_2)/\sigma_2\}]) \quad (3.4)$$

where F is a cumulative normal distribution function, and *f* is a normal density distribution function.

$$\Phi_{ji} = \frac{(\alpha Z_i + \rho_j \varepsilon_{ji}/\sigma_j)}{\sqrt{1-\rho_j^2}} \quad j = \text{Domestic FI certification, No domestic FI certification.} \quad (3.5)$$

where $\rho_L = \sigma_{1u}^2/\sigma_u\sigma_2$, is the correlation coefficient between ε_{1i} and u_i and $\rho_N = \sigma_{2u}^2/\sigma_u\sigma_2$, is the correlation coefficient between ε_{2i} and μ. The correlation coefficients determine the selection of domestic and foreign banks conditional on their certification.

3.4.4 Counterfactual Loan spreads and impact of domestic FI certification

After estimating the model parameters for equation (3.1) and (3.2), the study computes the unconditional expectation of loan spread for deals with domestic FI certification and those without using these error terms. For deals with domestic FI certification, the unconditional expectation is the loan spread without self-selection. In other words, it is an estimate of the loan spread for loans with domestic lead arranger certification given that there did not self-select themselves in these deals. The same explanation holds for deals without domestic Fi certification. These are shown below.

$$E\,(y_L \mid X_{Ii}) = \beta_1 X_{1i}$$

$$E\,(y_N \mid X_{2i}) = \beta_2 X_{2i}$$

Endogeneity of domestic FI certification means the characteristic of loans with domestic FI certification is likely to systematically differ from those without domestic FIs certification. If this is true, the error term for the two samples should be different. As a result comparison of the difference between the two subsamples (domestic and non-domestic FI) will yield misleading estimates of domestic FI impact. A better way to access this impact is to first estimates the conditional loan spread given that there is certification less the conditional loans spread if, for the same loans, there is no certification – the counterfactual loan spread.

To measure the impact of certification by domestic lead arrangers, the study estimates the conditional loan spreads for deals with domestic and foreign lead arrangers respectively. These conditional estimates are free of selection bias since the correlation of the error terms of the selection and outcomes equations of the endogenous switching regression controls for it. The conditional loan spread for deals with domestic FI's certification given that domestic FIs actually participated and its counterfactuals specified in equation (3.6) and (3.7) below:

$$E\,(y_L \mid I=1, X_{Ii}) = \beta_1 X_{1i} + \sigma_1 \rho_1 f(\alpha Z_i)/\, F(\alpha Z_i) \quad (3.6)$$

$$E\,(y_L \mid I=0, X_{Ii}) = \beta_1 X_{1i} - \sigma_1 \rho_1 f(\alpha Z_i)/\{1-F(\alpha Z_i)\} \quad (3.7)$$

Similarly, the conditional loan spread for deals without domestic FI certification and the counterfactual loan spreads are given in equations (3.8) and (3.9) respectively below.

$$E\,(y_N \mid I=0, X_{2i}) = \beta_2 X_{2i} - \sigma_2 \rho_2 f(\alpha Z_i)/\{(1-F(\alpha Z_i)\} \quad (3.8)$$

$$E\,(y_N \mid I=1, X_{2i}) = \beta_2 X_{2i} + \sigma_2 \rho_2 f(\alpha Z_i)/\{(1-F(\alpha Z_i)\} \quad (3.9)$$

The impact of domestic FI certification is calculated as the difference between equation (3.6) and (3.7) or equation (3.8) and (3.9). Thus, the impact of certification by domestic lead arrangers is the loan spread for deals with domestic FI certification conditional that they did have domestic certification less their counterfactual loan spread. Alternatively, domestic FI certification can be measured as the difference between loans spread for deals foreign lead arrangers certification conditional that they have no domestic FI certification and the counterfactual loan spread.

However, in this chapter the latter definition of impact, that is the difference between equation (3.8) and (3.9). This treatment is because loan deals with foreign lead arrangers that have a clean sample unlike those with domestic lead arrangers. Specifically, these loans have only foreign lead arrangers certifying it. On the other hand, the sample with domestic lead arranger certification can have foreign lead arrangers certifying as well. Thus, using equation (3.8) and (3.9), the conditional loan spread reflects only the estimate for deals structured by foreign mandated lead arrangers since no domestic FIs are contained in this categorise.

Equation (3.8) measures the conditional loan spread given that the loans did have non-FI certification while (3.9) measures the counterfactual loan spread if these deals had domestic FI participating instead. Where the estimate of (3.8) is higher than (3.9), then domestic FI certification is beneficial, since it leads to a lower loan spread. Alternatively, where the

estimate of (3.8) is lower than (3.9) then it means domestic FI certification is more expensive compared to deals without domestic FIs.

The empirical estimates of (3.8) and (3.9) are reversed to (3.9) - (3.8) to ensure that the estimate of the impact provides a clearer intuition on domestic FI certification. Thus, where domestic FI certification is beneficial, the impact will be a negative reflecting a reduction in the loan spread. Similarly, positive difference indicates that domestic FI certification increases loan spread for such deals.

3.4.5 Variable Definition and Sources

For each syndicated PF loan tranche included in the sample, information on microeconomic loan characteristics (tranche spread, tranche amount, tranche final maturity and tranche sign date), project-specific characteristics (currency risk, guarantees and refinance loans) and project sector as well geography are used. Additional controls are created for loan types (term loans, credit facilities, bridge loans and standby facilities). Macroeconomic variables are also added to capture the level of financial development and sovereign credit risk in the project country.

The dependent variable, tranche loan spread*,* is the value of spread over base rates such as Libor, Euribor and US Treasury Bill. This variable measures the cost and risk premium on the loan deals. In line with Corielli et al. (2010), the chapter uses the spread above these base rates as a measure of risk premium. However, there are instances where deals are priced as an absolute value without any base rate. In such cases, the study uses the absolute spread values as recorded in the dataset. This loan spread data exhibited various heterogeneity regarding its term structure. In most instances, loan spreads are priced in tiers, usually to correspond with the various phases of the project and in anticipation of future risk changes. A sizeable number of deals are also structured as a single rate over the base rate throughout the loan period. To

ensure that the tranche loan spread is homogenous, the chapter computed a weighted average method, where the maturity for each loan spread represents the weights. This treatment is in line with Blanc-Brude & Strange (2007) and Corielli et al. (2010), who also used the weighted average method to estimate the loan spread.

To distinguish between loans with domestic and foreign FI certification, a dummy variable is created, that equals one (1) if domestic FIs certify and zero (0) otherwise. A domestic lead arranger is an FI owned by shareholders resident in the project country, without a foreign owner or controlling parent (Nini, 2004). Hence, banks domiciled in a project country but are subsidiaries of foreign banks/parents, are classified as a foreign bank in the study. ProjectWare provides detailed information on the names of all the FIs in a PF deal and their roles. For each deal, the study checks the origin of the lead arranger using the global ultimate ownership field (GUO) in Zephyr and Bank Scope. When one or more lead arrangers are domestic without a foreign owner or controlling parent, it is assigned the value one or zero otherwise. Zephyr is also used to track FIs that have merged or were acquired during the sample period. If this is the case, it is only the ownership status at the time the loan is made that it used.

Other loan microeconomic variables include tranche amount, tranche maturity, tranche guarantees, where the tranche has an explicit political risk guarantee; tranche refinance, where the deals are to finance an on-going project and currency risk: deals structured in currencies other than that of the project country. The study also included additional dummies to account for the tranche loan types, such as secured, short term, credit facilities, EXIM and term loans. To account for industrial, regional and yearly differences, the chapter created industrial, regional and yearly dummies for each of the years captured in the sample period.

Similar to Nini (2004) the study measures sovereign credit risk using Institutional Investor magazine country credit score. The scores are compiled by interviewing leading economists from leading investment banks globally, to ascertain their outlook on sovereign credit risk. These responses are then compiled into scores ranging from 1-100, with a higher score indicating improved sovereign credit risk outlook. The scores are released biannually in March and September of every year. This variable is preferred to other sovereign credit risk measures because of its periodic and futuristic nature. The other macroeconomic variable, Private Credit to GDP, is a measure of the level of financial development in the model. The variable is included to account for the impact of financial development on domestic FI certification. Data on private credit by deposit money bank and other FI to GDP measured in US constant and obtained from World Bank Financial Development and Financial Structure Dataset first developed by Beck et al. (2000) and Cihak et al. (2012). A list of all the variables and their description is provided in Appendix 1.

3.5 Empirical Results

This section reports the main results of this chapter. It begins with the univariate analysis of the loan sample. This is followed by summary distribution of the loan sample based on industry, geography and country income classification. Next, the empirical results from the regression analysis are reported.

3.5.1 Descriptive Statistics

3.5.1.1 Comparison of Loan Tranches by Type of Arrangers

Table 3.1 shows the descriptive statistics of the sample data of syndicated PF deals structured in emerging markets for the period 1998 to 2011. Panel A reports the summary statistics for the full sample while Panel B and C reports that of deals with domestic and foreign FI certification respectively.

Results for the full sample in panel A show that on average, PF deals are priced 216 bps above the base rate with a maximum spread of 2,284 bps. The mean loan spread in Panel B and C are also similar to that of the full sample. However, the standard deviation indicates that there is more variation in the loan spread for deals with certification by domestic FI (232.7bps) compared to those with certification by foreign FI (144.1 bps).

Table 3.1: Univariate analysis of loan tranches by type of arrangers

1998-2011	Loan Tranches (Number)	Total ($USM)	Percent	Mean	St. Dev	Min	Max
Panel A: Full Sample							
Tranche spread (bps)	1270			215.5	185.9	1	2284
Tranche Maturity (months)	1270			122	75	0.96	393
Tranche Amount ($USM)	1270	306,360	100	241.2	403.6	0.32	6787
II Credit Risk (0-100%)	1262			57.8	14.8	4.3	87.1
Private Credit to GDP (%)	1252			61	43.6	8.1	159.6
Panel B: With Domestic FI Certification							
Tranche spread (bps)	526			214.9	232.7	10	2284
Tranche Maturity (months)	518			147.9	82.4	2.4	393
Tranche Amount ($USM)	526	158,301	52%	301	538	0.32	6,788
II Credit Risk (0-100%)	522			65.8	12.1	18.3	87.1
Private Credit to GDP (%)	525			85.2	48.3	9.4	159.6
Panel C: Without Domestic FI Certification							
Tranche spread (bps)	744			215.9	144.1	1	1150
Tranche Maturity (months)	734			103.8	63.7	10	300
Tranche Amount ($USM)	744	148,058	48%	199	263.4	1.3	2,186
II Credit Risk (0-100%)	730			52.1	13.8	4.3	87.1
Private Credit to GDP (%)	737			43.6	29.5	8.1	159.6

Table 3.1 shows the univariate analysis for syndicated project finance deals for the sample period. Panel A, reports the results for the full sample of deals in our study while panel B and C shows the result for deals with domestic FI certification and those without domestic FI certification respectively. Sample period: 1997-2011.

Tranche Maturity for the full sample is 122 months (10.2 years) with the longest contract spanning 393 months (32.8 years). For deals with domestic FI certification, the average maturity is 147 months relative to 103 months in Panel B and C respectively, with the maximum value indicating that deals with domestic FI certification have longer tenor (maturity). Tranche Amount for the full sample of syndicated PF deals shows an average of $241.2 million. This amount can, however, be as low as $320,000 rising up $6.8 billion. For the subsample of deals with domestic FI certification, the average tranche amount is slightly

higher at $304 million, while those without domestic FI certification are lower at $199 million. The total value of deals with domestic certification is $158 billion (52%), compared to $148 billion for deals without domestic certification. Interestingly, deals with certification by foreign FIs have more tranches (744) compared to those with domestic certification (526). These results confirm the capital-intensive nature of PF transactions. It also shows that foreign FI use more tranches in financing deals in these markets.

II Credit Risk, a measure of sovereign credit risk, reports an average score of 57.8 for the full sample with a standard deviation of 14.8. The sample deals with domestic FI certification show an average rating of 65.8 compared to 52.1 for deals without domestic bank certification. Generally, the results indicate that countries with better sovereign credit risk outlook are more likely to have domestic FIs certification. The average value of Private Capital to GDP for the full sample is 61 with a maximum value of 159.6. Deals with certification by domestic FI's record higher ratio of 85.2 while those with foreign lead arranger's certification record an average of 43.6. This result indicates the importance of financial development in promoting domestic FI certification.

3.5.1.2 Summary Statistics of Loan Tranches

Table 3.2 shows the summary description of loan tranches based on Industrial, Regional and Income classifications over the sample period. Panel A reports the results for industrial classifications, while panel B reports that of regional classifications. Finally, panel C reports the results for income classifications. Column 1 shows the individual count of deals, while column 2 reports the dollar value of the tranche value in (US$ million). The mean and standard deviation of the tranche amount is reported in column 3 and 4. For each panel, we report the statistics for loans certification by domestic FIs and that of foreign lenders.

Panel A of Table 3.2 indicates that infrastructure projects (transportation and water and sewage) receive more domestic FI certification, while extractive projects (mining, oil & gas, power & utility) and telecommunication receive lower domestic FI certification. The tranche value on these projects also shows that deals with domestic FI certification are usually larger compared to those without them. The results further indicate that foreign FIs usually participate in infrastructure projects together with domestic FIs in these markets. Governments in emerging markets economies have interests in infrastructure projects and are likely to promote more domestic FI especially they state-owned. A recent case is Brazil and India, where the government through state-owned FIs have undertaken numerous infrastructure projects over the past decades (Izaguirre, 2011). These government supports are likely to have driven the results reported here. In panel B, the study finds that domestic FI certification is more likely in regions like Indian Subcontinents, Middle East and South-East Asia. Tranche values show that domestic FI certification is associated with high-value deals compared to those without domestic FI certification. Interestingly, these regions include countries like India, South Korea, China and Saudi Arabia and UAE who in the last decade have increased their infrastructure investments (Ansar, 2012). On the other hand, Latin America, Western & Eastern Europe and Sub-Saharan Africa have relatively low domestic FIs certification. Lastly, panel C shows that income classification offers some explanation on domestic FIs certification. While 293 deals had domestic certification from high-income countries, only 82 deals had domestic certification in lower-income countries. However, the sample did not record any domestic FI certification for lower-income countries. Regarding mean value, the study finds that deals with domestic FI certification are higher compared to those without domestic FI certification.

Table 3.2: Descriptive statistics of project finance loan tranches based on industrial, regional and income classification of PF deals from 1998 to 2011

	No of Tranches		Value		Mean		St. Dev	
	With domestic FI	Without domestic FI	With domestic FI	Without domestic FI	With domestic FI	Without domestic FI	With domestic FI	Without domestic FI
Panel A: Industrial Classification								
Industrial and Commercial	35	29	14,200.90	3,310.50	405.7	114.2	680.6	189.2
Mining	10	38	2,065.90	8,381.60	206.6	220.6	222.3	207.2
Oil and Gas	46	159	26,830.50	52,933.80	583.3	332.9	819.4	365.3
Petrochemical	55	51	23,598.60	15,502.10	429.1	304	356.2	363.8
Power and Utility	98	198	31,292.40	34,535.40	319.3	174.4	429.3	210.4
Telecommunication	37	138	10,711	20,046	289.5	145.3	482	198
Transportation	134	61	43,321.50	7,315.30	322.6	119.9	663.7	137.4
Water and Sewage	32	28	1,062.10	1,453.30	33.19	51.9	29.4	47.1
Others	79	43	5,308.60	4,592.10	67.2	106.8	164	108.2
Total	526	745	158391.5	148,070.10				
Panel B: Regional Classification								
Indian Subcontinent	53	23	18,313.20	3,924.50	345.5	170.6	509.1	183.9
Latin America	44	255	12,798.60	46,918.90	290.9	184	301.3	185.5
Middle East	103	115	62,503.50	29,698	606.8	258.2	708.8	283.5
South-East Asia	259	137	43,606.20	18,202.40	168.4	132.9	484.9	160.1
Sub-Saharan African	7	45	1,464.30	9,833.90	209.2	218.5	135	357.4
Western Europe	20	50	8,672	5,070.90	433.6	101.4	429.8	119.5
Eastern Europe	40	119	10,943.80	34,410.10	273.6	289.2	333.6	417.3
Total	526	744	158301.6	148,058.70				
Panel C: Income Classification								
High Income	293	223	90970.3	63,658.30	310.5	285.5	521	361.9
Upper Middle Income	151	358	42684.2	56,112.20	282.7	156.7	621.9	173.3
Lower Middle Income	82	157	24647	26,114.50	300.6	217.7	425.1	217.7
Lower Income	-	6	-	2,173.70	-	362.3	-	585.3
Total	526	744	158301.5	148,058.70				

Table 3.2 shows the distribution of syndicated project finance tranches based on the Industrial, regional and income classifications of the project tranche amount. For each of the classifications, we compute number of tranches, deal value, mean and standard deviation for deals with and without domestic FI certification. Panel A reports the result for industrial classification while panel B reports that of regional classification. Finally, panel C reports the result for income classification. Sample period: 1997 - 2011.

3.5.1.3 Distribution of Loans Tranches

Table 3.3 shows the distribution of PF loan tranche value based on industrial, regional and income classification of project countries for the period 1998 to 2011. Panel A, shows that oil & gas, power & utility and petrochemical projects accounts for more than half (60%) of all project in the sample. Regarding deal size, these projects together with transportation account for the highest mean values. This result indicates that a high proportion of these deals are energy related. Infrastructure related projects like transportation and telecommunication account for 16% and 10% respectively. However, infrastructure projects in water & sewage and others accounted for less than 5% of total project value. The regional distribution of the loan sample shows that most of the projects are located in South-East Asia, Middle East and Latin America accounting for 69% of total project value. This result is followed by projects in Eastern Europe (15%) while projects in Indian Subcontinent, Western Europe and Sub Saharan Africa account for 11% of total value of PF deals. Finally, the income classification shows a polarisation of deals in high-income countries, accounting for 50% in deal values. This result is followed by Upper Middle and Lower Middle-Income countries, which account for 32% and 17% respectively. Low-income countries formed only 1% of the total project value.

Table 3.3: Descriptive statistics of syndicated project finance deals based on industrial regional and geographical classifications

	Tranches	Value (US$M)	St. Dev	Mean	St. Dev	Min	Max
Panel A: Industrial Category Projects							
Industrial and Commercial	64	17511.4	6%	273.6	536	2.8	2,800
Mining	48	10,447.5	3%	217.7	208	10	950
Oil & Gas	205	79,764.3	26%	389.1	512.3	2.6	3,600
Petrochemical	106	39,100.7	13%	368.9	363.9	15	2,000
Power & Utility	296	65,827.9	21%	222.4	307.9	1.3	2,672
Telecommunication	175	30,757	10%	175.8	287.1	3.9	2,451
Transportation	195	50,546.8	16%	259.2	562.8	1.3	6,788
Water and Sewage	60	2,515.5	1%	41.9	39.5	1.6	154
Others	122	9,900.7	3%	81.2	147.5	0.32	1,314
Total	1271	306,371.8	100%				
Panel B: Regional Classification							
Indian Subcontinent	76	22,237.7	7%	292.6	442.9	10.3	2672
Latin America	299	59,717.5	19%	199.7	209.5	2.6	1314.4
Middle East	218	92,201.5	30%	422.9	555.7	1.3	3600
South-East Asia	396	61,808.6	20%	156.1	403.3	0.32	6787.8
Sub-Saharan African	52	11,298	4%	217.3	335.2	14.9	1785
Western Europe	70	13,742	4%	196.3	289.6	4.8	1639.3
Eastern Europe	159	45,353	15%	285.2	396.9	1.3	2185.5
Total	1270	306,358	100%				
Panel C: Income Classification							
High Income	516	154,628.5	50%	299.7	458.8	0.32	3600
Upper Middle Income	509	98,796.4	32%	194.1	372.1	1.3	6787.8
Lower Middle Income	239	50,761.6	17%	212.4	310.9	4.8	2672
Lower Income	6	2,173.7	1%	362.3	585.3	80	1550
Total	1270	306,360.2	100%				

Table 3.3 shows a breakdown of our sample based on industrial, regional and income classification. Panel A shows the results based on Industrial classification of projects while Panel B classify the sample based on geographic regions. In panel C, classification is based on Income level of project country. Sample period: 1997-2011.

3.5.2 Determinants of Certification by Domestic Financial Institutions

Table 3.4 reports the coefficients of the determinant of domestic FI certification using the endogenous switching regression model. Model 1 reports result for loan characteristics, country credit risk and financial development. Model 2 add interaction term of sovereign credit risk (II Credit Risk) and year dummies to the variables in Model 1, while Models 3, 4 and 5 adds loan types, industry and regional dummies respectively.[22]

The results show domestic FIs certification is likely when the loan tranches have longer maturities. The estimated coefficients on Tranche Maturity are positive and statistically significant in Models 1, 3 and 4. This finding adds to the notion in the syndicated lending literature that domestic bank certification is required when the loan maturity is longer (Nini, 2004). Similarly, Tranche Amount is positive and statistically significant in Model 1, 2, 3 and 4, suggesting that domestic FI certification is likely for larger project. Tranche Guarantee is negatively related to domestic FI certification and statistically significant at the 10% level across all the models. These results mean that deals structured with political risk guarantees are less likely to have certification by domestic FIs. This finding potentially suggests that domestic FI certification is more likely when political risk guarantees are not in place. Tranche Currency is negatively related to certification by domestic FIs and significant at the 1% level across all the models. The coefficients suggest that deals structured in foreign currencies are less likely to receive certification from domestic FIs. With currency fluctuation common in emerging markets, the negative relationship observed suggests that domestic FI reduce their exposure to foreign currencies deals to guard against future fluctuation. Further, EXIM Loans are significant in all the three models at the 5% significant level. The coefficients for Short-Term loans and Credit Facilities are also positively associated with

[22] The coefficient on the unreported coefficients (that is, interaction term of II Credit Risk and year dummies, industrial dummies and regional dummies) are provided in Appendix 1.2.

certification by domestic FIs. However, these coefficients are insignificant. The coefficients on industrial and regional dummies (reported in Appendix 1.2) are positively related to domestic FI certification but statistically insignificant across all the five models.

The measure of sovereign credit risk, II Credit Risk, is positively related to domestic FI certification in all the five models. These results show that countries with better sovereign credit risks are likely to have domestic FI certification. However, these results are insignificant in all models except Model 2 and 3. The interaction term of II Credit Risk and year dummies yield some variations in sovereign credit risk over the sample period. The estimated coefficients (in Appendix 1.2) show that for most years, sovereign credit risk remains positively related to domestic FI certification. The estimated coefficients for the loan type dummies show that domestic FI certification is less likely when loan is secured or a term loan. Finally, Private Credit to GDP, included in the regressions to instrument for the endogeneity of domestic FI certification, shows a positive relationship with domestic FI certification. The results show positive relationship between financial development and certification by domestic lead arrangers. The results are statistically significant at the 5% level. This result is weaker than that of Nini (2004) who also found a positive and significant relationship between domestic bank certification and financial development for syndicated loans in emerging markets.

Overall, the results identify loan maturity, currency risk and EXIM facilities as the main determinants of certification by domestic FIs. Aside these, most variables in the model are statistically insignificant. These results are somewhat similar to those obtained by Nini (2004) who also examined domestic bank participation in emerging market economies. [23]

[23] To check for potential multicolinearity, a correlation analysis of the key variables is carried out and reported in Appendix 1.3. The results indicate that multicolinearity is less likely to bias the estimated results in Table 3.4,

Table 3.4: Determinants of certification by domestic financial institutions

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	-2.575 ***	-2.072**	-2.265***	-2.188***	-1.293*
	(0.868)	(0.682)	(0.628)	(0.604)	(0.606)
Tranche Maturity	0.227 ***	0.167	0.199*	0.165*	0.075
	(0.079)	(0.109)	(0.091)	(0.099)	(0.099)
Tranche Amount	0.115*	0.105**	0.097*	0.096*	0.090
	(0.064)	(0.045)	(0.052)	(0.051)	(0.057)
Tranche Guarantee	-0.386*	-0.439**	-0.521**	-0.523**	-0.652**
	(0.208)	(0.219)	(0.245)	(0.218)	(0.234)
Tranche Refinance	0.210	0.178	0.139	0.147	0.122
	(0.121)	(0.123)	(0.123)	(0.129)	(0.129)
II Credit Risk	0.014	0.016**	0.014*	0.011	0.012
	(0.009)	(0.008)	(0.008)	(0.008)	(0.009)
Tranche Currency	-1.265***	-1.306***	-1.250***	-1.178***	-1.097***
	(0.158)	(0.151)	(0.163)	(0.165)	(0.207)
Private Credit/GDP	0.246**	0.158	0.181	0.199	0.038
	(0.094)	(0.161)	(0.124)	(0.146)	(0.205)
Loan Type dummies: Secured			-0.249	-0.292	-0.213
			(0.280)	(0.267)	(0.269)
Short Term			0.145	0.19	0.0873
			(0.220)	(0.213)	(0.226)
Credit Facility			0.008	-0.017	0.012
			(0.287)	(0.282)	(0.265)
Term Loan			-0.011	0.018	-0.030
			(0.201)	(0.192)	(0.185)
EXIM loans			-1.385**	-1.327**	-1.553**
			(0.501)	(0.484)	(0.525)
II Credit Risk * Yearly Dummies	No	Yes	Yes	Yes	Yes
Industrial Dummies	No	No	No	Yes	Yes
Regional Dummies	No	No	No	No	Yes
No of Observations	1228	1228	1228	1228	1228

Notes: This table reports the results of the determinants of certification by domestic FI using an endogenous switching regression model. Model 1 includes microeconomic and macroeconomic determinants. Model 2 adds the interaction term II Credit Risk multiplied by yearly dummies. Models 3-5 control for loan type, industrial and regional dummies. Robust standard errors in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% respectively.

3.5.3 Determinants of Loan Spread for Deals with and without Domestic FI Certification

The results in Tables 3.5 and 3.6 are the loan spread determinants for deals with domestic and foreign FI certification respectively. The estimated coefficients on Tranche Currency in

with the highest correlation coefficient of 0.645 (that is, the correlation coefficient on tranche currency and private credit to GDP)

Tables 3.5 and 3.6 are both negative, indicating an inverse relationship with the loan spread. The magnitude on the coefficients for Tranche Currency in Table 3.5 reduced from -0.78 to -0.49 after controlling for industrial and regional characteristics. Similar reductions are observed for Tranche Currency in Table 3.6 with the coefficient reducing from -1.16 to -0.72 across the models. However, coefficient is insignificant once the study controls for regional differences in Model 5. The magnitude of reduction is higher for loans without domestic FI certification (Table 3.6). These results contradict that of Corielli et al. (2010) who find currency risks to be an insignificant determinant of PF loan spread. The coefficients on II Credit Risks are negatively related to the loan spreads in Table 3.5 and 3.6. The magnitudes of the coefficients are also similar for the two samples. For deals with domestic FIs certification, the coefficients remain significant at the 1% across the models while, those without domestic FI certification are insignificant in model 5. The results indicate that loan deals signed in countries with better sovereign credit risk are priced lower than those in countries with higher sovereign credit risk. Further, the study finds that these effects are stronger in deals with certification by domestic FIs. These results are similar to those of Nini (2004), who also report negative relationship between sovereign credit risk and loan spread. The unreported coefficients (see Appendix 1.4) from the interaction of *II Credit* and year dummies are positive and statistically significant for deals with certification by domestic FIs. On the other hand, these coefficients were only significant in 2008 for deals without the certification of domestic FIs. The coefficient on EXIM loans shows a positive relationship with the loan spread in Table 3.5 and 3.6. This result means EXIM loans are priced higher irrespective of whether domestic FIs are involved or not. However, the coefficient on EXIM becomes insignificant after controlling for regional differences (Model 5). Credit Facilities and Term Loan estimates are positively related with loan spread, while Secured Loans and

Short-Term Loans shows a negative relationship. However, these estimates are not significant.

The coefficients on industrial dummies (reported in Appendix 1.4), indicate that loan spread is relatively higher for Transportation and Industrial & Commercial projects. While results for Transportation projects are significant across the sample, Industrial and Commercial projects are only significant for the sample without domestic FI certification. These results may indicate that foreign lenders reduce their exposure to Industrial and Commercial projects in emerging markets, where economic uncertainties are higher. In response, foreign lenders charge a higher risk premium for investing in these markets. Coefficients on the regional dummies in Appendix 1.4 show that deals in Latin America and South East Asia are positively related to loan spread and significant at 5% and 10% levels.

Finally, the covariance of the error terms measures whether FI certification in the two samples are beneficial compared to the average population. For deals with domestic bank certification, the error term of covariance with certification equation ranges between 0.46 and 0.58, while deals without domestic certification have a covariance ranging from 0.92 to 0.95. These estimates are, however, not significant indicating that deals with domestic FI certification are not necessarily better than the average population.

Table 3.5: Loan spread results for deals with certification by domestic financial institutions

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	5.628***	6.239***	6.294***	6.271***	5.518***
	(0.794)	(0.499)	(0.538)	(0.529)	(0.526)
Tranche Maturity	-0.011	-0.022	-0.075	-0.092	-0.065
	(0.071)	(0.056)	(0.058)	(0.056)	(0.050)
Tranche Amount	-0.021	-0.035	-0.043	-0.057*	-0.038
	(0.034)	(0.025)	(0.025)	(0.026)	(0.025)
Tranche Guarantee	-0.3	-0.209	-0.136	-0.101	-0.066
	(0.360)	(0.332)	(0.316)	(0.274)	(0.252)
Refinance	0.113	0.073	0.051	0.016	-0.031
	(0.138)	(0.125)	(0.121)	(0.114)	(0.112)
Tranche Currency	-0.780**	-0.726***	-0.672***	-0.595***	-0.496**
	(0.296)	(0.172)	(0.161)	(0.147)	(0.152)
II Credit Risk	-0.007	-0.027***	-0.027***	-0.026***	-0.023***
	(0.007)	(0.006)	(0.005)	(0.005)	(0.006)
Secured			-0.151	-0.203	-0.229
			(0.239)	(0.243)	(0.253)
Short-Term			0.028	-0.028	-0.019
			(0.192)	(0.185)	(0.192)
Credit Facility			0.143	0.061	0.11
			(0.269)	(0.282)	(0.282)
Term Loan			0.264	0.252	0.204
			(0.182)	(0.184)	(0.197)
EXIM			1.078***	0.885**	0.029
			(0.306)	(0.310)	(0.395)
II Credit Risk * Yearly Dummies	No	Yes	Yes	Yes	Yes
Industrial Dummies	No	No	No	Yes	Yes
Regional Dummies	No	No	No	No	Yes
Error Term Covariance	0.54	0.52	0.46	0.46	0.58
Number of Observations	1228	1228	1228	1228	1228

Notes: This table reports the loan spread equation of the endogenous switching regression model for deals with domestic FI certification. Model 1 includes microeconomic and macroeconomic determinants. Model 2 adds the interaction term II CR multiplied by yearly dummies. Models 3-5 control for loan type, industrial and regional dummies. ***, **, * denote significance at the 1%, 5% and 10% respectively.

Table 3.6: Loan spread regression for deals without certification by domestic financial institutions

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	6.038***	6.632***	6.793***	6.625***	6.092***
	(0.36)	(0.38)	(0.348)	(0.403)	(0.444)
Tranche Maturity	0.092	0.065	0.048	0.021	0.040
	(0.061)	(0.053)	-0.047	-0.049	-0.05
Tranche Amount	0.005	-0.028	-0.035	-0.034	-0.028
	(0.065)	(0.041)	(0.047)	(0.044)	(0.051)
Tranche Guarantee	-0.206	-0.15	-0.135	-0.17	-0.152
	(0.12)	(0.111)	(0.111)	(0.114)	(0.109)
Refinance	0.265*	0.213*	0.184	0.133	0.116
	(0.105)	(0.104)	(0.099)	(0.096)	(0.09)
Tranche Currency	-1.161*	-0.999*	-0.900*	-0.837*	-0.716
	(0.571)	(0.457)	(0.393)	(0.377)	(0.458)
II Credit Risk	0.002	-0.017*	-0.018**	-0.021***	-0.020***
	(0.01)	(0.007)	(0.006)	(0.006)	(0.006)
Secured			-0.032	-0.055	-0.068
			(0.178)	(0.176)	(0.170)
Short Term			-0.355	-0.332	-0.204
			(0.185)	(0.193)	(0.203)
Credit Facility			-0.245	-0.224	-0.0991
			(0.191)	(0.194)	(0.186)
Term Loan			-0.057	-0.0342	-0.037
			(0.152)	(0.151)	(0.152)
EXIM			-1.467***	-1.488***	-1.385***
			(0.263)	(0.265)	(0.289)
II Credit Risk* Yearly Dummies	No	Yes	Yes	Yes	Yes
Industrial Dummies	No	No	No	Yes	Yes
Regional Dummies	No	No	No	No	Yes
Error Term Covariance	0.95	0.92	0.91	0.9	0.92
Number of Observations	1228	1228	1228	1228	1228

Notes: This table reports the loan spread equation of the endogenous switching regression model for deals without domestic FI certification. Model 1 includes microeconomic and macroeconomic determinants. Model 2 adds the interaction term II CR multiplied by yearly dummies. Models 3-5 control for loan type, industrial and regional dummies. ***, **, * denote significance at the 1%, 5% and 10% respectively.

3.5.4 Impact of Certification by Domestic Financial Institutions

The coefficients in Model 5 of Table 3.5 and 3.6 are used to construct conditional and counterfactual loan spreads for loan tranches arranged by foreign arrangers using equation (3.8) and (3.9). The conditional and counterfactual loan spreads are converted from their natural logarithm forms to basis points using the exponential function. The conditional loan spread for loans without domestic FI certification is the expected loan spread given that these loans actually had no domestic FI certifying them [eq. (3.8)]. The counterfactual loan spread

for deals without domestic FI certification is the expected loan spread conditional that these loans have had domestic FI certification [eq. (3.9)]. The spread impact is computed as the difference between these two expected loan spreads (conditional less counterfactual). In Table 3.7 the conditional loan spread is subtracted from the counterfactual for interpretational convenience so that impact is measured as a negative value if domestic FI certification reduces expected loan spread. Table 3.7 also reports the median, 25th and 75th percentile of the spread impact. The 'Percentage Impact' is the basis point spread impact divided the conditional loan spread. The results in Table 3.7 are statistically significant at the 1% level. Panel A reports the spread impact by industry classifications while panel B is based on geographical classification. Panel C is based on income classification.

The mean basis point spread impact for the full sample of loans without domestic FI certification is - 47 bps with 75th percentile impact of -61 bps. This result means that, for deals without domestic FI certification, the spread is 47 bps lower compared to those without domestic FI certification. This finding supports the first hypothesis, which states that certification by domestic FIs can be valuable in reducing asymmetric information, which in turn reduces spread. Panel A also reports the spread impact result for industrial classifications. The results show that Water and Sewage projects have the highest spread impact of -91 bps with median impact of -53 bps. The 75th percentile is also -68 bps. This is followed by projects in Mining, Oil and Gas, and Power and Utility sector. The sectors that receive the lowest impact include Transportation, Petrochemical and Commercial projects. Overall, the negative result confirms the widespread effect of domestic FI certification in all the industrial classification. It shows that domestic FI certification affects deals in all industry categories. These results confirm the second hypothesis that the impact of domestic FI certification varies across industry due to differential risks and cash flow characteristics.

Table 3.6: Impact of domestic financial institution certification

	Basis Point Impact				Percentage Impact	
	Mean	25th Pctl	Median	75th Pctl	Mean	Median
Total Sample	-47	-20	-33	-61	0	-42
Panel A: By Industry						
Industry and Commercial	-23	-5	3	-37	-4	-33
Mining	-79	-69	-68	-111	-69	-91
Oil and Gas	-67	-25	-56	-97	-78	-108
Petrochemical	-28	-21	-26	-9	-42	-9
Power and Utility	-61	-21	-60	-91	-71	-80
Telecommunication	-56	-42	-52	-53	-66	-44
Transportation	-21	-20	-12	-5	-13	-4
Water and Sewage	-91	-43	-53	-68	-83	-65
Panel B: By Geography						
Eastern Europe	-43	-27	-52	-49	-62	-86
Indian Subcontinent	-143	-106	-128	-200	-209	-229
Latin America	-87	-39	-96	-111	-73	-91
Middle East	-31	-17	-31	-29	-51	-62
South East Asia	-50	-18	-36	-49	-62	-48
Sub Saharan Africa	-73	-75	-76	-78	-81	-88
Western Europe	-76	-42	-67	-96	-120	-102
Panel C: By Income Classification						
High Income	-45	-24	-32	-37	-65	-52
Upper Middle Income	-48	-33	-42	-60	-49	-48
Lower Middle Income	-113	-84	-104	-146	-131	-132

Notes: The table reports the basis point spread impact and the percentage spread impact for our sample of syndicated project finance deals. Column 1 reports the mean impact, which is the difference between the counterfactual and the conditional loan spread together with 25th, median and 75th percentile values. Column 5 and 6 reports the mean and median percentage impact, which is the mean spread impact divided by conditional loan spread

The geographical distribution of spread impact in Panel B shows that Indian subcontinent, composed of India and Pakistan have the largest impact reporting a mean spread impact of -143 bps with a 75th percentile impact of -200 bps. This region experienced a higher proportion of domestic FI certification compared to other regions in the sample from Table 3.2 and 3.3. In India for instance, the number of government-owned banks is over 50% of the banking sector (Izaguirre, 2011) and could have accounted for the observed differences. This is followed Latin America, Western Europe, and Sub-Saharan Africa with spread impacts of -87 bps, -76 bps and 73 bps respectively. However, these regions have a lower domestic FI certification from Table 3 and 4. The lowest spread impact of -43 bps and -31 bps is observed in Eastern Europe and Middle East respectively. These regions saw many domestic FI

certification especially in Middle East where sovereign wealth funds dominate this market. The results confirm the third hypothesis which state that due to differences in economic characteristics across regional groups, domestic FI certification are likely to be different.

Panel C reports the spread impact results based on income classification of the project countries. For High-Income countries, the spread impact is -45 bps with a median of -32 bps. The percentage spread impact for the mean and median values are 65% and 52% respectively. For upper-middle-income countries, the reported spread impact is slightly higher at -48 bps with a median of -42 bps. However, lower-income countries report a higher spread impact of -113 bps with a median value of -104. The percentile values show that the lowest impact is -84 bps and the highest impact of -146. However, the study did not report the results for low-income countries because there was no domestic FI certification from our sample. Overall, the result shows that lower income countries benefit more than high-income countries from the certification of domestic FIs. This result is not surprising given that lower-income countries have higher asymmetric information and uncertainties compared to high-income countries. A domestic FIs certification can be seen as a good signal of project quality and viability. Finally, the result confirms the fourth hypothesis, which states that income classification of project countries is likely to influence the impact of domestic FI on loan spread.

3.6 Conclusion

This chapter examines the impact of domestic FI certification on emerging and frontier market PF loans. The results show that certification by domestic FIs are less likely when there is political risk guarantee included as part of the deal. Deals signed in currency other than the project country are also less likely to receive certification from domestic FIs. However, domestic FIs certification is more likely in countries with lower country risk.

Second, the chapter finds that EXIM loan, transportation, industry and commercial projects, and projects located in Latin America and South East Asia region have higher loan spread on average.

The results for the main hypothesis and its corollaries confirm the importance of domestic FIs in these markets. Specifically, the study finds that (i) domestic FIs certification reduces the loan spread by 47 bps on average, (ii) the impact of domestic FI certification is higher in sectors like Water & Sewage, Oil and Gas, Power and Mining, (iii) the impact of spread is higher in Indian subcontinent and Latin America, and (iv) the impact of spread is higher in low income countries.

These results provide important policy directions for market participants in PF and international finance. In an environment where asymmetric information is pervasive, lenders can use of domestic or home-grown institutions to overcome deficiencies. This in turn, enables an appropriate pricing of financial contracts. For borrowers and sponsors, the inclusion of domestic FIs provide and economic gain – reduction in the spread. Further, the results provide support to on-going efforts on financial system reforms in these markets. A well development financial system does not only increase access to finance but reduces the cost of doing so.

The findings also provide scopes for future research and improvements. First, the study relies on loan spread as a measure of cost of borrowing, leaving out tranche arranging fee, an equally important cost component. This treatment is mainly due to the unavailability of data on loan fees. With access to data that captures complete information on loan spread and fees, future research explore how domestic FI certification impacts both spread and arranging fee. Another possible direction for future research is to measure domestic FI certification by the proportion of loans they contribute. In the present study, the author only tracked the inclusion

of domestic FI using a dummy variable. This is because Dealogic Projectware only provide details on the total loan and not that of the lead arranger. Future research with lead arrangers' share of loan can improve on the existing findings.

Chapter 4 Sponsor Counterparties and PF Loan Outcomes

4.1 Introduction

In project finance (PF) the sponsoring firm(s) that commission the project is often shielded from project risks by limited liability. Typically, the projects are set up as bankruptcy-remote separate companies with the sponsors holding the equity stake in the new venture. The providers of debt finance to the project, not the sponsor, therefore carry future liabilities that arise from the project. It is therefore perhaps surprising that the sponsor often complicates this separation by becoming a counterparty to some of the NFCs agreed when the project is established (Gatti, 2013). For instance, the sponsor may be the primary or sole purchaser of the output, the sole supplier of raw material to the project company or the general contractor among others.

Sponsors involvement as contractual counterparties can make risk management more effective by reducing cash flow volatility and agency problem. It can also better align the interest of sponsors to that of the lenders (Corielli et al., 2010). On the other hand, it can increase the likelihood of conflict of interest between sponsors and lenders. These conflicts arise because sponsor counterparties have control over the key variables that affect cash flows. This, in turn, can induce opportunistic renegotiation of construction or supply contracts. For instance, sponsor counterparties anticipating lower equity return on their investment may compensate themselves in other ways such as high-cost construction contracts if they are construction contractors or providing O&M services (Yescombe, 2014).

Only a few studies have empirically examined these conflicts of interest in the context of PF. Studies by Dailami and Hauswald (2007) and Bonetti et al. (2010) provide evidence of a

positive relationship between sponsors' creditworthiness and the loan spread based on case studies of specific projects in which sponsors are involved as counterparties to the relevant project contracts. Further, Corielli et al. (2010) examine how NFCs and sponsor involvement as contractual counterparties affect the spread and leverage ratio offered on PF loans. Using a sample of 1093 PF loan tranches and a two-stage least square (2SLS) estimator to control for the simultaneous determination of the spread and leverage ratio, they find that lenders charge higher spread when the sponsors are involved as counterparties to project contracts.

The present chapter build on the work of Corielli et al. (2010) and examines the causal effect of sponsors involvement as counterparties on the loan spread and leverage ratio.[24] In line with previous studies, the chapter hypothesise that NFCs reduce the volatility of project cash flows and result in lenders charging a lower spread while increasing debt capital. Also, the involvement of the sponsors as contractual counterparties to the project company make risk management effective by lowering the interest rate and increasing the debt capital provided by lenders. Further, the chapter examines whether these impacts are stronger for sponsor counterparties with a verifiable credit rating or not.

The chapter tested these hypotheses using a sample of 5,871 PF loan tranches worth approximately $1.2 trillion and signed between January 1997 and March 2013. Data on PF loans and sponsors from Dealogic Projectware is merged with corporate credit ratings information from Thomson Reuters Eikon for the study.

The main contribution of the current study is that it treats the decision to use NFCs as potentially endogenous to the loan outcomes. Blanche-Brude and Strange (2007) note that lender are heavily involved in the PF deals design phase and may require the use of certain types of contracts such as fixed-price construction contracts as a mechanism to reduce agency

[24] Leverage ratio is the proportion of project debt divided by total project amount, where project size is debt plus equity.

costs and manage project risks among others. In addition, Corielli et al. (2010) recognize that sponsors choose contractual structure anticipating how lender would react to it regarding loan pricing, which adds an element of endogeneity to the negotiation process. This chapter addresses this potential endogeneity by conducting a pseudo-experiment using propensity score matching (PSM) technique to match observable pre-contract characteristics across loan tranches with and without NFCs. Thus, for every loan tranche with NFCs, there is a comparable loan tranche with similar propensity score for which there are no NFCs. The difference in the loan spread and leverage ratio between these two comparable tranches provide an estimate of the impact of NFCs on loan outcomes. The study is also the first to examine the effect of credit-rated PF sponsor on the spread and leverage ratios. Existing studies have ignored the dual role of sponsors as shareholder and counterparty to the SPV. However, this dual role typically transforms PF transactions from non-recourse financing to limited recourse (Yescombe, 2014).[25] Thus, the study provides new evidence on the difference between non-recourse and limited recourse loans and how project sponsors influence this relationship.

The findings suggest that the use of NFCs reduce both spread and leverage ratio on PF loans. Further there is a greater reduction in spread and leverage ratio if sponsors are involved as project counterparties and/or credit rated. Disaggregated results based on a country level of development indicate that these reductions are driven mainly by loans signed in emerging and developing countries.

The rest of the chapter is organised as follows. Section 4.2 provides institutional background and related literature on PF lending. Section 4.3 presents the testable hypotheses,

[25] Limited-recourse loan agreements allow for some form of compensation (indemnity) from the project company and sponsors in the event of project failure or difficulty. On the other hand, non-recourse loan agreements provide lenders no compensations from project company and sponsors in the event of project failure (Hainz and Kleimeier, 2008; Gardener and Wright, 2011).

while section 4.4 details the data and econometric procedure used. Section 4.5 reports the empirical findings and section 4.6 concludes.

4.2. Institutional Background of Project Finance and Related Literature

4.2.1 The Structure of PF Loans

PF is the financing of a single-purpose capital asset through a new legally distinct project company with equity from sponsoring firm(s) and non-recourse debt from lenders (Esty et al., 2014). It usually commences with the formation of a project company (also known SPV) that is solely responsible undertaking the new venture (Yescombe 2014). The project company initially assumes all project risks, and to manage them, signs a set of contracts (also referred to as NFCs) with various project counterparties.

Formally, NFCs are contracts that generate cash inflows or outflows that affect the unlevered free cash flow of the proposed venture (Corielli et al., 2010; Gatti, 2013). These contracts cover various risks related to the construction of new project physical infrastructure, raw material supply, O&M and sale of outputs. A number of these contracts exist, with the essential ones being the construction, EPC, O&M, Supply and the off-take agreements. A well-structured NFCs ensures there is (i) separation of project cash flows from the sponsors main businesses, (Esty, 2003), (ii) allocation of project risks into managed and unmanaged risk and the subsequent transfer of manageable risks to counterparties best suited to manage them (Dailami and Hauswald, 2007; Brealey, Cooper and Habib, 1996), and (iii) increase cash flows verifiability and reduction in agency problem associated with free cash flow (Subramanian and Tung, 2016). Carefully designed thus, NFCs convey credible signal about project quality to lenders and assure them that there would be sufficient revenue to meet debt service obligations.

The set of NFCs and other relevant project documents are then submitted to lenders to

secure debt financing for the project (Yescombe, 2014). Lenders typically require assurance from the project company regarding project completion schedule, potential cost overruns. Lenders also ascertain whether the project can generate sufficient cash flow to repay loan and interest charge, even when there are significant disruptions due to political instability or force majeure (Finnerty, 2013). If successful, lenders will typically provide the project company with debt financing on a limited or non-recourse basis.[26]

A number of studies have examined sponsors' motive for separate incorporation of new ventures through PF as opposed to financing them on their balance sheet. Shah and Thakor (1987) argue that PF is preferred if project risks are high. This preference is because the value of high-risk projects is maximized if they are incorporated separately. Empirical evidence however suggests that PF is common in industries with low cash flow volatility.[27] Separate incorporation of PF ventures also curb agency costs arising from managerial discretionary use of free cash flow. PF require capital injection at the construction phase after which free cash flow is generated once operational. Through various contractual agreements, lenders are thus able to ring-fence project cash flow from sponsors' primary business. Further, PF ventures are highly levered with the majority of free cash flow allocated to debt servicing. PF also reduces the possibility of leverage-induced underinvestment that might occur if the debt were issued directly from the sponsor's balance sheet (John and John, 1991). Further, it allows sponsors to avoid contamination risk, that is, a situation in where

[26] Project finance loans are often structured as limited or non-recourse finance, which insulate the project sponsors from any future liability from the project (Hainz and Kleimeier, 2006). The common form of lending for PF is through the syndicated loan market (Gatti 2012), where a group of banks form a syndicate to lend to a single borrower (project company). These syndicate banks are often represented by a lead bank who undertakes due diligence, develop the contractual terms and monitor the project company on behalf of the participating (syndicate) banks. Empirical examinations of PF lead arrangers in PF by Gatti et al. (2013) provide evidence on positive economic benefit when lead arrangers are prestigious.

[27]Kleimeier and Megginson (2000) compares PF loans with non-PF loans and find that PF loans are more likely to be used in asset tangible industries. The loan spread on PF loan deals are also relatively lower than non-project finance loans. Also Brealey et al (1996) argues that the dominant use of PF in asset tangible industries means that in the event of bankruptcy, the assets of the project can easily be converted to repay creditors.

default of the new project also leads to a default of already existing sponsor's assets (Gatti 2013).

4.2.2 PF Sponsors Involvement as NFCs Counterparties

In PF, any funding raised by the project company is reliant on the project characteristics rather than sponsors creditworthiness. From the sponsors' standpoint, any funding raised by the project company is off-balance sheets.[28] Thus, there is limited impact on their creditworthiness, ratings and ability to raise additional capital in the future (Bonetti et al., 2010).[29]

Notwithstanding the legal and operational distinction between sponsors and the project company, there are plausible reasons why one would expect sponsors to exert influence on PF loan outcomes. First, sponsors are responsible for incorporating the project company and act as its shareholders. They also negotiate together with the project company, the financing package for the project. Further, lenders consider sponsors knowledge and experience in the project sector, equity commitment, potential return on equity and the financial when taking decisions with regards to how much to lend to the project company (Finnerty, 2013 ch.7, Yescombe, 2014, ch.3). Most importantly, sponsors act as counterparties to some of the project contracts (Gatti, 2013). However, only a few studies have examined this interlocking relationship between sponsors and project companies in PF. Studies by Dailami and Hauswald (2007) and Bonetti et al. (2010) examine specific projects (case studies) where the sponsors are key project counterparties to the NFCs. Using econometric techniques that relate projects debts (bonds) to credit spread of sponsors debt instruments, their findings reveal a significant positive relationship between key sponsor counterparties' creditworthiness and the

[28] Off-balance sheet transactions occur when a borrower can keep away assets and/or liabilities from its statement of financial position.
[29] Gatti (2013) and Dailami and Hauswald (2007) provide situations where PF deal cannot be treated as off-balance sheet. This is usually the case when the sponsor is the only counterparty to a key contract.

spread on PF loans. Byoun et al. (2013) in a study of over 2,500 PF loans find that sponsors use less leverage if off-take agreements (NFCs) are in place due to the latter's risk-reducing effects. Corielli et al. (2010) investigate the effect of NFCs and sponsor counterparties on PF loan spread and leverage ratios using a sample of 1,093 loan tranches, signed between 1998 and 2003 and worth $195 million. They find that lenders use the NFCs as a mechanism to reduce agency cost and project risk. However, their results also reveal that lenders are less willing to (i) reduce loan spread on tranches; (ii) provide more debt to the project company; if the sponsors are counterparties to key contracts. Corielli et al. (2010) explain that where the tendency for conflict of interest is high, lenders would not appreciate sponsors involvement as counterparties. These conflicts of interest can take the form of opportunistic renegotiation or future increase in contract cost and price.

4.3 Testable hypotheses

The institutional background discussed in the previous section provides a basis for developing the following hypothesis.

The first and second hypotheses states that

Hypothesis 1: Loans with NFCs on average have a lower spread compared to those without NFCs.

Hypothesis 2: Loans with NFCs on average have a higher leverage ratio compared to those without NFCs.

As discussed earlier in Section 4.2, lenders often rely on NFCs and other project contracts when deciding how much financing to extend to the project company. This is because NFCs provide lenders mechanisms to ring-fence project cash flows from being utilized at the discretion of sponsors (Finnerty 2013; Yescombe, 2014). Also, the use of NFCs increase the

verifiability of the project cash flow and provide certainty on how specific project risks would be managed: reduction in cash flow volatility (Corielli et al., 2010; Subramanian and Tung, 2016). Therefore, NFCs provide an effective mechanism for managing project risks and lenders react by charging lower spreads.

In addition to reducing the spread on loans, lenders may be willing to commit more capital to the project when NFCs are in place. One potential benefit from reduced cash flow volatility and limited scope for managerial discretion is an increase in lenders willingness to increase their exposure on these transactions. Byoun et al. (2013) however, offer an alternative view on this notion. The authors note that sponsors tend to use more NFCs when they wish to control cash flow and only seek more debt when they wish to transfer project risks to lenders, who are diversified through their portfolio of loans on the syndicated loan market. Thus, only sponsors willing to diversify their risks in the project apportion a higher stake to lenders.

The third and fourth hypotheses state that

Hypothesis 3: Loans with sponsors involved as NFC counterparties are likely have lower spread because of better alignment of sponsors' interest to that of the project outcomes.

Hypothesis 4: Loans with sponsors involved as NFC counterparties are likely to have higher leverage ratio because of better alignment of sponsors' interest to project outcomes.

The study also examines whether sponsors participation as counterparties to NFCs influence lenders decision on the spread and debt capital offered. Support for these hypotheses comes from Corielli et al. (2010) who argue risk management through NFCs are more effective when sponsoring firms also act as contractual counterparties to the project company. On the other hand, sponsors involvement as contractual counterparties can increase

the likely of conflict of interest between sponsors and lenders. This conflict of interest may arise from the possible opportunistic renegotiation by the supplier-sponsor in the case of supply agreement or a future increase in contract costs and price by the contractor-sponsor in the case in the case of construction contract.

The fifth and sixth hypotheses state that;

Hypothesis 5: Loans with credit-rated sponsor counterparties have lower spread lenders due to reduction in asymmetric information.

Hypothesis 6: Loans with credit-rated sponsor counterparties have higher leverage ratio due to reduced asymmetric information.

The last set of hypotheses examine whether credit rating of sponsors provide a valuable medium for lenders to estimate the extent of credit risks on these contracts. Credit ratings are generally seen as indication of firms' credit risks quality (Hilscher and Wilson, 2016). In line with this, the chapter examine whether the availability of rating information for sponsors affects the hypotheses espoused earlier. Empirical supports for these hypotheses come from Dailami and Hauswald (2007) and Bonetti et al. (2010) who demonstrate that project bonds spreads are affected by sponsor creditworthiness.

4.4 Methodology

4.4.1 Data and Identification Strategy

Data for the present study comes from Dealogic Projectware, which covers over 14,000 PF loan deals signed between 1998 and 2013. Dealogic Projectware provides information on loan characteristics, sponsors, contracts, and counterparties as well as an accompanying PDF file, that provides useful descriptive details on the loan agreement. The study focuses on loan tranches that have data on loan spread and leverage ratio. This reduced the sample to only

6,122 loan tranches. Subsequently, the study filters out tranches that are cancelled reducing the final sample to 5,872 loan tranches (2,669 deals). Next a dummy variable is created that equals 1 if the loan tranche has NFCs in place and 0 otherwise. To construct this, I track the contract field in Projectware, for each loan tranche and code it as one (1) if it has NFC in place. I also construct a dummy that equals one (1) when sponsors sign the contracts and 0 otherwise. To construct this, I matched the NFC field that of sponsors, and where the names are the same, I label these tranches as having sponsor counterparties. Further check for subsidiary of sponsors is done by verifying the sponsor's detail on Thomson Reuters Eikon. Where subsidiaries instead of sponsors sign these contracts, they are interpreted to have sponsors certification and thus treated as having being sponsored by the sponsors. Subsequently, tranches with sponsor counterparty risk are matched with the credit ratings data obtained from Thompson Reuters Eikon.[30] Where these ratings are available, the tranches take the value one (1) and zero (0) otherwise. The main drawback of this approach is the text format of data on sponsors. Thus, relevant data on these variables are retrieved and processed manually. Appendix 2.1 describes the main variables used in the study.

4.4.2 Estimation Procedure

4.4.2.1 Motivation for Propensity Score Matching

A potential limitation of estimating the baseline regressions with ordinary least square (OLS) is that NFCs and sponsors' involvement can be endogenous to the spreads and leverage ratios. Thus, the decision to use such contracts or have sponsors as counterparties, are to a large extent, influenced by both the project company (i.e. the borrower) and the lenders. This, in turn, is likely to be related to observed characteristics such as project size,

[30] A main drawback is the text format of data on sponsors and credit rating. Therefore, relevant data on these variables have to be retrieved and processed manually.

industry, and country credit risk among others.[31]

An ideal set-up would be to conduct experiment with pairs of loan contracts that are identical in all characteristics except the use of NFCs. The observed difference across the two groups would then be an estimate of the impact of NFCs on loan outcomes. Even though this is not feasible, propensity score matching (PSM) enables a pseudo-experiment to be conducted whereby loan contracts with and without NFCs can be compared to identify and quantify the effect of NFCs on loan outcomes based on matching observable pre-treatment characteristics across the two loan types. Specifically, PSM allows the comparison of loan tranches with NFCs to comparable twin loans tranches that do not have these features using a probit model.[32] The basic idea behind PSM is to pair each participant in a treatment group to non-participants in the control group who are similar in all relevant pretreatment characteristics (for a detailed discussion on PSM see Appendix 2.2 and Caliendo and Kopeinig, 2008).[33]

The three treatments groups comprise (i) loan tranches with NFCs; (ii) loan tranches with sponsors participating as NFCs counterparties; and (iii) loan tranches with credit rated sponsor counterparties. The first treatment group allows for the estimate of the impact of NFCs on PF loans' spreads and leverage ratios. The second treatment group allows for the estimate of the impact of NFCs on these outcomes where the sponsors act as counterparties to the contracts. The third treatment group allows for the estimate of the impact of NFCs, where the sponsors counterparties are credit rated. The control group, loans tranches without NFCs, are matched with the treatment groups based on observable pre-contract characteristics, namely project size, project type/industry, loan type, country credit rating and a set of

[31] See Blanche-Brude and Strange (2007) and Corielli et al (2010) for discussion on the endogeneity of PF contracting process.
[32] PSMATCH2 in Stata is used to implement this procedure.
[33] Refer to Appendix 3 for details on propensity score matching estimation procedure.

dummies controlling for refinance loans and project located in advanced countries.[34]

PSM has a two-stage structure. First is the estimate of the propensity scores. Then estimate of the differences in the outcome variable of interest between the two matched groups of similar propensity score.

4.4.2.2 Estimating Propensity Scores and Average Treatment Effect on the Treated (ATET)

The propensity score is estimated by specifying a probit regression with pre-contract observables as

$$NFC = \alpha + \boxed{\sum_{j=1}^{4}\beta_j} CCR_j + \boxed{\sum_{i=1}^{6}\beta_j} IND_i + \boxed{\sum_{i=1}^{3}\beta_j} LOANTYPE_i + \beta\, REFIN + \beta\, SIZE + \beta\, REGi + \beta\, ADV + \varepsilon_i \quad (4.1)$$

where the dependent variable NFC is a dummy variable that equals one (1) if the loan has (i) NFCs, (ii) NFCs and sponsor counterparties, and (iii) NFCs and credit-rated sponsor counterparties. Otherwise the value is zero (0). *CCR* is project country credit risk indicators based on S&P classifications (best grade, investment grade, speculative and poor grade), *IND* is industry indicators (commercial, electricity & energy, oil and gas, transportation, telecommunication and others), *LOANTYPE* is loan type indicators (short-term loans, secured loans, term loans), *REFIN* is a dummy that equals one if the loan is to refinance an existing project and zero otherwise, *SIZE* is project value in $US million, *REG* is an indicator of project country regulatory environment, *ADV* is a dummy that equals 1 if project is located

[34] In the propensity score regression set up, I exclude variables that are not observable prior to the loan contract stage. This is line with propensity score matching procedure's assumption of *conditional independence* (*unconfoundedness),* that states that, given a set of observed covariates X, that are not affected by treatment, potential outcome Y are independent of the treatment assignment T (Khandker et al., 2010). This ensures that systematic differences in outcomes between treated and non-treated individuals with the same values for covariates are attributable to treatment T. In other words, it ensures that uptake of program is not influenced by the treatment process or any unobservable characteristics. Even though, conditional independence is a strong assumption and cannot be inherently tested it can credibly be invoked if there is a rich dataset on the observed characteristics that allow for adequate control of factors that affects program certification, as well as a deeper understanding of the institutional setting of the study (Cintina and Love, 2017).

in an advanced country (IMF classification) and zero otherwise.

For each loan tranche in a treatment group, a comparable loan tranche without NFCs the closest propensity score is selected using the matching with techniques (with replacement and without replacement. To ensure common support across the loan sample any loan tranches in the treatment group with propensity scores larger than those in the control group is dropped.[35] Conversely, loan tranches in the control group that have propensity scores lower than the minimum score in the treatment group are dropped. Finally, the study calculated the average treatment on the treated (ATET) as the mean difference in outcomes over the common support, appropriately weighted by the propensity score distribution of the loan sample. This is specified as:

$$ATET = E\,[E\{Y_{1i}\,|T_i = 1,\, p\,(X_i)\} - E\{Y_{0i}\,|T_i = 0,\, p\,(X_i)\}|T=1] \qquad (4.2)$$

where $p(X_i)|T_i=1$ is the propensity score given the observed characteristics conditional on loan tranches using NFCs; the outer expectation is over the distribution of $(p(X_i)|T_i =1)$, Y_{1i} and Y_{0i} are potential outcomes in the two counterfactual situations of the treated and non-treated groups, respectively.

The reliability of PSM scores are based on the use of an adequate number of control variables and sampling of both treatment and control samples from the same experiment. The study used a number of pre-contract characteristics for the estimation of the propensity score. Further, the treatment and control groups from the same dataset - Dealogic Projectware. In the estimation of the propensity score, the study control for country differences, such as country rating and development level to ensure comparison is made over similar markets.

[35] A second assumption, common support, ensures that treatment units are similar to the control units in terms of observed characteristics by requiring that both groups have observations from similar propensity score distribution (Heckman, LaLonde and Smith, 1999 *cited in* Khandker et al., 2010). Therefore, observations that fall outside the common support region would have to dropped for both treatment and control group, even though the former can lead to sampling bias and requires caution by the researcher.

4.5 Empirical Results

4.5.1 Summary Statistics of Loan Variables

Table 4.1 shows the summary statistics of the loan sample for the period January 1997 to March 2013. Panel A reports the results for the full sample, while Panel B and C report that of advanced and developing countries respectively. The average tranche spread for the full sample in Panel A is 201 basis points (bps) with standard deviation of 170 bps and a maximum value of 1,500 bps. There is greater variation in the loan spread due to the composition of countries in the sample. For advanced countries (Panel B), the average loan spread is 186 bps with a maximum value of 2284, while developing countries report a higher average loan spread of 237 (maximum of 1500). These results demonstrate the disparity in the pricing of PF loans across the sample countries. For instance, the maximum loan spread in observed in South Korea, while the lowest tranche spread is observed in Chile. The mean leverage ratio for the full sample is 0.88 with a standard deviation of 0.166. PF deals are usually highly levered with syndicated lending being the main source of loanable fund. The results are similar to those obtained in Byoun et al. (2013), Esty (2004) and Esty and Megginson (2002) and confirmed the highly levered nature of these transactions. Further, results in Panel B and C show that the leverage ratio is slightly higher for advanced countries relative to developing countries. The mean and maximum project size in the sample is $818.7 million and $20 billion respectively, with a standard deviation of $1.5 billion. These results confirm the large-scale nature of these transactions. PF loans are mostly utilized for investments in infrastructure and capital-intensive industries like oil and gas, telecommunication and infrastructures. However, Panel B shows that in advanced countries, the mean project size is $751 million, which is lower than $958 million reported for developing countries. The largest project size of $20 billion is reported in advanced countries.

Tranche maturity in Panel A shows that average duration of these loans are 31 months (2.6 years), with a standard deviation of 26 months. The maximum tranche maturity from the data is 798 months (66 years) confirming the long-term nature of these deals. Distribution of tranche maturity across advanced and developing countries in the sample are similar with 32 and 30 months respectively. Similar results are obtained on the standard deviation and maximum values. Table 4.1 (Panel A) also shows that 44% of the loan tranches have NFCs in place with 20% having sponsor counterparties and only 12% have credit rated sponsors. Further, the results show that deals in advanced countries make up 63% of the total sample.

Table 4.1: Summary statistics of the main variables

Variables	% of total sample	Mean	Std. Dev	Min	Max	Obs.
Panel A: Total sample						
Tranche spread (bps)		201.379	158.447	0.075	1500	5594
Leverage ratio		0.88	0.166	0.037	1	5871
Project size (US$M)		818.787	1474.359	1.438	20,000	5871
Tranche maturity (months)		31.508	26.326	0.24	798	5713
Tranches with NFCs (% of total sample)	44%					
Tranches with NFCs in Advanced Countries (% of total sample)	63%					
Tranches with NFCs and sponsors as counterparties (% of total sample)	20%					
Tranches with NFCs and credit-rated sponsors as counterparties (% of total sample)	12%					
Panel B: By the Country's Level of Development						
Advanced Countries						
Tranche spread (bps)		186.46	151.073	0.079	2284	3787
Leverage ratio		0.897	0.153	0.128	1	3971
Project size (US$M)		751.828	1386.141	1.438	15175	3971
Tranche maturity (months)		32.421	27.172	0.24	675	3852
Developing Countries						
Tranche spread (bps)		237.244	198.425	0.075	**1500**	1807
Leverage ratio		0.845	0.186	0.037	1	1901
Project size (US$M)		958.731	1635.071	6	20000	1900
Tranche maturity (months)		29.618	24.38	0.24	798	1861

Sample period: 1998-2013

4.5.2 Industrial Distribution of Loan Tranches

Table 4.2 provides industrial distribution of the loan sample. The sample is dominated by deals in the electricity and power projects, which accounts for 1,803 loan tranches. Next is oil and gas with 1,228 projects. On the other hand, commercial projects have the least number of tranches (532), followed by telecommunication and other project category. These results are somewhat similar to those reported in Byoun et al. (2013) and Corielli et al. (2010).

The number and percentage of tranches with NFCs in column 2 and 3 show that oil & gas and electricity & power projects have the highest number and percentage usage of NFCs in the sample. The percentages of NFCs used are 58% and 56% respectively. This is followed by other project category and transportation projects with 44% and 31% respectively. The least usage of NFC is recorded in commercial (26%) and telecommunication projects (19%) respectively. Overall these results show that when the outputs are more tangible and verifiable, as is the case with oil and gas and electricity projects, contracts can easily be written. On the other hand, where outputs are less tangible or storable, such as transportation and telecommunication, NFCs are less likely to be used (Yescombe, 2014).

Electricity & power, and oil & gas industries also recorded the highest number of tranches with NFC sponsors counterparties, while telecommunication (15) and commercial projects (27) recorded the least number of sponsor counterparties on NFCs. With regards to credit rated sponsors, the results show higher number for electricity & power and oil and gas projects, while telecommunication and other infrastructure projects recorded the least credit rated sponsor counterparties.

Table 4.2 Industrial distribution of NFCs

Industry	No. of Tranches	No. of tranches with NFCs	% of Tranches with NFCs	Sponsor Counterparty	Rated Sponsor	Leverage ratio (%)	Project size (US$M)
Transportation	951	302	0.317	164	63	0.883	234,037
Commercial	532	142	0.266	27	23	0.884	93,325
Oil and Gas	1228	718	0.584	208	143	0.845	304,980
Electricity and Power	1803	1020	0.565	249	149	0.877	364,530
Telecomm	584	116	0.198	15	6	0.902	175,533
Others	755	330	0.437	160	49	0.919	83,513
Total	5853	2628	0.449	823	433		1,255,918

Sample period: 1998-2013.

Leverage ratios across the industries range between 0.84 and 0.91 indicating the highly levered nature of these projects. Telecommunication and other projects recorded the highest leverage ratio of 0.91 and 0.90 respectively, while oil & gas (0.84) and electricity & power (0.87) report the lowest leverage ratios. Finally, results for project size show that electricity & power ($3.6 billion), and oil and gas ($3 billion) are the largest in the sample, followed by transportation and telecommunication projects. The least industries regarding project size are commercial and other infrastructural projects. Overall the results show that electricity & power and oil & gas projects dominate the sample in terms of the number of deals and project size.

4.5.3 Estimation Results

In this section, the study investigates whether loans tranches with NFCs differ from those without them. The study first reports a univariate test of the loan samples without controlling for loan, industry and borrower country characteristics. Next ordinary least square regression results, controlling for the relevant project, loan and country characteristics. Then the study carry out propensity score matching procedure to obtain the treatment effect estimates.

4.5.3.1 Univariate Test of Loan Sample

The study investigates whether loan tranches with NFCs differ from those without NFCs by comparing loan variables across the sample in Table 4.3. In Panel A, the study reported the mean values on the loan variables for tranches with NFCs and those without NFCs. Panel B reports the results for the sample of loan tranches with sponsor counterparties and those without NFC, while Panel C reports the results for the sample with credit-rated sponsor counterparties.

The results in Panel A. (Table 4.3) show that on average, loan tranches without NFCs have higher loan spreads relative to those with NFCs. T-test results also show that the mean

difference is statistically significant at the 1% level. The result possibly outlines the economic benefit of having NFCs due to its risk-reducing effect. Also, the mean difference in the leverage ratio for the two groups shows that tranches without NFCs have higher debt level on average and statistically significant at the 1% level. This is in line with the notion that without NFCs, lenders are willing to give more debt to pre-commit project company into higher debt repayment, which in turn, reduces the tendency of managerial discretion (Byoun et al. 2013). Project sizes for loan tranches without NFCs are lower compared to those with NFCs and statistically significant at the 1% level. The tranche maturity is also lower in the sample of loan tranches without NFCs and significant at the 1% level.

Panel B compares mean difference for loan tranches NFC with sponsor counterparties to those without NFCs. The results are similar to those obtained in Panel A. The result on tranche spread for loans with sponsor counterparties is 7 bps lower in Panel B compared to tranches with NFCs in Panel A. Similarly, the mean difference for leverage ratio is 7% lower than that of Panel A. The difference in project size ($32million) and tranche maturity (5 months) is also higher in Panel B relative to Panel A. These results demonstrate that tranches with sponsor counterparties have more favorable loan terms.

Panel C shows the results on the mean difference between loans without NFC and those with credit-rated sponsor counterparties. These results are similar to those obtained in Panel A and B. Generally, these results provide evidence that loan tranches with NFCs, sponsor counterparties and credit rated sponsor counterparties enjoy significantly better pricing and non-pricing loan terms when compared to those without the contract in place.

Table 4.3: Univariate analysis of loan tranches

Panel A: No NFCs vs. NFCs	No NFC (dummy=0)	NFC (dummy=1)	T-statistics
	(A)	(B)	(A)-(B)
Tranche spread (bps)	208.912	195.369	2.973***
Leverage ratio	0.902	0.853	11.35***
Project size (US$M)	728.214	929.865	-5.224***
Tranche maturity (months)	27.473	36.477	-13.044***
Panel B: No NFCs vs. Sponsors Counterparty	No NFC (dummy=0)	Sponsors Counterparty (dummy=1)	T-statistics
	(A)	(B)	(A)-(B)
Tranche spread (bps)	208.912	188.725	2.80***
Leverage ratio	0.902	0.833	10.84***
Project size (US$M)	728.214	961.206	-4.492***
Tranche maturity (months)	27.473	41.516	-14.082***
Panel C: No NFCs vs. Credit-Rated Sponsors Counterparty			
	No NFC (dummy=0)	Credit-rated sponsors Counterparty (dummy=1)	T-statistics
	(A)	(B)	(A)-(B)
Tranche spread (bps)	208.912	186.743	2.37**
Leverage ratio	0.902	0.809	11.005***
Project size (US$M)	728.214	1213.57	-6.982***
Tranche maturity (months)	27.473	40.48	-10.051***

Panel A segregates the entire into No NFC (Dummy =0) and NFC's (dummy =1) tranches. The first and second columns report the mean values for the loan characteristic, while the third column reports the t-statistics of the difference in the column A and B. Panel B reports similar result but this time for loan tranches with NFC and sponsor counterparty. Finally, Panel C reports the result for tranches with credit-rated sponsor counterparty. The t-statistics are computed with equal variance. ***, **, and * is significance at the 1%, 5% and 10% respectively.

However, the univariate analysis results does not consider the differences in the loan, project and country characteristics between loan tranches with NFCs and those without NFCs. It is possible that tranches with NFCs are fundamentally different in characteristics to those without NFCs. For example, the observed differences can be because only risky deals are structured using NFCs, while the less risky ones are structured without NFCs. Similarly, it can be argued that the intensity of use of NFCs are different across the industry. For instance, it is easier to write sales contract for electricity & power through power purchase agreements compared to a telecommunication or transportation project, where it is difficult to contract sales ex-ante (Yescombe, 2014).

4.5.3.2 Multivariate Analysis

In this section the study models loan spread and leverage ratio to depend on loan, industry and country characteristics. A linear regression model is specified as

$$T\_SPREAD = \alpha + \sum_{j=1}^{4} \beta_i CCR_j + \sum_{i=1}^{6} \beta_j IND_i + \sum_{i=1}^{3} \beta_j LOAN\_TYPE_i + \beta REFIN + \beta SIZE + \beta REG_i + \beta ADV + \beta MAT_i + \beta CURR + \varepsilon_i \quad (4.3)$$

$$LEV = \alpha + \sum_{j=1}^{4} \beta_i CCR_j + \sum_{i=1}^{6} \beta_j IND_i + \sum_{i=1}^{3} \beta_j LOAN\_TYPE_i + \beta REFIN + \beta SIZE + \beta REG_i + \beta ADV + \beta MAT_i + \beta CURR + \varepsilon_i \quad (4.4)$$

The dependent variable in equation 4.3, *T_SPREAD,* is the loan tranche spread over market base rate measured in bps. The dependent variable in equation 4.4, *LEV*, is the ratio project loan amount over the total project size. Two additional variable *MAT (*loan maturity) and *CURR* (a dummy that equals one if project is signed in currencies other than the project country, 0 otherwise), are added to the independent variables in equation 4.1 for model specification.[36]

[36] Refer to Appendix 2.1 for full definition of the variables used in the model.

The results from OLS estimate of equations 4.3 and 4.4 are reported in Table 4.4. Column 1, 2, and 3 report the result for regression (4.3) (tranche spread) while Column 4, 5 and 6 report the results for equation (4.4) (leverage ratio). Robust standards errors clustered at the deal level are used to correct for heteroskedasticity.

Column 1, 2 and 3 of Table 4.4 show that NFC dummies have a negative and statistically significant relationship with the tranche spread. Column 1 of Table 5 shows that all things being equal, tranche spread on loans with NFCs are 18 bps lower compared to those without NFCs. This is also 5 bps higher than the results from the univariate analysis. The result is similar to those obtained in Corielli et al. (2010). Similarly, results in Column 2 show that tranches with sponsor counterparties are 23 bps lower than those without NFCs in place. This result is also 3 bps higher than those obtained in the univariate analysis. The results in Column 3 show that loans with credit rated sponsor counterparties are 35 bps lower. Overall, these results show that NFCs and sponsors involvement reduces the cost of borrowing between 20 and 35 bps. Short-term tranches and those with currency risks are negative and significantly related to the tranche spread. The remaining control variables are not statistically significant. Results on country rating dummies and project sector dummies are reported in Appendix 2.2.

Results in column 4, 5 and 6 show that NFC dummies are negatively related to leverage ratio and significant at the 1% level. In Column 5, the results show that all things being equal, the leverage ratio for tranches with NFCs are 0.018% lower. The result is in line with Byoun et al. (2013) who examined the relationship between off-take contracts and leverage ratio in PF. These are also consistent with the findings of Corielli et al. (2010) who reported a negative association between NFCs and debt to equity ratio. Column 5 shows that tranches with sponsor counterparties are 0.035% lower compared to those without NFCs. Similarly, column 6 also shows that tranches with credit-rated sponsor counterparties are 0.05% lower. Results

on country rating dummies and project sector dummies are reported in Appendix 2.3. With the control variables, the study finds that project size and refinance tranches are negatively related to the leverage ratio, while secured tranches, currency risk tranches, advanced country tranches are positively related to the leverage ratio.

Table 4.4: Regression of loan spread and leverage ratio on NFC dummy and control variables

	Loan Spread			Leverage Ratio		
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Constant	330.125***	339.681***	338.447***	0.94***	0.955***	0.947***
	(13.620)	(11.36)	(9.16)	(39.32)	(34.3)	(31.64)
NFC dummy	-17.535**	-	-	-0.018***	-	-
	(-2.390)			(-2.72)		
NFCs with sponsor counterparty dummy	-	-22.784**	-	-	-0.035***	-
		(-2.120)			(-3.36)	
NFC with credit-rated sponsor dummy	-	-	-35.46***	-		-0.04***
			(-2.61)			(-2.74)
Log of project size	-3.538	-3.745	-4.119	-0.014***	-0.016***	-0.015***
	(-1.53)	(-1.25)	(-1.28)	(-5.67)	(-5.11)	(-4.66)
Final maturity (months)	-0.194*	-0.23**	-0.241*	0.000	0.000	0.000
	(-1.92)	(-1.97)	(-1.94)	(0.64)	(-0.11)	(-0.36)
Refinance dummy	-5.065	-7.954	-9.233	0.093***	0.091***	0.089***
	(-0.66)	(-0.94)	(-1.05)	(13.29)	(11.31)	(10.89)
Loan type dummy: short-term loans	-21.326***	-23.724***	-21.77***	0.011*	0.008	0.01
	(-3.73)	(-3.49)	(-3.06)	(1.81)	(1.24)	(1.29)
Loan type dummy: secured loans	9.86	-4.985	-0.104	-0.035***	-0.037***	-0.041***
	(0.98)	(0.37)	(-0.01)	(-3.66)	(-3.16)	(-3.18)
Currency risk dummy	-39.3***	-33.836***	-32.731***	0.021**	0.026**	0.028**
	(-3.71)	(-2.59)	(-2.41)	(2.25)	(2.24)	(2.31)
Regulatory environment	-5.065	-1.469	3.300	0.015*	0.016*	0.011
	(-0.66)	(-0.15)	(0.32)	(1.85)	(1.73)	(1.21)
Advanced country dummy	-12.44	-17.35	-26.71	0.033***	0.041***	0.046***
	(-0.81)	(-0.94)	(-1.410)	(2.640)	(2.860)	(3.10)
Country rating dummies	YES	YES	YES	YES	YES	YES
Project sector dummies	YES	YES	YES	YES	YES	YES
Number of observations	5093	3508	3177	5349	3681	3329
R^2	0.072	0.076	0.081	0.11	0.133	0.124

Table 4.4 reports the regression estimates on loan spread and leverage ratio (t-statistics in parenthesis) using an OLS method with robust clustered standard errors. Model 1 is estimated with NFC dummy. Model 2 and 3 are estimated with NFC with sponsor counterparty dummy and credit-rated sponsor counterparty dummies. Similarly, Model 4 5 and 6 are also estimated for leverage ratios as the dependent variable. ***, ** and * represents significance at the 1%, 5% and 10% level respectively. Results on country rating dummies and project sector dummies are reported in Appendix

4.5.3.3 Estimate of Treatment Effect on the Treated

As discussed in section 4.4.2.1, the decision by the project company to use NFCs is potentially endogenous to the loan outcomes. If this is true, both the univariate and regression results reported earlier are likely to be biased. In other words, these estimators would not account for the non-random distribution of NFCs across the sample. The chapter uses the propensity score matching estimator to generate the probability (propensity score) for each loan tranche having NFC to deal with this. These are then matched to loan tranche with and without NFCs using the nearest neighbour (NN) technique with and without replacement. To ensure the assumption of conditional independence (unconfoundedness) holds, the study selects as observables, variables that are known prior to the design of the PF deals. These pre-contract variables are used to generate propensity scores for each loan tranche. The matched sample is then used to calculate the average treatment effect on the treated as the difference in the tranche spread and leverage ratio between our treatment and control group.

Table 4.5 shows the average treatment results for the full sample (Panel A) and the subsample of advanced countries (Panel B) and developing countries (Panel C). Column 1, 2 and 3 show the results of the loan spread, while 4, 5 and 6 show that of the leverage ratio. From Panel A, the result indicate that tranche spread is at least 32 bps lower and statistically significant at the 1% level across Column 1 to 3. For loan tranches with sponsor counterparties, the magnitude of reduction in the tranche spread is slightly lower and ranges between 25 and 30 bps. Further, results for credit-rated sponsor counterparties have the highest reduction on tranche spread, with coefficients between 34 and 48 bps. These results are qualitatively similar to those obtained in our univariate and regression analysis, but higher with regards to the mean difference in the tranche spread. The reduction is plausible given that in multivariate analysis (4.5.3.2) there are no controls for potential endogeneity on sponsor involvement as counterparties. Thus, by matching the sample as opposed to assuming all loan tranches have

similar characteristics, the study obtains stronger effects for the use of NFCs. The results for matching with replacement are stronger with higher mean difference and t-statistics in most cases. Overall the results support Hypothesis 1, 3 and 5 that the use of NFCs reduce project risks and in turn reduce the spread lenders charge. The results are also in line with that of Corielli et al. (2010).

Turning to the results for advanced countries in Panel B, the mean differences in tranche spreads are small and statistically insignificant. These results are expected. NFCs are risk-mitigating instruments and likely to ameliorate institutional weakness, especially in developing countries. Given that these risks are relatively low in advanced economies, the effect of NFCs on loan spread is likely to be weaker, all things being equal. The mean difference for developing countries in Panel C, confirms the earlier notion of important risk factors that determine the use of NFCs. For developing countries, the higher mean difference in the tranche spread is observed across all groups. For loans tranches with NFCs, the mean difference ranges between 61 to 82 bps, almost twice the mean difference for the full sample, with, higher magnitudes for sponsor counterparties and credit rated sponsors in these (developing) countries. Kleimeier and Hainz (2012) and Subramanian and Tung (2016) show that PF is more likely in countries with higher political and legal/regulatory risk.

The results, in column 4, 5 and 6 show the mean difference in leverage ratio for loan tranches. The full sample results in Panel A show that loan tranches with NFCs have a lower leverage ratio compared to those without NFCs. The difference in leverage ratio ranges between 0.008% and 0.016%. The results are significant at the 5% level for matching with replacement, while insignificant for matching without replacement. For sponsor counterparties, the difference in leverage ratio is 0.03 to 0.04 lower and significant at the 1% level for the matching with replacements (column 5 and 6). Further, tranches with credit-rated sponsor counterparties record lower leverage ratios between 0.016 and 0.31%. These results are

significant at the 5% and 10% level for matchings with replacement but insignificant for matching without replacement. The results for advanced countries in Panel B are broadly consistent with those observed in the tranche spread analysis in developed countries. Though reduction is recorded in the leverage ratio, they are statistically insignificant. This possibly indicates the lesser influence NFCs have on contracts in these countries. These results contradict hypothesis 2, 4 and 6. Though the study expected NFCs to induce more capital contribution from lenders, the findings indicate the opposite effect. As a result, the findings support Byoun et al. (2013) argument that NFCs are used when sponsors want to internalize the risks of the project.

The results for developing countries in Panel C show a reduction in the leverage ratio across all the comparison groups with higher magnitudes and significance in most cases. For loans with NFCs, the leverage ratio is 0.05% lower for matching without replacement and significant at the 1% level. The results for matching with replacement also show a reduction in loan spread but they are not statistically significant. For loan tranches with sponsor counterparties, the leverage ratio is 0.07% to 0.1% lower and significant at the 1% level. Similarly, loan tranches with credit rated sponsor counterparty, the leverage ratio is 0.05 to 0.07% lower and at least statistically significant at the 10% level.

Table 4.5: Average treatment on the treated for loan spread and leverage using propensity score matching

	Loan spread			Leverage ratio		
	NN (1)	NN (5)	NN (10)	NN (1)	NN (5)	NN10)
Panel A: Full sample						
Loan tranches with:						
NFCs vs. No NFCs	-38.75 ***	-31.61***	-31.686***	-0.008	-0.016**	-0.015**
	(-5.37)	(--5.01)	(-5.24)	(-0.85)	(-2.35)	(-2.57)
NFCs with sponsor counterparty vs. No NFCs	-24.873***	-28.692***	-30.341***	-0.03	-0.032***	-0.041***
	(-2.71)	(-3.18)	(-3.49)	(-2.61)	(-3.91)	(-5.12)
NFCs with credit-rated sponsor counterparty vs. No NFCs	-33.757**	-47.605***	-44.907***	-0.016	-0.028**	-0.031***
	(-2.08)	-3.69	(-3.99)	(-0.89)	(-2.39)	(-2.76)
Panel B: Advanced Countries						
NFCs vs. No NFCs	-1.196	-1.541	2.86	-0.013*	-0.011*	-0.008
	(-0.12)	(-0.24)	(0.48)	(-1.77)	(-1.79)	(-1.50)
NFCs with sponsor counterparty vs. No NFCs	-2.647	13.819	14.237	0.012	0.01	-0.01
	(-0.22)	(1.42)	(1.49)	-1.13	(-1.28)	-1.24
NFCs with credit-rated sponsor counterparty vs. No NFCs	1.28	-1.126	6.561	-0.008	0.003	0.007
	(0.06)	(-0.08)	(0.52)	(-0.47)	0.28	-0.65
Panel C: Developing Countries						
NFCs vs. No NFCs	-61.432**	-81.897***	-64.145***	-0.055***	-0.018	-0.122
	(-2.31)	(-3.94)	(-4.14)	(-2.98)	(-0.99)	(-0.64)
NFCs with sponsor counterparty vs. No NFCs	-37.244*	-78.297***	-77.438***	-0.097***	-0.07***	-0.071***
	(-1.62)	(-4.29)	(-3.9)	(-3.82)	(-3.08)	(-3.34)
NFCs with credit-rated sponsor counterparty vs. No NFCs	-86.91***	-103.18***	-84.876***	-0.064*	-0.067***	-0.057**
	(-2.97)	(-4.58)	(-4.0)	(-1.79)	(-2.87)	(-2.35)

Table 4.5. reports the average treatment effect on the treated for the three treatment groups using propensity score matching. Column 1 reports the matching without replacement (NN (1)) and column 2 and 3 report matching with replacement with 5 (NN(5)) and 10 (NN(10)) nearest neighbours for the loan spread impact. Similarly column 4, 5 and 6 also report the results without replacement, replacement with 5 and 10 observations for the leverage ratio impact. ***, ** and * represent significance at the 1%, 5% and 10% respectively.

4.5.3.4 Sensitivity Analysis of PSM Results - Test for Hidden Bias

PSM estimators are not consistent estimators for treatment effect if unobserved factors that affect the assignment process are also related to the outcome (Bharath et al., 2009; Diprete and Gangl, 2004). If there are unobserved factors that simultaneously affect the assignment to the treatment and outcome variables, then *hidden bias* can arise and render matching estimators less robust (Rosenbaum (2002). For instance, if there are unobserved variables that affect simultaneously the decision to use NFCs and the loan outcomes, then PSM estimates are no longer robust.

To estimate the extent to which such selection on "unobservables" may bias the inferences about the effect of NFCs on loan outcomes, the study conducts the Rosenbaum bound sensitivity analysis outlined in Rosenbaum (2002). Specifically, Rosenbaum bound sensitivity analysis tests whether unobserved factors can alter inferences about treatment effect by estimating the extent to which unobserved variables alter the selection process resulting in the NFCs to undermine the implication of the matching analysis. Rosenbaum bound sensitivity analysis tests for potential hidden bias in PSM estimates by setting the level of hidden bias to a specific value Γ. This value (Γ) reflects the assumption about the endogeneity in treatment assignment regarding the odds ratio of differential treatment assignment due to unobserved covariates. At each level of Γ, a hypothetical p-critical value is computed. These p-critical values represent the bound on a significance level of treatment effect in the case of endogenous selection into treatment status.[37]

This section reports the results of Rosenbaum bound sensitivity analysis for the propensity score estimates reported in the previous section (Section 4.5.3.3). The sensitivity analysis results on the loan spread are reported in Table 4.6, while that of the leverage ratio is reported

[37] Refer to Appendix 2.4 for details on Rosenbaum bound sensitivity analysis.

in Table 4.7. Γ is the likelihood ratio of hidden bias, and a value of one (1) indicates no hidden bias. The Wilcoxon signed rank test significance levels are reported for each value of Γ to determine the extent of hidden bias.

Table 4.6 shows that robustness of loan spread estimate to hidden bias varies across the matching methods and the treatment groups. For tranches with NFCs, the results indicate that the Γ value at which conclusions of loan spread reduction are invalid is 1.3 in the case of NN(1), and 1.25 for both NN(5) and NN(10). Turning to NFCs with sponsor counterparties, the level of hidden bias required to render the loan spread results less robust is between 1.2 and 1.25 for NN (1). However, more robust estimates of hidden bias are reported for NN (5) (between 1.3 and 1.35) and NN (10) (1.4). Also, the result indicates that tranches with credit-rated sponsors are the least robust to hidden bias. NN (5) and NN (10) values are less robust at Γ values of 1.2 compared NN(1).

In Table 4.7 results of sensitivity analysis are reported for leverage ratio.[38] First, these results show more robustness to hidden bias compared to those reported in Table 4.6 for loan spread. Tranches with NFCs are only prone to hidden bias if the likelihood ratio Γ is between 1.3 and 1.45 with NN (1). For NN (5) and NN (10), these occur at Γ value of 1.6 and 1.65 respectively. Similarly, stronger results are reported for tranches with sponsors counterparties and credit rated. Hidden biases in these instances have to increase by a likelihood ratio of at least 1.7.[39]

Overall, the results indicate that unobservable covariates may influence the results obtained on the impact of sponsors' participation on loan spread. On the other hand, leverage ratio shows some robustness to hidden bias with a higher increase in likelihood ratio required to invalidate the PSM results. It is worth noting that, these coefficients do not necessarily confirm the

[38] Kumar *rsen* command in Stata is used in estimating the sensitivity analysis coefficients

[39] The Rosenbaum bound sensitivity analysis is also carried out for the sub-sample of advanced and developing countries. The unreported results demonstrate higher robustness to hidden bias for developing countries, but weaker in advanced countries. These results are available on request.

presence of hidden bias (unobserved covariates), but a ‘’worst-case scenario’’ test of the extent to which presence of hidden bias would affect inferences.

Table 4.6: Rosenbaum bound sensitivity analysis results for loan spread

	Loan spread					
	NN(1)		NN(5)		NN(10)	
	Γ	Sig. level	Γ	Sig. level	Γ	Sig. level
NFCs vs. No NFCs	1	0.99	1	0.99	1	0.99
	1.05	0.99	1.05	0.99	1.05	0.99
	1.1	0.99	1.1	0.99	1.1	0.99
	1.15	0.99	1.15	0.99	1.15	0.99
	1.2	0.99	1.2	0.98	1.2	0.93
	1.25	0.99	1.25	0.89	1.25	0.74
	1.3	0.94	1.3	0.68	1.3	0.46
NFCs with sponsor counterparty vs. No NFCs	1	0.99	1	0.99	1	0.99
	1.05	0.99	1.05	0.99	1.05	0.99
	1.1	0.99	1.1	0.99	1.1	0.99
	1.15	0.97	1.15	0.97	1.15	0.97
	1.2	0.91	1.2	0.99	1.2	0.99
	1.25	0.81	1.25	0.97	1.25	0.99
	1.3	0.66	1.3	0.94	1.3	0.99
	1.35	-	1.35	0.87	1.35	0.97
	1.4	0.33	1.4	0.77	1.4	0.93
NFCs with credit-rated sponsor counterparty vs. No NFCs	-	-	1	0.99	1	0.99
	-	-	1.05	0.98	1.05	0.99
	-	-	1.1	0.96	1.1	0.97
	-	-	1.15	0.92	1.15	0.94
	-	-	1.2	0.87	1.2	0.89
	-	-	1.25	0.79	1.25	0.74
	-	-	1.3	0.65	1.3	0.64
	-	-	1.35	0.58	1.35	0.52
	-	-	1.4	0.47	1.4	0.42

Table 4.6 reports the Rosenbaum Bound sensitivity analysis result estimated. NN (1) NN(5) NN(10). Γ is the measure of hidden bias introduced into the results. Where Γ is set to 1, it is assumed that there is no unobservable effect. *Sig level* is the Wilcoxon signed rank test p-value significance level for the average treatment effect on the treated. NN (1) is 1 for 1 matching; NN (5) is matching with five (5) nearest neighbours and NN (10) represent matching with 10 nearest neighbours.

Table 4.7: Rosenbaum bound sensitivity analysis results for leverage ratio

Leverage ratio

	NN(1)		NN(5)		NN(10)	
	Γ	Sig. level	Γ	Sig. level	Γ	Sig. level
NFCs vs. No NFCs	1	0.99	1	1	1	1
	1.15	0.99	1.05	1	1.05	1
	1.3	0.95	1.1	1	1.1	1
	1.45	0.77	1.15	1	1.15	1
	1.2		1.2	1	1.2	1
	1.25		1.25	0.99	1.25	0.99
	1.3		1.3	0.99	1.3	0.99
	1.35		1.35	0.99	1.35	0.99
	1.4		1.4	0.99	1.4	0.99
	1.45		1.45	0.99	1.45	0.99
	1.5		1.5	0.99	1.5	0.99
	1.55		1.55	0.98	1.55	0.96
	1.6		1.6	0.92	1.6	0.86
	1.65		1.65	0.79	1.65	0.67
NFCs with sponsor counterparty vs. No NFCs	1	0.99	1	0.99	1	1
	1.15	0.99	1.15	0.99	1.15	1
	1.3	0.97	1.3	0.99	1.3	1
	1.35	0.93	1.35	0.99	1.35	1
	1.45	0.74	1.45	0.99	1.45	0.99
	1.6	-	1.6	0.99	1.6	0.99
	1.75	-	1.75	0.97	1.75	0.99
	1.9	-	1.9	0.83	1.9	0.99
	2.05	-	2.05	-	2.05	0.98
	2.2	-	2.2	-	2.2	0.9
	2.35	-	2.35	-	2.35	0.69
NFCs with credit-rated sponsor counterparty vs. No NFCs	1	0.83	1	0.99	1	0.99
	1.15	-	1.15	0.99	1.15	0.99
	1.3	-	1.3	0.99	1.3	0.99
	1.45	-	1.45	0.99	1.45	0.99
	1.6	-	1.6	0.97	1.6	0.98
	1.7	-	1.7	0.92	1.7	0.95
	1.75	-	1.75	0.88	1.75	0.92
	1.9	-	1.9	-	1.9	0.75
	2.05	-	2.05	-	2.05	-
	2.2	-	2.2	-	2.2	-
	2.35	-	2.35	-	2.35	-

Table 4.7 reports the Rosenbaum Bound sensitivity analysis result estimated. NN(1) NN(5) NN(10). Γ is the measure of hidden bias introduced into the results. Where Γ is set to 1, it is assumed that there is no unobservable effect *Sig level* is the Wilcoxon signed rank test p-value significance levels for the average treatment effect on the treated. NN (1) is 1 for 1 matching; NN(5) is matching with five (5) nearest neighbours and NN(10) represent matching with 10 nearest neighbours.

4.6 Conclusion

PF has increasingly been used as a vehicle for large-scale infrastructure and capital-intensive projects. Its attractiveness is in part due to its ability to use contracting techniques (such as NFCs) to manage project projects. This, in turn, ensures there is separation of cash flow from sponsors business, allocation of risks to parties well suited to manage them and increase verifiability of managerial actions among others. However, an issue often overlooked is the potential costs and/ benefits of having sponsors as counterparties to these contracts (NFCs). Though sponsors involvement as counterparties can align their interest with that of project outcomes (and lenders), it also exposes project contracts to opportunistic behaviours by the sponsor (s).

The chapter examines the potential benefits and costs, using a sample of almost 6,000 loan tranches signed between 1998 and 2013. After controlling for the potential endogeneity in the use of NFCs, the chapter finds that loan tranches with NFCs, sponsor counterparties and credit-rated sponsors have lower tranche spread and leverage ratios. Furthermore, the reduction in tranche spread and leverage ratio is stronger and significant for developing countries, but insignificant for advanced countries. These results are attributed to the difference in macroeconomic and investment risks in these countries. However, sensitivity analyses of the treatment effects on loan spread and leverage ratio indicate that results are likely to be biased by unobserved heterogeneity.

Chapter 5 How Political and Legal Institutions Shape the Terms of Project Finance Loans

5.1 Introduction

The funding of large-scale investments using project finance (PF) has grown over the last three decades. Data from Thomson Reuters' Project Finance International database indicates that between 1994 and 2013, PF grew by a factor of ten from $41.3 billion to $415 billion in 2013 (Esty et al. 2014). In 2016 and 2017 alone, approximately $267 billion and $229 billion deals were signed using this funding technique.

Some factors are attributable for the growth of PF. First, governments have resorted to PF as az means to increase and diversify their infrastructure investments. As a result, there have been extensions of the technique to infrastructure projects like transportation, water and sewage, telecommunication, schools, hospitals, and prisons (Esty et al. 2014).[40] Second, the peculiar features of PF make it suitable for countries with weak political and legal institutions. These features include separation of the project from sponsors, exhaustive due diligence, and risk management through contract counterparties. These features are argued to promote transparency and cash flow verifiability, which in turn, make it suitable for funding investments in countries with weak political and legal systems (Kingsley, 2009; Hainz and Kleimeier, 2012 and Subramanian and Tung, 2016).[41] Third, PF promotes economic growth and help developing economies to reduce their infrastructure gap (Finnerty, 2013). Studies by Chan-Lau et al. (2016), for instance, show that increase in PF lending by one percentage point to GDP can lead to six to ten percentage point increase in real GDP growth per capita.

[40] Prior to the last three decades, PF was mainly used in resource-rich industrial projects like mining, pipelines, oil fields and power plants (Girardone and Snaith, 2011).

For developing countries, PF increase GDP by 0.67 percentage point per annum (Kleimeier and Versteeg, 2010).

Despite these burgeoning growth, little is known regarding the effect of country-level political and legal institutions on PF loan terms. Aside from Girardone and Snaith (2011), no other study has focused on the relationship between country-level political and legal institutions and PF loan terms. Thus there is limited knowledge on how PF contract terms differ under different political and legal regimes and whether they deliver value for money compared to other alternatives. Further, there is little evidence on whether PF loans are more sensitive to political risk factors or not. This lack of evidence is surprising, given its increasing popularity in the delivery of public infrastructure. Public infrastructures are prone to political and legal risks like creeping expropriation and regulatory changes because of asset specificity and hold-up costs, which raises some important contracting issues.

This chapter fills the void by examining series of hypothesis. First, the chapter examines how political institutions affect loan spread and leverage ratio, after controlling for legal institutions. The hypothesis complements the work of Girardone and Snaith (2011) by analysing the role of legal institutions as well as the effect on an additional response variable, that is, leverage ratio. Second, the chapter examines whether political and legal institutions are substitutes or complements by analysing their interactions. The hypothesis extends the strand of the literature focusing on their interactions. Third, the chapter explores if project contracts (NFCs) have any influence on the relationship observed between political institutions and PF loan terms.[42]

[42] For instance, we do not know if the detailed due diligence, evaluation of project risk and subsequent transfer (management) to project counterparties are enough to compensate for weaker political and legal institutions. On the other hand, the exhaustive contractual process can make these projects costlier to offset, any benefit derived from detailed contracting process.

The chapter contributes to the PF literature in at least two ways. First, to the best of the author's knowledge, the chapter is the first to examine how political and legal institutions simultaneously shape PF loans. An extensive body of work exists, linking country-level political and legal institutions to financial market development and economic growth. These studies demonstrate that improvement in political and legal institutions promote financial market development and the cost of financial intermediation. More recently, a strand of the literature has focused on the combined influences of both political and legal institutions on financial markets (Qi et al. 2010; Boubakri et al. 2014).[43] These studies find that improvements in political institutions can substitute for weaker legal institutions. Like these studies, the chapter accounts for the interaction between these two institutions to determine their effect in the context of PF. Second, the chapter complements the work of Girardone and Snaith (2011). Their study is the only work, thus far, to have explicitly examined how political risk factors influence PF loan spread. They show that disaggregated measures of political risks, as oppose to aggregated measures, allow for identifying specific elements of political risks that affect loan pricing. In line with this, the chapter used a disaggregated measure of political risk: *investment profile* by International Country Risk Guide (ICRG). *Investment profile* measures the likelihood of the country's political institutions to engage in expropriation, profit repatriation, and payment delays.[44]

The chapter finds that political and legal institutions are substitutes. Improvements in political institutions lead to a decrease (increase) in loan spread (leverage ratio) for countries with weak legal institutions and governance. The chapter also finds that the impact of political

[43] Qi et al. (2010) test the effect of political and legal institutions on bond issues, while Boubakri et al. (2014) tests these for banks loans. However, in the context of PF two studies, Hainz & Kleimeier (2012) and Subramanian and Tung (2015) show that PF loans are more likely when political and legal institutions are weak. However, no studies have directly tested for the interaction of these two institutions on the loan terms.

[44] According to Hainz & Kleimeier (2012), *investment profile* directly linked to firm's risk of an investment and therefore likely to affect PF loan terms.

institutions on loan spread reduces if there are NFCs in the PF deal. On the other hand, the impact on leverage ratio increases with NFCs. These results provide new evidence on how country-level institutions affect loan terms.

The rest of the chapter is organised as follows. Section 5.3 reviews related literature on political and legal risks, capital flow, and PF. Section 5.4 presents the testable hypotheses, while section 5.5 details the research design for the study. Section 5.6 reports the descriptive statistics and the empirical results, while section 5.7 concludes.

5.3 Related Literature

5.3.1 Political Risks and the Flow of Capital

The effect of political risks on capital inflow has been examined widely in the finance and economic literature. A number of these studies conclude that political risk factors like institutional uncertainties, corruption, nationalisation risks and weak contractual enforcement, impede inflow of foreign direct investment (FDI) (Gastanaga et al., 1998; Brunetti and Weder, 1998 and Wei, (2000).

Other studies have reported a positive relationship between political risks and FDI inflows. For instance, Henisz (2000) shows that foreign partners' strategic partnerships, with domestic investors and political government, determine the extent to which political risks influence FDI inflow. Similarly, Durnev et al. (2014) find that political instability regarding change in government, promote majority stake FDI. Egger and Winner (2005) show that corrupt regimes are likely to attract FDI inflow because it allows investors to circumvent excessive regulations and administrative controls.

5.3.2 Political Risks and the Flow of Project Finance

In the context of PF, Hainz and Kleimeier (2012) and Subramanian and Tung (2015) provide evidence of positive correlation between political risk factors and the likelihood to use PF. However, they attribute the relationship to the peculiar features of PF. They argue the separate incorporation of the new project through an SPV, ring-fencing of project cash flow from it sponsors and the involvement of development banks, among others, makes PF suitable for countries with weak political and legal systems. For instance, Hainz and Kleimeier (2012) compare PF loans to full-recourse corporate finance loans and show that where political risks are high PF lending are more preferable. Subramanian and Tung (2016) also came to a similar conclusion for legal institutions, after comparing PF loan to corporate finance loans. They find that countries with weak protection of outside investors use PF as a private response to these weaknesses.

5.3.3 Political and Legal Risks Determinants of Loan Terms

One of the earliest studies to examine the linkage between legal institutions and debt financing is Esty & Megginson (2003). The authors demonstrate that creditor right protections and improvement in legal risks positively affect debt ownership. Using a sample of 495 PF syndicated loans signed between 1986 and 2000 and worth approximately $151 billion, the authors explore the effect of creditor rights on PF loan structures. They find that countries with weak (strong) creditor rights have concentrated (diffused) debt ownership structure. Specifically, countries with weak creditor rights have eight and a half (8.5) more banks in the loan syndicate, relative to loans signed in countries with stronger creditor protection. They argue their results support the notion that legal rather than portfolio diversification considerations, influence heterogeneity in syndicate structure across countries.

Using the same sample as Esty & Megginson (2003), Esty (2004) explores how financial and legal systems shape foreign banks behaviour in the syndicated loan market. The study relates the proportion of syndicate loan held by foreign banks to legal and institutional factors. The findings indicate that foreign banks share of loan increases with stronger creditor protection and improvements in legal systems. The study also finds that the share of foreign bank loans decreases with improvement in the financial development of the country.

Recent works by Qian & Strahan (2007) and Qi et al. (2010) focus on how both political and legal institutions determine loan contract terms. Qian & Strahan (2007) is the first to provide a cross-country evidence on institutions and cost of financing. Using a sample of 43 countries (excluding the US), the authors examine the effect of legal and institutional on loan terms. They find that stronger creditor right protection and legal enforcement is positively related to loan maturity, but negatively related to the loan spread. The authors note that creditor right protection laws provide certainty and clarity on financial contracts, which in turn, stimulate credit market growth and thus favourable loan terms. Qi et al. (2010), as a follow up to Qian & Strahan (2007) examine the effect of both political and legal risks on corporate bond yield and spread. The authors are the first to investigate the simultaneous effect of political and legal systems on bond yield and rating. Using loan samples from 39 countries, they find that political and legal institutions are substitutes. They also show that increase in political rights lead to a reduction (increase) in the cost of debt (ratings), where the countries have weaker creditor rights. Further, they find that freedom of the press is a strong channel for reducing bond risks. Similar works by Boubakri et al. (2014) Francis et al. (2014) also came to the same conclusion. Boubakri et al. (2014) explore how political and legal institutions affect firm's cost of capital in 44 countries. They find that improvements in political rights lead to a reduction in the cost of equity. They also find that stronger political institutions can compensate (substitute) for weaker legal systems. Similarly, Francis et al.

(2014) examine the relationship between political uncertainty and the cost of capital on bank loans. The authors use data on 7,947 firms between 1990 and 2007 and measures political risk measures that capture individual firm exposure to political uncertainty. They find that firms with higher exposure to political uncertainty face higher cost of capital. They also show that these effects are lower for firms in relationship lending.

5.3.4 Political and Legal Institutions Determinants of PF Contracts

Hainz and Kleimeier (2012) demonstrate that non-recourse PF loans and the involvement of development banks in the loan syndicate help to mitigate political risks. Using a logit regression and data on 29 countries from 1996 to 2005 they show that PF is more likely to be used when countries with higher political and regulatory risks. They conclude that PF features like separate incorporation, high leverage and extensive use of contractual arrangements, and the certification of development banks reduce political risks.

Subramanian and Tung (2016) also establish that PF provides a mechanism for mitigating the effect of weak legal protection of outside investors. The authors use the difference in difference regressions and data for 43 countries covering the period 1993 and 2007 to examine the causal relationship between weak investor protections and financing choice. They find, after controlling for country and project characteristics that PF is more likely in countries with weaker laws against insider stealing and weaker creditor rights in bankruptcy. Thus PF provides contractual and organisational substitutes for investor protection laws through the separate incorporation of the project and private enforcement of contracts through networks of project accounts that ensure lenders control of project cash flow.

Sawant (2010) also demonstrate that the use of PF help to mitigate hold-up and country risk, especially in developing countries. The author developed a model that postulates that the use of PF as oppose to corporate financing for infrastructure help reduces political risks like

creeping expropriation from host government and hold-up cost from concentrated buyers and sellers. This is because high leverage and financing structure of PF improves the bargaining power of project stakeholders and serves as monitoring mechanism against creeping expropriation. Testing these predictions on 200 PF deals worth $159.97 billion, Sawant (2010) show that country-risks weakly predicts PF lending. Further, they find that PF lending help to mitigate the effect of hold-up from concentrated buyers and suppliers.

Similarly, Byoun and Xu (2014) develop and tested a theoretical model, in which, they show that concession grants and offtake agreements benefit PF sponsors in the presence of political risks. The authors argue concession grants and offtake agreements provide incentives for private sponsors to undertake otherwise unacceptable projects and improve financial return while exposing private sponsors to political influence from the host government. They tested these predictions on a sample of PF data deals signed between 1990 and 2012, and find that projects with higher political and financial risks are less likely to use government concessions and offtake agreements. They also find that project sponsors from countries with pervasive political risks are less likely to use government concessions grants in ordert to avoid political interference.

Girardone and Snaith (2011) provide evidence that indicate that lower political risks reduce loan spread in PF. Using a cross-country regressions and PF loan data for the period 1996 to 2003, the authors evaluate the extent to which various measures of political risk affects PF loan spread. Their findings reveal that the relationship between political risk measures and PF loan spread differs based on countries development, with stronger positive relationship observed in developing countries and weaker evidence in developed countries. They also find that the use of guarantees lowers the loan spread, which they attribute to legal and institutional qualities.

5.4 Testable Hypotheses

H_1: Ceteris paribus, improvement in political institutions reduces loan spread and increases leverage ratio, even after controlling for legal and governance institutions.

Some studies (Qian and Strahan, 2007; Roe, 2006; and Roe and Siegel, 2008) have demonstrate strong positive relationship between country-level institutions and financial development. These studies follow the seminal works of Laporta et al. (1997; 1998) who are the first to formalise the law and finance nexus in the economic literature. Laporta et al. (1997) show that a countries legal origin is positively related to the level of financial development. Studies building on Laporta et al. (1997) findings have shown that improvements in political institutions protect investors and creditors' rights, which in turn, positively affect the availability of loanable funds and the cost of borrowing. Thus, improvements in political and legal institutions should increase lenders willingness to lower the spread on PF loans due to the reduced perception of risks. In addition, lenders should be willing to commit more debt to the project company. This willingness to provide the project company more capital should reflect in a higher leverage ratio (loan to size ratio) for these projects compared to those signed in countries with weaker institutions. In other words, loans signed in countries with stronger political and legal institutions should be priced lower and have a higher leverage ratio.

H_2: Ceteris paribus, the impact of political institutions on tranche spread and leverage ratio are complemented (otherwise substituted) by improvements in legal and governance institutions.

Recent studies have also established an interaction between political and legal institutions (Qi et al., 2010; Francis et al., 2014; Boukari et al. 2014). These studies argue that improvements in either of these institutions can make up for the deficiency in the other. The

assertion from these studies is that improvements in political institutions compensate for weakness in the political system. Further, stronger political and legal institutions do not lead to incremental improvement in loan outcomes. Thus, to some extent political and legal institutions are considered substitutes. Given, PF is more suitability for weak institutional environments; the chapter examine how PF loan spreads and leverage ratios respond to changes in these institutions.

H_3: Ceteris paribus, PF tranche spread and leverage ratios are less responsive to institutions when NFCs are in place.

Following Subramanian and Tung (2016) findings that PF act as a private response to weak investor protection laws, one expects the spread on these loans to be less responsive to weaker legal institutions, especially when they already have contractual mechanisms (NFCs) in place. NFCs typically cover risks engineering, procurement and construction, input supply, output sales and the operation of the project. Collectively, these contracts provide the basis for lenders and creditors to monitor the activities of the project company. In other words, NFCs are one form of private responses to weak investor protection since; they allow lenders to pre-commit project company on how projects cash flow will be utilised. Thus, H_3 conjectures that loan spread and leverage ratio are likely to respond less to country-level institutions quality if project contracts (NFCs) are included in the loan agreement. Specifically, the relationship observed in H_1 and H_2 should become weaker once NFCs are included as part of the loan agreement. However, it is also possible that the time and cost involving in designing PF loans can offset these benefits of reduced pricing or higher debt

capital.[45] In that case, the inclusion of NFCs would not lead to any significant reduction (increase) in the loan spread (leverage ratio).

5.5 Research Resign

The section details the research approach adopted to test the study hypotheses. It provides details on data collection, sample selection and the description of study variables. The section ends with a review of the econometric procedure used to test the hypotheses.

5.5.1 Data and Sample

Data for the study comes from Dealogic Projectware database. Projectware contains comprehensive information on PF transactions including loan contracts characteristics, project company, sponsors and lenders. The database also provides details on the various contracts and agreements used to manage the project company. However, a main drawback of the dataset is the unavailability of information on pricing and fees for a large number of deals. The only pricing information available is the tranche spread. Other relevant costs like loan commitment fees are unreported in most instance.

The initial sample is composed of 6,000 PF loan tranches signed across 100 countries from 1998 to 2012. From this, a filter is applied to restrict the sample to deals that have complete information on loan spread which reduced the number of observations to 5,230. Moreover, a common practice in cross-country studies of the relationship between loan pricing and political risk is to exclude US from the analysis (for an argument, see Hainz & Kleimeier 2012; Qian & Strahan 2007). Hence, we exclude US loan tranches. The final sample comprises 3,362 loan tranches representing (approximately 1, PF loan) signed between May 1998 and December 2012. This data is then matched with country-level political, legal and governance indicators as further described below.

[45] For instance, Esty (2004b) estimate that the transaction cost involved in structuring a PF deal is usually between 5-10% of the loan value.

5.5.2 Description of Variables

5.5.2.1 Dependent Variables

Loan spread: Loan spread is the loan tranche spread over market base rates such as Libor, Euribor and US T-Bill. This treatment is in line with Corielli et al. (2010)., Blanche Brude and Starnge (2007), and Gatti et al. (2013). Most of the loan tranches have spread charges as a single rate above a market base rate. However, some tranches are priced in tiers corresponding to various phases of the project such as construction and operational phases. Consequently, to obtain a single rate for such tranches, we calculate an average rate weighted by the number of years assigned to each tier of loan spread (see Corielli et al., 2010). When the spread is quoted as a fixed rate (without a market reference), the observation is excluded from the analysis to ensure that the study capture the market premium.

Leverage ratio: Leverage ratio is the ratio of loan size to total project size. The total project size includes debt (loans) and equity (sponsor's capital). The loan size is made up of all the loans used to finance the project company. The variable ranges from 0 to 1, where the latter indicate 100% debt financing. Where a loan is financed with two or more tranches, the leverage ratio at the loan-level is used.

5.5.2.2 Political, legal and governance measures

Political risks measure (Investment profile): The measure of political risk, *investment profile,* comes from International Country Risk Guide (ICRG).[46] The index ranges between zero (0) and twelve (12) and captures three subcomponents of risks, that is, (i) contract viability or expropriation; (ii) profit repatriation and (iii) payment delays. Each of these subcomponents is scored between 0 and 4, where 0 indicates "very high risk," 4 indicate "very low risk." The investment profile variable captures risks that most firms and investors are likely to be

[46] Knack and Keefer (1995) shows that ICRG political risk measures have higher explanatory powers relative to country risk and legal measures.

concerned about, with regards to foreign investment and long-term lending (see Hainz & Kleimeier, 2012 and Bekaert et al. 2007). For the univariate analysis (5.6.2.1), an average score of *Investment profile* is estimated for each country over the sample period (1998 to 2012). The average scores are used to categorise project countries into three groups, that is, "High Risk" (0-9) and "Low Risk" (10-12). For each of these categories, dummies are constructed for with each risk category. In the multivariate analysis, annual investment profile index is used to capture the responsiveness of loan spreads and leverage ratio to variations in this measure across countries.

Legal risk (Creditors Right): Creditor right index by Djankov et al. (2007) is the measure of creditor protection in the study. This index aggregates the existence of creditor rights in the laws and regulations of a country. The index is composed four subcomponent with each assigned the value one, if any of the following law or regulations exist, (i) existence of restrictions such as creditor consent or minimum dividends, for a debtor to file reorganisation; (ii) secured creditors can seize their collateral after the reorganisation petition is approved; (iii) secured creditors are paid first out of the proceeds of liquidating a bankrupt firm, as opposed to other creditors such as governments or workers ; and (iv) management does not retain administration of its property pending the resolution of the reorganisation. A score of zero (0) indicates weaker creditor protection; while four (4) indicate stronger creditor protection.

Governance measures (WGI): The study also measures the quality of countries governance system using World Governance Indicators (WGI) index. The study focuses on indicators that directly affect investments in a country. As a result, four indicators, that is, *regulatory risk, government effectiveness, the rule of law and control of corruption* are used to estimate the effect of variables that potentially influence on investment risks. Principal component

analyses are carried on the four governance measures to reduce noise in these measures and maximise the variation. This process led to one principal component and as a proxy for project country's governance quality.

5.5.2.3 Control Variables

Aside the political, legal and governance measures, the study controls for loan and deal level characteristics. Industry and country level controls are also included to capture general macroeconomic and country-level effects on the loan contracts.

Loan characteristics: The study controls for some loan-specific features and include (i) loan maturity, measured as the tranche tenor in months, and (ii) loan amount, measured as the log of tranche amount measured in $US millions. Also, deal-level characteristics include dummies that consider whether the loan is in a currency different from the project country (domestic), refinance an existing loan or secured through a development agency guarantee. Further, control variables are introduced to capture the loan types, that is, whether the loan is long-term or short-term loan in nature.

Project type: Following Byoun & Xu (2014) finding that project types induce political influences, the study control for concession agreements and public-private partnerships (PPP/PFI). As a result, two dummy variables, PFI and Concession dummies are constructed to account for projects exposure to host country government influences. These dummies also interacted with the measures of political and legal institutions to evaluate their effect through political and legal institutions.

NFCs dummy: Following Corielli et al. (2010)'s finding that NFCs are effective mechanisms to reduce project risks and agency costs, the study creates a dummy variable controlling for the use of NFCs in PF transactions.

Bilateral dummy: To account for deal type, the study control for deals structured between the project company and a single lender (bilateral agreement). Thus, the base group is the syndicated loan deals, where a group of lenders, as opposed to a single lender, borrow to the project company. This variable is found to be a significant determinant of PF loan spread by Sorge & Gadanecz (2008).

Country sovereign rating: The study captures country risk using S&P sovereign debt rating in the year the loan deal is signed. The study follows the methodology of Altunbaş & Gadanecz (2004) and Corielli et al. (2010) to classify project countries into Best Grade, Investment Grade, Speculative, poor and default or unrated. For each of these classifications, a dummy variable is created to identify their effects in the primary model.

Currency risk dummy: The variable takes the value one (1), if the deal is signed in a currency other than, the project country's currency, and zero otherwise. This variable is included to control for the exchange rate differential and its potential effect on loan spread and leverage ratio.

Industry and year fixed effects: The final set of controls captures project industry classifications and year fixed effects. For the industrial classification, dummies are used for each industry.

5.5.3 Econometric Procedure

The chapter addresses the hypotheses in section 5.4, using ordinary least square (OLS) regression models. The regression equation is estimated with robust standard errors clustered at the deal level to account for potential serial correlation between tranches that go into financing a single deal. The baseline equations (4.1) and (4.2) are specified as

$$Spread_i = \gamma_0 + \beta_1 Political\ institutions_{it} + \beta_2 Legal\ institutions_i + \beta_3 Governance\ measures_{it} + \delta_1 NFC\ dummy_i + \delta_2 PPP_i + \delta_3 Concessions_i + \delta_4 Bilateral\ loans_i + \eta' Controls_{it} + \varepsilon_{it} \quad (5.1)$$

$$Leverage\ ratio_i = \gamma_0 + \beta_1 Political\ institutions_{it} + \beta_2 Legal\ institutions_i + \beta_3 Governance\ measures_{it} + \delta_1 NFC\ dummy_i + \delta_2 PPP_i + \delta_3 Concessions_i + \delta_4 Bilateral\ loans_i + \eta' Controls_{it} + \varepsilon_{it} \quad (5.2)$$

where *i* identifies a particular loan tranche, and t denotes the time (year) of the loan tranche signing, β are the coefficients on political, legal and governance variables, δ' are the coefficients on deal level variables, and η are the coefficients on the control variables.

By using predetermined (i.e. before the PF loan agreement is signed) country characteristics we greatly reduce the possibility that they are endogenous with the loan spread and leverage ratio for a later PF loan. A more plausible criticism is the existence of an omitted variable bias due to some excluded country characteristics. However, due to the very nature of PF lending, it is not possible to examine loan-level fixed effects regression. However, the study includes loan-level dummies to control for omitted country-level and loan-level variables.

5.6 Results

This section presents the empirical results of the chapter. The section begins with descriptive statistics at the country level and that of the total sample. Next, a correlation analysis is performed to ascertain the level of dependence between the main variables. Then the empirical results which includes a univariate analysis comparison of loan samples as well as multivariate regression analysis to test the hypotheses.

5.6.1 Descriptive Statistics

5.6.1.1 Country Level Summary Statistics

Table 5.1 reports the distribution of the key variables by country. The chapter reports statistics for the main loan terms, together with country-year political and legal institutions measure, for 36 selected countries out of the sample. The selected countries have at least 20

tranche observations for the sample period (1998-2012) and collectively represent 85% of the total sample. The statistics show that Spain (440), United Kingdom (419) and Australia (164) dominate the sample.

Regarding the tranche spread, the data reveals that loan tranches in countries with weaker political and legal institutions tend to have higher tranche spread, with the highest values recorded in Columbia (392.81bps), Brazil (316.97bps) and Argentina (294.8bps). On the other hand, developed countries recorded lower tranche spread, with lowest values in Japan (108.8bps), Greece (103.73bps) and Taiwan (89.43 bps). Tranche amount shows considerable variations across countries. Resource-rich countries like UAE ($532.19m), Saudi Arabia ($598.03m), Russia ($570.6m) and Qatar ($616.16m) reported larger tranche amounts compared to the rest of the sample. Further, tranche maturities record higher values in advanced countries like UK (48.47 months), Ireland (44.65 months) and Portugal (44.1 months). On the other hand, lower tranche maturities are reported in Columbia (17.38 months), Argentina (19.26 months) and Russia (19.65 months). Interestingly, these patterns are also consistent with the strength of political institutions in these countries.

Table 5.1 also shows summary statistics of the political (investment profile), legal (creditor rights) and governance measures. Countries like Egypt (7.26), Brazil (6.77) and Columbia (4.56) report higher political risk, with similar results on creditor rights and governance measures. Similarly, countries with better investment profile (that is, UK, Canada, Japan, Spain, and Portugal) also have strong creditor rights and governance institutions.

Table 5.1: Descriptive statistics by country

Country	Tranche spread (bps)	Investment profile	Creditor right	Governance	Tranche Maturity (months)	Tranche Amount (US$ M)	No. obs.
Argentina	294.8	6.71	1	-2.25	19.26	99.02	38
Australia	141.24	10.23	3	1.62	17.42	169.58	164
Belgium	140.97	9.88	2	1.16	36.66	284.27	27
Brazil	316.97	6.77	1	-2.28	24.63	204.77	161
Canada	222.74	11.42	1	2.12	22.46	222.65	52
Chile	189.78	10.67	2	1.01	26.74	209.95	53
China	134.24	6.92	2	-2.86	32.45	120.52	41
Colombia	392.81	4.56	0	-2.82	17.38	93.55	24
Egypt	133.46	7.26	2	-2.99	36.79	213.29	38
France	132.66	11.23	0	1.17	32.45	262.07	71
Germany	207.9	10.42	3	1.8	32.23	323.78	58
Greece	103.73	10.34	1	-0.66	26.43	275.96	29
Hungary	127.93	11.07	1	-0.99	39.15	151.31	42
India	241.62	8	2	-2.62	29.25	261.64	59
Indonesia	290.23	7.39	2	-3.52	21.45	215.76	57
Ireland	136.75	11.15	1	1.73	44.65	76.98	46
Italy	135.54	10.87	2	-0.73	28.76	271.98	144
Japan	108.8	11.42	2	0.17	37.32	121.31	42
Mexico	238.9	9.82	0	-2.25	26.8	158.19	94
Netherlands	162.2	11.02	3	2.16	41.2	295.82	42
Oman	125.14	11.05	0	-1.02	43.3	235.93	46
Philippines	206.72	8.39	1	-2.79	27.16	195.19	60
Poland	126.12	10.48	1	-0.81	28.01	213.77	35
Portugal	157.67	11.66	1	0.29	44.1	97.87	148
Qatar	115.47	10	-	-0.62	42.86	616.61	62
Russian Federation	280.91	8.73	2	-3.62	19.65	570.6	51
Saudi Arabia	114.74	10.45	3	-2.17	38.3	598.03	74
Singapore	154.27	10.83	3	2.51	21.21	362.85	31
South Africa	253.54	8.88	3	-1.34	22.99	104.21	21
South Korea	231.86	8.56	3	-0.29	32.31	138	22
Spain	139.31	11.63	2	0.58	33.57	152.64	440
Taiwan	89.43	10.58	2	-0.12	29.61	106.58	28
Thailand	158.2	8.21	2	-1.82	35.58	107.85	46
Turkey	209.07	7.68	2	-2	25.39	145.04	64
United Arab Emirates	183.53	9.05	2	-0.39	36.42	532.19	44
United Kingdom	148.54	11.37	4	2.05	48.47	247.76	419
Total (Average)	181.88	9.58	1.77	-0.63	31.18	234.93	2873.

The table reports the mean for the key variables in the main regressions for PF loans. Sample period: 1998-2012. Governance variable is captured using four governance indicators from World Governance Indicators (WGI): (i) regulatory risk; (ii) government effectiveness; (ii) rule of law; and (iv) control of corruption. A principal component analysis is carried out to reduce noise and maximize variation in the measures. This yields one principal component used as our proxy for the quality of a country's governance.

5.6.1.2 Univariate Descriptive Statistics

Table 5.2: Descriptive Statistics of the main variables

Panel A: Full Sample						
Variables	Obs.	Mean	Median	St. Dev.	Min	Max
Tranche amount ($million)	3362	225.3	91.21	407.54	0.07	5400
Tranche Maturity (months)	3293	32.21	27	22.98	0.24	354
Tranche Spread (bps)	3362	183.96	140	136.75	1	1275
Leverage ratio	3350	0.842	0.892	0.176	0.0375	1
Investment Profile	3356	9.795	10.5	2.37	0	12
Creditor rights	3243	2.05	2	1.15	0	4
Governance	2776	-0.358	0.136	1.95	-6.07	2.93
Spread with selected variables:						
Tranche spread with:						
NFCs	1554	172.51	135.32	121.02	1	1175
Concession	486	182.38	141.17	123.68	6.65	690
PPP	568	146.39	115	109.49	8.7	1175

Table 5.2 presents the descriptive statistics of the primary variables in the regression model.

Table 5.2 reports descriptive statistics for the variables used in the analysis. The table reports the mean, median, standard deviation, minimum and maximum values for each variable. The full sample of loan tranches is composed of 3,243 loan tranches.

The mean (median) tranche amount for the full sample is US$225.3 million (US $91.21 million). The statistics also show that mean tranche amount is highly skewed with the mean value twice as much as the median values. Mean (median) tranche maturity is 32.21 months (27 months) with a standard deviation of 22.98 months. This value translates into an average maturity of 2.6 years per tranche. However, the standard deviation of 22 months (1.83 years) indicates high level of variation around the mean. Tranche spread estimates show an average value of 183.96bps with a standard deviation of 136.75 bps. Leverage ratio has a mean (standard deviation) of 0.84 or 84% (0.89) with the minimum value of 0.037. The leverage ratio, 84%, is slightly higher when compared to 81% reported by Byoun et al. (2013).

The mean value for political institutions (investment profile) and legal institutions (creditor rights) are 9.79 and 2.05 respectively, with standard deviations of 2.37 and 1.15.

Similarly, the mean (median) value of governance is 0.36 (0.14). The standard deviation of 1.95 indicates some variations in the governance measure. These results indicate that most countries in the sample have stable political institutions and relatively moderate legal and governance institutions.

5.6.1.2 Correlation Analysis

Table 5.3 presents the correlation coefficients for the key variables. The table reports a negative correlation between tranche spread, investment profile, creditor right, and governance variables. On the other hand, a positive correlation exists between leverage ratio and investment profile, creditor rights and governance. These results indicate that loans in countries with stronger political, legal and governance institutions are likely to have lower tranche spreads and higher leverage ratios. Political, legal and governance institution measures show positive correlations with each other. However, the correlation between political and legal institution is small (0.19), and suggests the two measures capture different effects. Investment profile and governance, on the other hand, show high correlation (0.67) indicating that the two measures probably capture similar effects. The result also shows that loan spread negatively correlated with NFC, concession and PPP/PFI dummies. Further, it is observed that a negative correlation exists between NFCs and the political and legal institution measures. Further, tranche maturity exhibits positive correlation with political and legal measures.

Table 5.3: Correlation coefficients of the main variables

	Tranche loan spread	Leverage ratio	Investment profile	Creditor rights	Governance measures	NFC dummy	Concessions	PPP/PFI	Tranche maturity
Loan spread	1								
Leverage ratio	-0.132***	1							
Investment profile	-0.29***	0.108***	1						
Creditor rights	-0.10***	0.067***	0.19***	1					
Governance measures	-0.24***	0.141***	0.67***	0.40***	1				
NFC dummy	-0.07***	-0.198***	-0.040	-0.07***	-0.100***	1			
Concessions	-0.12	-0.079***	-0.09***	-0.16***	-0.170***	0.180***	1		
PPP/PFI	-0.12***	-0.067***	0.250***	0.19***	0.300***	0.007	-0.190***	1	
Tranche maturity	0.01	-0.108***	0.070***	0.06***	0.060***	0.220***	0.120***	0.210***	1

This table presents the correlation coefficient of the key variables used in the regression. Sample period: 1998-2012. *** indicates significance at the 1% level.

5.6.2 Empirical Results

In this section, the chapter examines the impact of country-level political, legal and governance institutions on tranche spread and leverage ratio. First, the chapter conducted univariate analysis to compare key loan terms for countries with strong to those with weak institutions. Afterwards, results of multivariate regression analysis of the impact of these institutional measures on both loan tranche spread and leverage ratio is performed. The multivariate analysis covers the baseline regression as well as the interacting effect of the institutional measures. Further, the institution features are interacted with NFC to ascertain their substitutability.

5.6.2.1 Univariate Analysis

Table 5. 4: Univariate analyses of loan terms

Panel A: Investment profile	High risk (dummy =0) (A)	Low risk (dummy =1) (B)	T-statistics (A-B)
Tranche Spread	211.13	150.37	13.13***
Tranche Maturity	30.23	34.68	-5.548***
Tranche Amount	239.09	208.25	2.18***
Panel B: Creditor Rights	Weak (A) (dummy=0)	Strong (B) (dummy=1)	T-statistics (A-B)
Spread	192.12	167.74	4.89***
Maturity	30.64	35.36	-5.58***
Tranche Amount	192.72	290.08	-6.57***

This table presents a univariate comparison of the loan terms used in the regression. Panel A reports comparative statistics for countries with high political risk (Investment profile between 0 and 9) and those with low political risk (Investment profile between 10-12). The categorisation of countries is done by first estimating an average investment profile for all the countries for the sample period (1998-2012). After this, the average investment profile score is used to categorise the countries into low and high investment risk. Panel B categorise the sample based on country creditor right measure. Given that creditor rights is time-invariant, the study classified project country as "weaker" if they have creditor right between 0 and 2, and stronger if they have creditor right between 3 and 4.

Table 5.4 reports the univariate analyses based on political and legal institution measures. Panel A reports the result for investment profile, while Panel B reports that of creditor rights. For each category, the mean values are compared using the t-test with equal variance.[47]

[47] The t-test is also estimated using unequal variance with the results statistically significant at the 1% level.

For tranche spread, the results indicate that countries with weaker investment profile and creditor rights have higher values compared to loans in countries with weaker investment profile and creditor rights. Similarly, results for tranche maturity show that countries with weaker investment and creditor rights have lower maturity on loans than those stronger investment profile and creditor rights. Tranche amounts are also higher in countries with weaker political institutions.

5.6.2.2 Multivariate Analysis

5.6.2.2.1 Impact of Institutional Quality on Loan Spread

Table 5.5 presents the regression results of the relationship between tranche spread and the political and legal institutions. Model 1 reports the main specification with investment profile (political risk variable), loan characteristics and country controls. Model 2 and 3 add creditor rights and governance measure respectively to the specification in Model 1. In Model 4 and 5, the investment profile interacts with legal and governance measures respectively.[48]

Consistent with the first hypothesis (H_1) and the findings of Girardone and Snaith (2011) and Qi et al. (2010), the present chapter finds that loan spread reduces with improvement (stronger) in political institutions. These results hold for all regression specifications in Table 5.5. Taking results in Model 1 for instance, a percentage increase in investment profile lead to 5.6% decrease in spread. Given mean (median) spread for the sample is 183.96 (140) bps (in Table 5.2), one percentage improvement in investment profile will lead to 10.3 bps (7.84 bps) reduction in the spread. This result suggests that loans signed in countries with strong politcal institutions benefits from lower financing cost. This result is in line with Girardone and Snaith (2011) and Qi et al. (2010) who also report lower spread (cost of debt) for countries with stronger political institutions. However, the coefficients (-0.045 to -0.092 from

[48] Unreported coefficients on industry, loan-type, sovereign credit rating and year dummies are provided in Appendix 3.1.

Model 1 to 5) are much lower than 0.216 to 0.668 obtained in Qi et al. (2010). A potential explanation for the smaller coefficients is that (together with Girardone and Snaith (2011)) PF has peculiarities-political risk-mitigants and certification benefits of development banks (Kingsley, 2009; Hainz and Kleimeier, 2012). Thus, loan spreads on PF are less likely to respond to political risks relative to corporate debt, bonds, and equity.

For legal institutions, the results in Table 5.5 indicate that stronger creditor rights lead to reduction in the spread. Model 4, for instance, show that one percent improvement in legal institution reduces loan spread by 19.6% and statistically significant at the 5% significance level. This result also provides support for the role legal institutions on financial contracts, and in line with previous studies by Qi et al. (2010). On the other hand, the coefficient on legal institutions in Model 2 is positive and statistically insignificantly. This finding is interesting considering Subramanian and Tung (2016) study that show that PF act as a private response to weak creditor protection. Thus, separate incorporation of the project company and ring fencing its project cash flow through network of contracts (NFCs), lenders can provide an alternative to weaker creditor protection. If this is true, the loan spread on these transactions should also be less responsive to legal institutions.

Governance in Model 3 shows a positive relationship on loan spread. A one percent increase in governance is associated with 4.7 percent increase in the loan spread. The result is, however, counter-intuitive, but likely due to governance's high correlation with investment profile (0.67 from Table 5.3). As a result, it is possible investment profile captures most of the effects from governance.

Table 5.5: OLS regression of tranche spread on political and legal institution

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant term	5.136***	5.793***	5.712***	6.132***	5.608***
	(32.79)	(25.45)	(31.63)	(22.79)	(29.04)
Investment profile	-0.056***	-0.058***	-0.055***	-0.092***	-0.045***
	(-5.18)	(-4.80)	(-4.65)	(-5.12)	(-3.42)
Creditor right		0.026		-0.196**	
		(1.63)		(-2.43)	
Governance			0.047***		0.000
			(3.00)		(0.000)
Investment profile x Creditor rights				0.022***	
				(2.90)	
Investment profile x Governance					0.004
					(1.17)
NFC dummy	-0.146***	-0.140***	-0.149***	-0.138***	-0.149***
	(-3.68)	(-3.70)	(-4.11)	(-3.68)	(-4.08)
Concession dummy	0.022	0.043	-0.020	0.038	-0.019
	(0.46)	(0.85)	(-0.38)	(0.76)	(-0.37)
Public finance initiatives/PPP dummy	-0.113**	-0.118**	-0.151***	-0.130***	-0.155***
	(-2.41)	(-2.46)	(-3.12)	(-2.74)	(-3.18)
Bilateral agreement dummy	0.031	0.033	0.008	0.029	0.008
	(0.50)	(0.65)	(0.17)	(0.59)	(0.16)
Log of maturity	0.064***	0.060***	0.077***	0.060***	0.077***
	(3.95)	(3.66)	(4.62)	(3.65)	(4.64)
Log of tranche amount	-0.052***	-0.052***	-0.054***	-0.052***	-0.053***
	(-5.42)	(-5.29)	(-5.25)	(-5.28)	(-5.20)
Currency dummy	-0.105**	-0.094**	-0.0502	-0.087*	-0.043
	(-2.34)	(-1.98)	(-1.02)	(-1.83)	(-0.89)
Refinance dummy	0.011	0.0169	-0.035	0.011	-0.033
	(0.29)	(0.40)	(-0.85)	(0.27)	(-0.80)
Industrial dummies	YES	YES	YES	YES	YES
Loan type dummies	YES	YES	YES	YES	YES
Sovereign Rating dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
Obs.	3284	3167	2717	3167	2717
Adjusted R^2	0.28	0.27	0.33	0.28	0.33

Table 5.5 shows regression estimates of the log of loan spread on political and legal institutions, loan characteristics and country controls for project finance loans. The variables: *Investment profile x creditor right* and *Investment profile x governance* are interaction terms of political institutions with legal and governance institutions respectively. Model 1 shows the estimates of loan spread on political institutions, loan, and country controls. Model 2 adds legal institutions while in Model 3 governance is the substituted for legal institutions. Model 4 and 5 add interaction terms of political institution and legal and governance institutions respectively. The sample period is 1998-2012. The models are estimated using OLS with robust standard errors clustered at the deal level. T-statistics are reported in parenthesis. ***, ** and * denotes significance at the 1%, 5% and 10% level respectively.

Turning to interaction terms in Model 4 and 5 reveal some interesting findings. Model 4 provides evidence on the interaction between political risk and creditor right. The estimated coefficient on interacting political and legal institution is positive and statistically significant at the 1% level. This result indicates that as countries' political institutions improve, the impact of creditor right on PF loan spread reduces, all things being equal. Similarly, as countries' legal institutions improve, the impact of political institutions on spread reduces. The finding suggests some degree of substitutability between political and legal institutions. The coefficient on the interaction between political institutions and governance is positive but statistically insignificant.

The coefficients on the control variables are consistent and in line with previous studies. NFC dummy, which proxies for risk-shifting contracts show a negative relationship with loan spread throughout Model 1 to 5. The estimated coefficients on the NFC dummy range between 0.138 and 0.149. These results are consistent with the findings of Corielli et al. (2010) who also report a negative relationship between loan spread and NFCs. NFCs provide contractual mechanisms for lenders to control the project company and its sponsors. In addition, following Byoun and Xu (2014) concession and PFI/PPP dummies are included to account projects with a higher tendency of government control. The results on concession report show both positive and negative results. However, they are insignificant throughout Model 1 and 5. On the other hand, PFI/PPP loans report negative and significant relationship with PF loan spread. Tranche maturity and amount show a positive and negative relationship with loan spread respectively.

5.6.2.2.2 The Effect of Political, Legal, Governance Institution on Leverage Ratio

Table 5.6 reports regression results of leverage ratio on political and legal institutions, together with the control variables. Model 1 reports the results of the basic specification with investment profile (political measure), loan characteristics and country controls. Model 2

adds creditor rights to the basic specification in Model 1, while Model 3 adds governance measure to Model 1 specification. In Model 4 and 5, the political variable interacts with legal and governance measures respectively.[49]

Overall, results in Table 6 suggest that political institutions positively affect leverage ratios offered on PF deals. The coefficients on investment profile are positive throughout the specifications, except Model 3. Interpreting Model 2, one percentage increase in investment profile is likely to be associated with a 0.006 (0.6%) increase in the leverage ratio. On creditor rights, the results are mixed. While Model 2 report negative signs, this changes to positive once interaction terms with investment profile is included. However, the coefficients are statistically insignificant and suggest legal institutions are not significant determinants of leverage ratios in PF. Similarly, the coefficients on governance measures are insignificant in from Table 5.6. Turning to the interaction terms, it is observed that both creditor rights and governance interacted with investment profile are insignificant predictors of leverage ratio.

On the loan characteristics, results indicate that tranches with NFCs are negatively related the leverage ratios. The coefficients on NFC dummy range between -0.032 and -0.036 across the five regression specifications. Taking Model 1, the result shows that leverage ratio on tranches with NFCs are 3.6% lower than those without these contracts in place. This finding is consistent with Byoun et al. (2012) and Corielli et al. (2010) who observe a negative relationship between loans with NFCs and leverage ratio. On the other hand, the leverage ratios for PPI/PFI PF deals are 3.1% higher than their counterparts. Loan maturity is negatively related to leverage ratio, while refinance loan tranches are associated with higher leverage.

[49] Unreported coefficients on industry, loan-type, sovereign credit rating and year dummies are provided in Appendix 3.2.

Table 5.6: Regression of leverage ratio on political and legal institutions

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant term	0.931***	0.922***	0.944***	0.884***	0.930***
	(17.27)	(16.29)	(15.88)	(14.13)	(14.20)
Investment profile	0.005*	0.006**	0.004	0.011**	0.006
	(1.82)	(1.98)	(1.30)	(2.51)	(1.37)
Creditor right		-0.002		0.024	
		(-0.57)		(1.08)	
Governance			-0.002		-0.009
			(-0.53)		(-0.67)
Investment profile x Creditor rights				-0.00263	
				(-1.26)	
Investment profile x Governance					0.0006
					(0.51)
NFC dummy	-0.036***	-0.032**	-0.036***	-0.033**	-0.036***
	(-3.47)	(-3.18)	(-3.33)	(-3.20)	(-3.31)
PFI/PPP dummy	0.031*	0.031*	0.031*	0.032*	0.031*
	(1.90)	(1.84)	(1.80)	(1.91)	(1.76)
Concession dummy	0.000	-0.004	0.014	-0.004	0.014
	(0.00)	(-0.34)	(0.96)	(-0.31)	(0.97)
Bilateral dummy	-0.025*	-0.027*	-0.026	-0.027*	-0.026
	(-1.68)	(-1.78)	(-1.53)	(-1.75)	(-1.53)
Log of maturity	-0.016***	-0.015***	-0.017***	-0.015***	-0.017***
	(-3.85)	(-3.60)	(-3.82)	(-3.58)	(-3.81)
Log of tranche amount	-0.000	-0.000	-0.000	-0.000	0.000
	(-0.12)	(-0.14)	(-0.01)	(-0.13)	(0.01)
Currency dummy	-0.017	-0.009	-0.032**	-0.010	-0.031**
	(-1.38)	(-0.76)	(-2.14)	(-0.84)	(-2.07)
Refinance dummy	0.108***	0.108***	0.109***	0.108***	0.110***
	(9.19)	(9.07)	(8.43)	(9.14)	(8.43)
Industry dummies	YES	YES	YES	YES	YES
Loan type dummies	YES	YES	YES	YES	YES
Sovereign rating dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
Obs.	3272	3155	2705	3155	2705
Adjusted R^2	0.14	0.14	0.15	0.14	0.15

Table 5.6 shows regression estimates of leverage ratio on political and legal institutions, loan characteristics and country controls for project finance loans. The variables: *Investment profile x creditor right* and *Investment profile x governance* are interaction terms of political institutions with legal and governance institutions respectively. Model 1 shows the estimates of leverage ratio on political institutions, loan and country controls. Model 2 adds legal institutions while in Model 3 governance is the substituted for legal institutions. Model 4 and 5 add interaction terms of political institution and legal and governance institutions respectively. The sample period is 1998-2012. The models are estimated using OLS with robust standard errors clustered at the deal level. T-statistics are reported in parenthesis. ***, ** and * denotes significance at the 1%, 5% and 10% level respectively.

5.6.2.2.3 Interaction of NFCs and Political, Legal and Governance Institutions

Impact on loan spread

Table 5.7 reports regression results relating loan spread to PF contract terms and country characteristics, together with the interaction of political and legal institutions with NFC dummies. In Model 1, the basic specification (Table 5.5, Model 1) is updated with an interaction term of NFC dummy and political institutions. Model 2 adds legal measure (creditor rights) with it interaction with NFC dummy, while Model 3 reports the interaction of NFC dummy with governance measures.[50]

First, the result shows that the impact of political risk measure (investment profile) on loan spread is slightly higher for Table 5.7 relative to those obtained in Table 5.5 earlier. Turning to the interaction of political risk measure and NFC dummy, the positive coefficient suggests that the impact of political risk on loan spread is smaller when loan tranches have NFCs. This result possibly suggests that NFCs (that is, the network of project contracts) can substitute for the effect of political risk on loan spread. In other words, where project country already has a high political risk, the use of NFCs does not derive any positive economic benefits, suggesting substitution between the two measures. This is not surprising given Hainz and Kleimeier (2012) show that use of non-recourse nature of PF as well as the certification of development banks make PF a relatively more suitable than corporate debt finance in weak countries with high political risk.

The study also finds that legal measure and its interaction with NFC dummy (Table 5.7, Model 2) yield positive but insignificant coefficients. The coefficients on these measures are also close to zero suggesting a weaker relationship between these variables and the loan spread.

[50] Unreported coefficients on industry, loan-type, sovereign credit rating and year dummies are provided in Appendix 3.3.

The result also shows that the use of NFCs substitute for the effect of governance measures on loan spread. Loan tranches with NFCs located in countries with stronger governance indicators receive lower interest rate compared to their counterparts in countries with lower governance indicators (Table 5.57, Model 3). The reason for this result appears to be that countries with better governance systems already have mechanisms in place to deal with such risks, while countries with weaker governance systems would have to rely on the extensive contracting mechanism in PF to protect creditors. This is consistent with Subramanian and Tung (2016) who show that verifiability of cash flows in PF through an extensive network of contracts and the private enforcement of these makes them suitability for countries with weaker legal and investor protection.

Impact on leverage ratio

Table 5.8 reports regression results relating leverage ratio to PF contract terms and country characteristics, together with the interaction of political and legal institutions with NFCs tranches. In Model 1, the basic specification (Table 5, Model 1) is updated with an interaction term of NFC dummy and political institutions. Model 2 adds legal measure (creditor rights) with its interaction with NFC dummy, while Model 3 reports the interaction of NFC dummy with governance measures.[51]

Similar to results in Table 5.6, the relationship between leverage ratios and our political and legal institution measures are weak and statistically insignificant except for governance measures in Model 3, which shows weak statistical significance at the 10% level. However, interactions terms of NFCs and political and legal measures reveal some interesting findings. First, the interaction of NFCs and political risk measure (investment profile) indicate that NFCs compliment political institution. In other words, countries with stronger political

[51] Unreported coefficients on industry, loan-type, sovereign credit rating and year dummies are provided in Appendix 3.4.

institutions are likely to see a willingness on the part of the lender in committing higher leverage to the PF deals.

Table 5.7: OLS regression estimates of loan spread on political and legal institution and its interaction with Non-financial contracts (NFCs)

	Model 1	Model 2	Model 3
Constant term	5.524***	6.207***	5.977***
	(32.89)	(30.32)	(36.64)
Investment profile	-0.095***	-0.084***	-0.071***
	(-8.12)	(-7.57)	(-5.97)
Creditor rights		0.001	
		(0.08)	
Governance			-0.039***
			(-2.57)
NFC dummy	-0.440***	-0.151**	-0.157***
	(-2.92)	(-1.98)	(-4.29)
Investment profile x NFC dummy	0.028*		
	(2.04)		
Creditor rights x NFC dummy		0.002	
		(0.06)	
Governance x NFC dummy			0.054***
			(2.80)
Loan characteristics variables	YES	YES	YES
Industry dummies	YES	YES	YES
Loan type dummies	YES	YES	YES
Sovereign rating dummies	YES	YES	YES
Year dummies	YES	YES	YES
Obs.	3284	3167	2717
R-square	0.26	0.25	0.31

Table 5.7 reports regression results of loan spread on the interaction of NFCs with political, legal and governance institutions. The variables: *Investment profile x NFC dummy, Creditor rights x NFC dummy* and *Governance*NFC dummy* are interaction terms of political, legal and governance institutions with NFC dummy respectively. Model 1 shows the estimates of spread on the interacting terms political institutions and NFC dummy together with loan and country controls. Model 2 substitutes the interaction terms with that of credit rights and NFC dummy, while Model 3 does the same with the interaction of governance and NFC dummy. The sample period is 1998-2012. The models are estimated using OLS with robust standard errors clustered at the deal level. T-statistics are reported in parenthesis. ***, ** and * denotes significance at the 1%, 5% and 10% level respectively.

On the other hand, results on the interaction of NFC and governance measures indicate that NFCs substitute for stronger governance measures. The positive and statistically significant coefficient on the interaction of governance and the NFCs dummy in column 3 suggests that NFCs substitute for governance. This result is consistent with the evidences reported in Hainz and Kleimeier (2012) that the probability of using PF is lower if the legal

provisions and corporate governance are better. Lastly, the interaction of NFCs and creditor rights in Model 2 (Table 5.8) reports negative but is however, statistically insignificant.

Table 5.8: OLS regression estimates of leverage ratio on political and legal institution and its interaction with (NFCs)

	Model 1	Model 2	Model 3
Constant term	0.963***	0.917***	0.925***
	(17.35)	(15.83)	(15.17)
Investment profile	0.002	0.006**	0.004
	(0.49)	(1.97)	(1.14)
Creditor rights		-0.0002	
		(-0.05)	
Governance			-0.010*
			(-1.80)
Investment profile * NFC dummy	0.009**		
	(2.04)		
Creditor rights* NFC dummy		-0.005	
		(-0.66)	
Governance* NFC dummy			0.015***
			(2.70)
NFC dummy	-0.120***	-0.022	-0.033***
	(-2.76)	(-1.18)	(-2.95)
Loan Characteristics	YES	YES	YES
Industry dummies	YES	YES	YES
Loan type dummies	YES	YES	YES
Sovereign rating dummies	YES	YES	YES
Year dummies	YES	YES	YES
Obs.	3272	3155	2705
R-square	0.148	0.142	0.16

Table 5.7 reports regression results of leverage ratio on the interaction of NFCs with political, legal and governance institutions. The variables: *Investment profile x NFC dummy, Creditor rights x NFC dummy* and *Governance*NFC dummy* are interaction terms of political, legal and governance institutions with NFC dummy respectively. Model 1 shows the estimates of spread on the interacting terms political institutions and NFC dummy together with loan and country controls. Model 2 substitutes the interaction terms with that of credit rights and NFC dummy, while Model 3 does the same with the interaction of governance and NFC dummy. The sample period is 1998-2012. The models are estimated using OLS with robust standard errors clustered at the deal level. T-statistics are reported in parenthesis. ***, ** and * denotes significance at the 1%, 5% and 10% level respectively.

5.7 Conclusion

This chapter examines the effect of country-level institutions quality on PF loan terms. The findings indicate that improvement in political institutions is associated with significantly lower spread for PF loans. A percentage increase in investment profile (political institutions) lead to 4.5% decrease in spread. Further, the interaction of political institutions with legal and governance institutions lead to an increase in loan spread, indicating that political institutions to an extent substitute for legal and governance institutions. The chapter

also finds that the percentage impact of political institutions on the spread is lower for PF relative to those obtained for bond and equity issues. This finding is attributed to various risk-mitigating mechanisms instituted by parties to manage political risks. These findings are consistent with the existing literature on the role of country-level institutions on financial institutions. The chapter also finds that improvements in political institutions is associated with an increase in leverage ratio for PF loans. A one standard deviation change in investment profile implies a 0.1% increase in leverage ratio. However, the interaction term of investment profile and creditor rights or governance measures does not yield any significant impact on the loan spread.

Furthermore, the chapter examines whether NFCs (project contracts) influence the effect of political risks on loan spread and leverage ratio. The findings from the interaction of NFCs with political institutions indicate that NFCs reduce the impact of political institutions on loan spread. This is finding indicate that where political institutions are weak, NFCs are essential in managing these risks. Similarly, when countries already have a developed political and governance regime, NFCs do not add significant value to these deals. This finding demonstrates the importance of NFCs in PF lending in developing and emerging economies.

Overall, the results in this chapter indicate that political risks matter in PF lending. There are economic benefits when PF deals are undertaken in countries with improved political systems. However, these reductions are lower when compared to corporate bond issues or banks loans. Further, the chapter demonstrates that political risks can be ameliorated through NFCs.

Chapter 6 Conclusion and Policy Implications

6.1 Summary of Findings and Policy Implications

The thesis examines the determinants of PF loan terms, given its increasing use in the financing of long-term capital investments and infrastructure. The primary objectives are to (i) examine whether certification by domestic FIs impact the spread on PF loans (ii) assess whether sponsors participation as counterparties have an impact on the key loan terms (spread and leverage ratio), and (iii) whether country-level political and legal institutions simultaneously affect PF loans terms. These three objectives are addressed in Chapter 3, 4 and 5 respectively.

The use of PF in emerging and developing economies has increased in the last two decades. Accompanying this increase is the participation of domestic FI as lead arrangers (also known as certification). In Chapter 3, the study attempts to quantify the economic benefits of these certifications, using a sample of 1,270, PF syndicated loan tranches signed in 53 emerging economies, between 1998 and 2011. The study used an endogenous switching regression to control for the joint determination of certification and loan outcomes. The study first estimates the determinants of domestic FI certification and the loan spread. Second, the study uses the estimates of the determinants of certification and loan spread to derive the conditional and counterfactual loan spreads, with the difference interpreted as the impact of certification by domestic FI. The findings indicate that domestic FIs are more likely to certify loan do not have political risk guarantees, but less likely to certify if it an EXIM loan facility or signed in currencies other than the project countries. On the loan spread determinants, the study finds that EXIM facilities, transportation and commercial projects, and Latin America and South East Asia projects have higher spreads. The impact of certification by domestic FIs

on the loan spread is approximately 47 bps. The reduction in loan spread is highest for projects located in water and sewage, oil and gas, power and mining industry. Further, projects located in Indian Subcontinent, Latin America and lower-income countries also report higher impact for loans with certification by domestic FIs. From a policy perspective, the findings suggest some economic benefits for borrowers and other key stakeholders. More generally, the findings show that in an environment where asymmetric information is pervasive, lenders can use domestic institutions to overcome these challenges. The results also support on-going efforts to deepen financial development in emerging market economies.

An essential basis for the use of PF is the ring-fencing of the new investment from its sponsors, to ease information production and risk management. Among its benefits, PF can reduce underinvestment, promote cash flow verifiability and reduce cash flows volatility. It is thus surprising that the sponsors also become counterparties to key contracts with the project company. This involvement often complicates the separation between the project company and the sponsors. Sponsor counterparties can be a *blessing or a curse* to the PF venture. On the one hand, sponsors involvement can potentially make risk management more effective by aligning sponsors interest to that of the project. (Corielli et al., 2010). However, it can increase the likelihood of conflict of interest between sponsors and lenders. These conflicts arise because sponsor counterparties can have control over key variables that affect cash flow. This, in turn, induces opportunistic renegotiation of key contracts like construction or supply agreements. Chapter 4, examines these economic benefits (or costs) of sponsors involvement as counterparties, using a sample of 5871 PF loans signed between 1998 and 2013. Specifically, the chapter examines whether NFCs reduce project risks, which in turn reduce the loan spread and leverage ratios charged by lenders. Next, the chapter examines whether these effects are distorted if the sponsors also act as counterparties to key NFCs.

This chapter hypothesises that the decision to include NFCs, and sponsors as counterparties is endogenous to the loan terms. To control for this endogeneity, the propensity score matching proceudre is used match loan tranches with sponsor counterparties to those without, using observed pre-contractual covariates. The results indicate that loans with NFCs are 32 bps lower. Loan with sponsor counterparties are, however, 25 bps lower, and those with credit-rated counterparties are 37 bps lower. On the leverage ratio, the findings reveal that loan tranches with NFCs are 0.008% lower, those with sponsor counterparties are 0.03% lower, and those with credit-rated counterparties are 0.016% lower. These results are driven by loans signed in developing countries. These findings provide useful insights into PF lending and demonstrate a trade-off between the cost of borrowing (loan spread) and the proportion of debt capital lenders offer in PF ventures. Sponsors must thus analyse this trade-off before engaging as counterparties to the project company.

Political risk continues to hinder the flow of capital into long-term investments globally. In recent years, these risks have heightened because of regulatory changes in developed countries and political instabilities in emerging and developing countries. Extant studies also suggest that political risk can substitute for deficiencies in legal systems and vice versa. In Chapter 5, the thesis explores how political and legal institutions shape PF loan terms. Three research hypotheses are developed. First, the chapter tests whether political institutions influence loan spreads and leverage ratios after controlling for legal institutions and governance. Given the interrelationship between political and legal institutions, the chapter also tests whether political institutions substitute (or complement) deficiencies in legal institutions. The chapter also examines whether the various NFCs used to manage project risks substitute for weaknesses in these institutions. To test these hypotheses, linear regressions are used to relate loan spread and leverage ratio to country-level political and legal institutions. The findings indicate that improvements in political institutions are

associated with lower loan spreads and higher leverage ratio. The findings also indicate that PF loans are less sensitive to political institutions, relative to corporate bonds and bank loans. The study results further reveal that political institutions substitute for legal institutions in relation to the spread, but complements in the case of the leverage ratio. The main policy implication from Chapter 5 is on the sensitivity of PF lending to institutional characteristics. In countries, where either political or legal institutions is weak, PF can generate economic benefits through its lesser response to institution weakness compared to corporate bonds or bank loans. For corporations and sponsors, PF represent a viable alternative for reducing the cost of financing long-term investments.

6.2 Directions for future research

The present thesis examines the determinants of PF loan terms in three empirical chapters. These chapters provide useful understandings on loan terms and role of various parties. Chapter 3 shows that domestic FIs are integral part of emerging market financial systems. These institutions create value by ameliorating asymmetric information between domestic and foreign lenders. Domestic FIs are also able to mobilise domestic financial resources and generate political support for projects. These factors are argued in the thesis to account for the reduction in loan spreads. Given the economic significance of the findings, it is essential to broaden the perspective on domestic FI certification. For instance, it will be interesting to know whether these economic benefits are related to peculiar features of domestic banks. For instance, it is possible that government-owned banks might provide stronger channels for mobilising political support, but simultaneously expose the project to political interference from the host government. With access to data on FIs origin, future studies can clarify some of these issues.

In Chapter 4, the results indicate that NFCs are an essential feature of risk management in PF. More importantly, the involvement of sponsors can align their interest to that of the project. Though the findings suggest some economic gains from sponsors' involvement at the project level, it opens up issues on conflict of interest. Future studies can examine sponsors involvements across various contract types (NFCs) and industries to deepen insights on sponsors' involvement and ascertain their suitability on sector by sector basis. Another issue of the importance is the potential endogeneity from unobserved heterogeneity. The econometric approach adopted in chapter 4 (PSM) assumes that differences across loans samples are due to observable differences. Though sensitivity analysis indicates some robustness of the unobserved differences, future studies can examine the extent to which unobservable differences affect these estimates.

In Chapter 5, the findings reveal that PF loans are less sensitive to political and legal institutions, relative to corporate debt finance (bank loans and bonds). However, these conclusions are based on a comparison of the chapter's results to those reported in previous studies. Future studies can carry out comparative analysis of PF and corporate loans drawn from the same population. These studies can also utilise treatment effect models like the difference-in-difference approach to generate causal inferences on the effects of political institutions.

Beyond these chapters, PF remains mostly under-researched. Some of the principles and conceptions of PF are still in their formative stages. First, there is little direction on the motivation and the economic benefits of high leveraging in PF. A typical PF deal is funded with 70% to 80% debt capital making them risky. However, PF loans are also one of the least defaulted financial instruments. According to Moody's Investors Service (2017), the ten-year cumulative default rate on PF loans is 6.7%. Future research is required to understand these issues to draw relevant insights that may be useful in other areas of finance. For instance, it is

useful to understand how organisational and managerial structures are utilised to achieve expected outcomes in PF.

Another critical area for future research is project finance bonds. Though the majority of PF lending is carried out through the syndicated loan market, project finance bonds are increasingly used in recent years. These bonds are often targeted at institutional investors and sovereign wealth funds who are looking to diversify their portfolios. Academic research is required to analyse the PF return and premium on these bonds. Studies on project bonds can also provide avenues to analyse the spread impact of project finance loans over time. For instance, studies can analyse the behaviour of bond spread at the construction and operational stages of the project. These are likely to provide meaningful insights on risk management for these project companies.

PF also provides a promising avenue to examine issues of sustainable investments. PF is often deployed to fund large-scale and long-term projects that have implications for the environment and sustainability. Research is thus required to determine if the structuring or pricing of these deals considers these issues, and to what extent.

Further, an issue of interest is why sponsors take up vital roles in PF. Though one of the motivations for PF lending is to separate project from its sponsors to ensure adequate risk evaluation and allocation. Given the potential for conflict of interest and opportunistic behaviour, it is interesting to shed more lights on this in the future.

Finally, an area for promising future research is case studies on PF loan deals. Given the paucity of information on the operational aspect of PF, especially he project company, future research can focus on specific projects that are carried out with PF to provide exciting and novel findings.

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Appendix 1

Appendix 1.1 Description of Variables for Chapter 3

Appendix 1	Description of Variable
Variable	**Description**
Loan Spread	Log of spread over the base rate in basis point. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Local FI Participation	Dummy equals to 1, if a local financial institution acts as one of the Mandated Lead Arranger (MLA), 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware*.
Tranche Maturity	Log of loans tranche maturity measured in months. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Tranche Amount	Log of tranche amount measured in million of US Dollars. Available for the period 1998-2011. Source: *Dealogic Projectware*.
Tranche Guarantee	Dummy equals to 1 if tranche has an explicit political risk guarantee, 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Tranche Refinance	Dummy equals to 1 if tranche is to finance an ongoing project, 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware*.
Tranche Currency	Dummy equals to one if deal is structured in a currency other than that of the project home country. Available for the period 1998-2011. Source: *Dealogic Projectware*.
II Credit Risk	September release of Institutional Investor (II) sovereign credit Risk score. Ranges from 0 to 100, with higher values indicating a better credit quality. Source: *Institutional Investor Magazine September Issues.*
Private Credit_GDP	Log of the ratio of financial claims on the private sector by deposit money banks and other financial institutions divided by Gross Domestic Product (GDP). Available from 1998-2011. Source: *World Development Indicators (WDI)*
Loan Type Dummies	
Secured Loans	Dummy equals to 1, if loan is secured with a collateral, 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Short-Term Loans	Dummy equals to 1, if loan is a short-term financing facility such as bridge loans and standby facilities. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Credit Facility	Dummy equal to 1, if loan type is a credit facility and 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Term Loan	Dummy equals to 1, if loan type is term loans. Available for the period 1998-2011. Source: *Dealogic Projectware.*
EXIM	Dummy equals to one if loan type is an EXIM facility. Available for the period 1998-2011. Source: *Dealogic Projectware.*
II Credit_Year Dummy	An interaction of II Credit and Year Dummies. Available for the period 1998-2011. Source: *Dealogic Projectware/Institutional Investor Magazine*
Industrial Dummies	
Industry & Commercial	Dummy equals to 1, if project fall under Industrial and Commercial sector. 0 otherwise. Available for the period 1998-2011. Source: Dealogic Projectware.
Mining	Dummy equals to 1, if project fall under Mining sector. 0 otherwise. Available for the period 1998-2011. Source: Dealogic Projectware.

Appendix 1.1 contd.	Description of Variable or Chapter Three (3)
Oil & Gas	Dummy equals to 1, if project falls under Oil and Gas sector. 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Petrochemical	Dummy equals to 1, if project falls under Petrochemical sector, 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Telecom	Dummy equals to 1, if projects falls under Telecommunication sector, 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware*.
Transportation	Dummy equals 1, if project falls under Transportation sector, 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware*.
Water and Sewage	Dummy Equals to 1, if project falls under Water and Sewage sector, 0 otherwise. Available for the period 1998-2011. Source*: Dealogic Projectware*.
Regional Dummies	
India Subcontinent	Dummy equals to 1, if project country falls under India Subcontinents region. Available for the period 1998-2011. Source: *Dealogic Projectware.*
Latin America	Dummy equals to 1, if project country falls under Latin American Region. Available for the period 1998-2011. Source: *Dealogic Projectware*.
Middle East	Dummy Equals to 1, if project country falls under Middle East Region. Available for the period 1998-2011. Source: *Dealogic Projectware*.
South East Asia	Dummy equals to 1 if project country falls under South-East Asia region. Available for the period 1998-2011. Source: *Dealogic Projectware*.
Sub-Saharan Africa	Dummy equals to 1, if project country falls under Sub-Saharan African region. 0 otherwise. Available for the period 1998-2011. Source: *Dealogic Projectware*.

Appendix 1.2 Unreported Coefficients for Table 3.4

Appendix 1.2 Unreported coefficients for Table 3.4

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
II Credit Risk by year dummies					
II Credit Risk * 1998		-0.002	-0.001	-0.001	0.0007
		(-0.007)	(-0.007)	(-0.008)	(0.011)
II Credit Risk * 1999		-0.005	-0.003	-0.003	0.0006
		(-0.005)	(-0.005)	(-0.006)	(0.009)
II Credit Risk * 2001		-0.001	0.001	0.002	0.0054
		(0.006)	(0.007)	(0.007)	(0.009)
II Credit Risk * 2003		0.001	0.003	0.005	0.006
		(0.007)	(0.007)	(0.007)	(0.007)
II Credit Risk * 2004		-0.0005	0.0006	0.002	0.004
		(-0.005)	(0.006)	(0.006)	(0.007)
II Credit Risk * 2005		0.006	0.008	0.01	0.014**
		(0.006)	(0.005)	(0.006)	(0.006)
II Credit Risk * 2006		0.008	0.01	0.01	0.011
		(0.006)	(0.006)	(0.006)	(0.006)
II Credit Risk * 2007		0.005	0.006	0.007	0.010
		(0.005)	(0.005)	(0.006)	(0.006)
II Credit Risk * 2008		0.002	0.003	0.005	0.008
		(0.005)	(0.005)	(0.006)	(0.007)
II Credit Risk * 2009		0	0.001	0.003	0.006
		(0.006)	(0.006)	(0.007)	(0.008)
II Credit Risk * 2010		-0.001	0.0008	0.003	0.004
		(-0.006)	(0.007)	(0.007)	(0.008)
II Credit Risk * 2011		0.002	0.003	0.005	0.008
		(0.006)	(0.006)	(0.007)	(0.008)
Industry dummies:					
Mining				-0.114	-0.159
				(-0.456)	(-0.576)
Oil and Gas				-0.326	-0.0207
				(-0.279)	(-0.291)
Power & Utility				0.0004	
				(0.262)	(0.317)
Telecommunication				-0.073	
				(-0.322)	(0.336)
Water & Sewage				-0.097	
				(-0.453)	(-0.567)
Industrial and Commerce				0.432	0.353
				(0.33)	(0.294)
Petrochemical				0.341	0.184
				(0.297)	(0.324)
Transportation				0.379	0.295
				(0.286)	(0.264)
Regional Dummies:					
Indian Subcontinent					0.711
					(0.423)
Latin America					-0.426
					(0.304)
Eastern Europe					-0.408
					(0.355)
Regional dummies:					
Indian Subcontinent					0.711
					(0.423)
Latin America					-0.426
					(0.304)
Eastern Europe					-0.408
					(0.355)
Indian Subcontinent					0.711
					(0.423)
Latin America					-0.426
					(0.304)

Appendix 1.2 contd. Unreported coefficients for Table 3.4

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
Regional dummies					
Eastern Europe					-0.408
					(0.355)
South-East Asia					0.27
					(0.294)
Sub-Saharan Africa					-0.095
					(0.328)
Middle East					0.2
					(0.297)

This table reports the results of the determinants of certification by domestic FI using an ESR model. Model 1 includes microeconomic and macroeconomic determinants. Model 2 adds the interaction term II Credit Risk of year dummies. In Models 3-5 controls for loan type, industrial and regional differences are added respectively. Robust standard errors in parenthesis. ***, **, * denote significance at the 1%, 5% and 10% respectively. Sample period: 1998-2011.

Appendix 1.3 Correlation coefficients of the main variables

	Tranche Maturity	Tranche Amount	Tranche Guarantee	Tranche Refinance	II Credit Risk	Tranche Currency	Private Credit/GDP	Short Term	Credit Facility	Term Loan	EXIM loans
Tranche Maturity	1										
Tranche Amount	0.0837	1									
Tranche Guarantee	-0.0242	0.0243	1								
Tranche Refinance	-0.223	0.0174	0.0079	1							
II Credit Risk	0.3618	0.1087	-0.221	-0.0409	1						
Tranche Currency	-0.3178	0.0693	0.1243	0.1521	-0.4854	1					
Private Credit/GDP	0.3771	-0.0997	-0.1405	-0.125	0.6414	-0.6459	1				
Short Term	-0.2024	-0.0066	0.0057	0.0303	0.1081	-0.0413	0.0391	1			
Credit Facility	-0.0157	-0.0422	-0.031	0.0014	-0.0945	0.049	-0.1076	-0.0777	1		
Term Loan	0.1476	0.0684	0.0042	0.0388	0.0456	-0.0815	0.1135	-0.5486	-0.3167	1	
EXIM loans	0.0756	-0.0148	0.0994	-0.0741	-0.1124	0.09	-0.1066	-0.0548	-0.0316	-0.2235	1

This table presents the correlation coefficients of key variables used in the main regression in Table 3.4. Sample period: 1998-2011

Appendix 1.4 Unreported Coefficients for Table 3.5

Appendix 1.4 Unreported coefficients for Table 3.5

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
II Credit Risk by year dummies					
II Credit Risk * 1999		0.006	0.007**	0.006*	0.006
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2000		0.008**	0.009**	0.009**	0.009*
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2001		0.003	0.004	0.002	0.003
		(0.005)	(0.005)	(0.005)	(0.005)
II Credit Risk * 2002		0.004	0.004	0.003	0.003
		(0.006)	(0.006)	(0.006)	(0.006)
II Credit Risk * 2003		0.009**	0.010**	0.009**	0.012**
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2004		0.014**	0.014***	0.013***	0.012**
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2005		0.0162***	0.017***	0.016***	0.016***
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2006		0.012***	0.012***	0.012**	0.012**
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2007		0.012***	0.013***	0.013***	0.013***
		(0.003)	(0.003)	(0.003)	(0.003)
II Credit Risk * 2008		0.0137***	0.0145***	0.0141***	0.0150***
		(0.003)	(0.00325)	(0.00332)	(0.00342)
II Credit Risk * 2009		0.022***	0.022***	0.022***	0.022***
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2010		0.023***	0.023***	0.023***	0.024***
		(0.004)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2011		0.024***	0.024***	0.024***	0.026***
		(0.004)	(0.004)	(0.004)	(0.004)
Industrial dummies					
Industry Commercial				0.0626	0.135
				(0.227)	(0.220)
Mining				0.135	0.0774
				(0.279)	(0.294)
Oil and Gas				-0.125	-0.223
				(0.222)	(0.194)
Petrochemical				0.0675	0.118
				(0.223)	(0.220)
Power & Utility				0.255	0.250
				(0.183)	(0.177)
Telecommunication				0.121	0.255
				(0.255)	(0.240)
Transportation				0.291	0.321*
				(0.156)	(0.149)
Water & Sewage				0.0741	0.0310
				(0.188)	(0.198)
Regional Dummies:					
Indian Subcontinent					0.124
					(0.234)
Latin America					0.680**
					(0.226)
Middle East					0.135
					(0.211)
South-East Asia					0.373*
					(0.184)

Appendix 1.4 Contd. Unreported coefficients for Table 3.5

Variables	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
Regional Dummies:					
Eastern Europe					0.0581
					(0.223)
Error Term Covariance	0.54	0.52	0.46	0.46	0.58
Number of Observations	1228	1228	1228	1228	1228

Notes: This table reports the loan spread equation of the ESR model for deals with domestic FI certification. Model 1 includes microeconomic and macroeconomic determinants. Model 2 adds the interaction term II CR multiplied by yearly dummies. Models 3-5 control for loan type, industrial and regional dummies. ***, **, * denote significance at the 1%, 5% and 10% respectively.

Appendix 1.5 Unreported Coefficients for Table 3.6

Appendix 1.5 Unreported coefficients for Table 3.6

Variables	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
II Credit Risk by year dummies					
II Credit Risk * 1999		0.003	0.003	0.003	0.004
		(0.005)	(0.004)	(0.004)	(0.004)
II Credit Risk * 2000		0.006	0.008	0.008	0.009*
		(0.004)	(0.004)	(0.004)	(0.005)
II Credit Risk * 2001		0.008	0.008	0.008	0.009
		(0.005)	(0.004)	(0.004)	(0.005)
II Credit Risk * 2002		0.008	0.007	0.007	0.007
		(0.006)	(0.006)	(0.006)	(0.007)
II Credit Risk * 2003		0.010	0.010	0.011	0.011
		(0.008)	(0.007)	(0.007)	(0.008)
II Credit Risk * 2004		0.008	0.007	0.008	0.009
		(0.005)	(0.005)	(0.005)	(0.006)
II Credit Risk * 2005		0.013*	0.013*	0.015*	0.016*
		(0.006)	(0.005)	(0.006)	(0.007)
II Credit Risk * 2006		0.007	0.006	0.006	0.007
		(0.007)	(0.006)	(0.006)	(0.007)
II Credit Risk * 2007		0.008	0.008	0.009	0.009
		(0.007)	(0.006)	(0.007)	(0.007)
II Credit Risk * 2008		0.012*	0.012**	0.014**	0.013**
		(0.005)	(0.004)	(0.004)	(0.005)
II Credit Risk * 2009		0.019***	0.019***	0.021***	0.023***
		(0.005)	(0.005)	(0.004)	(0.004)
II Credit Risk * 2010		0.013*	0.014*	0.017**	0.019***
		(0.006)	(0.006)	(0.005)	(0.006)
II Credit Risk * 2011		0.0182***	0.0174***	0.0202***	0.023***
		(0.005)	(0.005)	(0.005)	(0.006)
Industrial dummies					
Industry & Commercial				0.515*	0.551*
				(0.242)	(0.241)
Mining				0.336	0.307
				(0.313)	(0.332)
Oil and Gas				0.087	0.144
				(0.281)	(0.295)
Industrial dummies					
Petrochemical				0.466	0.501
				(0.252)	(0.271)
Power & Utility				0.413	0.407
				(0.263)	(0.286)
Telecommunication				0.414	0.481
				(0.280)	(0.284)
Water & Sewage				0.354	0.341
				(0.334)	(0.357)

Appendix 1.5 contd. Unreported coefficients for Table 3.6

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Regional dummies					
Indian Subcontinent					0.656
					(0.405)
Latin America					0.224
					(0.149)
Middle East					-0.075
					(0.185)
South East Asia					0.331
					(0.211)
Sub Saharan Africa					0.092
					(0.217)
Eastern Europe					-0.136
					(0.176)
Error Term Covariance	0.95	0.92	0.91	0.9	0.92
Number of Observations	1228	1228	1228	1228	1228

Notes: This table reports the loan spread equation of the ESR model for deals without domestic FI certification. Model 1 includes microeconomic and macroeconomic determinants. Model 2 adds the interaction term II CR multiplied by yearly dummies. Models 3-5 control for loan type, industrial and regional dummies. ***, **, * denote significance at the 1%, 5% and 10% respectively.

Appendix 2

Appendix 2.1 Variable Definition and Data Source for Chapter Four (4)

The following table summarised the explanatory variables in terms of definition and sources. Most the loan data comes from *Dealogic Projectware* unless otherwise stated. *Best Grade* captures project countries rated from AAA to A+. Investment captures project countries rated from A to BBB-. *Speculative* captures project countries rated from BB+ to BB. *Poor* captures project countries rated from BB- to CC as well as "default, unrated, or undisclosed". The ratings are those assigned to country by Standard & Poor's in the year the loan was agreed. Advanced country is based on the international Monetary Fund (IMF) country classification. Regulatory quality is the regulatory quality indicator of the World Governance Indicator.

Variable	Label	Definition
Tranche spread	T_SPREAD	Log of tranche spread over the base rate in basis point. Available for the period 1998-2013.
Leverage ratio	LEV	The ratio of project loan amount over total project size. Available for the period 1998-2013.
Tranche maturity	MAT	Loan tranche maturity measured in months. Available for the period 1998-2013.
Project size	SIZE	Log of tranche amount measured in millions of US Dollars. Available for the period 1998-2013.
Tranche Refinance	REFIN	Dummy equals to 1 if tranche is to refinance an existing project, 0 otherwise. Available for the period 1998-2013.
Tranche currency	CURR	Dummy equals to one if deal is structured in a currency other than that of the project home country. Available for the period 1998-2013.
Traches with:		
NFCs	NFC	Dummy equals 1 if tranche has a non-financial contract in place, 0 otherwise. Available for the period 1998-2013.
NFCs and sponsor counterparty		Dummy equals 1 if tranche has non-financial contracts with sponsors participating as counterparties, 0 otherwise. Available for the period 1998-2013.
NFC and credit-rated sponsor counterparty		Dummy equals 1 if tranche has non-financial contracts with credit-rated sponsors participating as counterparties, 0 otherwise. Available for the period 1998-2013.
LoanType Dummies	LOAN_TYPE	
Secured Loans		Dummy equals to 1, if loan is a guaranteed facility, export facility, 0 otherwise. Available for the period 1998-2012.
Short-Term Loans		Dummy equals to 1, if loan is a short-term financing facility such as bridge loans and standby facilities. Available for the period 1998-2013.
Term Loans		Dummy equals to 1, if loan type is term loans, Term A and Term B. Available for the period 1998-2013.
Industrial Dummies	IND	
Industry & Commercial		Dummy equals to 1, if project falls under Industrial and Commercial sector. 0 otherwise. Available for the period 1998-2013.
Oil & Gas		Dummy equals to 1, if project falls under Oil and Gas sector. 0 otherwise. Available for the period 1998-2013.
Power & Utility		Dummy Equals to 1, if project falls under Oil and Gas sector, 0 otherwise. Available for the period 1998-2013.

Appendix 2.1 (contd). Variable Description and Data Source for Chapter Four

Variable	Label	Definition
Telecom		Dummy equals to 1, if projects falls under Telecommunication sector, 0 otherwise. Available for the period 1998-2013.
Transportation		Dummy equals 1, if project falls under Transportation sector, 0 otherwise. Available for the period 1998-2013.
Others		Dummy Equals to 1, if project falls under other sectors, 0 otherwise. Available for the period 1998-2013.
Country Rating Dummies	CCR	
Best grade		Dummy equal 1, if tranche is signed in project country rated by S&P as" Best grade", 0 otherwise. Available for the period 1998-2013. Source: S&P.
Investment grade		Dummy equal 1, if tranche is signed in project country rated by S&P as" Investment grade", 0 otherwise. Available for the period 1998-2013. Source: S&P.
Speculative grade		Dummy equal 1, if tranche is signed in project country rated by S&P as" Speculative grade", 0 otherwise. Available for the period 1998-2013. Source: S&P.
Poor grade		Dummy equal 1, if tranche is signed in project country rated by S&P as" Poor grade", 0 otherwise. Available for the period 1998-2013. Source: S&P.
Additional Controls		
Currency dummy	CURR	Dummy equal 1, if tranche is signed in a currency other than the project country's currency, 0 otherwise. Available for the period 1998-2013.
Regulatory quality	REG	Measure of the project country regulatory quality. Source: World Governance Indicators (WGI).
Advanced Countries	ADV	Dummy equals 1 if tranche was signed in advanced countries, 0 otherwise. Source: IMF classification.

Appendix 2.2 Propensity Score Matching

Propensity score matching (PSM) is a statistical technique that computes the conditional probability of receiving a treatment based on a given pretreatment characteristics (Rosenbaum and Rubin, 1983). Its basic idea is to pair each participant in a treatment group to nonparticipants in the control group who are similar in all relevant pretreatment characteristics X (Caliendo and Kopeinig, 2008).

Propensity score can be expressed as:

$$P(X) = Pr(T=1/X) = E\,(T/X) \qquad (1)$$

where P(X) denotes the propensity score; T={0, 1} is the indicator of treatment and X is the multidimensional vector of pretreatment characteristics. Two important identifying assumptions must be sufficiently satisfied for the validity of propensity score matching estimates. First is *conditional independence* also referred to as *unconfoundedness,* which states that, given a set of observed covariates X, that are not affected by treatment, potential outcome Y are independent of the treatment assignment T (Khandker et al., 2010). This ensures that systematic differences in outcomes between treated and non-treated individuals with the same values for covariates are attributable to treatment T. In other words, it ensures that, uptake of program is not influenced by the treatment process or any unobservable characteristics[52]. Even though, conditional independence is a strong assumption and

[52] Formal tests can be conducted to test for the influence of unobserved characteristics. See Jalan and Ravallion (2003) for details on the specification and context of their test. However, Heckman et al. (1997, 1998a, 1998b) argue that the bias coming from unobservable characteristics is small relative to the bias coming from the incorrect use of observable characteristics (i.e., comparing units outside of the common support). Glazerman et al. (2003) find that bias of nonexperimental estimates was lower when the comparison group was drawn from within the evaluation itself rather than from a national dataset and locally matched to the treatment population. Diaz and Handa (2006) argue that, in cases when the outcomes are measured using comparable surveys, the bias arising from PSM is negligible.

cannot be inherently tested, it can credibly be invoked if there is a rich dataset on the observed characteristics that allow for adequate control of factors that affects program participation, as well as a deeper understanding of the institutional setting of the study (Cintina and Love, 2017)[53].

The second assumption, common support, ensures that treatment units are similar to the control units in terms of observed characteristics by requiring that both groups have observations from similar propensity score distribution (Heckman, LaLonde and Smith, 1999 *cited in* Khandker et al., 2010). Therefore, observations that fall outside the common support region would have to dropped for both treatment and control group, even though the former can lead to sampling bias and requires caution by the researcher.

Estimating the treatment effect

Given that the conditional independence and common support holds, the propensity score for average treatment on the treated (ATET), can be estimated as follows:

$$\text{ATET} = E\{Y_{1i} - Y_{0i} | T_i = 1\} \quad (2)$$

$$= E[E\{Y_{1i} - Y_{0i} | T_i = 1, p(X_i)\}]$$

$$= E[E\{Y_{1i} | T_i = 1, p(X_i)\} - E\{Y_{0i} | T_i = 0, p(X_i)\} | T=1]$$

where the outer expectation is over the distribution of $(p(X_i)|T_i = 1)$ and Y_{1i} and Y_{0i} are potential outcomes in the two counterfactual situations of the treated and non-treated

[53] According to Khandker et al., (2010) if one is only interested in the average treated on the treated (ATET) then only a weaker assumption of the conditional independence, where potential outcome Y must only be independent for only the control group, is required.

group respectively. The PSM estimator is simply the mean difference in outcomes over the common support, appropriately weighted by the propensity score distribution of participants.

A number of studies have also established that PSM estimator generate reliable results if there are a rich set of control variables, both treatment and control sample comes are drawn from the study and comparison of participant and non-participant are from the same local market.

Appendix 2.4: Hidden Bias (unobserved heterogeneity) for PSM results

Suppose that the probability of using NFCs in PF is given by

$$P_i = P(x_i, \mu_i) = P(NFC_i = 1/x_i, \mu_i) = F(\beta x_i + \gamma \mu_i) \quad \text{(A1)}$$

where x_i are the observed characteristics for loans with NFC, μ_i is the unobserved variables and γ is the effect of μ_i on the decision to use NFCs. If the selection process is free from of hidden bias γ will be zero and NFCs use will be solely determined by x_i. However, if γ is non-zero (hidden bias) two loans with the same observed covariates (x_i) will have different chances of receiving treatment.

Let us assume we have a matched pair of loans tranches, *i* and *j* with logistic distribution denoted *F*. The odd that loan tranches have NFCs are given by $\frac{P_i}{(1-P_i)}$ and $\frac{P_j}{(1-P_j)}$ with odd ratios given by

$$\frac{P_i\,(1-P_j)}{P_j\,(1-P_i)} = \frac{\exp(\beta_{x_i} + \gamma u_i)}{\exp(\beta_{x_j} + \gamma j)} \quad \text{(A2)}$$

If both loan tranches have identical observed covariates as implied by the matching procedure, the x vector cancel out implying that,

$$\frac{p_i\,(1-p_j)}{p_j\,(1-p_i)} = \exp(\gamma(\mu_i - \mu_j)). \quad \text{(A3)}$$

From equation (3), both loan tranches differ in their odds of receiving treatment by a factor that involves the parameter γ and the difference in their unobserved covariates μ. So, either if there are no differences in unobserved variables ($u_i = u_j$) or if unobserved variables have no influence on the probability of participating ($\gamma = 0$), the

odds ratio is 1, implying the absence of hidden bias.

Rosenbaum bound sensitivity analysis examines how changing the value of γ ($u_i = u_j$) alters inferences about the treatment effect. Rosenbaum (2002) for simplicity assumes that the unobserved variable is a dummy, i.e., μ ∈ 0, 1. Rosenbaum shows that this relationship implies the following bounds on the ratio of the odds that either of two matched loan tranches will receive treatment:

$$\frac{1}{\exp(\gamma)} \leq \frac{p_i\,(1-p_j)}{p_j\,(1-p_i)} \leq \exp(\gamma) \qquad \text{(A4)}$$

Both matched loan tranches have the same probability of NFCs if exp (γ) =1. Otherwise, if for instance, exp (γ) =2, loan tranches that are similar in (terms of x) could differ in their odds of receiving the treatment by as much as a factor of 2. In this sense, exp (γ) is a measure of the degree of departure from a study that is free of hidden bias.

Rosenbaum (2002) also develops a test statistics *T* (a Wilcoxon signed rank test statistics) for matched pairs where the outcome for the treatment is greater than the outcome for control. The ranks of these cases are summed and compared with the distribution of the test statistic under the null hypothesis that the treatment has no effect:

$$T = t(Z, r)$$
$$= \sum_{s=1}^{s} d_s \sum_{t=1}^{2} c_{si}\, z_{si} \qquad (A5)$$

where Z is the variable that records which of each of the s pairs was treated, and r is the outcome for each case in the S pairs. Z_{si} equals 1 if a case is treated, and 0 otherwise; c is defined as follows:

$$c: \begin{cases} c_{s1} = 1, c_{s2} = 0, \text{ if } r_{s1} > r_{s2} \\ c_{s1} = 0, c_{s2} = 1, \text{ if } r_{s1} < r_{s2} \\ c_{s1} = 0, c_{s2} = 0, \text{ if } r_{s1} = r_{s2} \end{cases}$$

Finally, *d*s is the rank of $|r_s1 - r_s2|$ with average ranks used for ties. As Rosenbaum (2002) shows in the case where the assignment to the treatment is not random, the above test statistic can be bounded. Under the assumption that a confounding variable u exists, the formula for T is the sum of S independent random variables where the *s*th pair equals *d*s with probability.

$$p_s = \frac{c_{s1}\, exp(\gamma\, u_{s1}) + c_{s2}\, exp(\gamma\, u_{s2})}{c_{s1}\, exp(\gamma\, u_{s1}) + c_s\, exp(\gamma\, u_{s2})} \qquad (6)$$

and equals zero with probability 1−*p*s. Define

$$p_s^+ : \begin{cases} 0, & \text{if } c_{s1} = c_{s2} = 0 \\ \frac{\exp(\gamma)}{1+\exp(\gamma)}, & \text{if } c_{s1} \neq c_{s2} \end{cases}$$

$$p_s^- : \begin{cases} 0, & \text{if } c_{s1} = c_{s2} = 0 \\ \frac{1}{1+\exp(\gamma)}, & \text{if } c_{s1} \neq c_{s2} \end{cases}$$

Rosenbaum (2002) shows that for a given value of γ, the null distribution of $T = t(Z, r)$ is bounded by two known distributions for T^+ and T^-, where

$$E(T^+) = \sum_{s=1}^{s} d_s\, p_s^+,$$

$$E(T^-) = \sum_{s=1}^{s} d_s\, p_s^-,$$

$$Var(T^+) = \sum_{s=1}^{s} d_s^2 \, p_s^+ \, (1 - p_s^+)$$

$$Var(T^-) = \sum_{s=1}^{s} d_s^2 \, p_s^- \, (1 - p_s^-)$$

These formulas are used to compute the significance level of the null hypothesis of no effect.

For any specific γ the study compute

$$\frac{(T - E(T^+))}{\sqrt{Var(T^+)}}, \frac{(T - E(T^-))}{\sqrt{Var(T^-)}}$$

where *T* is the Wilcoxon signed ranked statistics. These two values give the bounds of the significance level (p-values) of a one-sided test for no effect of the treatment.

Appendix 3

Appendix 3.1 Unreported Results for Table 5.5

Appendix 3.1 Unreported results for Table 5.5

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
Project-type dummies					
Transportation	0.110**	0.120**	0.132***	0.138***	0.133***
	(2.20)	(2.30)	(2.60)	(2.64)	(2.62)
Commercial	0.183**	0.194**	0.303***	0.215***	0.307***
	(2.37)	(2.42)	(3.71)	(2.70)	(3.74)
Oil & Gas	0.0563	0.0678	0.0627	0.0841	0.0614
	(0.96)	(1.11)	(1.07)	(1.36)	(1.04)
Electricity & Energy	0.116**	0.126**	0.114**	0.137**	0.115**
	(2.13)	(2.25)	(2.04)	(2.43)	(2.06)
Telecom	0.442***	0.459***	0.492***	0.473***	0.501***
	(5.87)	(5.98)	(6.46)	(6.08)	(6.55)
Loan-type dummies					
Short term loans	-0.0276	-0.0347	-0.0673	-0.0289	-0.0643
	(-0.60)	(-0.73)	(-1.48)	(-0.61)	(-1.41)
Long Term loans	0.0724*	0.063	0.0174	0.0668*	0.0179
	(1.83)	(1.56)	(0.45)	(1.65)	(0.46)
Sovereign rating dummies					
Unrated	0.286***	0.281***	0.305***	0.263**	0.310***
	(2.78)	(2.63)	(2.97)	(2.41)	(2.98)
Poor grade	0.437***	0.435***	0.652***	0.469***	0.642***
	(4.04)	(3.82)	(5.83)	(4.02)	(5.66)
Speculative grade	0.250***	0.246***	0.414***	0.251***	0.414***
	(3.22)	(3.03)	(4.75)	(3.12)	(4.73)
Investment grade	0.350***	0.351***	0.466***	0.355***	0.476***
	(6.50)	(5.81)	(7.80)	(5.84)	(7.95)
Year dummies					
YR97	0	0	0	0	0
	(-)	(-)	(-)	(-)	(-)
YR98	0	-0.706***	-0.665***	-0.712***	-0.665***
	(-)	(-3.42)	(-5.23)	(-3.47)	(-5.23)
YR99	-0.0153	-0.722***	0	-0.739***	0
	(-0.14)	(-3.71)	(-)	(-3.82)	(-)
YR00	0.0778	-0.630***	-0.576***	-0.654***	-0.578***
	(0.82)	(-3.33)	(-5.80)	(-3.48)	(-5.82)
YR01	0.186	-0.520***	0	-0.545***	0
	(1.82)	(-2.68)	(-)	(-2.81)	(-)
YR02	0.228**	-0.492**	-0.412***	-0.520***	-0.434***
	(2.20)	(-2.57)	(-4.03)	(-2.72)	(-4.16)
YR03	0.155	-0.539***	-0.469***	-0.558***	-0.491***
	(1.36)	(-2.77)	(-4.10)	(-2.88)	(-4.31)

Appendix 2.3 contd. Unreported results for Table 5.5

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
YR04	0.249**	-0.447**	-0.384***	-0.468**	-0.402***
	(2.28)	(-2.29)	(-3.59)	(-2.41)	(-3.72)
YR05	0.116	-0.570***	-0.494***	-0.600***	-0.515***
	(1.12)	(-2.99)	(-4.92)	(-3.13)	(-5.09)
YR06	-0.136	-0.839***	-0.754***	-0.862***	-0.770***
	(-1.27)	(-4.36)	(-7.03)	(-4.49)	(-7.14)
YR07	-0.0109	-0.688***	-0.634***	-0.704***	-0.656***
	(-0.11)	(-3.64)	(-6.42)	(-3.74)	(-6.56)
YR08	0.212*	-0.477**	-0.403***	-0.498***	-0.417***
	(2.15)	(-2.52)	(-4.19)	(-2.65)	(-4.34)
YR09	0.885***	0.175	0.266***	0.158	0.258***
	(9.38)	(0.94)	(2.82)	(0.86)	(2.73)
YR10	0.750***	0.0628	0.14	0.0528	0.132
	(7.24)	(0.33)	(1.35)	(0.28)	(1.27)
YR11	0.869***	0.195	0.261**	0.194	0.251**
	(8.09)	(1.03)	(2.54)	(1.03)	(2.44)
YR12	0.677***	0	0.043	0	0.0449
	(3.35)	(-)	(0.23)	(-)	(0.24)

Appendix 3.2 Unreported Results for Table 5.6

Appendix 3.2. Unreported results for Table 5.6

	Reg.1	Reg.2	Reg.3	Reg.4	Reg.5
Project-type dummies					
Transportation	0.0678***	0.0690***	0.0700***	0.0713***	0.0697***
	(-3.89)	(-3.89)	(-3.72)	(-4.00)	(-3.70)
Commercial	-0.0421*	-0.0414*	-0.0616**	-0.0443*	-0.0610**
	(-1.77)	(-1.68)	(-2.14)	(-1.79)	(-2.11)
Oil & Gas	-0.0578***	-0.0551***	-0.0557***	-0.0574***	-0.0559***
	(-3.12)	(-2.93)	(-2.81)	(-3.04)	(-2.81)
Electricity & Energy	-0.0219	-0.0233	-0.0198	-0.0249	-0.0196
	(-1.24)	(-1.28)	(-1.05)	(-1.36)	(-1.04)
Telecom	-0.0470**	-0.0478**	-0.0412	-0.0498**	-0.04
	(-2.14)	(-2.11)	(-1.61)	(-2.19)	(-1.56)
Loan-type dummies					
Short-term loans	0.0086	0.0105	-0.0002	0.0098	0.0002
	(0.80)	(0.96)	(-0.02)	(0.91)	(0.02)
Long-term loan	0.0149	0.0169*	0.0126	0.0163*	0.0127
	(1.61)	(1.78)	(1.23)	(1.74)	(1.24)
Sovereign rating dummies					
Unrated	-0.0133	-0.0314	-0.0132	-0.0282	-0.0127
	(-0.39)	(-0.87)	(-0.33)	(-0.78)	(-0.32)
Poor grade	-0.0153	-0.0236	-0.00586	-0.0274	-0.0073
	(-0.61)	(-0.92)	(-0.18)	(-1.08)	(-0.23)
Speculative grade	0.0034	-0.0031	-0.0072	-0.0035	-0.0074
	(0.17)	(-0.15)	(-0.30)	(-0.17)	(-0.31)
Investment grade	-0.0102	-0.0173	-0.0124	-0.0176	-0.0111
	(-0.70)	(-1.11)	(-0.69)	(-1.13)	(-0.62)
Year dummies					
YR_97	0	0	0	0	0
	(-)	(-)	(-)	(-)	(-)
YR_98	-0.0130	-0.0089	-0.0031	-0.0104	-0.0031
	(-0.30)	(-0.20)	(-0.09)	(-0.24)	(-0.09)
YR_99	-0.021	-0.018	0	-0.0183	0
	(-0.54)	(-0.45)	(-)	(-0.46)	(-)
YR_00	-0.033	-0.0291	-0.0289	-0.0285	-0.0293
	(-0.86)	(-0.74)	(-0.94)	(-0.72)	(-0.95)
YR_01	-0.0685*	-0.0626	0	-0.0619	0
	(-1.72)	(-1.53)	(-)	(-1.51)	(-)
YR_02	-0.0690*	-0.0686	-0.0638*	-0.0676	-0.0669**
	(-1.65)	(-1.58)	(-1.89)	(-1.55)	(-1.96)
YR_03	-0.0612	-0.0596	-0.0548	-0.0597	-0.0578
	(-1.42)	(-1.34)	(-1.58)	(-1.35)	(-1.64)

Appendix 3.3 contd. Unreported results from Table 5.6

	Reg.1	Reg.2	Reg.3	Reg.4	Reg.5
YR_04	-0.0754*	-0.0747*	-0.0703**	-0.0745*	-0.0726**
	(-1.95)	(-1.87)	(-2.43)	(-1.87)	(-2.47)
YR_05	-0.0720*	-0.0695*	-0.0698**	-0.0683	-0.0728**
	(-1.80)	(-1.67)	(-2.23)	(-1.64)	(-2.25)
YR_06	-0.0664	-0.0658	-0.0607*	-0.0655	-0.0629*
	(-1.63)	(-1.55)	(-1.82)	(-1.54)	(-1.88)
YR_07	-0.0565	-0.0504	-0.0513*	-0.051	-0.0543*
	(-1.44)	(-1.26)	(-1.76)	(-1.27)	(-1.84)
YR_08	-0.06	-0.0583	-0.0542**	-0.058	-0.0562**
	(-1.59)	(-1.50)	(-1.98)	(-1.50)	(-2.03)
YR_09	-0.0999**	-0.0953**	-0.0936***	-0.0957**	-0.0947***
	(-2.46)	(-2.29)	(-2.93)	(-2.30)	(-2.95)
YR_10	-0.0825**	-0.0834**	-0.0788**	-0.0845**	-0.0800**
	(-1.99)	(-1.96)	(-2.34)	(-1.99)	(-2.37)
YR_11	-0.0915**	-0.0751	-0.0851**	-0.0774*	-0.0864**
	(-1.97)	(-1.65)	(-2.06)	(-1.70)	(-2.09)
YR_12	0	0	0.0072	0	0.0071
	(-)	(-)	-0.16	(-)	(0.16)

Appendix 3.3 Unreported coefficient for Table 5.7

Appendix 3.3. Unreported coefficients for Table 5.7

	Reg. 1	Reg. 2	Reg. 3
Loan characteristics			
Log of maturity	0.0574***	0.0586***	0.0770***
	(3.52)	(3.55)	(4.51)
Log of tranche amount	-0.0561***	-0.0535***	-0.0539***
	(-5.63)	(-5.32)	(-5.11)
Currency dummy	0.0544	0.0564	0.0733
	(1.35)	(1.29)	(1.58)
Refinance dummy	0.0064	0.0135	-0.0468
	(0.16)	(0.32)	(-1.06)
Loan-type dummies			
Short-term loans	-0.0298	-0.027	-0.0438
	(-0.64)	(-0.57)	(-0.93)
Long-term loans	0.0812**	0.0775*	0.0303
	(2.03)	(1.9)	(0.76)
PFI dummy	-0.100**	-0.102**	-0.133**
	(-2.04)	(-2.04)	(-2.63)
Bilateral dummy	0.0499	0.0482	0.0317
	(0.97)	(0.93)	(0.59)
Sovereign rating dummies			
Unrated	-0.010	-0.0138	-0.0531
	(-0.11)	(-0.14)	(-0.56)
Industry dummies			
Transportation	0.135***	0.121**	0.158***
	(2.62)	(2.22)	(3.07)
Commercial	0.161**	0.174**	0.255***
	(2.02)	(2.11)	(3.04)
Oil & Gas	0.0634	0.068	0.0443
	(1.02)	(1.06)	(0.73)
Electricity & Energy	0.139**	0.134**	0.122**
	(2.44)	(2.3)	(2.15)
Telecom	0.462***	0.462***	0.491***
	(6.04)	(5.95)	(6.29)
Year dummies			
YR_97	0	0	0
	(-)	(-)	(-)
YR_98	0	-0.818***	-0.735***
	(-)	(-4.14)	(-6.16)
YR_99	0.027	-0.793***	0
	(0.25)	(-4.25)	(-)

Appendix 3.3 contd. Unreported coefficients for Table 5.7

	Reg. 1	Reg. 2	Reg. 3
YR_00	0.123	-0.703***	-0.577***
	(1.25)	(-3.93)	(-6.61)
YR_01	0.243**	-0.581***	0
	(2.30)	(-3.17)	(-)
YR_02	0.315***	-0.515***	-0.409***
	(2.94)	(-2.81)	(-4.51)
YR_03	0.245**	-0.576***	-0.485***
	(2.14)	(-3.08)	(-4.80)
YR_04	0.358***	-0.473**	-0.362***
	(3.22)	(-2.52)	(-3.98)
YR_05	0.202*	-0.607***	-0.522***
	(1.89)	(-3.29)	(-5.97)
YR_06	-0.0661	-0.880***	-0.782***
	(-0.60)	(-4.75)	(-8.03)
YR_07	0.0741	-0.731***	-0.653***
	(0.7)	(-4.05)	(-7.09)
YR_08	0.292***	-0.514***	-0.436***
	(2.89)	(-2.83)	(-5.12)
YR_09	0.974***	0.151	0.253***
	(10.04)	(0.85)	(3.20)
YR_10	0.846***	0.0285	0.116
	(8.05)	(0.16)	(1.22)
YR_11	0.952***	0.165	0.227**
	(9.01)	(0.92)	(2.5)
YR_12	0.793***	0	0.0972
	(4.08)	(-)	(0.55)

Appendix 3.4 Unreported coefficient for Table 5.8

Appendix 3.4. Unreported coefficient for Table 5.8

	Reg.1	Reg. 2	Reg. 3
Loan characteristics			
Log of tranche maturity	-0.0157***	-0.0149***	-0.0163***
	(-3.80)	(-3.59)	(-3.64)
Loan of tranche amount	0.0001	-0.0004	0.0009
	(0.06)	(-0.15)	(0.29)
Currency dummy	-0.0195	-0.0095	-0.0312**
	(-1.51)	(-0.73)	(-2.05)
Refinance dummy	0.109***	0.108***	0.109***
	(9.27)	(9.08)	(8.37)
Loan-type dummy			
STLoans	0.00914	0.0104	0.000629
	(0.85)	(0.96)	(0.05)
LTLoan	0.0145	0.0169*	0.0119
	(1.55)	(1.79)	(1.16)
PFI	0.0309*	0.0306*	0.0306*
	(1.91)	(1.84)	(1.77)
CONCESSION	0.0022	-0.0056	0.0189
	(0.17)	(-0.40)	(1.32)
BILLATERAL	-0.0246*	-0.0274*	-0.0247
	(-1.65)	(-1.82)	(-1.48)
Sovereign rating dummies			
Unrated	-0.0092	-0.0331	-0.0117
	(-0.27)	(-0.91)	(-0.30)
Poor Grade	-0.0125	-0.0233	-0.0136
	(-0.51)	(-0.91)	(-0.42)
Speculative Grade	0.0050	-0.00278	-0.0089
	(0.24)	(-0.13)	(-0.37)
Investment grade	-0.0089	-0.0178	-0.0153
	(-0.61)	(-1.15)	(-0.87)
Industry dummies			
Transportation	-0.0669***	-0.0695***	-0.0664***
	(-3.84)	(-3.90)	(-3.50)
Commercial	-0.0439*	-0.0420*	-0.0619**
	(-1.84)	(-1.70)	(-2.17)
Oil & Gas	-0.0568***	-0.0558***	-0.0515***
	(-3.07)	(-2.95)	(-2.59)
Electricity & Energy	-0.0220	-0.0238	-0.0173
	(-1.25)	(-1.30)	(-0.92)
Telecom	-0.0494**	-0.0477**	-0.0431*
	(-2.25)	(-2.10)	(-1.69)

Appendix 3.4 contd. Unreported coefficient for Table 5.8

	Reg. 1	Reg. 2	Reg. 3
Year dummies			
YR97	0	0	0
	(-)	(-)	(-)
YR98	-0.0096	-0.0078	0.0127
	(-0.23)	(-0.18)	(0.35)
YR99	-0.0194	-0.0165	0
	(-0.51)	(-0.41)	(-)
YR00	-0.0298	-0.0282	-0.0129
	(-0.80)	(-0.71)	(-0.40)
YR01	-0.0648*	-0.0624	0
	(-1.67)	(-1.52)	(-)
YR02	-0.0655	-0.0676	-0.0490
	(-1.61)	(-1.55)	(-1.44)
YR03	-0.0570	-0.0583	-0.0399
	(-1.34)	(-1.31)	(-1.10)
YR04	-0.0692*	-0.0728*	-0.0534*
	(-1.84)	(-1.81)	(-1.80)
YR05	-0.0676*	-0.0679	-0.0548*
	(-1.73)	(-1.62)	(-1.69)
YR06	-0.0650	-0.0639	-0.0467
	(-1.64)	(-1.48)	(-1.39)
YR07	-0.0521	-0.0497	-0.0343
	(-1.37)	(-1.23)	(-1.16)
YR08	-0.0595	-0.0571	-0.0414
	(-1.63)	(-1.46)	(-1.48)
YR09	-0.0994**	-0.0944**	-0.0817**
	(-2.53)	(-2.25)	(-2.53)
YR10	-0.0802*	-0.0823*	-0.0659*
	(-1.98)	(-1.92)	(-1.92)
YR11	-0.0906**	-0.0737	-0.0743*
	(-1.99)	(-1.61)	(-1.77)
YR12	0	0	0.0185
	(-)	(-)	(0.43)