Determinants of the Cost of Credit for Project Finance Debt in Africa

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Abstract

This study investigates the characteristics of project finance transactions and establishes the cost determinants for non-recourse project finance in Africa within the energy, oil and gas, mining and infrastructure sectors. Essentially, this thesis will be investigating what the main cost determinants are which lenders use to price the risk in project finance transactions.

Project finance risks such as market, operational, sponsor, political / regulatory and environmental risks are investigated. A loan transaction database is used to fit these risks to determine the relevant loan parameters available in the database, employing a regression model is used to obtain which loan parameters, and, in turn, risks, lenders price into the cost of the loans. The database represents non-recourse project finance transactions throughout Africa from 1995 to 2015 and was filtered down 89 loan entries that contained the most important loan parameters.

Empirical results suggest that secured loans are priced in a different category to unsecured loans, increasing the All-In credit-spread by 196.94 bps (P-value < 0.1%) if the loan parameter is moved from an unsecured to a secured loan. Political / regulatory risk, which had a 27.697 bps increase in the All-in Credit-spread (P-value < 2.3%). This can be attributed to being a result of a country's risk ranking, which was found to be the most significant pricing determinant for non-recourse loans on the African continent.

Key words: project finance, non-recourse debt, special purpose vehicle (SPV), credit spread, finance, project-risk, credit spread, political risk.

Contents

1 Introduction

Infrastructure development plays a key role in alleviating unemployment and improving the standard of living for citizens in the economies of developing countries. African governments already at their public sector borrowing limits with constrained tax pools limits their opportunities to raise taxes and with the increased need to invest in social spending, are starting to look at alternative means of funding power and infrastructure projects. Non-recourse Project Finance funding provides these governments the means to develop such projects without taking on additional direct debt on their balance sheets (Davis, 1996: P5).

As stated in the Financial Times Online Blog:

> "*A new report from the Centre for Global Development reveals the high importance placed on infrastructure by Africans across the continent relative to jobs and income related issues. In order to increase the pace of critical infrastructure investment, innovative financing mechanisms must be studied and scaled up*." [1]

A means of funding these capital intensive projects is to use Project Finance (PF), defined as financing with no recourse to the equity sponsors, who typically contribute 20-35% of the project's capital with the remainder sourced using debt financing (Davis, 1996: P11). The loans are only repaid through the cash flow revenue derived from the project itself, with limited resale value of the underlying project asset, and no financing recourse to the equity sponsor during the normal operation of the project. The projects require creating a stand-alone special purpose vehicle (SPV) company for control of ownership and operation lifecycle for a given operational period, after which the project is either

[1] Hruby, A., Jawara III, D., 2015, "Guest post: closing the infrastructure investment gap in Africa", Financial Times Website, http://blogs.ft.com/beyond-brics/2015/03/06/guest-post-closing-the-infrastructure-investment-gap-in-africa/ (accessed January 2016)

decommissioned, handed over to the government, or the off-taker agreement[2] is renewed with the off-taker.

These independent SPV companies are legally ring-fenced from the equity providers (sponsors) in terms of permitting, funding recourse and project risks. Debt providers, however, have recourse to the SPV and its underlying assets, but not to equity providers.

While project financing has increased in use in recent years, limited research is available in terms of what the drivers are for lenders in determining how the borrowing costs are priced, and how the lenders perceive the risks of the projects. As project finance is relatively new to Africa, local banks appear to take a conservative approach on pricing the project-risks, with higher interest spreads, longer loan maturities and the use of debt service covenants up to the maturity of the loan. This has resulted in more expensive cost of debt when compared to international (American and European) financing, which is based on a lower interest base-rate (e.g. LIBOR) and fewer debt service covenants (Kleimeier & Megginson, 2000). If, however, international lenders might also price in foreign market risks, such as currency exchange risks and sovereign risks, which the local lenders do not price into their credit spreads. The question is how does this compare to the all-in cost of non-recourse project finance loans in Africa and what are the most important cost determinants when lenders price these loans?

Previous research (Kleimeier & Megginson, 2001) has found that project finance costing is dependent on various factors of which loan characteristics (Size, Maturity, Third Party Guarantees) and project characteristics (Currency Risk, Sovereign Risk) have an effect on the pricing. Further research (Kleimeier & Megginson, 1997) has been conducted into comparing the pricing cost of project finance in Asia and developed western countries and (Europe and USA) what factors dominate lender-pricing decisions.

[2] Off-taker Agreement: The agreement between a resource's purchaser and producer, for the purchaser to purchase project's future production, http://www.investopedia.com/terms/o/offtake-agreement.asp (accessed on 30 June 2016).

According to Sorge & Gadanecz (2008: P2) "*project finance grants emerging market borrowers access to long-term funds at affordable rates*". As long as the new regulatory framework (Basel Accords) takes into account the adequate project-risk priced in longer-term project finance loans, it can be ascertained that international trading banks will not be discouraged from investing in project finance in developing countries (Sorge & Gadanecz, 2008).

As such, how do these project characteristics affect the price of non-recourse debt, taking into account that project finance is seen as a higher-risk financial product and how do commercial banks, development banks and export credit agencies (ECAs) who typically finance these projects have different cost determinants to address their risk perceptions?

This thesis will investigate the cost determinants for project-financed transactions in the energy, oil and gas, mining and infrastructure sectors. The principles, however, will apply to most other general infrastructure projects, where there is a fixed off-take agreement over the course of the operational lifespan.

As most of the existing academic research has focused on global project financed transactions, there is a need to investigate what the borrowing cost determinants are for African project finance transactions including the determining loan characteristics, such as loan size, loan maturity period, third party guarantees, loan covenants, etc., which lenders use to price the relevant project risks.

This thesis will compare loan-pricing determinants of lenders in Africa, using loan information from the Thomas Reuters Dealscan loan database. Detailed research will be undertaken to understand what project risks are present for non-recourse loans, followed by a regression analysis to compare all loan characteristics, in order better to understand the determinants of loan pricing and the main cost drivers for financial institutions in pricing the project risk. The thesis will also consider various pricing effects of including additional project characteristics such as currency risk with regard to international debt providers.

This investigation is currently both highly relevant and worthwhile as African governments and investors need to consider innovative solutions in facing the challenges of infrastructure financing. There also is a need to understand the credit spread determinants on existing project finance loans better. Greater understanding of loan characteristics, such as loan size, maturity periods, third party guarantees, loan securisation and covenants, as well as what external loan characteristics such as country risk rank and off-taker guarantees, allows project developers and investors to understand better how lenders price non-recourse loans in developing countries. This allows investors at a project pre-feasibility stage to consider the economic viability of investments in specific countries that have higher political risks, and in sectors with loans which require certain characteristics, and how these investments can compare to other countries and industry sectors, through understanding the cost determinants of project financing funding.

The Thomas Reuters PLC Dealscan database used in this thesis represents the most detailed information on financing deals in Africa, which shows project finance as becoming an increasingly popular means of debt financing. This ranged from capital intensive projects over the last 20 years, ranging from construction (in Algeria, South Africa), mining (Zambia, Liberia, Mali, Tanzania, Botswana, Ghana, South Africa), utilities (Cameroon, Kenya, South Africa, Zambia, Morocco, Mozambique, Egypt), to less capital intensive industries such as financial services (Ivory Coast, Seychelles) and business services (Gabon, South Africa).

An investigation of the most recent theoretical research and empirical findings on project finance follows in the Literature Review chapter. This is followed by a review of previous regression techniques that have been used on project finance, as well as the compilation of the multiple regression model used is discussed in the Data and Methodology chapter. The empirical findings and the testing of sensitivities of the regression analysis are contained in the Findings chapter. The empirical findings are reviewed in context with previous research in the Discussion chapter. The Conclusions chapter wraps up the findings and provides suggestions for any further studies.

2 Literature Review

This chapter will focus on researching the characteristics and properties of non-recourse project finance, how it is project finance is applied and what inherent risks are presents in this source of debt financing. An investigation is undertaken into how lenders price and mitigate these risks, and what previous research has been done on risk pricing, and how this can be used to better understand how lenders price in the risks for project finance debt.

2.1 What is Project Finance?

Project Finance (PF), a relatively new financing technique used in Africa, has become increasingly popular in financing projects which are long-term and capital intensive in nature within the natural resources, telecommunications, oil and gas, energy and infrastructure sectors. Throughout the mid 1990's lenders were financing projects using PF with the relevant terms and structures which would have been unimaginable a few decades ago. The worldwide number of project financed deals increased in the mid-1990s up until the Brazilian Real devaluation, Asian financial crisis of 1997 and the 1998 Russian default (Davis, 1996: P9). Thereafter, PF deals reached new highs globally in the 2000s before declining again along with the collapse of the US equity markets notably in the technology, telecommunications and power generation sectors. In particular, the fall in the US west coast energy sector with the Enron and PG&E bankruptcies renewed the scrutiny of trading and off-balance sheet financing. (Davis, 1996: P13-15)

In a global context, there is not much difference in the projects as these economic woes had medium term effects on lenders' appetite and their abilities to finance projects, which reflected on the financing terms offered to borrowers (Davis, 1996).

Davis (1996) concludes that there are significant differences to financing projects through PF in member states of the Organisation for Economic Cooperation and Development (OECD) and the developing world, in which Africa is categorised. Even though African PF has had limited exposure to the lending market, it has become a significant avenue of financing projects from the 1990s. This is mainly due to

improvement of legislative and regulatory frameworks, lawyers and bankers accustomed themselves to PF financial and legal concepts, and the opening of infrastructure markets to private companies.

Project finance is primarily used in developing countries for energy and infrastructure projects, due to it allowing governments not to take on additional debt onto the countries' balance sheets due to PF being limited- or non-recourse to the equity provides. This in turn has a limited influence on a country's sovereign credit rating, as the projects' debt are not recorded as long-term liabilities. Project finance can be more leveraged (higher proportion of debt) than traditional on-balance-sheet collateralised financing resulting in a lower project financing cost. It is most suitable for projects which:

- are highly capital intensive;
- are contractually ring-fenced away from the borrowers and their parent companies;
- are able to consist out of a consortium of different debt and equity providers;
- have limited resource, equipment and cash flow lifespans;
- have predictable revenue and expenses contained within a special project vehicle company with no requirements for additional investment during operation;
- Has limited or non-recourse towards the borrower, where only cash flows from the project itself supports loan repayments;
- Binds parties to the project company and transfers the risk accordingly through the extensive use of Non-financial contractual (NFC) agreements.

Project finance has been a successful means of financing stand-alone projects in Europe since the 1970s, such as the English Tunnel, Euro Disney, and the exploration of oil and gas in the North Sea (Esty, 2003). It has since penetrated new geographical regions in Asia, Australia, South America and Africa. As PF progressed and moved into new industries, lenders have become more confident with this loan type. They have subsequently reduced the credit costs, loosened loan covenants, extended the maturities of the loans and decreased lending spreads (Esty, 2003), making it even more available to a larger network of projects. PF has further seen a tremendous growth in countries

that are beginning to privatise their public services, such as electricity generation and distribution, water provision, toll roads, pipelines and telecommunication. Before the 1970s, the majority of global project finance was concentrated in the mining and oil exploration industries (Davis, 1996).

PF was originally used in the energy sector, and subsequently has been successfully implemented in the oil and gas, infrastructure and telecom sectors (Borgonovo, Gatti & Pecatti, 2010). The attractiveness of PF funding is that it limits and removes risk exposure of the borrowing firm's balance sheets, which is important when entering risky markets such as developing countries.

The structure of PF allows for the project and risks to be ring-fenced and isolated, removing any misalignment of lender and borrower conflicts i.e. agency conflict, and creating a '*community of interests'* between lenders and borrowers (Shen-fa & Xiao-ping, 2009: P6) to decrease possibilities of any project failures. From the equity sponsor's perspective, PF also reduces the potential of '*risk contamination'* to sponsors. If a project fails, it would not jeopardise the financial integrity of the sponsors' core business (Sorge, 2011: P96).

According to Esty (2003), the analysis of future trends in PF can be split into the nature of the project assets and the financing of project assets. This thesis focuses on the latter, establishing which determinants are used in pricing the project risk of PF loans used in the African market, and considering the effect these cost determinants have on the pricing of non-recourse PF loans.

Project finance is structured around a centre of contracts, focused around a special purpose vehicle (SPV) entity, which becomes the counterparty to all operating, financing and revenue agreements. The SPV is comprised of representatives from the sponsoring firms/equity-providers. They are in turn the SPV's shareholders who arrange financing with a syndication of banks, headed by a principal Lead Arranger who provides all funds to financially close, design, procure and construct the project. Various agreements transfer the risk away from the SPV and lenders such as:

- sales off-take agreements with the off-taker/purchaser (and sales take-or-pay guarantees towards the SPV);
- concession/environmental/permitting authorisations from the local and national authorities;
- input supply agreements with local suppliers;
- shareholder agreements with the various project sponsors; and
- loan-facility agreements with lenders who are providing the debt.

Lenders further reduce the risk of loan repayments by requiring loan covenants to be in place for the duration of the loan repayments. The typical loan covenant used would be a debt service reserve account, ensuring that there is reverse revenue available that can be used to service the loan repayments in the event that revenue is unavailable for a short period. The covenants are also designed to protect Lenders from asset substitution and project value expropriation by the borrower (Kleimeier & Meggison, 2001).

Dailami & Hauswald (2001: P6) reasserted that '*a firm is a nexus of contracts allocating contracted and non-contracted risks between different stakeholders'*, and that '*the markets assess the latter in the pricing of financial claims.*' Their study shows that, in the event of the lack of contractual agreements, the project risks are shared between the lenders and shareholders over time, despite loan covenants being in place which would have prevented risk shifting. Contractual completeness is essential for the non-recourse feature of PF. This does not essentially provide project sponsors with the reasoning to '*engage high risk, low value activities in order to increase shareholder value at the expense of debtholders (debt agency*)'. '*Informational advantage'* can still be exploited through equity-holders and project managers, leaving off-take agreements incomplete to lenders, in a way which will benefit equity-holders' interests. The Dailami & Hauswald (2001: P6) study observed that *'market risk perceptions are a function of a project's contractual structure.*' As projects are defined in terms of the nexus of individual contracts, the type and interface of these contracts motivate the use of PF, and provide a basis on project risk determination.

As PF projects only have a finite resource- and operational lifespan, both borrowers and lenders must ensure that the project's expected performance figures will be met, by using realistic production and revenue models during the planning process. The construction of the project is usually contracted out to a third party independent Engineering, Procurement and Construction (EPC) contractor, who undertakes all the risk in designing, procuring and constructing the project facility. After construction, the SPV enters into Operations and Maintenance (O&M) agreements with an independent operator to undertake all operational and maintenance obligations for the specific duration of the project's lifespan. An optimal combination of PF agreements, as mentioned above, is most effective in allocating risks to the most suitable counterparties who are able to deal with them (Bonetti, Caselli, & Gatti, 2010). In the event that the project's equity sponsors are also undertaking the construction and operation functions, the independent project company SPV will still enter into NFC agreements with the sponsor company's EPC and O&M companies to ring-fence and transfer the constructional and operations risks onto these companies. The lenders further transfer constructional and operational risk from the SPV to the EPC and O&M contractors by requiring them to provide performance guarantees to cover performance or delayed liquidated damages to the SPV. Esty (2003) refers to NFC as '*institutional risk management'* tools.

These extensive contractual structures allow the projects to achieve a higher leverage of debt compared to commercial syndicated loans, as they are able to address agency conflict, and in turn reduce total agency costs related to such risky debt in-light of information asymmetry between lenders and borrowers (Shen-fa & Xiao-ping, 2009). Corielli, Gatti & Steffanoni (2010; P1298) conclude that lenders rely upon these NFC contracts to regulate project risks and costs. Lenders are, however, unwilling to lower their credit spreads if equity sponsors act as counterparties in the relevant project agreements (e.g. EPC or O&M contractors).

The Corielli, Gatti & Steffanoni (2006) study obtained and used data from the Dealogic ProjectWare database between January 1994 – 2003. The database was filtered to completely focused on loans awarded to project finance deals.

The number of usable loans for the study was 1,093 deals to the value of US$195 Billion, and the study indicated that the largest share of loans were awarded to electricity, power and other utility industries, representing 52% of the total database value. Telecommunications where next in line with 28% and transportation with 14%.

The study reveals the geographical breakdown of project finance loans, with four significant area are identified: Western Europe 30%, North America 16%, Eastern Europe 15% and Southeast Asia 11% representing the respective breakdowns of the total of project finance loans.

The study also categorised the distribution of project finance loans according to the rating of the borrowers' country, and reclassified the Standard & Poor's country rating into five key categories. This showed a bias towards projects in the first (and highest) rating class, and accounted for 66% of the value of project finance loans. Poor & speculative countries, developing countries received a lower proportion of project finance loans.

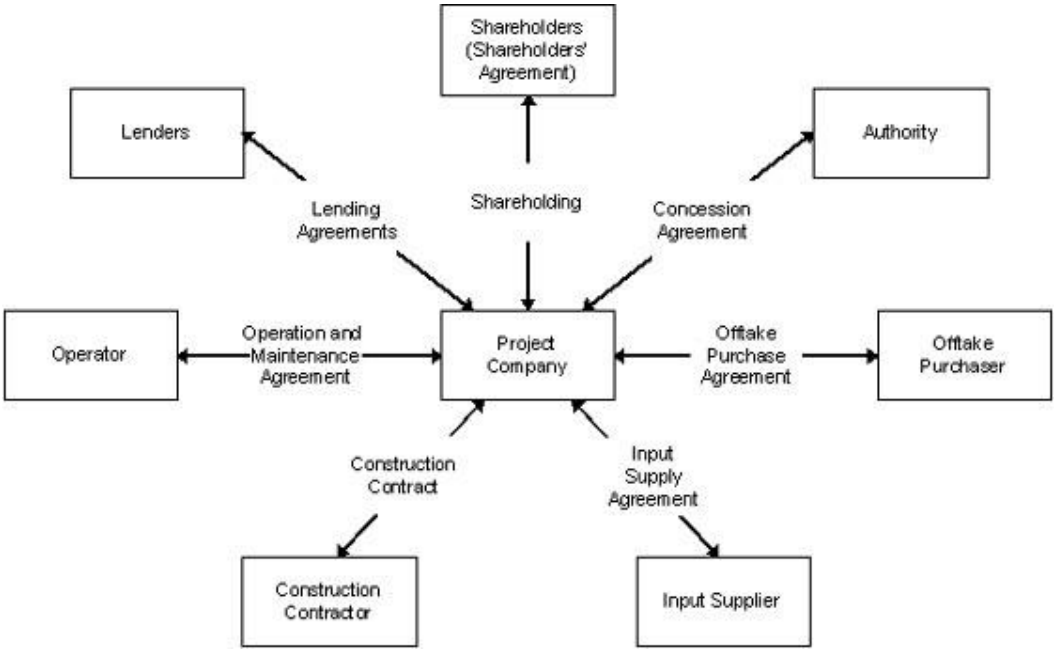
Project size is available for 518 operations with an average of US$513 million (median value US$200 million) and the average value of spread is 172 basis points (137.5 median) and the average loan majority is 10.5 years (median 9.0).

The study established that a number of variables, such as the level of NFC agreements entered into, micro-economical loan variables, geographical location (country) and the sector of transaction and industry all influence the loan interest rate and capital structure (debt leverage) of a project financed (PF) deal. The study concluded that the country credit ratings and project industry are determinants in defining the level of debt structure and interest rates, and that NFC agreements help reduce agency risk. The study could not confirm whether the agreements assist the projects in obtaining lower interest rates / loan spreads, or they increase the level of debt leverage for the project. In addition, low

levels of revenue volatility result in the project being able to negotiate higher debt leverage levels. This is supported by Dailami & Hauswald (2001), who found that the Qatar Ras Gas project's cash flow revenue was more important than the physical underlining assets, as a project's real collateral in being able to negotiate lower interest rates. This idea is further supported by Hainz & Kleimeier (2012; P6), citing Rajan & Winston (1995) who found that lender's incentives to provide financing for the project improved in the case of banks who had a right to claim pre-specified collateral assets.

Furthermore, Dailami & Hauswald (2001) determined that the lender's risk perception is a function of the project's contractual structure. Projects where the risks are covered through NFC contracts result in lower credit spreads and longer debt tenors. Corielli, Gatti & Steffanoni (2010) supported this finding, but also found that lenders are unwilling to reduce borrowing costs or increase the project leverage if the borrowers are involved as counter parties to the project's NFC agreements. Esty (2002) as cited by Gatti et al. (2007) finds that PF loans have higher leverage ratios (debt to equity) compared to regular corporate loans, with PF loans having 70% debt to equity ratio, versus 33.1% for corporate loans. A structural diagram of the various agreements and counterparties is shown below.

Figure 1: Project Finance Counter Party Agreements Structure



Source: http://ppp.worldbank.org/public-private-partnership/agreements/concessions-bots-dbos

2.2 Why Project Finance?

With Africa's growth in economic development, increasingly more financing is required for long-term infrastructure projects within the natural resources, energy, telecommunications and infrastructure sectors.

Governments are faced with new challenges resulting from high economic growth rates, which in turn yields immense economic benefits for the country, as there is more pressure on governments to provide education, social, health and environmental upliftment within their countries. This in turn has led to the governments increasingly allocating a majority of their national budgets to address these concerns. Furthermore, as governments get closer to their public sector borrowing limits, and due to their limited tax base, they are unable to increase tax revenue to finance additional infrastructure projects.

There is growing public opinion that infrastructure projects would be best suited for the private sector, with less intervention from the national government. In essence, due to governmental balance sheets being too small to finance these projects on their own,

partnering with private companies would be required to implement and finance such infrastructure projects.

Developing countries have increasingly accessed international financing from the 1990s with great success, and is believed to be due to their own domestic economic growth, international policies and the opening of markets to international lenders (Dailami & Leipziger, 1998).

According to Sorge & Gadanecz (2008: P2) '*Project finance grants emerging market borrowers' access to long-term funds at affordable rates*'. They further concluded that as long as the newer regulatory framework (the Basel Accord which restricts longer term debts) takes into account the reduced project risk lenders price into longer-term PF loans, and that lenders who provide global debt funding, would not be discouraged from investing in PF in developing countries. This is supported by Davis (1996) who states that the Basel Committee assigned its Models Task Force in 2002 with analysing the unique credit considerations of PF. The Task Force found that even though non-recourse PF loans should have a higher capital weighting (and in turn reduced debt : equity leveraging), compared to unsecured corporate loans, these higher capital requirements could reduce the profitability of such loans for banks who in turn will raise the cost of providing such loans, and deter banks from participating in loan syndications. Banks have responded by:

- Requiring loan features such as early-warning mechanisms to alert them if there are project difficulties;
- Encouraging equity-holders to remedy project defaults by providing additional equity or any other forms of equity support; and
- Being able to provide debt restructuring.

Subsequently a four-bank study steered by S&P Risk Solutions indicated that non-recourse loans had reduced losses subsequent to project defaults, compared to unsecured corporate loans. This was due to banking requirements, such as '*first-priority*

lenders, revenue cash-flow sweeps, covenant triggers and limitations on indebtedness', which act as credit enhancements that mitigate project risk. (Davis, 1996: P10)

Another means of financing infrastructure projects are through construction bonds, however, as African capital markets are relatively underdeveloped, firms do not have the capabilities to issue bonds at competitive returns for a long maturity. An & Cheung (2010) found a correlation that for projects which require a larger capital amounts, companies would be more likely to use PF, and that managers' skills have a profound effect on the possibility of positive outcomes for a project, resulting in PF financing to be chosen. Interestingly the study also found that using PF increases the relative advantage of being able to relieve expensive capital market imperfections for projects with extremely large fixed capital requirements, due to their larger project risks, with no compensating benefits that they could offer.

Edwards (1986) observed that loan credit spreads charged in the lenders does not reflect the true risk associated with lending in developing countries, yields in sovereign bonds do capture this risk better. There is, however, still uncertainty as to whether bank loans price the risks correctly.

Further studies (Pollio, 1998) found that the common beliefs of choosing PF over other debt financing options are '*unconvincing*', and that the benefits of PF are ancillary, not paramount. The main feature of PF was found to be the risk management features, with additional benefits of increased level of leverage, longer debt tenures and risk mitigation features.

Kleimeier & Versteeg (2010) hypothesized that PF provides the catalyst for growth stimulation in developing countries, in that foreign capital is beneficial to the development of domestic financial sectors. Their study found that developing countries gained up to 0.67% in annual economic growth when the level of PF in their sample size is increased from the 25th to the 75th percentile. This is due to 38% of PF funding is in infrastructure projects, and is viewed as the most significant economic driver in developing countries. An interesting comment from the study is that public investment

in infrastructure doesn't lead to the same economic growth as investment from the private sector through project finance, with no clear conclusions as to why.

Furthermore, Shen-fa & Xiao-ping (2009) also found that the PF lowers the opportunity cost of underinvestment in large and riskier projects.

2.3 Characteristics of Project Finance

Project financing is non-recourse, revenue-flow based, with important influences relating to project off-taker creditworthiness, and the ability to execute contracts over the duration of the project lifespan. PF has increased in popularity due to lenders who have started to focus more on straight forward projects (in contrast to complex Enron-type deals which were of-balance-sheet and hidden away among the subsidiary companies) and borrowers who are against financing a new project against a basket of their existing projects (Davis, 1996).

Project Finance loans entail higher structuring and debt costs compared to corporate syndicated loans, and are estimated at 5% of the loan capital for project finance loans (Esty, 2003). Due to the advantages of NFC counterparty agreements, surplus expenses are more than counteracted through the advantages of the sponsors' off-balance sheet financing structure, with the resulting appropriate risk allocation reduction (Bonetti, Caselli & Gatti, 2010).

The Esty (2003) study used data from Thomson Financial SDC database. The database contains over 1,200 signed deals between 1997 and 2001. The data indicates that projects tend to be larger than $100 million in size, and often highly leveraged capital structures with long, but limited project lifespans. The study reveals that 27% of projects are under $100 million in size and 26% of projects are larger than $500 million in size, and account for 74% of total lending volume. Majority of expenditure comes from projects greater than $1 billion in size, they account for 12% of projects by number and 53% by total cost over 5 years. Petrochemical, telecom's, and oil & gas sectors is shown to have the greatest number of large projects (i.e. greater than $1 billion).

It was found that the loan term structure of PF loans has a bell-shaped costing curve (Sorge & Gadanecz, 2008), contradicting other types of financing loans, where the credit risk accordingly increases with the loan maturity levels. Shen-fa & Xiao-ping (2009) concluded that PF loans carry a lower risk than short-term corporate loans, but there was no significant linear relationship between loan spreads and maturity. All other commercial financing loans and bonds had an upward sloping regression line between maturity and spreads, implying that lenders expect higher spreads for longer exposure to risk.

Sorge (2011) previously investigated the impact of credit risk, in particular political risk and the use of sovereign guarantees on credit spreads (interest rates) in emerging economies. The findings showed that there appears to be a hump-shaped term structure for credit spreads when the credit spread is plotted against the loan maturity duration. The study found that the size of the *'hump'* increases as the degree of leverage increases and that longer maturity (15 to 20 years) loans are priced cheaper than shorter term (10 to 15 years) loans. This would raise the question whether lenders perceive longer term loan maturities as less risky.

To obtain clarity on this, the relationship between corporate loan credit spreads versus maturities were investigated, with the research done by Gottesman & Roberts (2004). They tested whether lenders prefer short term debt to riskier borrowers, in order to control agency problems, i.e. asset substitution and underinvestment, (credit-quality hypothesis) or whether lenders prefer longer loan maturities (trade-off hypothesis), and whether lenders price their credit spreads accordingly. The study concluded that both hypotheses reflected reality, but the findings strongly show that lenders supported a trade-off hypothesis more between the two scenarios.

Sorge's study (2011: P97) cited Merton's (1974) earlier work on pricing risky debt, whereby the firm was expected to observe hump-shaped credit spreads for loans with different loan tenors. Merton's hypothesis in that '*default risk underlying credit spreads is primarily driven by two components: the degree of the firm's borrowing or leverage, and the uncertainty about the value of the firm's assets at maturity*.' Furthermore, assuming

that the firm's debt-leverage ratios are decreasing over time, thereby delaying the debt maturity dates and reducing the probability that the project's value will be below the debt default level when loan repayment is due. Contrary to this, a longer loan tenor also increases the uncertainties about the future value of the project's assets.

The Sorge (2011) study concluded that firms which commence with reduced debt leverage, additional assumption dominates, such as an upward sloping loan term structure. The study also found that for projects with higher levels of debt, '*the increase in default risk due to higher asset volatility will be strongly felt by debt holders at short maturities*.' As loan maturities further increases, '*the first component will rapidly take over, thanks to the greater margin for risk reduction due to declining leverage. This leads to a hump-shaped term structure of credit spreads for highly leveraged obligors'*. (Sorge, 2011: P97)

Previous research (Kleimeier & Megginson, 2001) has also found that global project finance costing is dependent on various factors, of which loan characteristics (Size, Maturity, Third Party Guarantees) and project characteristics (Currency Risk, Sovereign Risk) have the largest effect on the pricing. Further research (Kleimeier & Megginson, 1998) was conducted into comparing the project finance deals in Asia and Western-developed countries and what factors dominate lender-pricing decisions.

The Kleimeier & Megginson (2001) study used data from the Loanware database provided by Capital DATA (London based Company). The study focuses on the historical data between January 1, 1980 and March 23 1999 on signed loans and includes cancelled loans. A total 90,784 loans, worth $13.2 trillion, were examined in this study.

The study found that loans are highly concentrated in five key industry areas, 60.2% of all project lending (by value) and 46.3% of all PF loans are made to borrowers in the communications, mining and natural resources, oil and gas, electricity and energy utility, and transportation (excluding airlines and shipping) industries. These industries account for only 21.8% of all syndicated lending (value) and 17.1% of all syndicated loans.

Countries that attract bulk of general syndicated lending is concentrated in the United States (61.4% by value and 56.6% of all loans), only 16.8% of PF lending and only 14.7 percent of PF loans go to U.S. borrowers. The biggest recipient of PF lending was in south-east Asia. This region accounts for 23.8% of the total value and no less than 30.3% of the total number of project finance loans, whereas it accounts for only a 5.2% of the value (and 10.8 percent of the number) of all syndicated lending.

From the 25 largest PF loans arranged since 1980, the characteristics of the larger PF deals are that there were 46 loans associated with these 25 PF syndicated loans, averaging 1.84 loans per PF deal associated. One of the key features in all these PF deals where that a newly created special project vehicle (SPV) company was setup to finance, build and operate the project. Another key feature the study found was that project sponsors are usually well known international companies, state-owned enterprises and/or governmental bodies that are joint through ownership and vehicle companies. Furthermore, loans are relatively long-term credits, and priced at a fixed spread above benchmark interest rates. These loans also included a feature of loan tranche that is fully or partially guaranteed by a creditworthy third party.

PF loans have a longer average maturity and are more likely to have third party guarantees. PF loans are far more likely to be requested from non-US borrowers and to riskier countries. PF loans often use fixed-rate rather than floating-rate loan pricing.

According to the data, the features that consistently reduce the loan spreads were found to be whether a third party guarantee is present, and whether lending to a borrower in a collateralize asset-rich, such as oil and gas, real estate, and electric utilities industries increases loan spreads.

It was found that the most important parameter which have an effect on the loan credit spreads is the level of country risk (positively correlating to credit spread and that where a countries risk rank was 30 versus one of 20 the loan spread increases between 11.7 and 15.2 basis points). In addition, the year in which the loan is arranged (positively

correlating to credit spread), and whether there is a loan payment guarantee present from the government or a multilateral agency (negatively correlating to credit spread) also had an effect on the loan credit spreads.

Due to the associated risks of non-recourse to equity providers, for PF projects which are at the development and construction stages, lenders are compensated with high upfront fee payments in order to entice them to participate in such long term, highly geared projects (Kleimeier & Meggison, 2001).

Up until the late 1990's there has been an increase in the risk tolerance for project finance deals, through increasing debt maturities, reduction in credit spreads, loosening of project covenants and extension of PF to emerging markets. These trends, however, reversed as a result of the global consequences of the 1997 Asian financial crisis, the 1998 Russian sovereign debt default and the devaluation of the Brazilian currency in 1999. Lenders were unwilling to finance projects in emerging markets without support from sponsors, export credit agencies and insurance companies. (Davis, 1996).

The bankruptcy of the Fiberoptic Link Around the Globe (FLAG) and Enron in the early 2000s further compounded the risk perception of PF among lenders in the telecommunications and electricity sectors. The immediate effect of the Enron bankruptcy was a loss on confidence among investors in the underlying project finance structure, and increased the risk perception towards borrowers. This resulted in increased due diligences on the projects, increased counter-party guarantees and increased emphasis on the project's free cash flows to service debt repayments, with an increase in debt service reserve loan covenants (Davis, 1996).

Nguyen & Ross (2006) identified five risk-pricing factors as Operating, Environmental, Political/Regulatory, Market and Sponsor Risk. These are the key risk parameters affecting the project risk premium (usually expressed as a credit spread over a base rate). These risk-pricing factors could be analysed independently or combined given that they interact on each other. Their study further suggests that the project risk premium can be adjusted for by non-risk pricing factors such as experience in the particular financing

instrument (e.g. project finance, collaterisable term loans etc.), expertise in the particular financing market, lenders financial capacity and competitive pressure within the financing market. These non-risk pricing factors have indirect effects on the project risk premiums, for instance a lenders larger experience and their experience in PF might lead lenders being more assured of the market and thus provide lower project risk premiums.

Lenders take these risk pricing factors and non-risk factors into consideration when deciding a project's risk premium. These risk pricing and non-risk factors are further investigated below, as to which specific project risks they encompass.

2.3.1 Operating risk

Completion and operating risk is present when a project does not operate as planned within the project's designed cost, performance, management and technical parameters. (Tinsley, 1999, as cited by Nguyen & Ross, 2006).

Completion and operating cost overruns and plant underperformance exerts pressure on a project's financial performance by reducing cash available to service debt and equity repayments. Operating costs overruns can be mitigated by entering into long term NFC agreements such as Engineering, Procurement and Construction (EPC) and Operation and Maintenance (O&M) agreements, whereby the construction and maintenance companies are engaged with prior to the commencement of construction and operating phases of the plant. Plant performance risk can also be mitigated through NFC agreements with the contractor responsible for constructing and operating the plant. These guarantee the performance, on the back of providing various guarantees, performance bonds and liquidated damages if the performance guarantees are not met.

2.3.2 Management risk

Management risk relates to the inability of the project company's management to regulate and control the project's output, operating cost and to the extent even run the project's production facilities.

2.3.3 Technical risk

The technical risk relates to new and untested equipment being used for a project whereby there is a risk of these technologies not being viable, nor being able to meet the plant's projected output. As mentioned, these risks can be mitigated through NFC agreements with the respective third parties.

2.3.4 Environmental Risk

Environmental Risk relates to the possible environmental and social consequences the project could have on the surrounding environments and human inhabitants. Lenders are increasingly requiring projects to use the IFC's Performance Standards on Environmental and Social Sustainability (Equator Principles). Financial markets worldwide have accepted these Equator Principles as global best practice measures in managing environmental and social risks[3].

Even though environmental and social risk is present in projects, the study conducted by Nguyen & Ross (2006) concluded that environmental risk has the lowest perception among lenders and the least significant impact on affecting the project's total risk premium.

2.3.5 Political / Regulation Risk

Political risk relates to the effect of a project's host country's political and regulatory environment on the viability of the project. These political risks are political violence, war, nationalism and expropriation of property, changes in taxation, traffic, investment policies, foreign exchange control and currency convertibility. It can also be noted that a specific project can be politically more sensitive in a country which is perceived to have a lower country political risk profile.

[3] IFC website: www.ifc.org/wps/wcm/connect/Topics_Ext_Content/IFC_External_Corporate_Site/IFC+Sustainability/Partnerships/Equator+Principles+Financial+Institutions/ (accessed 20/06/16)

Political risk can be mitigated through lenders requiring the project company to purchase political risk insurance from government supported export credit agencies or third party insurance companies.

The main attributors to Political / Regulation Risk is mainly attributed to Currency- and Sovereign risk, described in more detail below.

2.3.5.1 Currency risk

Currency risk exposure is present if the loan amount is in a currency that is different from the project revenue (and in turn loan repayments) and no currency hedge in the off-taker agreement is available for any movement in the different currencies.

In some instances, the lender will usually require the borrower to hedge the exposure as a pre-condition of the loan (Pollio, 1998).

Kleimeier & Meggison (2001) undertook an ordinary least square (OLS) regression analysis on the parameters that influence the pricing of loan spreads for project finance, with currency risk as a dummy. They found there was a significant negative relationship with loan spread and the currency dummy, and that the mismatch between the currency of the lenders' country and borrowers repayment significantly reduced the loan spread, on average by 42 basis points for project finance loans.

Their understanding of this effect is that lenders might offer reduced credit spreads to projects who are willing to take on the currency exposure risks. It is not clear why this could result in increases in borrower default risk. The authors also provide an alternative explanation that the negative spread/currency risk relationship might be due to a yield premium charged to US borrowers, in that American borrowers pay higher spreads for loans than non-US borrowers. Reasons given were that:

- US corporations might have better access to syndicated loan markets than non-US corporations, and in turn the US corporations might have lower credit ratings;

- US lending might be used more for corporate take-over financing, which requires larger financing and larger spreads; and
- There might be certain institutional features within the US loan market charging US borrowers relatively more than non-US borrowers.

Hainz & Kleimeier (2003) in their earlier study found that international lending organizations (ILOs) are becoming increasingly present in using project finance in developing countries. ILOs not only include Western (American and European commercial banks) but also international development agencies, such as the International Finance Corporation (IFC), European Bank for Reconstruction and Development (ERBD) or other national export-import banks. The study's hypothesises is that PF is a more preferred financing choice in developing countries, due to asymmetric information availability between borrowers, lenders and the respective governments causing a '*moral hazard problem'* for the borrowers and lenders. This is due to the ILOs being able to influence the outcome of a project's success, through being able to influence the governments' decisions. Their model's results conclude that non-recourse financing offers the best incentives for lenders, and it is thus why PF is used in developing countries where there is a higher degree of political risk. The model also reveals that the only ILO that has influence over such governments is the IFC. This was observed that due to ILOs being able to use their leverage on the host governments to '*prevent the governments from making decisions which could jeopardize the success of the projects funded by the ILOs'*. (Hainz & Kleimeier, 2004: P290) This explains the reason why projects with a perceived high degree of political risk utilise PF funding.

Esty & Megginson (2003) support this statement, whereby their study concluded that countries with weak or un-enforceable legal rights, lenders syndications are relatively larger and distributed, in order to prevent any strategic defaults, and that even commercial banks can influence host governments and in turn reduce political and sovereign risk.

The Hainz & Kleimeier (2003) study concludes that there is still a residual country risk unaccounted for by lenders in their loan-pricing, and that limited- or non-recourse loans

through a syndication of lenders is an efficient means of funding in countries with a high political risk.

The Hainz & Kleimeier (2003) study's finding is supported by previous studies, such as Esty & Megginson (2003) who concluded that in countries with higher political risk (i.e. weaker creditor rights and legal enforcement), ILO syndications were found to be more complex and integrated, in order to deter project risk default. In contrast, it was found in countries with a lower political risk that syndications were structured to ensure monitoring of low-cost contracting. The study concluded that a lender's syndication structure is a direct result of country's political risk levels and that political risk is reflected in the credit spread of the loan.

Nguyen & Ross (2006) also confirmed that political risk is reflected in the credit spread of the loan, in their empirical study of non-recourse loan-pricing. They also confirmed the importance of political risk in the context of PF. In Australian project financed loans, there is a political risk premium, but it is of lower importance compared to other risk parameters in their study. They concluded that a higher level of importance might be attached to political risk by Australian lenders if the projects were in countries were there might be higher political risk.

2.3.5.2 Sovereign risk

Hainz & Kleimeier (2012) found that the loan term contract depends not only on political risk, but also on the legal and institutional environmental risk of the project country's jurisdiction. The study used indices sourced from Euromoney as inputs for the Coasian bargaining theory, and was used to clearly show that the higher the political risk of a country, the higher the probability is that PF loans will be used over other types of loans, and that development banks will participate in the loan syndication.

Sovereign risk can be split into the 'harder' and 'softer' sovereign risks. The harder risks include expropriation, currency restrictions, political violence (including war, sabotage or terrorism), failure to implement tariff adjustments as per the purchase agreement due

to political considerations, and quasi-commercial risks where state-owned suppliers/customers do not fulfil their contractual obligations.

'*Softer*' sovereign risks are also present such as '*bureaucracy quality, corruption, democratic accountable, ethnic tensions, government stability, investment profile, law and order, military politics, religious tensions and socio-economic tensions*', as defined by the International Country Risk Guide (Hainz & Kleimeier, 2012: P291).

Further to the sources of risk in PF loans that the lenders take into consideration to price their perceived lending risk, Davis (1996) found that the following factors also influence the pricing of PF:

2.3.5.3 Political Risk Insurance Coverage

Insurance providers are assisting sponsors in covering various project risks providing insurance products to the project covering construction-, operation-, off-taker- and residual value risks, and in turn reduces the project's risks. (Davis, 1996: P8). The lenders view the insurance coverage as additional re-assurance against any possible project risks, and adjusts their risk margins and project covenants accordingly.

2.3.6 Market risk

Market Risk relates to the possibility that a '*project's product may not be able to be sold at a sufficient price to cover all the essential costs of the project and repay the debt in full*' (Mechnie, 1990: P313, as cited by Nguyen & Ross, 2006). Market risk is caused by a decrease in commodity prices, or decrease in the demand for the project's output. Commodity prices can be below the long-term forecast borrowers and lenders base their financial models on, and result in a reduction of the revenue available to service debt repayments (Davis, 1996). This leads to a narrowing of market share, to the extreme situation of a total collapse in the international market of the project's product. Market risk can also relate back to political/regulation risks, whereby changes in the project's host government's investment and economic policies could have an effect on the local market.

These market risks can be mitigated through detailed market forecasts and running market sensitivities in the project's financial model. Long-term NFC agreements, such as leases agreements with the property owners, supply agreements, off-take purchase agreements, wheeling agreements, and government guarantees provide natural mitigation to market risks, whereby the project's off-take agreement can have take-or-pay clauses and the project is assured a minimum price for the project. Equity sponsors can further provide guarantees to mitigate risks in severe market circumstances.

2.3.7 Sponsor risk

Sponsor risk is best described as credit risk or equity risk, with reference to the financial strength, technical expertise and financial experience of both lenders and equity sponsors in the project. Sponsor risk can be present in weak credit characteristics of the sponsors, internal conflicts between the project's various equity sponsors and a weakness in the technical and financing expertise of the sponsors and their lenders.

Sponsor risk can be mitigated by lenders doing a thorough due diligence on the sponsors and all the project's internal and external NFC agreements. Loan covenants and project cost contingencies provide additional support to the lenders.

2.3.8 Non-risk Pricing Factors

Non-risk pricing factors do play a significant, yet indirect effect on the project risk premium. These pricing factors are worth mentioning, but are not explored in too great detail.

The non-risk pricing parameters are experience and expertise in the particular financing instrument, expertise in the financing market, lenders financial capacity and the competitive pressure among lenders within the financing market (Nguyen & Ross, 2006). It should also be noted that additional non-risk pricing factors could be added, such as the Basel Banking Requirements, and the effect of ratings agencies on the indirect cost of debt premiums.

The Basel Committee on Banking Regulation has resulted in PF deals being perceived as riskier and having lower debt leverage compared to corporate loans, due to the unique risk profile of PF and their low level of recourse to borrowers (Esty & Christov, 2002).

Furthermore, the effect of the Enron bankruptcy has resulted in rating agencies down rating PF deals, and resulting in '*rating triggers*' being inserted in the loan agreements, which are seen as events of default when there is a rating downgrade.

2.3.8.1 Financing expertise

Financing expertise is a risk when the project's sponsor does not adequately address interest rate and inflation volatility and thus changes in interest rates can affect a project's capabilities to service its debt repayments. Financial agreements, such as hedging agreements, can efficiently mitigate these risks. These hedging agreements can consist out of interest rate swaps, caps, collars or floors. Off-taker and supply agreements can also incorporate price-adjustment features, in which a change in the interest rates or inflation can be passed through to the counterparty (Bonetti, Caselli & Gatti, 2010).

2.4 Sources and Uses of Project Finance

As PF lends itself better to support creditor rights, Hainz & Kleimeier (2012) found that PF funding was the least common source of financing projects in Western Europe, but the most important source of financing in developing countries such as Africa, Middle East and South East Asia. Even though these developing countries are politically riskier and have a higher degree of politically unstable governments, -banking markets and -corporate governance, lenders in these markets are also more likely to partake in longer insolvency resolution processes.

The Kleimeier & Meggison (2001) study concluded that due to PF loans having longer maturities, the credit spreads are based over a lower base benchmark interest rate, e.g. London Inter-Bank Offered Rate (LIBOR), Singapore Inter-Bank Offered Rate (SIBOR), etc., and that the PF loans were either fully or partially guaranteed by a third party.

Recent trends in PF have all assisted in the uptake of project finance by borrowers. These trends include infrastructure requirements, industry privatisation, improvement of a country's legislative and regulatory frameworks, development of financial innovation, local currency financing, broadened sources of funding and the role of insurance(Davis, 1996).

Insurance has played an increasingly important role in PF. Insurers have taken on more of the construction, operating, off-taker and residual value risks as they have become more acquainted to the structures of project financing (Davis, 1996).

Credit rating agencies have used the increased comfort of insurers to improve the credit ratings for infrastructure projects to 'AAA' levels through the projects guarantees provided by 'AAA' rated insurance companies. This has led to the uptake, securitisation and liquidity in PF deals (Davis, 1996).

Hainz & Kleimeier (2012) also found that national development banks were active in loan club syndication, and that the most active multilateral financial institution was the European Investment Bank, with the European Bank for Reconstruction and Development (EBRD) and the World Bank being the most present multilateral development banks globally. These development banks are also more likely to lend to borrowers in countries which have a French or German legal origin. The development banks provide a '*political umbrella'* and tend to focus more on projects with larger investments and longer lives, and less on mining and other industry (agriculture, trade, etc.) sectors. The syndication of international commercial lenders results in governments owing them substantial amounts of money over time, allowing these lenders to exert pressure on the government and allowing better bargaining power, which could allow banks to indirectly constrain adverse negative political actions (Hainz & Kleimeier, 2012; P17).

PF is in essence a mechanism to deal with projects in high-risk countries and industries, whereby the project financing structure leads to a superior ability to facilitate

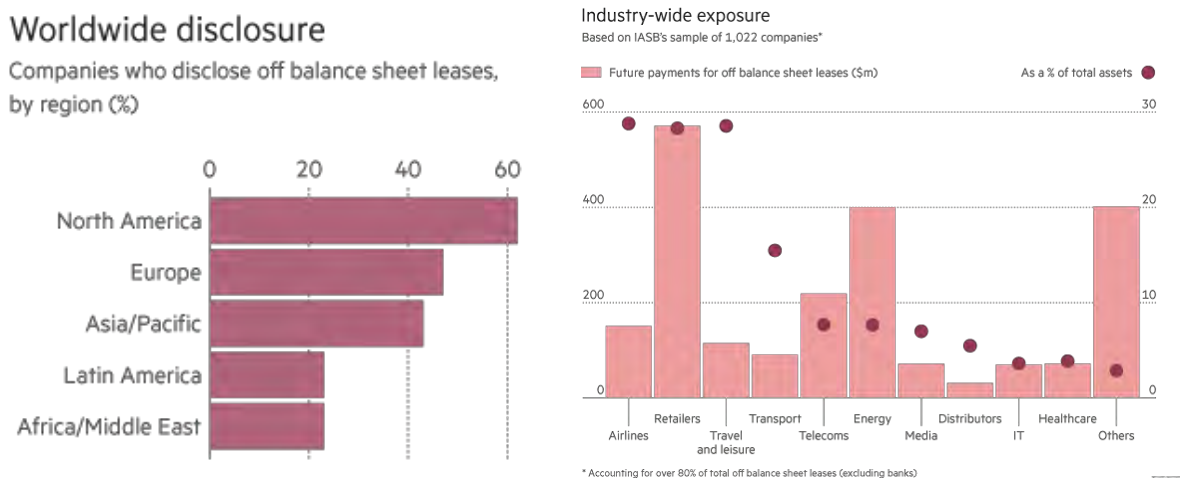
information sharing and provide good project management/governance, with independence from external sponsor governance (Kleimeier & Versteeg, 2010).

2.5 Project Finance going forward: Effect of IFRS 16

The fundamental nature of PF entails a long-term off-take purchase agreement for the project's output. This off-take agreement provides the required cash flow to enable the project to meet its debt and sponsors' dividend obligations.

Changes by the International Accounting Standards Board (IASB) through the newly promulgated International Financial Report Standards 16 (IFRS 16) will, however, change how lease agreements are accounted for. A lessee is required to recognise the "*right to use the leased item*" as an asset and record the present value of all of the future lease payments as a liability. The aim of the revised standard was to improve accounting transparency and assist with the calculation of a companies' often substantial operating lease obligations whose long-term off-balance sheet lease financing is now better accounted for (IFRS, 2016). IASB realised that a significant amount of long-term leases was recorded off-balance sheet, as presented by the percentage of understated leases from list companies as the heaviest users of off-balance sheet leases:

Figure 2: Summary of long-term leases recorded off-balance sheet



Source : http://www.ft.com/cms/s/0/138fe994-bdd5-11e5-846f-79b0e3d20eaf.html#axzz4CxzLXURH

Currently, International Financial Reporting Interpretations Committee Standards 4 (IFRIC 4) determines whether an arrangement can be classified as a lease and is determined through any arrangement that conveys the right to use an asset whereby the purchaser (lessee) has the right to control the use of the asset. *(BDO, 2016)*[4]

The right to control the use of the underlying asset is conveyed if any of the following conditions are met:

1. The purchaser has the ability or right to operate the asset or direct others to operate the asset in a manner it determines while obtaining or controlling more than an insignificant amount of the output or other utility of the asset;
2. The purchaser has the ability or right to control physical access to the underlying asset while obtaining or controlling more than an insignificant amount of the output or other utility of the asset. (BDO, 2016)[5].

The underlying principle of project finance is that long-term off-taker agreements are entered into, and form the basis of the project's cash flow over the project's lifespan. As per the definition mentioned in the paragraph above, these off-taker agreements can be classified as lease agreements, and once it has been decided that an arrangement contains a lease, that lease is accounted for under IAS17. IFRS 16, issued in January 2016, will now replace earlier leasing standards IAS 17 and IRIC4 and will affect most companies that report under IFRS in 2019.

[4] BDO publication, January 2016, "IFRS AT A GLANCE: IFRIC 4 Determining whether an Arrangement contains a Lease" http://www.bdointernational.com/Services/Audit/IFRS/IFRS%20at%20a%20Glance/Documents/IFRIC%204.pdf (accessed 29 June 2016)

[5] BDO publication, January 2016, "IFRS AT A GLANCE: IFRIC 4 Determining whether an Arrangement contains a Lease" http://www.bdointernational.com/Services/Audit/IFRS/IFRS%20at%20a%20Glance/Documents/IFRIC%204.pdf (accessed 29 June 2016)

Under the new IFRS 16, no distinction will be made between finance- and operating leases. IFRS 16 will now bring to lessees to account a right-to-use asset and lease liability onto their balance sheets for all leases. This means the vast majority of operating leases as defined by the current leasing standard, IAS17, which currently do not impact the balance sheet, will be required to be capitalised on the balance sheet once IFRS 16 is adopted (IFRS2016).

The IFRS 16 standard will have a profound consequence on lessees, and are counterparties to project finance. The Lessees balance sheet will reflect a higher value of asset, but their liabilities will also increase. The effect of IFRS 16 on the lessor (seller under the off-taker agreement) is minimal, as the Lessor will continue to account for leases based on the risk and rewards of the transaction. There is no significant change for the Lessor as compared to the current standard IAS17. The new standard does require additional disclosures to be presented.

The effect of putting the leases on the balance sheets for the off-taker will result in higher reported liabilities and will affect how credit rating agencies (such as Moody's, Fitch and Standard & Poor's) assess a company's default risk, and in turn its credit rating. Vincent Papa, a director of financial reporting policy for Chartered Financial Analysts, states, "IFRS 16 will standardise the currently varied disclosure of leasing costs in footnotes". He also is assured that IFRS 16 will improve the calculations of default risk, as presently a company's reported leverage understates reality.[6]

For companies with any significant leased assets, IFRS 16 will result in disclosure changes to reported profits, and recognition of previously unrecognized assets and liabilities.

[6] Kate Burgess and Harriet Agnew, January 20, 2016, Financial Times, "Accounting's big shake-up to bring more transparency" http://www.ft.com/cms/s/0/138fe994-bdd5-11e5-846f-79b0e3d20eaf.html#axzz4CxzLXURH (accessed 29 June 2016)

These changes are likely to be material for corporates with large leased estates, such as certain distributors, manufacturers, retailers and hotel and leisure operators.

These changes are likely to affect debt covenant calculations. The following are some implications to consider:

2.5.1 Income statements

Overall, IFRS16 is expected to have a limited impact on reported profit before tax. However the allocation of the expense would affect both EBITDA and EBIT, as these may increase materially, with property lease costs now being shown as depreciation and interest expenses and therefore no longer included as an expense in EBITDA and EBIT.

This will have an impact on banking covenants and leverage ratios that are derived from standard income statement measures such as EBITDA and EBIT. It could be suggested that lenders should revisit the definitions used for such covenant calculations, and ensure they are re-worded as necessary to take account of the forthcoming changes in accounting standards.

2.5.2 Balance sheets

The adoption of IFSR 16 is expected to result in a material increase in assets and liabilities, although it is estimated that the liabilities would exceed assets, resulting in a move from an overall net asset position to a net liability position.

Lease liabilities will be classified as financial liabilities, and therefore will affect reported financial indebtedness, balance sheet ratios and covenants.

2.5.3 Cash flow statements

It is expected that IFSR 16 will have no direct effect on a company's net cash flows. However the representation of cash flow statements would likely result in an increase in operating cash inflows, with a matching increase in financing cash outflows.

The principal payments on leases will now be classified as financing activities, whilst under IAS 7 the interest can be classified under operating, investing or financing cash flows.

IFRS removes the requirement and subjectivity for investors, credit rating agencies and others to make adjustments for off-balance sheet leases. Analysis has shown that common-practice adjustments are inconsistent, that they either over- or under-estimate, the value of off-balance sheet leases. (IFS Factsheet, 2016).

Under IAS 17, credit rating agencies had adjusted credit scores to account for operating leases through disclosures in accounting footnotes. However, different credit rating agencies use different methods to calculate how that they capitalize '*operating leases*' as additional to property, plant and equipment assets. The corresponding debt obligations are only mentioned in footnotes to the financial statements, whereby the credit rating agencies calculate the corresponding debt by calculating the lease obligations net present value of the reported minimum lease commitments. The rating agencies then use this amount derived from the use of a sector multiple applied to annual cost of the lease. This is where the discrepancy has resulted in the past. As an example Moody uses a sector variable of 3x to 6x[7], and Fitch have used 8x multiple as their base[8].

In light of IFRS 16, credit rating agencies announced that the revised methodology is expected to have a greater effect on industry sectors in which leases represent a large amount of the adjusted debt estimated by the credit rating agencies. The credit rating agencies also stated that the revised approach for leases might result in a reduction in the

[7] Moody article, June 2015, Moody's updates its global methodology for financial statement adjustments,https://www.moodys.com/research/Moodys-updates-its-global-methodology-for-financial-statement-adjustments--PR_327853 (accessed 29 June 2016)

[8] Fitch article, 29 February 2016, "Lease Accounting Rule Changes Won't Hit Corporate Ratings", https://www.fitchratings.com/site/pressrelease?id=1000145 (accessed 29 June 2016)

adjusted debt estimated by the credit rating agency of about 5 per cent across all non-financial corporates globally and positive rating actions for approximately 3 per cent of non-financial corporates globally. The credit rating agencies concluded 'that the effect is expected to be positive for companies where the reduction in adjusted debt results in a relatively large improvement in financial ratios'. (IFRS 2016)

Given the above opinion about the future effect of IFRS 16, the disclosure of operating leases on the financial statements may result in companies reconsidering their use of them, as it will now be accounted for as an asset under IFRS 16. Unlike an actual owned fully purchased asset, there will be no asset owned at the end of the operating lease period.

The implications of IFRS 16 are that off-take companies, who are currently the counter-parties to Project Financed projects, might start steering away from entering into long term off-take agreements. This is due to higher credit rating implications the off-take agreements might have on their companies, and in turn will lead to a decrease in number of projects being funded as non-recourse project-finance.

2.6 Project Finance Theoretical Models

Over the past few decades, non-recourse financing has attracted a large amount of academic awareness, with a large body of theoretical studies being made, but limited empirical studies available.

Shah & Takor (1987) originally developed a theory regarding the ideal debt leveraged capital structure based on corporate taxed and information asymmetries. The theory was used to explain why PF should be chosen in an organizational context for riskier investment projects and allows for higher debt financing than conventional commercial loans.

In contrast to Shah & Takor(1987), Chemmanur & John (1996) further developed a symmetric information model, based on corporate control benefits. They concluded that

control benefits are a function of the project's operating characteristics, weighing up the present value of control benefits against security benefits.

John & John (1991) derived a model to calculate the optimal structure based on the agency cost of debt and the tax benefits of interest payments. The model showed that it is optimal to finance new projects with non-recourse PF. They tested their hypothesis through providing a scenario where sponsors invest in a new project, take the tax subsidy and repay borrowers, while in the other chose not to and default. Based on their theoretical results, the following four empirical implications were developed:

- PF would be used if the growth potential is large between two projects, due to the increase in project value also being large;
- They predict a positive announcement of the sponsors stock value if PF is used, due to increase in growth options;
- They predict less sponsor balance-sheet debt would be used for higher growth options; and
- A certain amount of accounting choice predictions was made.

Following on from this study, the model created by Chemmanur & John (1996) incorporates a choice between ownership and capital structure, testing the following scenarios to provide the best decisions for:

- Incorporating new projects in the sponsor's firm versus a SPV;
- Amount of debt financing and structuring taking the above factor into account; and
- The ultimate value position in each firm.

The driving factor of the model is corporate control and the implication of using different kinds of financing with regard to capital and ownership structures.

Chemmanur & John (1996) go on to derive two predictions from their model. The first is that PF can be used to assure a level of control benefits for a project at a lower level than

the average level in the sponsor company. Secondly, the sponsor company is able to develop several projects with a lower level of debt and higher levels of control benefits.

2.7 Empirical Models

The most comprehensive studies undertaken on PF has been Kleimeier & Megginson (1998, 2001). They empirically analysed variables within PF and the capital markets through regression methods.

In their initial study, they tested if PF loans and non-PF loans are funded in an integrated market, or whether they are priced in separate markets, and found that both loan types are funded in a single market, and that floating-rate PF loans have lower credit spreads (over LIBOR) compared to non-PF loans. They also found that PF loan spreads are directly related to borrower country risk, covenant and the degree of project leverage.

Numerous academic literature was reviewed in the study and it used OLS regression analysis to analyse:

- The influence of 18 independent variables on loan spreads;
- Whether the different types of loans were priced in a similar manner (determining if the coefficient values and number of significant factors are similar for all groups);
- Whether there is a price difference between PF loans and non-PF loans.

Kleimeier & Megginson (2001:P18) used the Booth (1992) model and employed a standard OLS regression estimation technique and adjusted for heteroscedasticity using White (1980) methodology, to derive the following model:

$$\text{Spread} = \alpha + \beta 1\ \text{Size} + \beta 2\ \text{Maturity} + \beta 3\ \text{Guarantee} + \beta 4\ \text{Currency Risk} + \beta 5\ \text{Country Risk Rank} + \beta 6\ \text{Collateralisable Assets}, \quad (1)$$

where;

Size: Loan size, in US$ millions;

Maturity:	Loan maturity, in years;
Guarantee:	Dummy variable taking the value of 1 if a loan has a third-party guarantee and 0 otherwise;
Currency Risk:	Dummy variable taking the value of 1 if a loan is exposed to currency risk (the currency of the loan repayment cash flows differs from the borrower's home country currency), and 0 otherwise;
Country Risk Rank:	Country risk rank, an integer ranking of country risk provided by Euromoney every year, where low risk countries have low ranks (Luxembourg =1 in late-1998) and high risk countries have high ranks (North Korea = 179);
Collateralisable Assets:	Dummy variable taking the value of 1 if the borrower is in an industry generally considered rich in Collateralisable (tangible, non-specialized) assets, and 0 otherwise.

The results concluded that third-party guarantees significantly reduce loan spreads, while the size of the loan and time to maturity have no influence on PF loan-pricing. It also concluded that credit-spreads were more if the project is in a sector rich in tangible assets, and that loan fees compliment loan spreads.

Although heteroscedasticity was adjusted for by using the White (1980) methodology, 'panel data' techniques can also be used to further compensate for heterogeneity as well (De Jager, 2008). Panel data techniques refer to the combination of data from different time periods, thus creating a 'pooled' dataset where there is a limited amount of historical depth available for a particular individual data set. Pooling the datasets increases the 'degrees of freedom' and reduces the standard errors for the coefficients of a regression model.

Subsequently, Kleimeier & Megginson in their 1998 paper have undertaken an empirical analysis of PF loans in Asia and the West (US and European markets) to investigate whether the same loan-pricing factors apply to both markets and what the impact of each

variable is on the two different loan types. This was done in order to establish whether the two loan types are priced in an integrated market.

The study uses the Chow test (the classical test for structural change) to establish whether the 'Integrated Market Hypothesis' is present in the PF loans and if they are priced in a 'single market'. The Chow test undertakes to test whether the loan-pricing factors examined are significantly present in both loan types, and if they are, whether the co-efficient values are also similar. The Chow test used is shown below:

$$F(J, n-k) = [(SSE^* - SSE) / J] / [SSE / (n-k)],$$

$$\text{With } SSE = SSE1 + SSEO; \qquad (2)$$

where;

SSE* = Sum of squared errors from the regression on the combined sample;

SSE1 = Sum of squared errors from the regression on the Asian sample;

SSE0 = Sum of squared errors from the regression on the non-Asian sample;

J = Number of independent variables, including the constant;

K = Number of restrictions (2xJ); and

n = Number of observations in the combined sample.

The study went on to provide a detailed description of the loan-pricing variables, and each regression analysis included an intercept, three loan variables (Loan Size, Loan Maturity, and Guarantee Dummy) and three project variables (currency risk, country risk, and loan booked date). The study found that with critical F-values of J (7), n (43) and k (14), it equals 3.38 with a 5% significance level. Thus if the calculated test variables are more than this, the test Integrated Market Hypothesis needs to be rejected. For values less than 3.38, it needs to be accepted. The study concluded that F = 0.182 which was far below the critical level and it can be concluded that both types of loans have the same

pricing factors, and are priced based on the same risk factors in a single, integrated market.

The paper concluded the following key points:

- PF are on average larger with longer maturities than traditional loans;
- PF are used by larger companies;
- Larger and more capital intensive projects tended to have multiple sponsors involved, and dueto the fact that these PF projects are in riskier countries, it lead to conclude that sponsors prefer higher loan costs against a decrease in corporate risk for financing risky projects internally;
- PF in turn has higher spreads compared to commercial loans, due to project risk factors; and
- The loan spreads are positively related to loan maturities and riskiness of the project's host nation, while negatively related to currency risk and the presence of loan guarantees by Sponsors, host governments, or development agencies.

In summary, the paper concludes that PF is an efficient means of funding risky, high capital projects that have predictable, separable cash flows.

Nguyen & Ross (2006) undertook a study on the asset risk-pricing decisions for Australian domestic project finance deals. Lenders consisted of Australian commercial banks, consulting firms and superannuation funds. They were presented with 16 hypothetical risk-pricing cases and were required to participate in two level, five factor, one half fractional factorial experiment design (25-1), whereby the results were analysed using the Analysis of variance (ANOVA) method.

The participants were asked to rate each project on a scale of 1 to 9, in order of riskiness of the five risk pricing factors (Operating, Environmental, Political / Regulatory, Market and Sponsor Risk) which the study concluded as key risk parameters affecting the project risk premium.

Their study found that market risk was the most influential factor, and accounts for 2.45 basis points (bps) when the markets shifted from a low risk to high risk level. Operating (1.58 bps), political/regulation (1.52 bps) and sponsor (1.10) risks are also important in the risk allocation in pricing loans, but environmental risk (0.58 bps) carries the least importance in the weighting of loan risk pricing. It must be noted that the projects were assumed to be domestically project financed projects, and that no foreign exchange currency risks were assumed. The study also concluded that even though the effect of political/regulation risk was not viewed as the most important parameter, that it could be a more important project risk cost driver for foreign project finance funding.

The focus of this literature review has been on understanding what project finance is and how it has been applied to different industries. It is evident that the underlying basis to project finance are the various risks, and how these risks are mitigated and priced into the credit spreads by the lenders.

To better understand how project finance is priced on the African continent, the cost determinants need to be derived through a linear regression model, using a historical loan database which indicates the various loan characteristics.

The study follows on from here whereby an adequate loan database is obtained, filtered and the data processed so that the most relevant information can be extracted, and a linear regression model is derived in the Methodology chapter. The Finding chapter investigates and discusses the results of the regression model, where certain sensitivities were tested to check the suitability of the data and the regression models. The Discussions chapter follows on where the results of the regression models on the loan parameters are discussed and provides answers to the thesis hypothesis, through uncovering and discussing the regression model results, and how it ties in with what previous research has concluded. The Conclusion chapter focusses on the most important cost determinants are, and what conclusions are formed from the findings. Future research suggestions are also discussed in this chapter.

3 Data and Methodology

The purpose of this chapter is to detail the research hypothesis and questions emanating from the Chapter One (Introduction) and the literature reviewed in Chapter Two (Literature Review), as well as deriving a suitable loan database to use.

As the focus of this thesis is on understanding the risk-pricing determinants lenders use to price the resultant credit spreads (All-in Spread) for non-recourse project financed deals in Africa, a suitable database of loan information and an applicable regression model is required to determine the empirical analysis of what the cost determinants are. The first section of this Data and Methodology focuses on obtaining a suitable database with the various loan parameters, of which the most relevant parameters where filtered down in order to use the most relevant parameters in a regression model to determine which have the most significant effects on the pricing of loan credit spreads.

The second section of this chapter investigates which previous regression models have been used in prior studies, and then a suitable regression model is derived in order to perform the empirical analysis. The findings of the analysis, is presented in the following chapter, Findings.

As the project risk pricing factors were identified as Operating, Environmental, Political/Regulation, Market and Sponsor Risk (Nguyen & Ross, 2006), a suitable loan database is required where the loan parameters can adequately be classified within these risk pricing categories.

3.1 Loan Database

The loan information was obtained from the online web Dealscan database, compiled by Thomas Reuters PLC, who provides the most comprehensive global financing deals from commercial and development banks. The Thomson Reuters Dealscan database contains historical information on the terms and conditions of financing deals on over 200,000 loan transactions in the global commercial loan market. These transactions include finance M&A activity, working capital needs, non-recourse project finance, collaterised

loans and other general corporate purposes for loan participants worldwide. The database is compiled through sources which include regulatory filings, bank submissions and journalist contributions. The Dealscan database was accessed in November 2015, on which all the data was extracted for this thesis.

Within the database, the user is able to set parameters and search for deals, and generate reports with the required loan parameters for further analysis. A description of all of the parameters in the Dealscan database is presented in Appendix A, with the original data abstracted, as well as the processed data, as described herewith below.

3.2 Data Processing

The Dealscan database lists loans for different purposes under the 'Primary Purpose' tab, including Acquisitions, Leverage Buyouts, Mergers, Leveraged Buyouts, Project Finance, Capital Expenditures, Working Capital, etc. A filter was applied to extract the Project Finance loans, on which the loan data was further filtered by only viewing project finance deals in the 'Market Segment' tab.

As the thesis is focused on the African continent, the 'Region' tab was selected as 'Africa' and all project finance loans were further reduced and resulted in 154 loan entries.

The resultant list of project financed deals was further filtered in order to represent the loan agreements that commenced within the past 20 years, in the 'Tranche Active Date' tab. The 20 year period was chosen in order to obtain as much in loan deals as possible, and to establish a balanced weighing of the loan parameters. The earliest loans in the database were in 1997, of which there were 6 deals concluded Morocco (4), Ghana (1) and Seychelles (1). There were seven further deals in 1999 (five in Egypt and two in South Africa), where after there were a several deals each year until 2015.

As we are investigating the cost determinants of project financing through analysing all of the loan variables, with the resultant output/dependent loan variable being the credit 'Margin' rate that the lenders add onto the respective 'Base Rate'. This margin rate contains all the risks and costs which are priced into the loans, and is shown in the

database as the 'All-In Spread Drawn' tab as basis points (BPS), as well in the 'Base Rate & Margin', as basis points over the respective banking base rates (LIBOR, EURIBOR, FR, NIBOR, etc.). The database is further filtered to only show entries were the 'Base Rate & Margin' values are present. This reduced the database to 91 loan entries.

The refined database contained complete entries of in the 'Borrower Name', 'Region', 'Country', 'Major Industry Group', 'Tranche Type', 'Tranche Active Date', 'Tranche Maturity Date', 'Tranche Amended', 'Tranche Amount', 'Tranche Amount Converted (USD)', 'Tranche Currency', 'Primary Purpose', 'Market Segment', 'Base Rate & Margin', 'All in Spread Drawn', 'Secured' and 'Seniority'. No information was provided for the Credit rating information ('Moody's Bank Loan Current', 'Moody's Senior Unsecured', 'S&P Bank Loan Current' and 'S&P Senior Unsecured' tabs) and these tabs were subsequently removed from the database. Information in the 'Sponsor', 'Floor' and 'Original Issue Discount' were also not provided, and these tabs were removed.

There, however, appeared to be some incomplete tabs. The 'Guarantor' tab only contained eight entries. This tab relates to the 'Secured' tab, whereby the loan is secured by any guarantees from the sponsors. The 'Secured' tab has 63 'Yes' entries, implying that there is omitted information from the 'Guarantor' tab, and the tab is subsequently deleted.

The 'All in Spread Drawn' tab has five omitted entries; however, these values can be copied over from the 'Base Rate & Margin' tab. The 'Upfront Fee' (11 entries), 'Annual Fee' (two entries), and 'Commitment Fee' (27 entries) have been deleted given it appears that there is incomplete data and that the 'All in Spread Drawn' includes these fees.

As the thesis assumes that all PF loans are utilised, the All in Spread Undrawn' tab, with six entries can be removed, as it does not serve a purpose in the regression model.

The lenders' information and identities are also incomplete, as 'Top Tier Arranger' only contains 34 entries, of which 14 are independent/standalone lenders, and 20 are a syndication of two or more lenders. This data field has incomplete entries in order derive

results as to whether domestic lenders price domestic projects cheaper than international lenders (only one domestic lender pricing a domestic project in the whole database), and whether domestic lenders price projects cheaper if there is no currency risk. Furthermore the database omits information on whether lenders price projects cheaper which are in the same legal frameworks, (i.e. French-origin, British-origin, etc.) , whether syndicated lenders price loans differently to lenders on their own, and if the involvement of a development bank or agency further has an effect on the pricing. As there might be some inconsistence in how the 'Top Tier Arranger' tab is recorded in the Dealscan database, the lenders who are reported independent, might only be the main lender in a lender syndicate club, of which the status of the remaining lenders are unknown. Due to the inconsistencies in this data field, it would be best to delete it from the database.

The data fields 'LIN' (4 entries), 'Average Bid' (3 entries), 'Average Ask' (3 entries), 'Mean' (3 entries),'Yield' (3 entries) and 'Discount Spread' (3 entries) all relate to the pricing of the loans within the syndicated lender clubs. Due to insufficient data, this data fields are also deleted.

The resulting database contains the borrower's names (which can be ignored henceforward), Country, Industry type, Tranche Type, Tranche Active and Maturity Dates (i.e. loan term), Tranche Amendment details, Tranche amounts in local and US dollars, Tranche Currency, Base Rate & Margin, All-In Spread Drawn, Secured, and Loan Seniority Type.

3.3 Loan Parameters

The data fields are further refined to as follows to create tangible inputs for the regression model:

3.3.1 Country

As per the Kleimeier & Megginson (2001) model, each country was assigned a Country Risk Rank, taken directly from the semi-annual country risk tabulation in Euromoney magazine. Unfortunately, the Euromoney Country Risk Ranking database was not

available for this thesis, and a suitable alternative ranking was researched to be used as a proxy replacement.

In order to take sovereign risk rating into account, the sovereign risk rating as per an international rating agency such as Moody's or Standard & Poor's can be used. Kamin & Von Kleist (1999) used a numerical conversion of the rating agency's country credit rating into numerical rankings, with 1 being the best credit rating and 16 the worst.

Kamin & Von Kleist (1999) found that previous investigations of developing markets' credit spreads have used various country performance variables, including the '*debt/GDP ratio, debt service/exports, reserves/imports, etc., as measures of the borrower country's creditworthiness*'(Kamin & Von Kleist, 1999, P3).

Furthermore, Kamin & Von Kleist (1999: P12) suggests that the '*credit ratings assigned to sovereign borrowers by Moody's and Standard & Poor's, completely subsume all information contained in country performance measures, and add information relative to those measures in explaining sovereign debt spreads.*' As credit rating agencies take the various credit worthiness properties relevant to an issuer into account, the value of the off-taker creditworthiness is increased, as the credit rating agencies do not merely provide a credit rating to the sovereign bond issuer's country of origin. As the study's database includes issues by both private and public bond institutions, the credit rating agencies affords a more detailed degree of the credit risk, than the specific issuer country's performance measures alone. Therefore, Kamin & Von Kleist (1999) used the credit ratings agencies' newly assigned loan and bond ratings, as a measure of credit risk.

The Kamin & Von Kleist (1999) paper looked at credit spreads on emerging market sovereign bonds, whereby the country credit ratings assigned by Moody's and Standard & Poor would be more applicable than Euromoney- or OECD Country Risk Ranking, as their study focused exclusively on credit spreads on sovereign bonds.

The Euromoney Country Risk Ranking was used in the Kleimeier & Megginson (2001) model, this data was not available for this thesis, and data substitution source was

sourced. In light of limited country risk data available, Country Risk Ranking data from the Organisation for Economic Co-operation and Development (OECD) website[9] was obtained for the given year in which the project finance deal was undertaken. The risk rank is rated from 1 to 7, in order of the least to more riskiness of the country.

The OECD website, defines the country risk classifications as the *'Participants to the Arrangement on Officially Supported Export Credits (the 'Arrangement')'* which are one of the most fundamental building blocks of the Arrangement rules on minimum premium rates for credit risk.

As the country risk ratings are provided solely for the purpose of setting minimum premium rates for transactions supported according to the above mentioned arrangement, these are made available publicly so that any country that is not an OECD Member or a Participant to the Arrangement may observe the rules of the Arrangement if they so choose.

It is also noted that the country risk classifications are meant to reflect country risk and under the OECD Participants' System, country risk is composed of the transfer and convertibility risk (i.e. the risk a government imposes capital or exchange controls that prevent an entity from converting local currency into foreign currency and/or transferring funds to creditors located outside the country) and cases of force majeure (e.g. war, expropriation, revolution, civil disturbance, floods, earthquakes).

It is important to note the the OECD Country Risk Classifications are not sovereign risk classifications and can therefore not be compared with the sovereign risk classifications of private credit rating agencies (CRAs). Conceptually, they are more similar to the 'country ceilings' that are produced by some of the major CRAs.

For the purpose of this thesis, the relative country risk rankings from OECD would be an adequate replacement for the Euromoney country risk rankings, in order to ascertain

[9] OECD Website, http://www.oecd.org/tad/xcred/crc.htm, Country Risk Classification, Accessed 14 April 2015.

how lenders view the country risk ranking relative to each country in the database, in the same manner as which Export Credit Agencies interpret transfer and convertibility risk of a country.

3.3.2 Major Industry Group

Previous research has not used industry grouping in any regression models to determine the impact it has on credit spreads.

The database contains ten different types of industries categories, including Oil & Gas, mining, chemicals & plastics, Construction, Financial Services, Telecommunications, Beverage, Food & Tobacco Processing, Utilities, Business Services and Government.

The industries can be grouped into two groups, namely commodity and non-commodity industries, with commodity industries consisting out of the Oil & Gas and Mining industries. The non-commodity grouping consists out of all the manufacturing, infrastructure, and servicing industries, namely; Chemicals & plastics, Construction, Financial Services, Telecommunications, Beverage, Food & Tobacco Processing, Utilities, Business Services and Government.

Commodity industries have been found to have a higher price volatility compared to non-commodity industries and markets (Jacks, O'Rourke & Williamson, 2011: p810). As such, the commodity markets have been classified as 'High Risk', and the non-commodity markets as 'Low Risk', as independent variables for the regression model, as to determine whether industry risk is a determinant which lenders price credit spreads at.

The High Risk Group consists out of extractor/mineral industries, such as mining and Oil & Gas, where there exists resource and commodity price risks result in higher risks than other industries.

Manufacturing of chemicals & plastics, Construction, Financial Services, Telecommunications, Beverage, Food and Tobacco Processing, Utilities, Business Services and Government all have more controlled input and off-taker prices, and a resultant reduction in the level of risk, and are thus classified as lower risk industries.

The High Risk Industry will use a dummy variable with a value of one, and the low risk industry will have a dummy variable value of zero.

3.3.3 Collateralisable Assets

This variable was also present in the Kleimeier & Megginson (2001) study, and thus can be used as an independent variable. We assign as dummy variable taking the value of 1 if the borrower is in an industry generally considered to be rich in collateralisable assets (tangible, non-specialized assets), and 0 otherwise (such as financial- and business services, oil & gas, construction, mining and services).

As per Kleimeier & Megginson (2001: P14) collateralisable assets are defined as industries with whereby the borrowers are within industries such as of airlines, apartment management, electricity utility, hotels, property, REIT, or shipping, whereby the loans are for projects which assets have tangible underlining assets.

Furthermore, the study by Bradley, Jarrell, & Kim (1984) also concluded that indicates that companies with many such assets should be able to tolerate heavier debt levels than other companies.

It must be noted that mining and oil & gas industries were categorised as non-collateralisable assets, due to the fact that in the underlining value of the cash flow of these industries are the relevant commodity- and oil prices, and in turn effects the valuation of the project's assets, which the lenders see as specialised with limited value. Kleimeier & Megginson (2000) applied a similar classification when they arranged the loan data into categories of size, maturity, guarantee, currency risk, country risk and collaterisable assets, in order to hypothesise the loan spread as a function of these loan characteristics.

3.3.4 Tranche Type

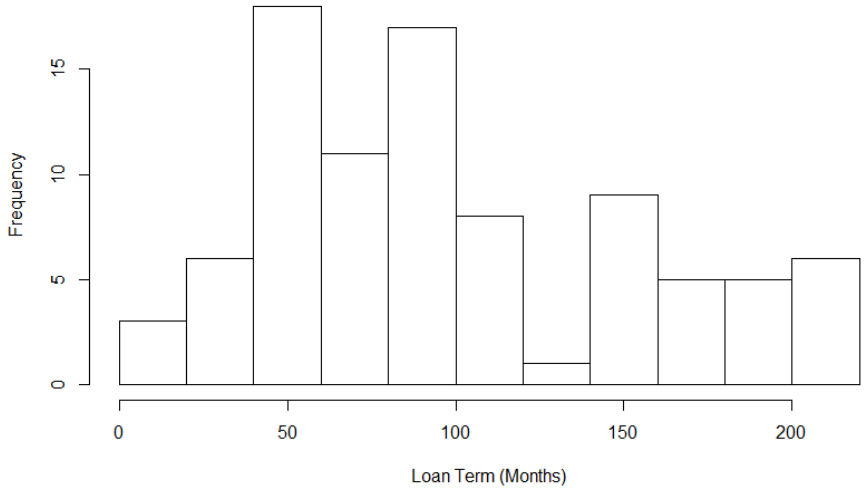
Term Loan, Revolver/Line loans with maturities greater than 1 year, Guarantee Loans, Mezzanine Tranche, Bridge Loans and Other Loans are recorded in this data field. The loans can be further simplified, with the 'Revolver/Line loans with maturities greater

than 1 year, Guarantee Loans, Mezzanine Tranche, Bridge Loans and Other Loans' all grouped into 'Other Loans' and the Term Loans remain as 'Term Loans', with a dummy variable value of one, and Other Loans with a value of zero.

3.3.5 Tranche Active and Trance Maturity Dates (Loan Term)

The loan term can be calculated as the difference between the maturity ("Tranche Maturity Date" data field) and activation ("Tranche Active" data field) dates of the loans.

Loan Term will be presented in months, as a Continuous Predictor, and is represented in the frequency histogram below:



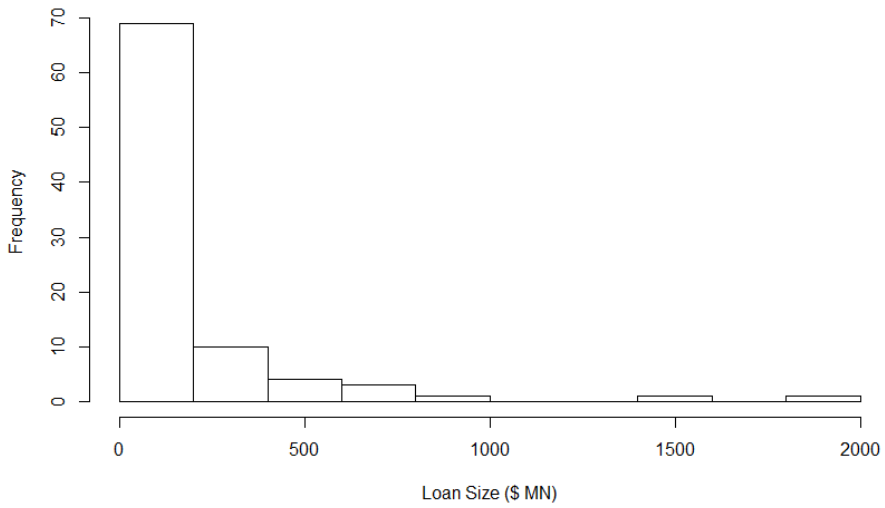
Graph 1: Loan Term

3.3.6 Tranche Amended

This data field only indicated a 'Yes' or 'No' input, and represented whether a loan trance was amended or not prior to being issued. The data field only had five 'Yes' data points. The 'No' field will be assigned a value of one, and the 'Yes' field a value of zero. Two 'Tranche Maturity Dates' were omitted, of which one data entry was able to be obtained from the previous entry which appeared identical, but the second omitting date entry and loan data field was deleted from the database, and could not be established.

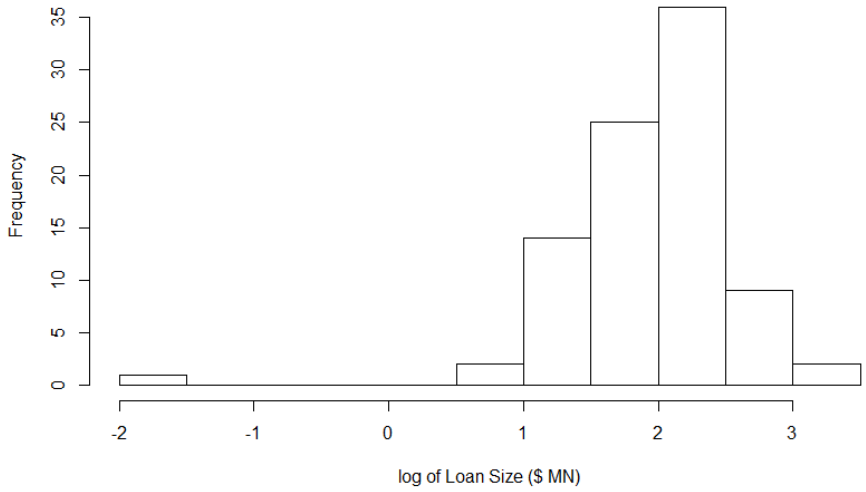
3.3.7 Tranche Amount, Tranche Amount Converted & Tranche Currency

As Tranche Amounts are shown in the local currencies, for consistency, the 'Tranche Amount Converted' will be used as the Loan Size and will be recorded as US$ millions. Currency Risk is determined if the 'Tranche Currency' is not the local currency of the 'Country', with a dummy variable of the value one if a loan is exposed to currency risk and zero otherwise; Tranche Amount converted to Loan Size is a continuous predictor which has a long tail to the right, as shown in the graph below:



Graph 2: Loan Size

While theoretically the regression models to be used do not rely on any assumptions about the distribution of the predictors, we nevertheless chose to log transform the extremely right-skewed distribution for loan size (base 10 log transformation). This was intended to reduce the influence of a very small number of observations with relatively large loan size values on the fit of the model.



Graph 3: Log of Loan Size

Post the log transformation, one data point has a relatively low loan size. The new log-transformed loan size can be interpreted as a one-unit increase corresponding to a tenfold increase in the original untransformed loan size.

3.3.8 Secured

A dummy variable with a value of one will be used if the loan is secured by a third-party guarantee, and zero otherwise.

3.3.9 Seniority Type

The loans are categorised in Senior, Mezzanine and Subordinate loans. Grouping Mezzanine and Subordinate loans together, we can assign senior loans a dummy variable with a value of one and Mezzanine/subordinate loans a value of zero.

3.3.10 Base Rate & Margin

The base rate is presented as LIBOR, EURIBOR, FR, SP5, NIBOR AND SP1. As these are the default rates in which the banks trade, they are not viewed as a pricing determinant, and can thus be removed from the database.

3.3.11 All in Spread Drawn

The 'All-In Spread Drawn' is presented in basis points, and represents the total cost of the loans to the borrower. This data field is thus the dependent variable in the regression model, in order to determine the other variables for the pricing of project finance loans.

In applying the project risk pricing factors were identified by Nguyen & Ross (2006) to the Dealscan database, the only loan parameters in the database which can confidently be grouped within the following risk pricing factors are Country and Currency into the Political/Regulation Risk category.

It can be argued that Industry Risk and Collateralisable Assets can be viewed as being loan parameters for Operating Risk, but they do not satisfy the criteria that cost, performance, management and technical parameters can be contained within, or mitigated by them.

Loan Term can be viewed as a parameter to Market Risk, as the longer the loan term is, the more exposure the loan has to the specific market. However, the Dealscan parameter provides no meaningful insight on how off-take prices and demands are controlled.

There are no loan parameters in the database which would appropriately group into Environmental and Sponsor Risk, as the remaining database parameters (Tranche Type, Tranche Amended, Loan Secured, Loan Seniority Type and Loan size) do not fit adequately into these loan risk pricing factors.

3.4 Data Size

The resultant database was filtered down to 89 loan entries. This is substantively less than the sample of 1'803 project finance loans from 1975 to 1992, which Kleimeier & Megginson (2001) used in their regression model, and research was done on how best to undertake a regression model with small data sets. The processed data is provided for in Appendix A.

An indication of the African countries, number of projects, industry sector, mean loan tenor and –loan size, and average all-in spread is presented in the table below.

Country	Number of Projects	Sector	Average Loan Tenor (Months)	Average Loan Size ($ Mn)	Average All-in Spread (BPS)
Algeria	1	Construction	144	66	300
Botswana	2	Mining	44	102.5	413
Cameroon	3	Utilities(2),Oil & Gas(1)	65	86	550
Egypt	14	Chemicals(2), Telecommunications(2), Oil & Gas(7), Utilities(3)	109	188	185
Gabon	5	Business Services(4), Oil & Gas(1)	73	53	465
Ghana	6	Mining(1), Oil & Gas(4), Utilities(1)	70	743	453
Ivory Coast	2	Financial Services	24	130	750
Kenya	5	Utilities(3), Food & Beverage (2)	146	75	565
Liberia	3	Mining	71	33	583
Mali	1	Mining	66	80	175
Morocco	4	Utilities	144	176	172
Mozambique	1	Utilities	116	767	190
Nigeria	7	Food & Beverage(4), Chemicals(2), Oil & Gas(1)	79	151	567
Senegal	2	Utilities	168	37	525
Seychelles	1	Financial Services	36	30	200
South Africa	27	Utilities(8), Construction(3), Mining(15), Services(1)	115	160	357
Tanzania	1	Mining	84	142	250
Tunisia	1	Telecommunications	84	165	150
Zambia	3	Utilities(1), Mining (2)	92	381	317

Table 1: Filtered Dealscan project finance loans in Africa (1997 – 2015)

As noted throughout the Kleimeier & Megginson (1998) paper, limited empirical research on project finance is available due to difficulty researchers have in collecting large data samples of project finance loans. Their study only had 120 project finance loan deals available to use for inputs in the pricing model, and constructed the model to specify if the loan's margin rate is a dependent function of two sets of characteristics: Loan Characteristics, i.e. loan size, maturity, etc., and Project Characteristics, i.e. currency risks, country risk, presence of guarantees, etc.

Their 120 loan deals were almost evenly spread between Asian (62) and non-Asian (58) project finance deals. The loan deals were tested to see whether they were priced in an integrated market using the Chow test. It was confirmed that the loans were priced in an integrated market, and the loan-pricing analysis was undertaken thereafter.

Four models were constructed, with the Country Risk Rank and Country Risk Score was used as alternating dummies, and an Asian dummy was used for the non-Asian loans. Two models had 43 data points and the other two models had 45 data points.

The determinants for loan spreads were examined using an Ordinary Least Square Regression analysis, with the loan spread as the dependent variable. Heteroscedasticity in the findings were corrected for by adjustments of the t-statistics, and in turn did not change the overall results.

Both of Kleimeier & Megginson (1998) and Kleimeier & Megginson (2001) studies referred to Booth (1992)'s '*Contract Costs, Bank Loans and the Cross-monitoring Hypothesis*'. The Booth (1992) study examined whether monitoring related contract costs were reflected through to bank loan spreads, and constructed a model on bank loan pricing. The study also had a relatively small loan dataset of 642 publicly traded loans and 145 loans owned to privately held equity companies. The loan spread was the dependent variable, with Total Sales, Loan Size, Maturity Term, Fees, Commitment, Price Option, Restructure, and Ratings being the independent Variables. Test/Dummy variables were used to measure whether loan-pricing reflected monitoring related

contract costs, and were Private (if a firm was held privately), Public x LBO, Earnings / Price, Public Debt and Loan Seniority.

The Booth (1992) study observes that loan spreads may have a nonlinear relationship with the individual variables, and that model misalignment might occur. The Durbin-Watson statistics and residuals from the model were compared against the individual variables, with results rejecting departures from linearity for these variables. The study calculates all p-values using the uniform covariance matrix as described in White (1980), and states the correlation index of coefficient of determinants for the regression models.

Further studies such as Datta et al. (1999)'s '*Bank Monitoring and Pricing of Corporate Public Debt*' examined the lender-borrower relationship and whether it lowered the cost of public debt. Their sample size was limited to 98 data points, where they found that the relatively small and limited records of deals could result in information asymmetry. A multivariate regression model was applied, with the yield spreads as the dependent variable. Heteroscedasticity was corrected for by using the White (1980) method. The independent variables were controlled for by collinearity, and were first regressed as the control and test variables in separate regression models. The residual from these regressions should be orthogonal to each of the other independent variables, and were if not were omitted in the final regression model.

3.5 Multiple Linear Regression Model

As described earlier in the Literature Review, the most comprehensive empirical study done to date on project finance was undertaken by Kleimeier & Megginson (2001), who studied the organisational structure in order to determining whether the project sponsor should use project finance or corporate finance when deciding which type of loan to use for borrowing funds for new projects.

The study observed that project finance loan spreads (which included the total loan and risk costs) are positively related to loan maturities, and the country riskiness in which the project is. There is also a negative relationship between loan spreads and the presence of currency risk and loan guarantees, from the project sponsors, or third parties.

The study went on to examine whether project finance or syndicated loans are funded and priced in a single integrated market, or in separate markets, and concluded with a pricing study comparing project finance loans with syndicated loans. The model employed in the Kleimeier & Megginson (2001) publication, will be used with an ordinary least squares regression estimation technique and consideration made for heteroskedastic outliners in the findings.

The Kleimeier & Megginson (2001) regression model (Equation 1 on page 41 of this thesis) is used as a basis for the multiple linear regression model to include all loan parameters obtained from the Dealscan database, into the revised model below, where by the model specifies that the response for all observations i is presented by:

$$y_i = \alpha_0 + \alpha_1 IR \cdot x_1 IR + \alpha_2 CA \cdot x_2 CA + \alpha_3 TT \cdot x_3 TT + \alpha_4 LT \cdot x_4 LT + \alpha_5 TA \cdot x_5 TA + \alpha_6 CR \cdot x_6 CR + \alpha_7 CRR \cdot x_7 CRR + \alpha_8 LS \cdot x_8 LS + \alpha_9 ST \cdot x_9 ST + \alpha_{10} LLS \cdot x_{10} LLS + \varepsilon_i \quad (3)$$

Whereby:

α_0, α_{xx} are the model parameters that are estimated by a method of maximum likelihood, and (other than α_0) show how the loan parameters impact the mean response, similarly to as above; and

ε_i represents standard deviation, i.e. 'noise' (independently and identically drawn for every measurement), and follows a normal distribution with a mean of 0 and standard deviation of σ_ε (also an estimated model parameter).

x_{xx} contain the loan data parameter, with each subscript xx denoting a loan variable parameter, such that the multiple linear regression model contains all 10 predictor as main effects (no interactions): Country Risk Rank (CRR), Industry Risk (IR), Collateralisable Assets (CA), Tranche Type(TT), Loan Term in months (LT), Tranche Amended (TA), log transformed of Loan Size in US $'millions (LLS), Currency Risk (CR), Loan Secured (LS) and Loan Seniority Type (ST). The impact of a given parameter on the response is modelled to be the same regardless of the values of other parameters.

A given parameter in the multiple linear regression model shows the impact of a single predictor on the mean response, when holding all other variables constant / when holding all else equal.

The significance of each 'slope' parameter was assessed based on the asymptotic (large sample) normality of the parameter estimator (p-values).

For each parameter (other than intercepts), the estimated parameter (effect size) is reported together with a 95% confidence interval (CI) and p-value (as described above). The 95% CI has a 95% probability of containing the true parameter value.

Residuals plots were used to assess model assumptions, fit and to check for the presence of heteroscedasticity in the data. As a residual is the difference between the observed response and the model-fitted expected response for that observation, scaled by an appropriate factor. Standardized Pearson Residuals are plotted, whereby a positive residual indicates an observed value that is higher than expected by the fitted model; a negative residual indicates an observed value that is lower than expected by the model. Scatter plot of residuals (y-axis) against fitted values (x-axis), and Histogram of residuals were produced as diagnostic residual plots in the next chapter.

Furthermore, by dropping the two categorical (binary) variables with very small sample sizes in a category (Tranche Amended, and Loan Seniority Type) the sensitivity of the regression findings for the following changes was assessed. Thereafter, the sensitivity analysis was continued through dropping the data point with the lowest loan size, which seemed to be a potentially influential point and including a quadratic term for the Log Loan Size variable (to allow for a non-linear relationship between Log Loan Size and the mean response). The loan size parameter dropped had a value of US$ 0.03 million, compared with the mean of US$ 194.410 million for the dataset and new minimum value of US$ 3.92 million and maximum value of US$ 2 billion for the dataset.

The Akaike Information Criterion (AIC) was used to compare the models to the original multiple regression model. As AIC measures the relative quality of a model, where a lower

value indicates better fit. It is based on quantifying how likely it would be to observe the data you have if the fitted model were in fact 'true', but also penalises models that have a greater number of parameters.

3.6 Data Processing and Regression Model

The Software used for the regression model was R (Version 3.1.3, 64-bit version, The R Foundation for Statistical Computing), whereby the regression models were fitted using the function lm. A simple linear regression (one predictor at a time) was first undertaken, thereafter followed by a multiple linear regression model (including all predictors). The suitability of model assumptions and model fit were assessed using residual plots.

The data was further grouped into Categorical Predictors and Continuous Predictors, whereby the Categorical Predictors consisted out of Yes/No or Low/High inputs, included Country Risk Rank, Industry Risk, Collateralisable Assets, Tranche Type, Tranche Amendment, Currency Risk, Loan Secured, and Seniority Type.

Continuous Predictors consisted out of variable inputs and consisted out of Loan Term and Loan Size. Loan size had a long tail to the right. A log (base 10) transformation was applied to the data set, in order to pull in the tail and avoid having some data points with 'very different' predictor values and possibly pulling the regression line.

Eighty-nine complete observations were used, with no missing data inputs. Appendix B contains the analysis of the Categorical and Continuous Predictors. A summary of the data observations is presented in the table below.

	Percentage Response							Mean	Median	Standard Deviation
	Yes	No	Country Risk Rank							
			3	4	5	6	7			
Categorical Predictors:										
Industry Risk	55.06%	44.94%								
Collateralizeable Assets	51.69%	48.31%								
Tranche Type	29.21%	70.79%								
Tranche Amended	5.62%	94.38%								
Currency Risk	22.47%	77.53%								
Loan Secured	26.97%	73.03%								
Loan Seniority Type	4.49%	95.51%								
County Risk Rank			33.7%	21.4%	16.8%	22.5%	5.6%			
Continuous Predictors:										
Loan Term (Months)								101.00	84.00	54.741
Loan Size ($ Mn)								192.23	106.18	297.005
Dependent Variable:										
All-in Spread								378.99	310.00	213.968

Table 2: Data Observation Summary

4 Findings

Following on from the previous chapters where previous research on PF was reviewed, the Dealscan database processed, and a base multiple linear regression model derived, this chapter focuses on determining the best regression models to use, after running various sensitivities to determine the best-fit model.

In summary, in this chapter an initial linear regression model (Model A) was created, whereby homoscedasticity was assumed by changing the 'noise' of the model. The residual plots of Model A indicated some model misfit, caused by possible variance of the model response and therefore to check for the potential presence of heteroscedasticity, a variance function was modelled for in Model B, whereby the standard deviation of noise was modelled to be proportional to the power of the responses. To check that heteroscedasticity cannot be further reduced, a more flexible and variant model with more flexible variants (Model C) was created. However for Model C the AIC increases slightly, and therefore Model B was retained as being better fit. A series of sensitivity analyses were undertaken on Model B, in order to assess the effect of certain parameters on the model and empirical results.

It must also be noted that a simple regression model was also created, with each loan parameter being independently regressed against the dependent (All-in Spread) variable. It was decided not to use the findings of the simple regression model, as it was found that the fitted variance function changes quite a bit for each predictor (compared to the multiple regression model with comparing the different simple regression models). The results of the simple regression model were not included in this discussion, but is attached as Appendix C for completeness.

All of the various models were created with the software R, where the R function 'gls' was used for model fitting (in the library 'nlme') and models were fitted by a method of restricted maximum likelihood. The Likelihood ratio tests and AIC are used to compare models, whereby the models were fitted by maximum likelihood for such comparisons.

4.1 Model A

The base model (as derived on page 55) was altered whereby the standard deviation 'noise' (ε_i) was changed from a normal distribution with mean 0, to where each each observation i is independently drawn (there is no correlation amongst the ε_i values). The assumptions were relaxed in fitted models to allow the variance of the noise (ε_i) to be a function of the mean response, i.e. $var(\varepsilon_i) = f\big(E(y_i)\big)$.

Assuming the variance of 'noise' is a constant standard linear regression, whereby; $(\varepsilon_i) = \sigma_\varepsilon^2$. The results of the regression are shown in the table below, with the "Intercept" variable representing All-In Spread when all predictors are equal to zero.

	Estimate	95% CI lower limit	95% CI upper limit	P-value
(Intercept)	436.686	104.950	768.422	0.011
Industry Risk	-71.555	-172.073	28.964	0.160
Collateralizeable Assets	-86.287	-184.590	12.015	0.084**
Tranche Type	69.689	-20.574	159.953	0.128
Tranche Amended	-112.539	-305.824	80.745	0.250
Currency Risk	-67.272	-192.820	58.276	0.289
Loan Secured	150.937	59.244	242.629	0.002*
Loan Seniority Type	-152.577	-340.941	35.788	0.111**
County Risk Rank	57.780	20.166	95.394	0.003*
Loan Term (Months)	-0.034	-0.768	0.699	0.926
Log of Loan Size (log10)	-47.384	-113.530	18.762	0.158

Footnote 1: The estimate for standard deviation (σ_ε) for the model was 168.41 (95% CI for effect: 145.63; 199.72).
Footnote 2: * represents P-values between 0% and 5%, and ** represents P-values between 5% and 12%.

Table 3: Model A Fitted regression model assuming homoscedasticity

The Akaike Information Criterion (AIC) was employed to test fit of the multiple regression models against each other. AIC measures the relative quality of a model, where a lower value indicates better fit and is based on quantifying how likely it would be to

observe the data you have if the fitted model were in fact 'true', but also penalises models that have a greater number of parameters.

The AIC for Model A was calculated as 1086.105.

A likelihood ratio test comparing this model to one with no predictors resulted in a P-value of less than 0.01%.

4.1.1 P-values

The significance of each 'slope' parameter was assessed based on the asymptotic (large sample) normality of the parameter estimator. In each case, the null hypothesis is that the parameter equals zero (i.e. there is no impact on the mean response resulting from changes in the predictor). Small p-values suggest evidence against the null, i.e. that there is a non-zero parameter and a significant impact (i.e. evidence of a relationship between the predictor and response). A large p-value shows that there is a lack of evidence for this.

Two categories of statistically significant P-values, were chosen, with the first category (represented by "*" in the results table) having P-values between 0% and 5%, and the second category of P-values (represented by "**" in the results table), having P-values between 5% and 12%. As per Goodman (2016), recent academic publication in statistics and scientific reasoning have seen the movement in statistics focusing more on the actual P-values and reporting effect sizes, rather than having thresholds, and in-turn measuring the credibility of result, such as having a statistically significant threshold level of 5% for all results.

Creating two categories for the P-values, as described above, allows for a broader understanding of the regression models' results, as not only the statistically significance of the findings is taken into account, but also the significance of the results from previous literature can be considered in context.

4.1.2 Observations

From the table above it is observed that Country Risk Rank and Loan Secured variables are both in the first P-values category, with both having P-values of less than 5%. As the

Country Risk Rank variable is moved by one unit from low to higher risk (and hence to a more 'riskier' country), the average All-In Spread increases by 57.780 (95% CI for effect: 20.166; 95.394; P-value: 0.003). For Loan Secured, if there is a third-party guarantee present the mean response on AIS increases by 150.937 (95% CI for effect: 59.244; 242.629; P-value: 0.002).

In the second category of P-values (5% to 12%), Collateralisable Assets and Loan Seniority Type ended up into this category. For the loan parameter Collateralisable Assets, the All-In Spread decreases by 86.287 (95% CI for effect: -184.590; 12.015; P-value: 0.084), as the borrower moves from an industry which is not rich in collateralisable assets (such as financial- and business services, oil & gas, construction, mining and services) to an industry generally considered rich in collateralisable assets (tangible, non-specialized assets). Loan Seniority Type changed the mean response on All-In Spread decreases by 152.577 (95% CI for effect: -340.941; 35.788; P-value: 0.111) as the loans were changed from subordinate to senior type loans.

Tranche Type, Industry Risk and Loan Size (log of) both have P-values between 12% and 16%. Tranche Type increasing the All-In Spread by 69.689 (95% CI for effect: -20.574; 159.953; P-value: 0.128) as this loan parameter moves from non-specific PF loans to loans which are term-loans, revolver/line loans, guarantee Loans, mezzanine tranches and bridge loans.

Industry Risk and Loan Size have higher P-values of around 16%, with Industry Risk reducing the All-In Spread by 71.555 (95% CI for effect: -172.073; 28.964; P-value: 0.160). Log of Loan Size was found to decrease the mean All-In Spread by 47.384 (95% CI for effect: -113.530; 18.762; P-value: 0.158) as the size of the loan increases by $ 10 million increments.

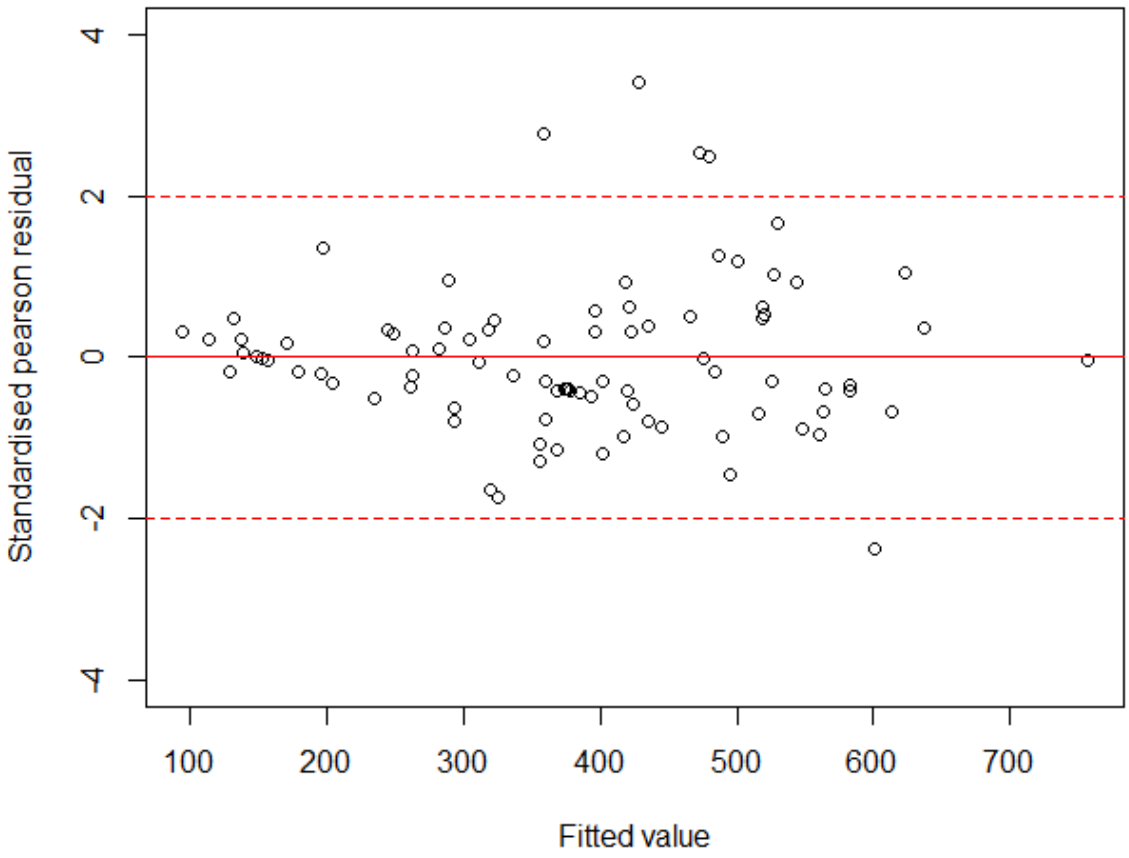
Tranche Amended and Currency Risk both have P-values in the 25% to 29% range with Tranche Amended decreasing the All-In Spread by 112.539 (95% CI for effect: -305.824; 80.745; P-value: 0.25) as loans move from being amended prior to being finalised to loans which are not amended prior being granted. The effect on All-In Spread also decreased by 67.272 (95% CI for effect: -192.82; 58.276; P-value: 0.289), as the loan currency is moved from local to a foreign sourced one.

Loan Term had the largest P-value of 92.6%, and decreases All-In Spread by 0.034 (95% CI for effect: -0.768; 0.699; P-value: 0.926), as the maturity of loans increases by one month increments.

4.1.3 Residual Plots

Residuals plots were employed to assess model assumptions and fit, with Standardized Pearson Residuals plotted. The visual examination of the residuals (miss-predictions of the fitted data to the model) is a useful mean to observe obvious deviations from randomness.

The following diagnostic residual plot was produced, with a scatter plot of residuals (y-axis) against fitted All-in Spread mean values (x-axis). It should be noted that the scatter of residuals should fall into a horizontal band, centred on 0, and that there should not be much variation in the vertical spread of points, or trends, as the fitted value changes. Residuals should thin out as you move away from 0 (vertically), with only about 5% of values larger than 2 in magnitude.



Graph 4: Model Residuals Vs All-In Spread Mean Fitted Values

Observations from the residual plots indicate that heteroscedasticity might be present, as there appears to be increasing variance of residuals appears with increasing fitted values, resulting in the pattern which can be seen in the plot.

4.2 Model B

To address the presence of heteroscedasticity, a second multiple linear regression model (Model B) was created whereby the standard deviation of noise is proportional to power of a response, such that: $var(\varepsilon_i) = \sigma_\varepsilon^2 \cdot |E(y_i)|^{2\delta}$.

The results of this regression model is shown in the table below, with the "Intercept" parameter representing a variable on the All-In Spread when all other predictors are set equal to zero.

	Estimate	95% CI lower limit	95% CI upper limit	P-value
(Intercept)	639.708	268.566	1010.851	0.001
Industry Risk	-44.971	-100.649	10.706	0.112**
Collateralizeable Assets	-36.351	-85.689	12.987	0.146
Tranche Type	34.824	-7.693	77.341	0.107**
Tranche Amended	-270.972	-565.433	23.489	0.071**
Currency Risk	-30.219	-101.646	41.208	0.402
Loan Secured	196.942	144.361	249.523	<0.001*
Loan Seniority Type	-149.643	-345.850	46.565	0.133
County Risk Rank	27.697	3.946	51.448	0.023*
Loan Term (Months)	0.015	-0.527	0.557	0.955
Log of Loan Size (log10)	-49.037	-100.069	1.996	0.059**

Footnote 1: The estimate for standard deviation (σ_ε) for the model was 0.000667 (95% CI for effect: 0.0006627; 0.14784), and the estimate of δ for the model was 1.626431 (95% CI for effect: 1.168176; 2.084687).
Footnote 2: * represents P-values between 0% and 5%, and ** represents P-values between 5% and 12%.

Table 4: Model B Fitted regression model assuming heteroscedasticity

Comparing the two models two each other, Model B had a 2.70% lower AIC at 1056.986.

A likelihood ratio test comparing this model A to Model B resulted in a P-value of less than 0.01%, thus concluding that there is lack of fit for Model A compared to Model B, suggesting that the variance function applied to Model B is appropriate. Furthermore, a likelihood ratio test comparing Model B to a model with no predictors resulted in a P-value of less than 0.01%, suggesting there are significant relationships between the predictors and response.

4.2.1 Observations

The two P-value categories of statistically significant P-values were kept in place as per the previous model, with Country Risk Rank and Loan Secured variables both remaining in the first P-values category. The Country Risk Rank variable estimate, however, reduced to 27.697 (95% CI for effect: 3.946; 51.448 ; P-value: 0.023), from 57.780 (95% CI for effect: 20.166; 95.394 ; P-value: 0.003) in Model A, and the Loan Secured estimate increased to 196.942 (95% CI for effect: 144.361; 249.523; P-value: <0.001), from 150.937 (95% CI for effect: 59.244 ; 242.629; P-value: 0.002) in Model A. Both models were observed had a tighter fit within their CI ranges, than in Model A.

The second category of P-values (5% to 12%) included Industry Risk, Tranche Type, Tranche Amended and Loan Size (log of), who all had reduced P-values lower than 12% in Model B.

Collateralisable Assets and Loan Seniority Type that had P-values of less than 12%, now had P-values in the 13% to 15% range.

Tranche Type, Industry Risk and Loan Size (log) both have P-values between 12% and 16%, with Tranche Type increasing All-In Spread by 69.689 (95% CI for effect: -20.574; 159.953; P-value: 0.128) as longs move from non-specific PF loans to Term loans, revolver/line loans with maturities greater than 1 year, guarantee Loans, mezzanine Tranche, bridge loans.

Industry Risk and Loan Size have higher P-values around 16%, with Industry Risk reducing the mean by 71.555 (95% CI for effect: -172.073; 28.964; P-value: 0.160) and

the log of Loan Size decreases All-In Spread by 47.384 (95% CI for effect: -113.530; 18.762; P-value: 0.158) as the size of the loan increases by $ 10 million increments.

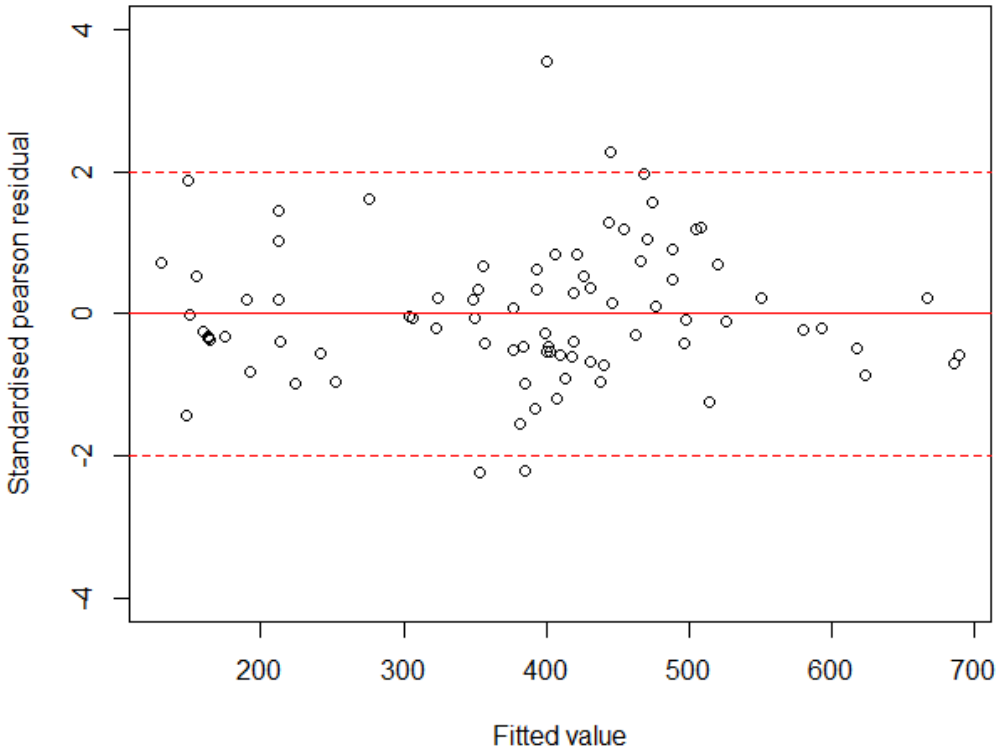
The P-value for Currency Risk increased to 40.2% from 25%, and the P-value for Loan Term remained relatively the same at 95.5% (from 92.6% previously).

It is further noted that the negative or positive effect of the variables' estimates on the All-In Spread remained all the same, except for Loan Term. Loan Term's Estimate changed from decreasing the All-In Spread from 0.034 (95% CI for effect: -0.768; 0.699; P-value: 0.926) in Model A, to increasing the All-In Spread by 0.015 (95% CI for effect: -0.527; 0.557; P-value: 0.955) in Model B, as the maturity of loans increases by one month increments. The relatively high P-values indicate that the effect on of Loan Term is statistically insignificant on the All-In Spread.

4.2.2 Residual Plots

The residuals plot for Model B was used to assess model assumptions and fit, with Standardized Pearson Residuals plotted. The visual examination of the residuals indicates that there is a random scatter of points centred on zero, with the pattern of potentially increasing variance no longer evident as in the residuals plot for Model A.

As Model B has accounted for the heteroscedasticity present, the below graph indicates the fit assumed in Model B seems reasonable.



Graph 5: Model Residuals Vs All-In Spread Mean Fitted Values

Further residual plots for each loan parameter is presented in Appendix D.

4.3 Model C

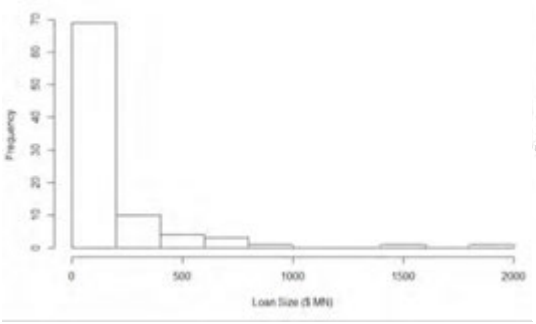
In addition, a number of variance functions could be considered to test whether a more general variance function, compared to the one chosen in Model B would improve the model fit,. A more flexible and variant model (Model C) with more flexible variants was tested, with the fitted regression model where the standard deviation of noise is proportional to constant plus power of response ($var(\varepsilon_i) = \sigma_\varepsilon^2 \cdot \left(a + |E(y_i)|^\delta\right)^2$).

This provides a more flexible variance function than in Model B. However the AIC increases slightly by 0.19% to 1058.982, and based on the lack of reduction in the AIC, and the good fit of Model B (based on the residual plot above), the form of Model B was retained as the primary model.

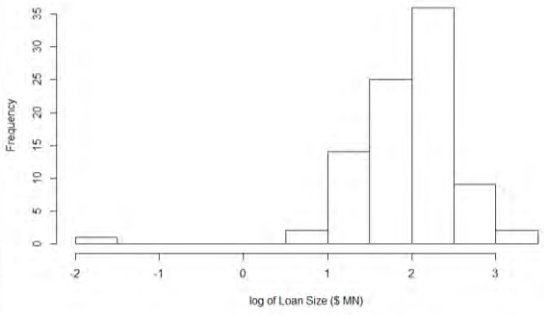
4.4 Sensitivity Analysis

A series of sensitivity analysis were conducted on Model B, whereby the results to the following changes were assessed:

Model 1: Dropping the data point with the lowest loan size (see Graph 6 and 7 below), which seemed to be a potentially influential point;



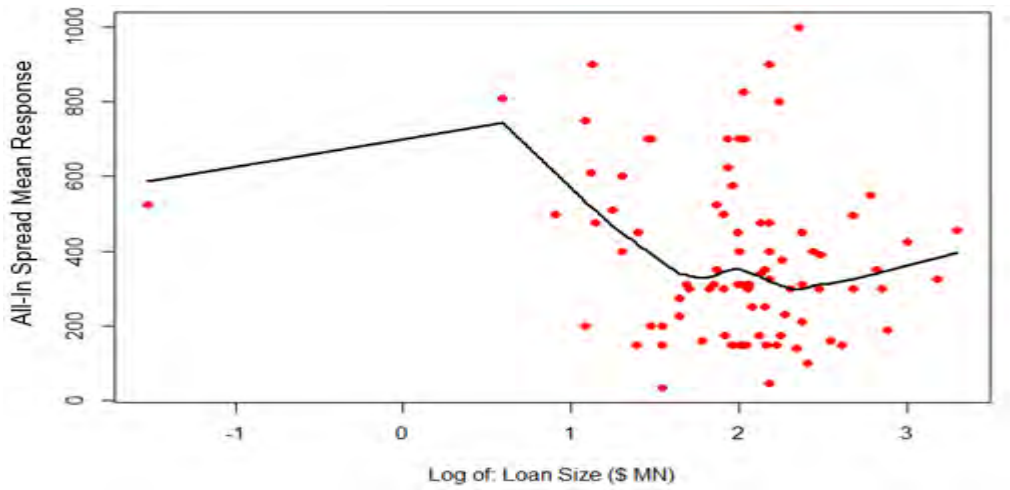
Graph 6: Loan Size



Graph 7: Log of Loan Size

Model 2: Removing the two categorical (binary) variables, Tranche Amended (Tr Amd Regg), and Loan Seniority Type (Sen Regg), which both have very small sample sizes in their respective category, from the Dealscan database;

Model 3: Including a quadratic term for the Log Loan Size variable (to allow for a non-linear relationship between Log Loan Size and the mean response). This was based on the following plot, whereby the red dots represented the loan size data points against their respective All-in Spreads. The black line represents the smoothing out of the data, whereby locally weighted scatterplot smoothing (LOWESS smoothing) was applied to the data points.



Graph 8: Quadratic Term for Long of Loan Size Vs All-In Spread

The results from the sensitivity analyses are shown in the table on the following page.

	1. Remove lowest loan size observation				2. Remove variables Trance Amended & Seniority Regression Parameters				3. Enter Log loan size as quadratic			
	Estimate	95% CI lower limit	95% CI upper limit	P-value	Estimate	95% CI lower limit	95% CI upper limit	P-value	Estimate	95% CI lower limit	95% CI upper limit	P-value
Intercept	642.459	267.379	1017.540	0.001	262.209	62.420	461.998	0.011	661.176	244.253	1078.099	0.002
Industry Risk	-44.481	-99.895	10.934	0.114**	-48.665	-123.616	26.286	0.200	-44.861	-100.882	11.160	0.115**
Collateralizeable Assets	-35.571	-84.759	13.617	0.154	-74.903	-146.588	-3.218	0.041*	-36.488	-86.313	13.336	0.149
Tranche Type	34.689	-7.823	77.201	0.108**	21.698	-41.817	85.212	0.499	34.788	-8.328	77.905	0.112**
Tranche Amended	-273.321	-572.726	26.084	0.073**					-272.250	-573.301	28.801	0.076*
Currency Risk	-29.888	-101.798	42.023	0.410	-96.155	-198.464	6.153	0.065*	-30.154	-102.408	42.101	0.409
Loan Secured	198.117	145.262	250.972	<0.001*	168.585	100.574	236.596	<0.001*	195.035	141.581	248.490	<0.001*
Loan Seniority Type	-148.231	-345.444	48.983	0.139					-149.599	-347.463	48.265	0.136
County Risk Rank	27.432	3.679	51.185	0.024*	43.904	10.337	77.472	0.011*	27.816	3.424	52.208	0.026*
Loan Term (Months)	0.027	-0.523	0.578	0.922	-0.122	-0.733	0.488	0.691	0.014	-0.538	0.566	0.960
Log of Loan Size (log10)	-50.523	-104.493	3.448	0.066**	-38.869	-97.698	19.960	0.192	-70.603	-270.875	129.669	0.485
Log of Loan Size – Squared									5.483	-45.211	56.178	0.830

Footnote 1:

The estimate for standard deviation (σ_ε) for Model 1 was 0.009 (95% CI for effect: 0.0006; 0.1345), and the estimate of δ for the model was 1.626 (95% CI for effect: 1.185; 2.103).

The estimate for standard deviation (σ_ε) for Model 2 was 0.285 (95% CI for effect: 0.011; 7.719), and the estimate of δ for the model was 1.074 (95% CI for effect: 0.515: 1.634).

The estimate for standard deviation (σ_ε) for Model 3 was 0.010 (95% CI for effect: 0.001; 0.143), and the estimate of δ for the model was 1.630 (95% CI for effect: 1.175; 2.086).

Footnote 2: * represents P-values between 0% and 5%, and ** represents P-values between 5% and 12%.

Table 5: Sensitivity analyses

4.4.1 Observations

The Akaike Information Criterion (AIC) was used to compare the models to Model B (AIC of 1056.986) for suitability with the models on which the sensitivities were run.

All the parameters' estimates and P-values remained relatively the same, for both P-value grouping (P-value < 5% and P-values between 5% and 12%). There was no clear change for any of the parameters, even with the effect for the Loan Size (log of) parameter, and was expected to have the most significant effect. The only change was experienced from decreasing the AIS by 49.037 (95% CI for effect: -100.069; 1.996; P-value: 0.059) to 50.523 (95% CI for effect: -104.493; 3.448; P-value: 0.066) when the lowest loan size observation was removed from the database.

The AIC for Model 2 in table above: 1096.78.

The changes in the results seen are seen as the initial grouping of P-values of up to 5% have had the Loan Secured parameter's effect decrease from 196.942 to 168.585, with the P-values remaining the same at 0.1%. Country Risk Rank's P-value, however, decreased from 2.3% to 1.1%, with the effect on the AIS changing from 27.697 to 43.904. The P-values of the parameters in the second grouping of P-values (5% to 12%) all increased with Industry Risk's P-value increasing from 11.2% to 20%, Tranche Type increasing from 10.7% to 49.9% and Loan Size (log of) increasing from 5.9% to 19.2%. It must be noted that the P-values for Collateralisable Assets decreased from 14.6% to 4.1%, Currency Risk decreased from 40.2% to 6.5%. Loan Term also had a decrease in P-value from 95.5% to 69.1%.

In conclusion, Loan Secured and Country Risk Rank continue to have very low p-values and the directions of their effects are the same, with Loan Term continuing to have a very large p-value (highly non-significant). Nevertheless, the remaining findings appear sensitive to whether the tranche was amended or not (Tr Amd Regg), and the seniority of the loan (Sen Regg) are included in the model. In this dataset, there is little variation in Tr Amd Regg and Sen Regg (5 or fewer observations). Therefore, in future studies, efforts should be made to collect observations with varying values of Tr Amd Regg and Sen Regg to better understand the impact of these variables, and other predictors when controlling for the effects of Tr Amd Regg and Sen Regg, on AIS.

From the findings discussed above, it is observed that these results are quite sensitive to whether there is a control for the two variables in the sensitivity model, seeing that there is a small number for the categories of each of these two variables. This suggests that further work could be done on the collection of observations that are currently scarce to further explore whether there is no benefit in removing these two variables. This is further supported but the change in the estimates of standard deviation (σ_ε) remained similar for Model 2, compared to Models 1 and 3, to Model B.

Removing the two variables changes the fitted variance function by a fair amount, with the AIC increasing substantially form Model B, and as the AIC increases, it suggests that the quality of fit decreases, and therefore this sensitivity model can be disregarded. The AIC for Model 3 in table above: 1050.996

The AIC improved by 0.57% from Model B, however, there are no improvements in the Estimate or P-Value of the parameters. Furthermore, there does not seem to be a need to allow for non-linear relationships between log of Loan Size and the expected All-In Spreads, as the estimates and P-values barely changed in Model 3.

	Model 3 Sensitivity		Original Model B	
	Estimate	P-value	Estimate	P-value
(Intercept)	661.176	0.002	639.708	0.001
Industry Risk	-44.861	0.115**	-44.971	0.112**
Collateralizeable Assets	-36.488	0.149	-36.351	0.146
Tranche Type	34.788	0.112**	34.824	0.107**
Tranche Amended	-272.25	0.076*	-270.972	0.071**
Currency Risk	-30.154	0.409	-30.219	0.402
Loan Secured	195.035	<0.001*	196.942	<0.001*
Loan Seniority Type	-149.599	0.136	-149.643	0.133
County Risk Rank	27.816	0.026*	27.697	0.023*
Loan Term (Months)	0.014	0.960	0.015	0.955
Log of Loan Size (log10)	-70.603	0.485	-49.037	0.059**
Log of Loan Size - Squared	5.483	0.830		

Table 6: Model 3 Sensitivity vs Original Model

4.5 Fitted means versus observed means

The fitted means for the expected Model B response are shown against the observed means of the data in the tables below.

As indicated in Model B, Country Risk Rank and Loan Secured were the statistically the most significant (P-values < 5%) and Industry Risk, Tranche Type, Tranche Amended and Loan Size (log of) had P-values in the range of 5% to 12%.

From tables below, it can be observed that the fitted and observed means are well aligned for the six loan parameters mentioned above.

Industry Risk**			
	Frequency	Fitted Mean	Observed Mean
0	49	399.01	400.66
1	40	349.86	352.45

Collateralizeable Assets			
	Frequency	Fitted Mean	Observed Mean
0	46	401.11	413.98
1	43	351.03	341.57

Tranche Type**			
	Frequency	Fitted Mean	Observed Mean
0	26	328.92	305.71
1	63	396.73	409.24

Tranche Amended**			
	Frequency	Fitted Mean	Observed Mean
0	5	618.33	491.00
1	84	362.55	372.33

Currency Risk			
	Frequency	Fitted Mean	Observed Mean
0	20	424.66	400.40
1	69	363.08	372.79

Loan Secured*			
	Frequency	Fitted Mean	Observed Mean
0	24	198.22	208.23
1	65	442.90	442.05

Loan Seniority Type			
	Frequency	Fitted Mean	Observed Mean
0	4	526.18	543.00
1	85	369.90	371.28

County Risk Rank*			
CRR	Frequency	Fitted Mean	Observed Mean
3	30	367.67	353.43
4	19	244.31	188.29
5	15	425.68	483.00
6	20	439.63	452.75
7	5	539.21	650.00

Loan Term (Months)			
Term Range	Frequency	Fitted Mean	Observed Mean
7.9 to 60	27	350.88	359.26
60 to 78	10	473.65	445.00
78 to 96	18	398.91	422.06
96 to 144	17	300.90	317.85
144 to 216	17	414.10	387.06

Log of Loan Size (log10)**			
Size Range	Frequency	Fitted Mean	Observed Mean
-0.07 to 35	20	437.09	453.35
3 to 90	17	357.87	369.47
90 to 135	16	363.57	364.38
135 to 230	18	349.57	371.67
230 to 2000	18	367.27	325.69

Footnote: * represents P-values between 0% and 5%, and ** represents P-values between 5% and 12%.

Table 7: Fitted means versus observed means

5 Discussion

The findings of the empirical analysis of the previous chapter are discussed in this chapter.

The thesis focuses on establishing the cost determinants for non-recourse project finance funding on the African continent. The empirical results of the loan parameters, and were analysed using multiple linear regression models, are compared with the expected loan parameters reviewed in the literature review chapter in order to establish which parameters influence project-risk pricing in Africa.

The findings grouped the loan parameters which are the most statistically significant first (P-values of 0% to 5%), followed by the loan parameters which have slightly higher P-values of 5% to 12%, and lastly those which have a P-value above 12% (statistically insignificant).

The first grouping consists of the Secured Loans and Currency Risk Rank parameters which both have P-values of less than 5% and can be viewed as being statistically significant.

5.1 Secured Loans

The loan parameter 'Secured Loans' had the smallest P-value at less than 0.1% and was seen as the most statistically significant loan parameter. Loans Secured, essentially through guarantees from either the project sponsors or third parties, was found to have a significant effect on the All-in interest rates. The All-in interest rates increased by 196.942 basis points when the loan parameter moved from 'unsecured' to 'secured' loans.

This is contradictory to earlier findings by Kleimeier & Megginson (2001) who found in their empirical analysis on limited-recourse project finance that third-party guarantees significantly reduce loan spreads. We attempt to provide a possible explanation in this chapter.

The empirical results relate to Dailami & Hauswald (2001) who found that project risks can significantly be reduced through the prudent application of a debt service reserve

account (or a guarantee from equity-holders) and that lenders compensate project sponsors with lower credit-spreads.

The Dealscan database does not provide a description or a distinction between the types of guarantees that are provided for securing the loan. Reviewing the Dealscan data, only 27% of the data fields had 'NO' unsecured loans. These data fields were for projects in the following industries: Chemicals, Plastics & Rubber (7.6%), Construction (7.6%), Mining (31.3%), Financial (3.8%), Telecommunications (7.6%), Oil and Gas (19.2%), Utilities (19.2%) and Government (3.8%).

As the major industries were Mining, Utilities and Oil & Gas, unsecured loans only accounted for 32% of Mining, 20% of Utilities and 34% of Oil & Gas project finance loans. There is, however, no clear industry in which these unsecured loans are the majority.

The countries in which these unsecured projects were financed were Egypt (Chemicals, Telecommunications, Oil & Gas), South Africa (Mining & Construction), Mali (Mining), Uganda (Government), Morocco (Utilities), Mozambique (Utilities), Seychelles (Financial Services), Ghana (Mining) and Algeria (Construction). These entries also have relatively low country credit ratings, with 80% of the entries being in countries (South Africa, Egypt and Morocco) with a CRR of 3 and 4 and the remaining 20% being in countries with the highest CRRs of 6 and 7.

Of the countries with the majority of the unsecured loans (South Africa, Egypt and Morocco), unsecured loans represent 26% of all South African PF loans, 57% of Egyptian PF loans and 100% of all Moroccan PF loans (note: Morocco had 15% of the total unsecured PF loans). There is no clear indication why these countries, which have a dominant market for unsecured loans, have lenders which price unsecured loans cheaper than secured loans. As such, the results contradict the expected hypothesis that secured loans are priced with cheaper credit-spreads.

The size of these unsecured loans had a mean of 181.8 ($ Mn) and median of 102.7 ($ Mn) compared to a mean of 192.2 ($ Mn) and median of 106.2 ($ Mn) for all 89 loan observations. The loan term has a mean of 106.2 months and median of 84 months, compared to a mean of 101 months and median of 84 months for all 89 loan observations.

The All-in Spread for the unsecured loans had a mean of 374.6 bps and median of 310 bps compared to the mean of 378 bps and median of 310 bps for all 89 loan observations.

Furthermore, it is noted that 46% of the unsecured loans were projects that had collateralisable assets and 84% of the loans were in a foreign currency to the country in which they are located. Except for one loan, all loans were senior loans.

From the discussion above there is, however, no indication as to any specific variables or inputs in the loan data observations as to why lenders price unsecured loans cheaper than secured loans in Africa.

A possible reason for unsecured loans being priced cheaper and having a lower All-in Spread compared to secured loans could be because those projects established project sponsors and the projects have off-take agreements which the lenders are comfortable with and therefore they don't foresee any severe project risks. The level of reassurance that lenders require to mitigate project risks can be provided through some form of project insurance guarantees; the project developer having a reputable track record and a strong relationship with the lenders; and the off-taker having an acceptable credit rating. From the database, it can be observed that the Egyptian borrowers were the Egyptian Natural Gas Company, Egyptian Refining Company and Egyptian LNG 2 Company, all of which are state-owned enterprises. In Morocco, the borrower was the Jorf Lasfar Energy Company, and in South Africa, the borrower was Avgold Ltd, owned by Harmony (South Africa's largest gold producer). These are all large and influential companies with undoubtedly established relationships with lenders. In addition, we note that the loans in these countries are only to the abovementioned borrowers, thereby confirming that the loans are for the same, or an extension of, an existing project.

A further argument for the loan secured pricing phenomenon might be due to the majority of project financing being secured prior to the construction phase of a project. Construction should only last for a couple of years at best, and then ideally the borrower should refinance once the project's risk profile has changed. This implies borrowing expensive money (secured through third-party guarantees) for a short period of time, and then substituting it for cheaper financing against the operational assets of the project once construction is complete.

5.2 Country Risk Rank

Country Risk Rank had the second smallest P-value at 2.3% and an increase in Country Risk Rank results in a 27.697 bps increase in the All-in Spread in the multiple linear regression model. The CRR P-value being below 5% indicates that the Country Risk Rank is statistically significant.

The Country Risk Rank relates back to the relative sovereign riskiness of one country to another and how lenders perceive the country's sovereign riskiness in relation to the credit-spreads for the loans.

Furthermore, lenders also take a view on whether there are any government support agreements in place with the project and borrower (in the event that the project is in a market which has price fluctuations, e.g. natural gas) or off-taker (in the event the private borrower sells to a state-owned company). This information is unfortunately not supplied in the Dealscan database and further investigation would be required as to what the effect would be as an additional cost determinant of CCR on the All-In Spread.

The CRR finding is supported by Dailami & Hauswald (2001: P10) who found that the credit quality of the purchaser of the off-take agreement and, more essentially, the lender's assessment of the '*off-taker's economic prospects'* determine the project's *'credit-spreads and the pricing thereof.*' In their study, the off-taker, who in turn was 50% owned by the Republic of Korea, shared its commercial credit rating with the South Korean's sovereign credit rating by having the sovereign credit rating take superiority over the off-taker's commercial credit rating.

Kamin & Von Kleist (1999) also could not establish why credit spreads from certain parts of the world were systematically higher than in other parts. One of their hypotheses was that project sponsors methodically differ in their valuation of off-taker creditworthiness compared to ratings agencies. An additional theory was that '*investors and credit ratings agencies share the same estimates of expected default, but that investors also charge a premium for greater uncertainty about current and prospective creditworthiness*.' (Kamin & Von Kleist, 1999: P18). They observed that *'Latin American and eastern European economies have exhibited greater volatility than Asian economies, and that these countries*

charged higher credit spreads to their borrowers, which may reflect a premium for higher uncertainty.' (Kamin & Von Kleist, 1999: P18)

A further important project finance structure feature, which was not available in the database, is the 'cash-flow waterfall' of the projects i.e. whether parties will receive payments first from the revenue stream. A general working cash flow structure (Davis, 1996:P9) of a PF project would be in the following order: Operation & Maintenance Company; Senior Loan Repayments; Subordinate Loan Repayments; Royalties & Taxes; and Shareholder Dividends. In some African countries, the cash-flow waterfall order might change with Royalties and Taxes paid before Senior Loan Repayments. This would make it uncertain as to whether the Royalties, Taxes, and O&M Costs might increase in the future, resulting in less retained earnings for debt repayments. Lenders address this through requiring loan covenants in the form of debt service reserve accounts and letters of credit from the project sponsors to be present. However this information was also omitted from the database. Dailami & Hauswald (2001) found that a project's revenue flow, rather than the project's underlining assets are viewed by lenders as the true collateral, and thus a well-thought out cash flow structure provides additional security to lenders.

Interestingly Dailami & Hauswald (2001) also ascertained that a project's debt structure could be used to create an '*implicit option'* for any future debt re-financing in a way whereby the new debt can match the real option for a project expansion.

A potential shortcoming of the Dealscan database is the omission of the debt and equity ratios for each project i.e. the degree of debt leverage each project has. Generally viewed, the proportion of debt to equity funding is either a determination set by the statutory thin-capitalisation laws of a country or by the degree of debt that lenders are comfortable with. Decreased debt leverage results in the project sponsors having to provide more capital to offset any risks lenders perceive in the project. This directly effects the cost of the loan, impacts loan covenants and has an impact on other project loan cost drivers. As Davis (1996: P14) stated; '*Not all projects are created equal*.' A large differentiation between strong and weaker projects exists whereby the challenge for project lenders is to be able to distinguish between the two and price risk accordingly.

Sorge (2011: P100) concluded that there is a significant impact on the loan's All-in credit-spread for project finance funding in emerging markets where political risk is present and any political risk guarantees are in place. This can be observed from the Country Risk Rank findings in this thesis.

5.3 Loan Size, Tranche Amended, Tranche Type and Industry Risk

The group of loan parameters which had P-values between 5% and 12% were; Loan Size (log of), Tranche Amended, Tranche Type and Industry Risk.

Due to one large loan size entry in the Dealscan database, the parameter Loan Size had a long tail to the right, on which a log (base 10) transformation was applied to the variable to pull in this tail and to avoid having some data points with 'very different' predictor values and possibly pulling the regression line.

The variable Loan Size was observed to have a negative effect on the All-In credit-spread by 49.037 bps in the multiple linear regression for each additional ten million US Dollars the loans size increases. The P-value for the multiple linear regression was 5.9% resulting in the variable being statistically significant to the All-in Spread.

Sensitivity testing was done through removing the data point with the lowest loan size (Graph 6 and 7), and seemed to be a potentially influential point, and including a quadratic term for the Log Loan Size variable (to allow for a non-linear relationship between Log Loan Size and the mean response, as per Model 2).

The first sensitivity test whereby the data point with the lowest loan size was removed did not result in any improvement in the loan variables' P-values to the degree that an additional variable could become statistically significant.

The second sensitivity test, whereby a quadratic term for the Log of Loan Size variable was entered developed an AIC value of 1096.78 resulting in a lower quality of fit to the original multiple linear regression model (1056.986). However an interesting observation in this model is that the Log of Loan Size variable's P-value worsened from 5.9% in the original multiple linear regression model to 6.6%. All other loan parameters' P-values remained similar with no improvement in statistical significance. In this

sensitivity test, the Log of Loan Size was found to decrease the AIS by 50.523 bps (95% CI for effect: -104.493; 69.684; P-value: 3.448) for each additional ten million US Dollars the loans size increases with. Kleimeier & Megginson's (2001) empirical analysis on project finance concluded the size of the loans have no influence on PF loan-pricing.

The Tranche Amended variable was represented with 94.4 % of loans having no tranches amended. Loan tranches which were amended decreased the credit-spread by 270.972 bps in the multiple linear regression. The P-value was calculated at 7.1%, resulting in the variable being statistically significant to the All-in Spread to a degree.

It should be noted that both Tranche Amended and Loan Seniority had very small sample sizes (Tranche Amended: 5.62% Yes, 94.38% No; Loan Seniority: 4.49% Yes, 95.51% No) in their categories and they were removed from the multiple linear regression model to see what the sensitivity would be on the other variables. The AIC for the sensitivity mode (1096.78) was higher than the original multiple linear regression, with most loan variables' P-values remaining the same. Collateralisable Assets improved its P-Value from 14.6% to 4.1% thereby becoming statistically significant to the All-in Spread. The presence of collateralisable assets decreased the AIS by 74.903 bps (95% CI for effect: -146.588; -3.218). The higher AIC for the sensitivity model does not validate the use of the revised Collateralisable Assets results.

The loan parameter Loan Tranche Type was also analysed and it was observed to increase the credit-spread by 34.824 bps in the multiple linear regression, with the P-value at 10.7%. It is thus expected that these longer duration term loans would have a higher credit-spreads over the mezzanine and revolver / line loans, with durations of about 12 months, as lenders are exposed to project risk for a longer period of time (Sorge & Gadanecz, 2008). As 70.8% of the loan tranche observations were term loans, further insight into the impact of the duration of the term loans on credit-spreads can be analysed through the Loan Term regression.

It was observed in the empirical model that the presence of Industry Risk decreases All-in credit-spreads by 44.971 basis points, with the P-value for both models (A and B) being 11.2%. Previous research provided no indication as to why the credit-spreads decrease with the increase in industry risk, but from the literature reviewed it could be argued that

riskier industries are better at contracting their risk out to third parties through NFC agreements. These riskier industries could also make use of a higher degree of project guarantees (67.5% of high-risk PF finance observations have the loans secured through guarantees).

The Dealscan database, however, provides no indication as to the level of NFC agreements entered into by the project company SPV with third parties, as well as to how the lenders view the enforceability of the NFC agreements provided.

The grouping of remaining loan parameters is presented below which represent the parameters with P-values above 12%.

5.4 Collateralisable Assets, Loan Term, Currency Risk, Loan Seniority

It was observed that the loan variable Collateralisable Assets decreases the credit-spread by 36.4 basis points, with a P-value of 14.6%. Despite it having a high P-value, this is an important empirical result due to the fact that lenders can attach a value to collateralisable assets. It was expected the presence of these assets would decrease lender credit-spreads to a degree, however, previous research (Dailami & Hauswald, 2001) concluded that a project's revenue cash flow is more important than the physical underlining assets as a project's real collateral in being able to negotiate lower interest rates. Our empirical results, however, indicate that the presence of physical underlining assets do have an effect on the credit-spread of a project. This is contradictory to the Kleimeier & Megginson (2001) empirical analysis on project finance which concluded that credit-spreads were higher if the project is in a sector rich in tangible assets, and that loan fees compliment loan spreads.

The loan parameter Loan Terms was calculated as the monthly difference between the maturity and activation dates of each loan. The Loan Term parameter was observed to increase the credit-spread by 0.015 bps in the multiple linear regression for each additional month of loan term, with a P-value of 95.5%. This unfortunately resulted in the loan parameter being statistically insignificant to the All-in Spread in both regression models.

Sorge (2011) previously investigated the impact of credit risk and found that there appears to be a hump-shaped term structure when the credit-spread was plotted against the loan maturity duration. The study found that the size of the 'hump' increases as the level of leverage increases, and that longer maturity (15 to 20 years) loans are priced cheaper than shorter term (10 to 15 years) loans.

In applying a filter to Dealscan PF database to indicate the shorter-term (10 to 15 years) loans, 20 loans met this criterion, with a mean of 338 months (with a standard deviation of 173.54) and a median of 350 months. The longer maturity (15 to 20 years) loans represented 14 loans, and had a mean of 370 months (with standard deviation of 135.21) and a median of 310 months. These findings correspond to the finding of Kleimeier & Megginson (1998) where their paper concluded the credit-spreads are positively related to loan maturities. However further research by Kleimeier & Megginson (2001) concluded time to maturity have no influence on PF loan-pricing.

There exists a discrepancy between the hump-shaped loan tenor in the Sorge (2011) study, compared to Kleimeier & Megginson (1998) and the empirical results of this thesis. A possible reason for this might be due to loan tenor being more of a function of what available funds lenders have for a particular market, as well as what they are willing to provide, as per the Basel Accords, for a given period of time.

The loans with exposure to foreign currency represented 77.5% of the loans in the database, and were assigned the Currency Risk variable. The Currency Risk variable was found to decrease the All-in credit-spread by 30.22 bps in the multiple linear regression for loans which were issued in a different currency to the country of the project. The P-value was calculated at 40.2%, resulting in this variable being statistically insignificant to the All-in Spread in the regression models and findings.

The Currency Risk results support the findings of Kleimeier & Megginson (2001: P22), where their paper concluded that loan credit-spreads are negatively related to currency risk and to the presence of loan guarantees by Sponsors, host governments, or development agencies. This might be because larger international lenders can provide cheaper loans compared to domestic lenders, due to domestic lenders having limited deposits books, and the Basel Accord requiring lenders who provide PF to have a higher

banking capitalisation requirement than other corporate loans. Domestic lenders might find it more profitable to use the limited available lending capital for more profitable unsecured retail lending in turn driving up the cost of project finance lending.

There is, however, no information provided for in the Dealscan database as to whether projects were required to take out foreign exchange hedging agreements for the loan repayments. Long-term forward-looking foreign exchange hedging covers are expensive and limited in the duration in which they can be provided for. However the PF loans that had currency risk exposure had a mean duration of 91 months, with 91% of all the Dealscan loans having exposure to the US Dollar. A variety and combination of forward curve, exchange rate swaps and options could be used to mitigate the risk. A further currency mitigation measure that can be employed by the borrower is to have a mechanism in the off-taker agreement to de-risk any currency volatilities i.e. where the sale price increases when the local currency weakens by a certain amount.

A 'natural hedge' for currency risk can be arranged through the project's off-take agreement being in the foreign currency of the debt funding. Unfortunately, there is no indication of this information in the Dealscan database.

The Loan Seniority variable was represented by 95.5 % of loans that were senior loans. Senior loans were found to decrease the credit-spread by 149.64 bps in the multiple linear regression over mezzanine and subordinate loans. The P-value was calculated at 13.3%,

As senior loans have priority debt repayments over subordinated and mezzanine loans in the cash flow structure of a project finance project, it appears that lenders prefer to provide PF financing as senior loans.

5.5 Database Shortcomings

The empirical findings would have been more useful if the Dealscan database provided information on whether lenders required any loan covenants, such as debt service reserve accounts or any plant maintenance reserve accounts. Although these covenants do not have a direct correlation to the All-in Spread, it allows lenders to adequately provide additional loan security and protection from asset substitution for riskier

projects. These loan covenants are expected to result in overall increased project costs during the operational phase of the projects.

There is limited information available on the Commitment Fees presented in the Dealscan database, and was thus removed as a loan parameter in the regression models. These commitment fees are also viewed as lenders' upfront fees where they require lenders to be committed to a project during the initial and the riskier phase of the project's lifecycle.

There is also no information available on the level of NFC agreements and project risk guarantees that the project companies enter into with third parties, or how the lenders price the risk mitigation of NFC agreements and guarantees and whether it is a definite funding requirement.

As such, the level of performance guarantees, provided by either the Engineering, Procurement & Construction (EPC) and Operational & Maintenance (O&M) contractors, nor whether these contractors are third parties or subsidiary companies of the project's equity sponsors, is provided for. No information is available on how lenders perceive the risks from either party, what level of performance guarantees are required and how this is priced into the project's capital expenditure or operational expenditure costs indirectly driving up the cost of credit for the projects.

There is also no information available of off-taker guarantees, whether the off-taker provides parent company guarantees (in the event that the off-taker is a private entity) or any government/treasury guarantees (in the event that the off-taker is a government owned entity), or the credit ratings of the off-takers and how the lenders price the off-taker's credit worthiness.

Unfortunately, the database also does not provide an indication if the project has any off-taker insurance guarantee from third parties such as the World Bank's International Development Agency (IDA) and the Multilateral Investment Guarantee Agency (MIGA) nor any export credit agencies (ECAs), who provide insurance guarantees for the equity and debt portions for projects. These insurance costs are, however, not reflected in the cost of credit, but can indirectly increase the cost of credit for the projects.

As previously mentioned, the debt / equity ratios of the specific projects were not provided in the Dealscan database and it could be that the borrowers are providing a higher amount of equity funding in order for lenders receive appropriate comfort from the sponsors, for them to provide unsecured PF loans to them.

Another means for lenders to receive greater security over the project is for the equity sponsors to provide their equity contributions first during the initial (higher risk) stages of construction. This allows the lenders to provide the debt financing at a much later stage. Unfortunately, this level of detail is not provided for in the Dealscan database.

Another important factor that wasn't accounted for was the impact of the Basel Capital Accords as to when they came into effect during the 1997 to 2015 period of the Dealscan database's African records. As per the Esty & Christov (2002) paper, project finance is perceived as riskier than other corporate loans under the Basel Capital Accords. However there is no indication in the Dealscan database how the increased capital requirements (due to project finance having lower degrees of recourse) have been priced into the various loans over the time period as various Basel Capital Accords have come into effect.

6 Conclusion

From the empirical findings and subsequent discussion, we conclude that the most significant cost determinants in non-recourse financing in Africa are Country Risk Rank and the Loan Secured parameters.

Country Risk Rank had a 27.697 bps increase in the All-in Credit spread (P-value < 2.3%) if a country's risk ranking is increased.

The core risk-pricing factor for Political / Regulatory Risks being present in a country is Country Risk Rank. As such, Country Risk Rank is not influenced by the strength of a project, nor by any internal project risk-pricing factors such as Operating-, Environmental-, Market- and Sponsor Risk (as identified by Nguyen & Ross (2006)) which can be mitigated by project stakeholders.

As project stakeholders have limited or no control over external Political / Regulatory Risks, it highlights a stern caution to governments, as with government bonds, the country's credit rating, which is determined by external credit rating agencies and applied by international lenders, have a real impact on the cost of projects, even when the debt is not used for government projects. This has real and deep implication for policy makers, since government policies and the economic health of a country have the largest impact on any credit rating. These credit ratings have a direct impact on the borrowing capabilities of governments as well as the borrowing costs by private companies, as was indicated in the empirical results of this thesis. These Political / Regulatory Risks could be mitigated through project insurances and guarantees, where these risks can be priced into the project and are reflected in the All-in credit-spread of the project.

The empirical results also established that the parameter Loan Secured increases the All-In credit-spread by 196.94 bps (P-value < 0.1%) if the loan parameter is moved from an unsecured- to a secured loan.

There is limited information available on the loan secured information provided in the Dealscan database and it can thus not be ascertained as to what degree of securitisation are priced into project financed loans.

A possible hypothesis for the loan secured phenomenon mentioned is that the majority of project financing is secured prior to the construction phase of a project, and that construction should only last for a couple of years, at best, where-after the borrower should refinance once the project's risk profile has changed. This implies borrowing expensive money (secured through third-party guarantees) for a short period and until the construction risk has been completed, and then substituting it for cheaper financing against the operational assets of the project.

The empirical findings of this thesis could support this hypothesis, whereby the secured loans (through guarantees) are more expensive, than unsecured loans where lenders can use the completed and operational physical assets as security.

All other loan parameters such as Industry Risk, Collateralisable Assets, Tranche Type, Tranche Amended, Currency Risk, Loan Seniority, Loan Term and Loan Size resulted in statistically insignificant cost determinants for the credit-spreads.

Of the project risk pricing factors identified by Nguyen & Ross (2006), this study has addressed the Political / Regulatory risk. However due to the lack of additional project information in the Dealscan database, Operating, Environmental, Market and Sponsor Risk could not properly be discussed and accounted for in this study.

Possible future academic research can investigate the effect of IFRS16 on the cost and utilization of Project Finance. Research can also be conducted on the credit pricing of projects during different stages of a project's lifecycle in order to determine how lenders price the lifecycle risk of a project. In addition, further studies can be undertaken to understand how project insurance and guarantees can effectively offset Political / Regulatory Risks, and what the implications are on the credit-spread and the cost benefits are to the projects.

7 References

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8 Appendix A : Dealscan Data

The Dealscan database provides information of the 'Borrower's Identity', geographic 'Region', 'Country' and 'Major Industry Group' which sets out wherein the borrower trades, i.e. chemicals, mining, utilities, oil & gas, construction, financial services, beverages, etc.

Loan information is shown as the 'Loan Tranche' type, which is categorised as 'term loans', 'revolver/lines for more than 1 year', 'guarantees', 'bridge loan' and 'other loans'. 'Tranche Activation' and 'Tranche Maturity' dates are provided with 'Tranche Currency', 'Trance Amounts' in the stated currency, and 'Trance Amount Converted' to US Dollars. There is also a 'Trance Amendment' tab indicating whether any of the tranches has previously been amended. 'Primary Purpose' and 'Market Segment' tabs are provided indicating which nature of the loans. Loan-pricing is provided through the 'Base Rate & Margin' (as a spread over LIBOR, EURIBOR, FR, NIBOR, etc.), 'Floor', 'Original Issue Discount Rate', 'All in Spread Drawn', 'All in Spread Undrawn', 'Upfront Fee', 'Annual Fee' and 'Commitment Fee' tabs. Lenders information is shown as 'Top Tier Arranger', 'Sponsor', 'Guarantor', 'LIN', 'Average Bid', 'Average Ask', 'Mean', 'Yield', 'Discount Spread', 'Secured', and 'Seniority' tabs. Credit rating information is provided by 'Moody's Bank Loan Current', 'Moody's Senior Unsecured', 'S&P Bank Loan Current' and 'S&P Senior Unsecured' tabs.

The following tables present the unfiltered Dealscan database, followed by the filtered Dealscan database, and finally the inputs are presented for the regression models, with the applicable codebook.

Unfiltered Dealscan Database

Unfiltered Dealscan Database

Borrower Name	Region	Country	Major Industry Group	Tranche Type	Tranche Active Date	Tranche Maturity Date	Tranche Amended	Tranche Amount (MM)	Tranche Amount Converted (MM)(USD)	Tranche Currency	Primary Purpose	Market Segment	Base Rate & Margin (bps)	Floor (bps)	Original Issue Discount (OID)	All In Spread Drawn (bps)	All in Spread Undrawn (bps)	Upfront Fee (bps)	Annual Fee (bps)	Commitment Fee (bps)	Top Tier Arranger	Sponsor	Guarantor	LIN	Average Bid	Average Ask	Mean	Yield (%)	Disc. Spread (bps)	Secured	Seniority Type	Moody's Bank Loan Current	Moody's Senior Unsecured	S&P Bank Loan Current	S&P's Senior Unsecured
Abdali Boulevard	Middle East	Jordan	Business Services	Term Loan	23-Jul-2008	22-Jul-2020	No	100	141.6	Jordanian Dinar	Project Finance	Project Finance																		Yes	Senior				
ACWA Power Solafrica Bokpoort CSP Power Plant (Pty) Ltd	Africa	South Africa	Utilities	Term Loan	28-Jun-2013	28-Jun-2031	No	3000	305.19	South African Rand	Project Finance	Project Finance	LIBOR + 390			390														Yes	Senior				
Adani Ports & Special Economic Zone Ltd [Ex-Mundra Port & Special Economic Zone]	Asia Pacific	India	Shipping	Term Loan	30-Apr-2011	30-Jul-2018	No	100	100	U.S. Dollar	Project Finance	Project Finance	LIBOR + 353			353					Axis Bank Ltd									Yes	Senior				
Addax Petroleum NV	Latin America/Caribbean	Netherlands Antilles	Oil and Gas	Revolver/Line >= 1 Yr.	07-Mar-2002	06-Mar-2006	No	100	100	U.S. Dollar	Project Finance	Project Finance									BNP Paribas SA									Yes	Senior				
AE-AMD Independent Power Producer One (Pty) Ltd	Africa	South Africa	Utilities	Term Loan	12-Nov-2012	30-Apr-2029	No	226	25.98	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
AE-AMD Independent Power Producer One (Pty) Ltd	Africa	South Africa	Utilities	Term Loan	12-Nov-2012	30-Apr-2029	No	65	7.47	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
AE-AMD Independent Power Producer One (Pty) Ltd	Africa	South Africa	Utilities	Term Loan	12-Nov-2012	30-Apr-2029	No	443	50.92	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
AE-AMD Independent Power Producer One (Pty) Ltd	Africa	South Africa	Utilities	Term Loan	12-Nov-2012	30-Apr-2029	No	130	14.94	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
AES Nigeria Barge Ltd	Africa	Nigeria	Utilities	Term Loan	10-Sep-2004		No	120	120	U.S. Dollar	Project Finance	Project Finance																		No	Senior				
AES Nile Power	Africa	Uganda	Utilities	Other Loan	09-Jan-2002		No	53	53	U.S. Dollar	Project Finance	Project Finance																		No	Senior				
Afren Plc	Western Europe	United Kingdom	Oil and Gas	Term Loan	13-Mar-2015	30-Apr-2019	Yes	300	300	U.S. Dollar	General Purpose	Borrower Base, Leveraged	LIBOR + 440			440					BNP Paribas SA, Citi, Natixis SA			A000S0018TL01	47.5	50.5	49	32.89	3260.2	Yes	Senior				
Afren Plc	Western Europe	United Kingdom	Oil and Gas	Term Loan	25-Mar-2013	30-Apr-2016	Yes	300	300	U.S. Dollar	General Purpose	Borrower Base, Non Investment Grade	LIBOR + 440			440					BNP Paribas SA, Citi, Natixis SA			A000S0018TL01	47.5	50.5	49	32.89	3260.2	Yes	Senior				
African Minerals Ltd [AML]	Western Europe	United Kingdom	Mining	Term Loan	09-Feb-2012		Yes	417.7	417.7	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
African Minerals Ltd [AML]	Western Europe	United Kingdom	Mining	Standby Letter of Credit	09-Feb-2012		Yes	100	100	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
AfriSam (South Africa) (Pty) Ltd	Africa	South Africa	Construction	Term Loan	27-Feb-2013	27-Feb-2019	Yes	2176.57	277.64	South African Rand	Project Finance	Project Finance	LIBOR + 400			400														Yes	Senior				
AfriSam (South Africa) (Pty) Ltd	Africa	South Africa	Construction	Term Loan	27-Feb-2013	27-Feb-2019	Yes	2087.43	236.8	South African Rand	Project Finance	Project Finance	LIBOR + 450			450														Yes	Senior				
AfriSam (South Africa) (Pty) Ltd	Africa	South Africa	Construction	Mezzanine Tranche	27-Feb-2013	27-May-2019	Yes	936	106.18	South African Rand	Project Finance	Project Finance	LIBOR + 825			825														No	Senior				
AfriSam (South Africa) (Pty) Ltd	Africa	South Africa	Construction	Bridge Loan	30-Jan-2012	30-Nov-2012	Yes	5200	663.31	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
AIBD SA [Aeroport International Blaise Diagne]	Africa	Senegal	Transportation	Term Loan	04-Aug-2010	03-Feb-2013	No	90	118.42	Euro	Project Finance	Project Finance									BNP Paribas SA									Yes	Senior				
AIBD SA [Aeroport International Blaise Diagne]	Africa	Senegal	Transportation	Bridge Loan	14-May-2009	13-Jan-2011	No	21	28.63	Euro	Project Finance	Project Finance									BNP Paribas SA									Yes	Senior				
Al Fajr Co	Middle East	Jordan	Oil and Gas	Revolver/Term Loan	06-Feb-2004	05-Feb-2016	No	160	160	U.S. Dollar	Project Finance	Project Finance																		No	Senior				
Al Nahda Co for Industries	Africa	Egypt	Construction	Term Loan	09-Dec-2009	08-Dec-2019	No	1200	219.02	Egyptian Pound	Project Finance	Project Finance																		Yes	Senior				
Al Nouran Sugar SAE	Africa	Egypt	Beverage, Food, and Tobacco Processing	Ijara	27-Apr-2014		No	1500	214.06	Egyptian Pound	Project Finance	Islamic Financing, Project Finance									Abu Dhabi Islamic Bank PJSC [ADIB], Banque Audi SAL									Yes	Senior				
Al Nouran Sugar SAE	Africa	Egypt	Beverage, Food, and Tobacco Processing	Other Loan	27-Apr-2014		No	400	57.08	Egyptian Pound	Project Finance	Project Finance									Arab Fund for Economic and Social Development [AFESD], Islamic Corp for the Development of the Private Sector [ICD]									Yes	Mezzanine				
Al Sharkeya Sugar Manufacturing SAE [ASSM]	Africa	Egypt	Agriculture	Ijara	27-Apr-2014		No	1500	214.06	Egyptian Pound	Project Finance	Islamic Financing, Project Finance									Abu Dhabi Islamic Bank PJSC [ADIB], Banque Audi SAL									Yes	Senior				
Al Waddan Hotel	Africa	Libya	Hotel & Gaming	Term Loan	05-Nov-2007	04-Nov-2014	No	16	16	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Alexandria Fertilizer Company [AlexFert]	Africa	Egypt	Chemicals, Plastics & Rubber	Revolver/Term Loan	23-Jan-2004	22-Jan-2012	No	110	110	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150														No	Senior				
Alexandria Fertilizer Company [AlexFert]	Africa	Egypt	Chemicals, Plastics & Rubber	Revolver/Term Loan	23-Jan-2004	22-Jan-2012	No	75	12.21	Egyptian Pound	Project Finance	Project Finance	LIBOR + 200			200														No	Senior				
Al-Futtaim Trading Group	Middle East	United Arab Emirates	Financial Services	Term Loan	08-Oct-2009		No	2000	365.23	Egyptian Pound	Project Finance	Project Finance																		Yes	Senior				
Algerian Cement Company (ACC)	Africa	Algeria	Construction	Other Loan	02-Dec-2002	01-Dec-2014	No	66	66	U.S. Dollar	Project Finance	Project Finance	EURIBOR + 300			300		90			Citibank									No	Senior				
Ambatovy Nickel Project	Asia Pacific	Japan		Term Loan	22-Aug-2007	22-Aug-2024	No	150	150	U.S. Dollar	Project Finance	Project Finance	LIBOR + 65			65														No	Senior				
Arab Republic of Egypt	Africa	Egypt	Government	Other Loan	07-Jun-2012		No	2600	2600	U.S. Dollar	Project Finance	Project Finance											European Investment Bank [EIB], Kexim Asia Ltd, Nippon Export & Investment Insurance (NEXI)							Yes	Senior		B3		AA+
Arkan Building Materials Co PJSC	Middle East	United Arab Emirates	Construction	Murabaha	15-Jun-2008		No	283.2	283.2	U.S. Dollar	Project Finance	Islamic Financing, Project Finance									Union National Bank PJSC [UNB]									Yes	Senior				
Ashanti Goldfields Co Ltd	Africa	Ghana	Mining	Revolver/Line >= 1 Yr.	22-Sep-1997	22-Sep-2001	No	60	60	U.S. Dollar	Project Finance	Project Finance	LIBOR + 160			160					NM Rothschild & Sons Ltd [US]									No	Senior				
Avgold Ltd	Africa	South Africa	Mining	Term Loan	30-Mar-2001	30-Mar-2006	No	350	43.57	South African Rand	Project Finance	Project Finance	LIBOR + 225			225		100		75	Deutsche Bank AG									No	Senior				
Avgold Ltd	Africa	South Africa	Mining	Term Loan	30-Mar-2001	29-Mar-2006	No	350	43.57	South African Rand	Project Finance	Project Finance	LIBOR + 275			275		100		75	Deutsche Bank AG									No	Senior				
Avgold Ltd	Africa	South Africa	Mining	Revolver/Line >= 1 Yr.	17-May-1999	16-May-2003	No	24.21	24.21	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150	75	100		75										No	Senior				
Avgold Ltd	Africa	South Africa	Mining	Term Loan	17-May-1999	16-May-2003	No	100	100	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150		100												No	Senior				
Avon Peaking Power Pty Ltd	Africa	South Africa	Utilities	Term Loan	05-Aug-2013	05-Aug-2028	No	9660	986.37	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Azura Edo Independent Power Project [Azura-Edo IPP]	Africa	Nigeria	Utilities	Term Loan	07-May-2014		No	530	530	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
B2Gold Corp	USA/Canada	Canada	Mining	Revolver/Line >= 1 Yr.	17-Apr-2013	17-Apr-2017	No	50	50	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance	LIBOR + 350			350					Macquarie Bank Ltd									Yes	Senior				
B2Gold Corp	USA/Canada	Canada	Mining	Revolver/Line >= 1 Yr.	17-Apr-2013	17-Apr-2017	No	50	50	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance	LIBOR + 350			350					Macquarie Bank Ltd									Yes	Senior				
B2Gold Corp	USA/Canada	Canada	Mining	Revolver/Line >= 1 Yr.	17-Apr-2013	17-Apr-2017	No	50	50	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance	LIBOR + 350			350					Macquarie Bank Ltd									Yes	Senior				
Bakwena Platinum Corridor Concessionaire (Pty) Ltd [BPCC]	Africa	South Africa	Construction	Term Loan	11-Jun-2009	10-Dec-2028	No	1400	176.36	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Bakwena Platinum Corridor Concessionaire (Pty) Ltd [BPCC]	Africa	South Africa	Construction	Term Loan	11-Jun-2009	10-Dec-2028	No	1500	188.95	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Bakwena Platinum Corridor Concessionaire (Pty) Ltd [BPCC]	Africa	South Africa	Construction	Term Loan	11-Jun-2009	10-Dec-2028	No	650	81.88	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Bakwena Platinum Corridor Concessionaire (Pty) Ltd [BPCC]	Africa	South Africa	Construction	Guarantee	11-Jun-2009	10-Jun-2011	No	150	18.9	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Bakwena Platinum Corridor Concessionaire (Pty) Ltd [BPCC]	Africa	South Africa	Construction	Term Loan	18-Sep-2001	17-Sep-2021	No	1014	117.1	South African Rand	Project Finance	Project Finance																		No	Senior				
Bakwena Platinum Corridor Concessionaire (Pty) Ltd [BPCC]	Africa	South Africa	Construction	Standby Letter of Credit	18-Sep-2001	17-Sep-2021	No	60	6.93	South African Rand	Project Finance	Project Finance																		No	Senior				
Bakwena Platinum Corridor Concessionaire (Pty) Ltd [BPCC]	Africa	South Africa	Construction	Term Loan	18-Sep-2001	17-Sep-2021	No	180	20.79	South African Rand	Project Finance	Project Finance																		No	Subordinated				
Base Resources Ltd	Asia Pacific	Australia	Mining	Term Loan	24-Sep-2012	24-Sep-2018	No	80	80	U.S. Dollar	Project Finance	Project Finance	LIBOR + 600			600		250												Yes	Senior				
Base Resources Ltd	Asia Pacific	Australia	Mining	Term Loan	24-Sep-2012	24-Sep-2020	No	70	70	U.S. Dollar	Project Finance	Project Finance	LIBOR + 600			600		250												Yes	Senior				
Base Resources Ltd	Asia Pacific	Australia	Mining	Term Loan	24-Sep-2012		No	20	20	U.S. Dollar	Project Finance	Project Finance	LIBOR + 600			600		250												Yes	Senior				
Blue Falcon 140 Trading Pty Ltd	Africa	South Africa	Utilities	Term Loan	01-Jul-2013	01-Jul-2028	No	1975	199.77	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Blue Ridge Platinum	Africa	South Africa	Mining	Term Loan	14-Dec-2007	13-Dec-2015	No	505	73.62	South African Rand	Project Finance	Project Finance	SP1 + 365			351														Yes	Senior				
Blue Ridge Platinum	Africa	South Africa	Mining	Term Loan	14-Dec-2007	13-Dec-2019	No	120	17.49	South African Rand	Project Finance	Project Finance	SP1 + 525			511														Yes	Mezzanine				
Blue Ridge Platinum	Africa	South Africa	Mining	Other Loan	14-Dec-2007	13-Dec-2015	No	90	13.12	South African Rand	Project Finance	Project Finance	SP1 + 625			611														Yes	Subordinated				
Bombela [Gautrain Rapid Rail Link]	Africa	South Africa	Transportation	Other Loan	07-Feb-2007	07-Feb-2024	No	4500	630.25	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Bulyanhulu Mining Project	Africa	Tanzania	Mining	Term Loan	19-Dec-2012	19-Dec-2019	No	142	142	U.S. Dollar	Project Finance	Project Finance	LIBOR + 250			250														Yes	Senior				
Capital Meters Ltd [CML]	Western Europe	United Kingdom	Utilities	Other Loan	05-Mar-2004		No	14.1	26.03	Great Britain Pound	Project Finance	Project Finance	LIBOR + 400			400														Yes	Mezzanine				
Cenpower Generation Co	Africa	Ghana	Utilities	Undisclosed	03-Oct-2014		No	650	650	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Central Bank of Seychelles	Africa	Seychelles	Financial Services	Term Loan	19-Dec-1997	19-Dec-2000	No	30	30	U.S. Dollar	Project Finance	Project Finance	LIBOR + 200			200		100			Citibank									No	Senior				
Cerro Matoso SA	Latin America/Caribbean	Colombia	Mining	Term Loan	09-Dec-1999	09-Dec-2004	No	240	240	U.S. Dollar	Project Finance	Project Finance, Sponsored	LIBOR + 100			100						Billiton Plc								No	Senior				
Core Energy Pty Ltd	Africa	South Africa	Utilities	Term Loan	16-Dec-2012	31-Mar-2031	No	771	89.69	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Core Energy Pty Ltd	Africa	South Africa	Utilities	Term Loan	16-Dec-2012	31-Mar-2031	No	125	14.54	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Core Energy Pty Ltd	Africa	South Africa	Utilities	Term Loan	16-Dec-2012	31-Mar-2031	No	150	17.45	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Coria (PKF) Investments 28 Pty Ltd	Africa	South Africa	Utilities	Term Loan	15-Nov-2012	29-Jun-2029	No	1102	123.49	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Coria (PKF) Investments 28 Pty Ltd	Africa	South Africa	Utilities	Term Loan	15-Nov-2012	29-Jun-2029	No	300	33.62	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
DA Tollroads Pvt Ltd	Asia Pacific	India		Term Loan	01-Jan-2015	30-Jan-2030	No	18600	293.61	Indian Rupee	Project Finance	Project Finance	FR + 1225								SBI Capital Markets									No	Senior				
Damietta International Port Co [DIPCO]	Africa	Egypt	Shipping	Murabaha	06-Feb-2008	05-Feb-2023	No	480	480	U.S. Dollar	Project Finance	Islamic Financing, Project Finance									Ahli United Bank BSC [AUB], Arab Banking Corp BSC [ABC]									Yes	Senior				
Dark Fibre Africa	Africa	South Africa	General Manufacturing	Term Loan	01-Jul-2012	01-Jul-2021	No	1758	215.44	South African Rand	Project Finance	Project Finance									Barclays Bank Plc									Yes	Senior				
Dark Fibre Africa	Africa	South Africa	General Manufacturing	Revolver/Line >= 1 Yr.	01-Jul-2012	01-Jul-2014	No	200	24.51	South African Rand	Project Finance	Project Finance									Barclays Bank Plc									Yes	Senior				
Dark Fibre Africa	Africa	South Africa	General Manufacturing	Mezzanine Tranche	01-Jul-2012	01-Jul-2017	No	635	77.82	South African Rand	Project Finance	Project Finance									Barclays Bank Plc									Yes	Mezzanine				
Department of Education Head Office Accommodation PPP	Africa	South Africa	Services	Term Loan	04-Aug-2009	03-Aug-2027	No	30.6	3.92	South African Rand	Project Finance	Project Finance	SP1 + 824			810														Yes	Senior				
Discovery Metals (Botswana) Pty Ltd	Africa	Botswana	Mining	Term Loan	25-Jul-2011	31-Mar-2015	No	180	180	U.S. Dollar	Project Finance	Project Finance	LIBOR + 375			375														Yes	Senior				
Discovery Metals (Botswana) Pty Ltd	Africa	Botswana	Mining	Revolver/Line >= 1 Yr.	25-Jul-2011	31-Mar-2015	No	25	25	U.S. Dollar	Project Finance	Project Finance	LIBOR + 450			450														Yes	Senior				
Dorper Wind Farm	Africa	South Africa	Utilities	Term Loan	31-Oct-2012	30-Jul-2029	No	140	16.15	South African Rand	Project Finance	Project Finance									Sumitomo Mitsui Banking Corp		Euler Hermes Kreditversicherungs AG							Yes	Senior				
Eastern Platinum Ltd (Eastplats)	USA/Canada	Canada	Mining	Term Loan	28-Oct-2010	27-Oct-2016	No	100	100	U.S. Dollar	Project Finance	Project Finance	LIBOR + 385			385														Yes	Senior				
Eastern Platinum Ltd (Eastplats)	USA/Canada	Canada	Mining	Revolver/Line >= 1 Yr.	28-Oct-2010	27-Oct-2016	No	0	0	U.S. Dollar	Project Finance	Project Finance	LIBOR + 385			385														Yes	Senior				
Econet Wireless Nigeria (EWN)	Africa	Nigeria	Telecommunications	Other Loan	16-May-2002		No	127	127	U.S. Dollar	Project Finance	Project Finance																		No	Senior				
Egypt Palm Hills Development	Africa	Egypt	Real Estate	Term Loan	15-Mar-2010	14-Mar-2015	No	567	103.46	Egyptian Pound	Project Finance	Project Finance																		Yes	Senior				
Egypt Power Station [Orascom Construction]	Africa	Egypt	Oil and Gas	Undisclosed	16-Mar-2015		No	1950	1950	U.S. Dollar	Project Finance	Project Finance									Arab Bank Plc, National Bank of Abu Dhabi PJSC [NBAD]									No	Senior				
Egyptian Co for Mobile Services	Africa	Egypt	Telecommunications	Term Loan	22-Apr-1999	21-Oct-2005	No	220	220	U.S. Dollar	Project Finance	Project Finance	LIBOR + 140			140		65		50										Yes	Senior				
Egyptian Co for Mobile Services	Africa	Egypt	Telecommunications	Term Loan	22-Apr-1999	22-Oct-2006	No	350	350	U.S. Dollar	Project Finance	Project Finance	LIBOR + 160			160		70		50										No	Senior				
Egyptian LNG 2	Africa	Egypt	Oil and Gas	Term Loan	14-Jul-2005	13-Jul-2017	No	411.2	411.2	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150					Bank of Tokyo-Mitsubishi Group									No	Senior				
Egyptian LNG 2	Africa	Egypt	Oil and Gas	Guarantee	14-Jul-2005	13-Jul-2015	No	144	144	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150					Bank of Tokyo-Mitsubishi Group									No	Senior				
Egyptian LNG 2	Africa	Egypt	Oil and Gas	Guarantee	14-Jul-2005		No	144	144	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150					Bank of Tokyo-Mitsubishi Group									No	Senior				
Egyptian Natural Gas Co	Africa	Egypt	Oil and Gas	Term Loan	13-Dec-2001	12-Dec-2008	No	104	104	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150														No	Senior				
Egyptian Nitrogen Products Co SAE [ENPC]	Africa	Egypt	Chemicals, Plastics & Rubber	Term Loan	16-Dec-2009		No	1050	1050	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Egyptian Petrochemicals Holding Company (ECHEM)	Africa	Egypt	Oil and Gas	Other Loan	27-Feb-2003		No	127.5	127.5	U.S. Dollar	Project Finance	Project Finance																		No	Senior				
Egyptian Petrochemicals Holding Company (ECHEM)	Africa	Egypt	Oil and Gas	Other Loan	23-Jan-2003		No	225	225	U.S. Dollar	Project Finance	Project Finance																		No	Senior				
Egyptian Refining Co SAE	Africa	Egypt	Oil and Gas	Other Loan	08-Sep-2010	07-Mar-2028	No	112.5	112.5	U.S. Dollar	Project Finance	Project Finance	LIBOR + 300			300														No	Mezzanine				
Egyptian Refining Co SAE	Africa	Egypt	Oil and Gas	Term Loan	08-Sep-2010	08-Mar-2028	No	200	200	U.S. Dollar	Project Finance	Project Finance	LIBOR + 300			300														Yes	Senior				
Egyptian Refining Co SAE	Africa	Egypt	Oil and Gas	Guarantee	08-Sep-2010	31-Dec-2025	No	472.5	472.5	U.S. Dollar	Project Finance	Project Finance	LIBOR + 300			300					Bank of Tokyo-Mitsubishi UFJ Ltd [BTMU]		European Investment Bank [EIB]							Yes	Senior				
El Hamarawan coal-fired power	Africa	Egypt	Utilities	Term Loan	12-Jun-2015		No	600	676.08	Euro	Project Finance	Project Finance																		Yes	Senior				
El Hamarawan coal-fired power	Africa	Egypt	Utilities	Term Loan	12-Jun-2015		No	3000	393.18	Egyptian Pound	Project Finance	Project Finance																		No	Senior				
Elektrocieplownia Nowa Sarzyna Sp zoo	Eastern Europe/Russia	Poland	Utilities	Term Loan	01-Jun-1998	01-Dec-2015	No	118.5	118.5	U.S. Dollar	Project Finance	Project Finance, Sponsored	LIBOR + 125			125	50	50		50		Enron Corp								No	Senior				
Eleme Petrochemicals Co	Africa	Nigeria	Oil and Gas	Term Loan	20-Mar-2007		No	125	125	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Eleme Petrochemicals Co	Africa	Nigeria	Oil and Gas	Other Loan	20-Mar-2007		No			U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Energy City Development Co WLL	Middle East	Qatar	Utilities	Murabaha	21-Apr-2008	20-Apr-2011	No	300	300	U.S. Dollar	Project Finance	Islamic Financing, Project Finance	LIBOR + 250			250					Emirates Islamic Bank PJSC [EIB]									Yes	Senior				
Erika Energy Pty Ltd	Africa	South Africa	Utilities	Term Loan	16-Dec-2012	31-Mar-2031	No	660	76.78	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Erika Energy Pty Ltd	Africa	South Africa	Utilities	Term Loan	16-Dec-2012	31-Mar-2031	No	125	14.54	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Erika Energy Pty Ltd	Africa	South Africa	Utilities	Term Loan	16-Dec-2012	31-Mar-2031	No	150	17.45	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
EuroChem Mineral & Chemical Co JSC [EvroKhim]	Eastern Europe/Russia	Russian Federation	Chemicals, Plastics & Rubber	Term Loan	30-Mar-2010	29-Mar-2020	No	261	261	U.S. Dollar	Project Finance	Project Finance	LIBOR + 250			250					Barclays Capital, Citi		Export Credit Insurance Corp of South Africa (Pty) Ltd [ECIC]							Yes	Senior				BB
Fonds d'Entretien Routier [FER]	Africa	Ivory Coast / Cote d'Ivoire	Financial Services	Term Loan	20-Feb-2014	20-Feb-2016	No	86	86	US Dollar (Same Day)	Project Finance	Project Finance	FR + 700							10	BGFIBank, BNP Paribas SA, Societe Generale SA									Yes	Senior				
Fonds d'Entretien Routier [FER]	Africa	Ivory Coast / Cote d'Ivoire	Financial Services	Term Loan	20-Feb-2014	20-Feb-2019	No	174	174	US Dollar (Same Day)	Project Finance	Project Finance	FR + 800							10	BGFIBank, BNP Paribas SA, Societe Generale SA									Yes	Senior				
Fountain Set (Holdings) Ltd	Asia Pacific	Hong Kong	Textiles and Apparel	Term Loan	21-May-1997	21-May-2002	No	450		Hong Kong Dollar	Project Finance	Project Finance	HIBOR + 160					77.5		37.5	Paribas Asia Ltd, Standard Chartered Bank Plc [SCB]									No	Senior				
Gabon Special Economic Zone [GSEZ]	Africa	Gabon	Business Services	Term Loan	22-Aug-2011	01-Mar-2015	No	28.73	28.73	US Dollar (Same Day)	Project Finance	Project Finance	SP5 + 700			700				245										Yes	Senior				
Gazprom OAO	Eastern Europe/Russia	Russian Federation	Utilities	Term Loan	03-Mar-2003	02-Sep-2008	No	450	450	U.S. Dollar	Project Finance	Project Finance	LIBOR + 330			330		85			ABN AMRO Bank NV [RBS], HypoVereinsbank									Yes	Senior		WR		BB+
Ghana Airports Company Ltd [GACL]	Africa	Ghana	Transportation	Term Loan	22-Dec-2014	31-Dec-2021	No	350	350	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Glencore Exploration (EG) Ltd	Latin America/Caribbean	Bermuda	Oil and Gas	Revolver/Line >= 1 Yr.	13-Aug-2012	23-Sep-2018	No	390	390	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance									BNP Paribas SA, Credit Agricole SA, Natixis SA, Societe Generale SA		Glencore International AG							Yes	Senior				
Golden Sugar Co Ltd	Africa	Nigeria	Beverage, Food, and Tobacco Processing	Term Loan	26-Jan-2011	25-Jan-2016	No	50	50	US Dollar (Same Day)	Project Finance	Project Finance	NIBOR + 300			300				45										Yes	Senior				
Golden Sugar Co Ltd	Africa	Nigeria	Beverage, Food, and Tobacco Processing	Term Loan	26-Jan-2011	25-Jan-2016	No	13.3	13.3	US Dollar (Same Day)	Project Finance	Project Finance	FR + 900																	Yes	Senior				
Golden Sugar Co Ltd	Africa	Nigeria	Beverage, Food, and Tobacco Processing	Term Loan	26-Jan-2011	25-Jan-2016	No	80	80	US Dollar (Same Day)	Project Finance	Project Finance	NIBOR + 300			300														Yes	Senior				
Golden Sugar Co Ltd	Africa	Nigeria	Beverage, Food, and Tobacco Processing	Term Loan	26-Jan-2011	25-Jan-2016	No	80	80	U.S. Dollar	Project Finance	Project Finance	LIBOR + 500			500				45										Yes	Senior				
Haldia Petrochemicals Ltd	Asia Pacific	India	Chemicals, Plastics & Rubber	Term Loan	30-Sep-1999	30-Mar-2008	Yes	50	50	U.S. Dollar	Project Finance	Project Finance, Sponsored	LIBOR + 225					125		50	ANZ Investment Bank	Tatas, West	State Bank of India							No	Senior				
Henri Konan Bedie Toll Bridge	Africa	Ivory Coast / Cote d'Ivoire	Construction	Term Loan	09-Jul-2012		No	127	156.44	Euro	Project Finance	Project Finance											Multilateral Investment Guarantee Agency (MIGA)							Yes	Senior				
Herald Resources Ltd	Asia Pacific	Australia	Mining	Term Loan	20-Jun-2005		No	65	50.41	Australian Dollar	Project Finance	Project Finance																		No	Senior				
Hidroelectrica de Cahora Bassa Sarl	Africa	Mozambique	Utilities	Term Loan	30-Apr-2008	30-Dec-2017	No	5736	763.78	South African Rand	Project Finance	Project Finance	LIBOR + 190			190					Banco BPI SA, Credit Agricole Corporate & Investment Bank SA [ex-Calyon]									No	Senior				
Highlands Kainantu Ltd	Asia Pacific	Papua New Guinea	Mining	Term Loan	13-Jan-2004	13-Jan-2008	No	31	31	U.S. Dollar	Project Finance	Project Finance											Highlands Pacific Ltd							Yes	Senior				
Independent Power Southern Africa Plc [IPSA]	Africa	South Africa	Utilities	Other Loan	29-Jan-2008		No			U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Indorama Eleme Petrochemicals Ltd [IEPL]	Africa	Nigeria	Chemicals, Plastics & Rubber	Term Loan	27-Feb-2013	27-Feb-2024	No	475	475	U.S. Dollar	Project Finance	Project Finance	LIBOR + 495			495					Bank of India, Belgian Investment Company for Developing Countries [BIO], CDC Group Plc [Colonial/Commonwealth Development Corp], DEG [Deutsche Investitions-und Entwicklungsgesellschaft mbH], Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden NV [FMO]									Yes	Senior				
Indorama Eleme Petrochemicals Ltd [IEPL]	Africa	Nigeria	Chemicals, Plastics & Rubber	Term Loan	27-Feb-2013	27-Feb-2021	No	135	135	U.S. Dollar	Project Finance	Project Finance	LIBOR + 475			475					Standard Chartered Bank Plc [SCB]									Yes	Senior				
Itezhi Tezhi Hydro Power Project	Africa	Zambia	Utilities	Term Loan	12-Jun-2015	12-Jun-2028	No	142	142	U.S. Dollar	Project Finance	Project Finance	LIBOR + 350			350					Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden NV [FMO], Proparco [Promotion et Participation pour la Cooperation Economique]									Yes	Senior				
Itezhi Tezhi Hydro Power Project	Africa	Zambia	Utilities	Term Loan	28-Dec-2012		No	55	55	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Jorf Lasfar Energy Co SA	Africa	Morocco	Utilities	Term Loan	20-Jun-2012	31-May-2028	No	4500	518.43	Moroccan Dirham	Project Finance	Project Finance																		Yes	Senior				
Jorf Lasfar Energy Co SA	Africa	Morocco	Utilities	VAT	20-Jun-2012	20-Dec-2012	No	700	80.65	Moroccan Dirham	Project Finance	Project Finance																		Yes	Senior				
Jorf Lasfar Energy Co SA	Africa	Morocco	Utilities	Revolver/Line >= 1 Yr.	30-Sep-1997	30-Sep-2009	No	237	237	U.S. Dollar	Project Finance	Project Finance	LIBOR + 212.5			212.5	50			50	Credit Suisse First Boston									No	Senior				
Jorf Lasfar Energy Co SA	Africa	Morocco	Utilities	Revolver/Line >= 1 Yr.	30-Sep-1997	30-Sep-2009	No	256	256	U.S. Dollar	Project Finance	Project Finance	LIBOR + 100			100	50			50	Credit Suisse First Boston									No	Senior				
Jorf Lasfar Energy Co SA	Africa	Morocco	Utilities	Revolver/Line >= 1 Yr.	30-Sep-1997	30-Sep-2009	No	35	35	U.S. Dollar	Project Finance	Project Finance	LIBOR + 200			200	50			50	Credit Suisse First Boston									No	Senior				
Jorf Lasfar Energy Co SA	Africa	Morocco	Utilities	Revolver/Line >= 1 Yr.	30-Sep-1997	30-Sep-2009	No	176	176	U.S. Dollar	Project Finance	Project Finance	LIBOR + 175			175	50			50	Credit Suisse First Boston									No	Senior				
Jubilee Field	Africa	Ghana	Oil and Gas	Term Loan	13-Jul-2009	31-Dec-2015	No	600	600	U.S. Dollar	Project Finance	Borrower Base, Project Finance									Standard Chartered Bank Plc [SCB]									Yes	Senior				
Jubilee Field	Africa	Ghana	Oil and Gas	Term Loan	13-Jul-2009	30-Jun-2016	No	150	150	U.S. Dollar	Project Finance	Borrower Base, Project Finance									Standard Chartered Bank Plc [SCB]									Yes	Senior				
Kansanshi Copper Project	Africa	Zambia	Mining	Term Loan	31-Jan-2012	24-Jan-2017	No	300	300	U.S. Dollar	Project Finance	Project Finance	LIBOR + 300			300					BNP Paribas SA, Standard Chartered Bank Plc [SCB]									Yes	Senior				
Kansanshi Copper Project	Africa	Zambia	Mining	Revolver/Line >= 1 Yr.	31-Jan-2012	24-Jan-2017	No	700	700	U.S. Dollar	Project Finance	Project Finance	LIBOR + 300			300					BNP Paribas SA, Standard Chartered Bank Plc [SCB]									Yes	Senior				
Kansanshi Copper Project	Africa	Zambia	Mining	Other Loan	29-Nov-2002		No	60	60	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Kansanshi Copper Project	Africa	Zambia	Mining	Other Loan	29-Nov-2002		No	60	60	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Kayelekera Uranium Mine	Africa	Malawi	Mining	Term Loan	30-Jun-2009	31-Mar-2015	No	35	35	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Kayelekera Uranium Mine	Africa	Malawi	Mining	Term Loan	30-Jun-2009	31-Mar-2015	No	110	110	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Kenya Pipeline Company (KPC) (Olkaria)	Africa	Kenya	Oil and Gas	Term Loan	11-Dec-2008		No	105	105	U.S. Dollar	Project Finance	Project Finance									Citi									Yes	Senior				
Keysbrook Mineral Sands Project	Asia Pacific	Australia	Mining	Term Loan	19-Nov-2014	19-Nov-2019	No	37.5	37.5	U.S. Dollar	Project Finance	Project Finance	LIBOR + 474			474														No	Senior				
Keysbrook Mineral Sands Project	Asia Pacific	Australia	Mining	Term Loan	19-Nov-2014	19-Nov-2019	No	3	3	U.S. Dollar	Project Finance	Project Finance	LIBOR + 400			400														No	Senior				
Keysbrook Mineral Sands Project	Asia Pacific	Australia	Mining	Guarantee	19-Nov-2014	19-Nov-2019	No	11.5	9.91	Australian Dollar	Project Finance	Project Finance																		No	Senior				
Kinangop Wind Park Project	Africa	Kenya	Utilities	Other Loan	09-Oct-2013	09-Oct-2023	No	90	90	U.S. Dollar	Project Finance	Project Finance	LIBOR + 575			575					Standard Bank Plc									Yes	Senior				
Korea Electric Power Corp [KEPCO]	Asia Pacific	South Korea	Utilities	Term Loan	21-Jun-2013	21-Jun-2020	No	303	303	U.S. Dollar	Project Finance	Project Finance																		No	Senior		Aa3		A+
Korea Electric Power Corp [KEPCO]	Asia Pacific	South Korea	Utilities	Revolver/Line >= 1 Yr.	21-Jun-2013	21-Jun-2014	No	5	5	U.S. Dollar	Project Finance	Project Finance																		No	Senior		Aa3		A+
Kosmos Energy Ghana HC	Africa	Ghana	Oil and Gas	Revolver/Line >= 1 Yr.	14-Mar-2014	31-Mar-2021	Yes	1500	1500	U.S. Dollar	Project Finance	Borrower Base, Project Finance	LIBOR + 325			325					BNP Paribas SA, Credit Agricole Corporate & Investment Bank SA [Credit Agricole CIB], HSBC Bank Plc, SG Corporate & Investment Banking, Standard Chartered Bank Plc [SCB]			K0004W049RC01	99	100	99.5	3.89	360.5	Yes	Senior			B	
Kosmos Energy Ghana HC	Africa	Ghana	Oil and Gas	Revolver/Line >= 1 Yr.	15-Jul-2011	29-Mar-2018	Yes	2000	2000	U.S. Dollar	Project Finance	Project Finance	LIBOR + 325			455	170		130	40	BNP Paribas SA, Citi, Credit Agricole Corporate & Investment Bank SA [Credit Agricole CIB], HSBC Bank Plc, SG Corporate & Investment Banking, Standard Chartered Bank Plc [SCB]			K0004W049RC01	99	100	99.5	3.89	360.5	Yes	Senior				
Kosmos Energy Ghana HC	Africa	Ghana	Oil and Gas	Term Loan	13-Jul-2009	12-Dec-2015	No	600	600	U.S. Dollar	Project Finance	Project Finance	LIBOR + 550			550					Asean Finance Corp Ltd [AFC Merchant Bank], Cordiant Capital			K0004W013TL01						Yes	Senior				
Kpone Independent Power Project	Africa	Ghana	Utilities	Other Loan	20-Nov-2013	20-Nov-2028	No	1000	1000	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Kribi Power Development Co SA [KPDC]	Africa	Cameroon	Utilities	Term Loan	17-Jan-2012		No	138	175.77	Euro	Project Finance	Project Finance																		Yes	Senior				
Kribi Power Development Co SA [KPDC]	Africa	Cameroon	Utilities	Bridge Loan	31-May-2011	05-Jan-2012	No	119.76	119.76	US Dollar (Same Day)	Project Finance	Project Finance	SP5 + 250			250				35										Yes	Senior				
Kuvaninga Energia	Africa	Mozambique	Utilities	Term Loan	31-Dec-2013	30-Mar-2027	No	34	34	U.S. Dollar	Project Finance	Project Finance									Investec Bank Plc									Yes	Senior				
Kwale International Sugar Co Ltd [KISCOL]	Africa	Kenya	Beverage, Food, and Tobacco Processing	Term Loan	12-Aug-2013	12-Aug-2022	No	100	100	U.S. Dollar	Project Finance	Project Finance	LIBOR + 700			700														Yes	Senior				
Kwale International Sugar Co Ltd [KISCOL]	Africa	Kenya	Beverage, Food, and Tobacco Processing	Term Loan	12-Aug-2013	12-Aug-2025	No	20	20	U.S. Dollar	Project Finance	Project Finance	LIBOR + 600			600														Yes	Senior				
Lafarge Cement Syria SA [ex-Syrian Cement]	Middle East	Syria	Construction	Bridge Loan	28-Jul-2008		No	380	380	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Lake Turkana Wind Power	Africa	Kenya	Utilities	Term Loan	26-Mar-2014	26-Mar-2029	No	110	151.59	Euro	Project Finance	Project Finance	LIBOR + 475			475														Yes	Senior				
Lake Turkana Wind Power	Africa	Kenya	Utilities	Term Loan	26-Mar-2014	26-Mar-2029	No	10	13.78	Euro	Project Finance	Project Finance	LIBOR + 475			475														Yes	Senior				
Lake Turkana Wind Power	Africa	Kenya	Utilities	Term Loan	26-Mar-2014	26-Mar-2029	No	20	27.56	Euro	Project Finance	Project Finance																		Yes	Subordinated				

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Borrower Name	Region	Country	Major Industry Group	Tranche Type	Tranche Active Date	Tranche Maturity Date	Tranche Amended	Tranche Amount (MM)	Tranche Amount Converted (MM)(USD)	Tranche Currency	Primary Purpose	Market Segment	Base Rate & Margin (bps)	Floor (bps)	Original Issue Discount (OID)	All In Spread Drawn (bps)	All in Spread Undrawn (bps)	Upfront Fee (bps)	Annual Fee (bps)	Commitment Fee (bps)	Top Tier Arranger	Sponsor	Guarantor	LIN	Average Bid	Average Ask	Mean	Yield (%)	Disc. Spread (bps)	Secured	Seniority Type	Moody's Bank Loan Current	Moody's Senior Unsecured	S&P Bank Loan Current	S&P's Senior Unsecured
Leading Spirit Electronics Ltd	Asia Pacific	Hong Kong	General Manufacturing	Term Loan	24-Jul-1995	24-Jul-1997	No	126		Hong Kong Dollar	Project Finance	Project Finance	HIBOR + 175					45		40	Banque Nationale de Paris Hong Kong									No	Senior				
Ledjadja Coal Ltd	Africa	South Africa	Mining	Term Loan	11-Oct-2012	11-Oct-2021	No	400	400	US Dollar (Same Day)	Project Finance	Project Finance																		Yes	Senior				
Lekki-Epe Expressway	Africa	Nigeria	Construction	Term Loan	20-Oct-2008	19-Oct-2023	No	85	85	US Dollar (Same Day)	Project Finance	Project Finance																		Yes	Senior				
Lekki-Epe Expressway	Africa	Nigeria	Construction	Term Loan	20-Oct-2008	19-Oct-2023	No	93	93	US Dollar (Same Day)	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Liberian Palm Developments Ltd	Africa	Liberia	Agriculture	Term Loan	27-Feb-2013		No	140	140	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Llanga 100MW CSP	Africa	South Africa	Utilities	Term Loan	25-Feb-2015		No	8000	698.96	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Luanda Shopping	Africa	Angola	Construction	Term Loan	05-Nov-2012	05-Nov-2016	No	62.2	62.2	U.S. Dollar	Project Finance	Project Finance									Banco Caixa Geral SA [BCG]									No	Senior				
Lundin Petroleum AB	Western Europe	Sweden	Oil and Gas	Revolver/Line >= 1 Yr.	06-Feb-2014	25-Jun-2019	Yes	4000	4000	U.S. Dollar	Project Finance	Borrower Base, Project Finance	LIBOR + 275			275					Bank of Tokyo-Mitsubishi UFJ Ltd [BTMU], BNP Paribas SA, Citi, Commonwealth Bank of Australia, Credit Agricole SA, Deutsche Bank AG, DNB ASA, HSBC, ING Bank NV, JP Morgan, Lloyds Bank, Natixis SA, Nordea Bank AB, SG Corporate & Investment Banking, Skandinaviska Enskilda Banken AB [SEB]			L0006X010RC01						Yes	Senior				
Lundin Petroleum AB	Western Europe	Sweden	Oil and Gas	Revolver/Line >= 1 Yr.	25-Jun-2012	25-Jun-2019	Yes	2500	2500	U.S. Dollar	Project Finance	Borrower Base, Investment Grade, Project Finance	LIBOR + 275			275					Bank of Tokyo-Mitsubishi UFJ Ltd [BTMU], BNP Paribas SA, Citi, Commonwealth Bank of Australia, Credit Agricole SA, Deutsche Bank AG, DNB ASA, HSBC, ING Bank NV, JP Morgan, Lloyds Bank, Natixis SA, Nordea Bank AB, Skandinaviska Enskilda Banken AB [SEB], Societe Generale SA			L0006X010RC01						Yes	Senior				
Mainstream Renewable Power Ltd (South Africa)	Africa	South Africa	Utilities	Term Loan	02-Nov-2012	02-Nov-2029	No	967.13	110.91	South African Rand	Project Finance	Project Finance	SP5 + 310			310				100										Yes	Senior				
Mainstream Renewable Power Ltd (South Africa)	Africa	South Africa	Utilities	Term Loan	02-Nov-2012	02-Nov-2029	No	2067.18	237.06	South African Rand	Project Finance	Project Finance	SP5 + 310			310				100										Yes	Senior				
Mainstream Renewable Power Ltd (South Africa)	Africa	South Africa	Utilities	Term Loan	02-Nov-2012	02-Nov-2029	No	991.91	113.75	South African Rand	Project Finance	Project Finance	SP5 + 310			310				100										Yes	Senior				
Majid Al Futtaim Group LLC [MAF]	Middle East	United Arab Emirates	Retail & Supermarkets	Term Loan	07-Nov-2013	07-Apr-2026	No	3000	435.5	Egyptian Pound	Project Finance	Project Finance																		Yes	Senior				BBB
Mamba Cement Co (Pty) Ltd	Africa	South Africa	Construction	Term Loan	21-May-2014	21-May-2024	No	1100	106.1	South African Rand	Project Finance	Project Finance									Bank of China Ltd									Yes	Senior				
Minas de Aguas Tenidas SAU	Western Europe	Spain	Mining	Term Loan	28-May-2008	27-Aug-2013	No	170	170	U.S. Dollar	Project Finance	Project Finance	LIBOR + 225			225					BNP Paribas SA, SG Corporate & Investment Banking									Yes	Senior				
Minas de Aguas Tenidas SAU	Western Europe	Spain	Mining	Term Loan	28-May-2008	27-Aug-2013	No	30	30	U.S. Dollar	Project Finance	Project Finance	LIBOR + 300			300					BNP Paribas SA, SG Corporate & Investment Banking									Yes	Senior				
Minas de Aguas Tenidas SAU	Western Europe	Spain	Mining	Term Loan	28-May-2008	27-Aug-2013	No	10	10	U.S. Dollar	Project Finance	Project Finance	LIBOR + 225			225					BNP Paribas SA, SG Corporate & Investment Banking									Yes	Senior				
Minas de Aguas Tenidas SAU	Western Europe	Spain	Mining	Revolver/Line >= 1 Yr.	28-May-2008	27-May-2009	No	20	20	U.S. Dollar	Project Finance	Project Finance									BNP Paribas SA, SG Corporate & Investment Banking									Yes	Senior				
Minera Isla Riesco	Latin America/Caribbean	Chile	Mining	Other Loan	22-Jul-2011	22-Jul-2021	No	450	450	U.S. Dollar	Project Finance	Project Finance									Banco Itau BBA SA									No	Senior				
Moma Titanium Mineral Sands Project	Africa	Mozambique	Mining	Other Loan	22-May-2003		No	40	40	U.S. Dollar	Project Finance	Project Finance																		No	Senior				
Moxie Patriot LLC	USA/Canada	United States	Oil and Gas	Term Loan B	19-Dec-2013	19-Dec-2020	No	585	585	U.S. Dollar	Project Finance	Institutional, Non Investment Grade, Project Finance									Ares Capital Corp, Credit Suisse AG, Goldman Sachs & Co, Union Bank NA	Panda Power Funds								No	Senior				
Moxie Patriot LLC	USA/Canada	United States	Oil and Gas	Standby Letter of Credit	19-Dec-2013	19-Dec-2020	No	52.5	52.5	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance									Ares Capital Corp, Credit Suisse AG, Goldman Sachs & Co, Union Bank NA	Panda Power Funds								No	Senior				
Moxie Patriot LLC	USA/Canada	United States	Oil and Gas	Other Loan	19-Dec-2013	19-Dec-2020	No	14	14	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance									Ares Capital Corp, Credit Suisse AG, Goldman Sachs & Co, Union Bank NA	Panda Power Funds								No	Senior				
Mulilo 100MW De Aar 1 wind farm	Africa	South Africa	Utilities	Term Loan	25-Feb-2015	25-Feb-2031	No	800	69.9	South African Rand	Project Finance	Project Finance	EURIBOR + 310			310														Yes	Senior				
Mulilo 140MW De Aar 2 wind farm	Africa	South Africa	Utilities	Term Loan	25-Feb-2015	25-Feb-2031	No	1115	97.42	South African Rand	Project Finance	Project Finance	LIBOR + 310			310														Yes	Senior				
Mulilo Prieska 75MW	Africa	South Africa	Utilities	Term Loan	25-Feb-2015	25-Feb-2031	No	550	48.05	South African Rand	Project Finance	Project Finance	LIBOR + 310			310														Yes	Senior				
Mulilo-Sonnedix 75MW Prieska	Africa	South Africa	Utilities	Term Loan	25-Feb-2015	25-Feb-2031	No	1160	101.35	South African Rand	Project Finance	Project Finance	LIBOR + 310			310					Standard Bank Plc									Yes	Senior				
MZI Resources Ltd	Asia Pacific	Australia	Mining	Bridge Loan	19-Nov-2014	19-Nov-2015	No	4	4	U.S. Dollar	Project Finance	Project Finance	LIBOR + 100			100														No	Senior				
MZI Resources Ltd	Asia Pacific	Australia	Mining	Bridge Loan	19-Nov-2014	19-Nov-2015	No	13	13	U.S. Dollar	Project Finance	Project Finance	LIBOR + 100			100														No	Senior				
MZI Resources Ltd	Asia Pacific	Australia	Mining	Bridge Loan	19-Nov-2014	19-Nov-2015	No	12.5	12.5	U.S. Dollar	Project Finance	Project Finance	LIBOR + 100			100														No	Senior				
MZI Resources Ltd	Asia Pacific	Australia	Mining	Bridge Loan	19-Nov-2014	19-Nov-2015	No	4	4	U.S. Dollar	Project Finance	Project Finance	LIBOR + 100			100														No	Senior				
New Liberty Gold Project	Africa	Liberia	Mining	Term Loan	04-Dec-2013	13-Sep-2019	No	80	80	U.S. Dollar	Project Finance	Project Finance	LIBOR + 500			500							Export Credit Insurance Corp of South Africa (Pty) Ltd [ECIC]							Yes	Senior				
New Liberty Gold Project	Africa	Liberia	Mining	Term Loan	04-Dec-2013	13-Sep-2019	No	8	8	U.S. Dollar	Project Finance	Project Finance	LIBOR + 500			500														Yes	Senior				
New Liberty Gold Project	Africa	Liberia	Mining	Term Loan	04-Dec-2013	13-Mar-2020	No	12	12	U.S. Dollar	Project Finance	Project Finance	LIBOR + 750			750							Export Credit Insurance Corp of South Africa (Pty) Ltd [ECIC]							Yes	Subordinated				
NGL II Supplemental Cost Financing	Africa	Nigeria	Oil and Gas	Term Loan	17-Jun-2008	17-Jun-2009	No	220	220	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Nigerian Liquefied Natural Gas Ltd [NLNG]	Africa	Nigeria	Oil and Gas	Other Loan	18-Dec-2002		No	200	200	U.S. Dollar	Project Finance	Project Finance									BNP Paribas SA, Citibank									No	Senior				
Nigerian National Petroleum Corp [NNPC]	Africa	Nigeria	Oil and Gas	Other Loan	18-May-2012		No	900	900	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Nord Resources Corp	USA/Canada	United States	Mining	Term Loan	30-Jun-2008	31-Dec-2008	No	25	25	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance	P + 350			605				25										Yes	Senior				
Nyumba Ya Akiba SA	Africa	Democratic Republic of Congo (Kinshasa)	Construction	Term Loan	19-Dec-2014		No	30	30	U.S. Dollar	Project Finance	Project Finance											Danish Export Credit Fund (Eksport Kredit Fonden (EKF))							Yes	Senior				
Nyumba Ya Akiba SA	Africa	Democratic Republic of Congo (Kinshasa)	Construction	Term Loan	19-Dec-2014		No	30	30	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
O3b Networks Ltd [Other 3 Billion]	Western Europe	United Kingdom	Telecommunications	Other Loan	19-Nov-2010		No	145	145	U.S. Dollar	Project Finance	Project Finance	LIBOR + 195			195	78			78										No	Mezzanine				
Olam Palm Gabon Ltd [OPG]	Africa	Gabon	Business Services	Term Loan	12-Jul-2012	12-Jul-2019	No	100	100	US Dollar (Same Day)	Project Finance	Project Finance	SP5 + 400			400				35			Olam Palm Gabon Ltd [OPG]							Yes	Senior				
Olam Palm Gabon Ltd [OPG]	Africa	Gabon	Business Services	Term Loan	12-Jul-2012	12-Jul-2022	No	20	20	US Dollar (Same Day)	Project Finance	Project Finance	SP5 + 400			400				35			Olam Palm Gabon Ltd [OPG]							Yes	Senior				
Olam Palm Gabon Ltd [OPG]	Africa	Gabon	Business Services	Term Loan	12-Jul-2012	12-Jul-2019	No	70	85.37	Euro	Project Finance	Project Finance	EURIBOR + 625			625				35			Olam Palm Gabon Ltd [OPG]							Yes	Senior				
Optimum Coal Holdings (Pty) Ltd [OCH]	Africa	South Africa	Mining	Term Loan	15-Dec-2009	31-Dec-2015	No	600	80.75	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Optimum Coal Holdings (Pty) Ltd [OCH]	Africa	South Africa	Mining	Revolver/Line >= 1 Yr.	15-Dec-2009	31-Dec-2015	No	200	26.92	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Optimum Coal Holdings (Pty) Ltd [OCH]	Africa	South Africa	Mining	Term Loan	15-Dec-2009	31-Dec-2015	No	350	47.11	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Optimum Coal Holdings (Pty) Ltd [OCH]	Africa	South Africa	Mining	Standby Letter of Credit	15-Dec-2009	31-Dec-2015	No	100	13.46	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Orascom Telecom Tunisie SA [OTT]	Africa	Tunisia	Telecommunications	Term Loan	02-Nov-2004	01-Nov-2011	No	130	165.42	Euro	Project Finance	Project Finance	LIBOR + 150			150					Arab Banking Corp BSC [London], HypoVereinsbank, Standard Bank Plc [Ex-Standard Bank London Ltd]		Compagnie Francaise d'Assurance pour le Commerce Exterior [COFACE], Hermes Kreditversicherungs AG [Hermes]							No	Senior				
Orascom Telecom Tunisie SA [OTT]	Africa	Tunisia	Telecommunications	Term Loan	02-Nov-2004	01-May-2011	No	110	139.98	Euro	Project Finance	Project Finance									Arab Banking Corp BSC [London], HypoVereinsbank, Standard Bank Plc [Ex-Standard Bank London Ltd]									No	Senior				
Palabora Mining Co	Africa	South Africa	Mining	Term Loan	15-Jun-2001	20-Jan-2006	No	90	90	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150			75		Citibank SA, Industrial Bank of Japan Ltd									No	Senior				
Palabora Mining Co	Africa	South Africa	Mining	Term Loan	15-Jun-2001	14-Jan-2006	No	35	35	U.S. Dollar	eral Purpose/Refina	Project Finance	LIBOR + 150			150				75	Citibank SA, Industrial Bank of Japan Ltd									No	Senior				
Paladin Resources Ltd	Asia Pacific	Australia	Mining	Term Loan	26-Aug-2011	26-Aug-2017	Yes	135	135	U.S. Dollar	Project Finance	Project Finance									SG Corporate & Investment Banking									Yes	Senior				
Paladin Resources Ltd	Asia Pacific	Australia	Mining	Standby Letter of Credit	26-Aug-2011	26-Aug-2017	Yes	6	6	U.S. Dollar	Project Finance	Project Finance									SG Corporate & Investment Banking									Yes	Senior				
Paladin Resources Ltd	Asia Pacific	Australia	Mining	Term Loan	05-Sep-2005	05-Sep-2012	Yes	65	65	U.S. Dollar	Project Finance	Project Finance									SG Australia Ltd									No	Senior				
Paladin Resources Ltd	Asia Pacific	Australia	Mining	Standby Letter of Credit	05-Sep-2005	05-Sep-2012	Yes	6	6	U.S. Dollar	Project Finance	Project Finance									SG Australia Ltd									No	Senior				
Palm City Ltd	Africa	Libya	Real Estate	Term Loan	20-Mar-2007	19-Mar-2014	No	55	73.23	Euro	Project Finance	Project Finance																		Yes	Senior				
Petroleum Oil and Gas Corporation of South Africa Ghana Ltd [PetroSA Ghana]	Africa	Ghana	Oil and Gas	Revolver/Line >= 1 Yr.	25-Feb-2015	25-Feb-2022	No	150	150	U.S. Dollar	Project Finance	Borrower Base, Project Finance	LIBOR + 325			325														Yes	Senior				
PG Group (Pty) Ltd	Africa	South Africa	Construction	Term Loan	15-Mar-2006	14-Mar-2018	No	790	127.94	South African Rand	Project Finance	Project Finance																		Yes	Senior				
PG Group (Pty) Ltd	Africa	South Africa	Construction	Revolver/Line >= 1 Yr.	15-Mar-2006	14-Mar-2018	No	350	56.68	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Platinum Group Metals Ltd	USA/Canada	Canada	Mining	Term Loan	11-Nov-2013	11-Nov-2021	No	195	195	U.S. Dollar	Project Finance	Project Finance									Barclays Bank Plc, Societe Generale SA									No	Senior				
Platinum Group Metals Ltd	USA/Canada	Canada	Mining	Term Loan	06-Dec-2012	06-Dec-2020	No	260	260	U.S. Dollar	Project Finance	Project Finance	LIBOR + 500			500					Societe Generale SA									Yes	Senior				
Platmin Ltd	Africa	South Africa	Mining	Term Loan	02-Nov-2007		No	200	200	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Rapu Rapu Processing Inc	Asia Pacific	Philippines	Mining	Term Loan	07-May-2004	31-Dec-2008	No	31.5	31.5	U.S. Dollar	Project Finance	Project Finance											Lafayette Mining Ltd							No	Senior				
Rapu Rapu Processing Inc	Asia Pacific	Philippines	Mining	Term Loan	07-May-2004	31-Dec-2008	No	3.5	3.5	U.S. Dollar	Project Finance	Project Finance											Lafayette Mining Ltd							No	Senior				
Red Cap Kouga Wind Farm Pty Ltd	Africa	South Africa	Utilities	Term Loan	15-Nov-2012	31-Jan-2030	No	1056	118.33	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Red Cap Kouga Wind Farm Pty Ltd	Africa	South Africa	Utilities	Term Loan	15-Nov-2012	31-Jan-2030	No	264	29.58	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Red Cap Kouga Wind Farm Pty Ltd	Africa	South Africa	Utilities	Mezzanine Tranche	15-Nov-2012	31-Jan-2030	No	188	21.07	South African Rand	Project Finance	Hybrid, Institutional, Project Finance, Second Lien									Standard Bank Plc									Yes	Mezzanine				
Reliance Ports & Terminals Ltd	Asia Pacific	India	Shipping	Term Loan	28-Apr-2007	28-Apr-2017	No	500	500	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150		55			Arab Bank Plc, BNP Paribas SA, DBS Bank Ltd, Emirates NBD PJSC [ex-Emirates Bank], ICICI Bank, Intesa Sanpaolo SpA [ISP], Mashreqbank psc, Standard Chartered Bank Plc [SCB], Sumitomo Mitsui Banking Corp, Union National Bank PJSC [UNB]			R0007Z016TL01	97.16	97.65	97.41	3.41	312.2	No	Senior				
Reliance Ports & Terminals Ltd	Asia Pacific	India	Shipping	Term Loan	28-Apr-2007	28-Apr-2017	No	425	425	U.S. Dollar	Project Finance	Project Finance	LIBOR + 150			150		55			Arab Bank Plc, BNP Paribas SA, DBS Bank Ltd, Emirates NBD PJSC [ex-Emirates Bank], ICICI Bank, Intesa Sanpaolo SpA [ISP], Mashreqbank psc, Standard Chartered Bank Plc [SCB], Sumitomo Mitsui Banking Corp, Union National Bank PJSC [UNB]			R0007Z014TL02	97.16	97.65	97.41	3.41	312.2	No	Senior				
Republic of Uganda	Africa	Uganda	Government	Term Loan	30-Oct-2007	30-Oct-2047	No	3484	30.4	Japanese Yen	Project Finance	Project Finance	FR + 1								Japan Bank for International Cooperation									No	Senior				
Safi Independent Power Plant [Safi IPP]	Africa	Morocco	Utilities	Term Loan	16-Sep-2014	01-Sep-2032	No	4592.6	536.14	Moroccan Dirham	Project Finance	Project Finance											Nippon Export & Investment Insurance (NEXI)							Yes	Senior				
Sasol Chemicals (USA) LLC	USA/Canada	United States	Utilities	Term Loan	22-Dec-2014	22-Dec-2021	No	3995	3995	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance	LIBOR + 225			225					Bank of America, Bank of Tokyo-Mitsubishi UFJ Ltd [BTMU], Barclays, BNP Paribas SA, Citibank, HSBC, Industrial & Commercial Bank of China, ING, Intesa Sanpaolo SpA [ISP], JP Morgan, KfW IPEX-Bank GmbH, Korea Development Bank, Mizuho Bank Ltd, Societe Generale SA, Sumitomo Mitsui Banking Corp									No	Senior				
Sasol Chemicals (USA) LLC	USA/Canada	United States	Utilities	Standby Letter of Credit	22-Dec-2014	22-Dec-2021	No	45	45	U.S. Dollar	Project Finance	Non Investment Grade, Project Finance	LIBOR + 225								Bank of America, Bank of Tokyo-Mitsubishi UFJ Ltd [BTMU], Barclays, BNP Paribas SA, Citibank, HSBC, Industrial & Commercial Bank of China, ING, Intesa Sanpaolo SpA [ISP], JP Morgan, KfW IPEX-Bank GmbH, Korea Development Bank, Mizuho Bank Ltd, Societe Generale SA, Sumitomo Mitsui Banking Corp									No	Senior				
Sasol Ltd	Africa	South Africa	Oil and Gas	Bridge Loan	13-Jan-2003	11-Jan-2004	No	550	63.78	South African Rand	Project Finance	Project Finance																		No	Senior				
Sasol Ltd	Africa	South Africa	Oil and Gas	Other Loan	29-Aug-2002	28-Aug-2014	No	393	393	US Dollar (Same Day)	Project Finance	Project Finance																		No	Senior				
Scatec Solar SA 166 Pty Ltd	Africa	South Africa	Utilities	Term Loan	06-Nov-2012	29-Dec-2028	No	1250	144.96	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Scatec Solar SA 166 Pty Ltd	Africa	South Africa	Utilities	Term Loan	06-Nov-2012	29-Dec-2028	No	400	46.39	South African Rand	Project Finance	Project Finance									Standard Bank Plc									Yes	Senior				
Seacom	Africa	South Africa	Telecommunications	Term Loan	19-Nov-2007		No	650	650	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
SENDOU Senegal Project	Africa	Senegal	Utilities	Other Loan	15-Sep-2013	15-Sep-2027	No	55	73.11	Euro	Project Finance	Project Finance	LIBOR + 525			525														Yes	Senior				
SENDOU Senegal Project	Africa	Senegal	Utilities	Other Loan	15-Sep-2013	15-Sep-2027	No	0.03	0.03	US Dollar (Same Day)	Project Finance	Project Finance	LIBOR + 525			525														Yes	Senior				
SENDOU Senegal Project	Africa	Senegal	Utilities	Other Loan	15-Sep-2013	15-Sep-2025	No	0.08	0.08	US Dollar (Same Day)	Project Finance	Project Finance																		Yes	Senior				
Seven Energy International Ltd	Africa	Nigeria	Oil and Gas	Term Loan	02-Apr-2013	02-Apr-2020	No	225	225	U.S. Dollar	Project Finance	Project Finance	LIBOR + 1000			1000								S000PR013TL01	84	87	85.5	17.23	1694.6	Yes	Senior				
Sidi Krir Generating Co	Africa	Egypt	Utilities	Revolver/Line >= 1 Yr.	02-Aug-1999	01-Aug-2014	No	6	6	U.S. Dollar	Working capital	Project Finance																		Yes	Senior				
Sidi Krir Generating Co	Africa	Egypt	Utilities	Term Loan	02-Aug-1999	01-Aug-2010	No	130	130	U.S. Dollar	Project Finance	Project Finance	LIBOR + 175			175		55												Yes	Senior				
Sidi Krir Generating Co	Africa	Egypt	Utilities	Term Loan	02-Aug-1999	01-Aug-2014	No	187	187	U.S. Dollar	Project Finance	Project Finance	LIBOR + 230			230														Yes	Senior				
Sidi Krir Generating Co	Africa	Egypt	Utilities	Bridge Loan	02-Aug-1999	01-Aug-2002	No	35	35	U.S. Dollar	Project Finance	Project Finance	LIBOR + 35			35		15												Yes	Senior				
Sidi Krir Generating Co	Africa	Egypt	Utilities	Other Loan	02-Aug-1999	01-Aug-2014	No	19.5	19.5	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Sociedad Concesionaria Autopista de Antofagasta SA	Latin America/Caribbean	Chile	Construction	Term Loan	16-Dec-2010	16-May-2026	No	900	0.04	Chilean Unidad de Fomento	Project Finance	Project Finance									Corpbanca									No	Senior				
Socieded Contractual Minera Centenario Copper Chile	Latin America/Caribbean	Chile		Other Loan	15-May-2009	15-May-2014	No	30	30	U.S. Dollar	Project Finance	Project Finance									Portigon AG [ex-WestLB AG]									No	Senior				
Socieded Contractual Minera Centenario Copper Chile	Latin America/Caribbean	Chile		Other Loan	15-May-2009	15-May-2014	No	7.5	7.5	U.S. Dollar	Project Finance	Project Finance									Portigon AG [ex-WestLB AG]									No	Senior				
Societe Anonyme Marocaine de l'Industrie du Raffinage [Samir]	Africa	Morocco	Oil and Gas	Term Loan	28-Feb-2006	27-Feb-2019	No	267	267	U.S. Dollar	Project Finance	Project Finance											SACE [Sezione speciale per l'Assicurazione del Credito alla Esportazione]							Yes	Senior				
Societe Anonyme Marocaine de l'Industrie du Raffinage [Samir]	Africa	Morocco	Oil and Gas	Term Loan	28-Feb-2006	27-Feb-2019	No	85	85	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Societe des Mines de Loulo SA [SOMILO]	Africa	Mali	Mining	Term Loan	26-Oct-2004	25-Apr-2010	No	81.5	81.5	U.S. Dollar	Project Finance	Project Finance									NM Rothschild & Sons Ltd [US]									No	Senior				
Societe des Mines de Morila SA	Africa	Mali	Mining	Term Loan	06-Sep-2004	05-Mar-2010	No	81.5	81.5	U.S. Dollar	Project Finance	Project Finance	LIBOR + 175			175					NM Rothschild & Sons Ltd [US]									No	Senior				
Societe du Metro Leger de Tunis [Tunis Metro Project]	Africa	Tunisia	Transportation	Term Loan	28-Jun-2005	27-Jun-2015	No	42.7	51.49	Euro	Project Finance	Project Finance									Credit Agricole Corporate & Investment Bank SA [ex-Calyon]		Republic of Tunisia							No	Senior				
Societe Nationale de Raffinage (Sonara)	Africa	Cameroon	Oil and Gas	Term Loan	21-Jun-2011	01-Apr-2019	No	107.08	107.08	US Dollar (Same Day)	Project Finance	Project Finance	FR + 700							35										Yes	Senior				
Societe Nationale de Raffinage (Sonara)	Africa	Cameroon	Oil and Gas	Term Loan	21-Jun-2011	01-Apr-2019	No	29.74	29.74	US Dollar (Same Day)	Project Finance	Project Finance	SP5 + 700			700				35										Yes	Senior				
Solar IPP Namibia	Africa	Namibia	Utilities	Undisclosed	03-Dec-2014		No	7	7	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Sonatrach	Africa	Algeria	Oil and Gas	Other Loan	21-Nov-2008		No	2060	2060	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Sorfert Algeria	Africa	Algeria	General Manufacturing	Term Loan	16-Apr-2008	15-Apr-2023	No	1100	1754.39	Euro	Project Finance	Project Finance																		Yes	Senior				
Takoradi International Co LLC [Takoradi 2 Power Plant]	Africa	Ghana	Utilities	Term Loan	23-Jul-2012	23-Jul-2028	No	330	330	U.S. Dollar	Project Finance	Project Finance									Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden NV [FMO]									Yes	Senior				
Talvivaara Mining Co Ltd	Western Europe	Finland	Mining	Term Loan	07-May-2007	06-May-2016	No	320	320	U.S. Dollar	Project Finance	Project Finance	EURIBOR + 275			275					Nordea Bank AB, SG Corporate & Investment Banking, UniCredit Group (HVB)			T000FA010TL01						Yes	Senior				
Tamar Gas Field	Middle East	Israel	Oil and Gas	Term Loan	20-Apr-2012	20-Apr-2020	No	900	900	U.S. Dollar	Project Finance	Project Finance, Sponsored	LIBOR + 475			475					Bank Hapoalim BM, Barclays Bank Plc, Citibank NA London, Credit Agricole Corporate & Investment Bank SA [Credit Agricole CIB], HSBC Bank Plc, ING Bank, Israel Discount Bank Ltd [IDB], Mizrahi Tefahot Bank Ltd, Natixis SA, Societe Generale London			T000DM016TL01	97.5	98.5	98	5.95	566.7	Yes	Senior				
Tarfaya Wind Farm	Africa	Morocco	Utilities	Term Loan	16-Jan-2013	16-Jul-2028	No	2000	238.9	Moroccan Dirham	Project Finance	Project Finance									BRED Banque Populaire SA									Yes	Senior				
Tarfaya Wind Farm	Africa	Morocco	Utilities	Term Loan	16-Jan-2013	16-Jul-2028	No	2000	238.9	Moroccan Dirham	Project Finance	Project Finance									BRED Banque Populaire SA									Yes	Senior				
TAV [Tepe Akfen Vie Yatirim Yapim ve Isletme AS]	Eastern Europe/Russia	Turkey	Transportation	Term Loan	12-Mar-2003	11-May-2005	No	60	60	U.S. Dollar	Project Finance	Project Finance	SP1 + 528			514					HSBC									No	Senior				
Tema Oil Refinary Co Ltd [TOR]	Africa	Ghana	Oil and Gas	Other Loan	06-Feb-2002		No	24.67	24.67	U.S. Dollar	Project Finance	Project Finance	LIBOR + 200			200														No	Senior				
Tharisa Minerals (Pty) Ltd	Africa	South Africa	Mining	Term Loan	03-Feb-2012	03-Feb-2019	No	1000	132.72	South African Rand	Project Finance	Project Finance	SP5 + 340			340				125	HSBC									Yes	Senior				
Tiger Resources Ltd	Asia Pacific	Australia	Mining	Term Loan	10-Jan-2013		No	80	80	U.S. Dollar	Project Finance	Project Finance	LIBOR + 180			180														Yes	Senior				
Tiomin Kenya Ltd	Africa	Kenya	Mining	Term Loan	31-Jul-2007		No	40	40	U.S. Dollar	Project Finance	Project Finance											Tiomin Resources Inc							Yes	Senior				
Titan Africa Inc	USA/Canada	United States		Delay Draw Term Loan	10-Dec-1999	31-Dec-2003	No	300	46.34	French Franc	Project Finance	Non Investment Grade, Project Finance	FR + 950										Office des Postes et Telecommunications du Benin							Yes	Senior				
Total Gabon SA	Africa	Gabon	Oil and Gas	Revolver/Line >= 1 Yr.	30-May-2013	30-May-2016	No	30	30	U.S. Dollar	Project Finance	Project Finance	LIBOR + 200			200														Yes	Senior				
Tynagh Energy Ltd	Western Europe	Ireland	Utilities	Other Loan	08-Dec-2004		No	25	33.34	Euro	Project Finance	Project Finance									KBC Bank NV, Royal Bank of Scotland Plc [RBS]									No	Mezzanine				
United Development Co PSC [UDC]	Middle East	Qatar	Real Estate	Term Loan	30-Aug-2008	29-Aug-2017	No	285.7	285.7	US Dollar (Same Day)	Project Finance	Project Finance	SP4 + 165			130					Al Khaliji Commercial Bank QSC [KCBK], Commercial Bank of Qatar QSC [CBQ], Mashreqbank psc, Qatar Islamic Bank QSC, Standard Chartered Bank Plc [SCB]									Yes	Senior				
United Republic of Tanzania	Africa	Tanzania	Government	Term Loan	09-Aug-2011	09-Aug-2018	No	50	50	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
United Republic of Tanzania	Africa	Tanzania	Government	Term Loan	09-Aug-2011	09-Aug-2018	No	150	150	U.S. Dollar	Project Finance	Project Finance											African Trade Insurance Agency [ATI], Export Credit Insurance Corp of South Africa (Pty) Ltd [ECIC]							Yes	Senior				
United Republic of Tanzania	Africa	Tanzania	Government	Term Loan	09-Aug-2011	09-Aug-2016	No	50	50	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Vivo Energy Investments BV	Western Europe	Netherlands	Wholesale	Term Loan	31-Oct-2014	31-Oct-2018	No	160	160	U.S. Dollar	Project Finance	Project Finance									Barclays, BNP Paribas SA, Societe Generale SA, Standard Bank Plc									Yes	Senior				
Vodafone Ghana Ltd	Africa	Ghana	Telecommunications	Other Loan	17-Jun-2011		No	33	33	U.S. Dollar	Project Finance	Project Finance									International Finance Corp									Yes	Senior				
Volta River Authority	Africa	Ghana	Utilities	Term Loan	30-Nov-2012	30-Nov-2017	No	150	150	U.S. Dollar	Project Finance	Project Finance	LIBOR + 900			900														Yes	Senior				
Windfall 59 Properties	Africa	South Africa	Utilities	Term Loan	03-Jul-2013	03-Jul-2028	No	1754	174.7	South African Rand	Project Finance	Project Finance																		Yes	Senior				
Xina Solar One CSP	Africa	South Africa	Utilities	Term Loan	17-Mar-2015		No	660	660	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				
Yau Lee Construction Co Ltd	Asia Pacific	Hong Kong	Construction	Revolver/Line >= 1 Yr.	08-May-1997	01-Nov-1999	No	220		Hong Kong Dollar	Project Finance	Project Finance	HIBOR + 125					45		35	Banque Nationale de Paris Hong Kong		Yau Lee Holdings Ltd							Yes	Senior				
Zain Communications Ghana Ltd	Africa	Ghana	Telecommunications	Term Loan	15-Jul-2009		No	70	70	U.S. Dollar	Project Finance	Project Finance																		Yes	Senior				

Filtered Dealscan Database

Dealscan Data Filtered

Country	CRR	Major Industry Group	Industry Regg	Coll Assets	Tranche Type	Tranche Regg	Tranche Active Date	Tranche Maturity Date	Loan Term (Months)	Tranche Amended	Tr Amd Regg	Tranche Amount (MM)	Tranche Amount Converted (MM)(USD)	Loan Size ($ MN)	Tranche Currency	Currency Risk	All In Spread Drawn (bps)	Secured	Secured Regg	Seniority Type	Sen Regg
Algeria	4	Construction	0	0	Other Loan	0	02-Dec-2002	01-Dec-2014	144	No	1	66	66	66	U.S. Dollar	1	300	0	0	Senior	1
Botswana	3	Mining	1	0	Term Loan	1	25-Jul-2011	31-Mar-2015	44	No	1	180	180	180	U.S. Dollar	1	375	1	1	Senior	1
Botswana	3	Mining	1	0	Revolver/Line >= 1 Yr.	0	25-Jul-2011	31-Mar-2015	44	No	1	25	25	25	U.S. Dollar	1	450	1	1	Senior	1
Cameroon	6	Utilities	0	1	Bridge Loan	0	31-May-2011	05-Jan-2012	8	No	1	119.76	119.76	119.76	US Dollar (Same Day)	1	250	1	1	Senior	1
Cameroon	6	Oil and Gas	1	0	Term Loan	1	21-Jun-2011	01-Apr-2019	94	No	1	107.08	107.08	107.08	US Dollar (Same Day)	1	700	1	1	Senior	1
Cameroon	6	Oil and Gas	1	0	Term Loan	1	21-Jun-2011	01-Apr-2019	93	No	1	29.74	29.74	29.74	US Dollar (Same Day)	1	700	1	1	Senior	1
Egypt	4	Chemicals, Plastics & Rubber	0	1	Revolver/Term Loan	0	23-Jan-2004	22-Jan-2012	96	No	1	110	110	110	U.S. Dollar	1	150	0	0	Senior	1
Egypt	4	Chemicals, Plastics & Rubber	0	1	Revolver/Term Loan	0	23-Jan-2004	22-Jan-2012	96	No	1	75	12.21	12.21	Egyptian Pound	0	200	0	0	Senior	1
Egypt	4	Telecommunications	0	1	Term Loan	1	22-Apr-1999	21-Oct-2005	78	No	1	220	220	220	U.S. Dollar	1	140	1	1	Senior	1
Egypt	4	Telecommunications	0	1	Term Loan	1	22-Apr-1999	22-Oct-2006	78	No	1	350	350	350	U.S. Dollar	1	160	0	0	Senior	1
Egypt	4	Oil and Gas	1	0	Term Loan	1	14-Jul-2005	13-Jul-2017	144	No	1	411.2	411.2	411.2	U.S. Dollar	1	150	0	0	Senior	1
Egypt	4	Oil and Gas	1	0	Guarantee	0	14-Jul-2005	13-Jul-2015	120	No	1	144	144	144	U.S. Dollar	1	150	0	0	Senior	1
Egypt	4	Oil and Gas	1	0	Guarantee	0	14-Jul-2005	13-Jul-2015	120	No	1	144	144	144	U.S. Dollar	1	150	0	0	Senior	1
Egypt	4	Oil and Gas	1	0	Term Loan	1	13-Dec-2001	12-Dec-2008	84	No	1	104	104	104	U.S. Dollar	1	150	0	0	Senior	1
Egypt	4	Oil and Gas	1	0	Other Loan	0	08-Sep-2010	07-Mar-2028	210	No	1	112.5	112.5	112.5	U.S. Dollar	1	300	0	0	Mezzanine	0
Egypt	4	Oil and Gas	1	0	Term Loan	1	08-Sep-2010	08-Mar-2028	210	No	1	200	200	200	U.S. Dollar	1	300	1	1	Senior	1
Egypt	4	Oil and Gas	1	0	Guarantee	0	08-Sep-2010	31-Dec-2025	183	No	1	472.5	472.5	472.5	U.S. Dollar	1	300	1	1	Senior	1
Egypt	4	Utilities	0	1	Term Loan	1	02-Aug-1999	01-Aug-2010	12	No	1	130	130	130	U.S. Dollar	1	175	1	1	Senior	1
Egypt	4	Utilities	0	1	Term Loan	1	02-Aug-1999	01-Aug-2014	60	No	1	187	187	187	U.S. Dollar	1	230	1	1	Senior	1
Egypt	4	Utilities	0	1	Bridge Loan	0	02-Aug-1999	01-Aug-2002	36	No	1	35	35	35	U.S. Dollar	1	35	1	1	Senior	1
Gabon	5	Business Services	0	0	Term Loan	1	22-Aug-2011	01-Mar-2015	43	No	1	28.73	28.73	28.73	US Dollar (Same Day)	1	700	1	1	Senior	1
Gabon	5	Business Services	0	0	Term Loan	1	12-Jul-2012	12-Jul-2019	84	No	1	100	100	100	US Dollar (Same Day)	1	400	1	1	Senior	1
Gabon	5	Business Services	0	0	Term Loan	1	12-Jul-2012	12-Jul-2022	120	No	1	20	20	20	US Dollar (Same Day)	1	400	1	1	Senior	1
Gabon	5	Business Services	0	0	Term Loan	1	12-Jul-2012	12-Jul-2019	84	No	1	70	85.37	85.37	Euro	1	625	1	1	Senior	1
Gabon	5	Oil and Gas	1	0	Revolver/Line >= 1 Yr.	0	30-May-2013	30-May-2016	36	No	1	30	30	30	U.S. Dollar	1	200	1	1	Senior	1
Ghana	6	Mining	1	0	Revolver/Line >= 1 Yr.	0	22-Sep-1997	22-Sep-2001	48	No	1	60	60	60	U.S. Dollar	1	160	0	0	Senior	1
Ghana	6	Oil and Gas	1	0	Revolver/Line >= 1 Yr.	0	14-Mar-2014	31-Mar-2021	84	Yes	0	1500	1500	1500	U.S. Dollar	1	325	1	1	Senior	1
Ghana	6	Oil and Gas	1	0	Revolver/Line >= 1 Yr.	0	15-Jul-2011	29-Mar-2018	80	Yes	0	2000	2000	2000	U.S. Dollar	1	455	1	1	Senior	1
Ghana	6	Oil and Gas	1	0	Term Loan	1	13-Jul-2009	12-Dec-2015	65	No	1	600	600	600	U.S. Dollar	1	550	1	1	Senior	1
Ghana	6	Oil and Gas	1	0	Revolver/Line >= 1 Yr.	0	25-Feb-2015	25-Feb-2022	84	No	1	150	150	150	U.S. Dollar	1	325	1	1	Senior	1
Ghana	6	Utilities	0	1	Term Loan	1	30-Nov-2012	30-Nov-2017	60	No	1	150	150	150	U.S. Dollar	1	900	1	1	Senior	1
Ivory Coast	7	Financial Services	0	0	Term Loan	1	20-Feb-2014	20-Feb-2016	24	No	1	86	86	86	US Dollar (Same Day)	1	700	1	1	Senior	1
Ivory Coast	7	Financial Services	0	0	Term Loan	1	20-Feb-2014	20-Feb-2019	24	No	1	174	174	174	US Dollar (Same Day)	1	800	1	1	Senior	1
Kenya	6	Utilities	0	1	Other Loan	0	09-Oct-2013	09-Oct-2023	120	No	1	90	90	90	U.S. Dollar	1	575	1	1	Senior	1
Kenya	6	Beverage, Food, and Tobacco Processing	0	1	Term Loan	1	12-Aug-2013	12-Aug-2022	108	No	1	100	100	100	U.S. Dollar	1	700	1	1	Senior	1
Kenya	6	Beverage, Food, and Tobacco Processing	0	1	Term Loan	1	12-Aug-2013	12-Aug-2025	144	No	1	20	20	20	U.S. Dollar	1	600	1	1	Senior	1
Kenya	6	Utilities	0	1	Term Loan	1	26-Mar-2014	26-Mar-2029	180	No	1	110	151.59	151.59	Euro	1	475	1	1	Senior	1
Kenya	6	Utilities	0	1	Term Loan	1	26-Mar-2014	26-Mar-2029	180	No	1	10	13.78	13.78	Euro	1	475	1	1	Senior	1
Liberia	7	Mining	1	0	Term Loan	1	04-Dec-2013	13-Sep-2019	69	No	1	80	80	80	U.S. Dollar	1	500	1	1	Senior	1
Liberia	7	Mining	1	0	Term Loan	1	04-Dec-2013	13-Sep-2019	69	No	1	8	8	8	U.S. Dollar	1	500	1	1	Senior	1
Liberia	7	Mining	1	0	Term Loan	1	04-Dec-2013	13-Mar-2020	75	No	1	12	12	12	U.S. Dollar	1	750	1	1	Subordinated	0
Mali	6	Mining	1	0	Term Loan	1	06-Sep-2004	05-Mar-2010	66	No	1	81.5	81.5	81.5	U.S. Dollar	1	175	0	0	Senior	1
Morocco	4	Utilities	0	1	Revolver/Line >= 1 Yr.	0	30-Sep-1997	30-Sep-2009	144	No	1	237	237	237	U.S. Dollar	1	212.5	0	0	Senior	1
Morocco	4	Utilities	0	1	Revolver/Line >= 1 Yr.	0	30-Sep-1997	30-Sep-2009	144	No	1	256	256	256	U.S. Dollar	1	100	0	0	Senior	1
Morocco	4	Utilities	0	1	Revolver/Line >= 1 Yr.	0	30-Sep-1997	30-Sep-2009	144	No	1	35	35	35	U.S. Dollar	1	200	0	0	Senior	1
Morocco	4	Utilities	0	1	Revolver/Line >= 1 Yr.	0	30-Sep-1997	30-Sep-2009	144	No	1	176	176	176	U.S. Dollar	1	175	0	0	Senior	1
Mozambique	6	Utilities	0	1	Term Loan	1	30-Apr-2008	30-Dec-2017	116	No	1	5736	763.78	763.78	South African Rand	1	190	0	0	Senior	1
Nigeria	5	Beverage, Food, and Tobacco Processing	0	1	Term Loan	1	26-Jan-2011	25-Jan-2016	60	No	1	50	50	50	US Dollar (Same Day)	1	300	1	1	Senior	1
Nigeria	5	Beverage, Food, and Tobacco Processing	0	1	Term Loan	1	26-Jan-2011	25-Jan-2016	60	No	1	13.3	13.3	13.3	US Dollar (Same Day)	1	900	1	1	Senior	1
Nigeria	5	Beverage, Food, and Tobacco Processing	0	1	Term Loan	1	26-Jan-2011	25-Jan-2016	60	No	1	80	80	80	U.S. Dollar	1	500	1	1	Senior	1
Nigeria	5	Chemicals, Plastics & Rubber	0	1	Term Loan	1	27-Feb-2013	27-Feb-2024	132	No	1	475	475	475	U.S. Dollar	1	495	1	1	Senior	1
Nigeria	5	Chemicals, Plastics & Rubber	0	1	Term Loan	1	27-Feb-2013	27-Feb-2021	96	No	1	135	135	135	U.S. Dollar	1	475	1	1	Senior	1
Nigeria	5	Oil and Gas	1	0	Term Loan	1	02-Apr-2013	02-Apr-2020	84	No	1	225	225	225	U.S. Dollar	1	1000	1	1	Senior	1
Senegal	6	Utilities	0	1	Other Loan	0	15-Sep-2013	15-Sep-2027	168	No	1	55	73.11	73.11	Euro	1	525	1	1	Senior	1
Senegal	6	Utilities	0	1	Other Loan	0	15-Sep-2013	15-Sep-2027	168	No	1	0.03	0.03	0.03	US Dollar (Same Day)	1	525	1	1	Senior	1
Seychelles	6	Financial Services	0	0	Term Loan	1	19-Dec-1997	19-Dec-2000	36	No	1	30	30	30	U.S. Dollar	1	200	0	0	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	28-Jun-2013	28-Jun-2031	96	No	1	3000	305.19	305.19	South African Rand	0	390	1	1	Senior	1
South Africa	3	Construction	0	0	Term Loan	1	27-Feb-2013	27-Feb-2019	72	Yes	0	2176.57	277.64	277.64	South African Rand	0	400	1	1	Senior	1
South Africa	3	Construction	0	0	Term Loan	1	27-Feb-2013	27-Feb-2019	72	Yes	0	2087.43	236.8	236.8	South African Rand	0	450	1	1	Senior	1
South Africa	3	Construction	0	0	Mezzanine Tranche	0	27-Feb-2013	27-May-2019	75	Yes	0	936	106.18	106.18	South African Rand	0	825	0	0	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	30-Mar-2001	30-Mar-2006	60	No	1	350	43.57	43.57	South African Rand	0	225	0	0	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	30-Mar-2001	29-Mar-2006	60	No	1	350	43.57	43.57	South African Rand	0	275	0	0	Senior	1
South Africa	3	Mining	1	0	Revolver/Line >= 1 Yr.	0	17-May-1999	16-May-2003	48	No	1	24.21	24.21	24.21	U.S. Dollar	1	150	0	0	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	17-May-1999	16-May-2003	48	No	1	100	100	100	U.S. Dollar	1	150	0	0	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	30-Jan-2013	30-Jan-2028	180	No	1	650	650	650	U.S. Dollar	1	350	1	1	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	14-Dec-2007	13-Dec-2015	96	No	1	505	73.62	73.62	South African Rand	0	351	1	1	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	14-Dec-2007	13-Dec-2019	144	No	1	120	17.49	17.49	South African Rand	0	511	1	1	Mezzanine	0
South Africa	3	Mining	1	0	Other Loan	0	14-Dec-2007	13-Dec-2015	96	No	1	90	13.12	13.12	South African Rand	0	611	1	1	Subordinated	0
South Africa	3	Mining	1	0	Term Loan	1	14-Dec-2011	15-Dec-2013	24	No	1	150	150	150	U.S. Dollar	1	400	1	1	Senior	1
South Africa	3	Services	0	0	Term Loan	1	04-Aug-2009	03-Aug-2027	216	No	1	30.6	3.92	3.92	South African Rand	0	810	1	1	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	14-Nov-2006	14-Nov-2016	120	No	1	150	150	150	U.S. Dollar	1	45	1	1	Senior	1
South Africa	3	Mining	1	0	Term Loan	1	01-Jul-2009	30-Jun-2018	108	No	1	750	97.06	97.06	South African Rand	0	450	1	1	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	02-Nov-2012	02-Nov-2029	204	No	1	967.13	110.91	110.91	South African Rand	0	310	1	1	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	02-Nov-2012	02-Nov-2029	204	No	1	2067.18	237.06	237.06	South African Rand	0	310	1	1	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	02-Nov-2012	02-Nov-2029	204	No	1	991.91	113.75	113.75	South African Rand	0	310	1	1	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	25-Feb-2015	25-Feb-2031	192	No	1	800	69.9	69.9	South African Rand	0	310	1	1	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	25-Feb-2015	25-Feb-2031	192	No	1	1115	97.42	97.42	South African Rand	0	310	1	1	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	25-Feb-2015	25-Feb-2031	192	No	1	550	48.05	48.05	South African Rand	0	310	1	1	Senior	1
South Africa	3	Utilities	0	1	Term Loan	1	25-Feb-2015	25-Feb-2031	192	No	1	1160	101.35	101.35	South African Rand	0	310	1	1	Senior	1
South Africa	3	Mining	1	1	Term Loan	1	15-Jun-2001	20-Jan-2006	54	No	1	90	90	90	U.S. Dollar	1	150	0	0	Senior	1
South Africa	3	Mining	1	1	Term Loan	1	15-Jun-2001	14-Jan-2006	54	No	1	35	35	35	U.S. Dollar	1	150	0	0	Senior	1
South Africa	3	Mining	1	1	Term Loan	1	21-Nov-2008	20-Nov-2009	12	No	1	1000	1000	1000	U.S. Dollar	1	425	1	1	Senior	1
South Africa	3	Mining	1	1	Term Loan	1	03-Feb-2012	03-Feb-2019	84	No	1	1000	132.72	132.72	South African Rand	0	340	1	1	Senior	1
Tanzania	6	Mining	1	0	Term Loan	1	19-Dec-2012	19-Dec-2019	84	No	1	142	142	142	U.S. Dollar	1	250	1	1	Senior	1
Tunisia	3	Telecommunications	0	1	Term Loan	1	02-Nov-2004	01-Nov-2011	84	No	1	130	165.42	165.42	Euro	1	150	0	0	Senior	1
Zambia	5	Utilities	0	1	Term Loan	1	12-Jun-2015	12-Jun-2028	156	No	1	142	142	142	U.S. Dollar	1	350	1	1	Senior	1
Zambia	5	Mining	1	1	Term Loan	1	31-Jan-2012	24-Jan-2017	60	No	1	300	300	300	U.S. Dollar	1	300	1	1	Senior	1
Zambia	5	Mining	1	1	Revolver/Line >= 1 Yr.	0	31-Jan-2012	24-Jan-2017	60	No	1	700	700	700	U.S. Dollar	1	300	1	1	Senior	1
																					1

Regression Model Parameters

Regression Model Parameters

CRR	Industry Risk	Coll Assets	Tranche Regg	Loan Term (Months)	Tr Amd Regg	Loan Size ($ MN)	Currency Risk	Secured Regg	Sen Regg	All In Spread Drawn (bps)
4	0	1	0	96	1	110	1	0	1	150
4	0	1	0	96	1	12.21	0	0	1	200
4	0	0	0	144	1	66	1	0	1	300
6	1	0	0	48	1	60	1	0	1	160
6	1	0	1	84	1	142	1	1	1	250
6	0	0	1	36	1	30	1	1	1	200
3	1	0	1	44	1	180	1	1	1	375
3	1	0	0	44	1	25	1	1	1	450
4	0	1	1	78	1	220	1	1	1	140
4	0	1	1	78	1	350	1	0	1	160
4	1	0	1	144	1	411.2	1	0	1	150
4	1	0	0	120	1	144	1	0	1	150
4	1	0	0	120	1	144	1	0	1	150
4	1	0	1	84	1	104	1	0	1	150
4	1	0	0	210	1	112.5	1	0	0	300
4	1	0	1	210	1	200	1	1	1	300
4	1	0	0	183	1	472.5	1	1	1	300
7	0	0	1	24	1	86	1	1	1	700
7	0	0	1	24	1	174	1	1	1	800
5	0	0	1	43	1	28.73	1	1	1	700
5	0	1	1	60	1	50	1	1	1	300
5	0	1	1	60	1	13.3	1	1	1	900
5	0	1	1	60	1	80	1	1	1	300
5	0	1	1	60	1	80	1	1	1	500
6	0	1	1	116	1	763.78	1	0	1	190
5	0	1	1	132	1	475	1	1	1	495
5	0	1	1	96	1	135	1	1	1	475
5	0	1	1	156	1	142	1	1	1	350
4	0	1	0	144	1	237	1	0	1	212.5
4	0	1	0	144	1	256	1	0	1	100
4	0	1	0	144	1	35	1	0	1	200
4	0	1	0	144	1	176	1	0	1	175
5	1	1	1	60	1	300	1	1	1	300
5	1	1	0	60	1	700	1	1	1	300
6	0	1	0	120	1	90	1	1	1	575
6	1	0	0	84	0	1500	1	1	1	325
6	1	0	0	80	0	2000	1	1	1	455
6	1	0	1	65	1	600	1	1	1	550
6	0	1	0	8	1	119.76	1	1	1	250
6	0	1	1	108	1	100	1	1	1	700
6	0	1	1	144	1	20	1	1	1	600
6	0	1	1	180	1	151.59	1	1	1	475
6	0	1	1	180	1	13.78	1	1	1	475
7	1	0	1	69	1	80	1	1	1	500
7	1	0	1	69	1	8	1	1	1	500
7	1	0	1	75	1	12	1	1	0	750
5	0	0	1	84	1	100	1	1	1	400
5	0	0	1	120	1	20	1	1	1	400
5	0	0	1	84	1	85.37	1	1	1	625
3	0	1	1	84	1	165.42	1	0	1	150
6	1	0	0	84	1	150	1	1	1	325
6	0	1	0	168	1	73.11	1	1	1	525
6	0	1	0	168	1	0.03	1	1	1	525
5	1	0	1	84	1	225	1	1	1	1000
4	0	1	1	12	1	130	1	1	1	175
4	0	1	1	60	1	187	1	1	1	230
4	0	1	0	36	1	35	1	1	1	35
6	1	0	1	66	1	81.5	1	0	1	175
6	1	0	1	94	1	107.08	1	1	1	700
6	1	0	1	93	1	29.74	1	1	1	700
5	1	0	0	36	1	30	1	1	1	200
6	0	1	1	60	1	150	1	1	1	900
3	0	1	1	96	1	305.19	0	1	1	390

Regression Model Parameters

CRR	Industry Risk	Coll Assets	Tranche Regg	Loan Term (Months)	Tr Amd Regg	Loan Size ($ MN)	Currency Risk	Secured Regg	Sen Regg	All In Spread Drawn (bps)
3	0	0	1	72	0	277.64	0	1	1	400
3	0	0	1	72	0	236.8	0	1	1	450
3	0	0	0	75	0	106.18	0	0	1	825
3	1	0	1	60	1	43.57	0	0	1	225
3	1	0	1	60	1	43.57	0	0	1	275
3	1	0	0	48	1	24.21	1	0	1	150
3	1	0	1	48	1	100	1	0	1	150
3	1	0	1	180	1	650	1	1	1	350
3	1	0	1	96	1	73.62	0	1	1	351
3	1	0	1	144	1	17.49	0	1	0	511
3	1	0	0	96	1	13.12	0	1	0	611
3	1	0	1	24	1	150	1	1	1	400
3	0	0	1	216	1	3.92	0	1	1	810
3	1	0	1	120	1	150	1	1	1	45
3	1	0	1	108	1	97.06	0	1	1	450
3	0	1	1	204	1	110.91	0	1	1	310
3	0	1	1	204	1	237.06	0	1	1	310
3	0	1	1	204	1	113.75	0	1	1	310
3	0	1	1	192	1	69.9	0	1	1	310
3	0	1	1	192	1	97.42	0	1	1	310
3	0	1	1	192	1	48.05	0	1	1	310
3	0	1	1	192	1	101.35	0	1	1	310
3	1	1	1	54	1	90	1	0	1	150
3	1	1	1	54	1	35	1	0	1	150
3	1	1	1	12	1	1000	1	1	1	425
3	1	1	1	84	1	132.72	0	1	1	340
									1	

Regression Model Parameters Descriptions

Name	Label	Type of data	Format	Codes	Notes
CRR	Country Risk Rank	Numerical	1 TO 7		The risk rank is rated from 1 to 7, in order of the more riskiness.
Industry Risk	Industry Risk Rank	Binary	0/1	1= High Risk 0 = Low Risk	The High Risk Industry will use a dummy variable with a value of one, and the low risk industry will have a dummy variable value of zero.
Coll Assets	Collateralizeable Assets	Binary	0/1	1= Asset Rich 0= No Assets	A dummy variable taking the value of 1 if the borrower is in an industry generally considered to be rich in collateralizeable assets (tangible, non-specialized assets), and 0 otherwise (such as financial- and business services, oil & gas, construction, mining and services)
Tranche Reg	Tranche Type	Binary	0/1	1= Term Loans, etc 0= "Other" loans	Term Loan, Revolver/Line loans with maturities greater than 1 year, Guarantee Loans, Mezzanine Tranche, Bridge Loans and Other Loans are recorded in this data field.
Loan Term (Months)	Loan Term (Months)	Numerical	# months		The loan term can be calculated as the difference between the maturity and activation dates, and will be presented in months.
Tr Amd Regg	Tranche Amended	Binary	0/1	1 = No 0 = Yes	This is data field which only represents a “Yes” or “No” input
Loan Size ($ MN)	Loan Size ($ MN)	Numerical			
Currency Risk	Currency Risk	Binary	0/1	1 = Yes 0 = No	The “Tranche Currency” is not the local currency of the “Country”
Secured Regg	Loan Secured	Binary	0/1	1 = Yes 0 = No	A dummy variable with a value of one will be used if the loan is secured by a third-party guarantee, and zero otherwise;
Sen Regg	Seniority Type	Binary	0/1	1 = Senior 0 = Subordinate	Senior loans a dummy variable with a value of one and Mezzanine/subordinate loans a value of zero
All In Spread Drawn (bps)	All in Spread Drawn	Numerical			Presented in basis points, and represents the total cost of the loans to the borrower

9 Appendix B: Categorical Predictors

Frequency tables for categorical predictors follow.

County Risk Rank (CRR)

	Frequency	Percentage	Valid Percentage
3	30	33.71	33.71
4	19	21.35	21.35
5	15	16.85	16.85
6	20	22.47	22.47
7	5	5.62	5.62
Total	89	100.00	100.00

The sample size is small for category 7. Although strictly categorical, the variable is brought into the model as continuous to reduce the number of model parameters.

Industry Risk

	Frequency	Percentage	Valid Percentage
0	49	55.06	55.06
1	40	44.94	44.94
Total	89	100.00	100.00

Collateralisable Assets

	Frequency	Percentage	Valid Percentage
0	46	51.69	51.69
1	43	48.31	48.31
Total	89	100.00	100.00

Tranche Regg

	Frequency	Percentage	Valid Percentage
0	26	29.21	29.21
1	63	70.79	70.79
Total	89	100.00	100.00

Tr Amd Regg

	Frequency	Percentage	Valid Percentage
0	5	5.62	5.62
1	84	94.38	94.38
Total	89	100.00	100.00

There are very few data points for category 0.

Currency Risk

	Frequency	Percentage	Valid Percentage
0	20	22.47	22.47
1	69	77.53	77.53
Total	89	100.00	100.00

Secured Regg

	Frequency	Percentage	Valid Percentage
0	24	26.97	26.97
1	65	73.03	73.03
Total	89	100.00	100.00

Sen Regg

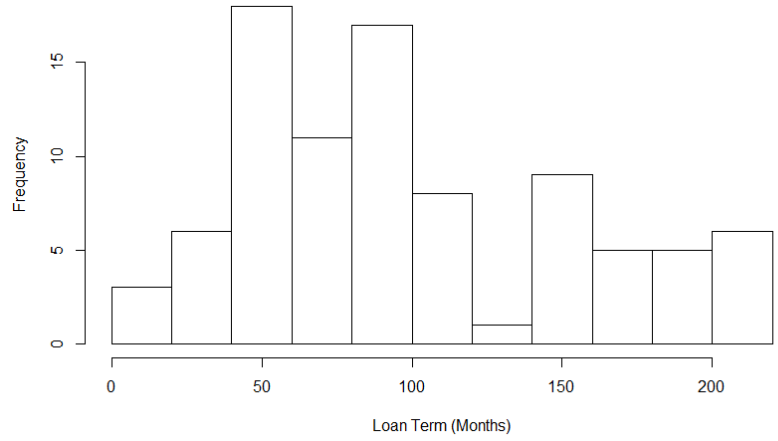
	Frequency	Percentage	Valid Percentage
0	4	4.49	4.49
1	85	95.51	95.51
Total	89	100.00	100.00

There are very few data points for category 0.

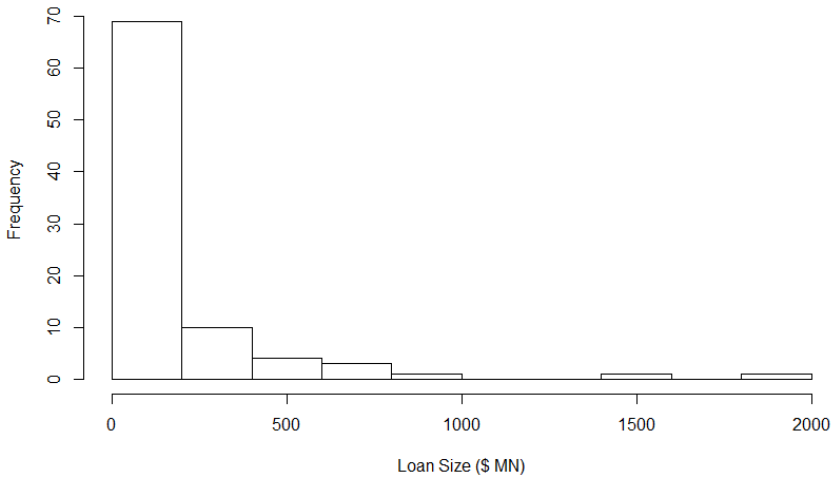
Continuous Predictors

Frequency histograms for continuous predictors follow.

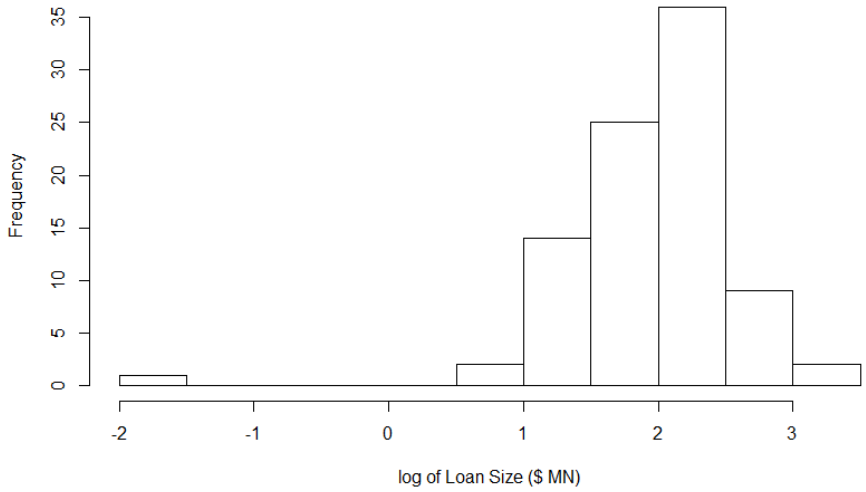
Loan Term



Loan Size



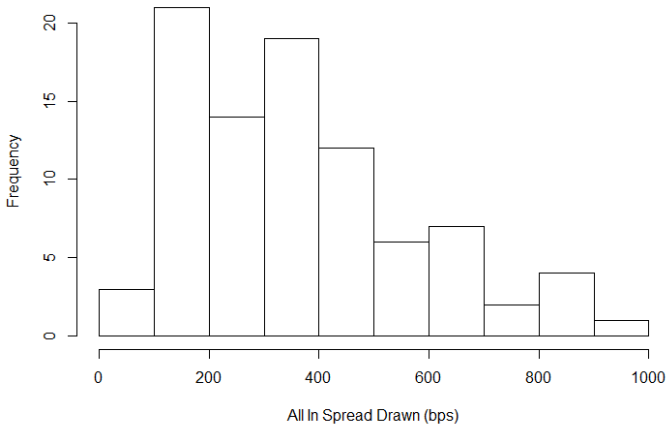
This variable has a long tail to the right. A log (base 10) transformation was applied to the variable, to pull in the tail, to avoid having some data points with 'very different' predictor values and possibly pulling the regression line.



After transformation, there is now one data point with a relatively low loan size (further discussed below).

Interpretation of the new (transformed) loan size: A one-unit increase corresponds to a tenfold increase in the original untransformed loan size.

Continuous Response



10 Appendix C: Simple Linear Regression Model

The results of the simple linear regression model are shown in the table below.

Simple Linear Regression				
Loan Parameter	**Estimate**	**95% CI lower limit**	**95% CI upper limit**	**P-value**
Industry Risk	-48.213	-137.517	41.090	0.293
Collateralizeable Assets	-72.408	-160.572	15.755	0.111**
Tranche Type	103.527	7.649	199.404	0.037*
Tranche Amended	-118.673	-311.220	73.875	0.230
Currency Risk	-27.610	-134.564	79.344	0.614
Loan Secured	233.817	145.868	321.766	<0.001*
Loan Seniority Type	-171.724	-384.477	41.030	0.117**
County Risk Rank	61.453	29.776	93.130	<0.001*
Loan Term (Months)	-0.112	-0.933	0.709	0.789
Log of Loan Size (log10)	-71.458	-141.437	-1.479	0.048*

All-in Spread

As the All-in-Spread (AIS) is the dependent variable, the mean is 378.99, with a standard deviation of 212.76 and Median of 310.00.

Running all the Categorical and Continuous Predictors in the simple linear regression model provided indication of their independent effects on AIS. The findings are discussed herewith below:

Industry Risk:

Industry Risk consisted out of 55.06% “0” and 44.94% “1” indicators, with 0 representing low risk industries and 1 representing high-risk industries.

In the simple linear regression model, as the Industry Risk variable is moved from 0 to 1 (i.e. low risk to high risk industry), the mean response on AIS decreases by 48.213 (95% CI for effect: -137.517; 41.090; P-value: 0.293). This P-value is relatively large at 29.3% and can be viewed as been statistically insignificant on AIS.

From the results above, Industry Risk does decrease the All-in-Spread as the industry changes from a low risk to a high risk sector, but the high P-values result in the Industry Risk variable actually not having a real effect on the AIS.

Collateralisable Assets:

Collateralisable Assets consisted out of 51.69% "0" and 48.31% "1" indicators, with 1 representing the borrower who is in an industry wish is not rich in collateralisable assets (such as financial- and business services, oil & gas, construction, mining and services) to an industry generally considered rich in collateralisable assets (tangible, non-specialized assets).

In the simple linear regression model, as the Collateralisable Assets variable is moved from 0 to 1, the mean response on AIS decreases by 72.408 (95% CI for effect: -160.572; 15.755; P-value: 0.111). This P-value is moderately large at 11.1% and can be viewed as being statistically insignificant on AIS.

From the results above, Collateralisable Assets does decrease the All-in-Spread as the industry changes from a non-collateralisable to collateralisable sector, but the high P-values result in the Collateralisable Assets variable actually not having a real effect on the AIS.

Tranche Type

Tranche Type consisted out of 29.21% "0" and 70.79% "1" indicators, with 1 representing Term loans, revolver/line loans with maturities greater than 1 year, guarantee Loans, mezzanine Tranche, bridge loans and 0 for all other loans which are not specific to project finance.

In the simple linear regression model, as the Tranche Type variable is moved from 0 to 1, the mean response on AIS increases by 103.527 (95% CI for effect: 7.649; 199.404; P-value: 0.037). This P-value at 3.7% and can be viewed as being statistically significant on AIS.

From the results above, Tranche Type does increase the All-in-Spread as the industry changes from a low risk to a high risk sector, but the high P-values result in the Tranche Type variable actually having a real effect on AIS in the simple linear regression model, but not having a real effect in the multiple linear regression model.

Tranche Amended

Tranche Amended consisted out of 5.62% "0" and 94.38% "1" indicators, with 0 representing "Yes", indicating that the loan tranche has been amended before, and 1 indicating "No" indicating that the loan tranche has not been amended prior to being finalised and granted.

In the simple linear regression model, as the Tranche Amended variable is moved from 0 to 1, the mean response on AIS decreases by 118.673 (95% CI for effect: -311.220; 73.875; P-value: 0.230). This P-value at 23.0% is extremely high and can be viewed that Tranche Amended is not statistically significant on AIS.

From viewing the results above inversely, as a loan tranche has been amended, it increases the All-in-Spread, but the high P-values result in the Tranche Amended having no real effect on AIS in both the simple linear regression model and in the multiple linear regression model.

Currency Risk

Currency Risk consisted out of 22.47% "0" and 77.53% "1" indicators, with 0 representing loan tranche currency being the same currency as the currency as the country in which the project is, and 1 representing whether the loan tranche currency is from a foreign currency.

In the simple linear regression model, as the Currency Risk variable is moved from 0 to 1, the mean response on AIS decreases by 27.610 (95% CI for effect: 134.564; 79.344; P-value: 0.614). The P-value at 61.4% is extremely high, which results in Currency Risk having no real effect on AIS.

From the results above, as Currency Risk moved from local to foreign sourced, it decreases the All-in-Spread, but the high P-values result in the Currency Risk having no real effect on AIS in both the simple linear regression model and in the multiple linear regression model.

Loan Secured

Loan Secured consisted out of 26.97% "0" and 73.03% "1" indicators, with 1 representing a dummy variable if the loan is secured by a third-party guarantee, and 0 otherwise.

In the simple linear regression model, as the Loan Secured variable is moved from 0 to 1, the mean response on AIS increases by 233.817 (95% CI for effect: 145.868; 321.766; P-value: <0.001). This P-value at <0.1% and can be viewed as being highly statistically significant on AIS.

From the results above, Loan Secured does increase the All-in-Spread as the borrower changes from a loan requiring no third-party guarantees to loans which do, and the extremely low P-values result in the Loan Secured variable having a real effect on AIS in the simple linear- and multiple linear regression models.

Loan Seniority Type

Loan Seniority Type consisted out of 4.49% "0" and 95.51% "1" indicators, with 0 indicating subordinate loan types and 1 indicating senior loan types.

In the simple linear regression model, as the Loan Seniority Type variable is moved from 0 to 1, the mean response on AIS decreases by 171.724 (95% CI for effect: -384.477; 41.030; P-value: 0.117). This P-value at 11.7% and can be viewed as being statistically insignificant on AIS.

From the results above, Loan Seniority Type does decrease the All-in-Spread as the loan type changes from subordinate to senior loans, but the high P-values result in the Loan Seniority Type variable actually having no real effect on AIS in the simple linear- and multiple linear regression models.

Country Risk Rank

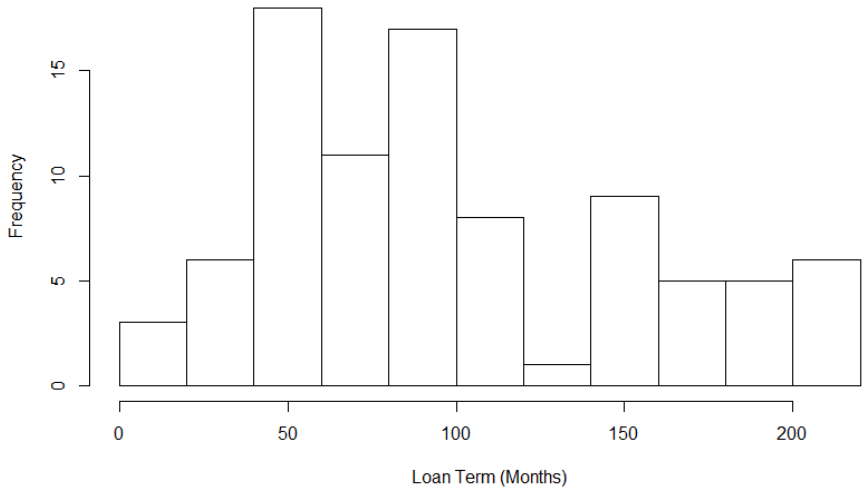
Country Risk Rank is ranked from 1 to 7, in order of the countries sovereign's riskiness. The sample sized is relatively small for a category of seven variables, and although strictly a Categorical Predictor, the variable is brought into the models as continuous to reduce the number of model parameters. The variables consist out of 33.71% "3", 21.35% "4", 16.85% "5", 22.47% "6" and 5.62% "7" country risk rankings.

In the simple linear regression model, as the Country Risk Rank variable is moved by one unit, the mean response on AIS increases by 61.453 (95% CI for effect: 29.776; 93.130; P-value: <0.001). This P-value at <0.1% and can be viewed as being highly statistically significant on AIS.

From the results above, as Country Risk Rank variable is moved by one unit it does increase the All-in-Spread as the countries sovereign risk increases, and the extremely low P-values result in the Loan Secured variable having a real effect on AIS in the simple linear- and multiple linear regression models.

Loan Term

Loan Term was calculated as the difference between the maturity and activation dates, and each unit presents one month, as a Continuous Predictor, and is represented in the frequency histogram below:

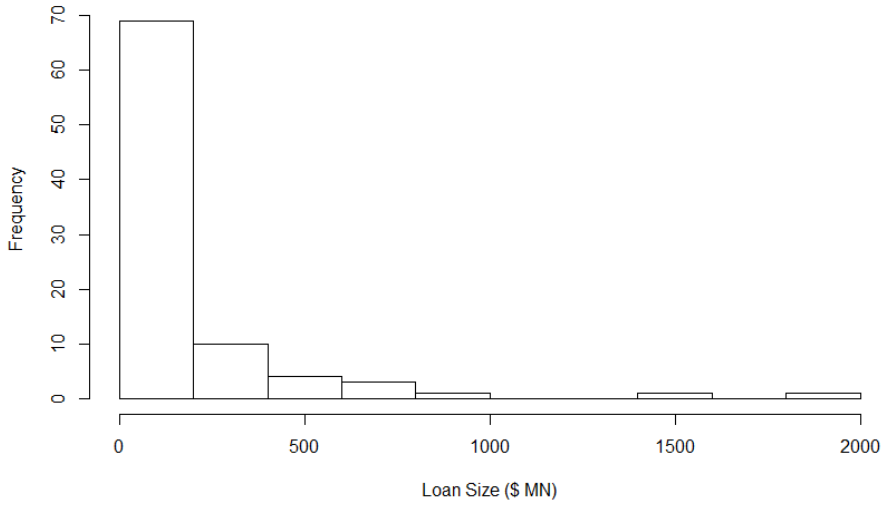


In the simple linear regression model, as the Loan Term variable is moved by one unit, the mean response on AIS decreases by 0.112 (95% CI for effect: -0.933; 0.709; P-value: 0.789). This P-value at 78.9% is extremely high and can be viewed that Loan Term has no statistically significant effect on AIS.

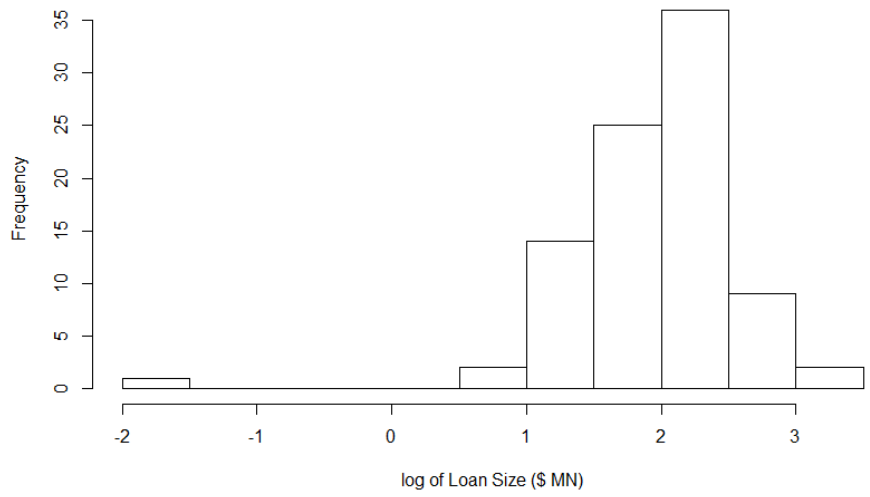
From the results above, Loan Term does decrease the All-in-Spread as the maturity of the loan increases, but the extremely high P-values result in the Loan Term variable actually having no real effect on AIS in both the simple linear and the multiple linear regression models.

Loan Size

Loan Size is a Continuous Predictor that has a long tail to the right, as shown in the graph below:



A log (base 10) transformation was applied to the variable, to pull in the tail, to avoid having some data points with 'very different' predictor values and possibly pulling the regression line.



Post the log transformation, one data point has a relatively low loan size. The new log-transformed loan size can be interpreted as a one-unit increase corresponds to a tenfold increase in the original untransformed loan size.

In the simple linear regression model, as the Log of Loan Size variable is increased by one unit, the mean response on AIS decreases by 71.458 (95% CI for effect: -141.437; -1.47;

P-value: 0.048). This P-value at 4.8% and can be viewed as being statistically significant on AIS.

From the results above, increasing the Loan Size does decrease the All-in-Spread the relatively high P-values result in the Loan Size variable actually having a real effect on AIS in the simple linear regression model, but not having a real effect in the multiple linear regression model.

Standard deviation of Regression Models

The estimate for standard deviation (σ_ε) in the simple linear regression has a range from 188 to 215, and in the multiple regression, the estimate of σ_ε is 168.

An ANOVA test was used to assess overall significance of the model. The low p-value (<0.001) leads to rejection of the null hypothesis that all parameters, except the intercept α_0, equals 0.

Co-efficient of Determinants

In order to assess how well the model fits the data, the co-efficient of determinants are used to assess the degree of variation in the response's variables in the model outputs, represented by the R-square statistic, which provides the percentage of the deviance in the response variable for by adding the explanatory variable into the model (Hutcheson, 2011).

To account for distortions of R-square as more variables are added to the model (deviances reduce as additional variances are added), the Adjusted R-square statistics are calculated which take into account the number of terms entered into the model (Hutcheson, 2011).

The R2 and Adjusted R2 values for the Simple Linear Regression Models:

Variable	R^2	Adjusted R^2
Industry Risk	0.0127062560	0.001358052
Collateralizeable Assets	0.0289223613	0.017760549
Tranche Type	0.0489605034	0.038029015
Tranche Amended	0.0164960051	0.005191361

Currency Risk	0.0029338972	-0.008526633
Loan Secured	0.2378510954	0.229090763
Loan Seniority Type	0.0279619185	0.016789067
County Risk Rank	0.1424988217	0.132642486
Loan Term (Months)	0.0008274197	-0.010657323
Log of Loan Size (log10)	0.0440140488	0.033025705

Residual Plots

Residuals plots were used to assess model assumptions and fit, with Standardized Pearson Residuals plotted. The visual examination of the residuals (miss-predictions of the fitted data to the model) is a useful mean to observe obvious deviations from randomness.

The following diagnostic residual plots were produced:

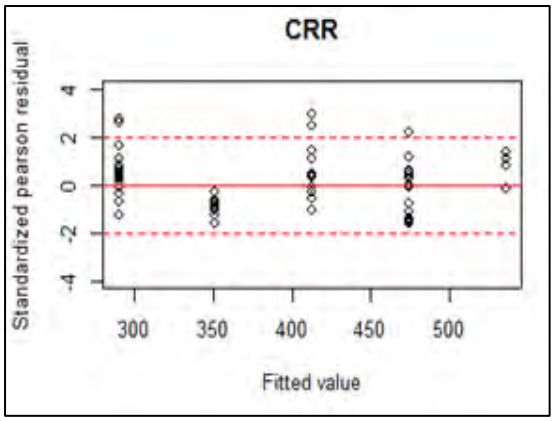
Scatter plot of residuals (y-axis) against fitted values (x-axis), or predictor variables (x-axis): The scatter of residuals should fall into a horizontal band, centred on 0. There should not be much variation in the vertical spread of points, or trends, as the fitted value / predictor changes. Residuals should thin out as you move away from 0 (vertically), with only about 5% of values larger than 2 in magnitude.

Histogram of residuals: This should be approximately normally distributed with a mean of 0 and variance of 1 (bell shaped curve centred around 0, with about 68% of residuals within -1 to 1, and 95% within -2 to 2).

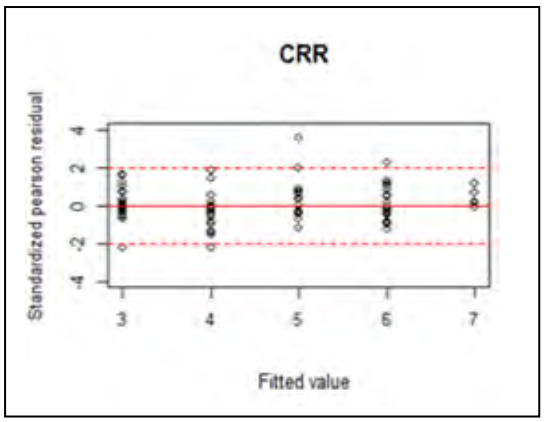
There is evidence of some model misfit when considering only single predictors, such as Country Risk Rank. The simple linear regression model consistently overestimates the response for the Country Risk Rank category 4 (the second highest fitted value), imposing a linear relationship between Country Risk Rank (continuous), resulting in the expected response which does not seem appropriate. The remaining parameters in model seem okay. The point lying far to the right for Log of Loan Size corresponds to the very small loan size of 0.03.

In the multiple linear regression model (Model B) it can be noted that the pattern of residuals by Country Risk Ranking has improved. The comparison of the Standardized

Pearson Residuals plotted for the simple linear- and multiple linear regression models are shown below:



Single Linear Regression

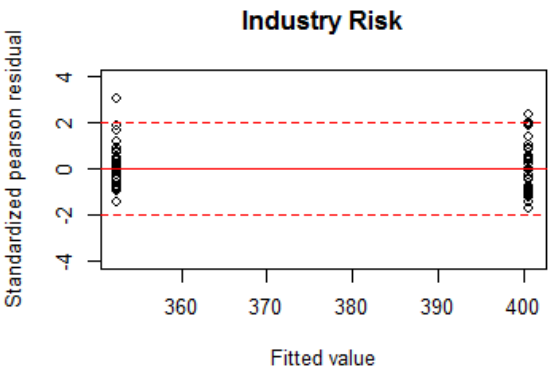


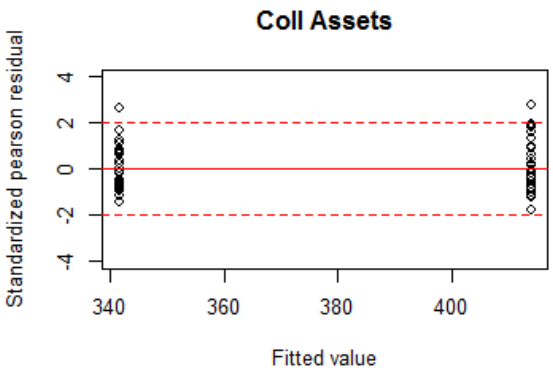
Multiple Linear Regression

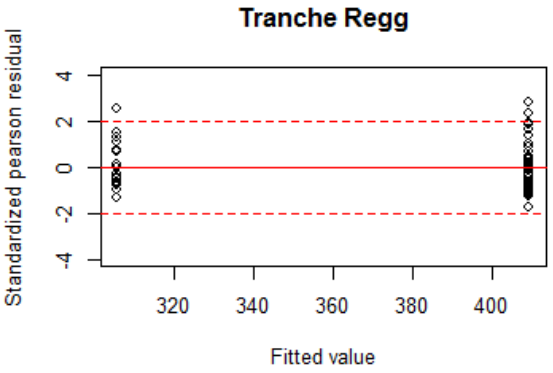
It should be noted that the Country Risk Rank in the simple linear regression does not seem right when not accounting for other variables. A possible means of rectifying the discrepancy would be to allow for each of the five categories in Country Risk Rank to have their own mean responses. However the sample sizes are already small, and this effect the results in the multiple linear regression model. Since the problem disappeared in the multiple regression model, we decided to leave the CRR variable as is.

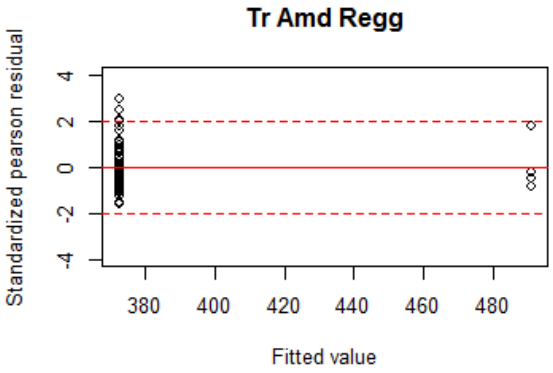
The Standardized Pearson Residuals plotted for the simple linear- and multiple linear regression models are shown on the following pages.

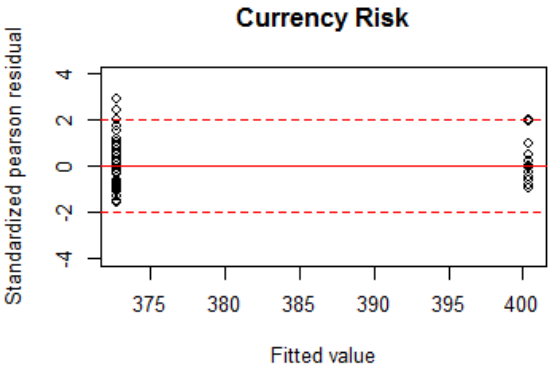
Residual Plots – Simple Linear Regressions

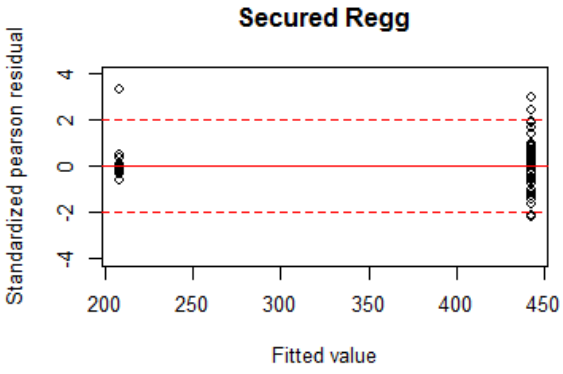

Industry Risk
Standardized pearson residual
-4
-2
0
2
4
360
370
380
390
400
Fitted value

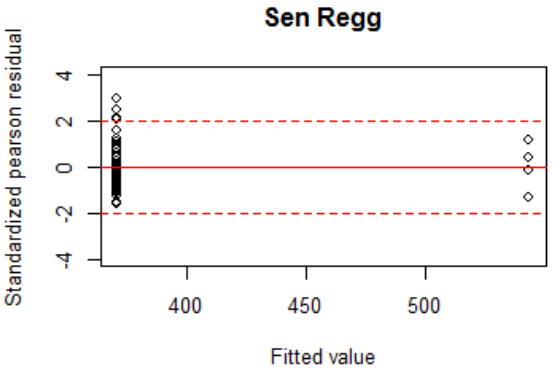

Coll Assets
Standardized pearson residual
-4
-2
0
2
4
340
360
380
400
Fitted value

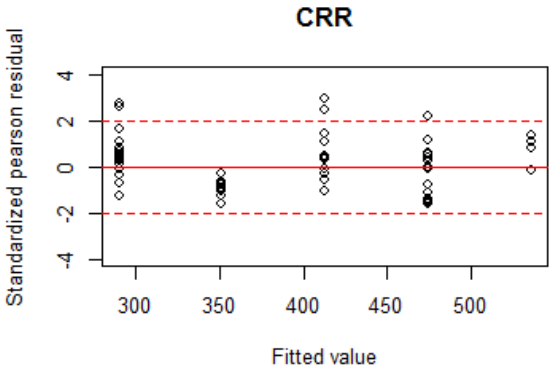

Tranche Regg
Standardized pearson residual
-4
-2
0
2
4
320
340
360
380
400
Fitted value

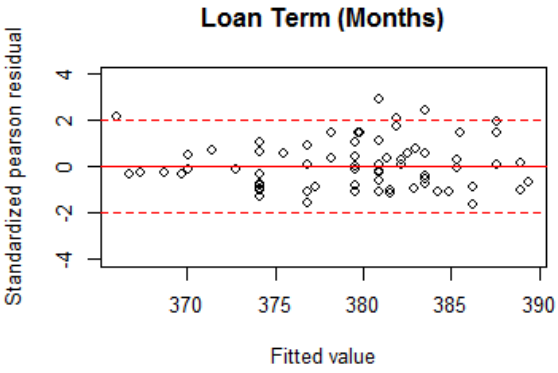

Tr Amd Regg
Standardized pearson residual
-4
-2
0
2
4
380
400
420
440
460
480
Fitted value

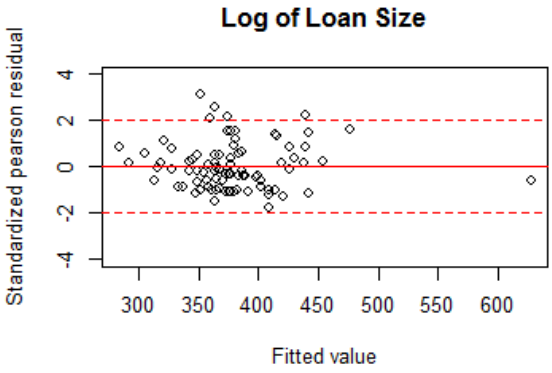

Currency Risk
Standardized pearson residual
-4
-2
0
2
4
375
380
385
390
395
400
Fitted value


Secured Regg
Standardized pearson residual
-4
-2
0
2
4
200
250
300
350
400
450
Fitted value


Sen Regg
Standardized pearson residual
-4
-2
0
2
4
400
450
500
Fitted value

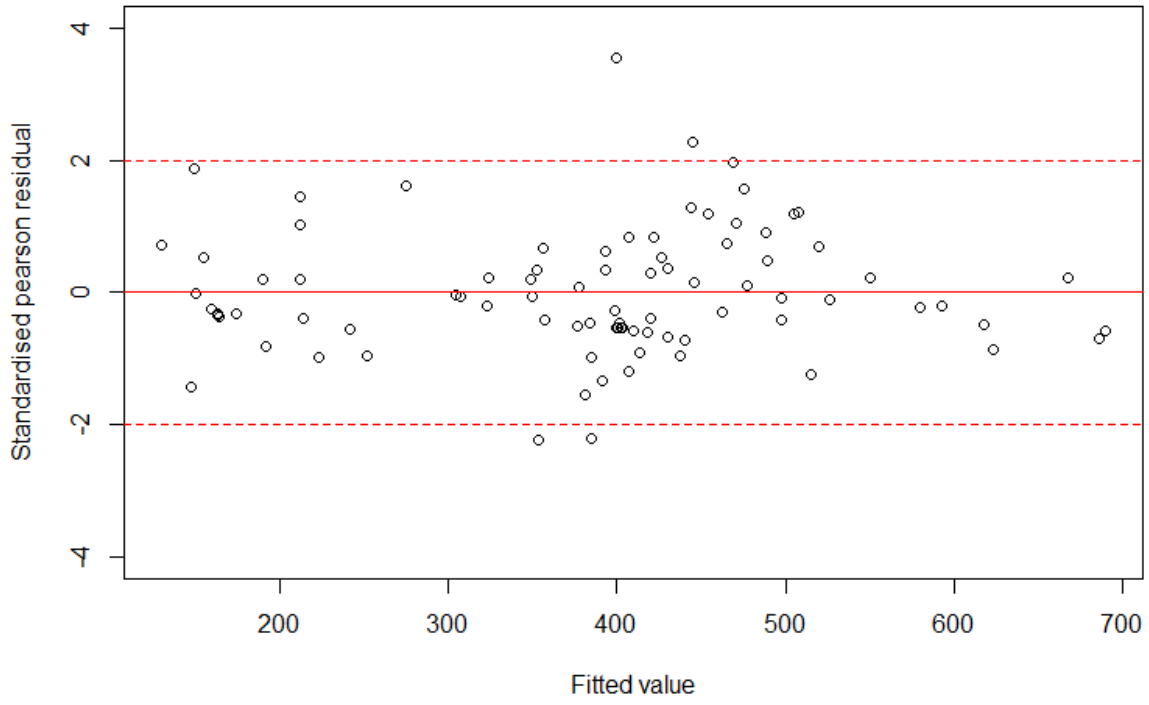

CRR
Standardized pearson residual
-4
-2
0
2
4
300
350
400
450
500
Fitted value

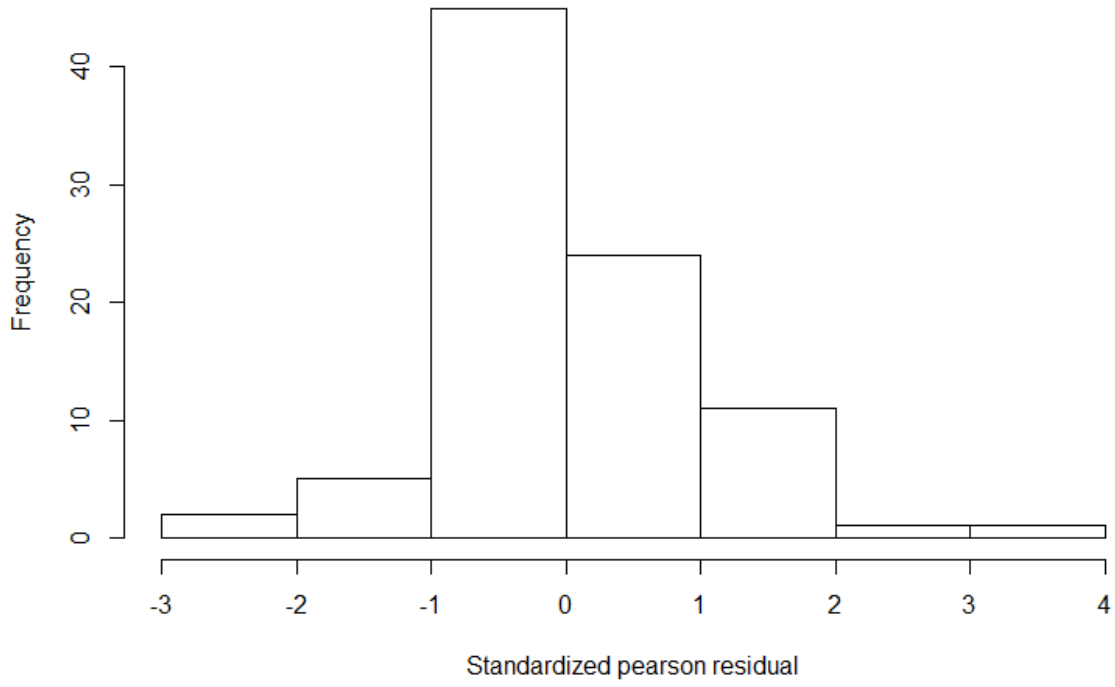

Loan Term (Months)
Standardized pearson residual
-4
-2
0
2
4
370
375
380
385
390
Fitted value

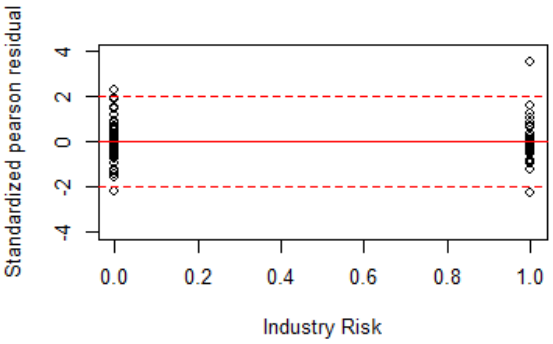

Log of Loan Size
Standardized pearson residual
-4
-2
0
2
4
300
350
400
450
500
550
600
Fitted value

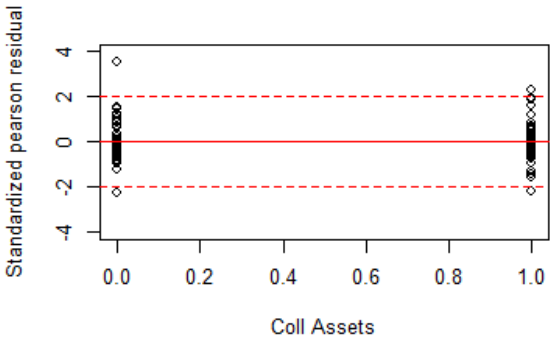
11 Appendix D: Model B Residual Plots

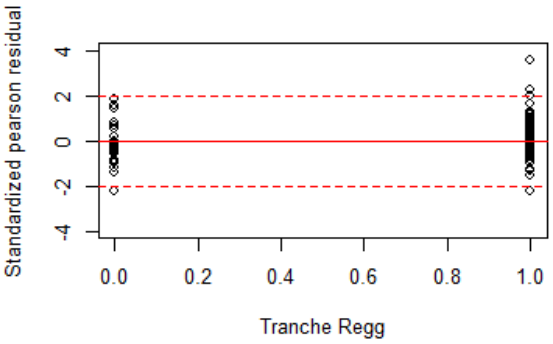
The Standardized Pearson Residuals plotted for Model B multiple linear regression models are presented on the following pages:

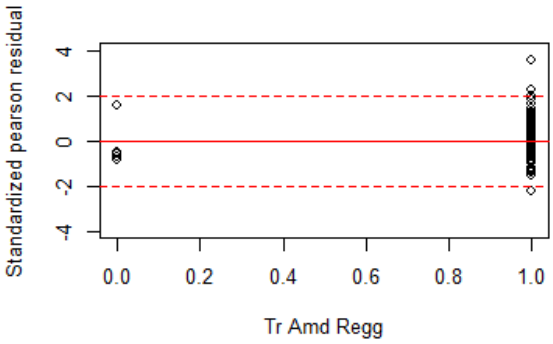


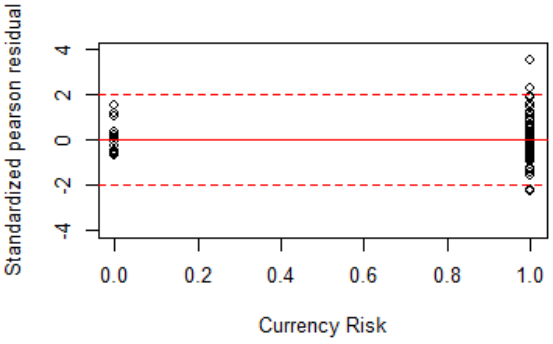


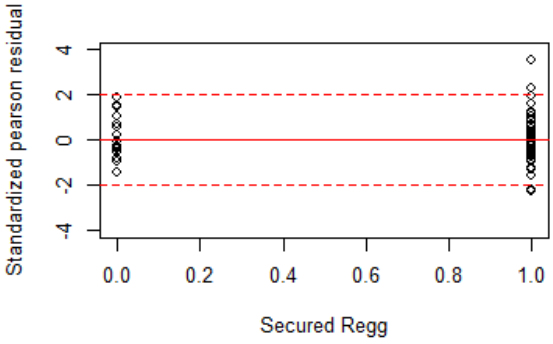

Standardized pearson residual
-4
-2
0
2
4
0.0
0.2
0.4
0.6
0.8
1.0
Industry Risk

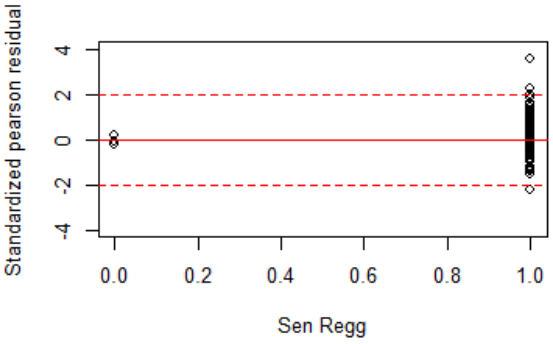

Standardized pearson residual
-4
-2
0
2
4
0.0
0.2
0.4
0.6
0.8
1.0
Coll Assets

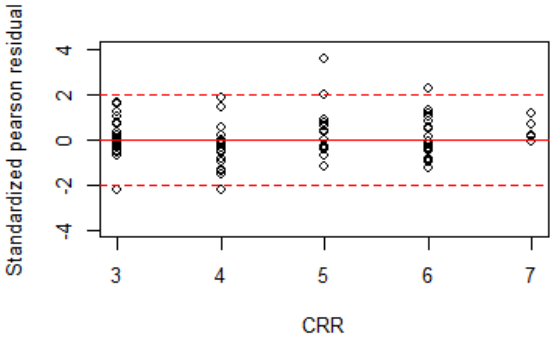

Standardized pearson residual
-4
-2
0
2
4
0.0
0.2
0.4
0.6
0.8
1.0
Tranche Regg

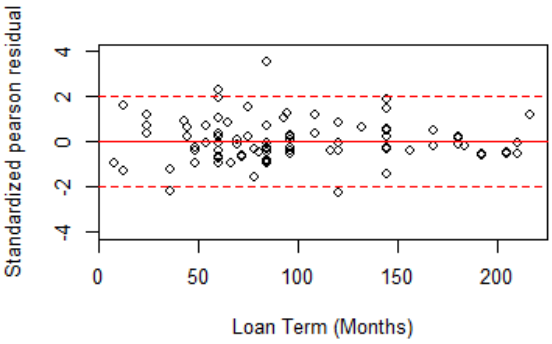

Standardized pearson residual
-4
-2
0
2
4
0.0
0.2
0.4
0.6
0.8
1.0
Tr Amd Regg

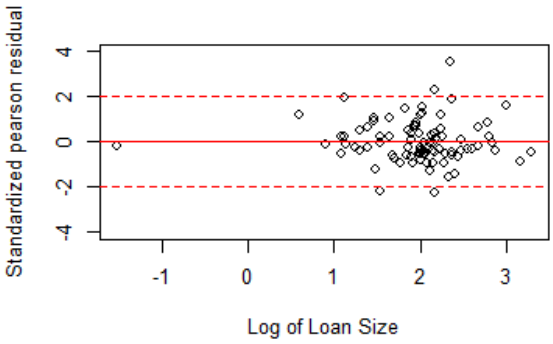

Standardized pearson residual
-4
-2
0
2
4
0.0
0.2
0.4
0.6
0.8
1.0
Currency Risk


Standardized pearson residual
-4
-2
0
2
4
0.0
0.2
0.4
0.6
0.8
1.0
Secured Regg


Standardized pearson residual
-4
-2
0
2
4
0.0
0.2
0.4
0.6
0.8
1.0
Sen Regg


Standardized pearson residual
-4
-2
0
2
4
3
4
5
6
7
CRR


Standardized pearson residual
-4
-2
0
2
4
0
50
100
150
200
Loan Term (Months)


Standardized pearson residual
-4
-2
0
2
4
-1
0
1
2
3
Log of Loan Size