

Facoltà di Economia

Dottorato di Ricerca in

Economia e Tecnica della Finanza di Progetto

XX Ciclo

**Le determinanti del rating e
del pricing risk adjusted nelle
operazioni di project finance**

*Multiple case study analysis in a
Basel 2 environment*

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ABSTRACT

This doctoral thesis develops and tests three main hypothesis derived from a multi-theoretical framework, to understand factors shaping ratings, credit spreads and risk adjusted spreads for project finance loans in a Basel2 compliant environment, by means of a multiple case studies analysis. The research perspective is that of a Mandated Lead Arranger bank.

Project finance, together with other income producing assets financing architectures are referred to as Specialized Lending by the Basel Committee, and within the IRB Approach, they have a dedicated and more basic rating methodology for regulatory capital calculations: the Slotting Approach.

According to the new Basel framework, the thesis shows how to assign rating to project finance loans and how to calculate the break-even and the risk adjusted spreads. Then, applying some sensitivities to the base case models, we find that ratings and risk adjusted spreads are more influenced by unexpected shifts in “non project specific elements”, referred to the Sponsor group and to their respective financial and reputational conditions, than by shifts in “project specific elements”. Furthermore, we find that the term structure of credit spreads can be reasonably approximated by a hump-shaped function, with several local humps that during the project life entail “riskiness revamping points”. In accordance with the crisis-at-maturity model, we also find that the relative weight of credit spread and cost of funding varies along the project life cycle, with credit spreads being higher in the short and in the long term and cost of funding prevailing in the medium term.

EXECUTIVE SUMMARY

This doctoral thesis develops and tests three main hypothesis derived from a multi-theoretical framework, to understand factors shaping ratings, credit spreads and risk adjusted spreads for project finance loans in a Basel2 compliant environment.

Project finance, together with other financing architectures like object finance, commodities finance, income producing real estate and high volatility commercial real estate, have loan repayment schedules depending primarily on the cash flow generated by the financed asset, rather than on the credit quality of the borrower; moreover they show unique loss distributions and risk characteristics, and suffer from scarcity of historical performance data.

For this reason, they are referred to as Specialized Lending by the Basel Committee, and for regulatory purposes they are treated separately from other Corporate exposures. In fact, the scarcity of historical data prevents banks from establishing reliable estimates of key risk factors and probabilities of default; thus, the Basel Committee was compelled to define and propose a dedicated and more basic framework for SL within the IRB Approach: the Slotting Approach.

According to the new Basel framework, we show how to assign rating to project finance loans and how to calculate the break-even credit spread, that is the minimum spread for the loan to be EVA neutral in a multi-period setting, and the risk adjusted spread, obtained from the credit spread taking into account the fee structure and the costs associated with the term structure of marginal economic capital.

The thesis analyses the peculiar nature of credit risk and the term structure of credit spreads in project finance, by means of a multiple case studies analysis based on five projects, both investment grade rated (BBB- rated) and non investment grade rated (BB+ rated). These projects, all closed between 2005 and 2007 and developed in Italy, U.S. and Ireland, roughly represents a €5 bln portfolio of total syndicated loans, that is a €270 mln portfolio of final take for the bank.

The research perspective is that of a Mandated Lead Arranger bank, while its theoretical building blocks are the corporate and project credit spread researches and the credit spread modeling literature (Madan and Unal, 1993; Fons, 1994; Jarrow and Lando, 1995 Jarrow, Lando and Turnbull, 1997; Lando, 1998; Jockivuolle and Peura, 2003; Turnbull, 2003), as well as the project default and project rating research pipeline (Sorge and Gadancz, 2004; Erturk and Gillis, 2005; Orgeldinger, 2006; Vaaler, James and Aguilera, 2007) and the risk-return relationship literature for corporate and project loans (Keong et al.,1997; Tam and others. 1999; Dailami and Hauswald, 2000, 2003; Kleimeier and Megginson, 1998, 2000; Klompjan and Wouters, 2002).

We describe and use a Slotting Approach rating model for project finance loans and a risk adjusted loan pricing model, applying also some sensitivities to the base cases, in order to test our three hypotheses.

We find that even though the project and the SPV are separated from the investing firms (Sponsor), according to the ring fence principle, the project credit risk, as approximated by the rating, and the project pricing, in terms of risk adjusted spread, are still influenced by unexpected shifts in “non project specific elements”, that is to say elements not directly referred to the project and to the SPV, but rather to the Sponsor group and to their respective track records, reputations, experiences and financial stability conditions. Furthermore, in three out of five cases, the relative weight of “non project specific elements” on projects’ rating and pricing reveals to be higher than those of “project specific elements”.

Moreover, considering *coeteris paribus* projects’ parameters, and leaving only the maturity statistic free to change 12 months by 12 months until the 240 months threshold, we find the term structure of credit spreads for project finance loans being reasonably approximated by a hump-shaped function, like a logarithmic one, as in Sorge and Gadancz (2004) and in accordance with the crisis-at-maturity model, but we also observe that credit spread and risk adjusted spread are not monotone function, as they not preserve the same order in each time period considered. Therefore, even though they are positive function of the maturity, they increase at an overall decreasing pace,

despite not at a monotone one, and we observe that sometimes for shorter maturity the spread growth rate is higher than for a longer maturity. We conclude that the spread–maturity function have both a hump-shaped comprehensive behavior and several other local humps, that entail “riskiness revamping points” during the project life cycle.

Furthermore, as far as the crisis-at-maturity model is regarded, we also find that consistently with the idea that in project finance shorter maturities increase liquidity and refinancing risks for the SPV, the relative weight of credit spread and cost of funding on the risk adjusted spread varies along the project life cycle, with credit spreads influence being higher in the short and in the long term because of a higher perceived riskiness of the initiative, and cost of funding increasing more during the medium and medium-long term perspective.

We conclude our analysis measuring value creation (EVA) and risk adjusted returns (RAROC) of the five projects, both in the base case scenario and as a function of rating and maturity, assuming *coeteris paribus* all other relevant parameters, thus depicting the relative strength of our projects to face unexpected changes in terms of ratings or loans tenor.

The choice of the multiple case study methodology, that is a non-statistical but very common one in doing social science researches, was driven by a strong underlying assumption: each project is rather unique and special, therefore despite any attempt to provide aggregate figures, each project is worth to be understood and analyzed stand alone. Case studies are the preferred research strategy when “how” or “why” questions are being posed, and when the focus is on contemporary phenomenon within the same context.

The chosen methodology allows to go deeply inside in each project, through a vertical analysis, without renouncing to a cross case aggregate focus: first of all we design single case studies according to a common structure, to collect data and present them; then we propose a cross case report, to synthesize main findings, and propose some sensitivities to test hypothesis.

All the findings and conclusions provided by our case studies will contribute to our knowledge of project financing architectures, and will turn into new starting points or new hypothesis for future researches endowed with statistical relevance and significance.

KEY WORDS: *project finance, term structure of credit spreads, risk adjusted spread, Basel 2 rating model.*