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"Effects of Basel III on the business segment of international project finance"

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For my little sister Dr. Carolin Ostendorf

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List of abbreviations

AASF	Available amount of stable funding
ABS	Asset-Backed-Securities
ADB	Asian Development Bank
AfDB	African Development Bank
AIG	American International Group
AIIB	Asian Infrastructure Investment Bank
ARSF	Associated required stable funding
BCBS	Basel Committee on Bank Supervision
BOO	Build-own-operate
BOOT	Build-own-operate-transfer
BOT	Build-operate-transfer
Bps	Basis points
BTO	Build-transfer-operate
CB	Countercyclical buffer
CCP	Central counterparty
CDA	Confirmatory Data Analysis
CDB	Caribbean Development Bank
CEDB	Council of Europe Development Bank
CET	Common equity tier
CFADS	Cash flow available for debt service
DBSA	Development Bank of Southern Africa
DSCR	Debt service cover ratio
D-SIB	Domestic Systemically Important Banks
EAD	Exposure at default
EBITDA	Earning before interests, tax, depreciation and amortisation
EBRD	European Bank for Reconstruction and Development
ECA	Export Credit Agencies
EDA	Exploratory Data Analysis
EIB	European Investment Bank
EIF	European Investment Fund
EL	Expected loss
EPC-Contract	Engineering, Procurement and Construction contract
EURIBOR	Euro interbank offered rate
ExIm Bank	Export Import Bank of the United States
FASB	Financial Accounting Standards Board

G-SIB	Global Systemically Important Banks
HQLA	High-quality liquid assets
IADB	Inter-American Development Bank
IBRD	International Bank for Reconstruction and Development
IDB	Islamic Development Bank
IDFI	International Developmental Finance Institutions
IFC	International Finance Corporation
IFRS	International Financial Reporting Standards
IIC	Inter-American Investment Corporation
IMF	International Monetary Fund
IRB	Internal rating-based
IRR	Internal rate of return
ISDB	Islamic Development Bank
K	Capital requirements
KEXIM	Korea Export Import Bank
LCR	Liquidity coverage ratio
LGD	Loss given default
LIBOR	London interbank offered rate
LLCR	Loan life cover ratio
M	Maturity
MCR	Minimum capital requirements
MDB	Multilateral Development Banks
MIGA	Multilateral Investment Guaranty Agency
MLA	Mandated lead arranger
MR	Market risk
NADB	North American Development Bank
NDB	New Development Bank BRICS
NIB	Nordic Investment Bank
NPV	Net present value
NSFR	Net stable funding ratio
O&M contract	Operation and Maintenance contract
OECD	Organisation for Economic Co-operation and Development
OP	Operational risk
OTC	Over the counter
PD	Probability of default
PF	Project finance

PFI	Project Finance International
PLCR	Project life cover ratio
PPP	Public-private partnership
RASF	Required amount of stable funding
RBS	Royal Bank of Scotland
RCAP	Regulatory Consistency Assessment Programme
RCR	Reserve cover ratio
ROE	return on equity
RWA	Risk-weighted assets
SA-CCR	Standard approach for counterparty credit risk
SFAS	Statement of Financial Accounting Standards
SIV	Structured Investment Vehicles
SL	Specialised lending
SME	Small and medium-sized enterprises
SPE	Special purpose entity
SPV	Special purpose vehicle
UL	Unexpected loss
US-GAAP	United States Generally Accepted Accounting Principles
VBA	Visual Basic for Applications
ZBW	Deutsche Zentralbibliothek für Wirtschaftswissenschaften (German National Library of Economics)

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1 INTRODUCTION

1.1 PROBLEM DEFINITION AND OBJECTIVES

The origin of this work is to be found in the subprime crisis and the resulting chain reaction via the financial crisis and the global economy crisis to the Basel III regulatory framework. One of the underlying features of the financial crisis was the build-up of inordinate on and off-balance sheet leverage in the banking sector. Banks often built up giant leverage while still showing strong risk-based capital ratios. Consequently, banks depreciated globally US$1,992.8bn until 2010 with regard to the financial crisis. Starting with the decline in value of private property and loan defaults, banks had to depreciate their receivables from direct private property loans and/or investments in those ABS funds and had to realize losses. These losses had a direct impact on the banks' capital value and thus on the leverage ratio. As a reaction to the financial crisis the Basel Committee was once again forced to act and, as a result, they published a first draft of Basel III in 2010. Through systematic failures the crisis turned into a financial crisis, reduced banks' equity and, as a result, the possibilities of refinancing significantly. And finally the crisis had an impact on the global economy and also on international project finance.

International project finance has its origin in capital-intensive major infrastructure projects where the financing amount mostly ranges from hundreds of millions of euros or up to several billions of euros which are in jointly structured and financed by a number of global banks. Project finance has been established on the market as a safe and reliable financial product. Since 1998 the annual default rate for all project finance debt has, on average, been at 1.5%. This is slightly below the 1.8% default rate for corporate financing issuers for the same period. Because of their special character with long-term agreements, market fluctuations only have little to no effect on running projects and that is why projects in operation do were largely not affected by the financial crisis. Also the long planning and start-up phase led to downstream effects of market fluctuations and had no immediate impact on project financing structures. Against this background and with a recovery of the global economy, a recovery in the project finance market is expected too. However, the mentioned chain reaction from the financial crisis to the new regulatory framework of Basel III has led to a review of the impact of Basel III on

the project finance sector.

On account of a huge number of changes of the economic and legal framework conditions, classic project financing finds itself at a crossroads. The financial crisis and, as a result, the stricter requirements of Basel III regarding the granting of credit have rendered the financing of projects more and more complicated, especially in view of the changed willingness of the banks to take risks. The legal and regulatory framework conditions have also become more complex in the project financing business segment. This is why it has to be feared, for example, that the Basel III equity depositing regulations for risk-carrying credit will be tightened and, as a consequence, entire projects may be doomed to fail because of the increased cost structure for investors. Nevertheless, in spite of changed basic conditions it is to be expected that there will be a demand for suitable financing opportunities in the area of the financing of major, capital-intensive projects in the future. Insurance companies and other institutional investors are also facing massive problems with regard to the long-term investment of assets at favourable risk conditions and ROI terms (e.g. the reflection of guaranteed interests on life insurances).

1.2 OBJECTIVES

The present work will initially focus on a detailed elaboration of the mechanism between the financial crisis, the regulatory framework of Basel III and the project finance business unit. After an examination of the in-depth presentation of the three subject areas, the first objective is to get an accurate understanding of the individual range of the subject and to understand the mechanisms among each other.

With the achievement of the first objective, it should be possible to develop a suitable scientific research strategy. Thus, another objective is to present an appropriate research strategy that fulfils scientific claims. This research strategy has to elaborate the impact of the framework conditions on the business segment of project finance. Moreover, the research strategy should focus on the following three crucial points:

- Can the impact of Basel III be defined or at best measured within a standardised project finance case study?
- Can the first project finance-related consequences of Basel III already be seen on the market?
- Can solutions for the project finance market be identified?

One of the central questions to be answered is whether classic project financing models can still be used in the future and whether there are possibilities / potentials for the advancement of project financing. Consequently, the overall objective is to find solutions for the following problems:

- The increase in capital costs resulting from regulation renders the implementation of large projects within the scope of project finance more difficult.
- With a downturn in demand or declining profitability, project finance loses its relative appeal in the orientation of the banks' business policy.
- Project finance has to be complemented by other forms of financing, or replaced, to financially ensure the realization of large projects also for the long-term.

1.3 METHODOLOGY

Chapter 2 »General conditions of project finance« presents typical characteristics of a classical project finance structure. The different project participants are successively introduced, along with a typical project finance case. Here, special attention is given to any connection with funding. For a better understanding of the behaviour of the project participants among each other, the special role of the principal-agent theory is described in the context of project finance in chapter 2.3 »The Principal-agent theory«. Subsequently, the influence of the financial crisis is described in detail as a link between project finance and the regulatory framework of Basel III. Because Basel III is widely based on the Basel Accords and Basel II, there is a treatment along the paragraphs with the focus on project finance in chapter 2.5.

Chapter 3 »Empirical research strategy« first presents a precise definition and analysis of the hypotheses. Within the scope of the previous information, analyses, characteristics of the subject of investigation and the research design will be defined. Due to the process of elimination there is no quantitative research method available and the selection process preceeding the case study research is the best suitable research design. Based on the variety of qualitative scientific research designs, there will be a detailed determination of the theoretical evaluation methods in the following chapters. Finally, the resulting research design and the selection of appropriate cases will be presented in chapter 3.3.

Chapter 4 »Empiric investigation of project finance business unit « transfers the previously developed case study into a practical approach. Here, the case study is divided into the following three individual cases: field research, data analysis and literature review. For each case there are further theoretical adjustments, a practical implementation and a conclusion. In the conclusion, the results of the individual cases may not be linked to each other. Only in the case-cross-border analysis in chapter 4.4 can the individual results be interlinked and the evaluation of all results takes place.

Chapter 5 »Result analysis and validation« analyses the evaluated and interlinked results from the previous chapter. The theoretical adjustments about the quality of the evaluated and interlinked results as well as a gain of external validity through expert interviews will be discussed. After an evaluation of all the results in the result analysis, the results will be transferred into a sustainable project finance model. The results of the case study research represent a mix of different financial products.

Chapter 6 »View and perspective for the business segment of project finance« summarises in an overall conclusion all evaluation results from the empirical case study. Thereby an exact determination of the impact of Basel III on the project finance will be made and also a very precise determination of possible solution approaches of a future-oriented project finance funding structure will be presented.

2 GENERAL CONDITIONS OF PROJECT FINANCE

2.1 INTERNATIONAL PROJECT FINANCE

The present thesis with the title »Effects of Basel III on the business segment of international project finance« requires a clear demarcation. The topic is divided into two independent main elements. On the one hand, there is the definition of »Basel III« which has its origin in the financial crisis and, on the other hand, there is »international project finance«. In order to understand the correlation between the two, they first need to be defined exactly.

There are many definitions for international project finance. The literature defines project financing in a broader sense and in a stricter sense. In the broader sense there are the terms »international«, »project« and »financing«.

The term »international« underlines that various states are involved across country borders. This contains the place of investment and all participants. Consequently the documentation language, the currency, the place of jurisdiction, the cross-border transactions and the commodity flows have to be defined. (Müller, 1985)

The best way to define the term »Project« is to have a look at the standardised definition from organisations like the British Standards Institute »BS 6079-2:2000 Project Management«, the German Institute for Standardisation »DIN 69901« or the International Organisation for Standardisation »ISO 21500« (Alisch et al., 2004; Grau, Wagner, 2013; Lester, 2014; Nagel, 2012). The agreed-on definition of »project« is “a unique process, consisting of a set of co-ordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources.” (Lester, 2014)

Finally, there is the term »finance« which contains the complete process of borrowing and redeeming money. Thus, financing includes the complete liability side of a balance sheet. In the financial economy it is common to separate financing into internal financing and external financing. The project starting date mentioned clarifies that a project has no history and the complete scope of internal financing

is not relevant for project financing. Therefore, an explanation of internal financing will be omitted in this work. There are different types of external financing instruments. In the first step, the external instruments can be divided into the equity provider, as the owner of the project company's shares, and the debt provider. The distribution of these two parties is expressed in the debt to equity ratio. In special cases the shareholder can also provide the loan, which is known as a shareholder loan. It is also possible that a further investor with no shares wants to participate in the project, provide equity and have a voice when it comes to making decision. These special cases are hybrid financings, also known as mezzanine capital. The debt financing is ensured by the banks' insurance companies or supplier credits. The documents especially tailored for project financing will be explained in chapter 2.2 »The project finance case«. (Drukarczyk, Lobe, 2015)

In the strict sense international project finance is often referenced to Nevitt (1980) who defined it as followed: "A financing of a particular economic unit in which a lender is satisfied to look initially to the cash flows and earnings of that economic unit as the source of funds from which a loan will be repaid and to the assets of the economic unit as collateral for the loan." Also the Financial Accounting Standards Broad »FASB«[1] has slightly modified Nevitt's definition. Instead of "particular economic unit" the SFAS 47[2] used "major capital project" which puts the focus more on the capital-intensive size of a project. There is no uniform recommendation related to the investment size for international project finance. Considering a huge amount of fix transaction costs for a comprehensive due diligence and several advisors increase the costs of project financing. Also this special kind of financing has a high individuality for every project agreement in every single project. Therefore and regarding the fix-cost degression, it is economically reasonable to preferably have a higher project investment. It is possible to reduce these fix-costs by standardised facility agreements, the transferability of project agreements and reduced due diligence costs due to proven technology, and to obtain a project finance structure for smaller project investments of approx. EUR25m. However, the international project finance has its origin in

[1] FASB founded in 1973 is a private US-American organisation which develop accounting principles.

[2] SFAS 47 Statement of Financial Accounting Standards No. 47 "Disclosure of long-term obligations", March 1981, Appendix B, Tz. 23 a.

capital-intensive major projects where mostly the financing amount ranges from hundreds of millions of euros to several billions of euros which are jointly structured and financed by certain global banks. Consequently, the following characteristics are the primary ingredients of international project finance:

- The existence of a clear particular unit
- The cash flows and earnings of that economic unit as source of the funds from which a loan will be repaid
- The assets of the economic unit as collateral for the loan.

2.2 THE PROJECT FINANCE CASE

The literature provides a number of books on project finance. Alongside others, Yescombe (2013), Fabozzi, de Nahlik (2012) and Gatti (2013), regularly published their revised edition of a comprehensive and very detailed overview of the basic conditions in project finance. Because project finance is a complex subject matter with its own terminology, it is necessary to give a basic overview. Other than the authors mentioned before, the chapter headline has already revealed it, the following project finance case will give a very detailed description along a typical approach in project finance. However, there is no universal approach to a project financing structure, because every single project is special and individual in its complexity so that in the following typical or common procedures will be described. Above all, the case described below is also the basis for the empirical analysis in chapter 3 and, in the conclusion, will be adjusted by the results. The figure below shows a typically line up of project finance. Thereby project financing is described from the direct credit lending approach because this is the dominating form of financing. Beyond that, also products like project finance bonds as a complementary vehicle will be integrated. As mentioned above, the single steps in the figure below do not necessarily have to run in this order and could also proceed parallel to each other. Furthermore, the individual steps do not involve the same amount of work and, consequently, the same expenditure of time.

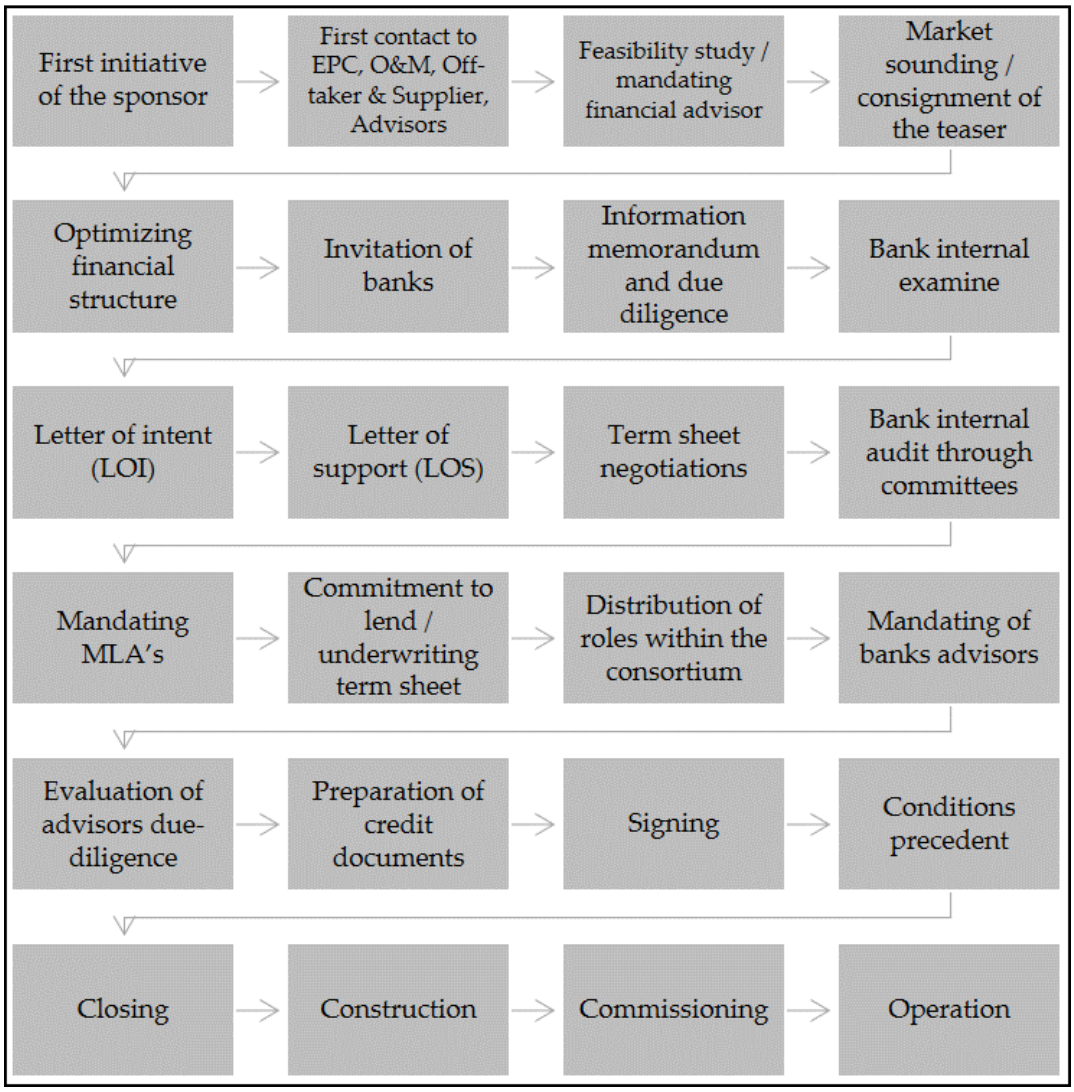


Figure 1: Line up of project finance (Source: own representation based on Brodehser (2012))

The first step is the initiative of the sponsor, but the services of private banks in the project finance sector support the project developer already at an early stage. The substantial range of products of project finance banks allow sponsors to define margins and compensation components for different services at different stages. (Morrison, 2012; Weber, Alfen, 2010) The target focus is to introduce the main participants during the several stages of structuring a project. This introduction helps to understand the scientific investigations in the next chapters. The investigations recurrently refer back to the following case of the project

financing structure. It will be examined whether new regulations or changes in circumstances will have an impact on the original structure. Finally the pros and cons will be discussed and, if necessary, the case will be adjusted or extended. The simplified figure below gives an overview of the main participants in a project finance structure. In combination with the figure above, the main project participants are already involved in the project at the second stage. For a convenient overview of the complex structure of project financing the chronological order in the figure above will be abandoned. In the following, firstly, the important role of the sponsor and the tasks to be done as a first step will be presented. In a second step the other participants will be presented one after the others. After the comprehensive presentation of the main participants, chapter 2.2.3.3 »Project financing« will continue with the second step in the chain in the figure above.

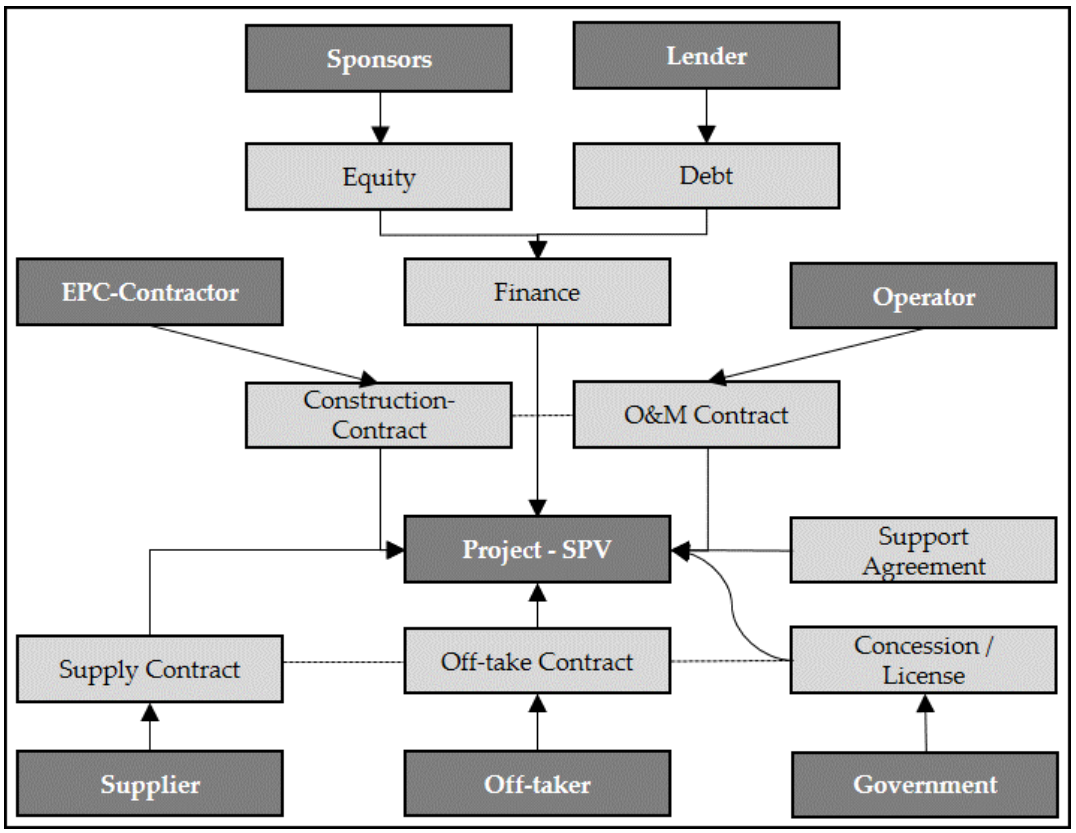


Figure 2: Project finance organization chart (Source: Yescombe (2013)

2.2.1 Sponsors

The idea, the initiative and the first step in the project's timeline is done by the project initiators, »the sponsors«. In a special form the first step could also be made by the government which constitutes a public invitation. If such an invitation is extended, the sponsors often support the project in different ways and therefore it is called a »public-private partnership« – PPP (see next clause »Differentiation to PPP«). (Yescombe, 2013) The sponsors expect to realise a profit from the project implementation and create a first draft. They also provide the equity, have the legal responsibility and are the owners of the project company's shares. Nevitt (1980) define the term sponsors as a "party interested in supporting a project financing. A party providing the credit to support a project financing." Typical reasons for sponsors to promote a project in a project financing structure are:

- to open new markets
- to secure procurement and distribution channels for the long-term
- the need of additional know-how before implementing a large-scale project
- to improve their return on equity or spread their risks across a broader portfolio
- that buyers of the project's products wish to or are able to fund the construction
- constructors use the investment as a way of developing captive business and
- operators use the investment in a project to develop their business.

To reconcile all of these interests of the different parties, a »special purpose vehicle« – SPV is founded. After the founding of the SPV the foundation of the recourse of the sponsors will be defined. At the beginning, there has to be a clear differentiation between a Brownfield or Greenfield project. The Greenfield project is something completely new. It is easy to separate the new business from the existing business. This contains all profits and losses as well as the balance sheet statement. It is more difficult to separate a Brownfield project from the origin company. Often a Brownfield project is an enlargement of an existing business, a new product line or an expansion into new markets, so it is very important to find a clear separation from the origin businesses. In case of an insolvency, similar to the origin company or the project company, liabilities may not be transferred from one to the other. This total encapsulation is called »ring fencing«. In general, there is a distinction between non-recourse-financing, limited-recourse-financing and full-recourse financing. Full-recourse includes the comprehensive rights against the sponsors.

The guarantees and commitments of the loan are similar to normal corporate finance credit and in practice is usually not a project financing structure in the proper sense. Limited financing means that banks have limited rights against the project sponsors. The sponsors only cover a part of the project risks. This could be in a special phase of the project, for example in the construction phase or until the necessary condition precedent is fully in place. Limited-recourse financing is the most common project financing structure. In a non-recourse financing structure lenders have no rights or securities against the sponsors beyond the project companies' value. Therefore the granting of the cash flow is the most important security for the lender. The limited-recourse and the non-recourse-financing structures are also often commonly known as »off-balance sheet-financing«. However, this depends on the respective accounting rules. According to the percentage stake of shares of the SPV or contractual obligations, notes have to be made to the financial statement. The equity ratio to be provided by the sponsors is usually between 15% - 35%. At the time of the first steps of project evaluation a significant share of the costs has to be provided. Several comprehensive expert reports have to be mandated to ensure the licence to be in place, sufficient capacity of commodities at the project destination and a sufficient infrastructure to market the product. The sponsors collect all these results in a first »feasibility study« which is also checked by technical and legal experts. The project idea will then be complemented with an implementation plan and a concept of risk mitigation. The next step is to develop a financial concept. The sponsor mandates external advisors and other project participants. The following table shows the integration of the main project participants and their role in providing information. (Böttcher, Blattner, 2013; Delmon, 2009)

Table 1: Project finance participants (Source: own representation)

Project participants and advisors	**Tasks and interests in the project**
Sponsor	Provide equity / expect return on equity
EPC-Contractor	Secure the construction and maintenance of the project / Income from construction and service contract
O&M-Contract	Secure the project operating / Income from service contract to operate the project
Supply Contract	Secure the obtaining of commodities / Income from long-term commodity supply
Off-take Contract	Secure the long-term sales / Obtaining long-term projects products
Debt provider	Provide the funding / Interests, margins and fees
Advisor	Secure the project process / consultation fee
Insurer	Insure the project / insurance fee
State	Governmental support / concession fee and securing infrastructure

Differentiation to PPP

Project finance transactions which are part of an initiative by the government are divided into public private partnerships (PPP) or public private initiatives (PPI). There the government looks for better terms and conditions in project contracting, delivery and operation through a partnership between the government and private contractors combined in an SPV. In general, these can be forms of agreements between the government and the private sector "that exist to procure, build or develop a facility or service and that shares risks and rewards between the public and the private sector partners." (Fabozzi, de Nahlik, 2012) The private finance initiative PFI differs from the PPP in the point that in PPPs the asset ownership remains in the public hand and the project is set up to operate the facilities through a concession. PFIs can include fund raising and a shift in ownership. There are several basic forms of project agreements which describe

such a shift in ownership. (Fabozzi, de Nahlik, 2012) The four most common in project financing are:

- BOOT – Build-own-operate-transfer
- BOT – Build-operate-transfer
- BTO – Build-transfer-operate
- BOO – Build-own-operate.

The BOOT agreement means that the SPV constructs, owns and operates the project. At the end of a set period of time the asset is transferred to the public sector. In the BOT agreement, the SPV constructs the project, earns the revenue, but never owns the asset. In a modified form the BOT is also known as BLT – build-lease-transfer, or BLOT – build-lease-operate-transfer. This structure is common, for example, in the construction of roads or bridges. In the BTO agreement the public sector does not take over the ownership of the project until the construction is complete. Otherwise it is similar to the BOT. The most common structure in the private sector is the BOO. The SPV builds, owns and operates the project along the complete project life cycle. (Yescombe, 2011, 2013)

2.2.2 Project participants

EPC-Contractor

The Engineering, Procurement and Construction contract »EPC-Contract« is the main important contract in the project documentation. Often the project construction is so complex and difficult to monitor that there is one EPC-Contractor who manages the complete process of construction. A »Multi-Contract« is also a possibility but the resulting interface risks between the individual construction processes are not easy to handle in the documentation. But the convenient solution, to mandate an EPC-Contractor, is always a significantly more expensive solution. The risk to finish the project turnkey, certain date and with a contractually agreed capacity is transferred to an EPC-Contractor with a good credit rating. The experience of the EPC-Contractor has to be paid and the contactor knows how to calculate the risks exactly. The competition at the market grants a fair value for risk pricing. But not only is the construction made by the EPC-Contractor, in general, there are comprehensive long-term services and maintenance agreements which ensure the agreed capacity over years. To prevent further conflicts of interests the

EPC-Contractor is also often a stakeholder of the project company. The EPC solution is a common approach in project financing. (Gatti, 2013; Lockwood, Renda-Tanali, 2010) Pros and cons are shown in the following table.

Table 2: EPC-Contractor vs. Multi-Contracting (Source: own representation)

	EPC-Contractor	**Multi-Contracting**
Principles	An EPC contract includes a turnkey, certain date handover.	Multi-contracting refers to the implementation of a project via individual contracts for the respective construction packages, combined insular solutions are also possible.
Motivation	The sponsors need less experience and the project structure is substantially less complicated.	Enterprise project understanding, expenses and budget responsibility are with the sponsors.
Cost	Clearly more expensive than as a Multi-Contracting. There is a cap on expenses. The higher costs are a result of the interface risks.	At first sight lower expenses, but the interface risk is variable and requires comprehensive technical and legal coordination.
Interfaces	No interface risk.	Interfaces are very important and the main point is the experience of the project manager.
Benefits	Fixed price, fixed dates for total construction.	Greater choice and more options for the Sponsors. The project company has a better monitoring of the project.
Consequences for financing	Easier for project financing.	Project financing requires the proof of a sufficient risk migration.
Avoidance of risks	An experienced constructor with excellent credit rating and, if necessary, by additional guarantees.	Need of additional risk migration: Experienced project management, from a technical point of view can achieve this by close cooperation with technical consultants and enough flexibility in temporal and legal interface arrangement with sufficient budget.

O&M contract

After project completion the operation phase starts. The necessary planning and documentation have already been done before the financial close. Therefore the Operation and Maintenance contract »O&M contract« and also the Supply and Off-take contract will be defined in detail below. Yescombe (2013) says that an "O&M-Contract helps to ensure that the project O&M costs stay within budget and that the project operates as projected. Because the project company has no track record of operating at the beginning of a project, lenders often prefer established companies, which the necessary experience of similar projects as well as more financial substance, to take this responsibility." It is also common that the O&M contractor is one of the sponsors. The documentation makes a clear distinction to define the sponsor's involvement. It is also common that the O&M contract is divided between two parties. As explained in the EPC-Contract above, often a comprehensive service and maintenance agreement is closed with the EPC contractor. In this case there is a second contract with an operator. If the service and maintenance is connected with the performance of the project, then it is called a Major Maintenance Contract. Fixed maintenance fees over a period of time are agreed. (Yescombe, 2013) But there are different types of compensation for the O&M-Contract. Two common solutions are, firstly, the fixed-price contract, where the risks related to the fluctuation in operating costs is minimised. Secondly, there is the pass-through contract, where a fixed payment and a performance bonus are agreed. If the project does not perform as planned due to a fault of the O&M-Contractor, then the contractor has to pay agreed penalties. (Gatti, 2013)

Off-take and supply contract

Market risks are not easy to calculate. In a producing SPV there are normally two points of contact with market risk. On the one hand, there is the purchase of raw materials and supplies for the production. On the other there is the distribution of the produced products. Depending on the economic situation, purchasing and distribution prices can float very strongly and there is a risk that the SPV does not realise any profit or even incurs losses, if the products cannot be sold in the market. To cover these risks, there are a lot of standard long-term contracts with the supplier and the off-taker, whose expertise can handle such long-term contracts. In power projects, the local electricity provider is usually the off-taker. The off-takers in petrochemical projects are often committed upstream chemical firms. Road projects or pipelines, on the other hand, are often projects without an off-taker.

Their contracts are based on a long-term 'tolling' or »throughput« agreement. (Tan, 2014) In the following, first the off-take contracts and afterwards the supplier contracts will be described.

The off-taker is interested in securing stable conditions for his supply for the long-term to. This makes the supply a calculable item for him. The off-taker also has a lot of experience and can value such long-term commitment. In general, the term of such commitments has to be longer than the loan life of the SPV and can reach 20 years or more. In the following, standard common off-take contracts will be presented, which are adjusted to the different circumstances of every single project. The »take-or-pay contract« provides that the off-taker has to take the SPV's product. Otherwise the off-taker has to make a payment to the SPV. The price and the penalties are based on an agreed tariff. These tariffs are usually paid on a monthly basis and often consist of two elements: a fixed availability charge and a charge which varies by the usage of the plant. This varied charge is normally indexed against an agreed published index. The »take-and-pay contract« provides that the off-taker only pays for the product taken. The price can also be paid on an agreed indexed basis like the varied charges before. In a »long-term-sales contract« the off-taker agrees to take minimum quantities of a product from the SPV. The price paid in this case is based on market prices, often even on a market index. The »hedging contract« is common in the commodity finance sector and offers various hedging contracts with market traders. Last but not least, the »throughput contract« is often used in pipeline financings. In this agreement the purchaser pays a fee for an agreed volume. In this case the purchaser often has to take a minimum volume per month. (Decker, 2008; Reuter, 2011)

The achievements of the »supply contract« are in general similar to the off-take agreements. The structure of the supply contracts is also long-term and contains high penalties in the event of non-fulfilment. The supply-or-pay contract is equivalent to the take-or-pay contract. The supplier is committed to supply a minimum quantity of raw materials to a previously agreed fixed price or an indexed price. In case of no supply the supplier has to pay a penalty. If there is also a penalty to be paid in cases of force majeure, the terms and conditions are called hell or high water supply contract. (Yescombe, 2013)

Advisors

Within the scope of project financing, different partners cooperate on different tasks depending on the type of the project. A strict separation of tasks does not always make sense. Often different partners take over several tasks. The work at hand focuses on the tasks to be done by the financial advisor. Because of the involvement in the financial structure and because banks are often mandated as financial advisors, a comprehensive overview will be given in the following chapter 2.2.3 »Lender«. After the mandated financial advisor additional advisors have to be mandated.

Technical advisor

As has already been described in detail in the previous chapter, international structured project financing is about the implementation of major projects with a very high degree of complexity. This complexity does not only concern the financing structure and the organisation of the cooperation of all parties to the project, but, in general, also the technical construction and operation. Technical understanding does not count among the core competences of the banks, and sponsors do not necessarily possess in-depth knowledge either. Conflicts of interest may arise if the constructor is not also a sponsor. This is why several technical advisors, also called technical consultants or independent engineers, are involved in a project. The extent of the involvement of the technical advisor in the project depends on the project phase, the technical complexity and the innovativeness of the project. The essential reason for the integration of the technical advisors is the reduction of risks during the financing phase. The main activities performed by the technical advisor in project financing can be subdivided into four basic phases:

- Due diligence report
- Monitoring the project realisation
- Assistance during acceptance of the plans
- Monitoring operations management.

The technical advisor's due diligence report typically covers:

- Engineering and design
- Construction
- Project start-up
- Operation and maintenance
- Input supply
- Inspection and approval of production
- Financial projections.

This due diligence report also forms the basis for the legal design of the project and the financial documents. Close coordination with the technical advisor is essential, especially during the test phase and during the transition from the construction phase to the operation phase. The legal liability for the project is transferred from the constructor to the sponsors. Therefore the statement during this phase is especially significant to the banks. If the project does not perform as required, this immediately has a negative impact on the success of the project. (Decker, 2008; Reuter, 2011)

Legal advisor

Project financing agreements are also considerably more extensive than those in corporate financing. This is, once again, due to the cash flow lending, risk sharing and a lack in usability of the project. In order to ensure the cash flow, the risks are distributed among the different parties to the project according to risk sharing principles. The contractual arrangements regarding the mutual rights and obligations concern the cooperation of the project sponsors including the design of the project company's legal structure, as well as all other parties. All of those agreements are individual agreements. These project documents have to consider any eventuality and be legally valid. The agreements have to structure the project in a way that provides the project with its own credit standing. Their design will only be successful if the different interests of the parties to the project as well as their motivation for participating are appropriately taken into account. In international project finance, it is essential to consider the legislation which provides the legal framework. Legal advisors are so vital to a project that it might be justified to consider them the key players in the overall framework. Furthermore, the legal advisor is independent and does not - or should not – take strategic decisions.

Risk management and insurance advisor

Involving insurances in the project financing is another step based on risk sharing principles. In general, the project company and, consequently, those parties which are under a contractual obligation bear the project risks. Only then are the lenders of debt capital liable for the credit they granted. Should identified risks affect debt capital lenders, they have to be insured and mitigated. The insurance cover is a transfer for consideration of risks onto balance sheets of third parties. The question whether and on which terms these risks can be insured is not an isolated matter but part of a closed risk management process. A project-oriented risk analysis, as described in chapter 3 »Empirical research strategy«, requires an individually fitted insurance programme. In order to be able to insure a risk, several criteria have to be fulfilled. The risks in this case have to be incentive-compatible and the following mathematical conditions have to be determinable:

- Probability of damage occurrence
- Imputability of an event covered by insurance to an insured event
- Predictability of the financial consequences.

In addition, it has to be possible to insure the risks with reinsurance companies.

The choice of the insurer is as important as the regulations of the insurance package. The financial efficiency of an event of damage is assessed by rating agencies. Due to the diversity, the financial advisor has to perform an independent check and develop a concept. In general, the insurance packages make a distinction between the construction phase and the operation phase. The property insurance covers, among other things, damages resulting from water, fire, theft, vandalism and natural disasters in both phases. In the operation phase, a business interruption insurance provides additional security. Further distinction is made between public and private insurances. The public insurers, in most cases export insurers, cover, among other things, political risks. Since such risks play only a minor role in the remaining parts of this thesis, export insurances will not be further considered at this point. Last but not least, a cost-benefit analysis has to provide information regarding the kind and scope of the insurance benefit, because, after all, the insurance premium directly affects the cash flow. (Finnerty, 2013; Weber, Alfen, 2010)

2.2.3 Lender

This chapter describes the role and tasks of the lender. Lender, in this case, refers to the complete financing structure including all roles which can be performed by the lender. However, the scope of this chapter makes it clear how complex the banking business in international project finance is. The complexity also illustrates the know how that banks have to possess to be, on the one hand, a competent partner for the sponsor and, on the other hand, to be successful in the project finance market.

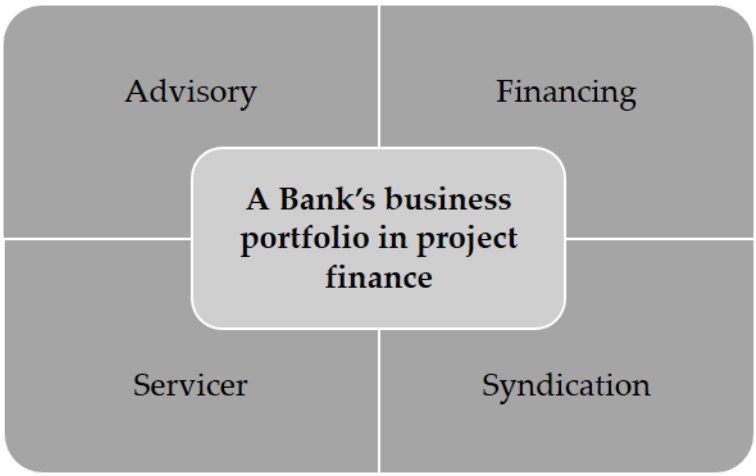


Figure 3: Bank services in project finance (Source: own representation)

2.2.3.1 Financial advisor

The first point of contact between sponsors and banks is often the consultancy which mandates the bank as a »financial advisor«. The sponsors often use the know-how of the banks with regard to financial engineering. This may lead to a conflict of interest in certain situations. In their function as consultants, the banks have a vested interest in interest rates not being too low. This argues in favour of a separation of those functions. The mandating of a financial advisor can take place in two different ways. In general, banks are mandated as financial advisor, but there are also boutiques which provide such a service. The advantage for banks is that they discuss the financial structure of the project directly with the credit risk department and afterwards are able to take their own commitment of debt. To present a risk audit structure with an own commitment offers a comfort position during the marketing process in the banking market. A boutique does not have these capabilities and is not able to make own commitments in the financing

structure. In practice, however, the banks' know-how is the decisive factor and by taking over a share, the banks underline their confidence in the project. This, in turn, facilitates syndication. As the entire project structure has to be adjusted to the requirements of project financing, the tasks of a financial advisor are substantially more far-reaching than those of a financial advisor in corporate finance. (Tan, 2014; Vinter et al., 2013) The financial advisor has to anticipate all the issues that might arise during the lenders' due diligence process. In this process, the financial advisor has the following tasks:

- Advise on the optimum financial structure
- Assist in the preparation of a financial plan
- Advise on sources of debt and likely financing terms
- Assist in preparation of or prepare financial model
- Advise on the financing implications of project contracts and assist in their negotiation
- Prepare information memorandum
- Advise on assessment of proposals for financing
- Advise on selection of commercial bank lenders or placement of bonds
- Assist in the negotiation of financing documentation.

The role of the financial advisor has considerable relevance and is highly profitable. If the consultancy and the financing is done by one and the same party, then the consultant-fee is called »arranging-fee« or »structuring-fee«. This fee is separated into a fixed payment and a success-related fee. If the consultancy is split from the financing part, then the fee often consists of two components: the »success fee« and the »retainer fee« with the success fee often being defined either as an integer amount of money or as a percentage of the debt capital amount which only has to be paid by the sponsor upon a successful deal-closing. In contrast to the success fee, the retainer fee is paid on a monthly basis independent of a successful deal-closing. This type of remuneration is only used by banks which have an active part in structuring the project. In case other banks join the financing structure later, the structuring fees will not be passed through. The financial advisor is responsible for providing the project finance documentation which is then approved by the banks as a sustainable structured concept. A sustainable structure is achieved if all participants of a project agree to the risk sharing structure. Therefore the financial advisor needs a very good market knowledge to design an appropriate risk distribution for all participants. The work of the financial advisor ends once the financial close has been completed. If the financial advisor is a bank, the bank in

most cases takes over the role as lead manager. (Brodehser, 2012; Yescombe, 2013) This role differs in that the bank takes part in the procurement of debt capital.

Table 3: Documents provided by banks (Source: own representation)

Provided documents	Performance of the financial advisor	Fee	Amount of fee
Project information memorandum Term sheet Financial model	Structuring advisory by a financing bank	Arranging fee or structuring fee	25 - 75 bps of the credit amount
	Structuring advisory by an external boutique	Retainer fee	US$ 5 - 50k per month
		Structuring fee	10 - 20 bps of the credit amount

2.2.3.2 Financial structure

With 60% of total debt capital in international project finance, bank commercial loans are by far the most common financial source. Leading project finance banks have huge teams segmented by sector and region. (Thomson-Reuters, 2014)

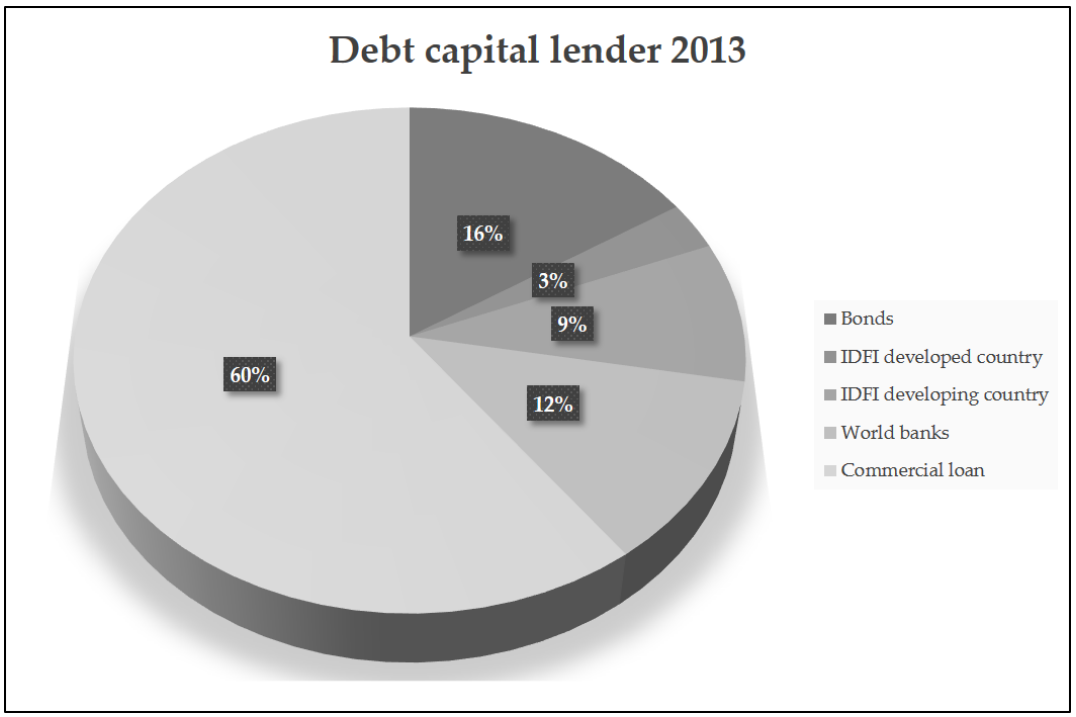


Figure 4: Funding in project finance (Source: own representation based on Thomson-Reuters (2014))

Bonds in project finance structures are the second-largest financing source. In general, project finance bonds are securitised debts of the SPV to the creditor of the bond, but project finance bonds are not traded on the stock exchange. The main difference between commercial loans and bonds is that bonds are tradable instruments. Interested parties of project finance bonds are investors which require a good long-term fix-rate return without equity risk. In the context of a private placement investment, banks place such a bond to institutional investors. If there is a split between the institutional investors into risk-taker, on the one hand, and liquidity provider, on the other hand, then the risk is taken by monoline insurers and the liquidity from institutional investors which is based on a monoline risk insurance. (Yescombe, 2013)

Export Credit Agencies

Credit insurance companies, commonly known as »Export Credit Agencies« ECAs are often commissioned by the state and primarily support the government's demand. ECAs are placed where project finance banks or investment banks do not want to bear the financing risk. This can be the case in developing countries where political risks cannot be handled by the foreign banks. Also, during the financial crisis ECAs supported a significant number of transactions to close the financing gap for required infrastructure. In doing so ECAs support a country's export with short, medium or long-term credits, deficiency guarantees and subsidised financial means in terms of interest subsidy loans. (Caselli, Gatti, 2005)

National and international development banks

Financial means from national and international development banks, also known as »World Banks«, support mostly poverty reduction, climate protection and securing of peace. (Tytko, 1999) Like ECAs, they provide short, medium or long-term credits, deficiency guarantees and subsidised financial means in terms of interest subsidy loans. In practice one disadvantage is the long-winded application process. In general, development banks are separated into multilateral development banks, which are internationally active, and national development banks, which provide financing for the purpose of economic development of their country. The following table lists several well-known development banks in project finance:

Table 4: Development banks (Source: own representation based on Caselli, Gatti (2005))

ADB	Asian Development Bank
AfDB	African Development Bank
CDB	Caribbean Development Bank
DBSA	Development Bank of Southern Africa
EIB	European Development Bank
EBRD	European Bank for Reconstruction and Development
ExIm Bank	Export Import Bank of the United States
IADB	Inter-American Development Bank
IIC	Inter-American Investment Corporation
IFC	International Finance Corporation
IMF	International Monetary Fund
ISDB	Islamic Development Bank
KEXIM	Korea Export Import Bank
MIGA	Multilateral Investment Guaranty Agency
NIB	Nordic Investment Bank
NADB	North American Development Bank
	The World Bank

Next to the financing instruments described above, there are separate instruments of minor relevance. To be mentioned are leasing structures where the lessor is owner of the financing asset and leases the asset to the SPV as lessee. In practice this is not very common and is confined to technical assets or maybe parts of power plants.

Beside the financing instruments which provide the necessary debt capital there are derivative financial instruments, which secure the SPV from market risks. The derivative financial instruments provide the sponsors and, consequently, the SPV with a long-term calculation security. This coverage can protect the SPV against fluctuating interest rates, exchange rates or commodity prices. Banks

provide such derivative financial instruments as swaps, options, forwards, futures, floors, collars and caps. Because of the high debt to equity ratio, banks require as financial conditions a coverage against interest rate risks and exchange rates. A current coverage of 60% to 80% of the debt capital with variable interest rates has been established on the project financing market. The challenge of international project finance is to find a combination of a financial structure whose cost-effectiveness is in accordance with the requirements of risk protection. Banks gladly provide the derivative instruments to the SPV, because it is a good profit-risk relation. (Brodehser, 2012)

But not alone the derivative instruments are profitable, also the term sheet negotiations and therewith the agreement of the credit margin are essential elements. These negotiations afford a high asset value potential for both banks and sponsors in connection with a high leverage. Small changes in basis points »bps«[3] can have a significant impact on the cash flow in investments worth billions of USD, which have a high debt ratio. The banks are in competition and want to offer a competitive bidding, but also have to consider their internal refinancing costs. In contrast to the classic corporate small and medium-sized enterprises »SME« business, there are no fixed-rate financings in project financing. Consequently, sponsors always have the possibility to refinance depending on the interest interval. Common interest intervals during construction range from one to three months and in the operation phase they are up to six months. Refinancing makes sense, if the basic conditions of the project have improved, so that the risk mark-up can be reduced. The risk of increasing interest rates is solved by complementary derivative financial instruments provided by the banks which give the sponsor a high flexibility and calculation certainty. In general the variable interest rate is based on a refinancing index. In Europe the refinancing is based on the Euro interbank offered rate »EURIBOR« or the London interbank offered rate »LIBOR«. The refinancing index should reflect the bank's true refinancing costs but in practice they are often clearly below. The internal bank calculation cannot only be based on the refinancing index. Various components are added to the interest rate of the SPV. (Röver, 2001; Tytko, 1999) The basis is the bank's funding rate which is aggregated with the refinancing costs, the risk surcharge, the handling costs, the

[3] The term basis point »bp« (plural bps) is equivalent to an interest rate of 0.01%. In project financing it is common for interest rates to be expressed as bps instead of percentage points.

equity costs and the margin (see also the figure below).

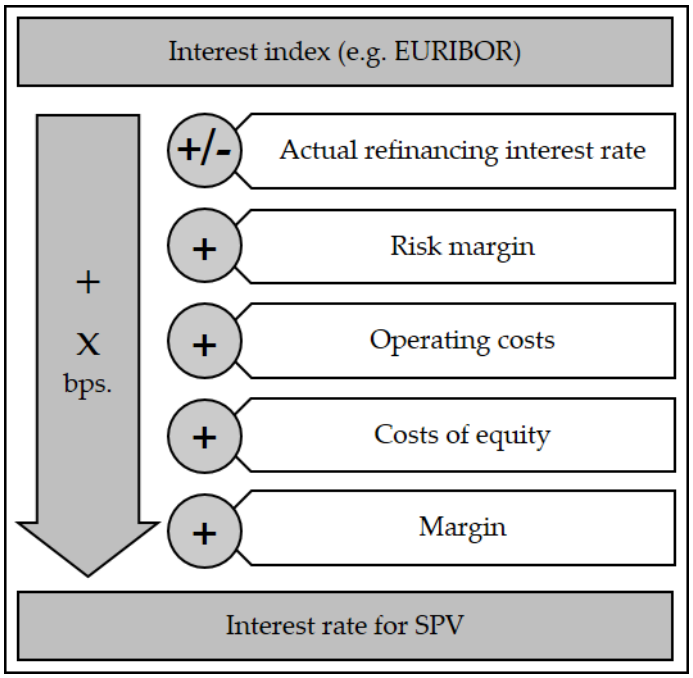


Figure 5: Banks' refinancing (Source: own representation based on Reuter (2011))

Related to the financing, banks require a so called »upfront fee« which is to cover the loan processing costs and often consists of a percentage of the financing debt. In contrast to the arranging or structuring fee, the upfront fee, in terms of a possible syndication, is partly or completely forwarded to the respective parties. The commitment fee is payable on promised loans which have not been drawn until then. Analogue to the interest margin, the commitment fee is a percentage amount per annum. The reason for the commitment fee is that banks incurs costs for their commitment even if the debt is not drawn down. So the commitment fee is similar to the interest margin with the bank being compensated for resulting costs. This is equivalent to the »utilisation fee« which also has to be paid as a percentage amount per annum for providing avals and guarantees. (Reuter, 2011; Tytko, 1999)

Table 5: Funding roles (Source: own representation based on Vinter et al. (2013))

Role of the Bank	Function
Mandated lead arranger (MLA)	The MLA, in the lead, is the financial structurer of the project. In general, there are a few MLA's mandated by the sponsors to structure the project.
Lead arranger	The lead arranger is structuring as well as the MLA the project. But the lead arranger is not mandated by the sponsor, therewith the lead arranger support the MLA.
Arranger	The role as arranger is taken by a bank that has an active part in structuring the project but with a significantly lower relevance than the lead arranger.
Participant	The participant is a non-active member which is interested in financing the project. Banks in the role as participants leave the structuring to the arranger and join the finally negotiated credit documentation.
Bookrunner	The bookrunner is the bank leading the underwriting and the following syndication
Coordinating bank	In a group of more than one MLA's, there are one or two banks which coordinate the consortium of MLA's. They are the interface between the sponsors and the consortium.
Agent	There are several agent-functions. These tasks can be performed by one agent or by several agents for the different functions, for example, documentation agent, security agent or facility agent.

Syndication

The credit volume in international project finance is usually so high that a single project is rarely financed by only one bank alone. That is, on the one hand, because of the regulatory framework and because banks reach the boundaries of the amount for a single borrower unit and, on the other hand, because the risk sharing concept includes additional banks with more experience. If he »final take position« is higher than the structuring bank wants to take permanently, then the bank tries to syndicate the differential amount to the »underwriting position«. The syndication takes place by consortium banks and other investors. This way the

syndication allows to finance credit volumes amounting to billons of USD by only a small group of banks, which during the structuring process act quickly and in consent. The sponsors already have the binding final take position and the underwriting position before banks have successfully implemented the syndication. A syndication including the data to be circulated, is in accordance with the sponsor and as a syndication-clause integrated in the credit documents. Next to a project structure and pricing, the placing power of the syndication bank is crucial for a successful syndication. Industry experience and key contacts in the project finance sector are the key to success. Banks take the risk that they cannot fully syndicate the underwriting positon. The difference between the syndicated amount and the underwriting position remains with the underwriting bank. Because of that underwriting or syndication risk and the costs for the syndication, the structuring bank takes an underwriting fee which is not passed through to the syndication partners. (Yescombe, 2011)

Club deal

Different from the traditional syndication above, there is another financing technique which has been established in project financing. In the club deal transaction, also commonly known as club loan, only a few banks directly provide the full credit amount. A further credit breakdown does not occur. In doing so the underwriting commitment is the same as in the final take commitment. Club deal banks are similar to the MLAs in the traditional syndication with increased final take commitments. Banks in the club deal often provide the same credit amount in asset finance transactions e. g. in shipping or airplanes. But it is also possible to have an unequal distribution with roles as senior lender or junior lender. (Decker, 2008)

Agent

During the financial structuring of the project, the agency role has to be defined. There are several tasks which have to be performed post-financial closing and the tasks can be done by one or more agents. It is not very common for the agent role to be placed with an external provider. The agent has a largely monitoring role, is the interface between sponsors and banks and has to ensure information transparency. (Yescombe, 2011)

The following table presents fundamental functions of banks and their respective performance and remuneration type. In addition, a benchmark is presented which is only an indicator and in practice depends on the type and volume of the project.

Table 6: Fees in project finance (Source: own representation based on Brodehser (2012))

Function	Performance of Banks	Margin or fee	Amount of fee
Financial structuring	Providing liquidity	Margin	100 – 300 bps p.a. of credit amount
	Providing liquidity	Upfront fee	50 – 300 bps of credit amount
	Providing undrawn credit amount	Commitment fee	40% -50% p.a. of credit amount
	Providing liquidity	Utilisation fee	
	Changes in documentation	Waiver fee	US$ 10k – 200k in total divided by banks commitment / depend on the waiver-size
Syndication	Syndication service	Underwriting fee	5 – 75 bps of the underwriting amount
	Syndication risk		Depends on syndication risk
Agent	Security Facility Modelling Documentation among other things	Agency fee	US$ 5k – 50k p.a.

2.2.3.3 Project financing

The previous chapter showed the performance range of a bank. In this chapter the performance range will be shown in a timeline along an example. International project finance is characterized by a high level of individuality. Financial structuring has developed customised solutions to match this high level of individuality. Nevertheless, there are fundamental structures and functional mechanism which are identical to the project finance process. The following steps refer to figure 1 which simulates the project finance process. Assumptions will be made which illustrate typical features of a power project. Because the focus is on the financial structure, the framework conditions can mostly be exchanged so that the project finance case can also be transferred to a petrochemical plant, for example.

The sponsors have the highest profit expectations. Consequently, they are prepared to take higher risks, which include the funding at the beginning of the project evaluation. This funding is needed for the first concept plus the costs for the advisors which can quickly amount to several US$100k. If the project is implemented, these costs can be integrated in the financial structure and evaluated as a part of the equity provided by the sponsors. Once the sponsor takes the initiative and contacts possible advisors, EPCs, suppliers, off-takers and O&Ms, a feasibility study may be prepared. A number of expert opinions will be collected. After the specification of the implementation concept and the preparation of the legal and technical due diligence, the concept has to be finalized in a financial concept. For this, a financial advisor has to be mandated. Between the mandating of the financial advisor and the next step, the market sounding and consignment of the teaser, there are a lot of tasks for the financial advisor to complete. They will be explained in detail in the following. The experience of the financial advisor helps to implement the risk sharing concept in order to mitigate not coverable bank risks. The financial advisor also creates a financial structure out of the projected cash flows and integrate it into a financial model. (Böttcher, Blattner, 2013; Dewar, 2011)

Risk Sharing

Risk identification, evaluation and allocation on core competition is the heart of project finance. Risks are divided into the main categories as commercial risk, macro-economic risk and political risk. Commercial or project risks are those which are related to the project itself, like construction time extension and cost overruns, market risks or operating risks and force majeure risks. Macro-economic or

financial risks are related to inflation, change in interest rates or change in currency exchange rates. Political or country risks are events such as change of law, war and civil disturbance. These identified risks can be evaluated and allocated in two different ways. On the one hand, risks can be related to the causer and, one the other hand, risks can be distributed in proportion. Thereby, risks related to the causer can be mitigate proactively and risks which are distributed in proportion linger on unchanged, but their impact on SPV can be reduced, e. g. by insurances. Project finance risk analysis is based on a comprehensive due diligence process which collects all relevant information about the project. In this data base risks can be identified and allocated to the respective causer. This way the respective causer is, in general, the party which has the core competence to quantify and to consider the acceptability of the residual risk. Primarily the process of due diligence and risk evaluation is to be undertaken by the lenders. The theoretical principle of risk identification and allocation on the core competence of project participants is to mitigate nearly all risks of the SPV. By transferring the theoretical principle onto the power plant case, the EPC, for example, has to ensure that the plant can be taken over turnkey, fixed price, certain date, and with an agreed capacity. Beyond that the losses for all project participants have to be calculated in terms of construction delay, normally on a monthly basis, and the credit standing of the EPC must be able to carry the penalties for all project participants beyond the worst case planning horizon. The EPC can calculate these risks better than all other project participants. Much depends on whether the technology is proven or not. Because of the historical experience proven technology is easier to calculate. If it is non-proven technology, the EPC also has to guarantee the available capacity over an agreed period. This example clarifies the comprehensive risk allocation. In reality risk allocation is based on the negotiating power of the different parties and stands in direct relation to the leverage ratio. As more risks can be mitigated, more debt is provided by the banks and the leverage ratio for the sponsors is even higher. An error in the development and negotiations of project contracts leaves too much risk with the SPV. Consequently the mitigation of all risks for project participants and away from the SPV, increases the total project costs, so that the declining return on equity cannot be compensated by the leverage ratio. (Yescombe, 2013) Once there is a sustainable concept which allows to forecast the expected cash flows, the financial advisor puts the financial structure into a financial model.

Financial model

The financial model is often provided by the sponsor or the mandated financial advisor and plays an important role in the project evaluation and risk quantification. It can also be done by external agencies in close cooperation with the financial advisor and the sponsor. As well as the project documentation, which will be described in the next chapter, the financial model reflects the complete life cycle of the project or at least covers the project loan life term. In contrast to the formulated project documentation the financial model represents technical, legal and insurance considerations translated into numbers. In general the financial models are created in complex Microsoft Excel spreadsheets. The complexity and the need to have a valid model with a significant relevance for all project participants, require an external auditor's attestation of the correctness of the model. It is not common for users and auditors of project finance models to specify the model using VBA code, because it is more difficult to audit such a code than the formulas within the spreadsheet cells. There are three main phases of a project where cash flow models are used. To optimise the design of the projects structure, models are used in an early stage of the planning phase. During the second phase, the negotiation phase, the model develops the construction drawdowns and sets the relevant ratios e. g. the debt to equity ratio. With the beginning of the construction phase and later with the operation phase, the model is used to make a target-actual comparison and should be similar to the actual accounting figures for past periods. (Fabozzi, de Nahlik, 2012; Finnerty, 2013)

There is no consistent standard for the design of a project finance models because of the individuality of each project. But the past has formed parameters which have become established in the design of project finance models. The following figure shows how such a complex Excel table combines the different calculation modules. First, there is a differentiation between the free access sheet or input sheet and the secured access sheet, the calculation and the output sheet.

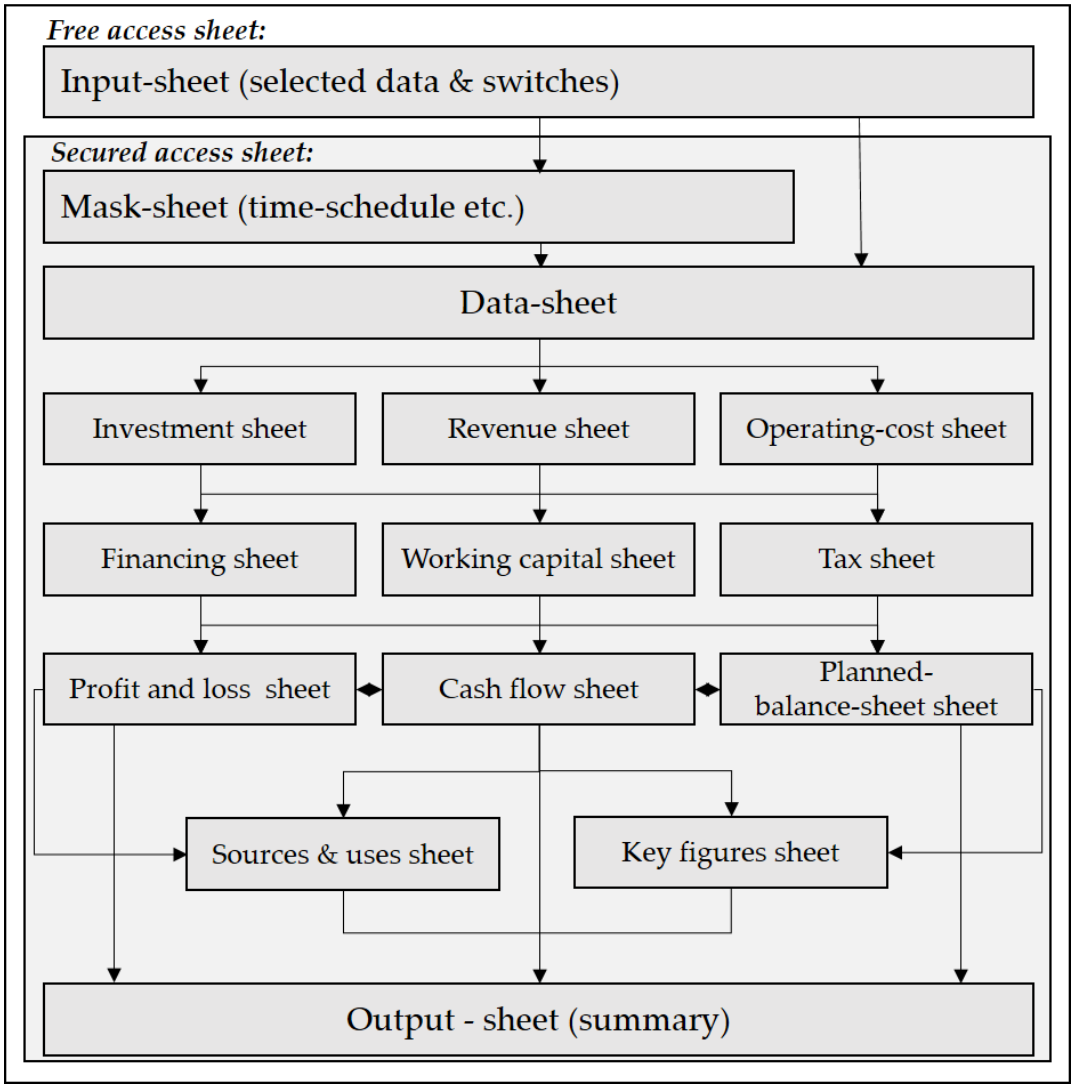


Figure 6: Financial modelling (Source: own representation based on Decker (2008))

The input sheet enables the interested parties to modify assumptions and allows a comprehensive risk analysis. There are various sensitivities in form of switches which can be turned on or off, or modified in the respective input fields. Above all, it is also possible to modify key assumptions which enable an inverse calculation to determine basic conditions. The benefit of the sensitivity analysis is the direct impact of a particular change on the results. The sensitivity analysis is less complex and easier to explain. (Yescombe, 2013) But in reality there is often more than one changing condition or even a series of changing events. This concatenation is often very complex and is represented in a scenario analysis.

Scenario analyses belong to the dynamic quantifying risk methods. (Tytko, 1999) The starting point for a scenario analysis is the realistic, expected cash flow, which is agreed by the sponsors and the lender and is usually called the »base case scenario«. (Reuter, 2011) The base case scenario provides the combined risk parameters out of the »sponsor`s base case« and the »banking case«. Fundamental information has to be provided to justify the base case assumptions. The documentation has to provide the materialisation of project financing risks, how these risks can be mitigated and the amount of remaining risks which can affect the expectations of the SPV. The base case will be extended by a »best case scenario«, which shows a more positive view than the banks have expected. This scenario only plays a secondary role for the banks because only the sponsors benefit from the additional cash flow. On the other hand, the banks pay a lot of attention to the »worst case scenario«, which is highly relevant for them. This scenario shows a more conservative view than the sponsors expected. The conservative view can have an impact on single sensitivities or it covers a combination of different risk parameters and sensitivities which have a negative impact on the expected cash flow. All scenarios contain a project-specific cash flow responsiveness under the assumptions of market risk, cost-overruns and construction delay. (Tytko, 1999) The following figure shows best case, base case and worst case under corresponding debt service cover.

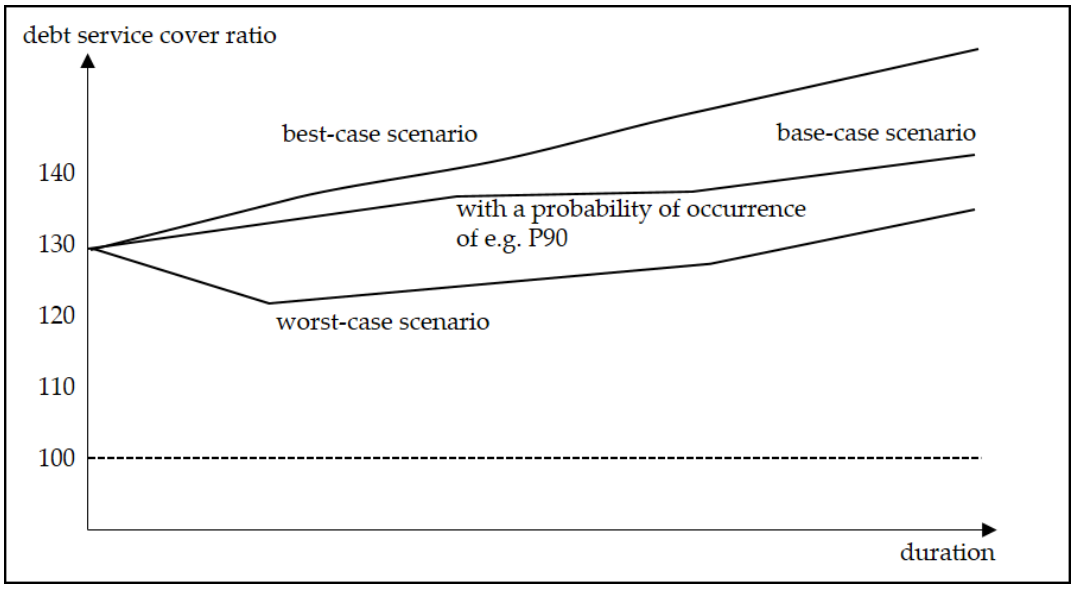


Figure 7: Project finance scenarios (Source: own representation)

In conclusion, the scenario analysis shows connections between single sensitivities of input figures, influencing factors and parameters and their impact on the project and their hypersensitivity reaction. (Tytko, 1999)

Next, the attention will be placed on the sheets with secured access. The mask sheet initially forms a uniform layout regarding the allocation between rows and columns, the time schedule, currency and units. All numerical assumptions for parameters and variables are collected in the data sheet. In contrast to the following sheets which are mainly calculations out of formula and algorithms, the data sheet comprises largely numerical data input. Considering the time schedule, the data sheet includes, e. g., the following assumptions:

Table 7: Data-sheet in the financial model (Source: own representation)

Macroeconomic	Benchmark interest rates EURIBOR, LIBOR, etc.
Capital expenditure	Amount and timing of payable costs up to completion for e.g. planning, implementation, layers, auditing services, advisories, permits, insurances.
Financing	Fix and variable interest rates, arrangement fees, commitment fees, underwriting fees, life of loan and repayment terms.
Revenues	Quantity, price, fix purchase quantity and reference price.
Operating costs	Input parameter for raw materials and supplies, overhead and/or costs for the operator.
Tax	Tax and depreciations.

The data sheet is the basis for the following sheets, which consist of more formulas and algorithms and refer to the figures on the data sheet. The investment sheet contains the specific features of the construction phase. This way the different stages of the construction phase along the building process and their appropriate payments are considered. The revenue sheet and the operating cost sheet are very similar to each other in their calculation in terms of the price-volume relationship. On the revenue sheet there is the quantity of sales in relation to the price and on the operating cost sheet there is the quantity of raw materials and supplies also in relation to the price. Whereas the revenue sheet is to be completed with insurances, tariffs, freightage and deductibles, the operating cost sheet is to be completed with the maintenance agreement, the costs for the operator and replacement of wearing. Should there be more than one product line, the modelling has to be done for every single product line. The working capital sheet calculates the need of capital for liquidity, storage of raw materials and supplies and storage of finished products, during the operating phase but also for the construction phase, e. g. for the first tests of the unfinished project. In the financing sheet the complete equity and debt structure has to be implemented. This contains every single debt tranche, e. g., subsidies, subsidised loans, ECA loans, standby facilities, commercial loans, revolver loans and the arising interests during construction. This way the order conditions also have to be implemented in the model. This means that normally the

different equity tranches have to be paid first before the different tranches of the debt facilities are drawn down. In contrast to corporate finance the drawdown phase could continue over several years without any cash flow. The following figure shows the different phases which have to be considered in the financing sheet. There can also be a grace period after construction, during the commissioning phase and for a short initial time in the operating phase to generate enough cash flow for repayment. (Böttcher, Blattner, 2013; Decker, 2008)

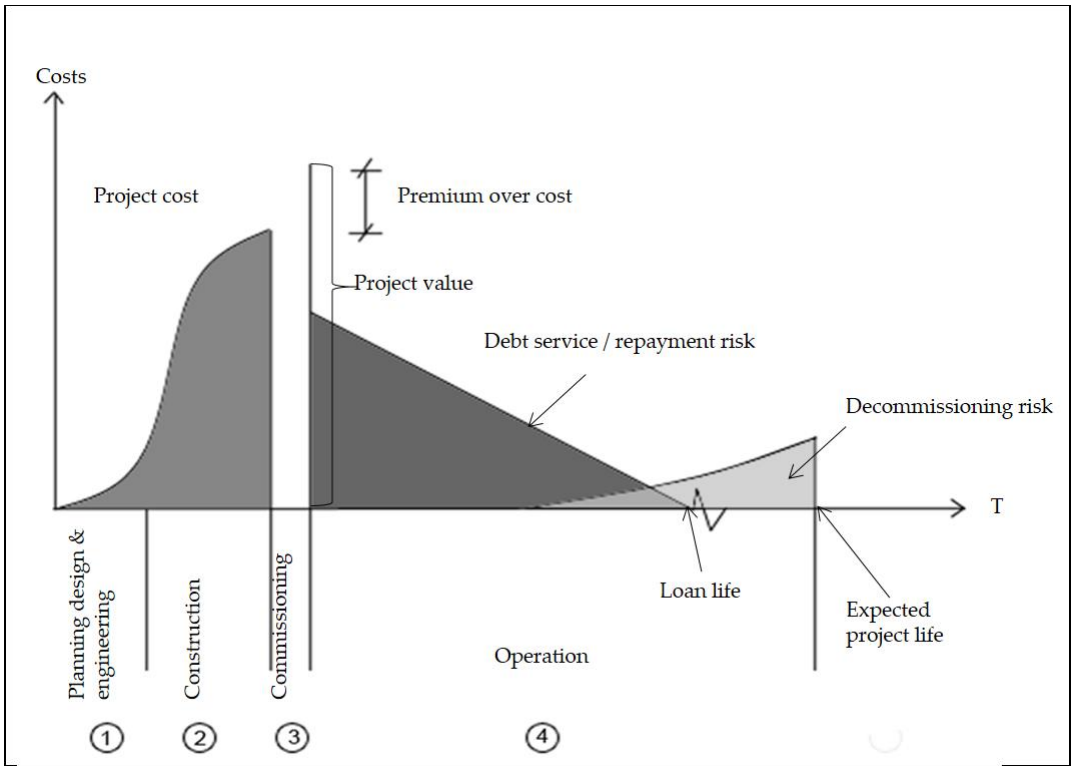


Figure 8: Project phases (Source: own representation)

The profit and loss sheet contains the calculations from the former sheets and transfers the results onto the planned balance sheet. The cash flow sheet shows, as the name suggests, the flow-oriented liquidity and contains the first numerical key figures, like the earning before interests, tax, depreciation and amortisation »EBITDA« and the cash flow available for debt service »CFADS«. Furthermore, the model has to implement, similar to the drawdown conditions, the cash flow waterfall in the cash flow sheet. The cash flow waterfall also shows the order conditions and which creditor first profits from the positive cash income. The viability of a project finance model depends on the adequacy of the cash flows and

timing is a contributing factor of the cash inflows and outflows. Even if the model has a plan profit and loss statement and plan balance sheet, the focus is on the statement of cash flows. The assignment of risk quantification is to determine every single project risk and its effect on the project's liquidity cash inflows and outflows. The key figure and output sheet provide a summary and an overview of the most relevant information produced by the financial model. The model is the basis of the agreed ratios, also known as »covenants«, between the project participants. Covenants are binding agreements for the SPV in the documentation along the loan life. There are positive covenants which ensure the strict observance of exactly defined key figures and negative covenants e. g. that the SPV is not allowed to open a new bank account. By non-compliance with any of those covenants, the SPV is causing an »event of default«, which opens an extended scope of influence for the banks. The SPV has to »waive« such an event of default with a new consent of the bank consortium. The exact percentage or volume is defined in the documentation but the calculation is integrated in the financial model. The following cover ratios belong to the quantifying risk methods and the financial model counts them as analytical results in the key figure and output sheet. (Tytko, 1999)

The debt service cover ratio »DSCR« puts the operating cash flow after tax in ratio to the debt service and makes a statement if the cash flow for debt service in the defined period »t« beyond the debt service. In the financial model the following formula is used for every single period:

$$DSCR = \frac{CF_t}{Debt\ Service_t}$$

If the DSCR > 1, the cash flow for debt service is higher than debt service in this period. If the DSCR < 1, there is a gap between the cash flow and the debt service which leads to an event of default that has to be covered by the sponsors. Results < 1 do not lead to the conclusion that the debt cannot be paid back during the loan life, because the shortfall is only the result for a period and not over the complete loan life. Shortfalls can be compensated by surpluses in other periods. During the modelling process it is necessary to mitigate shortfalls so that recourse on reserve accounts only takes place in situations of distress. These reserve

accounts have to be established at the beginning of the project and have to be filled up within the scope of the financing structure or by cash flows generated during the runtime. Reserve accounts must be individually adapted to the project and are often integrated as debt service, maintenance, interest, tax and insurance reserve accounts. During the negotiation process and the modelling setup, an average and a minimum DSCR during the loan life are agreed in the documentation. The DSCR is the main coverage coefficient to evaluate the sustainability of the project financing structure. (Yescombe, 2013)

Depending on the DSCR, the loan life cover ratio »LLCR« is a key figure, which opposes the free cash flow available for debt service along the loan life to the incurred debt service in the same period. The key figure give the information, whether the SPV performs sufficiently to provide the debt service by its independently generated free cash flows available for debt service, without focusing on shortfalls during that period. The LLCR is based on the following formula which is also integrated in the model and conforms to the present value of cash flows during the loan life.

$$LLCR_t = \frac{\sum_{i=1}^{T_L}\left[CF_i(1+r_i)^{-i}\right]}{L_t}$$

Even though the DSCR and the LLCR already allow a fundamental and sustainable statement about the project, the model is often supplemented by the project life cover ratio »PLCR«. The PLCR shows the percentage by which the generated free cash flow available for debt service during the complete project lifecycle exceeds the debt service.

$$PLCR_t = \frac{\sum_{i=1}^{T_P}\left[CF_i(1+r_i)^{-i}\right]}{L_t}$$

A comparison between the LLCR and the PLCR shows by how much the cash flows of the complete project life top the cash flows during the loan life. This enables an evaluation of possible extensions of the debt repayments in case of project restructuring, if it is not possible to comply with the base case assumptions. The shorter the loan life in comparison to the project lifetime, the higher the difference between the project key figures of PLCR and LLCR. In mineral exploration projects the PLCR is often known as the reserve cover ratio »RCR«. The RCR makes a statement about the percentage of mineral resources and thus the resulting cash flows exceeds the required debt service. In addition, the borrowing base is often calculated in exploration projects. This key figure is calculated by the cash value of all cash flows during the loan life divided by the LLCR. The result is the maximum possible debt in the financing structure. The above key figures are analysed in detail by the financing parties in regular, often semi-annual intervals in order to form an own opinion of the project's success. (Yescombe, 2013) Further relevant key figures are the internal rate of return »IRR« and the net present value »NPV«. Primarily these key figures are relevant for the sponsors, because of their statement for the profitability of the project from the return on equity's point of view. But in context of the next chapter, 2.3 »Principal-Agent theory«, the NPV and the IRR can very well catch the debt provider's attention both during the financing phase and during the runtime of the project. As soon as the SPV does not reach the equity providers' required rate of return, reluctance in supporting the project on the part of the sponsors is to be expected. This reluctance can lead to neglect in management decisions, which, in turn, leads to mismanagement or negatively affects supply and off-taking products. (Böttcher, Blattner, 2013)

Cash flow-oriented rating system

Ratings are boon and bane at once. If market participants had all relevant information in a complete transparent market, ratings would be redundant. The lack of information and time makes ratings essential. (Elschen, Lieven, 2009) Rating systems should summarise a huge number of qualitative and quantitative information into a single key figure, which reflects the probability of default over a defined period, often about the next 12 month. There is no absolute certainty, sometimes it is even like looking into a crystal ball, not at least since the financial crisis – chapter 2.4. The best approach to understand the reason for ratings is to put the focus on the target group of rating demand. Furthermore, a distinction has to be made between external and internal ratings. Because of the banking supervision, banks have to rate their customers before credit lending. Therefore, there is no need

for a target group of rating demand and banks can decide to draw on external ratings, but only from certified rating agencies like Fitch, Moody's or Standard & Poor's, or rely on their own internal ratings. It does not matter whether banks use internal or external ratings, the process of credit granting requires a comprehensive risk analysis to ensure a fundamental creditworthiness. Prudential regulations such as Basel III, chapter 2.5 »The impact of the Basel framework«, increase the pressure on banks that based their risk analysis on non-standardised risk assessment or subjective evaluations. Small and medium-sized businesses as well as private customers often have no external rating and banks draw on their own internal rating tools. Companies have to mandate rating agencies to get an external rating. Such an external rating from the above-mentioned famous rating agencies involves high costs, which have to be paid by the company itself. This can lead to a conflict of interest which is often discussed in the literature. Banks can mitigate this conflict as far as possible by the requirement of two signatures, separated by a front office and an independent back office. It is not clear who the actual target group for external ratings is. Companies of a certain size are forced by their equity providers to regularly present an external rating. These parties can be shareholders, banks, off-takers and suppliers. Or these ratings can be a listing requirement for the stock exchange. It depends on the pressure of the concerned parties and the dependence of the company. (Reuter, 2011)

The above-mentioned risk sharing process distributes risks on the project participants. Due to the high contractual penalties and the long run of the project agreements it has to be ensured that the project participants can handle the current risks in the event of the occurrence of penalties. So all project participants which take project risks have to have a comfortable external rating, e. g. the EPC's usual investment grade. Also banks have to have a comfortable external rating to participate in the financial structure. This is to ensure that the banks sustain the long-term drawdown period with high amounts. In the area of company ratings, rating agencies and banks can draw on a huge portfolio of historical data from different companies, from all fields and all sizes. Standardised processes have become established and the retrograde credit analysis has been approved. This method implies that, in the context of sustainability, a good credit standing in the past and the recent past suggest a good credit standing in the future as well. In the scope of financial statement and creditworthiness analyses this information, taken together with additional information, provides a credit rating which shows the probability of default. The special feature of project financing is the off balance sheet financing without any historical data of the newly-founded SPV. The off-balance sheet character is to avoid a consolidation of a sponsor's balance sheet with

the balance sheet of the SPV. A consolidation would have a negative impact on the key figures and, ultimately, on the rating of the sponsor. Predominantly, accountancy rules in accordance with IFRS and US-GAAP as well as the banks' supervision guidelines for consolidation regulations and credit units are applied. The individual rating criteria is used by rating agencies and banks. For Standard & Poor's the financial imputation is not important. Project financing structures are generally part of the overall view during the corporate rating process. Thereby the SPV can be considered fully, partly or not at all in the corporate rating. The degree of integration of the project into the project-initiating company and how far the project initiating company would support a non-performing project is crucial. During this evaluation process different assessment criteria have to be categorised, for example, the strategic relevance of the project, the amount of participation, the influence on the management, etc. Consequently, the off-balance character does not directly lead to the requested rating effect. Above all, financial reporting standards have increasingly higher requirements in off-balance sheet projects. This includes the relocation of risks from the SPV onto other project participants and increases the requirements of project design and project documentation. (Delmon, 2009; Morrison, 2012)

After the necessity and techniques of ratings for project participants have been described, in the following the necessity, techniques and demand of project ratings will be illustrated. The main difference of project ratings compared to corporate ratings is the non-existent history of the SPV. Consequently, a retrograde credit analysis as mentioned above is impossible. Moreover, project financing is normally a long-term credit lending of at least a 5 year tenor which can easily be up to 25 years and which contains a qualified risk analysis over the same period. (Brodehser, 2012) Initially, by means of the financial model, project financing experts conduct an individual risk analysis through own sensitivities of cash flows. Starting with the bank supervision, banks also have to establish a standardised risk assessment for project financing. The aim of »cash flow-oriented project finance rating« is to reflect interdependencies of the various risk parameters, to convert qualitative factors into quantitative factors, to analyse cash flow sensitivities of individual risk parameters and to consolidate all these results into a single rating score. The main task of the rating analysis is to present a quantitative rating score of the probability of default. The probability of default can be transformed to the expected loss by the following formula:

$$Expected\ loss = Probability\ of\ default \times Loss\ given\ default \times Exposure\ at\ default$$

The determination of the probability of default is ensured by the rating process which itself consists of a qualitative and a quantitative part. The basis of both parts is the cash flow from the base case of the financial model. This base case is analysed by different scenarios and for each scenario the DSCR and the LLCR are calculated by considering the cash flow waterfall. In conclusion, the probability of default is the division of all results of the above-mentioned scenarios, which provide the default result of all probable scenarios.

The loss given default is essentially dependent on the security situation. The possibility of utilisation proceeds reduces the deficiency in an event of default. But securities are only a minor part in a project financing structure because the focus is on generating project-related performance incentives. Such performance incentives are to secure a permanent, successful operating project. In contrast to classical corporate ratings, the cash flow-related rating is a combination of the probability of default and loss given default.

The exposure at default is primarily determined by the transaction and repayment structure. The higher and shorter the structure of repayment is after fully loan disbursement during the construction phase, the more positive is the effect of exposure at default on the cash flow-related rating. But right now the experience of such cash flow-oriented project finance rating is not comparable with the accuracy of corporate ratings. The experience of project finance experts is often more appreciated by banks than project ratings.

The above-mentioned cash flow-oriented project finance rating is an internal rating developed by banks. For the external demand of project finance ratings, as for instance bond holders in a financing structure with bonds or, less common for a wider syndication where institutional investors participate in bank syndicated loans, project finance banks and rating agencies jointly develop external ratings. In this case, the project finance bank prepares a prospectus that covers a summarised project information memorandum and the rating agency provide the external rating. This combination reduces the need for a detailed due diligence by the

bondholders and the participants in the extended syndication. Potential investors or bondholders can base their decision to buy on their own review of the prospectus while also relying on the external rating without having a lot of work. As bond structures only play a minor part in international project finance, external ratings are not very common. Most of project finance ratings are below the investment grade level which most major bondholders will not purchase. The following table lists the prime credit level of triple A down to the below investment grade and often project finance rating level of double BB+ and lower. (Yescombe, 2013)

Table 8: Rating classes (Source: own representation based on Elschen, Lieven (2009)

	Main rating agencies			Probability of default in %
	Standard & Poor's	Moody's	Fitch	
Investment grade	AAA/AA+	Aaa/Aa1	AAA	0.020-0.033
	AA	Aa2	AA+	0.042
	AA-	Aa3	AA	0.059
	A+	A1	AA-	0.084
	A	A2	A+	0.119
	A-	A3	A	0.154
	BBB+	Baa1	A-	0.200
	BBB	Baa2	BBB+	0.259
	BBB-	Baa3	BBB+	0.367
Sub-investment grade	BB+	Ba1	BBB-	0.518
	BB	Ba2	BBB-	0.733
	BB-	Ba3	BBB-	1.215
	B+	B1	BB/B+	2.014
	B-	B3	BB/B+	3.338
	CCC/CC/C	Caa/Ca/C	B/B-/CCC/CC/C	8.682-18.250
	D	D	D	20.000

2.3 THE PRINCIPAL-AGENT THEORY

There are a lot of principal-agent conflicts within the scope project finance and especially in connection with the loan pricing. The principal-agent theory describes the contractual relationship between the agent, who has a claim on remuneration for the principal's occupation, and the principal. The necessity of assignment is the natural consequence of differentiation and a concentration on core competences. Through the principal-agent relationship there is a clear hierarchic structure of superordination and subordination of the two parties. The success, expected by the principal, does not only depend on the willingness of the agent but also on other external factors. It also depends on other external factors. Problems in a principal-agent constellation occur from three main assumptions: Firstly, the information asymmetry between the two parties has to be addressed, secondly, the conflicting goals of the parties and thirdly, the strong opportunistic behaviour as a homo oeconomicus of utility maximisation. (Blum et al., 2015; Meinhövel, 2005) Under these conditions the principal-agent theory supposes that the agent minimises the expenditures to fulfil the tasks devolved by the principal. Because of the information asymmetry, potential failures can be transferred by the agent on external non-influenceable factors. In a pure competition with full transparency of information, there can be no principal-agent conflicts. Hence, there are different kinds of approaches which all deal with delegating problems and which can be summarised under the term of principal-agent theory. The literature distinguishes between the normative and the positive principle-agent theory. The normative models calculate ideal remuneration contracts by means of mathematical methods. The positive models often include a verbal description and explanation of the contractual relationship. These contractual relationships can cause problems such as hidden characteristics, hidden intention, moral hazard and costly state verification, which will be explained below. (Blum et al., 2015; Hartmann-Wendels et al., 2013)

Hidden characteristics

Problems in terms of hidden characteristics are based on information asymmetries between principal and agent regarding the quality of the subject matter before contract closing. This information asymmetry is relevant, because information is a strategic factor for all economic decisions. Thus, in the context of a purchase agreement, the seller is usually better informed about the nature of the object of sale as the buyer. The buyer can only decide on the basis of a temporary inspection of the purchased item. Consequently, and assuming a strictly

opportunistic behaviour, this leads to an adverse selection. Based on hidden defects, the purchaser is willing to pay a lower than average price for the goods. But the seller is not willing to sell the product at an average price, if the product quality is above-average. Corollary, the average quality of the products offered in the market will decline and the purchaser, in turn, is willing to pay a below-average price for the goods. In theory, the chain would continue indefinitely and an equilibrium price would not be found. (Akerlof, 1995; Blum et al., 2015)

Hidden intention

A hidden intention is a problem which results from the willingness of the agent to exploit the dependence of the principal. This can occur before and after contract closing. With his advanced knowledge, the agent knows how to reduce the working effort or to maximise his compensation claim and he is prepared to put this knowledge into operation. (Hartmann-Wendels et al., 2013)

Moral hazard

The moral hazard effect emerges after contract closing and is divided into hidden action and hidden information. A hidden action is any activity in the context of actively realised or omitted action, which cannot be monitored by the principal. The agent can reduce his efforts and fall short of his performance capabilities - »shirking«. It is also possible that the agent uses the resources of the principal to pursue his own interests - »consumption on the job«. Hidden information means that the principal is capable of monitoring the agent, but due to gap of expertise he is not able to evaluate the agent's working effort and performance capabilities. This information asymmetry allows the agent to realise fringe benefits. The agent can act for his own benefit without any benefit for the principal. (Blum et al., 2015; Hartmann-Wendels et al., 2013)

Costly state verification

A costly state verification is when the agent's output renders a final assessment by the principal difficult. In contrast to hidden information, costly state verification does not assess the action during a working process, but rather the final result after finishing the working effort. (Hartmann-Wendels et al., 2013)

All cases have in common that they produce additional costs. The principal has additional monitoring costs and the agent incurs additional bonding costs. In addition, the principal incurs so-called »residential costs« for the difference between the utility maximising action and the effective action by the agent, even if an optimal monitoring and accounting report is implemented. In an agency-relationship, cooperation profits stand against costs arising from this relationship. Thereby costs and profit have to weigh up in every agency relationship. Mutual trust reduces agency costs and increases the cooperation profit for both parties. If there is a lack of confidence, monitoring costs will rise continuously which leads to an overinvestment in safeguards. With the ambition to achieve a cooperation solution, there has to be consensus between the parties, and activities of one's accord or manipulation have to be excluded. Consensus solutions found in a regulatory system have the advantage that the interests and values of each party are respected. This consensus provides a reliable basis for conflicts in the ongoing project process and appreciates every party as a legit member. The consensus should be characterized by fairness in balancing interests and by the layout of documentation. (Göbel, 2002; Pietsch, 2005)

As mentioned above, agency problems between principal and agent arise in a combination of information asymmetries and conflicting aims, so both parties need to show strong opportunistic and utility-maximising behaviour. The three main solution approaches, according to the literature consulted, are the reduction of information asymmetries, the harmonisation of aims and confidence building.

Reducing information asymmetries

Since all agency problems are based on information asymmetries, all measures to improve market transparency lead to a reduction of agency problems. Such an improvement of market transparency can be initialized by the principal as well as by the agent. The principal with his lack of information respective to the agent, can fill up this gap by an active information procurement. This information procurement process is commonly known as »screening«. The screening process is done by the principal in his own interest, to avoid risks and problems of the hidden characteristics and hidden intention. In return, the agent with his information advantage can provide decision-relevant information to the principal, which is called »signalling«. The cost-associated signalling is to be carried out in the agent's self-interest and not in the interest of the principal. The agents' motivation can result in generally finalising and / or achieving better terms and conditions.

Screening and signalling are only relevant for problem categories before contract closing. After closing screening and signalling are merged with monitoring and reporting. Both activities are aimed at reducing the asymmetric information distribution during the operating contractual relationship. Thereby the monitoring and reporting tools should also prevent the risk of hidden intention, moral hazard and costly state verification. (Göbel, 2002)

Harmonisation of aims

The themed asymmetric information in relation with the principal-agent theory would be not affected by the agency problems, if the principal and the agent did not pursue different aims. An instrument the principal has to harmonise the agent's aims before contract closing is to present a portfolio of different contract models from which the agent can choose the most qualified one. This consequently leads to a contract which offers the lowest conflict potential. Conversely, with this method the agent present to the principal his commitment in a document by choosing this contract type. Accordingly, only a motivated agent will agree to sign a performance-oriented contract. The instrument of designing performance-oriented contracts has been established especially for the remuneration of managers in stock listed companies. For example, the agent's compensation claim can be linked completely or partially to the aim desired by the principal. Several authors focus on motivation especially in employment relationships. They point out, however, that there is no linear relationship between remuneration of an agent and his performance. Under certain circumstances, a material reward could reduce the motivation or even displace the motivation completely. A multi-period cooperation has a positive effect on the agency problem, because of the possibility that the agent risks losing his reputation. (Göbel, 2002; Pietsch, 2005)

Confidence building

Considering that it is near impossible to cover all future contingencies in the documentation, there are, consequently, gaps in the regulations which require a degree of confidence when signing those contracts. Regulatory gaps are the wider, the more complex the contractual relationship and the longer the duration of the contract is. Provided that both parties, principal as well as agent, want to build such a degree of confidence, primarily the assumption of the opportunistic behaviour of the homo oeconomicus for the contractual relationship has to be refuted. On the hand, this can be based purely on rational economic arguments, or on the other, on moral and ethical arguments – if this can be done objectively in an individual case

at all. Of importance is only that the two parties have a reasonable assurance that the other one does not exhaust any perceptible opportunity. Then this party would maximize his utility at the expense of the other. (Blum et al., 2015; Pietsch, 2005)

The above-mentioned three possible solutions to solve agency problems do not provide one single proper solution, but, theoretically, rather an individual situation-dependent combination is preferred. Above all, the individual and well-considered design of the respective project contracts is based on efficiency in information asymmetries. It has to be considered that, despite the comprehensive agreements, the economic reality cannot be fully reproduced. The implementation is subject to uncertainty and additional costs.

Delimitation of transaction costs

Transaction costs are the advancement of the principal-agent theory. The basic approach of the principal-agent theory is already beyond the scope of the neoclassical achievements. This is primarily due to the systematic exclusion of difficulties in the interaction of humans with its model assumptions. The difficulty of human interaction is taken into account by the principal-agent theory in the individual and well-considered design of the respective project contracts. In contrast to the principal-agent theory, the transaction-cost-approach looks at interaction problems more comprehensively. This is done by taking into account that the closing of contracts generates costs, because extensive agreements are never perfect. Gaps in contracts exist and the enforcement of contracts is afflicted with additional costs and uncertainty. Transaction costs are always higher than agency costs due to their additive components. As the transaction costs approach also focuses on transaction problems, this approach can also work out better the differences between the various types of contracts. The principal-agent theory tends to level out the differences between these types of contracts. While the principal-agent theory requires a certain type of contract and tries to optimize this depending on the situation, the transaction costs approach requires a well-configurd type of contract for the transaction. (Hartmann-Wendels et al., 2013; Meinhövel, 2005)

The principal-agent theory and project financing

In the following, the contractual relations of the individual project participants will be analysed. The relevant principal-agent conflicts and their

possible solutions will be discussed.

Agency problems of the sponsor

Principal-agent conflicts between the sponsor and the SPV are manageable compared to other project contracts. This is mainly due to the fact that the sponsor has the ownership position of the SPV and may exercise all rights of disposal. Conflicts can arise, if the SPV has more than one equity providers which act as a joint venture. From the legal point of view it is a joint venture, if two or more legally and economically independent legal entities found an organizational unit with its own legal status. In that case, agency problems can be divided into ex ante and ex post-conflicts. Ex ante-conflicts extend to the selection of the joint venture partner during the foundation process. Consequently, there is a risk in the choice of the venture partner in that the potential venture partner may have hidden characteristics. This can lead to an adverse selection if both contractors have the possibility to value the quality and the reliability of the respective contractor. A possible reduction of the information asymmetry can be effected by mutual signalling and screening. In the context of international joint ventures there are additional difficulties, such as unknown cultural differences, which complicate the selection process. For international project finance it is common that the joint venture partners are legal entities from different jurisdictions. This is due to the fact that contractor A provides the product or technological know-how and contractor B provides additional local cultural, legal, supply, off-take or authority skills. In the respective country Contractor B willing to support contractor A only if he gets access to the product or technology in return. In the case of cross-border joint ventures the reputation plays an important role. (Wolff, 2005)

One efficient method of screening is to obtain an external assessment of the potential contracting partner. The company which created the assessment has to be reliable. Furthermore, the company that created the assessment has to have a comprehensive knowledge about the contractor. Only then, can they make an independent, expressive statement. In return, the voluntary offering of reputation, in terms of signalling, can have positive effect – provided that the voluntary reputation is reliable. Ex post-conflicts occur after contract closing. Especially the problematic issues of hidden action where the contract parties fall short of the performance possibilities – shirking. Then the contract parties make use of the resources for their own purposes - »consumption on the job«. Because the contract parties have an advantage in knowledge in their respectively skills, – hidden information – there is the risk that one of the contract parties attempts to achieve

fringe benefits. Additionally, problems of hidden action and hidden information, which lie within the scope of moral hazard, can go as far blackmailing. This possibility exists, if the blackmailed party is not able to withdraw directly from the project – derived from hidden intention. The risk can be reduced by specific monitoring tools and by creating an incentive structure. In the context of international project finance the information asymmetries are too big to close the gap by monitoring. Therefore it is opportune to close these gaps by implementing an incentive structure. In a special form of international project finance the EPC can also be the sponsor of the SPV. Usually, the EPC will sell the SPV after project completion and minimise the work performance during construction to maximise his profit. In this case all previously mentioned problems of the categories hidden characteristics, hidden intention, moral hazard and costly state verification take effect.

Agency problems by debt provider

As mentioned in chapter 2.2.3 banks are involved in a multitude of contracts which are related to the project company. Below, the phenomenons are illustrated using credit agreements as examples. However, the statements made can be transferred in their entirety to all financial contracts. As before, agency problems exist only in the context of asymmetric information and conflicting goals between the contracting parties. Likewise, a strictly opportunistic behaviour has to be assumed. The following table shows the potential agency conflicts that may arise in the contractual relationship between the SPV and the lender. Subsequently, the conflicts are reviewed in the field of international project finance. Of special significance is the analysis of agency conflicts for financial contracts. For contracts mentioned above, the mutual commitment is usually only occasionally and does not extend to such a long period as the financial contracts. This results in particularly strong interdependences, which are vitally important for both parties. (Hartmann-Wendels et al., 2013)

Table 9: Agency conflicts (Source: own representation based on Meinhövel (2005))

Information asymmetry	**Chargeable to the lenders**	**Chargeable to the SPV**
Ex ante contract closing	I Hidden characteristics; hidden information	III Hidden characteristics; hidden information
Ex post contract closing	II Hidden intention; hidden action	IV Hidden intention; hidden action

Agency problems chargeable to the lenders

Basically, it can be assumed that the SPV is always better informed about the economic and financial situation than the lender. (Meinhövel, 2005) This information asymmetry exists both until completion and afterwards. Due to incomplete closed contracts the lender is not regularly involved in the economic decisions of the SPV. The reasons for incomplete contracts are, firstly, that the contracts cannot reproduce the complex reality in all its future facets. Secondly, a risk for enforceability of its own legal position of contractual agreements exists, because the lenders have to furnish evidence of their own legal position and the court always has a subjective perception. Thirdly, a fixed procedure before contract signing subsequently always has the potential for optimization. The more complex the financing structure, and the longer the financing term, the more difficult the complete transformation of all eventualities, and with time comes the risk of change. Project financing is characterized both by complex financing structures and long-term repayments. Both lead to agency conflicts. In contrast to the sponsors, lenders only have the right to a contractually agreed debt service against the sponsor. This gives rise to conflicting goals. In addition, the SPV is subject to a strictly opportunistic behaviour, whereas the lender has to anticipate agency problems. (Hartmann-Wendels et al., 2013)

The conditions mentioned above may lead to an adverse-selection by hidden characteristics before contract closing. The adverse selection in project financing will be reduced by the SPV which provides a variety of documents to potential lenders during the project review process – signalling. This enables the lender to perform a comprehensive project risk assessment – screening. In particular, the

credibility and the motivation of the sponsors is of central importance in the credit analysis and rating process. In addition, the integration of reputable consultants is a very trust-building measure.

In project financing, the intention of the SPV to misuse the provided debt capital close to impossible – hidden intention. Often the sponsors have already been established in the market for years, enjoyed a good reputation and would like to implement similar projects in the future. If the sponsor misuses funds, he will not find any lenders for financing in the future. Such rule breaking would be internationally noticed in the relatively small market of project financing. The reputation of the sponsor thus acts as the strongest corrective, because the reputation is difficult to fudge and a highly informative signal for the creditor. Furthermore, a compromise is agreed in the documentation and, consequently, under the law of obligations. Above all, the sponsors are the first to transfer equity into the SPV's account. For reasons of clarity, there is often only one account-holding bank, the accounts are pledged and dispositions require the agreement of the supervising bank or the bank consortium. During the construction period, there is a comprehensive drawdown schedule, which is linked to the progress of construction and only after examination by an independent technical consultant will the tranches provided by the banks and the payment authorised. Connecting a payment and a delivery makes misuse practically impossible. Moral hazard risks like failure to obtain new, replacement or expansion investments are de facto not considered a risk in project financing. Such investments are planned in detail from the project starting point over the project life cycle,or at least over the financing term and will be monitored by covenants and pledged reserve accounts. Covenants are agreed with the sponsor as well as with the SPV and restrict the respective opportunities for action. The sponsor is committed to maintaining the shareholder structure and observance of the cash flow-waterfall restrictions. Commitments by the SPV are:

- Regular provision of relevant project information – balance sheet cash flow model
- Compliance with certain financial ratios
- No sale of major asset items
- No collateral to a third party
- No raising of capital
- No investments deviating from the project planning
- No change of corporate form

- No change / termination of project contracts
- No admission of further business activities.

This covenants do not exclude hidden action and hidden information on the part of the SPV, but restrict the scope of action of the SPV. (Göbel, 2002; Meinhövel, 2005)

There is a range of agency conflicts, but in practice the occurrence of a loan default due to agency conflicts is very low. This is, on the one hand, because of the comprehensive documentation and the agreed covenants and, on the other hand, because of the permanent partial community of interests between sponsor and lender. Even if the sponsor strictly acts in terms of the homo oeconomicus, his act is also in the interest of the lender. This is due to the synchronized interests, which means that sponsor and lender have the same objective. Both parties are interested in earning a profit or to generate income from debt service. Finally, the sponsor's right to priority-provided equity is at stake before the lender even had to provide a single euro. In this respect, the equity ratio should be sufficiently high to ensure a permanent partial community of interest. If the selected equity ratio is too low and the project loses its relative attractiveness because of declining profitability, this may have a negative impact on the willingness of the sponsor. Therefore, the risk of losing equity should constitute sufficient motivation for the commitment of the sponsor. However, should the economic situation of the sponsor change, this would also affect the decisions of the sponsor. If the sponsor was previously still concerned about a loss of reputation, liquidity decisions can now be significant and detrimental to the lender. Thus, continuous monitoring and a good credit rating of the sponsors are an indispensable part of project financing. (Hartmann-Wendels et al., 2013)

Agency problems chargeable to the SPV

In contrast to the agency problems chargeable to the lenders, agency problems chargeable to the SPV are also conceivable. The performance of banks significant especially in the area of project finance, because the service of a bank in this product segment goes well beyond capital lending. The experience in the industry, the region, the reputation and the international orientation all play a crucial role. On the side of the banks hidden characteristics that favour adverse selection may arise. The best prevention is the bank's reputation. The relevance of positive and negative reputation is due to the high level of market- and transaction-transparency in international project finance. After the financial close it is in the

self-interest of the banks and the sponsors to disclose the market standard information. The parties intend to document their creditworthiness and expertise for future transactions. This involves primarily the »track record« which is essential for a good reputation. Furthermore, there are possible constellations where banks can reach fringe benefits from the sponsor due to the basis of hidden information. The hidden information may be related to the financing terms. Normally, the bank can better determine the adequate market conditions as the sponsor. If the structuring bank is also the financing bank, the bank may offer the sponsor an interest rate above market standard. In the role as the financing bank the structuring bank would later benefit from the high interest rates. Even if the bank was only in the role as financial advisor and did not participate in the financing, the bank would benefits by higher interest rates. The project would have a high attractiveness in the market and the financial advisor could place the transaction easily on the market. The objectives of the financial advisor would be quickly achieved and he would, on the one hand, receive his performance-related profit and, on the other, build up a good reputation. To counteract this problem, it is to consider that the sponsors are often well-experienced market participants with the right contacts to evaluate the financing terms. Above all, if the financial advisor increases the financing terms too much, he will lose his reputation as a reliable advisor. (Göbel, 2002; Hartmann-Wendels et al., 2013)

2.4 THE FINANCIAL CRISIS

First of all it is important to define the financial crisis in terms of time, region and type of crisis. There are different time schedules, from 2008 to 2009 or from 2007 to 2012, to be found in the literature. Also the type of crisis is different in the literature. There is the subprime-crisis, the global economy crisis, the international debt crisis or the financial crisis. Michaelis (2011) said that there are systematic failures which lead from subprime crisis over the financial crisis to the global economic crisis. The following description does not claim to be complete, but it shows the origin of the crisis and which impact the crisis had on international project finance.

Subprime crisis

The financial crisis had its origin in the USA where subprime loans are typically granted to borrowers with strong credit history or capacity to repay their loans. Banks systematically issued a large number of loans to private customers to purchase private property. These customer were not be able to pay back their loans so that a credit approval would actually not have been justified. Consequently, the credit approval was not linked to the income situation of the private borrower, but instead banks trust in the continuously rising performance of the private property market. Under this premise, private customer could own property for several years and sell it into the market for higher proceeds. With these proceeds from the sale they were able to pay back their loan, the interest and still have a margin. But with the first signs, which became visible in 2006 when house prices peaked, more American homeowners found it difficult to pay their mortgage obligations.(Fernandez et al., 2010; Radonjić, Zec, 2010)

Financial crisis / International debt crisis

This property financing system was so common that a huge percentage of American banks' credit portfolios were infected with these claims and liabilities. Investment banks had massively been buying pools of subprime mortgages. Firstly, they securitized these special loans in terms of Asset-Backed-Securities »ABS«[4]. The ABS were divided into different tranches to meet different risk-return preferences. In general the pool would be divided into a 70% senior tranche AAA, a junior tranche 20% and a subordinated tranche 10%. Owners of the 70% stake would be paid first from income that was generated and owners of the subordinated stake held the highest risk. Secondly, the investment banks hired external rating agencies to grant the senior tranches investment grade status. Then these shares, also known as SIV's »Structured Investment Vehicles« or Conduits, were sold on the capital market with unjustifiedly high ratings because of a conflict of interest. (See also the figure below) This conflict assumes, firstly, that agencies were paid by the investment banks for providing rating services to them and, secondly, that the rating agencies used the calculations of the investment banks to assess potential default risks. The unfoundedly good ratings were based on the

[4] Asset-Backed-Securities: "Companies (…) bundle up a group of assets and then sell the cash flow from these assets. (…) The debt is secured, or backed, by underlying assets." (Brealey et al., 2014)

assumption that, on the one hand, the shares trust in recoverable securities and, on the other hand, the portfolio has a high diversification and losses of single debtors were recovered by other mostly solvent debtors. The insurance institutions with small capital bases massively insured these securities which apparently had investment grade quality, and helped to validate the high rating status assigned by the rating agencies. The highly rated shares were traded and found their way through the capital market to other banks, insurance institutions and pension funds all over the world.(Akerlof, Shiller, 2010; Pagano, Volpin, 2010; Radonjić, Zec, 2010)

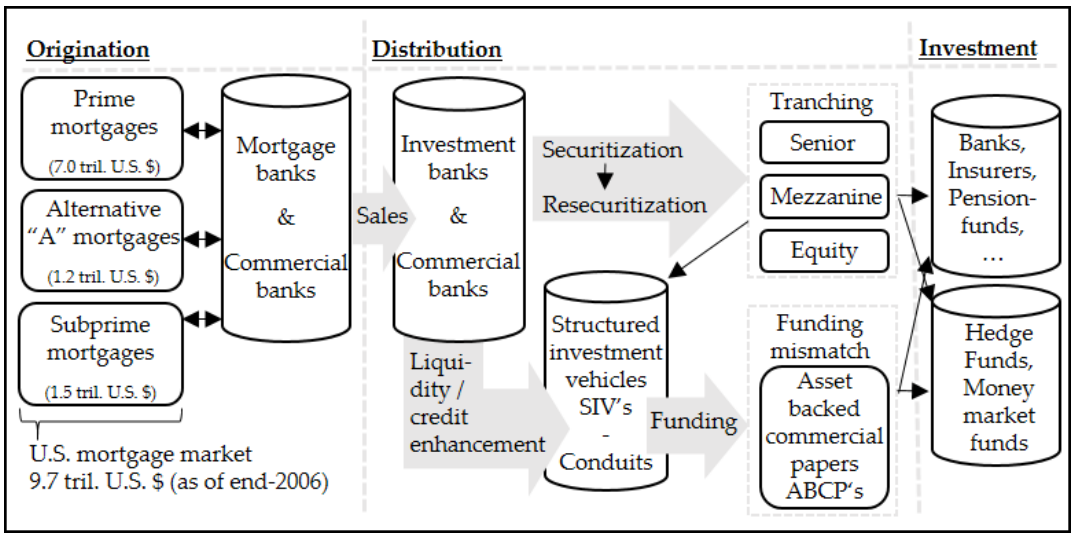


Figure 9: Subprime mortgages (Source: own illustration referring to Bank-of-Japan (2008))

These construction could only work as long as the positive trend in the private property market did not stagnate. At this moment the private customers could not realize proceeds from their sales anymore and were unable to pay back their loans and plus interest on interests. The purchasing price for private property was higher than the selling price. The whole market of private property collapsed and private property price slumped. If it was possible to sell private property at all, then only with high losses. Credit approval, which was unlinked to the income of the borrower, used to be compensated by the securitization but was now uncompensated by the retail price and the significant decreasing real estate prices. A systematic failure of these credits were a direct consequence. When banks found that they could not sell existing buyout loans, the so called "Minsky moment" had finally arrived. Through the vehicle of the ABS shares, not only the direct credit lending banks were infected, but also a rather great number of involved

institutions.(Radonjić, Zec, 2010)

Impact on banks' equity

Starting from decline in value of private property and loan defaults, banks had to depreciate their receivables from direct private property loans and / or investments in those ABS funds and had to report losses. These losses had a direct impact on banks' capital value and therewith on the leverage ratio. (Akerlof, Shiller, 2010) The figure below shows the return on equity of German credit banks consistent to the leverage ratio.

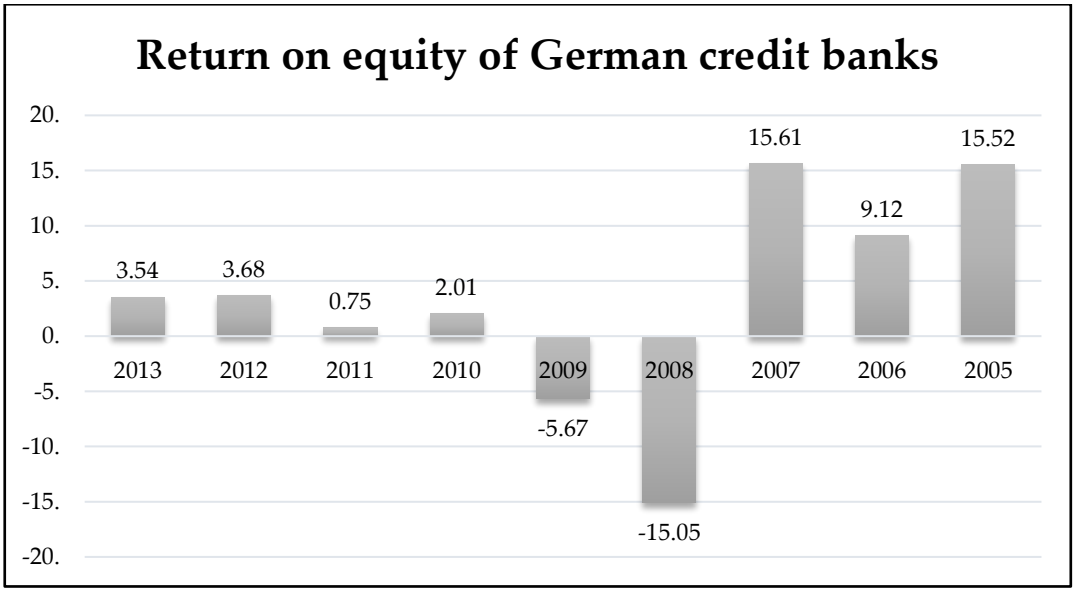


Figure 10: Impact of the financial crisis on banks' return on equity (Source: own illustration, data from Statista.com (2015))

The IFRS accountancy rules lead to an aggravation of the financial crisis and, as a consequence, negatively affected the banks' refinancing. The principle of fair value in accord with the IFRS accounting rules is highly volatile and depends on market fluctuations. Balance sheets are directly affected and during a crisis the downward spiral forces corporate companies to devaluate their assets. This led to a domino effect until the functional chain was interrupted. The regulation authority had to realize that the principle of fair value had a significant impact on the outbreak and the aggravation of the financial crisis. In 2008 the regulation authority created opportunities for reclassification so that the principle of fair value was not

stringently required. It has to be noted that the principle of fair value follows the attitude of liquidation which is in contrast of the »going-concern« attitude. (Elschen, Lieven, 2009; Fröhlich, 2011)

Lehman Brothers Inc., because of its size and despite the maxim »too big to fail«, was the first bank that could not handle these losses and went into administration. With the bankruptcy of Lehman Brothers Inc. not only private property debts and ABS funds were affected, but there were also claims against a system-relevant bank amounting to billions USD. On the one hand, the state has to prevent a domino effect and maintain the systematic stability if a large institution becomes near insolvent. On the other hand, moral hazard becomes a serious issue, if banks have to be bailed out by the government that are considered too big to fail. If management and shareholders take excessive risks, they need to be punished, because, otherwise it will encourage other banks to take risks too. But there were no indicators and nobody foresaw that the insolvency of Lehman Brothers would lead to an uncontrolled chain reaction. (Ito, 2011) The realization of losses and the impairment of recoverable assets leads to high equity reduction in banks' balances around the world. The figure below, for example, shows the equity reduction in 2008 of Deutsche Bank AG. They had to depreciate the highest amount of all German banks.

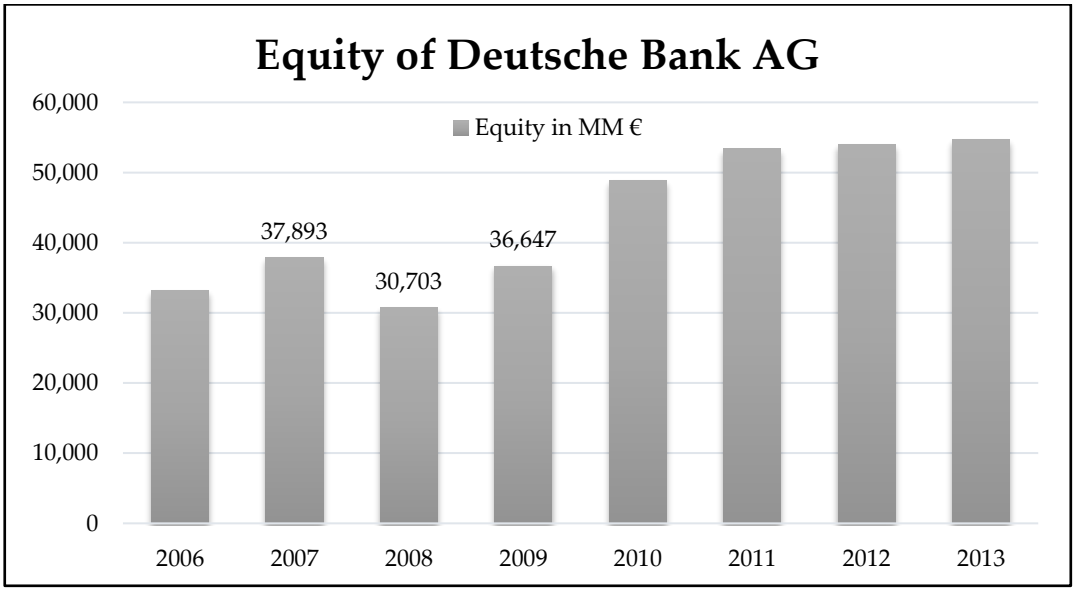


Figure 11: Equity reduction of Deutsche Bank AG (Source: own illustration, data from (Statista.com, 2015))

There was distrust among the banks and the interbank trading was disrupted. The instrument of equity deposit for risk-weighted assets, which is described in detail in chapter »2.5. The impact of the Basel framework« was infected in two different ways. First, equity was reduced by the realization of losses and second, more equity deposit was needed for risk weighted assets which had a downgraded rating after revaluation. This led to a collective over-indebtedness of the banking sector and a great number of banks were downgraded. The example of Deutsche Bank AG in the figure above also shows the need of equity and the increase in capital in the years after 2008.

The downgrading also led to higher refinancing costs. Because of this constellation nearly all market participants had a high uncertainty which resulted in the impairment of structured finance products and also cause the solvency of credit institutes.(Elschen, Lieven, 2009; Sommer, 2009)

Impact on the banks' refinancing

The classical refinancing deduce from a huge number of customers and their saving deposits. Banks use these deposits for short-term, medium-term and long-term investments or credit lending. But most of banks do not have such number of customers. They are dependent on liquidity and credit lending from other credit agencies or issue loans and bonds.(Elschen, Lieven, 2009) But after the bankruptcy of Lehman Brothers a very restrictive credit lending from credit agencies ensued. So a credit crunch for medium and long-term investments occurred because liquidity was scarce and the banks' notion was that medium and long-term investments could lead to a future liquidity shortage. Consequently, sector of structured finance products, liquidity loans in interbank trading and the market for syndications was close to or already in stagnation. Some credit institutes completely discontinued their new credit lending.

There was a liquidity shortage in the market and central banks could only partly help with fresh liquidity. Liquidity was mostly provided for the short-term and, therefore, led to a high term-transformation-risk in banks.(Bloss et al., 2009) The term-transformation-risk was especially seen in long-term commitments which is one reason for the collapse of project finance in 2009. The debt crisis in Europe highlights the vulnerability of short-term credit markets.(Duygan-Bump et al., 2013)

Global impact of the financial crisis

Many banks around the world held these internationally traded toxic securities. With the insolvency of Lehman Brothers and the resultant loss of confidence in interbank-trading financial troubles arose. Globally, banks depreciated US$1,992.8bn until 2010 in relation to the financial crisis. As, the crisis had its origin in North America, US and Canadian banks were mostly affected with approx. two-thirds of the complete amount and had to depreciate US$1315.9bn. The figure below shows the proportional distribution on affected regions. Next to North America, Europe was mostly affected and then, significantly less so, the Asian-Pacific area. (See the figure below)

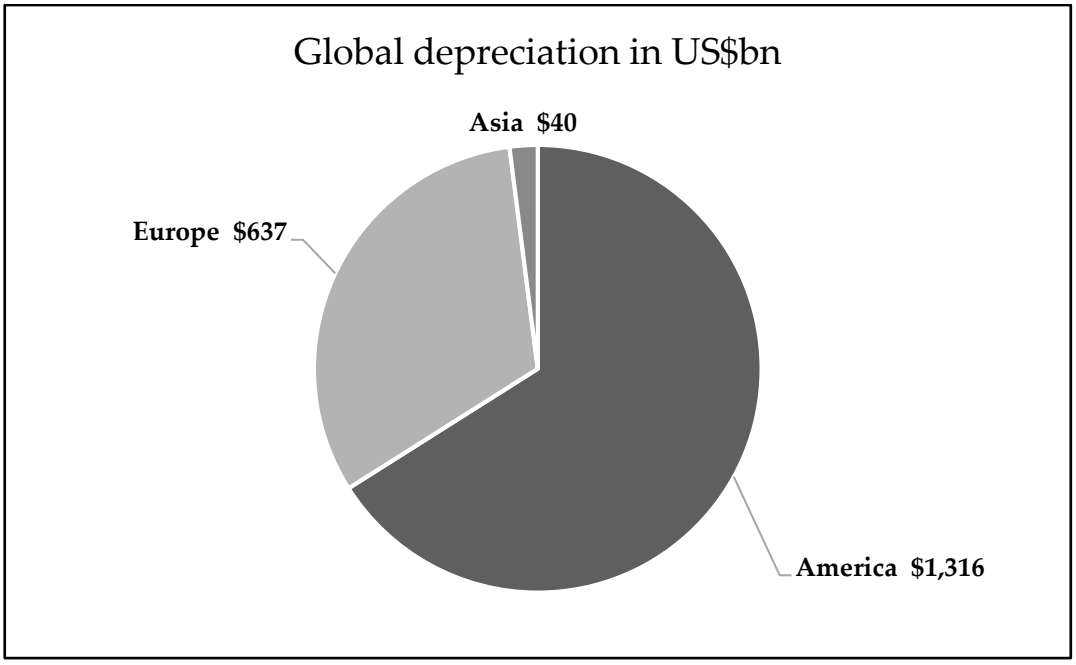


Figure 12: Global depreciation in comparison (Source: own illustration, data from Bloomberg (2015))

In America there are, on the one hand, the mortgage banks and, on the other, the investment banks. Because of their regional business orientation, mortgage banks are usually much smaller than the globally active investment banks. New Century Financial was the first popular mortgage bank, which could not handle the losses and went into administration in April 2007. Others followed and only after the two mortgage banks Fannie Mae and Freddie Mac with mortgage loans of US$5.2tn got into trouble, did Fed set up a rule to stabilize the real estate market.

With Bear Stearns, Merrill Lynch, Lehman Brothers, Morgan Stanley and Goldman Sachs, there were five huge independent investment banks on the US market. After JPMorgan had taken a huge commitment from Bear Stearns to avoid the insolvency, after the takeover of Merrill Lynch by the Bank of America, after the insolvency of Lehman Brothers and, considering the special status of Morgan Stanley and Goldman Sachs, the American investment bank sector was seriously changed. Without government subsidies neither of these five investment banks would still be in business to today.

The figure below shows the Top 19 highest depreciations over US$10bn in the US and Canada. After America's mortgage banks and investment banks, the government also had to protect the insurance companies. American International Group »AIG« for example had to be rescued by the government with another US$97.0bn and the state now holds 80% of the shares. (Elschen, Lieven, 2009)

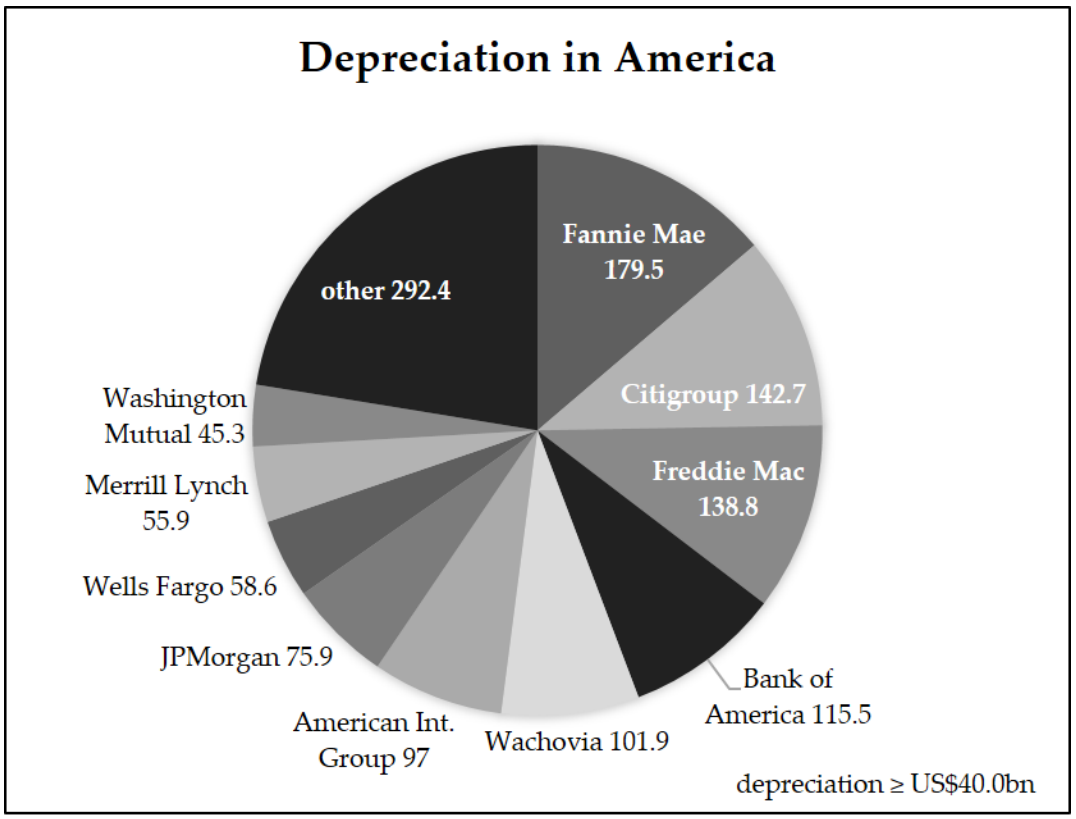


Figure 13: Depreciation of American banks and insurer (Source: own illustration, data from Bloomberg (2015))

Europe had to depreciate approx. US$636.6bn and was affected by the financial crises globally the second-hardest. The Royal Bank of Scotland »RBS« depreciated US$72.6bn and is the bank with the highest losses in Europe. (Bloomberg, 2015) The figure below shows the division of depreciation in the respective countries in Europe. The figure for the United Kingdom also includes the Irish depreciation. Germany and Switzerland had the highest depreciations. But consideration their economic power, Italy, Spain and Greece were no less affected.

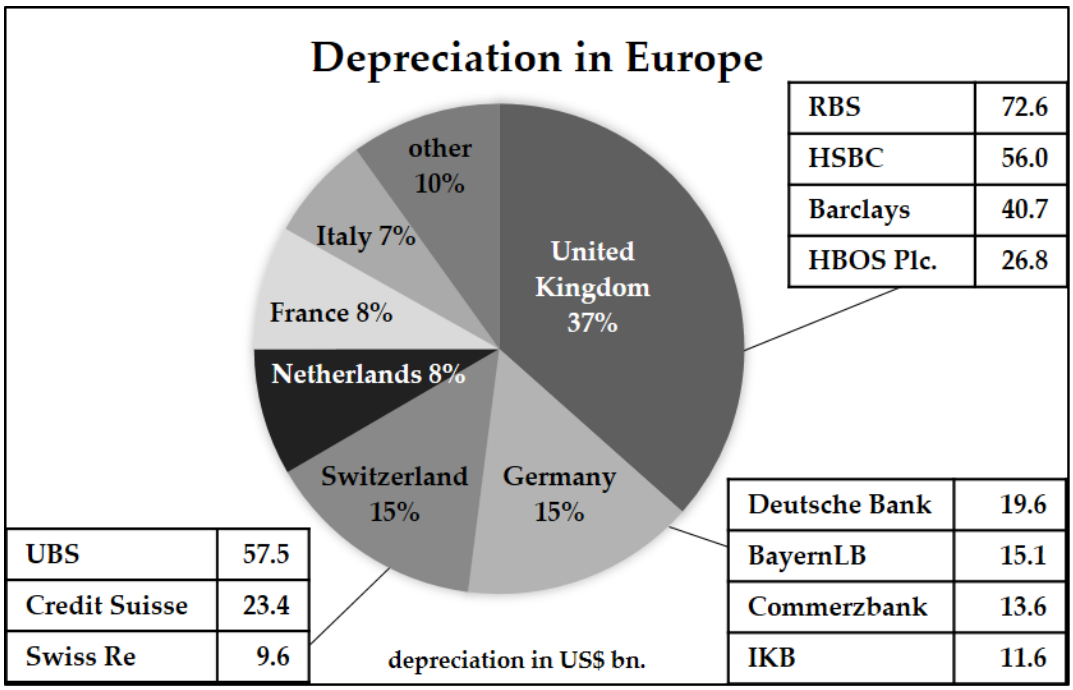


Figure 14: Depreciation in Europe by country (Source: own illustration, data from Bloomberg (2015))

The following figure shows the banks in Europe with the highest depreciations. Thus leads to huge wave of bank mergers especially in Spain and Italy. But massive government subsidies also prevented a large number of bank insolvencies. In Germany above all the Landesbanken Bayern LB, LBBW, HSH Nord, WestLB, SachsenLB, HessenLB, NordLB and BerlinerLB were affected and had to depreciate a total amount of US$ 31.3bn. (Bloomberg, 2015)

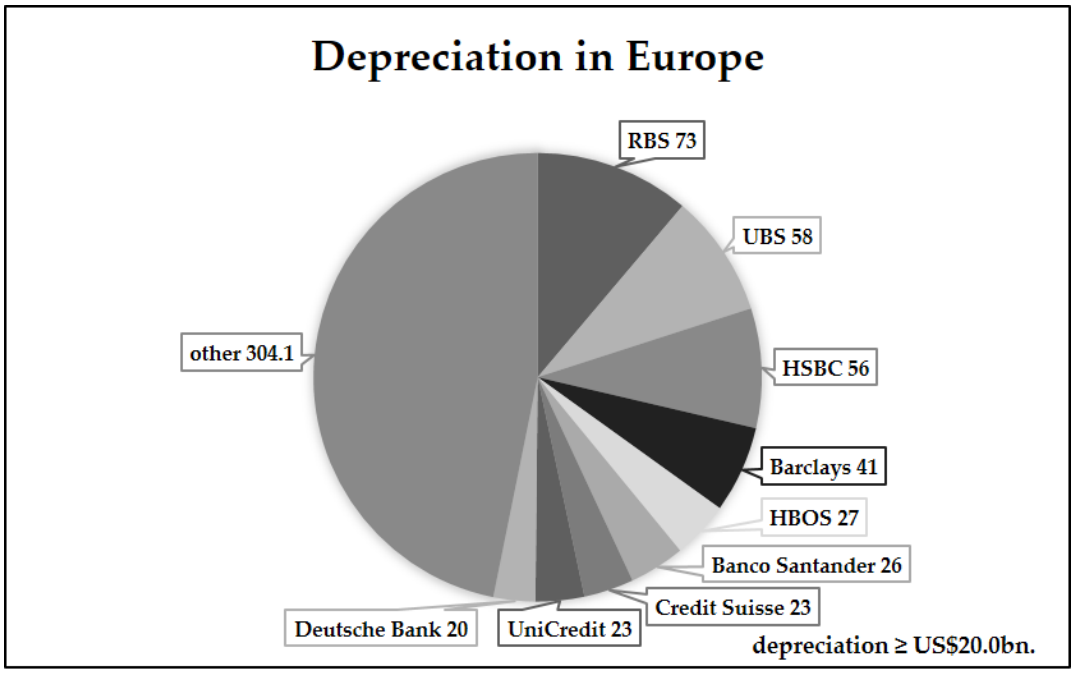


Figure 15: Depreciation of European Banks (Source: own illustration, data from Bloomberg (2015))

Compared to American and European banks, Asian banks were affected by the financial crisis very mildly. Together, the International and Commercial Bank of China and the Bank of China only had to depreciate a total of US$11.4bn, but they still range among the top three banks with the highest depreciations in China and even in Asia-Pacific. Also the dwindling interbank-trading only had a mild impact on Chinese banks. China's policy is only one of many reasons for the relative immunity of Chinese banks to the global financial crisis. The government exerts a strong influence on international financial market with capital-control policies which only grant access to foreign securities markets only to a small group of qualified investors, and the amount and scope of investments are also regulated. Foreign sources of funding constituted only a very small proportion of the total funds of Chinese financial institutions. Therefore, Chinese banks were in a very comfortable situation during the global economic crisis. The dominance of the state kept the banking structures and instruments simple and effective. (Liang, 2012) Compared to China, the three Japanese system relevant banks Mizuho, Mitsubishi and Sumitomo, were even less severely affected by the financial crisis. Together they had to depreciate US$12.0bn which, considering their size, is certainly relevant, but not anywhere near other system-relevant banks. (Bloomberg, 2015) Why Japan was still hurt by the financial crisis is described below.

Global economic crisis

Michaelis (2011) describes the financial crisis as a system crisis, which started with the subprime crisis and through several consecutive cardinal failures the crisis grow into a financial which then and, as a consequence, became a global economic crisis. This chain reaction leads to a serious crisis which was equivalent to the Great Depression in 1929. Scientific investigation has shown that leading indicators had not forecast such a chain reaction and the following recession. (Drechsel, Scheufele, 2011) The credit crunch described above not only concerned interbank trading. The effects of the financial crisis also spilled-over into the business economy. The three main consequences for real economy were

- the impairment of credit lending conditions
- the collapse of asset prices and
- fundamental uncertainty.

Banks had to cover their issued loans by equity. Through the depreciations of mortgage loans and claims against other banks the scope of new credit lending shrank to a minimum. Quite a few banks had to reduce or to withdraw variable contingent credit lines from their customers. Then the so called »credit crunch« not only had an effect on banks which ha to depreciate losses, but also on banks which had not been directly hit by the crisis like the banks in Japan. The effect of the asset price collapse in combination with the collapse on the commercial paper market led to serious losses. From there the financial crisis started to affect the economy. The fundamental uncertainty regarding payment defaults of business partners and customers reduced their willingness to invest, which, in turn, had an impact on consumption behaviour and endangers jobs. This vicious cycle came back to those banks whose confident loans became risky. Especially export-oriented real economies like Germany and Japan were affected by the global decline in consumption. As a consequence, countries were globally affected.

From a macroeconomic perspective the decline in values in combination with the fear of people losing their jobs and a decrease in consumption were the consequences of a recession and deflation. Deflation can lead to a massive and continuing crisis of the real economy. The government had several possibilities to counter deflation, but, on the one hand, the interest mechanism had already reached a very low level, so reducing interest rates even further was not an option. On the other hand, many states had already provided bailout packages of

unprecedented amounts which also had had consequences. The rating agencies threatened to downgrade the state's financial standing. Rising government expenditure and decreasing tax income led to an increasing indebtedness. With the rating downgrade the refinancing costs for the state increased. This meant that states had very little room to manoeuver. Above all in Europe the states were getting in trouble and the euro threatened to collapse. Especially the Greeks have since then had to follow strict savings policies. (Elschen, Lieven, 2009)

The financial crisis and international project finance

Before all participants sign the final documentation in project finance, all risks have to be identified and eliminated or allocated to participants with the respective core competences. Because of these special characteristic, market fluctuations have only little to no effect on project financing structures, so, in general, projects were not affected by the financial crisis. (Böttcher, Blattner, 2013) Since 1998 the annual default rate for all project finance debt has, on average, been at 1.5%. This is slightly below the 1.8% default rate for corporate financing issuers for the same period. (Macdonald, 2014) In contrast, however, we can see in the figure below that market fluctuations have an impact on the value of new deals in international project finance.

The selected schedule allows a comparison of the two last relevant crises, the dot-com crisis in 2000/2001 and the financial crisis in 2008. The figure also shows a time lag of crises and their impact on the project financing sector. Similar to the dot-com bubble, where the impact on the project financing sector became apparent in 2002, the impact of the financial crisis was obvious in 2009. This is mostly due to those deals whose negotiations were already very advanced and which had already caused a huge amount of costs. To stop these negotiations in their final stages would have made no economic sense with banks already having signed a letter of interest or maybe a commitment letter. Therefore the financial planning was already safe. The negotiations took several months which finally led to a time lag between the crises and their impact on the project financing sector.

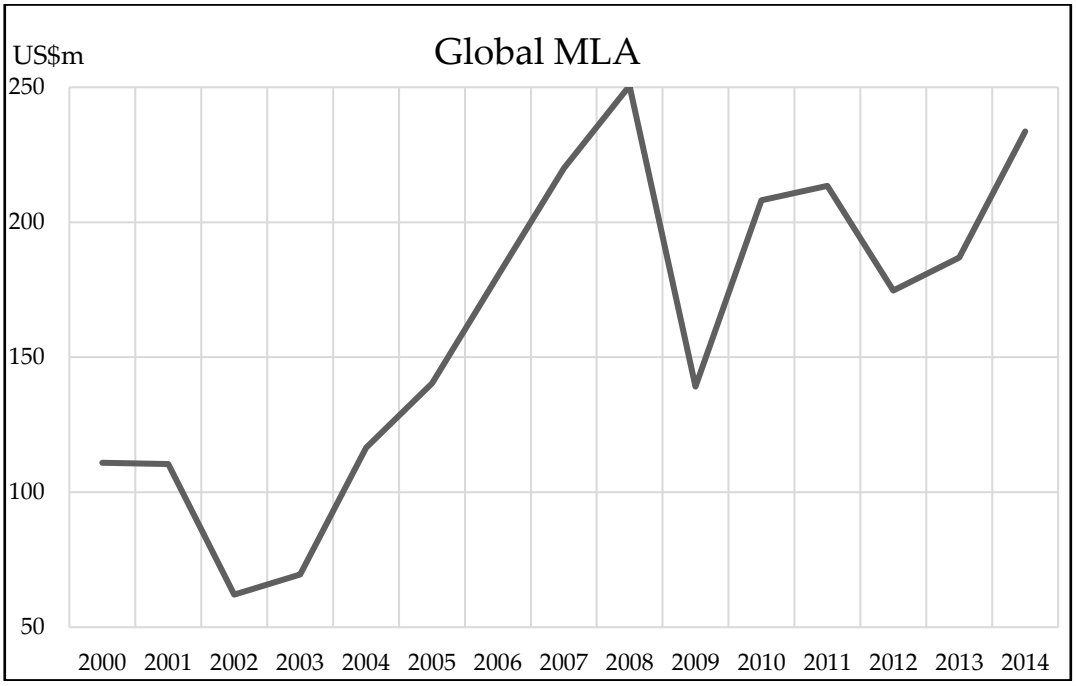
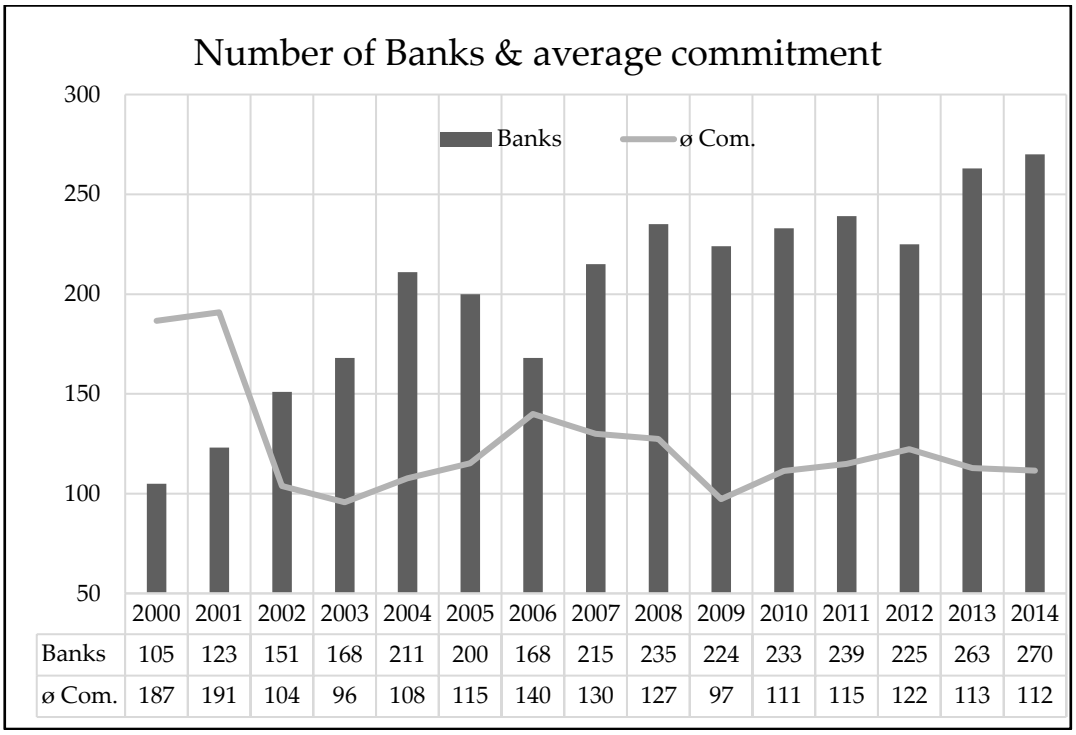


Figure 16: Global mandated lead arrangers (Source: own illustration, data from Thomson-Reuters (2014))

Moreover there are further parallels between the two crises shown. The project finance sector decreased after the dot-com crisis approx. by half, from US$111bn in 2001 to US$62bn in 2002. In 2008 the project finance sector was on a higher level at US$251bn and, likewise, decreased by approx. half to US$139bn in 2009. It has to be noted that with a decline by 44% both crises had a similar impact on the project financing sector. There are further parallels to be found in the figure below. The pillars in the figure show the number of banks which are globally active in project financing. There number quantity is continuously rising and has more than doubled since 2000. There was a negligible decrease in 2005: -5%, 2006: -16%, 2009: -5% and 2012: -6% which could not empirically be connected to the two crises. The huge percentage decrease is often a result of the total numbers of projects. There are small local banks which are not active in international project finance but they are close to a project's destination so that their interests in participation is related to local politics. In general it is nearly impossible to switch from year to year between an active and non-active international project finance banks. Project finance is no sub-division of corporate finance. The expertise in that business is hard to establish and a relevant cost factor. By when and why single project finance banks enter or leave the market will be analysed in greater detail at a later point. It

is not relevant in the figure below.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Banks	105	123	151	168	211	200	168	215	235	224	233	239	225	263	270
ø Com.	187	191	104	96	108	115	140	130	127	97	111	115	122	113	112

Figure 17: Number of banks and their average commitment (Source: own illustration, data from Thomson-Reuters (2014))

The average commitment refers to the Top 50 banks in international project finance from 2000 to 2014. The basis of the Top down order is the sum of the total commitment of each bank in international project finance in this period. Then the total commitment of each bank per year is divided by the corresponding total number of projects. The sum of all 50 results is divided by 50. This certainly only reflects an average value but it is an impressive and reliable item which shows whether banks are interested in bigger or smaller stakes. Beyond that the Top 50 banks reflect a minimum of 69%, a maximum of 91% and on average 77% of the total project financing market. One manual correction was made for the year 2010. The refinancing of the Taiwanese high-speed rail project added US$12bn for only one single bank, The Bank of Taiwan. If this special effect had not been adjusted, the average commitment would have increased to US$354.7m. However, with this adjustment the graph shows the continuous impact of the crises on the average commitment. As a consequence, the banks are willing to only take smaller commitments during and after crises and lager commitments in economically

strong phases. The average commitment from 2000 to 2013 was US$121.7m. But at this stage, it does not make any sense to discuss the average of an average and to consider whether a market with an average above US$121.7m is bullish and below is bearish. Tendencies can only provide an indication of the market situation. (Thomson-Reuters, 2014) It also depends on several other factors like the individual project size, the loan life, a more restrictive granting of credit, higher margins and cover ratios. In 2006 and 2007, for example, there were projects in the energy sector which had a loan life of 20-25 years or in the infrastructure sector of even up to 30 years. During and after crises a veritable collapse of loan-life can be noticed. This short-term financing with loan-life of 5-8 years is called »Mini-Perm-Financing«. (Brodehser, 2012) These facts can only be represented with difficulty and they are not reliable. But there interactions will be explained in chapter »4.2 Data analysis«.

Conclusion

The financial crisis began with the subprime crisis in the US. Systematic failures turned the crisis into a financial crisis, significantly reduced banks' equity and thus their possibilities of refinancing. Ultimately the crisis had an impact on the global economy and also on international project finance. Several parallels to the dot-com crisis at the beginning of the 21st century were shown. But in what ways was the financial crisis different from other crises?

> One of the underlying features of the crisis was the build-up of excessive on- and off-balance sheet leverage in the banking system. In many cases, banks built up excessive leverage while still showing strong risk based capital ratios. During the most severe part of the crisis, the banking sector was forced by the market to reduce its leverage in a manner that amplified downward pressure on asset prices, further exacerbating the positive feedback loop between losses, declines in bank capital, and contraction in credit availability. (Basel-Committee, 2011a: para. 151.)

First of all, international project finance is a financing method which is not so old and became relevant with the implementation of computer modelling at the end of the 20th century. For that reason it is not possible to show parallels to other crises. The financial crisis for the first time allows to study the impact of a crisis on project finance. However, this is only the first step and one of the results so far could be that project finance has recovered after the first crisis and hopes are justified that it will recover from other crises too. But similar to the dot-com crisis,

during the financial crisis the Basel Committee agreed to once again reissue of the capital requirements. The financial crisis gave rise to significant changes in bank regulations. Basel III is the result of the financial crisis. To understand the mechanism and thus the impact of Basel III on project finance, it is important to understand the impact of the financial crisis on what Basel III was to prevent.

2.5 THE IMPACT OF THE BASEL FRAMEWORK

The previous chapter analysed the financial crisis and its impact on the international project finance sector. In conclusion, there are measurable impacts caused by the financial crisis which had a negative impact on the project financing sector. Certainly the negative impact of the financial crisis is similar to other crises before. The difference of the financial crisis in relation to other crises is a distinct change in banking regulation. These changes in regulation materialised in Basel III. These regulations were to prevent bank failures and financial crises in the future. The reason why financial crises have to be prevented is that while the financial impact of crises in other sectors affects the individual financial institutions, the impact of financial crises affects society as a whole. The Basel Committee on Bank Supervision »BCBS« has played a major role in defining the rules and instruments of regulation. (Gurrman et al., 2014) In the following, the development from the foundation of the BCBS to the latest version of Basel III will be described. The goal of this chapter is to point out the changes in regulation before and after the financial crisis. Specifically, this means a comparison of Basel II and Basel III. Because of the enormous scope of the Basel regulations it is important to largely focus on those clearly defined paragraphs which are related to international project finance. Thus, not only a simple repetition of Basel II and Basel III takes place, but rather alternatives within the scope of the regulation framework will be selected following the economic principle, as in the figure below. The subordination of the economic activity of banks is due to profit maximization and enables a transparent comparison. Finally the sheer dimensions of the two sets of regulations will be shown. This scientifically measurable comparison of the most efficient solution of Basel II and Basel III for international project finance allows a reduction to a mathematic formula. The result of this analysis is a factorization of these two regulatory frameworks. Furthermore, this result is the basis of the chapter 4.1 »Field research« which used the developed framework to analyse the impact on figures of a single project.

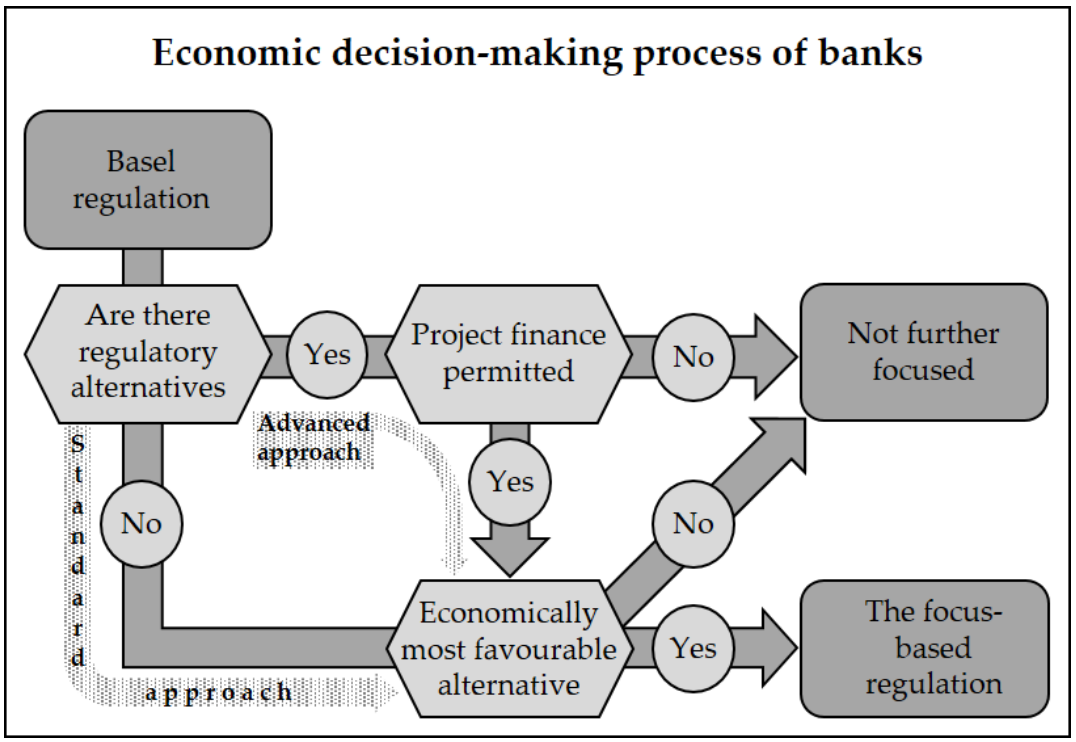


Figure 18: Decision process in banks (Source: own representation)

Origin of the Basel Committee on Banking Supervision

On 16 December 2010 the BCBS published the final text of the capital and liquidity standards, Basel III. Basically, Basel III is the result of the further development of Basel I and Basel II and they are based on each other (see the figure below). In order to understand the scope of application of Basel III and its amendments relating to international project finance, it is essential to know its origin.

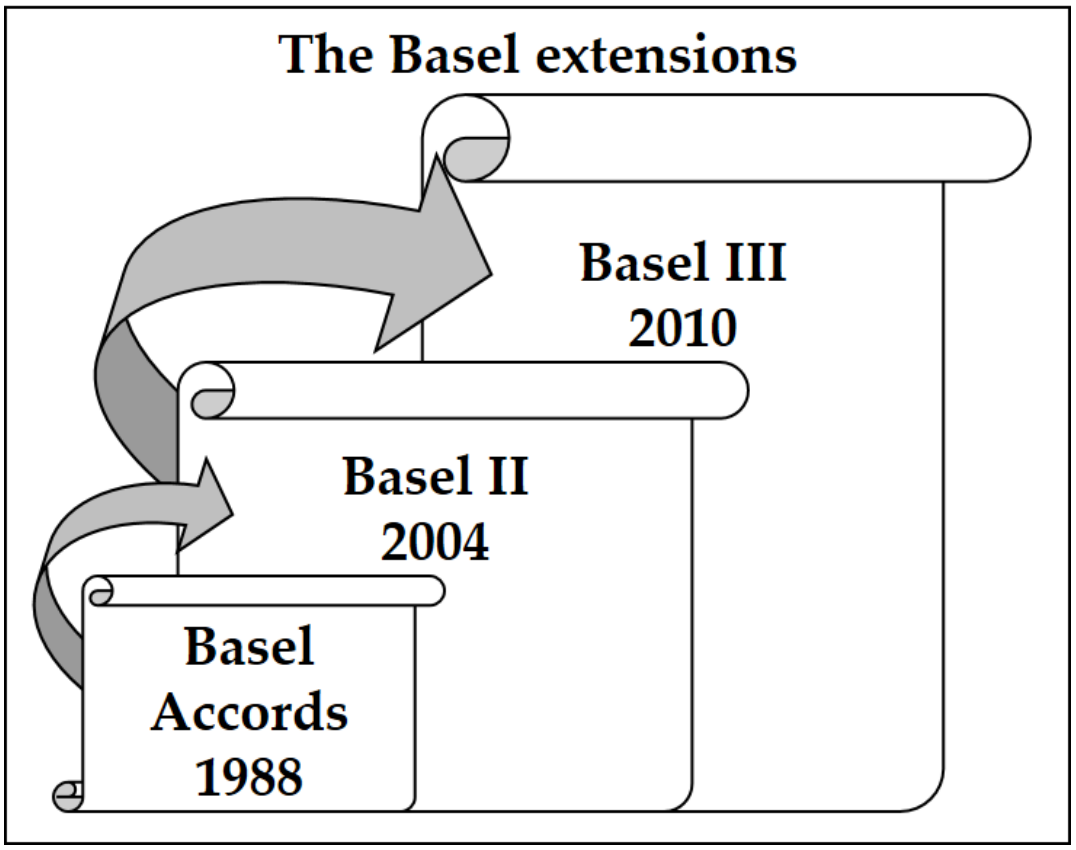


Figure 19: From Basel accords to Basel III (Source: own representation)

2.5.1 The basis of banking regulation

The BCBS was founded by the G10 States[5] in 1974 as a result of the banking crisis of 1973-75. The Committee adopted standard guidelines for equity resources for banks, called »Basel Accords«, in 1988. (Huelmann, 2004) They published a set of minimum capital requirements »MCR« for banks. Banks with an international presence are required to hold equity equal to 8% of their risk-weighted assets »RWA«. Thereby capital elements are divided into tier 1 and tier 2 capital.

[5] The Group of Ten (since 1962): Belgium, Canada, France, Germany, Italy, Japan, Netherlands, Sweden, United Kingdom, United Stated and since 1964 Switzerland, but the name remained the same.

$$MCR = \frac{Tier\ I + Tier\ II}{RWA} \geq 8\%$$

In other words, banks could accommodate loans up to 12.5 times their equity. Tier 1 capital includes paid-up share capital or common stocks and disclosed reserves. Tier 2 capital includes undisclosed reserves, asset revaluation reserves, general provisions or general loan-loss reserves, hybrid capital instruments and subordinated debt. The Basel Accords also include a clear definition of all given key figures. Above, assets of banks are classified and grouped into the following five categories and have to be multiplied with the additional percentage:

Table 10: Risk weight category (Source: own representation based on Basel-Committee (2006))

Risk weights in %	Category of on-balance sheet assets
0	• Cash • Claims on OECD central governments and OECD central banks
0, 10, 20 or 50	• Claims on domestic public-sector entities excluding central government, and loans guaranteed by such entities (at national discretion)
20	• Claims on multilateral development banks • Claims on OECD banks
50	• Loans fully secured by mortgage on residential property that is or will be occupied by the borrower or that is rented
100	• All other assets

After the on-balance sheet assets the Basel Accords also define credit conversion factors for off-balance sheet items. These items are, among others, letters of credit, unused commitments and derivatives. Together the off and on-balance sheet factors result in the RWA. The respective tier or total capital ratio is the result of the tier or total capital divided by the RWA. Even if there are precise specifications and definitions, risks are mitigated only by eligible capital and, on the other hand, by standing demands. In 1996 there was a further consideration of market risks. Market risk include equity risk, interest rate risk, currency risk and commodity risk. They reveal themselves in volatility of stock indices, change of interest rates, change of exchange rates and the fluctuating commodity prices. Certainly, there was the extension with the market risk in 1996, but altogether it took 16 years until the Basel Accords were thoroughly revised. Over 100 other countries also adopted the principles of Basel I. As a reaction to the dot-com crisis in 2001 Basel II was modified and extended in 2004. It took no more than 6 years for the latest adjustments in Basel III to be made. (Kaiser, Köhne, 2004)

2.5.2 Critical overview of Basel II

The »International Convergence of Capital Measurement and Capital Standards – A Revised Framework«, better known as Basel II, were published in 2004 and comprised completely modified equity requirements. With 347 pages Basel II was considerably more extensive than the first Basel Accord and would become the most important bank regulation for decades. An additional guideline »Implementation of Basel II: Practical Considerations« was also published. In the following, reference is made to the most recent edition of the Basel II framework, the one published in June 2006. This framework is a compilation of the June 2004 Basel II Framework, the elements of the 1988 Accord, which were not revised during the Basel II process, the 1996 Amendment to the Capital Accord to Incorporate Market Risks, and the 2005 paper on the Application of Basel II to Trading Activities and the Treatment of Double Default Effects. Based on this framework a detailed examination as shown in figure 18 »Decision process in banks« above will follow. The most serious change in regulation anticipated was an adequate capital management allocation for the risk that banks expose through their credit lending, investment and trading activities. A three-pillar-approach, the figure below, was to ensure the stability of the international financial system. The first pillar »minimum capital requirements« is the development of the previously existing regulations of Basel I. The two pillars »supervisory review« and »market

discipline« were added. (Hofmann et al., 2007)

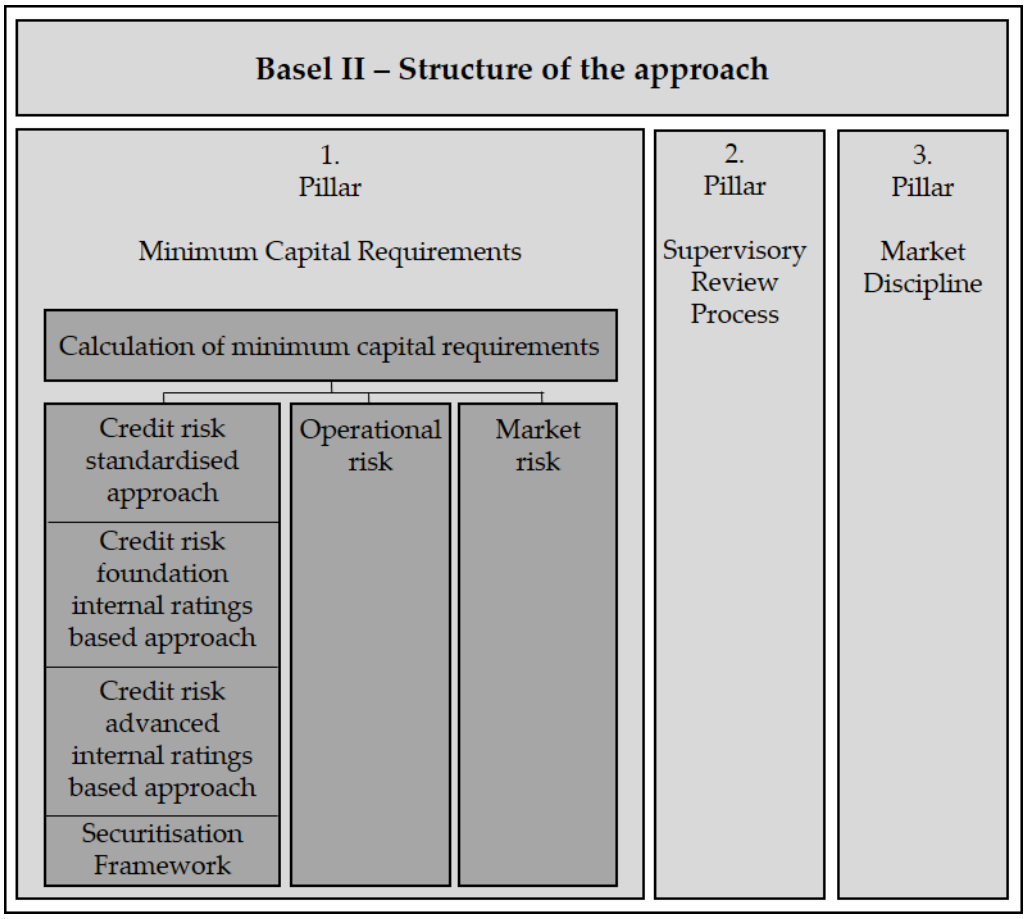


Figure 20: Basel II overview (Source: own representation)

The content of the second pillar is an integrated »Supervisory Review Process«, which was to prove the individual risk profile of each bank and therefore forms the basis for potential penalties from quantitative standards of capital adequacy requirements.

Pillar three increase the transparency of a bank's risk positions so that would discipline each other in terms of return requirements. The disclosure requirements include a description of the scope of application, an assessment of risks taken as well as the equity base and structure. The connection between all three pillars is of considerable importance. (Hofmann et al., 2007)

Before Basel II starts with the exact definition of the three pillar approach, there is an introduction statement on the framework conditions. As a matter of principle, there is a definition regarding the scope of consolidation. According to the Basel-Committee (2006: para. 20.) the "Framework will be applied on a (fully) consolidated basis to internationally active banks. "This means that project finance activities of banks in subsidiaries and / or business departments in foreign countries have to be consolidated and need to fulfil the legal requirements of Basel II. Additional specifications were made that were not directly related to international project finance.

2.5.2.1 Minimum capital requirements

Generally Basel II is a three-pillar approach with the first pillar being more comprehensive than the other two. The first pillar is based on the capital adequacy of Basel I. However, it is the first time that operational risks are limited by quantitative rules. Consequently, the first pillar of Basel II first describes the calculation of the MCR.

> "Calculation of minimum capital requirements
> 40. Part 2 presents the calculation of the total minimum capital requirements for credit, market and operational risk. The capital ratio is calculated using the definition of regulatory capital and risk-weighted assets. The total capital ratio must be no lower than 8%. Tier 2 capital is limited to 100% of Tier 1 capital." (Basel-Committee, 2006: para. 40.)

In contrast to the MCR formula in Basel I the total capital is supplemented by Tier III and under the fraction bar the market risk »K_{MR}« and operational risk »K_{OP}«, with K as capital requirements were added.

$$MCR = \frac{Tier\ I + Tier\ II + Tier\ III}{RWA + 12{,}5 * (K_{MR} + K_{OP})} \geq 8\%$$

The MCR is the pivotal point of the first pillar of Basel II. In general, at this stage it can be assumed that the numerator as well as the denominator have an impact on the banks' lending decisions and thus on the project financing unit.

Specifically, it can be assumed that a decreasing numerator and an increasing denominator will have a negative impact on banks' lending capacity. Conversely, an increasing numerator and a decreasing denominator will have a positive impact on banks' lending capacity. The minimum capital requirements also include also definition of the constituents of the Tier capital.

Table 11: Capital elements (Source: Basel-Committee (2006: Annex 1a))

A. Capital elements Tier 1: (a) Paid-up share capital/common stock (b) Disclosed reserves Tier 2: (a) Undisclosed reserves (b) Asset revaluation reserves (c) General provisions/general loan-loss reserves (…) (d) Hybrid (debt/equity) capital instruments (e) Subordinated debt Tier 3: At the discretion of their national authority, banks may also use a third tier of capital (Tier 3), consisting of short-term subordinated debt (…), for the sole purpose of meeting a proportion of the capital requirements for market risks. The sum of Tier 1, Tier 2, and Tier 3 elements will be eligible for inclusion in the capital base, subject to the following limits.
B. Limits and restrictions (i) The total of Tier 2 (supplementary) elements will be limited to a maximum of 100% of the total of Tier 1 elements; (ii) Subordinated term debt will be limited to a maximum of 50% of Tier 1 elements; (iii) Tier 3 capital will be limited to 250% of a bank's Tier 1 capital that is required to support market risks. (iv) Where general provisions/general loan-loss reserves include amounts reflecting lower valuations of asset or latent but unidentified losses present in the balance sheet, the amount of such provisions or reserves will be limited to a maximum of 1.25 percentage points;

(v) Asset revaluation reserves which take the form of latent gains on unrealized securities (see below) will be subject to a discount of 55%.
C. Deductions from the capital base From Tier 1: Goodwill and increase in equity capital resulting from a securitization exposure. 50% from Tier 1 and 50% from Tier 2 capital: (i) Investments in unconsolidated banking and financial subsidiary companies. N.B. The presumption is that this Framework would be applied on a consolidated basis to banking groups. (ii) Investments in the capital of other banks and financial institutions (at the discretion of national authorities). (iii) Significant minority investments in other financial entities.

Within the definition of the total capital there is no direct connection in the framework conditions specifically related to project financing. Consequently, the change in regulations from Basel II to Basel III, particularly above the fraction bar of the MCR-formula, can only have an impact on the banks' lending policy in general and not especially on project finance. The denominator of the MCR formula is the sum of the RWA for credit risks plus 12.5 times the sum of equity requirements for market risks and operational risk. Through the involvement of external and individual internal bank ratings a differentiated credit risk control takes place. The overall minimum equity ratio in relation to the risk-weighted assets was to be 8% on average. (Basel-Committee, 2006: para. 40.–44.) Basel II enables banks to choose different evaluation methods to calculate the RWA:

> "50. The Committee permits banks a choice between two broad methodologies for calculating their capital requirements for credit risk. One alternative, the Standardised Approach, will be to measure credit risk in a standardised manner, supported by external credit assessments.
>
> 51. The other alternative, the Internal Ratings-based Approach, which is subject to the explicit approval of the bank's supervisor, would allow banks to use their internal rating systems for credit risk.

> 52. (…)In determining the risk weights in the standardised approach, banks may use assessments by external credit assessment institutions recognised as eligible for capital purposes by national supervisors (…)."(Basel-Committee, 2006: para. 50.–52.)

The following figure illustrates the different calculation alternatives of the RWA and the accompanying right to select one for the options of banks, i. e. the standardised approach and internal rating-based »IRB« approach with the IRB approach being divided into the foundation IRB approach and the advanced IRB approach.

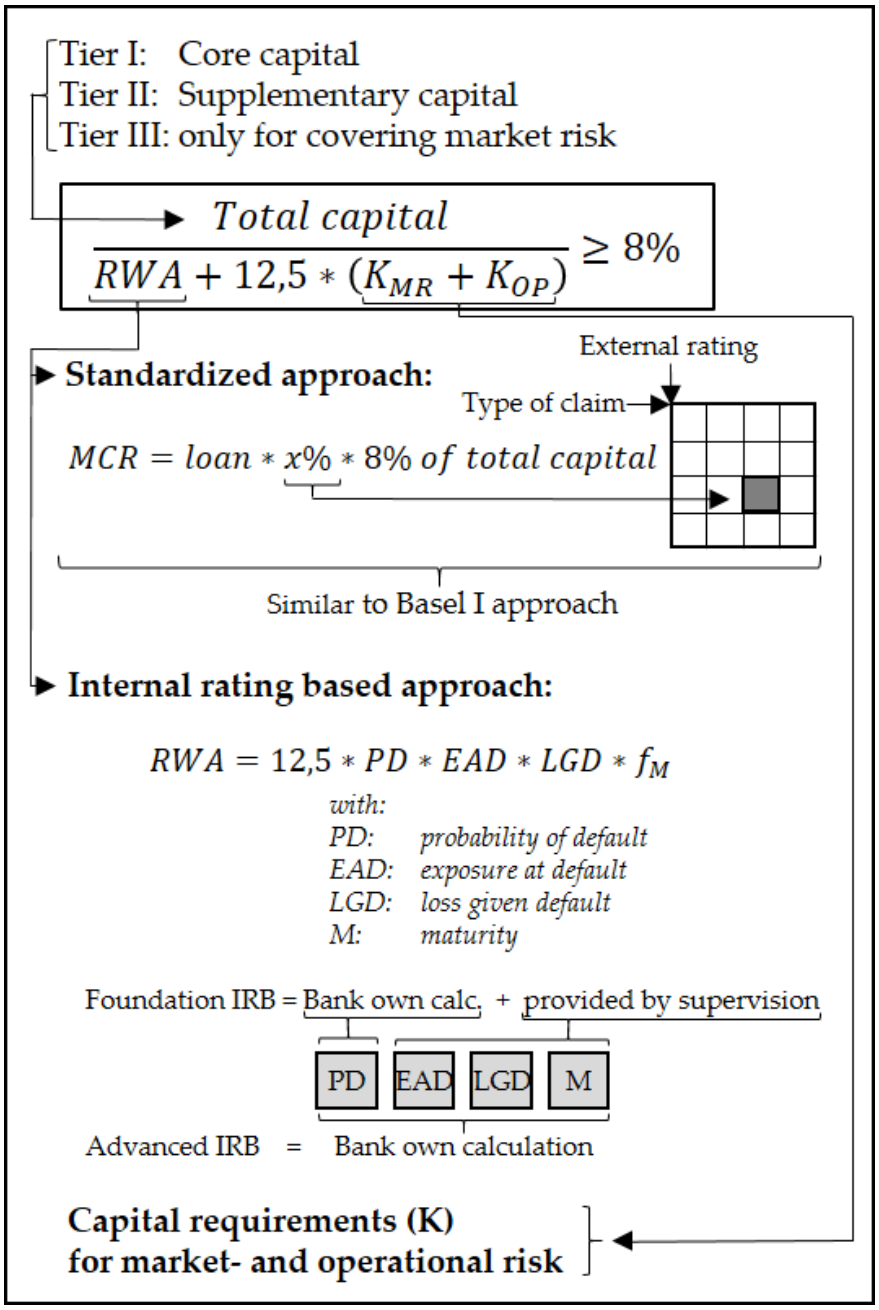


Figure 21: The IRB approach (Source: own representation)

2.5.2.2 Standardised approach

Banks which use the standardised approach draw on external rating agencies to quantify the risk of credit lending. An excerpt from the committed and differentiated risk weights is shown in the following table. Detailed descriptions of the respective risk weightings is draft in the original Basel II agreements. (Basel-Committee, 2006: para. 50.ff)

Table 12: External risk weighted table of Basel II (Source: Basel-Committee (2006: para. 53.–66.))

Credit assessment ➔ / Risk weight in % ➘ / Claims on ➓	AAA to AA-	A+ to A-	BBB+ to BBB-	BB+	BB-	B-	Below B-	Un-rated
Sovereigns	0	20	50	100			150	100
Banks and Securities companies	20	50	100				150	100
Corporates	20	50	100			150		100
Retail portfolios e.g. credit cards, personal- and small business finance etc.	75							
Residential property	35							
Commercial real estate	10							
Multilateral development banks	0							

The table above is the expansion of the risk weighted table of Basel I. In the following, a point to point discussion of the Basel II framework takes place, in which only the relevant factors in relation to international project finance are introduced. There are several reasons why the standard approach does not qualify for project finance: It is uncommon for a project to have an external rating pre financial close. Furthermore, internationally acting banks that are active in the business sector of project finance apply the IRB approach and have to observe:

"Once a bank adopts an IRB approach for part of its holdings, it is expected to extend it across the entire banking group. (…) Supervisors may require a bank to employ one of the IRB equity approaches if its equity exposures are a significant part of the bank's business, even though the bank may not employ an IRB approach in other business lines. Further, once a bank has adopted the general IRB approach for corporate exposures, it will be required to adopt the IRB approach for the SL sub-classes (project finance) within the corporate exposure class." (Basel-Committee, 2006: para. 256. and 260.)

But within the scope of the IRB approach there is a range of paragraphs which relate to the framework conditions of the standard approach. The points of contact are highlighted in the following.

As explained in chapter 2.2.2 »Project participants« Multilateral Development Banks »MDB« and Export Credit Agencies »ECA« play a crucial role in international project finance. For this reason, the focus will be on a detailed description of the standardised approach.

"55. For the purpose of risk weighting claims on sovereigns, supervisors may recognize the country risk scores assigned by (…) ECAs. To qualify, an ECA must publish its risk scores and subscribe to the OECD agreed methodology. Banks may choose to use the risk scores published by individual ECAs that are recognised by their supervisor, or the consensus risk scores of ECAs participating in the "Arrangement on Officially Supported Export Credits". The OECD agreed methodology establishes eight risk score categories associated with minimum export insurance premiums. These ECA risk scores will correspond to risk weight categories as detailed below.

ECA risk scores	0-1	2	3	4 to 6	7
Risk weight	0%	20%	50 %	100%	150%

56. Claims on the Bank for International Settlements, the International Monetary Fund, the European Central Bank and the European Community may receive a 0% risk weight. (…)

59. The risk weights applied to claims on MDBs will generally be based on external credit assessments (…). A 0% risk weight will be applied to claims on highly rated MDBs that fulfil to the Committee's satisfaction the criteria provided below. (…)

MDBs currently eligible for a 0% risk weight are: the World Bank Group comprised of the International Bank for Reconstruction and Development (IBRD) and the International Finance Corporation (IFC), the Asian Development Bank (ADB), the African Development Bank (AfDB), the European Bank for

> Reconstruction and Development (EBRD), the Inter-American Development Bank (IADB), the European Investment Bank (EIB), the European Investment Fund (EIF), the Nordic Investment Bank (NIB), the Caribbean Development Bank (CDB), the Islamic Development Bank (IDB), and the Council of Europe Development Bank (CEDB)." (Basel-Committee, 2006: para. 55., 56. and 59.)

Therewith, the corporate loans are significantly higher risk-weighted in comparison to MDB and ECA-supported loans. The commitment of MDBs and ECAs could support the funding of projects essentially and have a positive influence.

The standardised approach also contains the following possible risk-weight reduction by securitization under section 74.:

> "74. (…) The Committee, however, recognises that, in exceptional circumstances for well-developed and long-established markets, mortgages on office and/or multi-purpose commercial premises and/or multi-tenanted commercial premises may have the potential to receive a preferential risk weight of 50% for the tranche of the loan that does not exceed the lower of 50% of the market value or 60% of the mortgage lending value of the property securing the loan." (Basel-Committee, 2006: para. 74)

Claims secured by commercial real estate play only a subordinate role in international project finance. There may be exceptions for project financed commercial property but such stakes are insignificant compared to the global project finance sector (see figure 4 »Funding in project finance«). The majority part of international project finance consist of special real estate whose third-party use or conversion is near impossible. Often, this real estate involves huge decommissioning or disposal costs before a conversion can take place.

Among the credit risk mitigation techniques there guidelines for handling off-balance sheet items in para. 82.-89. In this particular case off-balance sheet refers to a banks' balance sheet and those risks that are not recorded in the bank's accounts. There is no relation to the nature of off-balance sheet financing in structured finance products. However, the project finance structure has in impact on a bank's off-balance sheet items. At financial close the SPV has the commitment from the underwriting banks that they have to draw down the loans within the

scope of the agreed schedule. This drawdown schedule covers the entire construction period which can easily extend over several years in the project financing sector and especially in infrastructure projects. Apart from that there are agreed standby facilities and other tranches which will become important in the operating phase later on. These are all binding loan commitments which are balance sheet-neutral at the point of financial close. Nevertheless, banks have to consider the risks out of these commitments. Within the standardised approach off-balance sheet items are converted into credit exposure equivalents through the use of credit conversion factors. Commitments with an original maturity up to one year receive a credit conversion factor of 20% and over one year of 50%. Regarding project finance the Basel-Committee (2006: para. 84(ii).) ruled that "Certain transaction-related contingent items (e.g. performance bonds, bid bonds, warranties and standby letters of credit related to particular transactions) will receive a CCF of 50%." Banks can use the lower of the two applicable credit conversion factors. (Basel-Committee, 2006: para. 82–86)

There is an overview of credit risk mitigation techniques in paragraph 109.ff. A collateralized transaction is one in which a credit or a potential credit has exposure and is hedged in whole or in part by collaterals posted by a counterparty or by a third party on behalf of the counterparty. The framework offers a simple approach or a comprehensive approach and banks may operate under either but not both. Within the simple approach the risk weight of the collateralized portion is substituted by the risk weight of the collateral, but only if it is lower than the risk weight of the counterparty and generally a 20% floor applies. The comprehensive approach allows fuller offset of the collateral against exposures by effectively reducing the exposure amount by the value ascribed to the collateral. (Basel-Committee, 2006: para. 119. and 121.)

The securitization of real estates, mentioned above, is uncommon in project finance but there are other collaterals, e.g. guarantees, which have a huge impact on risk weighting. In particular, the aforementioned MDBs and ECAs trace back to a range of eligible guarantors in paragraph 195. This includes sovereign entities like the Bank for International Settlements and the International Monetary Fund or PSEs, banks, securities firms and other entities rated A- or better. Furthermore this includes credit protection provided by parent, subsidiary and affiliate companies when they have a lower risk weight than the obligor. The secured stake is assigned the risk weight of the guarantor and the uncovered stake of the exposure is assigned the risk weight of the underlying counterparty. Where the amount guaranteed is less than the amount of the exposure, and the secured and unsecured

stakes are of equal seniority, capital relief will be afforded on a proportional basis. That implies that the secured stake of the exposure will receive the treatment applicable to eligible guarantees and credit derivatives, with the remainder treated as unsecured. Currency and maturity mismatches play a minor role in project finance. Firstly, refinancing takes place on money and capital market in the same currency and secondly, guarantees and credit derivatives are structured in individual credit tranches, so that maturity mismatches are barred. (Basel-Committee, 2006: para. 195., 196. and 198.)

2.5.2.3 IRB Approach

To calculate the RWA using the IRB approach is much more extensive than to calculate the RWA by the standardised approach. The formula in figure 21 »The IRB approach« shows that the calculation of the RWA in the IRB approach does not distinguish between the foundation IRB approach and the advanced IRB approach. Both calculation methods draw on the probability of default »PD«, loss given default »LGD«, the exposure at default »EAD« and the effective maturity »M«. The formula below shows a calculation in dependency of project finance-specific variables and does not claim to be complete. (Basel-Committee, 2006: para. 211.)

$$RWA = 12.5 \times f_{(PD,LGD,EAD,M)}$$

To evaluate these unknown figures banks have to develop their own empirical rating model. The rating model to be used to estimate these figures has to be approved by national bank regulation authorities. Under precise specifications, banks are required to determine specific indicators to calculate the RWA. The effort to establish and operate such a rating tool is connected with large expenditures for banks. The motivation for banks to establish such a rating tool is, on the one hand, that they get more capability of adopting more sophisticated techniques in credit risk management, and, on the other hand, that they can reduce the RWA. The target is to define risk weights between the expected loss »EL« and the unexpected loss »UL«. (Basel-Committee, 2006: para. 212.) The IRB approach

contains different asset classes. Similar to the standardised approach, a close review of the Basel II framework and contact points with international project finance will be given in the following to evaluate a targeted risk weight function for international project finance. "In cases where an IRB treatment is not specified, the risk weight for those other exposures is 100%, except when a 0% risk weight applies under the standardised approach, and the resulting risk-weighted assets are assumed to represent UL only. (…) Under the IRB approach, banks must categorise banking-book exposures into broad classes of assets with different underlying risk characteristics, subject to the definitions set out below. The classes of assets are (a) corporate, (b) sovereign, (c) bank, (d) retail, and (e) equity. Within the corporate asset class, five sub-classes of specialised lending are separately identified." (Basel-Committee, 2006: para. 214. and 215.) In a point to point examination, international project finance is initially assigned to the main category 'corporates'. Furthermore, the corporate asset class, as mentioned above, is divided into five sub-classes which are characterised by the following features in paragraph 219.:

- "The exposure is typically to an entity (often a special purpose entity (SPE)) which was created specifically to finance and/or operate physical assets;
- The borrowing entity has little or no other material assets or activities, and therefore little or no independent capacity to repay the obligation, apart from the income that it receives from the asset(s) being financed;
- The terms of the obligation give the lender a substantial degree of control over the asset(s) and the income that it generates; and
- As a result of the preceding factors, the primary source of repayment of the obligation is the income generated by the asset(s), rather than the independent capacity of a broader commercial enterprise." (Basel-Committee, 2006: para. 219.)

International project finance covers the above features and is first mentioned by name in paragraph 220. as one of the five sub-categories. The exact definition of project finance takes place in paragraphs 221. and 222.:

> "Project finance (PF) is a method of funding in which the lender looks primarily to the revenues generated by a single project, both as the source of repayment and as security for the exposure. This type of financing is usually for large, complex and expensive installations that might include, for example, power plants, chemical processing plants, mines, transportation infrastructure, environment, and telecommunications infrastructure. Project finance may take the form of financing of the construction of a new capital installation, or refinancing of an existing installation, with or without improvements. (…) In such transactions, the lender is usually paid solely or almost exclusively out of the money generated by the contracts for the facility's output, such as the electricity sold by a power plant. The

borrower is usually an SPE that is not permitted to perform any function other than developing, owning, and operating the installation. The consequence is that repayment depends primarily on the project's cash flow and on the collateral value of the project's assets. In contrast, if repayment of the exposure depends primarily on a well-established, diversified, credit-worthy, contractually obligated end user for repayment, it is considered a secured exposure to that end-user." (Basel-Committee, 2006: para. 221. and 222.)

As a next step, definitions of sovereign and bank exposures will be given. In both cases asset classes all exposures to counterparties are treated as sovereigns, banks and those securities firms under the standardised approach. This includes sovereigns and their central banks, MDBs and the entities referred to in paragraphs 56. and 65. (Basel-Committee, 2006: para. 229. and 230.)

As mentioned in figure 21 »The IRB approach«, there are two broad approaches available: a foundation and an advanced approach. Banks provide their own estimates of PD under the foundation approach and rely on supervisory estimates for risk components LGD, EAD and M. Within the scope of the advanced approach, banks, in addition to the PD, provide their own calculation of LGD, EAD and M. For both approaches, banks have to use the RWA calculation formula provided in the table 13 »Risk-weighted assets calculation« and in a detailed description in the following. There is an exception for banks that do not meet the requirements to calculate the PD under the corporate foundation approach for their specialized lending classes, including project finance. They have to map their internal risk grades, which are associated with a specific risk weight, in a »supervisory slotting criteria approach«. Argumentum e contrario, there is no standardised approach for project finance. If a bank does not meet the requirements for the IRB approach, regardless of whether the foundation or the advanced approach, the bank has to use the supervisory slotting criteria approach. Otherwise, if banks meet the requirements for the foundation or advanced approaches, they are able to use the foundation or advanced approach to corporate exposures to derive risk weights for project finance. (Basel-Committee, 2006: para. 245.–251.)

> "Once a bank adopts an IRB approach for part of its holdings, it is expected to extend it across the entire banking group. (…) Further, once a bank has adopted the general IRB approach for corporate exposures, it will be required to adopt the IRB approach for the SL sub-classes within the corporate exposure class. (…) Banks adopting an IRB approach are expected to continue to employ an IRB approach. (…) Given the data limitations associated with SL exposures, a bank may remain on the supervisory slotting criteria approach for (the project finance) (…) sub-classes, and move to the foundation or advanced approach for other sub-classes within the corporate asset class." (Basel-Committee, 2006: para. 256., 260., 261. and 262.)

In conclusion, both approaches, the foundation and the advanced approach, can be relevant for the project finance business unit. The Committee urges banks to implement the advanced IRB approach but recognizes that for some banks it may not be practicable for various reasons to implement the IRB approach in this respective business unit. This is mainly due to the data limitations, because in contrast to the corporate finance business unit the individual number of projects versus corporates is significantly lower. The incentive on the part of the Committee to opt for the advanced IRB approach is supported by a lower RWA. Below, the exact basis for calculation of PD, LGD, EAD and M is represented along the framework agreement, targeted for project finance.

> "The derivation of risk-weighted assets is dependent on estimates of the PD, LGD, EAD and, in some cases, effective maturity (M), for a given exposure. (…) Throughout this section, PD and LGD are measured as decimals, and EAD is measured as currency (e.g. euros), except where explicitly noted otherwise. For exposures not in default, the formula for calculating risk-weighted assets is. Ln denotes the natural logarithm. N(x) denotes the cumulative distribution function for a standard normal random variable (i.e. the probability that a normal random variable with mean zero and variance of one is less than or equal to x). G(z) denotes the inverse cumulative distribution function for a standard normal random variable (i.e. the value of x such that N(x) = z). The normal cumulative distribution function and the inverse of the normal cumulative distribution function are, for example, available in Excel as the functions NORMSDIST and NORMSINV." (Basel-Committee, 2006: para. 271. and 272.)

Table 13: Risk-weighted assets calculation (Source: (Basel-Committee, 2006: para. 272.))

$$\text{RWA} = 12.5 \times f_{(PD,LGD,EAD,M)} \times \text{SF}$$ $$\text{RWA} = 12.5 \times \text{K} \times \text{EAD} \times \text{SF}$$ with SF = scaling factor of 1.06
$$\text{Capital requirement (K)} = \left[LGD \times N_{\left(\sqrt{\frac{1}{1-R}} \times G_{PD} + \sqrt{\frac{R}{1-R}} \times G_{0.999}\right)} - PD \times LGD \right] \times \frac{1 + (M - 2.5) \times b}{1 - 1.5 \times b}$$
$$\text{Correlation (R)} = 0.12 \times \frac{1 - EXP^{-50 \times PD}}{1 - EXP^{-50}} + 0.24 \times \left(1 - \frac{1 - EXP^{-50 \times PD}}{1 - EXP^{-50}}\right)$$ with EXP = Exposure
$$\text{Maturity adjustment (b)} = (0.11852 - 0.05478 \times ln_{PD})^2$$ p
If this calculation results in a negative capital charge for any individual sovereign exposure, banks should apply a zero capital charge for that exposure. The capital requirement (K) for a defaulted exposure is equal to the greater of zero and the difference between its LGD and the bank's best estimate of expected loss. The risk-weighted asset amount for the defaulted exposure is the product of K, 12.5, and the EAD.

The above formula exactly describe the interaction between PD, LGD, and M in the resulting capital requirements K. Thereby, PD, LGD, EAD and M are also the unknown parameters. In the next paragraphs the framework summarises the possible approaches to calculate these parameters, before returning to the specialized lending categories. For these categories and particularly for project finance there are different approaches in the respective categories. As before, the relevant calculation approaches for project finance will be described in detail below.

Banks that do not meet the requirements in the business unit of project finance for the estimation of PD under the corporate IRB approach will be required to use the specific risk weight for project finance of the supervisory category. The risk weight for project finance based on the »Supervisory Rating Grades for Project Finance Exposures« ,which is provided in detail in Annex 6 of the Basel II framework and is also represented in Annex 1 of this work. (Basel-Committee, 2006: para. 275.) The risk weights for unexpected losses associated with the project finance category and a link to a range of external credit assessments are presented in the table below:

Table 14: Supervisory categories and UL risk weights for Project Finance exposures (Source: Basel-Committee (2006: para. 275. and 276.))

Strong	**Good**	**Satisfactory**	**Weak**	**Default**
70%	90%	115%	250%	0%
BBB- or better	BB+ or BB	BB- or B+	B to C-	Not applicable

Banks that meet the requirements for the estimation of PD will be able to use the general foundation approach and banks that meet stricter requirements than LGD and EAD will be able to use the advanced approach for the corporate asset class to derive risk weights for project finance. (Basel-Committee, 2006: para. 278. and 279.) As mentioned above, collaterals in the form of commercial real estate also only play a subordinate role in the extended consideration under the IRB approach. In the progression of this work, the handling with collaterals in the form of guarantees will become more and more important. In contrast to the standard approach where collaterals in the RWA calculation relate to external ratings, collaterals are entered separately into the complex formulas of the PD and LGD calculation. In this context, especially this two-tier risk assessment (PD/LGD with

and without collaterals) has a comprehensive complexity and can, among other things, lead to the »double default effect«. The formula in paragraph 272. is extended by the double default framework in paragraph 284. in the following table:

Table 15: Calculation of risk-weighted assets for exposures subject to the double default framework (Source: Basel-Committee (2006: para. 284.))

The capital requirement for a hedged exposure subject to the double default treatment K_{DD} is calculated by multiplying K_0 as defined below by a multiplier depending on the PD of the protection provider PD_g: $$K_{DD} = K_0 \times (0.15 + 160 \times PD_G)$$
K_0 is calculated in the same way as a capital requirement for an unhedged corporate exposure (as defined in paragraphs 272. and 273.), but using different parameters for LGD and the maturity adjustment. $$K_0 = \left[LGD_g \times N_{\left(\frac{G_{PD_0} + \sqrt{\rho_{OS}} \times G_{0.999}}{\sqrt{1-\rho_{OS}}}\right)} - PD_0 \right] \times \frac{1 + (M - 2.5) \times b}{1 - 1.5 \times b}$$
PD_0 and PD_g are the probabilities of default of the obligor and guarantor, respectively, both subject to the PD floor of 0.03%. The correlation ρ_{OS} is calculated according to the formula for correlation (R) in paragraph 272., with PD being equal to PD_0, and LGD_g is the LGD of a comparable direct exposure to the guarantor. There may be no consideration of double recovery in the LGD estimate. The maturity adjustment coefficient b is calculated according to the formula for maturity adjustment (b) in paragraph 272., with PD being the minimum of PD_0 and PD_g. M is the effective maturity of the credit protection, which may under no circumstances be below the one-year floor if the double default framework is to be applied.
The risk-weighted asset amount is calculated in the same way as for unhedged exposures, i.e. $$RWA_{DD} = 12.5 \times K_{DD} \times EAD_g$$

In accordance with Basel-Committee: para. (2006: para. 285.), for "corporate and bank exposures, the PD is the greater of the one-year PD associated with the internal borrower grade to which that exposure is assigned, or 0.03%." So the minimum requirements for the derivation of the PD estimates associated with each internal borrower grade are also outlined in the rating criteria in the Basel II framework.

Banks have to provide an estimate of the LGD for each exposure. They can choose between a foundation approach and an advanced approach for estimating the LGD. The foundation approach is further divided into an approach with senior claims and with subordinated claims. Corporates, sovereigns and banks not secured by recognized collateral will be assigned a 45% LGD on senior claims and a 75% LGD on subordinated claims. A subordinated claim has to be expressly subordinated to other claims. As in the standardised approach, collaterals, i. e. those in paragraph 145. and in paragraph 289. e.g. cash, gold or equities, are insignificant in project finance. (Basel-Committee, 2006: para. 286.–296.)

Under the advanced approach banks are permitted to use their own internal estimates of LGD for corporate, sovereign and bank exposures, subject to additional minimum requirements in paragraph 468.-473. Then the LGD has to be measured as a percentage of the EAD. Banks that are unable to meet these additional minimum requirements have to use the foundation LGD approach. (Basel-Committee, 2006: para. 297. and 298.)

For the recognition of credit risk mitigation of guarantees there is also a foundation approach for banks using supervisory values of LGD, and an advanced approach for those banks using their own internal estimates of LGD. Credit risk mitigation by guarantees must not reflect the double default effect under either approach. The adjusted risk weight may not be less than that of a comparable direct exposure to the protection provider, but banks may choose not to recognize credit protection if doing so would result in a higher capital requirement. (Basel-Committee, 2006: para. 300. and 301.)

Banks using the foundation approach to guarantees closely follow the treatment under the standardised approach outlined in paragraphs 189.-201. In project finance the range of eligible guarantors is the same as under the standardised approach outlined in paragraphs 189.-194. The secured stake is risk weighted by the risk-weight function appropriate to the type of guarantor, and the

PD appropriate to the guarantor's borrower grade. By taking into account seniority and any collateralization of a guaranteed commitment banks are allowed to replace the LGD of the underlying transaction with the LGD applicable to the guarantee. The unsecured loan is risk weighted on the underlying obligor. As mentioned before, partial coverages or currency mismatches are not common in project finance. (Basel-Committee, 2006: para. 302.–305.)

Banks using the advanced approach to adapt the risk mitigating effect of guarantees have to decide between PD or LGD estimation. The adjustment of the PD or LGD has to ensue in a consistent manner. Banks cannot use the double default-effect so that the adjusted risk weight must not be lower than that of a comparable direct exposure to the protection provider. Banks which rely on their own-estimation of LGD have the option to adopt the foundation approach in paragraphs 302.-305. or to make an adjustment to their LGD estimation. Under this option, there are no special limits for project finance regarding the range of eligible guarantors or the minimum requirements in paragraphs 483.-484. Banks have the option of using the substitution approach. However, the double default framework according to paragraph 284. is explicitly excluded for specialised lending exposures and MDBs in paragraph 307. (Basel-Committee, 2006: para. 306. and 307.)

There are different EAD calculation approaches for on and off-balance sheet positions. In general, the on-balance sheet calculation is more relevant in the context of project finance and less complex than the off-balance sheet calculation. Nevertheless, there is also a reduced calculation approach for the off-balance sheet calculation for the particular of project finance. The calculation formula for the EAD on drawn amounts is as follows:

$$EAD \geq x + y$$

where x is the amount by which a bank's regulatory capital would be reduced if the exposure were fully written-off, and y is any specific provisions and partial write-offs. A discount is the positive amount of the difference between the instrument's EAD and the sum of x and y and is independent of the RWA calculation. (Basel-Committee, 2006: para. 308.)

For off-balance sheet items there is a foundation and an advanced approach. In both cases the exposure is calculated as the committed but undrawn amount which is multiplied by the credit conversion factor. Within the scope of the foundation approach the credit conversion factors are the same as those as in the standardised approach with the exception of the commitments. Commitments with a credit conversion factor of 75% will be applied regardless of the maturity of the underlying facility. A credit conversion factor of 0% will be applied to those "facilities which are uncommitted, that are unconditionally cancellable, or that effectively provide for automatic cancellation, for example, due to a deterioration in a borrower's creditworthiness, at any time by the bank without prior notice." (Basel-Committee, 2006: para. 312.) Banks have to fulfil a number of requirements to apply a 0% credit conversion factor. A characteristic project finance structure states the requirements in paragraph 314. of an active monitoring of the financial condition and the internal control systems which can lead to the facility being cancelled upon evidence of a deterioration in the credit quality of the SPV. In a common project financing structure, a quarterly monitoring of a lender's own technical, legal and financial advisor ensure that all agreed covenants are in place. A broken covenant leads directly to an event of default and after an agreed cure period loans will be called due. A detailed description of the banks own internal estimates of a credit conversion factor under the advanced approach will be omitted here. That is because, on the on hand, there could be no more benefit for a bank than a usable credit conversion factor of 0% and on the other hand, the »Transaction types« in Annex 4 do not refer to project finance products. (Basel-Committee, 2006: para. 311.–316. and Annex 4)

In the foundation approach for corporate exposures the effective maturity M is be 2.5 years. Even when partially using the advanced IRB approach, banks are required to measure the effective maturity for each facility. This way, M is defined as the greater of one year and will be no greater than 5 years. For a loan with a determined cash flow schedule, the effective maturity M is defined as:

$$M = \frac{\sum_t t \times CF_t}{\sum_t CF_t}$$

Here CF_t denotes principal, interest payments and fees contractually payable by the borrower in period t. If a bank is not in a position to calculate the contracted payments in this manner, the bank could use a more conservative measure of M. (Basel-Committee, 2006: para. 318.–320.) They are allowed to take "the maximum remaining time (in years) that the borrower is permitted to take to fully discharge its contractual obligation (principal, interest, and fees) under the terms of the loan agreement." (Basel-Committee, 2006: para. 320.)

Operational and market risk

The RWA calculation is complete and so the calculations for market risk and operational risk remain. The operational risks was defined by the Basel-Committee (2006: paragraph 644.) as "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk." There are three calculation approaches to ascertain the operational risk: the basic indicator approach, the standardised approach, and advanced measurement approach.

> "Banks are encouraged to move along the spectrum of available approaches as they develop more sophisticated operational risk measurement systems and practices. Internationally active banks are expected to use an approach that is more sophisticated than the Basic Indicator Approach and that is appropriate for the risk profile of the institution." (Basel-Committee, 2006: para. 646. and 647.)

Within the scope of the above paragraph it has to be taken into account that project financing banks by their nature act internationally and therefore apply the advanced measurement approach. Regardless of this fact all approaches are individual and depend on the bank's internal figures. For example, within the basic indicator approach banks have to hold capital for operational risk equal to the average of the previous three years of a fixed percentage of the positive annual gross income. Therefore, it is impossible to obtain a comparable transparency of a calculation approach for the operational risk. Independently it has to be noted that there are no project finance-specific or related regulations in any of the operational risk approaches. The same complexity applies to the market risk which is defined in the Basel-Committee (2006: paragraph 683(i).) as "the risk of losses in on and off-balance sheet positions arising from movements in market prices. The risks subject to this requirement are: The risks pertaining to interest rate related instruments and equities in the trading book; Foreign exchange risk and

commodities risk throughout the bank." There are also no project finance-specific or related regulations in the market risk approach. Principally at this point it has to be taken into account that any changing condition of the operational risk or the market risk in the regulation framework from Basel II to Basel III could have had an impact on the MCR formulas and respectively on the total capital and the RWA. So far, the work at hand has listed all the quantitative and measurable items of Basel II related to project finance to achieve a comparability to Basel III. In consideration of market risk and operational risk this may no longer be guaranteed. Similar to the internal PD estimation these two key figures relate to quantitative but individual standards which cannot be integrated and compared in a case study. It already becomes apparent at this point that the scientific research cannot only based on quantitative figures in a case study and, consequently, has a significant influence on the research design. Finally, all measurable and comparable quantitative factors of Basel II associated with project finance will be taken into account.

2.5.3 Substantial modifications of Basel III in relation to project finance

After the financial crisis in 2008 the Basel Committee was once again forced to act and, as a result, they published a first draft of Basel III in 2010. Today, Basel III is a compilation of the basic framework: »Basel III: A global regulatory framework for more resilient banks and banking systems«, which was completed after a large number of revisions and updates until it reached its final form including final documents and additional or supplemented standards (see table below). (Basel-Committee, 2010) The Basel III framework with its 77 pages is much less extensive than the comprehensive version of the Basel II framework form 2006. This is mainly because Basel II is an already completed process and a compilation of several appropriate standards, while Basel III is an update to a continuous process until 2019. Furthermore, the Basel II framework forms the basic framework of Basel III. However, the basis of this work is not only the above-mentioned basic framework of Basel III, but it also includes the essential standards above which in this case refers to the webpage of the Bank for International Settlements which features filters providing an overview of the latest Basel III publications. (Basel-Committee, 2016) The filters to be used are shifted as follows: Topic »Basel III«; Publication type »Standards«; Publication status »Final«; Year »All«. A further careful selection eliminates questionnaires and pre-versions of revised standards. The result and thus the basis for the further investigation are the following publications and also the current context of Basel III:

Table 16: Basel III Framework (Source: (Basel-Committee, 2011a, 2012a, 2014f, 2014g, 2015b, 2013a, 2013b, 2013c, 2014a, 2014b, 2014c, 2014d, 2014e))

Basel III and additional published standards	**Published**
• Basel III: A global regulatory framework for more resilient banks and banking systems	2011/06
• Basel III leverage ratio framework and disclosure requirements	2014/01
• Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools • Liquidity Coverage Ratio disclosure standards	2013/01 2014/03
• Basel III: the net stable funding ratio • Net stable funding ratio disclosure standards	2014/10
• Margin requirements for non-centrally cleared derivatives	2013/09
• Capital requirements for bank exposures to central counterparties	2014/04
• The standardised approach for measuring counterparty credit risk exposures	2014/04
• Global systemically important banks: updated assessment methodology and the higher loss absorbency requirement • The G-SIB assessment methodology - score calculation	2013/07 2014/11
• A framework for dealing with domestic systemically important banks	2012/10
• Supervisory framework for measuring and controlling large exposures	2014/04

The Basel III framework 2011/06 is a revised version of the Basel III framework published in 2010 and increased the resilience of the banking sector in a two-pillar approach. The first pillar is based on the existing three-pillar approach of Basel II and makes adjustments by strengthening the global capital framework. This is achieved by raising the quality of the capital base, enhancing risk coverage, implementing a leverage ratio, addressing systemic risk, reducing procyclicality and promoting countercyclical buffers. The second pillar of Basel III introduces a global liquidity standard. This will be achieved by implementing a liquidity coverage ratio »LCR« and a net stable funding ratio »NSFR«. In addition there are

published additional explanations and accommodations of the just mentioned leverage ratio in 2014/01, the LCR in 2013/01 with an additional disclosure standard in 2014/03 and the NSFR in 2014/10. There are also published new regulations which are not included in the basic framework, but will nevertheless be represented in the following if there is a relevant connection to project finance. The new framework contains comprehensive transitional arrangements with a step by step integration up to 2019. The incremental integration up to 2019 will not be considered further in the work at hand. Instead, a comparison between the final implemented version of Basel III in 2019 and the framework of Basel II will be made. In order to ensure a measurable differentiation between these two frameworks when dealing with project finance, the focus will be on measurable and quantitative factors. (Basel-Committee, 2011a: para. 7.–48.)

The Basel III framework reveals the weak spots of the global banking system during the financial crisis. The framework traces these weak spots to the Basel II framework and shows how Basel III can prevent such an occurrence with adjustments. A major point of criticism is the insufficient level of high-quality capital. As a preliminary point, the Basel Committee has not been able to increase the MCR of 8%, which has been in effect since 1988. Instead, the key element of the new definition of capital is to increase the highest quality of common equity. A comparison of the capital requirements under Basel II and the new capital requirements under Basel III shows the following graphic. Here with Basel III eliminates the Tier III capital. (Basel-Committee, 2011a: para. 48.)

Table 17: Definition of capital (Source: (Basel-Committee, 2011a: para. 49. and 50.))

Components of capital	
Elements of capital	Total regulatory capital will consist of the sum of the following elements: 1. Tier 1 Capital (going-concern capital) a. Common Equity Tier 1 b. Additional Tier 1 2. Tier 2 Capital (gone-concern capital) For each of the three categories above (1a, 1b and 2) there is a single set of criteria that instruments are required to meet before inclusion in the relevant category.
Limits and minima	• Common Equity Tier 1 must be at least 4.5% of risk-weighted assets at all times. • Tier 1 Capital must be at least 6.0% of risk-weighted assets at all times. • Total Capital (Tier 1 Capital plus Tier 2 Capital) must be at least 8.0% of risk-weighted assets at all times.

A comparison of the total capital requirements of Basel II and Basel III (applicable from 2019) is shown in the following figure:

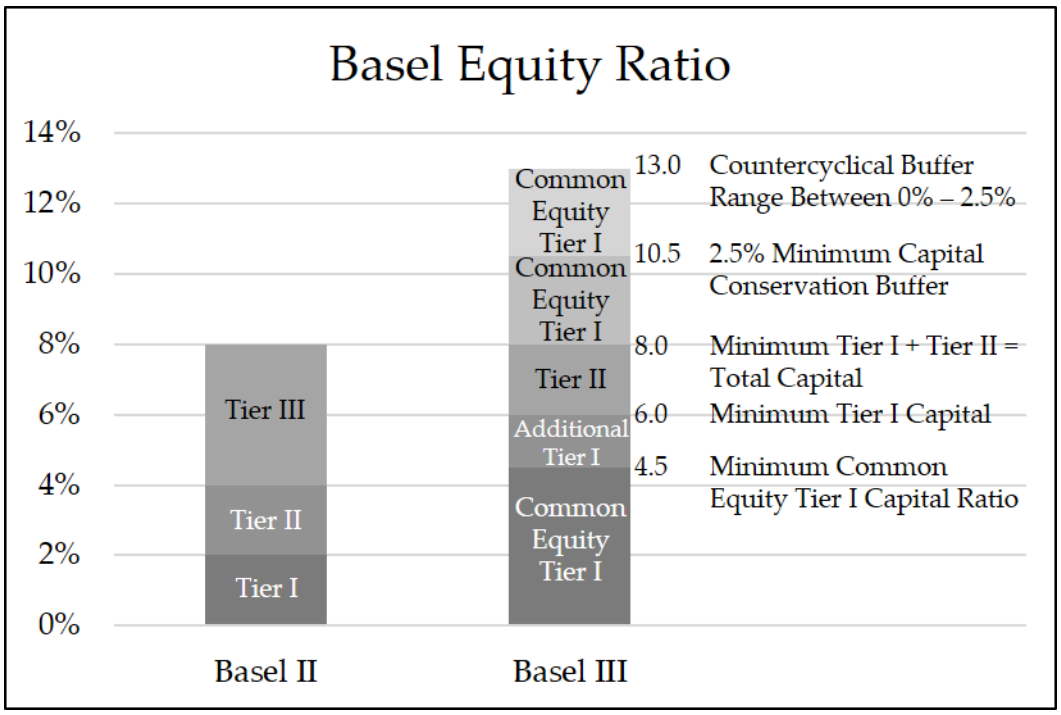


Figure 22: A comparison between the equity ratio of Basel II and Basel III (Source: own representation based on (Basel-Committee, 2006, 2011a)

If the capital requirements as well as the capital buffers are fully in place, then the total capital requirements increase by 5% to a total of 13%. The capital buffers consist of a capital conservation buffer and a countercyclical buffer of 2.5% each. Both are comprised of Common Equity Tier 1 which has to be used first to meet the minimum capital requirements, including the 6% Tier 1 and 8% total capital requirements if necessary, before the remainder can be contributed to the capital conservation buffer. If the capital levels fall within this range, capital distribution constraints will be imposed on a bank. The imposed constraints only relate to distributions, not to the operation of the bank. The countercyclical buffer aims to ensure that the banking sector capital requirements take account of the macro-financial environment in which banks operate and extend the size of the capital conservation buffer. If banks do not meet the requirements they will be subject to restrictions on distributions. The buffer that applies to each bank reflects the geographic composition of its portfolio of credit exposures and is thus tangent to internationally active project finance banks. (Basel-Committee, 2011a: para. 129.–142.)

So far it has to be noted that there is a measurable increase in the total capital above the fraction bar of the MCR formula in contrast to Basel II. Under Basel II the calculation of the RWA and the influence quantities of market risk and operational risk composed the denominator. The formula and the detailed explanations of the RWA calculation of Basel III are based nearly completely on the definition in paragraph 272. of Basel II. In relation to project finance the formula remains unchanged. There is a changed multiplier of 1.25 to the correlation parameter of all exposures to financial institutions. But in the paragraph there is no evidence that financial institutions also have to include MDBs or ECAs. (Basel-Committee, 2011a: para. 102.) Project finance is also not affected by changes related to collaterals like guarantees. (Basel-Committee, 2011a: para. 103.) In addition, in the context of Basel III there are no references or any changing conditions regarding market risk or operational risk. Finally, the impact of Basel III on the MCR in connection with international project finance is only measurable in the numerator and therefore measurable in the quality and quantity of the capital adequacy. Below the effects of the supplement risk-based capital requirement with a leverage ratio will be examined, followed by an analysis of the global liquidity standards starts.

The leverage ratio is intended to reinforce the risk-based requirements with a simple, non-risk based »backstop« measure and to achieve the constraint of the build-up of leverage in the banking sector, thus helping to avoid a destabilisation of the deleveraging processes, because this can damage the broader financial system and the economy. The basis of calculation is the average of the monthly leverage ratio over the quarter based on the definitions of the capital measure and the total exposure measure. Initially the Committee will test a minimum Tier 1 leverage ratio of 3% as of 1st January 2017. The total exposure is limited to 33.3 times the total Tier 1 capital.

$$Lerverage\ ratio = \frac{Tier\ 1\ Capital}{Total\ exposure} \geq 3\%$$

Based on that result the Committee will make final adjustments to the definition and calibration of the leverage ratio in the first half of 2017. Consequently, there is no binding standard which will migrate to a Pillar 1 treatment before 1st January 2018 and thus no reliable calculation basis based on

appropriate review and calibration. Parallel a replacement of Tier 1 Capital to Common Equity Tier 1 is proved. The impact of the leverage ratio on project finance will be investigated in the course of this work only on the basis of guidelines from the observation phase. In addition, only an overall assessment of the lending facilities of banks will be performed and not a project finance-specific assessment. It will be reviewed below whether the liquidity standards allow a measurable assessment of the project finance. (Basel-Committee, 2011a: para. 152.–167., 2014a: para. 11.)

The Liquidity Coverage Ratio »LCR« has to be one of the Basel Committee's key reforms to develop a more resilient banking sector. They argue that the LCR promote the short-term resilience of the liquidity risk profile of banks and improve the banking sector's ability to absorb shocks arising from financial and economic stress, whatever the source, thus reducing the risk of spill-over from the financial sector to the real economy. The liquidity risk is supposed to be prevented "by ensuring that banks have an adequate stock of unencumbered high-quality liquid assets (HQLA) that can be converted easily and immediately in private markets into cash to meet their liquidity needs for a 30 calendar day liquidity stress scenario." (Basel-Committee, 2013a: para. 1.)

$$LCR = \frac{High\ quality\ liquid\ assets}{Total\ net\ cash\ outflows\ over\ 30\ days} \geq 100\%$$

Furthermore, there are additional incentives for banks to fund their activities with more stable sources of funding on an ongoing basis to promote resilience over a longer time horizon. In this the Net Stable Funding Ratio »NSFR« supplements the LCR and has a time horizon of one year. The gradual introduction of the LCR, which began in 2015, will come to an end in 2019 in a manner similar to that of the Basel III capital adequacy requirements. (Basel-Committee, 2013a: para. 5. and 9.) The LCR is used internally by banks to assess the exposure to contingent liquidity events, which are all isolated cases and cannot be compared. The connection between the classical project finance and the LCR is a difficult one. The common long-term lending of project finance is the opposite of the definition of HQLA. Even modern project financing vehicles, e. g. project bonds, which can be traded more

flexibly, do not meet the high requirements of the Level 1 and Level 2 criteria in paragraphs 49.-68. of the LCR standards. Since there is not even a direct connection between the project finance and the »Total net cash outflows over 30 days«, the LCR does not have direct or measurable control on project finance. The indirect influence will be the subject of investigation later on within the scope of the analysis part. The NSFR above all requires a stable funding profile in relation to the composition of their assets and off-balance sheet activities. Furthermore, the NSFR encourages a better assessment of the funding risk across all on and off-balance sheet items, limits overreliance on short-term wholesale funding, and promotes funding stability. (Basel-Committee, 2014b: para. 1.) The NSFR will become a minimum standard by 1st January 2018 and is defined in the framework as follows:

> "The NSFR is defined as the amount of available stable funding relative to the amount of required stable funding. This ratio should be equal to at least 100% on an ongoing basis. "Available stable funding" is defined as the portion of capital and liabilities expected to be reliable over the time horizon considered by the NSFR, which extends to one year. The amount of such stable funding required ("Required stable funding") of a specific institution is a function of the liquidity characteristics and residual maturities of the various assets held by that institution as well as those of its off-balance sheet (OBS) exposures." (Basel-Committee, 2014b: para. 9.)

$$NSFR = \frac{Available\ amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} \geq 100\%$$

Although the exact parameters have still not been finalized, the examination of the NSFR has to be more precise. On the one hand, the exact classification of the assets under the terms of the required amount of stable funding »RASF« has to take place. It has to be taken into account that compared to almost any other financing vehicle, project finance has a period of at least 5 years. On the other hand, even if the project finance bank has an adequate refinancing structure through syndication or the bond market, this structure has to be developed one step further, because the demand for such project finance products predominantly comes from smaller banks without the capacity to take over a direct participation. Those banks generate their profit out of term transformation and, in the future, will be restrained by Basel III. Consequently, the refinancing risk and, consequently, the available amount of stable funding »AASF« has to be monitored up to the final consumer and ultimately leads to a harder price war, lower demand and a credit

crunch. (Hofmann, 2011) Against this backdrop, there will be a detailed description of the classification of the NSFR in order to evaluate such a credit crunch within the scope of the analysis part of this work.

The AASF is measured according to the broad characteristics of the relative stability of an institution's funding sources. The amount of AASF is calculated by first assigning the carrying value of an institution's capital and liabilities to one of five categories as summarised in the table below.(Basel-Committee, 2014b: para. 17.) Multiplied by an AASF factor the amount will be assigned to each category. For long-dated liabilities in connection with project finance, "only the portion of cash flows falling at or beyond the six-month and one-year time horizons should be treated as having an effective residual maturity of six months or more and one year or more, respectively." (Basel-Committee, 2014b: para. 18.)

Table 18: Summary of liability categories and associated AASF factors (Basel-Committee, 2014b: para. 26.)

AASF factor	Components of AASF category
100%	• Total regulatory capital (excluding Tier 2 instruments with residual maturity of less than one year) • Other capital instruments and liabilities with effective residual maturity of one year or more
95%	• Stable non-maturity (demand) deposits and term deposits with residual maturity of less than one year provided by retail and small business customers
90%	• Less stable non-maturity deposits and term deposits with residual maturity of less than one year provided by retail and small business customers
50%	• Funding with residual maturity of less than one year provided by non-financial corporate customers • Operational deposits • Funding with residual maturity of less than one year from sovereigns, PSEs, and multilateral and national development banks • Other funding with residual maturity between six months and less than one year not included in the above categories, including funding provided by central banks and financial institutions
0%	• All other liabilities and equity not included in the above categories, including liabilities without a stated maturity (with a specific treatment for deferred tax liabilities and minority interests) • NSFR derivative liabilities net of NSFR derivative assets if NSFR derivative liabilities are greater than NSFR derivative assets • "Trade date" payables arising from purchases of financial instruments, foreign currencies and commodities

The ARSF is calculated by first assigning the carrying value of an asset to the categories listed in the table below. The amount assigned to each category is then multiplied by its ARSF factor. Assets should be allocated based on their residual maturity or liquidity value. When determining the maturity, it will be assumed that possible options to extend the maturity will be fully exploited. Assets on the balance sheet receive a 100% ARSF factor when they are encumbered for one year or more. (Basel-Committee, 2014b: para. 27.–31.)

Table 19: Summary of asset categories and associated ARSF factors (Basel-Committee, 2014b: para. 44.)

ARSF factor	Components of RSF category
0%	• Coins and banknotes • All central bank reserves • All claims on central banks with residual maturities of less than six months • "Trade date" receivables arising from sales of financial instruments, foreign currencies and commodities
5%	• Unencumbered Level 1 assets, excluding coins, banknotes and central bank reserves
10%	• Unencumbered loans to financial institutions with residual maturities of less than six months, where the loan is secured against Level 1 assets as defined in LCR paragraph 50, and where the bank has the ability to freely rehypothecate the received collateral for the life of the loan
15%	• All other unencumbered loans to financial institutions with residual maturities of less than six months not included in the above categories • Unencumbered Level 2A assets
50%	• Unencumbered Level 2B assets • HQLA encumbered for a period of six months or more and less than one year • Loans to financial institutions and central banks with residual maturities between six months and less than one year • Deposits held at other financial institutions for operational purposes • All other assets not included in the above categories with residual maturity of less than one year, including loans to non-financial corporate clients, loans to retail and small business customers, and loans to sovereigns and PSEs
65%	• Unencumbered residential mortgages with a residual maturity of one year or more and with a risk weight of less than or equal to 35% under the Standardised Approach • Other unencumbered loans not included in the above categories, excluding loans to financial institutions, with a residual maturity of one year or more and with a risk weight of less than or equal to 35%

	under the standardised approach
85%	• Cash, securities or other assets posted as initial margin for derivative contracts and cash or other assets provided to contribute to the default fund of a CCP • Other unencumbered performing loans with risk weights greater than 35% under the standardised approach and residual maturities of one year or more, excluding loans to financial institutions • Unencumbered securities that are not in default and do not qualify as HQLA with a remaining maturity of one year or more and exchange-traded equities • Physical traded commodities, including gold
100%	• All assets that are encumbered for a period of one year or more • NSFR derivative assets net of NSFR derivative liabilities if NSFR derivative assets are greater than NSFR derivative liabilities • 20% of derivative liabilities as calculated according to paragraph 19 • All other assets not included in the above categories, including non-performing loans, loans to financial institutions with a residual maturity of one year or more, non-exchange-traded equities, fixed assets, items deducted from regulatory capital, retained interest, insurance assets, subsidiary interests and defaulted securities

In April 2014 the Basel Committee published »The standardised approach for measuring counterparty credit risk exposures« a new approach for measuring the EAD for counterparty credit risk »SA-CCR«. Both current non-internal models approaches were be replaced by the SA-CCR. This concerns the Current Exposure Method as well as the Standardised Method and thus exclusively the OTC derivatives, the exchange-traded derivatives and the long settlement transactions. The revised conditions will be implemented by the supplementation of paragraphs 84., 186. and Annex 4 of the Basel II framework. Furthermore, paragraph 187 and 187(i) were deleted in their entirety. The revised conditions do not affect the EAD calculation of the project finance business unit. A comparison between the revised paragraphs and the paragraphs used for the EAD calculation under Basel II, (see the section above), shows that there are no points of contact. (Basel-Committee, 2014g) However, the SA-CCR approach was not the first adjustment for OTC derivatives. The Basel Committee presented the »Margin requirements for non-centrally cleared derivatives«, an initiated reform programme to reduce the systemic risk from OTC derivatives in September 2013 and the »Capital

requirements for bank exposures to central counterparties« in April 2004 which is an extension of Annex 4 and at once an addition to the SA-CCR approach. The main focus of these approaches is the reduction of systemic risk and the promotion of central clearing. Both approaches have up to this state of knowledge no influence on the RWA calculation of the project finance business unit. (Basel-Committee, 2013c, 2014c)

The remaining three additional standards must be seen in a coherent context. Firstly, the Global Systemically Important Banks »G-SIB«, published in 2012, is an »updated assessment methodology and the higher loss absorbency requirement« of the original version from November 2011. And secondly, the framework for dealing with Domestic Systemically Important Banks »D-SIB«, published in 2012, is the first principle of transferring the G-SIB onto a domestic level. So far, no updated version of the D-SIB with a reliable assessment basis has been made available. Consequently, the focus is on the G-SIB whereby a description of the G-SIB on a domestic level will be considered later in the analysis part. The G-SIB framework was complemented by a score calculation framework in November 2014. Finally, the »Supervisory framework for measuring and controlling large exposures« uses the G-SIB and D-SIB framework to establish additional protection. (Basel-Committee, 2012a, 2013b, 2014e, 2014f)

The G-SIB framework was not intended to protect the system from the wider spill-over risks, but the framework is based on the negative cross-border externalities created by systemically important banks, which current regulatory policies do not fully address. The methodology is based on an indicator-based measurement approach. Key parameters for this measurement approach are the banks interconnectedness, the size of the bank, the lack of readily available substitutes or financial institution infrastructure for the services they provide, the bank's global activity and complexity. When analysing the relevance for the project finance business unit, the focus will not be on the grouping process of each individual bank, the priority will rather be on the impact of the respective grouping. (Basel-Committee, 2013b: para. 2., 12. and 16.)

As shown in the table below, the magnitude of the higher loss absorbency requirement for the highest populated bucket is 2.5% of risk-weighted assets, with an initially empty top bucket of 3.5% of risk-weighted assets. The top bucket is empty, if this bucket become populated in the future, a new bucket will be added to maintain incentives for banks to avoid becoming more systemically important.

The higher loss absorbency requirement has to be met with Common Equity Tier 1 capital as defined by the Basel III framework. (Basel-Committee, 2013b: para. 46. and 47.)

Table 20: G-SIB Bucket approach (Basel-Committee, 2013b, 2014f)

Bucket	Score range	Higher loss absorbency requirement (common equity as a percentage of risk-weighted assets)
5	D-E	3.5% Common Equity Tier 1
4	C-D	2.5% Common Equity Tier 1
3	B-C	2.0% Common Equity Tier 1
2	A-B	1.5% Common Equity Tier 1
1	Cutoff point–A	1.0% Common Equity Tier 1

The figure below shows the gradual increase in risk-weighted assets with increasing systemic importance.

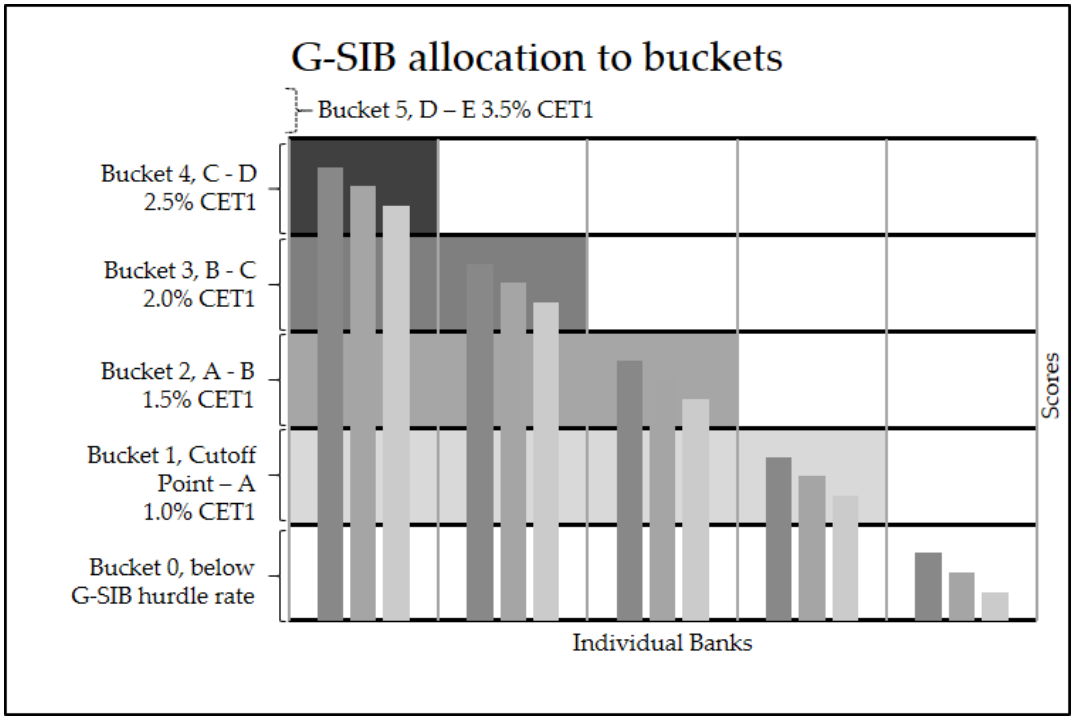


Figure 23: Distribution of G-SIB scores and bucket allocation (Source: own representation based on (Basel-Committee, 2013b: para. Annex 1))

The »Supervisory framework for measuring and controlling large exposures« has been developed after the financial crisis because banks did not always consistently measure, aggregate and control exposures to counterparties across their books and operations. In the event of a sudden counterparty failure the new regulation tool is to limit the maximum loss to a level that does not endanger the bank's solvency. This is not about protecting banks from large losses resulting from the sudden default of a single counterparty or a form of concentration risk as mentioned before. The capital framework needs to be supplemented with a large exposure framework that protects banks from traumatic losses caused by the sudden default of a counterparty to close the gap of microprudential risk from exposures that are large compared to a bank's capital resources. A relatively tighter limit on exposures between global systemically important banks is included in the framework to mitigate the risk of contagion between G-SIBs. For project finance the exposure value must be defined as the accounting value of the exposure, net of specific provisions and value adjustments. (Basel-Committee, 2014e: para. 1.–5. and 32.) There is a difference between the regulatory reporting and the large exposure limit as shown in the following table:

Table 21: Comparison between reporting and limit (Source: own representation based on (Basel-Committee, 2014e: para. 14.,16. and 90.))

Definition of regulatory reporting	Minimum requirement – the large exposure limit
The sum of all exposure values of a bank to a single counterparty or to a group of connected counterparties (…) must be defined as a large exposure if it is equal to or above 10% of the bank's eligible capital base. Banks must report to the supervisor the exposure values before and after application of the credit risk mitigation techniques.	The sum of all the exposure values of a bank to a single counterparty or to a group of connected counterparties must not be higher than 25% of the bank's available eligible capital base at all times. (…) The large exposure limit applied to a G-SIB's exposure to another G-SIB is set at 15% of the eligible capital base (Tier 1).

To prevent a contagion on a state level, the relatively tighter limit on exposures between G-SIBs has to be transferred onto D-SIBs. There is also the danger of the concern about contagion at the jurisdictional level to D-SIBs. The Committee endorsed stricter limits to exposures between D-SIBs and to exposures of smaller banks to G-SIBs. (Basel-Committee, 2014e: para. 91.)

2.5.4 Global regulatory framework and transfer into national law

An important step to measure the impact of the regulatory framework on the financial economy is to analyse a period of the financial economy before and after the implementation of the changed framework conditions. The optimum would be an analysis of a defined period before and a comparable period after the implementation of the Basel III regulatory framework. Because the complete implementation process of Basel III will be finalized until 2019, there is no comparable period after the implementation at this point in time. For that reason, the analysis period will be taken from the ongoing implementation process. The Bank for International Settlements will periodically publish different types of monitoring and progress reports. Initially, the relevant publications, their content and a targeted preparation for a subsequent analysis will be presented in this chapter. As has already been mentioned, the webpage of the Bank for International Settlements enabled filters once again that provide an overview of the latest Basel III implementation publications. The filters to be used are shifted as follows: Topic »Basel III«; Publication type »Implementation«; Publication status »Final«; Year »All«. (Basel-Committee, 2016) After further careful selection, pre-versions and local assessment programmes will be removed. The result, and thus the basis for the further investigation, are the following publications:

Table 22: Monitoring paper (Source: own representation based on (Basel-Committee, 2011b, 2012b, 2015a, 2015c))

Publications	Published
• Ninth progress report on adoption of the Basel regulatory framework • Eighth progress report on adoption of the Basel regulatory framework • … • Progress report on Basel III implementation	2015/10 2015/04 … 2011/10
• Implementation of Basel standards • … • Report to G20 Leaders on Basel III implementation	2015/11 … 2012/06

Both regularly published reports set out the adoption status of Basel III regulatory reforms for each of the 27 Basel Committee on Banking Supervision member jurisdictions. The table below shows an inventory of certain key dates and provides a good overview of the implementation process for a certain period. This inventory also forms the basis for drawing insights on the progress of the project finance sector in the analysis part of this work. Transparency and the consideration of all factors over the monitoring period are highly relevant.

The implementation from year-end 2006 of Basel II by the G20 Leaders proceeded only very slowly. In 2009 the Leaders were re-affirmed to complete the adoption of Basel II by 2011. The table below starts with the record of implementation in October 2001 and shows that the target of the adoption of Basel II has not been reached by all members. (Basel-Committee, 2011b, 2012b) This could be one reason why the Committee started the Regulatory Consistency Assessment Programme (RCAP) in 2011. The RCAP comprises the following three parts: monitoring the progress in adopting Basel III standards, assessing the consistency of national or regional banking regulations with the Basel III standards, and analysing the prudential outcomes that are produced by those regulations. The Committee extends its monitoring of the adoption progress to all Basel III standards, which will become effective by 2019. Within the scope of the latest monitoring report all 27 members have the final risk-based capital rules in place, and all but two members have published final LCR regulations. The next steps will

be the implementation of the leverage ratio, the SIBs framework and the NSFR. (Basel-Committee, 2015a, 2015c)

Table 23: Implementation process (Source: own representation based on Basel-Committee (2015c))

Country	Basel II	Basel III			
		Def. of capital	LCR	LCR*	LR
Argentina	1	4	4	4	4
Australia	4	4	4	4	4
Brazil	4	4	4	4	4
Canada	4	4	4	4	4
China	4	4	4	2	4
European Union	4	4	4	1	4
Hong Kong	4	4	4	4	4
India	4	4	4	4	4
Indonesia	3	4	2	2	2
Japan	4	4	4	4	4
Korea	4	4	4	4	4
Mexico	4	4	4	4	1
Russia	1;4	4	2	2	1
Saudi Arabia	4	4	4	4	4
Singapore	4	4	4	1	4
South Africa	4	4	4	4	4
Switzerland	4	4	4	4	4
Turkey	4	4	4	3	3
United States	4	4	4	1	4

○ adoption completed
◌ adoption in process
● no adoption

1 = draft regulation not published
2 = draft regulation published
3 = final rule published
4 = final rule in force

3 EMPIRICAL RESEARCH STRATEGY

3.1 HYPOTHESES

Research processes are generally based on existing knowledge and want to extend this with new knowledge. Research goals and hypotheses are based on preliminary theoretical considerations and existing knowledge. These considerations are based on the principle of the theory-based approach, which builds on the previous academic experience and continues with the aim of cognitive progress. (Gläser, Laudel, 2010; Mayring, 2002) The modified legal framework conditions of Basel III and the gained knowledge have to be organised in a next step. This gained knowledge has to support the following empirical study as best as it can. (Gläser, Laudel, 2010) In this chapter the hypotheses serve to structure the previous knowledge. Hypotheses transfer presumptions of an existing state of affairs into a scientific context. (Diekmann, 2008) First of all it is important to make a clear division between a general assumption and a scientific hypothesis. Scientific hypotheses implement the following four criteria:

1. Scientific hypotheses are assumptions about real facts and circumstances with an empirical content or an empirical study.
2. A scientific hypothesis must be transmitted at least in the formal structure of a conditional clause.
3. The possibility must exist that the conditional clause is falsifiable by experience data. Otherwise the hypothesis would be a tautology and consequently not a scientific hypothesis.
4. Apart from the individual case, scientific hypotheses show a generalizability or a degree of generality.

General assumptions:

On account of a huge number of changes of the economic and legal framework conditions, classic project financing finds itself at a crossroads. The financial crisis and, as a result, the stricter requirements of Basel III to the granting of credit have rendered the financing of projects more and more complicated, especially in view of the changed willingness of the banks to take risks. The legal and regulatory framework conditions have also become more complex in the project financing business segment. That is why it has to be feared, for example,

that the Basel III equity depositing regulations for risk-carrying credit will be tightened and, as a consequence, entire projects may be doomed to fail because of the increased cost structure for investors. Nevertheless, in spite of changed basic conditions, it is to be expected that there will be a demand for suitable financing opportunities in the area of the financing of major, capital-intensive projects. Insurance companies and other institutional investors also face massive problems with regard to the long-term investment of assets at favourable risk conditions and ROI terms (e.g. the reflection of guaranteed interests of life insurances). One of the central questions to be answered is whether the classic project financing models can still be used in the future and whether there are possibilities / potentials for the advancement of project financing.

Hypotheses:

- The increase in capital costs resulting from regulation renders the implementation of large projects within the scope of project finance more difficult.
- With a downturn in demand or declining profitability, project finance is losing its relative appeal in the orientation of the banks' business policy.
- Project finance has to be complemented by other forms of financing, or replaced, to financially ensure the realization of large projects also for the long-term.

Conditional clauses:

- If the capital costs from regulation increase, then the implementation of large projects within the scope of project finance is rendered more difficult.
- If there is a downturn in demand or declining profitability, then project finance will lose its relative appeal in the orientation of the banks' business policy.
- If project finance is being complemented or replaced by other forms of financing, then the realization of large projects will also be financially ensured for the long-term.

Falsifiability

- The increase in capital costs resulting from regulation can be compensated by a strong economy. Then the implementation of large projects within the

scope of project finance can increase.

- In an adjusted banking market with a reduced number of project finance banks, the number of projects per bank and the banks' financial commitment per project can increase. In this case a downturn in demand or declining profitability can cause project finance to win its relative appeal in the orientation of the remaining banks' business policy.
- Project finance does not have to be complemented or replaced by other forms of financing, in order to ensure the financial realization of large projects also for the long-term.

The first interim result of the hypotheses examination is the realization that the presented hypotheses are scientific hypotheses. The general assumptions have shown real facts with an empirical content. The impact of the framework regulations on an individual case can be generalized for the whole business unit of project finance. The presented hypotheses can be transferred into a formal structure of conditional clauses and can be falsified with experience data. The second interim result of the hypotheses examination is to verify the resilience and the validity of the respective hypothesis. This is a much more extensive assignment than to confirm a hypothesis to be scientific.

For conjunctive extensions of the 'if-part' with 'and' the information content decreases and for disjunctive extensions with 'or' the information content increases. The variable belonging to the 'if-part' of a hypothesis is referred to as the independent variable 'X'. The variable belonging to the 'then -part' of a hypothesis is referred to as the dependent variable 'Y'. A scientific hypothesis maintains a more or less precise relationship between two or more variables that will apply to a particular population of comparable events. The following figure exemplifies the transmission of independent and dependent variables on the example of project finance. Hypotheses are probability statements. They cannot be refuted through evidence of individual counterexamples. Otherwise, hypotheses cannot be confirmed by the evidence of all positive examples. Because of their degree of generality all ever existing cases have to be investigated, which is practically impossible. Specific criteria have to be established for the examination of the hypothesis, because neither falsification nor verification is possible. (Diekmann, 2008; Döring, Bortz, 2014)

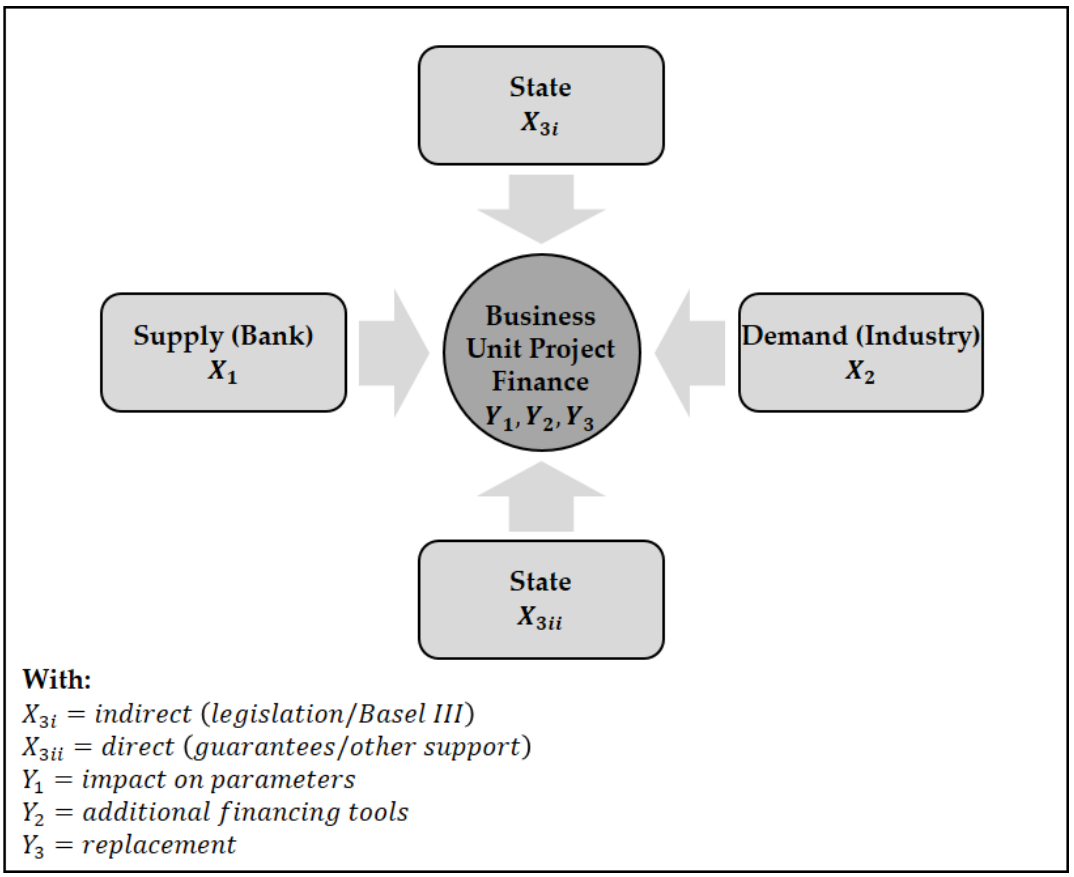


Figure 24: Assignment of variables on the If-Then-Part (Source: own representation)

In a further step, the hypotheses must be examined by means of heuristics on causalities. The empirical evidence of a relationship between independent and dependent variables is not sufficient evidence of a causal effect on the dependent variables by independent variables. Monocausal explanations attribute the variability of the dependent variable on an independent variable, while multi-causal explanations use several effective factors. In a hypothetical if-then sentence there is a causal hypothesis when an interchanging if-part (condition, cause) and then-part (consequence, effect) are not meaningful with regard to language and content. Confounding variables refer to all factors influencing the dependent variable that cannot be considered in an investigation. (Döring, Bortz, 2014)

Interchanging conditional clauses:

- If the implementation of large projects within the scope of project finance renders more difficult, then the capital costs increase from regulation.
- If project finance is losing its relative appeal in the orientation of the banks' business policy, then there is a downturn in demand or declining profitability.
- If the realization of large projects also for the long-term is financially ensured, then project finance is being complemented by other forms of financing, or replaced.

The above-mentioned interchanged conditional clauses are not meaningful in regard to language and content and the figure above illustrates the use of several effective factors ($X_1, X_2, ...$). Another interim result that has to be noted is, firstly, that the presented hypotheses are multi-causal explanations and, secondly, that there is a causal coherence with the respective hypothesis. Therefore, the presented hypotheses are multi-causal-hypotheses. Confounding variables which influence the dependent variable are not known at this time.

Theories have the function to describe, explain and predict situations. In essence, there are sociological theories of a network of well-established hypotheses or accepted empirical regularities. Within the scope of a deductive-nomological approach a special statement is derived from a general theory. Predictions or statements obtained this way have to be verified by using empirical studies. The value of a deductive-nomological explanation depends on how well the underlying theory is empirically confirmed. Verification is supposed to demonstrate the validity of a hypothesis or theory. The verification of universal statements about populations is logically impossible through random sampling. A hypothesis is the starting point of an empirical investigation in deductive procedure. (Hempel, Oppenheim, 1948)

The exploration above has already been adapted to the present work and the developed scientific hypotheses. The developed scientific hypotheses are the starting point of an empirical investigation and, as result, the investigation follows the deductive-nomological approach. Furthermore, the result is still unknown which is a distinctive attribute of a deductive-nomological approach. The critical factor is the outstanding result after the introduction of Basel III in 2019. In addition, Basel III will be implemented gradually. Therefore, there is no historical data material after the implementation of Basel III and thus no reliable basis for a

quantitative analysis method. Whether a hypothesis is confirmed or refuted, is to a certain extent clearly visible in a quantitative social research method. The qualitative research method hardly achieves a statistically representative sample size because of their numerically inferior character. However, to achieve a representative and valid result, it is important to build the case study by exactly applying a recognized qualitative empirical social research method. In this case, it is possible to use influencing factors for structuring the prior knowledge. Influencing factors describe relevant subject areas and their connection and dimensions but their consequence is still unclear. (Gläser, Laudel, 2010) The implementation is based on the considerations of the influencing factors in chapter 2 and has a high complexity and dynamic. For stabilization of the hypotheses and the structuring of the Guide, the influencing factors need to be further consolidated and structured. This further exploration follows the example of Popper (1935) and the transfer of hypotheses in Explanans and Explanandum.

Table 24: Exploration in accord with Popper (1935)

Explanans: The regulatory induced increase of costs by Basel III $C1$ reduced the relative appeal of traditional project financing $C2$. • $C1$ The increase of costs by Basel III. • $C2$ The reduction of the relative appeal of the traditional project financing. ○ The relative appeal includes increasing project financing costs $C2_i$, a more difficult implementation of major projects $C2_{ii}$, a decline in demand $C2_{iii}$, a fall in profitability on the sponsors side as well as for the banks $C2_{iiii}$.
Explanandum: The traditional project finance has to be complemented by other forms of financing, or replaced.

The further consolidation and structuring of the influencing factors permits the transformation of the hypotheses into a case study which enables a recognized qualitative empirical social research method. Research question and research

interest support the empirical study and its evaluation. The case study research method is presented in detail in the next chapter.

3.2 EMPIRICAL CASE STUDY RESEARCH METHOD

Based on the formulated epistemological foundations in chapter 2, the next step is to clarify the methodological access, which means the research strategy. While methods denote concrete procedures of data collection and data analysis, the methodology describes the paradigm-conducted approach to an object of investigation. Under certain circumstances, different methodologies can use the same methods of data collection. However, depending on the underlying epistemology the obtained data will be assigned with a different epistemological status. Methodology forms the context of abstract epistemological or scientific theoretical foundations and concrete approaches to the subject matter and the interpretation of empirical data. (Lamnek, 2005; Travers, 2001)

3.2.1 Case study research

The case study is not a research method in the strict sense, but describes a strategy for the planning and structuring of empirical studies. Within the scope of the case study research the literature generates different views. Yin (2014) considers case study research as a comprehensive research approach that includes all aspects of a research project, from the formulation of the question about dealing with theory, to the methods of data collection and analysis. For Yin, case study research is on a level with experimental and historical approaches and distinguishes the different kinds of approaches. Given the enormous number of variants that are associated with case studies (from the individual to the whole nation), in the following the view is shared that case study research itself does not specify methodological design but provides the framework within which a variety of methodological approaches can be used. The definition of a case study as a research object provides the setting of examination units, the selection of relevant data sources and collection methods as well as the evaluation and presentation of results. (Lamnek, 2005) The fact that correlations of collected data and gained knowledge are composed, sorted and condensed is the essential feature of a case study. (Punch, 2013) Case studies are not limited to a particular type of data

collection and analysis, e. g. the qualitative or quantitative approach, but provide a framework for the organization of empirical research, which can be "filled" with different empirical methods of knowledge acquisition.

3.2.1.1 Requirements of a case

In contrast to other research strategies, case study research is not particularly concerned with isolating individual variables and aggregating data from many cases. Rather, social phenomena are to be considered within their real contexts. The unit »case« denotes the demarcation of the context in which a particular phenomenon is to be investigated. The scope of a case therefore varies widely and ranges from an individual or a family to large organizations. Even countries may be considered as cases (especially in political sciences). (Gillham, 2000; Punch, 2013) Yin (2014) summarises the characteristics of case studies in a definition, where initially the scope of a case study is defined in the research:

„A case study is an empirical inquiry that

- investigates a contemporary phenomenon within its real-life context, especially when
- the boundaries between phenomenon and context are not clearly evident“ (Yin, 2014)

The contemporary relevance demonstrates that it is not about the reconstruction of historical developments, but the case is considered as a functioning unit in the here and now. (Stake, 1995) The particular case that has been selected and defined has a significant impact on the expected findings. Accordingly, a clear and well-defined distinction is of very high importance.

The present empirical study has already been classified as a qualitative case within the scope of the hypotheses testing. This is mainly due to the inadequate data quality for conducting a quantitative analysis. The different types of data material also determine the different types of the case study components. However, initially more basic conditions have to be clarified for the case study design before the individual methods of data collection and data evaluation are applied.

Many research strategies (e.g. experimental designs or quantitative questionnaire studies) try to control context factors in order to obtain an isolated view of the effects of an individual factor (independent variables) on a phenomenon. A typical example is the laboratory experiment that tries to explain the cause-effect relationship in a preferably context-independent and general-purpose way. In contrast, the case study research selects an open access. First within the scope of the analysis of the empirical material, the relevant elements and relationships are collected for an investigation of the case. Such a holistic view is typical of the cultural perspective on social contexts. Here, relationships rarely appear linear but often are rather mutual or circular. (Yin, 2014)

Starting from this basic orientation of case study research, Yin (2014) expanded his definition by research strategic guidelines for the conduction of case studies:

„The case study inquiry

- copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result
- benefits from the prior development of theoretical propositions to guide data collection and analysis.“ (Yin, 2014)

These statements can be made for designing the case study more concrete. With the aim of a holistic, contextual study of phenomena, a high quality of the obtained data has to be ensured. Quantitative methods normally require valid and reliable data for each to be examined variable. As already mentioned, due to the progressive implementation process, no reliable data corresponding to a representative sample size can be collected. To achieve the required holistic understanding of a case, it is necessary to shed light on a phenomenon within the case from two different perspectives and preferably have recourse to different data sources. (Lamnek, 2005; Stake, 1995) This triangulation (Denzin, 1973; Yin, 2014) of individual and independent data sources is one of the most important strategies to increase the quality of interpretive or qualitative research. (Leech, Onwuegbuzie, 2007) The concept of triangulation means that a research subject is viewed from (at least) two points. In general, the consideration of two and more points of view is realised by the use of different methodological approaches. (Flick, 2011) Different strategies are available: a combination of different elicitation methods (methods-

triangulation); the use of different evaluation methods for the analysis of data obtained; the interpretation of data by multiple researchers, experts or discussions of interpretations in the context of the researched case ("member checking" with the expertise of people within a practical context). (Leech, Onwuegbuzie, 2007; Stake, 1995)

When transferred to project finance, the design of the case study has to be based on multiple data sources accordingly. A solid data foundation creates an image of the project finance market with all projects up to the recent past. Another data foundation represents a calculation of a standardised project with average key figures that can be compared once the regulations of Basel II, and even the 2019 Basel III regulations have been fully converted. Moreover, the gradual implementation already offers first reactions of the market, which have been recognized and interpreted in the literature. Here, a literature review is also a possible data foundation. Based on these three different data sources a triangulation strategy can be developed for project finance. A closer description of the triangulation strategy is carried out within the scope of the methodological approach.

The extent to which theoretically the analysis can be influenced by the social phenomena of the researcher is an important point of discussion, especially in qualitative research. The widespread approach of the subject-related theory, better known as the grounded theory assumes that social reality can only be understood from within itself. (Glaser et al., 1968) The researchers have to conduct the investigation without priori theoretical considerations, if possible. Since such a tabula rasa situation is actually difficult to achieve, there are good arguments for the development of theoretical considerations ahead of an empirical analysis. The reference to existing scientific knowledge helps to focus the investigation and to reduce the complexity of the reality. ”The complete research design embodies a 'theory' of what is being studied. … the simple goal is to have a sufficient blueprint for your study, and this requires theoretical propositions, usefully noted by two authors as 'a [hypothetical] story about why acts, events, structure, and thoughts occur'“ (Sutton, Staw, 1995) Such a "blueprint" will be developed with the help of experts. The concomitant expertise is to contribute to the validation of the results and will therefore only be performed after the data analysis. The scientific requirements for qualitative expert interviews are described in detail in the later stages.

3.2.1.2 Case studies and generalizability

One of the main characteristics of case study research is its realism. The uniqueness, the individuality, the isolatedness, as well as the holistic reminiscent strongly of our daily lives, in which never aggregated data or individual variables occur, but perceiving acting individuals in a specific manner. Likewise this is an apparent weakness of this research strategy: The difficulty to generate general knowledge out of one or a few cases. However, case studies, despite being holistic and individual, seek to provide a degree of abstraction and generalization for their findings. The ultimate aim is to work out what is typical of a particular case in the form of regularities. The case study in the qualitative paradigm seeks a scientific reconstruction of patterns of action on the basis of mundane and real actions. Here, the researchers try to convert these actions into a scientific discourse and to identify patterns of action based on suspected general regularities. The objective is to identify specific patterns of action that make it possible to understand and classify individual actions. (Lamnek, 2005; Stake, 1995; Yin, 2014) Yin (2014) describes this approach as an analytic generalization and contrasts it with a statistical generalization. Statistical generalizations based on the aggregation of data on a large number of cases. Generalization means to hide the specific characteristics of each case, in order to gain insights that apply across contexts. In contrast, analytical generalization mean to develop a theoretical framework that makes it possible to understand the analysed patterns of action in their entirety free of contradictions. Unlike statistical generalizations, such theories contain information on contextual conditions. Case-specific features that are considered in the statistical generalization as confounding, are considered here as valuable additional information for a better understanding of the studied behavioural patterns. (Yin, 2014) Essentially, the degree of generalization of case studies depends on the objective and the design of the study. In this context, intrinsic, instrumental and collective case studies can be distinguished. (Punch, 2013; Stake, 1995)

An intrinsic case study focuses on a particular case. The investigation of this particular case is an end in itself and is not used to answer a parent issue. An intrinsic case study is represented by field research – the calculation of a standardised project with average key figures that can be compared once the regulations of Basel II, and even the 2019 Basel III regulations have been fully converted. This case alone cannot answer the research question. Generalizations usually take place within the individual case. This means, the identification of patterns of action contributes to a better understanding of the case. A generalisation

about the case-boundaries is not desired. However, this means there is no exclusion of subsequent generalization in comparison to the additional evaluation methods.

An instrumental case study follows an overarching research interest. Here, a case will be examined, because it is expected that it will contribute to answering the research question. The historical data analysis is an instrumental case study where the interest of an individual case is instrumental because a question is to be followed that does not directly concern the investigated case. However, the findings are not focused on developments in the past, but on identifying possible consequences in the future.

In a collective case study, the analysis of the particular case serves as an answer to a superordinate research question. The study of several selected cases expands the data base and allows to make generalizations about several cases. The literature review is a collective case study. An important source of information are primarily comparisons and contrasts of analysed cases, also known as cross-case analysis.(Stake, 1995; Yin, 2014)

Thus, the case study concept is based on a broad data collection for the empirical investigation of the project finance business unit. First it is important to examine the individual methods separately, strictly according to the regulations of the survey method. Only after the individual survey methods, the respective results may be linked. A comparative analysis of the cases studies has to make it possible to identify similarities and differences and to understand their respective causes. Therewith, the instrumental character of the study is clear: The selected cases are studied, because they can contribute to answering the superordinate research question.

3.2.1.3 Selection of cases

The selection of cases to be examined has a very high importance in case study research. While quantitative projects preferably use a selection of a representative sample-size from a population, individual cases are selected because of their special characteristics.

3.2.1.3.1 Theoretical sampling

In this work the case selection is done on the basis of theoretical considerations with the aim to find a case that can make the theoretical concepts of the researcher more complex, sophisticated and profound. (Brüsemeister, 2008; Lamnek, 2005) Such theoretical or purposeful sampling is done with a focus on

- the target of investigation
- the theoretical assumptions with regard to the hypotheses and
- the characteristics of the cases related to the disposition. (Flick, 2007; Patton, 2005; Yin, 2014)

Case study research usually requires an intensive examination of the researched field which, in turn, requires the accessibility of data, such as the possibility to access documents, contact experts or carry out observations. (Stake, 1995) In general, an iterative procedure is recommended in the selection of cases: Based on the analysis of the first case, the criteria for the other cases to be examined are determined. (Lamnek, 2005; Stake, 1995) When selecting the initial case a number of different sampling strategies possible. If the decision has been made in favour of a typical case, the case is representative of a large population because of its characteristics particular. However, such a choice does not showing the strengths of a case study. (Patton, 2005; Stake, 1995)

The present work does the same. Initially the first case of the case study has a high comparability with a conventional project and the calculation approach based on the regulatory framework. This case is representative within the scope of a qualitative approach. Beyond, this particular case supports the research question only moderately, but the case helps to understand the mechanisms and provides a contribution to the case study in its entirety.

3.2.1.3.2 Iterative, explorative approach

The selection of other cases can also proceed differently. Kleining, Witt (2001) basically plead for maximum structural variation of the cases in the qualitative research process. The research question is to be divided into relevant dimensions, according to which the cases are individually selected and adjusted. The sample is combined so that all possible variations are covered. The analysis of the data should always be focused on similarities. The development of regularities and patterns

over several different (contrasting) cases should increase the transparency of the interpretation of the researcher. The selection of the cases according to the principle of structural variation is thus a form of triangulation, while the investigated phenomenon is considered in different contexts. The following figure illustrates the process of targeted case selection. Each case contrasts the previously obtained (theoretical and empirical) knowledge, and enables further expansion of the understanding of the problem. With each case expands the understanding of the research subject. (Kleining, Witt, 2001)

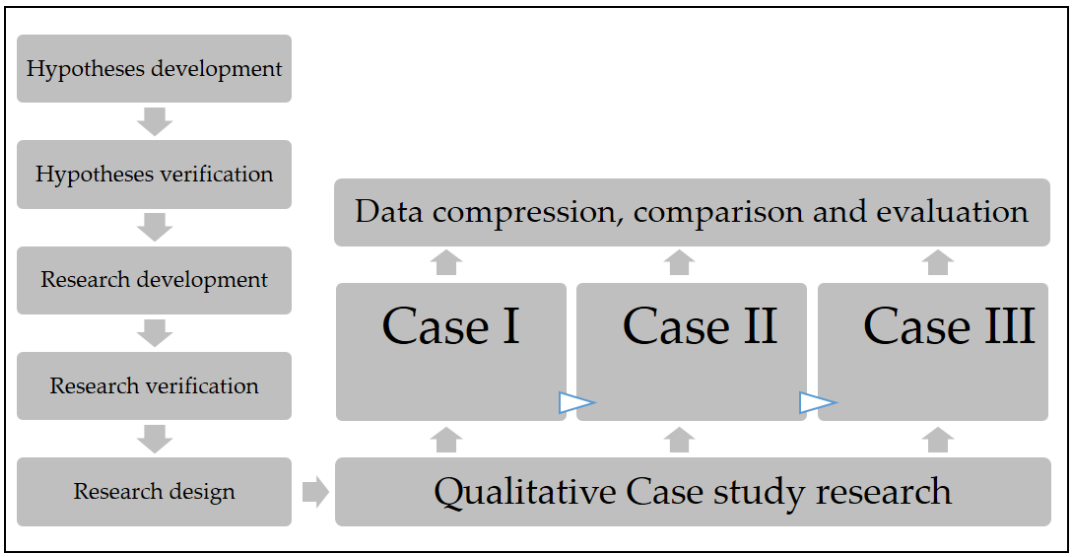


Figure 25: Research development (Source: own representation)

As shown in the figure above, the cross-case analysis accompanies the research process. Here, the respective individual case is abstracted and the evidence will be placed in a larger context. Especially in this step of the analysis process the focus has to be on the identification of general patterns of action and a context-comprehensive understanding.

3.2.1.4 Data collection

As mentioned before, there is not *the* one method in case study research. Rather different survey and analysis strategies are used in order to understand the phenomenon in the case context. For the purpose of triangulation the access on multiple data sources is recommended. (Flick, 2011; Stake, 1995; Yin, 2014) Basically, the methods for data collection in case studies are freely combinable. A

criterion for the selection of a method is its contribution to the understanding of the case. However, the most common survey methods are observations, document analysis and individual and group interviews. (Stake, 1995; Yin, 2014) A combination of qualitative and quantitative methods in the context of case studies has become increasingly popular is. (Hunter, Brewer, 2003; Johnson, Onwuegbuzie, 2004; Onwuegbuzie, Leech, 2006; Onwuegbuzie et al., 2009) An important criterion for the compatibility of data collection methods is their epistemological compatibility. The literature discusses this aspect in detail and tags it as a problem area of triangulation. Each method explores the object for itself in its specific way. As a consequence, the combination of quantitative and qualitative methods cannot assume that the respective approach will bring the same results. (Flick, 2011) According to this problem it has to be checked how exactly the method affects the findings (Reactivity) and whether different data sources allow a common interpretation (Incommensurability and incompatibility of methodological approaches). Finally, for the selection of the survey methods, as with the determination of the examined cases, the access to the field and the matching of the research interest play an important role.

3.2.1.5 Data analysis

A common feature of all the qualitative methods is the interpretive approach within the evaluation of generated data. Methodically coordinated, scientific understanding requires a classification of statements or actions into the respective contexts within their origin. The interpretive researcher asks about the meaning of a statement or action in the context of the survey situation. Interpreting is to correlate the elicitation data and the research interest. A variety of methods and techniques exists for the interpretive analysis of the compiled data material. These are used depending on the aim of the evaluation. (Lamnek, 2005) Stake (1995) distinguish roughly between direct interpretation and aggregation categories.

Direct interpretation means to interpret an event or manifestation in the immediate context of the action. This makes sense especially in particularly important or critical events, which as unique events are important for the understanding of a case.

Within the scope of the aggregation, methods for evaluating qualitative data are employed, which abstract from an immediate statement or a concrete

individual action. The data material is grouped into units of meaning and then categorized. (Stake, 1995) The ever more abstract interpretation is typical of the approach of the grounded theory. Based on the data material complete theories are developed about a subject area. How the categorization works in detail and which category systems are used, largely dependents on the advancement of knowledge and the underlying theoretical concepts. (Glaser et al., 1968)

3.2.2 Quality criteria of scientific case studies

The discussion about the scientific quality of case studies has a long tradition. (Flyvbjerg, 2006) Essentially, the question is asked under which circumstances case studies provide results that meet the demands of scientific knowledge and differ from unreflective stories. The methodological control of the research process and the acquisition of knowledge are criticized. (Diefenbach, 2009; Gibbert, Ruigrok, 2010; Gibbert et al., 2008) The discussion on the scientific quality of case study research is due to different paradigmatic approaches and contrarian research understanding: Traditional research of critical rationalism is based on the possibility of objective knowledge and on standardised research methods. Such objectivist approaches usually prefer quantitative methods. (Johnson, Onwuegbuzie, 2004; Onwuegbuzie et al., 2009) From this perspective, case studies are primarily problematic because of their open approach and the very wide data access. Especially, the alleged arbitrariness in data collection and interpretation is criticized. (Diefenbach, 2009; Flyvbjerg, 2006) Researchers in the tradition of subjectively oriented qualitative research contradict such allegations and point out that time and context-independent generalizations seem to be neither possible nor desirable. The subjectivity of the researcher is inevitably part of any research. (Johnson, Onwuegbuzie, 2004)

3.2.2.1 Compatibility of different epistemological approaches on the practical research level

Instead of continuing this traditional paradigm dispute, there have recently been increased efforts to overcome the contradictions of both positions. The respective methodological approaches are not to be understood as mutually exclusive opposites but as complementary approaches with specific strengths and

weaknesses. (Johnson, Onwuegbuzie, 2004; Onwuegbuzie et al., 2009) The objective is to identify and to combine connection-oriented concepts within the different paradigmatic approaches so that the ambitious research goals and questions can be answered satisfactorily if possible. As a quality criterion the critical rationalism-oriented objectivist approaches offers the advantage, with the criteria of validity and reliability, of having developed a clear and generally accepted quality standard. The qualitative research also has proven methods, but the applicable performance criteria are much less standardised and particularly in the field of research practice often only superficially described. (Onwuegbuzie, Leech, 2006) Diefenbach (2009; 2010) try to transfer the standards of validity and reliability onto the case study research and to develop concrete strategies for their research practice. These authors do not need the concepts of validity and reliability in terms of quantitative and statistical research understanding, but instead apply these concepts to the more qualitatively-oriented case study methodology. The proposed strategies for ensuring the validity and reliability transform what is referred to under the subjectivist approach of constructivism as the intersubjective traceability of the research process. In this case the epistemological opposites dissipate, when the problem of the quality of a scientific case study is considered at the level of practical research implementation. In this sense, the concepts of validity and reliability are taken from Gibbert, Ruigrok (2010; 2008), where these terms are understood as aspects of intersubjective traceability of the research process.

3.2.2.2 Strategies for the execution of high-quality case studies

The quality of a research project can be determined by the following four key criteria: the internal, external and construct validity as well as the reliability of the research project. (Gibbert, Ruigrok, 2010; Gibbert et al., 2008; Onwuegbuzie, Leech, 2006)

Internal validity requires the logical connection between the examined variables and collected data or their interpretation. This criterion especially concerns the phase of data analysis. “The single main challenge for qualitative researchers wishing to ensure validity is to convince themselves (and their audience) that their findings are genuinely based on critical investigation of all their data and do not depend on a few well-chosen examples” (Gibbert, Ruigrok, 2010) In accordance with this requirement methods for data analysis must be used, which enable a stringent connection between the theoretical construct, the examined

variables and empirical data. In the present research project this request is taken into account with the selection of the analysis method. The condition that the internal validity can be guaranteed, have already fulfilled during the design phase of the research process. First, a consistent theoretical framework is necessary, in which the variables to be examined are clearly determined and positioned in relation to each other. (Gibbert et al., 2008) This requirement is met in this project in several ways:

First, chapter 2 "General conditions of project finance" establishes a theoretical framework which clarifies how the various elements examined in the practice (structural and material aspects as well as actors on different levels) are connected to each other and what action relationships is assumed.

Second, chapter 3, enables the identification of relevant variables related to the research problem with a comprehensive hypotheses investigation. In terms of a theory-triangulation not just one theoretical explanation model was used, but rather three different perspectives for the investigation of project finance which were combined in order to determine the relevant variables. Input on the systematisation of the empirical data is already in the theoretical foundations of the research an input to and the data analysis is closely linked to the theoretical construct of the project finance.

Construct validity shows the ability of empirical methods to detect those aspects of reality the researchers seek to capture. (Gibbert, Ruigrok, 2010; Gibbert et al., 2008) To fulfill this criterion, several strategies are suggested. The first is method triangulation, which has already been discussed. Accordingly, various collection methods and data sources are to be used to obtain knowledge about a target variable. The triangulation methods used in this work are performed in the “Resulting research design". Strategies to improve the construct validity within the different methods will also be described.

Reliability shows the transparency and reproducibility of the cognitive process. Other people than the researchers themselves should come to similar conclusions when they review the research process. To meet this demand in qualitative research, a detailed and comprehensible documentation of the research process is necessary. The following measures make it easier to reconstruct the research process retrospectively or to replicate it: The application of case studies protocols with records of the procedure of the case study in parallel with the

research process and the used data should be stored in a case study database. (Gibbert, Ruigrok, 2010) In the present work, such a documentation will be produced and stored in digital form. Moreover, it has to be ensured that the researcher's interpretation steps during the data analysis are made as transparent as possible. Accordingly, in connection with the presentation of case studies, in addition to highly abstracted concepts concrete data material always has to be presented too (Excerpts of interviews, excerpts of documents, etc.). The table below summarises the described quality criteria for scientific case studies and identifies the strategies for compliance that have been applied in the present study. Gibbert et al. (2008) emphasize the hierarchical relationship of the quality criteria set: Internal and construct validity, so the consistency of the underlying theoretical construct and the empirical research designs are an essential condition for external validity. He further complains that the first two criteria of validity often do not get sufficient attention in publications

Table 25: Validity and reliability of the case study (Source: own representation)

Criteria	Transfer within this work
Internal validity	Case I
External validity	Case II; Case III
Construct validity	Case-cross-border analysis
Reliability	Expert interviews

External validity refers to the generalizability of the results beyond the investigated individual case. This point has also been mentioned above, with the principle of the analytical generalization in contrast to the statistical generalization in quantitative work. In the present case study, the abstraction from the individual case is possible due to the fact that not just one, but three cases are studied. The selection of the respective cases considers a possible systematic and theory-based variation of the relevant structural features. The results of the three cases are collected, compressed and linked. Furthermore, this inquiry is checked again with the help of expert interviews on external validity within the scope of a fourth case. In addition, the characteristics of the four individual cases are described in detail in order to make the respective observations and conclusions understandable. Moreover it should be noted that the present research project basically does not determine universally valid cause-effect relationships in project financing. Rather, the aim is to identify risks from regulatory influences on project finance at an early

stage, to interpret their scope of consequences and to prevent a possible credit crunch with alternative solutions.

3.2.2.3 Open design decisions

This section describes the basic principles of the applied research designs. The establishing of concrete decisions within the practical case regarding the selection of the examined cases, the employed survey methods and the evaluation strategies still remain to be completed. As already explained, these decisions crucially depend on the theoretical considerations, the hypotheses as well as on the underlying concepts and constructs. In the following section the research design is transferred concretely onto the object of investigation. Because of the dynamic within the research process, the research design of the individual case will ultimately be determined only within the part of the research process. Therefore, a comprehensive explanation of the individual decisions inside the case is of high relevance.

3.3 RESULTING RESEARCH DESIGN AND SELECTION OF APPROPRIATE CASES

In addition to the epistemological foundations in the second part of this work also the principles of case study research will be discussed in detail. As part of the case study design three major design decisions have not yet been made: The criteria-based selection of appropriate cases, the description of the respective data collection methods and an appropriate evaluation method. Along these three decisions, the final research design will be developed below.

As already illustrated, the selection of the cases to be examined will not be based on a random selection, but on the principle of theoretical or targeted sampling. (Flick, 2007; Lamnek, 2005; Patton, 2005) Criteria are to be formulated for the case selection with a view to

- the investigation objective
- the theoretical assumptions regarding the to be examined phenomenon and
- the characteristics to be subject of negotiation cases in comparison with

research practical considerations. (Yin, 2014)

First of all, there are several objectives to be investigated in this work. These were sufficiently verified by means of hypotheses development and hypotheses verification in chapter 3.1.

The first objective is the definition of the influence of Basel III on the project finance business unit. To answer this question, a laboratory experiment could provide clear results with a sample of a ceteris paribus project finance market before and after the implementation of Basel III, respectively. Firstly, there is no sample of the project finance market after the implementation of Basel III and secondly, a ceteris paribus sample, free from external economic influences, is unrealistic and not realizable.

The second objective is the assessment of the profitability of the project finance business unit and the examination whether project finance is losing its relative appeal in the orientation of the banks' business policy. The required parameters must be able to provide information on the profitability of the entire project finance business unit before and after the implementation of Basel III. The parameters required for this investigation cannot be evaluated under ceteris paribus conditions. In addition, profitability requirements of banks and the price elasticity of demand must be known.

Within the third objective, other forms of financing have to be found to complement or replace project finance. This is the all or nothing question and altogether too vague and speculative and will therefore not be looked at in this work. The problem can be avoided with a careful structure of the data and a comprehensive analysis of the results.

The hypothesis verification has already shown within all investigation objectives that due to insufficient determinable variables a quantitative investigation cannot take place. To process the investigation objectives in a scientific context so that at the end a representative and valid result can be presented seems to be squaring the circle. This huge task has to be accomplished with the help of the case study research already presented. Nevertheless, the justification to want to achieve a representative and externally valid result is based on strict compliance with the requirements of qualitative case study research.

The above-mentioned theoretical assumptions to the examined phenomenon can be described as follows: Basel III is expected to be fully implemented in 2019. Until the full implementation a gradual implementation takes place. The regulatory framework conditions and their consequences have already almost been fully known since 2011. Against this background, if the implementation has any impact at all, first measures or changes should already have occurred in the market. Also, experts should have already reported on the changes in the market or the theoretical consequences in the relevant specialist literature or journals. If Basel III has an impact on project finance, there should be measurable results of this phenomenon.

Triangulation is essential within the scope of a representative case study. The concept of triangulation means that a research subject is viewed from at least two points. This is realized by the use of different methodological approaches. Method triangulation is a combination of different elicitation methods. In total, there will be three different elicitation methods, which are based on three different and independent data sources, as shown in the table below. This fundamental structure provides a maximum construct validity and reliability of the case study and research design.

Table 26: Methodological approaches (Source: own representation)

Elicitation methods	Data sources
Field research	Regulatory framework / sample of a standardised project
Data analysis	Project finance market review
Literature review	Specialist literature or journals

The presentation of the elicitation methods and the data sources will be carried out in detail in the following chapters. In addition, the use of different evaluation methods for the analysis of obtained data is equally relevant. An interpretation of the generated data and the results by multiple experts within the scope of qualitative expert interviews leads to results with an external validity. The exact execution of the expert interviews will also be presented in detail in the following chapter. The figure below illustrates the concept of the research design in this work.

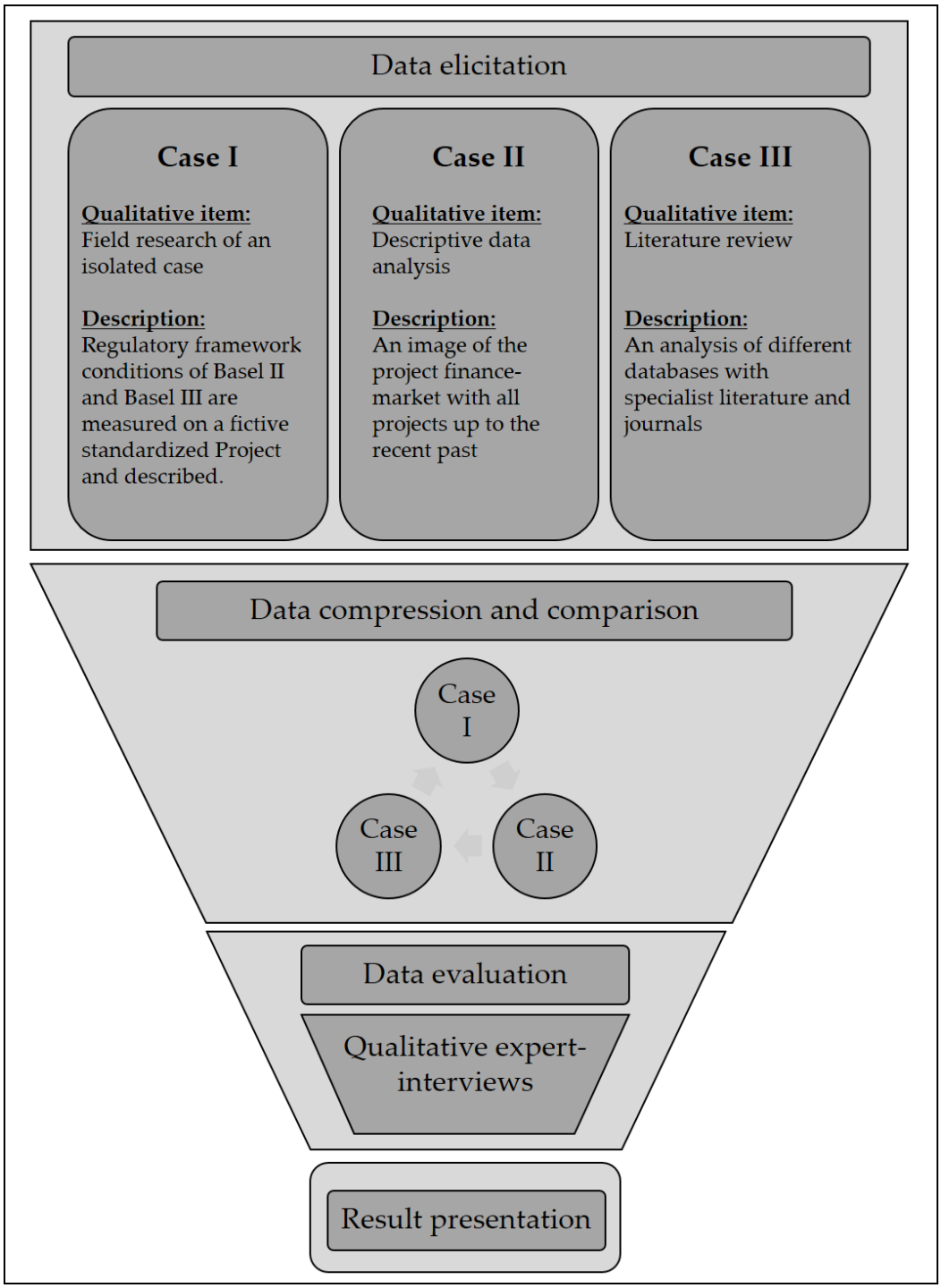


Figure 26: Case study research design (Source: own representation)

4 EMPIRICAL INVESTIGATION OF THE PROJECT FINANCE BUSINESS UNIT

4.1 FIELD RESEARCH

The epistemological foundations together with the principles of the case study research lead to the criteria-based selection of appropriate cases. As part of the criteria-based selection of appropriate cases, three major cases have been determined: field research, data analysis and literature review. The field research is the first of three cases. In order to ensure the claim of scientificity, the precise method, which has already established in the literature, is first described in detail theoretically and afterwards transferred into practice.

4.1.1 Theoretical adjustment of the field research

The idea is to observe a typical project finance case once under the regulatory framework conditions of Basel II and even under the regulatory framework conditions of Basel III. The observation is supposed to meet scientific requirements, although significant variables are unknown. This »observation« in a broader sense will be studied with scientifically accepted research methods and on the basis of the selected method the validity of the result will be determined. In the following, the two methods field and laboratory research will be presented, which when combined, will lead to the optimal research method.

Field and laboratory research highlight the extremes of a continuum of different "lifelike" or "biotic" investigations. (Gottschaldt, 1942) Field research in its natural form environments is generally characterized by a high external validity as opposed to the strictly controlled laboratory research with a low external validity. Laboratory research places special emphasis on the control or the elimination of investigation-related confounding variables. Field research in contrast takes place in natural and hardly altered environments.

Laboratory research:

Laboratory research is not necessarily carried out in a laboratory space. The research location is less important than the degree of control that is exerted on the examination conditions. Laboratory research is carried out in environments that allow a high degree of elimination or control of disturbance variables that may potentially affect the dependent variable. The advantage of laboratory research lies in the control of investigation conditional confounding variables. The strict control of investigation conditional confounding variables makes laboratory research suitable for investigations with a high internal validity. Changes of the dependent variable can very likely be attributed to the independent variable. Criticism of laboratory tests often superficially focuses on the unnaturalness and artificiality of the scenario. The unnaturalness of the investigation environment raises the question whether the results are generalizable to other, natural situations. It is assumed that laboratory effects are artefacts that have nothing to do with real life and have no general significance (external validity). (Döring, Bortz, 2014)

Field research:

In contrast to the laboratory, which represents an artificial environment, created by researchers specifically for investigation purposes, in field research normal life takes its course undisturbedly. Field research takes place in the field, i. e. in a natural environment as unaffected by the researchers as possible. (Legewie, 1995) The natural life-expiration in the field should be affected by the research as little as possible, instead, it is the task of the researcher to fit as seamlessly as possible into the field. The advantage of this approach is that the significance of the results to be immediately obvious, because this is a piece of unadulterated reality characterize (high external validity). This advantage results from internal validity, because the naturalness of the examination area or the only conditionally possible control of confounding variables, often permit several equivalent explanation alternatives of the investigation findings. Daily situations are highly variable and the extent to which transfer from one situation to another is possible, has to be justified. The aim of qualitative field research is to detect manageable units as holistically as possible and to document and analyse their structures and processes. Qualitative field research must not to be confused with quantitative field research, for which the field is only the location of their investigation. Qualitative field

research works with a variety of empirical methods to approach their particularly complex subject. These include participant observation and observant participation, informal and formal interviews. The open design of observation makes it possible to react flexibly to current events. A field research project typically includes six steps:

1. planning and preparation
2. entry into the field
3. acting in the field
4. documentation of field activities
5. exit from the field
6. evaluation and results reporting.

(Darbyshire, 1990; Filstead, Filstead, 1970; Werner, Schoepfle, 1987a, 1987b; Whyte, 1984)

Combination:

The decision to design an investigation as a laboratory or a field investigation may in isolated cases create significant difficulties. If there are laboratory investigations in an advanced research field so that there are no doubts of the internal validity of the findings, the results should be reviewed with the field research for external validity. If a well-elaborated field of research is dominated by realistic field researches, whose internal validity does not appear to be sufficiently documented, laboratory research should be given priority. The table below shows that a comprehensive assessment of the different research variants: experimental vs. quasi-experimental and field vs. laboratory, leads to the conclusion that with respect to internal and external validity as criteria, the combination experimental field research is superior to all other combinations. This applies to the hypothesis-testing research and in the event that all combinations are virtually equally well realizable and that the state of research does not require any specific combination of these types of tests. (Döring, Bortz, 2014; Shadish et al., 2002)

Table 27: Field vs. Laboratory research (Source: (Dö ring, Bortz, 2014; Shadish et al., 2002))

	Experimental	Quasi-experimental
Field	(+) Internal validity	(-) Internal validity
	(+) External validity	(+) External validity
Laboratory	(+) Internal validity	(-) Internal validity
	(-) External validity	(-) External validity

The combination of field and laboratory research within an experimental field research leads to a positive internal and external validity. For the following reasons the application of this research method is particularly suitable for the planned observation:

Table 28: Guarantee of internal and external validity (Source: own representation)

Characteristic	Observation
Field: • In the field the normal life takes its course undisturbedly • Natural life-expiration should be unaffected by the researcher, if possible • Is a piece of unadulterated reality • Detect manageable units as holistically as possible	The »normal life« or »life-expiration« is figuratively assigned to the Basel regulation framework. The regulations remain unchanged and present a piece of unadulterated reality. The researcher does not affect the regulatory framework conditions and observes and describes the changes. This generates a high internal validity.
Laboratory: • The degree of control that is exerted on the examination conditions • High degree of elimination or control of disturbance variables • Strict control of investigation conditional confounding variables	By eliminating external factors (elasticity of demand and supply) a high control of disturbance variables is exerted on the examination conditions. A representative project serves as an example and ensures a strict control of investigation conditional confounding variables. This generates a high external validity.

4.1.2 Observation of a project finance case under changing regulatory framework conditions

Direct credit lending in the form of the classical bank loan is still by far the dominant financing form within the scope of project finance. (Thomson-Reuters, 2015) This combination of field and laboratory research is to show the impact of the changing regulatory framework conditions especially on this dominant financing form. Therefore, the research in the »field« is figuratively the changing framework conditions which are not influenced externally. The laboratory part includes the measurable impact on a fictional project finance case. First, the services and the related margins and allowances of private banks in the business unit of project finance are presented. The total compensation is broken down into individual components of compensation and associated with the respective services. Cross-selling products such as derivatives remain unconsidered. Also mandates such as the Agent role or advisory mandates which can only be assigned once within a project financing will not be considered for the following reason: If a project financing can only be implemented in a banking consortium, then the funding must also be profitable for those banks which do not get the agent role or additional advisory mandates. Otherwise, no consortium will be founded. In addition, the recoverable margins and fees are compared with the bank's internal costs. On the basis of this comparison, the achievable return can be derived within the project finance business. Furthermore, the analysis will consider not only the changing regulatory framework conditions of Basel II and Basel III but also the different yields due to market fluctuations.

There is a huge portfolio of key figures to calculate the profitability of banks. Many of these key figures are very complex with a dependency on many variables. Often these variables are strictly confidential and only known to a small circle of people within the internal controlling of the bank. Below, the return on equity »ROE« within the project finance business unit will be analysed. However, neither data from the internal controlling of the banks, nor data from the financial reporting from active project finance banks were available for this analysis. These profitability data and indicators are very sensitive, highly confidential and usually not published. For this reason the ROE is calculated in the following approximation, in line with the experimental field research, with fictitious but realistically justified compensation components. The ROE is a percentage indicator which is specified per annum. Some components are in absolute EUR or USD amounts and are translated for the calculation in percent per annum of the lending volume. The calculation basis will exemplary be shown for a »standard« project finance case. However, since there is not *one* »standard« project finance case,

documented averages were compiled. Basically, the individuality of project finance refers to the due diligence and the documentation. However, the financing structure contains a certain degree of standardisation represented and justified within the scope of the following standardised project presentation.

The following necessary data is based on the »Project Finance International« yearbooks edited by Thomson-Reuters. Why this source was used as a scientific and representative basis, will be sufficiently explained in chapter »4.2.2 Data analysis«. The necessary data are transaction parameters that represent an almost standardised project. Transaction parameters consist of the following components:

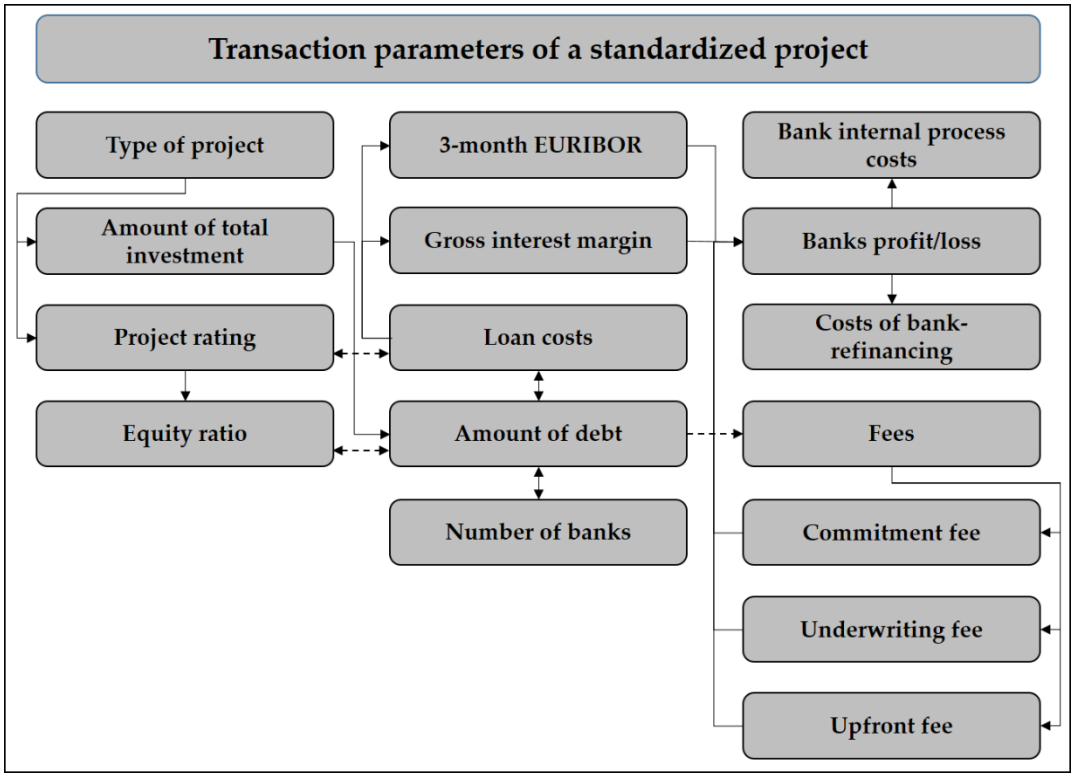


Figure 27: Composition of transaction parameters (Source: own representation)

The type or, respectively, the sector of the project has an influence on nearly all parameters. For the labouristic construction the type of project is irrelevant. This is explained follows: The type of project certainly has an impact on the project rating and the amount of total investment. However, in all sectors there are different types of projects with different total investment amounts. The largest

project in 2014 was Freeport LNG with US$10.935bn and the smallest project was Essel Jabalpur with US$19m. In 2014, the average amount of all projects was at US$893m and will be largely rounded to US$900m for the standardised project. (Thomson-Reuters, 2015) There is almost no information on project ratings. They are based on internal bank own individual calculation methods that are not published. At this point reference is made to Yescombe (2013), who says that most project finance ratings are at the lower end of the minimum »investment grade« rating of BBB–. Thus, in this case a range of ratings from BBB- to BBB+ will be assumed and the transaction parameters »Type of project« equalized. The average rating results in an average equity ratio of 20% and hence to the amount of debt of US$720m. (Thomson-Reuters, 2015) In 2014, the average loan participation of the Top 50 MLAs per project was US$119m and in the past 5 years it was US$135m. Without a significant impact on the results and of reasons of clarity and comprehensibility, an average credit participation of US$120m is assumed. The direct loan cost, from the perspective of Project Company, result from the sum of the 3-month EURIBOR and the gross interest margin. Although the current EURIBOR is negative, the average value of the 3-month EURIBOR 1999-2016 is at to 2.21%. (o. J.) From the perspective of the bank the respective index should approximate the refinancing rate. Usually, an individual surcharge is added which is dependent of the bank's credit standing. Moreover, the risk depends on the rating of the SPV, the bank-internal operating costs and the required equity margin have to be added. There are also additional fees that cover the bank's corresponding costs. The table below shows an allocation of the correlating cost on bank and project side:

Table 29: Correlating cost on bank and project side (Source: own representation)

Project Company	**Bank**
EURIBOR Gross interest margin	EURIBOR Bank refinancing rate Risk margin (dependent on SPV-rating) Equity margin
Upfront fee	Process costs
Underwriting fee	Syndication risk
Commitment fee	Banks off balance sheet costs

As on a fraction line, the EURIBOR can be cancelled on both sides. To keep the example simple, a full disbursement of loans takes place under the first drawdown. Thus, the commitment fee and the off balance sheet costs can almost be substituted. The risk margin is defined by the range of the ratings. With the aim to calculate the ROE, the equity margin remains open so that the result of the ROE allow an own interpretation of whether the result of the ROE is high enough for the maintenance of the project finance business unit in view of the covering of all additional costs. Unfortunately the data for the gross interest margin, the bank's refinancing rate, the bank-internal process costs and the upfront and underwriting fees have to be taken from the literature because these are not published regularly either. As the missing parameters are interrelated, the following figure shows three possible scenarios:

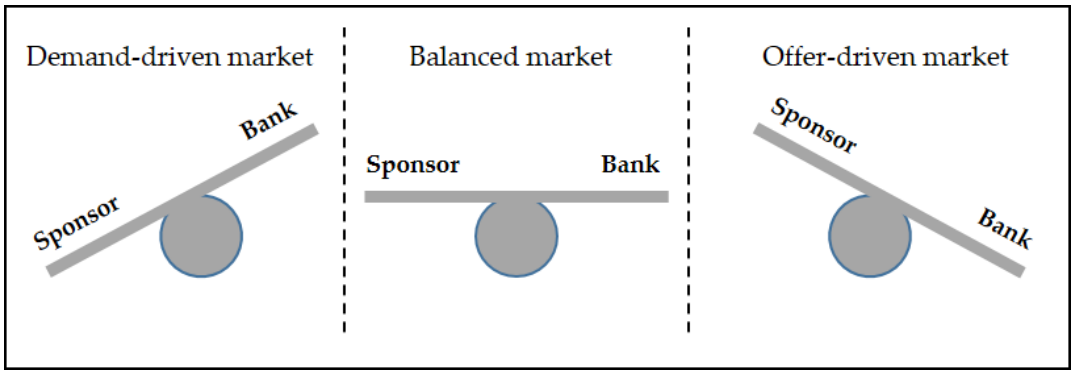


Figure 28: Three possible market scenarios (Source: own representation)

In a demand-driven market the competition among banks is strong. Money is sufficiently available at the money and capital markets. The bank refinancing rate decreases. Through the competition between the banks also the gross interest rate decreases disproportionately. In an offer-driven market the competition among banks is weak. Money is rarely available at the money and capital markets. The bank refinancing rate increases and through the weak competition between the banks also the gross interest rate increases disproportionately. The balanced market is somewhere in between. (Brodehser, 2012; Decker, 2008; Gatti, 2013; Yescombe, 2013) In order to be able to sufficiently consider the different yields resulting from market fluctuations, three assumptions regarding the refinancing rate and the gross interest rate are made. Thus, the following transaction parameters result:

Table 30: Assumptions of the transaction parameter (Source: own representation)

Transaction parameter	Quantitation		
Amount of total investment	US$900m		
Project rating	BBB+; BBB; BBB-		
Equity ratio	20%		
Amount of debt	US$720m		
Number of banks	6		
Underwriting per bank	120		
3-month EURIBOR	221 bps		
Market conditions	Demand-driven	Balanced	Offer-driven
Gross interest margin	70	200	300
Bank refinancing rate	10	90	110
Banks internal process costs	US$15.000		
Upfront fee	200 bps		
Underwriting fee	40 bps		
Commitment fee	100 bps		
Financing term	20 years		

The figure »banks internal process costs« is not indicated in percent per annum. Hence, there will first be a transformation into bps. Thus, a total amount of all compensation components has to be represented in a single profitability indicator. As starting point t_0 at the time of the »Financial Closing« is selected, to or from which the remuneration and expenses are accumulated or discounted. If the time of payment of the remuneration or expenses differs by less than one year from t_0, then, for the sake of clarity, no accumulation or discounting takes place. Project finance generally covers both the construction and the operational phase. The remuneration components may vary widely between these two phases, because the risk during construction is significantly higher than in the operational phase. Usually there are different reference interest rates for the different phases. During construction the 1-month EURIBOR or the 3-month EURIBOR will be selected as reference interest rate. This enables greater flexibility in terms of credit

drawdowns for the borrower, because each new drawdown can only be retrieved at the end of an interest period. In the operating phase, this flexibility is no longer necessary and the reference interest rate is usually converted to the 6-month EURIBOR. For the sake of clarity, these variations in the arrangement of terms and the reference interest rates are not included in the represented example. The values represent averages, which cover both the construction phase and the operational phase. Cash flows during the period of financial close are compounded for the duration of the average loan term. In the example, an approximately linear amortisation is assumed which leads to an average loan term calculated on the basis of the total financing period divided by two, i. e. 10 years. In favour of clarity, in the illustration the consideration remains that the average financing term exceeds 50% of financing period, because of no repayments during construction. The compounding is done with the borrower's interest rate, which is the result of the addition of the average 3-month EURIBOR and the gross interest margin. A compounding is carried out with the relevant parameters by using the following formula:

$$K_n = K_0 \times (1 + i)^n$$

with:

K_n: Compounded amount of capital after n years

K_0: Original amount of capital at time t_0

i: Interest

n: Years

Banks internal process costs

The bank-internal process costs essentially include personnel costs including back office and administrative costs. These costs are bank individual and flow into the calculation basis of the banks as a single amount or over the duration of the mandate. In an assumed mandating of about 6 months for each US$15,000 process

costs of US$90,000 arise.

$$\Longrightarrow K_n = US\$90{,}000 \times (1 + 0.0421_{Balanced})^{10} = US\$135{,}936.62$$

$$\Longrightarrow process\ costs = \frac{US\$135{,}936.62}{(US\$900{,}000{,}000\ \div 2)} \div 20 years = 0.002\ bps\ p.a.$$

Upfront fee:

$$\Longrightarrow K_n = 200bps \times (1 + 0.0421_{Balanced})^{10} = 302.08\ bps_{Balanced}$$

$$\Longrightarrow Income\ upfront\ fee = 302.08\ bps_{Balanced} \div 20\ years = 15.10\ bps_{Balanced}\ p.a.$$

Synonym:

$$\Longrightarrow 13.32\ bps_{Demand-driven}\ p.a.$$

$$\Longrightarrow 16.62\ bps_{Offer-driven}\ p.a.$$

Underwriting fee:

$$\Rightarrow K_n = 40\ bps \times (1 + 0.0421_{Balanced})^{10} = 60.42\ bps_{Balanced}$$

$$\Rightarrow Income\ underwriting\ fee = 60.42\ bps_{Balanced} \div 20\ y. = 3.02\ bps_{Balanced}\ p.a.$$

In view of the high volatility between a demand-driven market and an offer-driven market, the impact of the bank's internal process costs and the underwriting fee is so marginal that after further consideration they will be ignored. Based on this conversion, the individual income and the cost components are converted in the following table:

Table 31: Net margin calculation (Source: own representation)

Income and cost components	Converted in bps p.a.		
Market conditions	Demand-driven	Balanced	Offer-driven
Bank refinancing rate	-10	-90	-110
Gross interest margin	+70	+200	+300
Upfront fee	+13	+15	+17
Net margin	+73	+125	+207

In a balanced market with a net margin of 125 bps there will be a net income of US$1.25 for a credit amount of US$100. At this point it should be noted that all parameters have been determined. Only two parameters are not fixed on a number. These are market fluctuation and the rating of the SPV. A range could be defined for both parameters. With all parameters in place, now the amount of required equity for granting a credit facility has to be determined. Reference is made to the calculation in section »2.5 The impact of the Basel framework«. The assumptions made above will now be inserted into the following formula:

$$\text{RWA} = 12.5 \times \text{K} \times \text{EAD} \times \text{SF}$$

$$\text{K} = \left[LGD \times N_{\left(\sqrt{\frac{1}{1-R}} \times G_{PD} + \sqrt{\frac{R}{1-R}} \times G_{0.999}\right)} - PD \times LGD \right] \times \frac{1 + (M - 2.5) \times b}{1 - 1.5 \times b}$$

$$\text{R} = 0.12 \times \frac{1 - EXP^{-50 \times PD}}{1 - EXP^{-50}} + 0.24 \times \left(1 - \frac{1 - EXP^{-50 \times PD}}{1 - EXP^{-50}}\right)$$

$$\text{b} = (0.11852 - 0.05478 \times ln_{PD})^2$$

With the Basel framework parameters, already defined for project financing in chapter 2.5, and the determined parameters for a standardised project financing above, the previously shown formula can be calculated for each rating category. This creates three RWA results. A presentation of all three formula calculations is omitted for clarity. The following table shows the defined parameters and the RWA results:

Table 32: RWA calculation (Source: own representation)

PD	BBB+	BBB	BBB-
	0.200%	0.259%	0.367
EAD*	US$120m		
LGD**	45%		
M**	2.5		
SF**	1.06		
Confidence**	99.99%		
R	12%	13%	14%
b	0.181222478	0.197842606	0.210640823
K	0.041851695	0.03664548	0.034085563
RWA	US$66,544,195.42	US$58,266,313.75	US$54,196,044.63

* EAD = EXP because there are no undrawn facilities, other off-balance sheet items or collaterals.

** In compliance with Basel II and Basel III IRB foundation approach

The calculation of the RWA for the project finance is identical under Basel II and Basel III. The market fluctuations have not yet been important. These change with the equity provision. In the sense of a cost-effective structure, only the minimum equity requirement is met, so the equity requirements according to the Basel II and Basel III regulations have to be fulfilled. Here Basel III is further divided into systemically important banks and non-systemically important banks. The systemically important banks are once again split into five buckets. For the sake of clarity, the calculation within the systemically important banks only includes Bucket 1 and Bucket 4. Furthermore, Basel III responds with the countercyclical buffer to market fluctuations. It is assumed that these market fluctuations correlate with the market fluctuations of project finance. The respective capital requirements results from chapter »2.5 The impact of the Basel framework«. The following matrix gives an overview of the individual calculation operations:

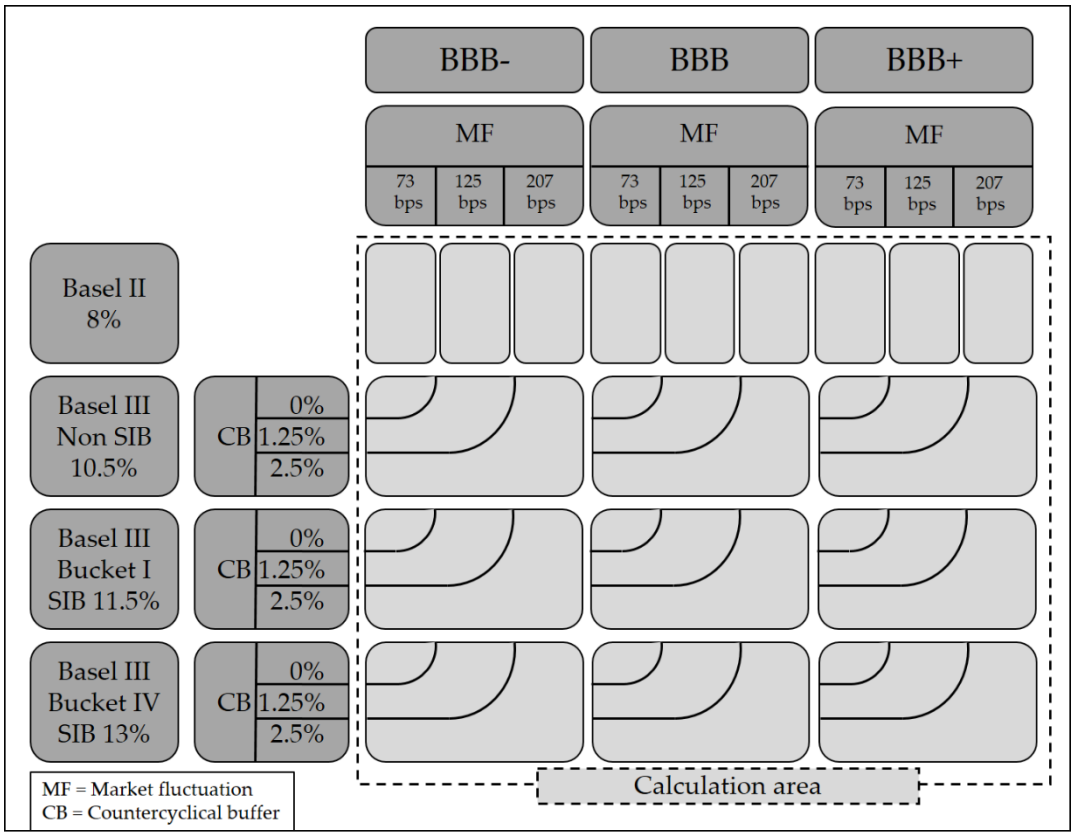


Figure 29: Calculation matrix (Source: own representation)

In total, the matrix provides 36 individual calculations. Here, the calculation refers to the already identified RWA and will be supplemented as follows to calculate the ROE:

$$Equity\ in\ \%\ of\ EAD = RWA \times Basel\ min.requirement\ in\ \%$$

$$ROE = \frac{Amount\ of\ total\ investment \times Net\ margin}{Amount\ of\ total\ investment \times Equity\ in\ \%\ of\ EAD}$$

For the sake of clarity, the individual calculations are omitted. The following table presents, firstly, the equity in percent of EAD and, secondly, the results of the 36 individual calculations:

Table 33: Results of the calculations of changing conditions (Source: own representation)

	BBB-	BBB	BBB+
Basel II			
Equity for Basel II	US$5,323,535.63	US$4,661,305.10	US$4,335,683.57
Equity in % of EAD	4.44%	3.88%	3.61%
ROE with 73bps	16.91%	19.31%	20.76%
ROE with 125bps	28.18%	32.18%	34.60%
ROE with 207bps	46.66%	53.29%	57.29%
Basel III Non G-SIB			
Equity for Basel III CB 0%	US$6,987,140.52	US$6,117,962.94	US$5,690,584.69
Equity in % of EAD	5.82%	5.10%	4.74%
ROE with 73bps	12.54%	14.32%	15.39%
Equity for Basel III CB 50%	US$7,818,942.96	US$6,846,291.87	US$6,368,035.24
Equity in % of EAD	6.52%	5.71%	5.31%
ROE with 125bps	19.18%	21.91%	23.56%
Equity for Basel III CB 100%	US$8,650,745.40	US$7,574,620.79	US$7,045,485.80
Equity in % of EAD	7.21%	6.31%	5.87%
ROE with 125bps	28.71%	32.79%	35.26%

Basel III G-SIB Bucket 1			
Equity for Basel III CB 0%	US$7,652,582.47	US$6,700,626.08	US$6,232,545.13
Equity in % of EAD	6.38%	5.58%	5.19%
ROE with 73bps	11.45%	13.07%	14.06%
Equity for Basel III CB 50%	US$8,484,384.92	US$7,428,955.00	US$6,909,995.69
Equity in % of EAD	7.07%	6.19%	5.76%
ROE with 125bps	17.68%	20.19%	21.71%
Equity for Basel III CB 100%	US$9,316,187.36	US$8,157,283.93	US$7,587,446.25
Equity in % of EAD	7.76%	6.80%	6.32%
ROE with 207bps	26.66%	30.45%	32.74%
Basel III G-SIB Bucket 4			
Equity for Basel III CB 0%	US$8,650,745.40	US$7,574,620.79	US$7,045,485.80
Equity in % of EAD	7.21%	6.31%	5.87%
ROE with 73bps	10.13%	11.56%	12.43%
Equity for Basel III CB 50%	US$9,482,547.85	US$8,302,949.71	US$7,722,936.36
Equity in % of EAD	7.90%	6.92%	6.44%
ROE with 125bps	15.82%	18.07%	19.42%
Equity for Basel III CB 100%	US$10,314,350.29	US$9,031,278.63	US$8,400,386.92
Equity in % of EAD	8.60%	7.53%	7.00%
ROE with 207bps	24.08%	27.50%	29.57%

Although the table above shows the results in a very condensed way without the associated individual calculations, an evaluation of results is possible only with difficulty. A graphical representation of the results is given in the subsequent conclusion. With this case study the most serious factor of the Basel III framework is measured. The additional regulations of Basel III, i. e. the leverage ratio, the liquidity cover ratio and the net stable funding ratio, cannot be considered in this case study. This is because the respective factors are determined by bank-individual ratios. Thus, within the scope of the two remaining case studies the attention on the effects of these ratios is reinforced.

4.1.3 Conclusion

The first case of a total of three cases is the combination of field and laboratory research as an experimental field research. The unchanged field corresponded to the observations made in chapter 2.5 of the changing framework conditions from Basel II to Basel III. A defined standard project financing provided the necessary labouristic parameters. Based on these parameters, the relationships between cost and equivalent value from the banks perspective were determined, key parameters identified and insignificant parameters sorted out. First, the transaction parameters and their connection were presented. Furthermore, there were also three different market conditions and three different project ratings. After determining these ranges nine calculations result as a product of three market conditions multiplied with three project ratings. Applied to Basel II and three bank-individual Basel III framework conditions, there are 36 individual calculations in total. Table 33 presents all results and allows first conclusions. For a better illustration of the results, the transformation of the table into a graphical presentation will be given below.

The first result is that the impact of the bank's internal process costs and the underwriting fee is so marginal that they can be neglected in the overall calculation. As a further result it can be stated that Basel II does not classify different types of banks, as it will be done under Basel III. In addition, with the countercyclical buffer, Basel III also attempts to address varying market conditions. Thus, under Basel II there is only one single calculation basis for the equity provision. The figure below shows that the equity provision under Basel II is significantly lower than in all calculation bases under Basel III. Furthermore, the larger the bank the more capital

has to be provided. The figure shows that in an extreme case almost twice as much equity has to be provided.

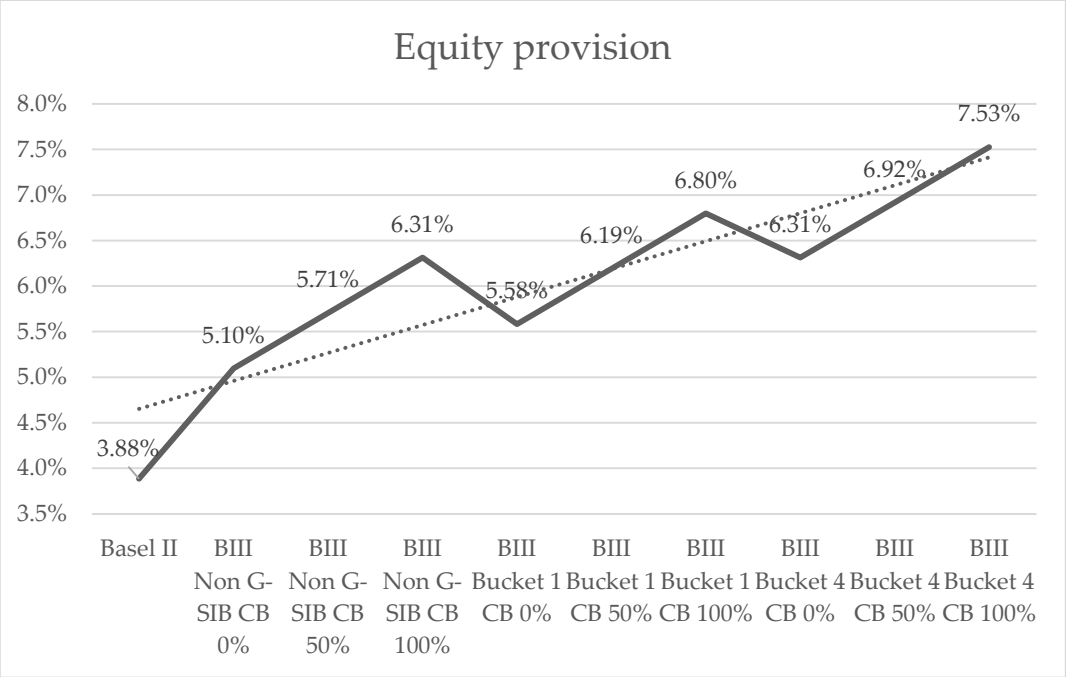


Figure 30: Equity provision for different Basel requirements with a BBB rating (Source: own representation)

The figure above shows an example of a project financing with the rating BBB. The next figure, however, shows the spread between a BBB- and BBB+ project. Here it is clear that the spread of Basel II is lower than that of Basel III. This primarily means that the rating is gaining importance. A closer look at the extremes of Basel II to Basel III in Bucket 4 with a countercyclical buffer of 100% reveals that a BBB- rating requires 4.16% more equity and a BBB+ requires only 3.39% more. This means that in contrast to an average rating of BBB, which requires under ceteris paribus conditions an increase of 3.65% equity, a rating of BBB- requires above-average amounts of equity and a rating of BBB+ a little below. Consequently, the demand of banks for projects with a better rating increases disproportionately and the interest in projects with a lower rating falls disproportionately. Although this phenomenon applies to all banks, the impact is greater as the size of the bank increases.

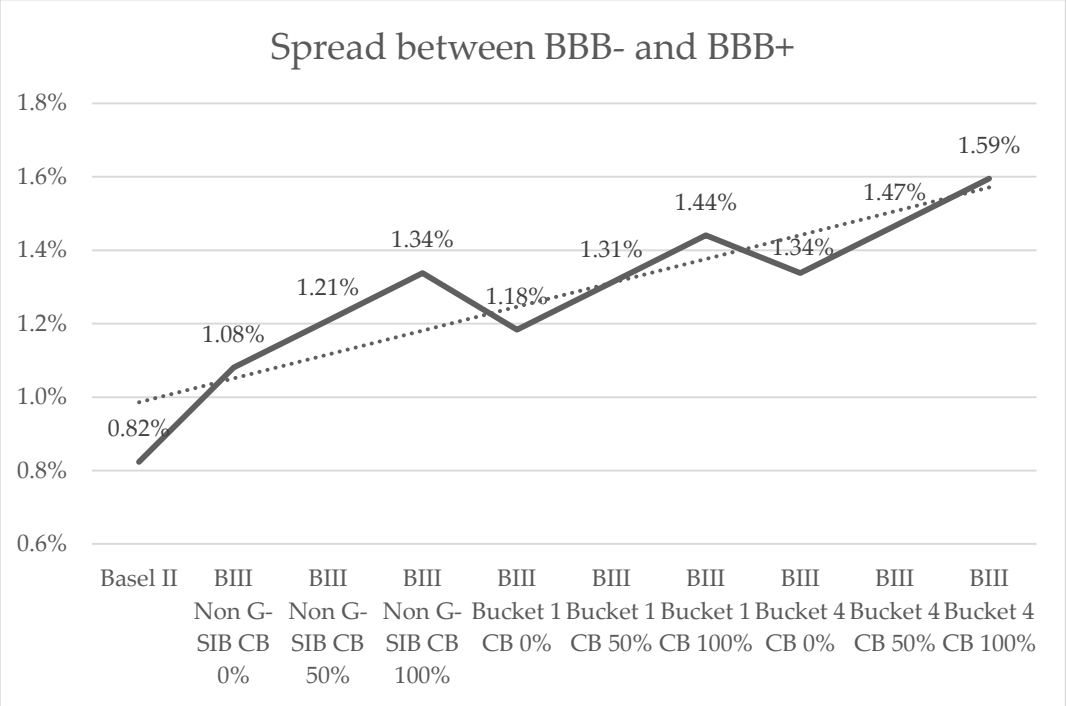


Figure 31: Spread between BBB- and BBB+ within the equity provision for different Basel requirements (Source: own representation)

The net margin has to be considered carefully. Performance-based payments for employees in the business unit of project financing cannot be considered. Therefore, the net margin will potentially be lower in reality. It would also be a mistake to insinuate that 125bps would be an arithmetic average of an achievable ROE. Nevertheless, the calculation is fairly close to reality and creates a realistic image. The opposite applies to the provision of equity: The larger the bank the lower the ROE. Even the countercyclical buffer has a positive effect and ensures a more balanced economic cycle. This refers to the spread between the demand-driven market and the offer-driven market. The spread under Basel II and thus without the countercyclical buffer is between 53.29% and 19.31%, approximately at 33.98%. In contrast, the average spread for all Basel III calculations ranges from 32.79% to 11.56%, i. e. it is at approx. 17.26%. It can be noted that the attractiveness of the project finance business unit has almost halved.

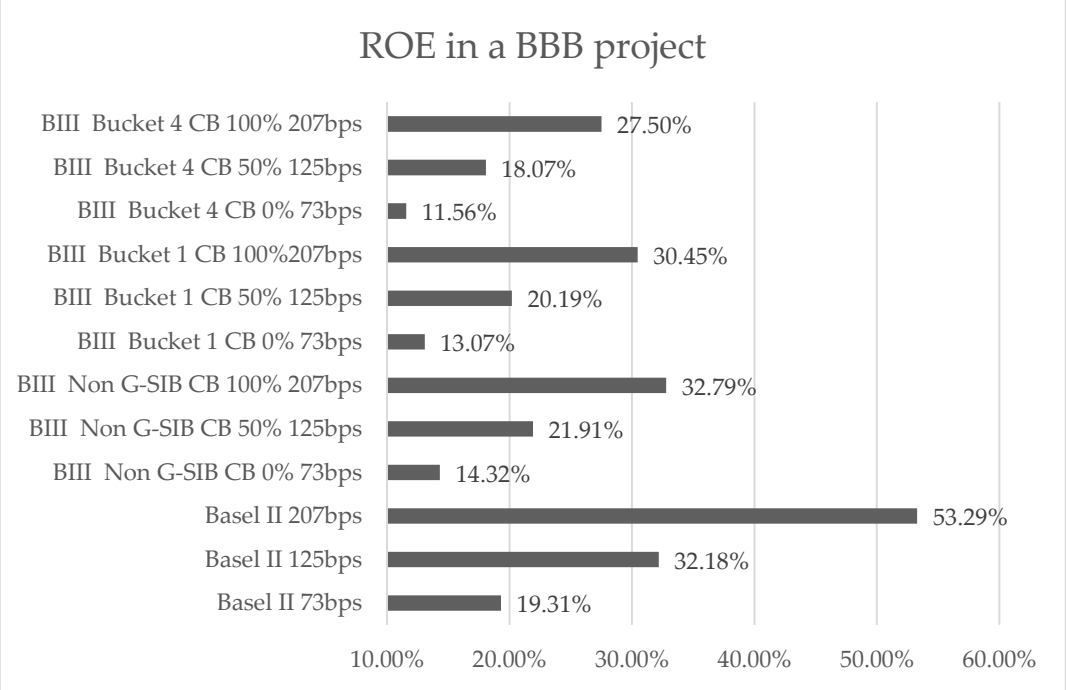


Figure 32: ROE for different Basel requirements and net margins with a BBB rating (Source: own representation)

Furthermore, the figure above shows that an increase in the gross margin leads to a disproportionate increase of the ROE. Hence there is no linear relationship between the gross margin and the ROE. Whether banks will still continue to be involved in the project finance business unit in case of such a drastic deterioration, cannot be answered with this case. However, it can be ruled out that banks only engage in phases in the project finance business unit, and it can equally be ruled out that banks only engage in phases in the project finance business unit or conduct a type of cherry-picking. Since this is a very complex financing vehicle, highly qualified, experienced and therefore cost-intensive staff is needed. It is therefore not possible to adapt the staff numbers to short-term fluctuations in capacity utilization. In addition, the structuring teams require a long start-up time to be perceived by the market as a serious financing partner. Thus, it fundamentally remains a strategic long-term decision to operate or resolve a project finance business unit. (Yescombe, 2013) Whether and how the changing conditions in the project finance market are noticeable, is determined within the scope of the two other cases.

4.2 DATA ANALYSIS

The data analysis is the second of three cases. In order to ensure the claim of scientificity, the precise method, which has already established in the literature, is first described in detail theoretically and afterwards transferred into the practice.

4.2.1 Theoretical adjustment of the data analysis

Empirical-quantitative exploration strategies use quantitative data from various sources to generate new ergonomic findings and hypotheses. Contrary to explanatory studies, exploratory studies tend to use more variable data and include more extensive data analysis which is usually also graphical. The empirical-quantitative exploration supports a special presentation and analysis of quantitative data, previously unrecognized or undetected patterns and abundances which become visible in measurements. (Wellenreuther, 2000)

Numerical data represents reality-cut outs in compressed and abstract form. Surprising effects and concise patterns in the data draw attention to phenomena that would have been lost within the everyday observations. The aim of quantitative exploration methods is therefore to present and summarise data like that as such patterns are easily recognizable. In principle data of all survey methods and scales of measurement can be used. Access to quantitative data can be obtained in three different ways: use of existing data, data collection by a third party, own data collection. Data archives provide electronic datasets to a range of subjects. Big data volumes are thus immediately available. For trend research data archives are helpful, too, because they can draw on collected data on a regular basis. The present study uses existing data from different data sources. The data comes from reputable sources and is representative so that valid evidence can be obtained (further explanation in the chapter).

The evaluation of existing raw data with new methods or another way of preparation is called secondary analysis. In contrast to the primary analysis which uses its own new data, quantitative methods of data analysis as inferential analysis methods classified are classified into a more manageable form, canonized (parametric and distribution-free method, univariate and multivariate methods etc.) and shown in statistics books. However, significance tests and parameter estimates are not the only methods to evaluate quantitative material. In addition to simple descriptive analyses the graphical methods and exploratory multivariate techniques are gaining in importance. (Döring, Bortz, 2014) The following methods

of descriptive statistics are suitable for summaries and clear presentations of the results of a sample survey: frequency distributions, measures of central tendency and dispersion, crosstabs and correlation matrices. They can be represented numerically, for example in a frequency table, or graphically, for example in a histogram. Based on such descriptive analyses the samples or collectives are at a glance comparable glance and feature-correlations become recognizable. (Benninghaus, 2005; Bortz, 2013)

The Exploratory Data Analysis »EDA« is used to discover patterns, trends and structures in a set of quantitative data that can easily be missed without technical aids. In contrast to the Confirmatory Data Analysis »CDA«, which is limited to the presentation and analysis of the characteristics or of aggregate values, the EDA techniques provide a complete and clear picture of the entire data set, by which instead of summaries first the individual measured values are considered. Even quantitative data can be made manageable by careful structuring. EDA techniques are primarily graphical methods and similar to inferential analyses. They are produced with appropriate statistics software. The EDA technique is especially designed for confusing, big and realistic data sets, where the EDA technique is not a graphical analysis routine, but rather the subsequent conceptual processing of the data relations – »risky inference«. Graphic data processing is only exploratory when new insights and knowledge are gained. As part of »data mining« or »knowledge discovery in databases« patterns and contexts in very large data volumes are detected. (Tukey, 1977) The quantitative data collected in the present study will be gathered in Excel using EDP and analysed with the presented methods.

4.2.2 Examination of the project finance market

This data analysis is based on data collected by the researcher. The origin, the quality and the scope are of crucial importance. Overall, the data analysis is based on different sources which will be connected in different ways with each other. The data analysis includes only numeric or quantifiable data. The by far predominant source is the »PFI - Project Finance International« journal which is published annually by Thomson Reuters Corporation. It contains the »LEAGUE TABLES« which include an overview of nearly all approved projects of the previous year. »Approved« in this case refers to the date of financial close. "The Thomson Reuters Project Finance International (PFI) annual league tables are the most accurate and comprehensive measure of project finance activity across the globe in any given year. (…) The league tables are compiled from submissions sent in from

commercial banks and financial advisors. Only transactions that are limited or non-recourse are included in the tables." (Thomson-Reuters, 2015) Even if the projects actually are strictly confidential, basic information is published to compete on the market and to demonstrate the expertise for future projects. The annual highlight is the awarding of the »PFI Awards«. Thus, Thomson Reuters Corporation does not only provide a sample size of the project finance market but also an illustration of the whole project finance market. Furthermore, Thomson Reuters Corporation is a globally recognized major multinational mass media and information company and thus publishes a representative database which provide a maximum of reliability as well as internal and external validity. To account for market fluctuations sufficiently, the data is collected from the publications from 2001 to the most recent one from 2015. The information given in each publication always refers to the previous, so the volume for 2015 covers the activity in the market in 2014, and so on. The following information is collected: name of MLA, headquarter of MLA, continental region of MLA, G-SIB Bucket of MLA, MLA commitment per year, number of deals per MLA, project location, projects per country, project sector and size, commitment of bonds in project finance, commitment of International Developmental Finance Institutions »IDFI« in developed countries, commitment of IDFI in developing countries, single project and size. All data are collected in an Excel spreadsheet. A total of approximately 20,350 individual data items has been collected from 15 journals. This data was not only copied but sensibly transferred into the Excel table. This means that bank mergers, bank takeovers, bank rebranding have been meaningfully combined and reduced the number project finance banks from far more than 700 onto 657. The reduction reflects reality more closely and reproduces a true illustration in the following chart analysis. Only one manual change to the numerical data has been made, namely in 2010 one absolute special effect had to be removed. The Taiwan high-speed rail project with a total loan of US$12bn had to be refinanced and even the PFI calls it: "an event that will not be repeated." (Thomson-Reuters, 2011) The Bank of Taiwan was the sole MLA which distorted the result for the annual average bank participation. Without the Bank of Taiwan the average commitment in 2010 was at US$101m. Otherwise the average commitment would have increased to US$354.7m. That is why the number of projects for the Bank of Taiwan was manually raised from 1 to 119 projects so that the overall average was not distorted.

With the publication of Basel III in 2010, the main focus was on the period of the previous 5 years. Nevertheless, the history is also partly listed to 2001 in order to establish relationships or draw conclusions to the dot-com crisis and the financial

crisis, if necessary. In the following, several figures and charts will be presented with different content in order to give an overview of the project finance market and possibly to gain new insights. The data from the Excel table is linked usefully and in different ways. This not only provides an immediate insight into the connection with Basel III, but also allows other factors to be identified or excluded. As part of the chart analysis, first a detailed description of the individual parameters of each figure will be given, followed by an analysis of the findings in all figures and, lastly, an analysis in the context of all three cases.

The first figure shows an overview over the project finance sector over the last 5 years. »Other« includes Mining, Petrochemicals, Telecommunication, Water & Sewerage, Waste & Recycling and Agriculture & Forest. Over the defined period, the »Other« sectors account for less than US$50bn per sub-period and for only 13 % of all sectors taken together. For reasons of clarity and comprehensibility this summary is acceptable. Sectoral external effects, such as the decommissioning of the power sector, are reflected in the overall picture of the project financing market. If this is the effect, the causes have to be found. Extraordinary sectoral changes on the project finance market are not apparent in this chart. On the other hand, spill-overs from sectoral effects onto the project finance market can be excluded. A strong increase of the Oil & Gas sector in 2014 is striking. It might be caused by »fracking« in the US which could have led to a slight increase in the total project finance market from 2013 to 2014.

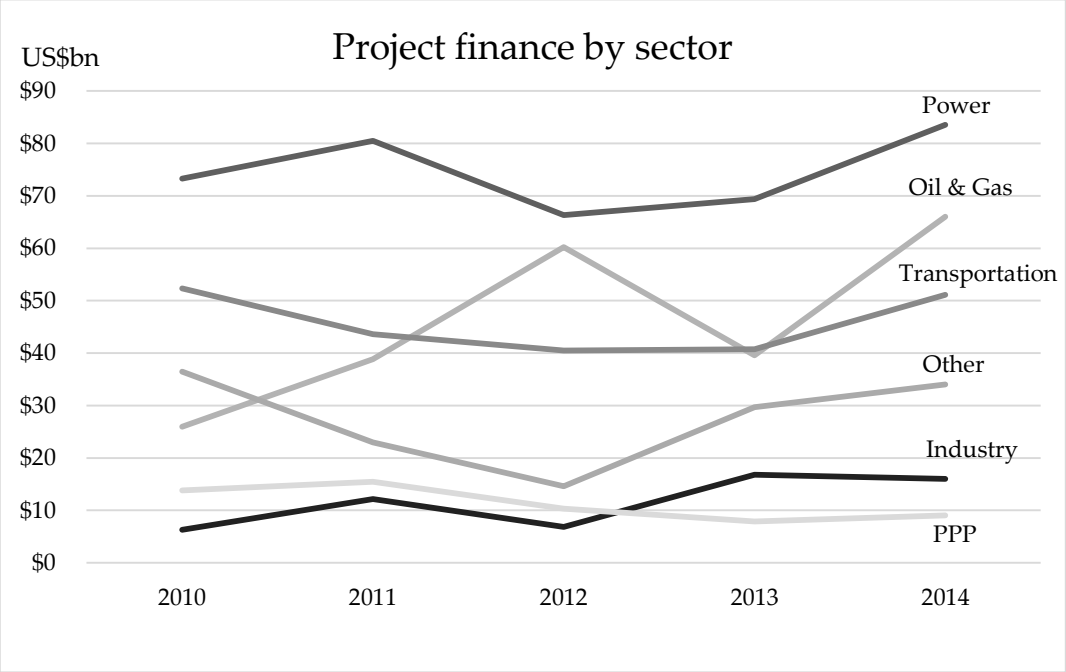


Figure 33: Project finance by sector (Source: own representation based on Thomson-Reuters (2011, 2012, 2013, 2014, 2015))

Even if the contents are completely different, the following two figures referring to locations have to be considered together. The first figure refers to the »Project location«, i. e. to the place where the investment or SPV takes place. The second figure refers to the MLA location, i. e. the place where the financing bank is located. As mentioned above, local effects can be reflected in the overall picture of project financing market. Thus, for example a war in a country with high project finance stake could drastically affect the demand and have a lasting negative impact on project financings. Conversely, changes in local law and regulation can lead to market exits of individual, major banks which consequently has an impact on the global project finance market. Even global effects can be identified if isolated locations are not affected.

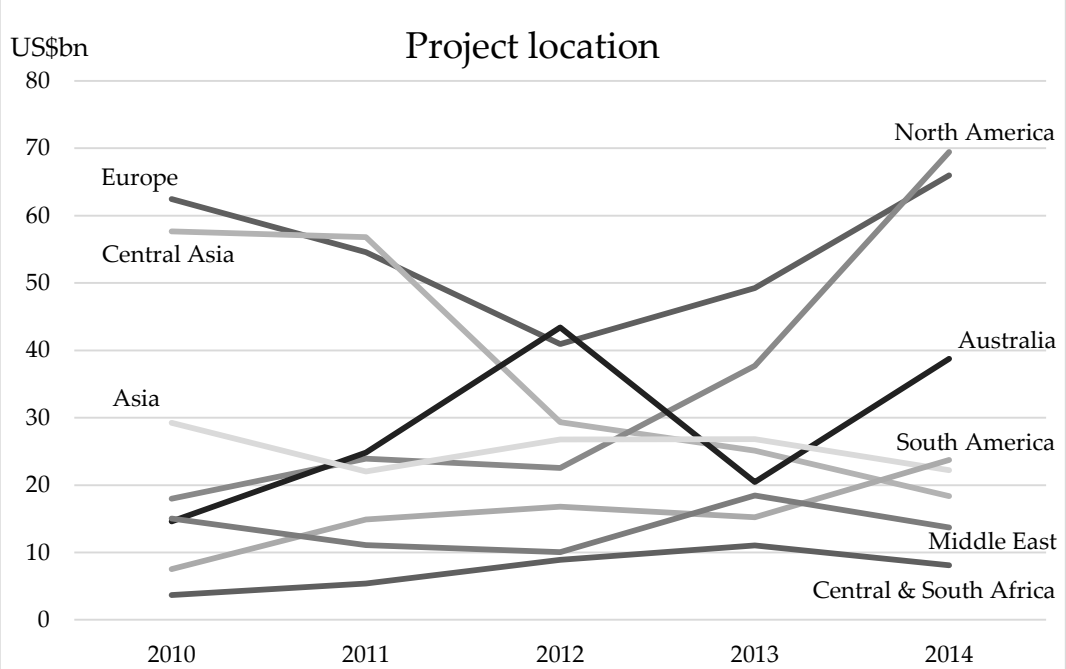


Figure 34: Project location (Source: own representation based on Thomson-Reuters (2011, 2012, 2013, 2014, 2015))

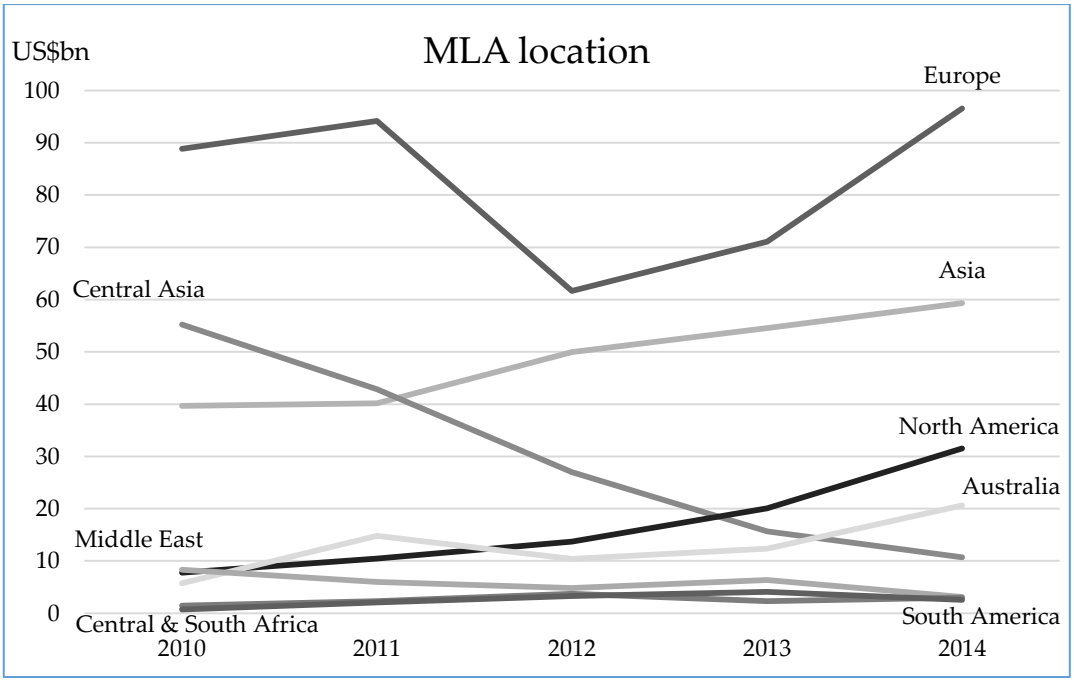


Figure 35: MLA location (Source: own representation based on Thomson-Reuters (2011, 2012, 2013, 2014, 2015))

The above-mentioned »fracking« in the US was consolidated with the increase in the number of project locations in North America. The fact that banks are more involved in regional projects explains the increase in MLA locations in North America. The increase in the number of project locations as well as in the number of MLA locations in Europe can be explained with the euro crisis in 2012. Thus, there is no real increase, but only a recovery of the market. The sharp decline in the project finance market in Central Asia, above all, in India is very striking, both with regard to the MLA location and the project locations. This confirms that India has a very national market on which only a few foreign banks are active and only very few Indian banks are active abroad. The fact that the Basel regulations were introduced at the same time may be seen as strong evidence of the impact of Basel III. Therefore it is very important to further investigate this fact. This is helpful for the investigation, although Central Asia, ranked second in the number of MLA and project locations in 2010, is losing importance in the project finance market. The Australian market is subject to fluctuations of the number of project location sites, however the MLA participation of the banks remains stable. While these fluctuations only play a subordinate role in the examinee context, the recognizable trends, however, are very interesting. Projects in Asia, for example, remain solid with Asian banks continuously increasing their commitment in project finance. It remains open whether foreign banks are withdrawing from the Asian market and local banks compensate the difference, or whether Asian banks increasingly participate in project financings in foreign countries. An interpretation of the markets in the Middle East, South America, Central and South Africa will be omitted, because the entire market shares of the respective regions are not essential and, secondly, the market fluctuations are too marginal to derive trends.

The next two figures show a sample size of the Top 50 MLA from 2000 up to 2014. Considering that there were 270 MLA in the project finance market in 2014 and that the Top 50 MLA already provide almost 80% of the total commitment, this sample size shows the essential role of banks in the project finance market. Even though the commitment immediately collapsed by 56% from 2008 to 2009, the market share of the Top 50 MLA remained constant at about 75%. In this context it should be noted that the Top 50 MLA are the most essential and at once influential group in the market which have been operating for years and with their experience improved the business processes. A direct link between the economic crisis and the Top 50 MLA commitment was first recognized in 2002 after the dot-com crisis and then again in 2009 after the financial crisis. A direct link between the Top 50 MLA commitments and the percentage of the total market is not clear. From this negative

finding it can be seen that the Top 50 MLA, independent of market fluctuations, are also holding a substantial share of the project financing market. In summary, it has to be noted that from more than 700 project finance banks only approximately the first 50 MLA banks have a significant stake in the project finance market and that this stake is independent of market fluctuations. These findings in connection with figure 36 »Top 50 MLA in relation to the total market«, which also presents the Top 50 MLA, gives further important results. In this figure the total commitment of the Top 50 MLA is linked with the average project commitment. With the assumption from the previous figure that these banks have an optimized and highly efficient project finance business units, a commitment between US$100m and US$150m for each project seems to be optimal. This batch size seems to be independent of the market situation, because within a strong and continuously growing economy from 2003 to 2008 the total commitment developed in a seriously disproportionate way compared to the average commitment. On the other hand, in the economic crisis in 2009 the total commitment fell disproportionately compared to the average commitment. At first glance, this information seems to be irrelevant, but in the context of Basel III, the new capital requirements and the leverage ratio, such amounts easily add up to a critical size within the total business unit. If this ratio tilts, this will also have an impact on the profitability.

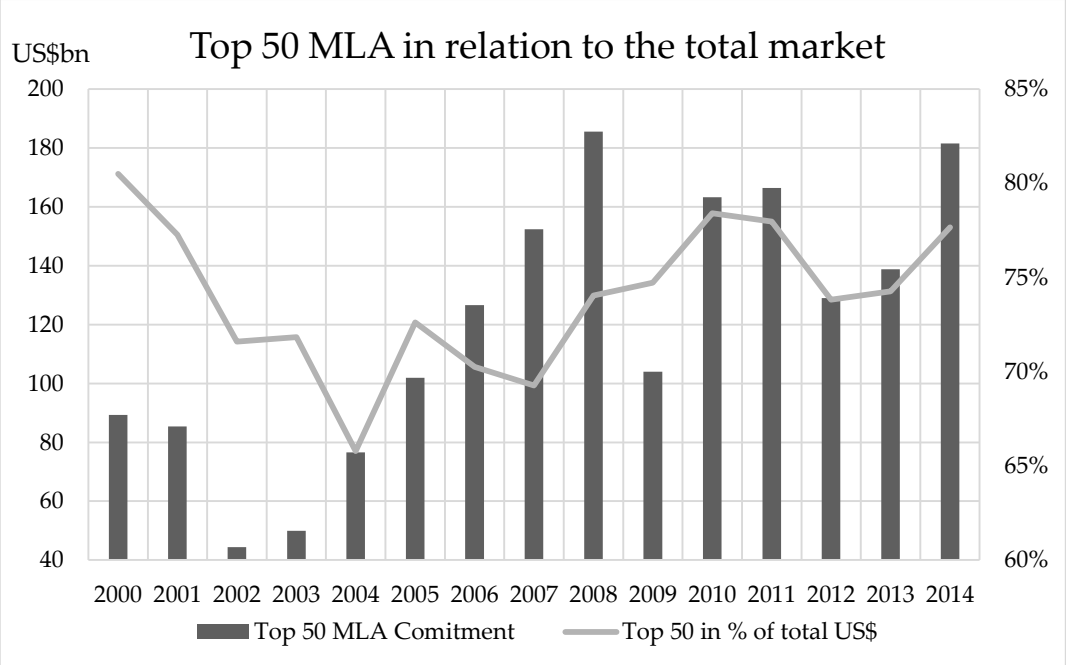


Figure 36: Top 50 MLA in relation to the total market (Source: own representation based on Thomson-Reuters (2001, 2002, 2011, 2012, 2013, 2014, 2015, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010))

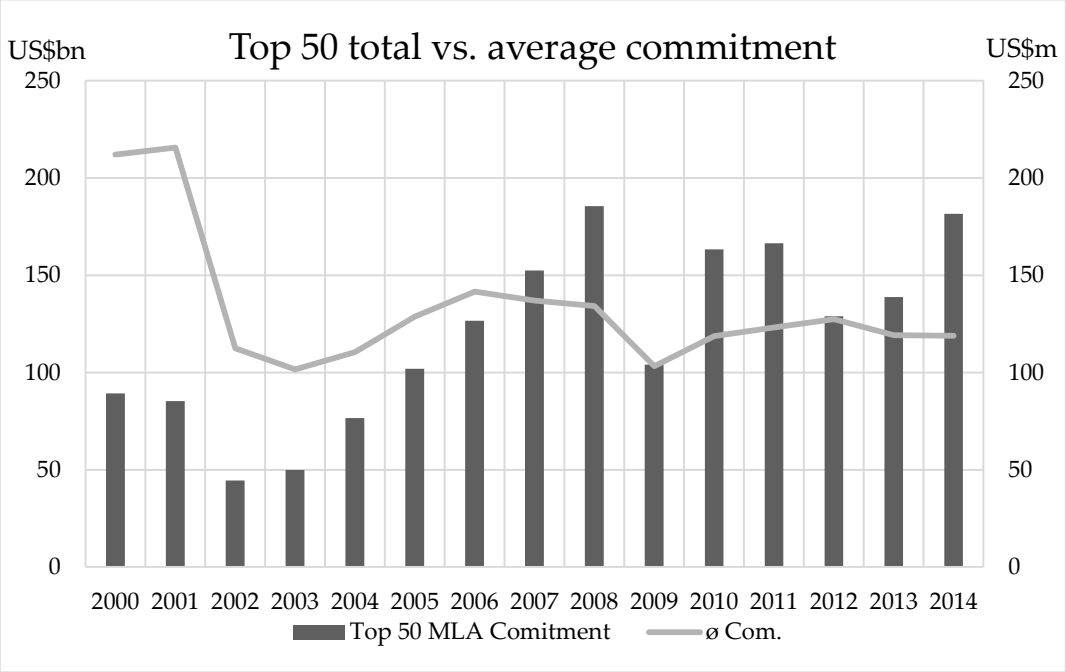


Figure 37: Top 50 - total vs. average commitment (Source: own representation based on Thomson-Reuters (2001, 2002, 2011, 2012, 2013, 2014, 2015, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010))

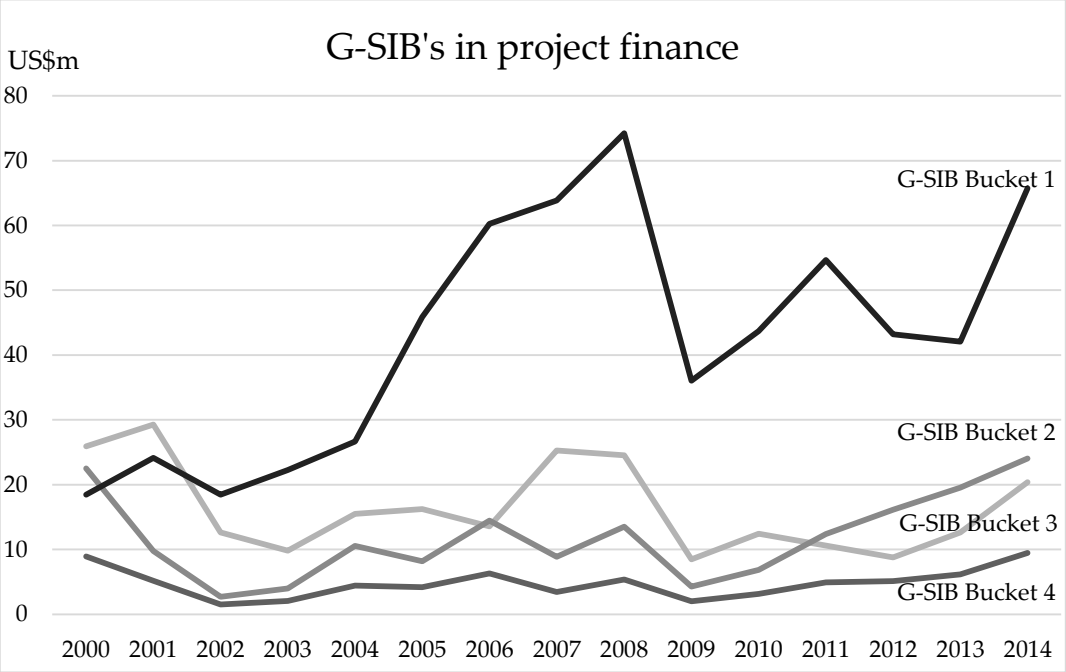


Figure 38: G-SIB's in project finance (Source: own representation based on Thomson-Reuters (2001, 2002, 2011, 2012, 2013, 2014, 2015, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010))

The figure above show the G-SIBs in the project finance market. As of November 2015 a total of 30 commercial banks form the G-SIB list. All of them are represented in the project finance sector with different engagements. The list includes 19 Bucket 1 banks, five Bucket 2 banks, four Bucket 3 banks and two Bucket 4 banks. This relationship is also accurately reflected in the figure above. However, it cannot be derived that Bucket 4 banks withdraw more from the project finance market than the Bucket 1 banks, because of the principle 'more banks more project finance'. The sample size of just two Bucket 4 banks, just as the number of Bucket 3 and Bucket 2 banks is too small to divide the total amounts of each bucket by the number of banks to obtain an arithmetic medium. Furthermore, the G-SIB framework conditions have only been published in recent years and they should be fully implemented after a transitional period in 2019. Thus, the initial impact of these regulations has not been captured yet in the figure above. Consequently, the following information can be taken from the figure: The G-SIB regulations relate to all Bucket category banks that are active in project finance sector.

The table below is divided into two time-period columns. On the left hand, there are the Top 50 MLA banks before the financial crisis from 2000 to 2008. The basis of the Top down order is the sum of the total project finance commitment of each bank within this schedule. On the right hand, the same structure was used but with the Top 50 MLA after the financial crisis from 2009 to 2014. Since the focus of the following analysis of the table is not based on total commitment amounts, the different time-periods are irrelevant. Therefore, and in order to ambiguities, the illustration is shown in percentage. Another piece of information included is the banks' depreciation in relation to the financial crisis. This information originates from the Bloomberg Terminal and was linked manually to the Top 50 MLA. The amount of depreciation is fix and has not been changed before or after the financial crisis. The monitoring aims should identify whether banks with high depreciation have reduced their stake of commitment within project finance. This would create a direct relationship between equity and project finance. Primarily the table should help to identify these shifts better. Then, the relationship between the depreciation and the shifts should become clear. It becomes obvious that some of the Top 50 MLA with depreciations are no longer listed post-financial crisis. Pre-financial crisis, there were 38 MLA with depreciation among the Top 50 MLA. Post-financial crisis, there are only 32 MLA with depreciations left, i. e. 6 banks less. The total depreciation of the Top 50 MLA until 2008 was US$771.3bn and thus amounted to 39% of the global depreciation of US$1,992.8bn. Starting with the depreciations of US$771.3bn pre-financial crisis, the depreciation reduced post-financial crisis by US$76.6bn, i.e. by almost 10% with the departure of 6 MLA. The total commitment

of the Top 50 MLA until 2008 amounted to US$1,019.5bn. Banks with depreciations take a share of that total amount of 87.4%. The total commitment of the Top 50 MLA post-financial crisis amounts US$703.9bn. Banks with depreciations take a share of that total amount of 63.9%. This is a reduction of 23.5% of the market share of banks with depreciations in connection with the financial crisis. Consequently, banks with depreciations have a significantly lower commitment post-financial crisis. The conclusion should not be that project finance has proven to be a high-risk financing construct during the financial crisis. It has already been described in detail in section »2.4. The financial crisis« that project finance even in times of crisis is a secure financing construct with losses lower than in the corporate sector. The conclusion to be drawn from the above-mentioned shifts is that the project finance is a very capital intensive finance form from the banks' point of view. Thus banks and especially their project finance business unit react very sensitively to capital reductions through depreciations or, on the other hand, to an increase in capital requirements through Basel III. (Bloomberg, 2015; Thomson-Reuters, 2014)

Table 34: Top 50 MLA's before and after the financial crisis (Source: own representation based on Bloomberg (2015; 2014)

Top 50 MLA's	Depreciation in US$bn	PF-Com. in % of total 2000-2008	Top 50 MLA's	Depreciation in US$bn	PF-Com. in % of total 2009-2014
BNP	18.8	7.5%	State Bank of India	0.0	11.9%
RBS	72.6	5.9%	BoT Mitsubishi UFJ	3.4	6.1%
Citigroup	142.7	5.3%	SMBC	1.7	5.0%
Societe Generale	15.3	5.1%	Credit Agricole	7.7	4.4%
Credit Agricole	7.7	4.9%	BNP	18.8	3.7%
WestLB	3.1	4.2%	Mizuho	6.9	3.5%
Mizuho	6.9	3.6%	Societe Generale	15.3	3.2%
BoT Mitsubishi UFJ	3.4	3.1%	ID Bank of India	0.0	3.2%
SMBC	1.7	3.0%	Axis Bank	0.5	3.0%
Dexia	5.6	2.8%	ING	15.8	2.5%
Credit Suisse	23.4	2.8%	Korea Develop.Bank	0.0	2.5%
ABN AMRO	1.8	2.8%	HSBC	56.0	2.4%
Barclays	40.7	2.6%	Bilbao Vizcaya	10.6	2.4%
Unicredit	22.8	2.6%	Santander	26.0	2.3%

State Bank of India	0.0	2.5%	IDFC	0.0	2.2%
Santander	26.0	2.3%	Unicredit	22.8	2.1%
HSBC	56.0	2.3%	Natixis	7.2	2.1%
Bilbao Vizcaya	10.6	2.2%	Standard Chartered	0.6	2.0%
Commerzbank	13.6	2.2%	CBA	0.0	2.0%
ING	15.8	2.0%	NBA	0.0	2.0%
BoA Merrill Lynch	171.4	1.9%	RBS	72.6	1.9%
JP Morgan	75.9	1.8%	ANZ-Bank	2.8	1.8%
Deutsche Bank	19.9	1.6%	Bank of Taiwan	0.0	1.7%
ANZ-Bank	2.8	1.5%	China Develop.Bank	0.0	1.7%
Korea Develop.Bank	0.0	1.5%	Lloyds Bank	3.3	1.5%
Intesa SanPaolo	8.0	1.4%	Barclays	40.7	1.4%
Standard Chartered	0.6	1.4%	ICICI	0.0	1.4%
Bankia	0.0	1.4%	KfW IPEX-Bank	0.0	1.4%
Goldman Sachs	9.1	1.1%	WestLB	3.1	1.3%
Hypo Real Estate	5.7	1.1%	Westpac	0.0	1.2%
Bank of Scotland	0.0	1.1%	Deutsche Bank	19.6	1.2%
HSH Nordbank	3.3	1.1%	Dexia	5.6	1.2%
Novo Banco	0.0	1.1%	Citigroup	142.7	1.1%
Natixis	7.2	1.0%	RBC	9.1	1.0%
RBC	9.1	1.0%	Intesa SanPaolo	8.0	1.0%
NAB	0.0	0.9%	DBS	0.0	0.9%
CBA	0.0	0.9%	Bayern LB	15.1	0.9%
Caixa Geral	0.0	0.8%	Bankia	0.0	0.8%
HBOS	26.8	0.8%	NordLB	0.5	0.8%
Gulf Intern.Bank	1.0	0.8%	Credit Suisse	23.4	0.8%
Bayern LB	15.1	0.7%	Scotiabank	0.0	0.8%
KBC Group	11.9	0.7%	Bank of China	5.0	0.7%
KfW IPEX-Bank	0.0	0.7%	OCBC	0.0	0.6%
Lehman Brothers	16.2	0.7%	la Caixa	0.0	0.6%
Lloyds Bank	3.3	0.6%	BoA Merrill Lynch	171.4	0.6%
Kookmin Bank	0.0	0.6%	DNB ASA	8.9	0.6%
Scotiabank	4.6	0.6%	CIBC	9.2	0.6%
Banco	0.0	0.6%	Standard Bank	0.0	0.6%

Com.Portugues					
ICBC	6.4	0.6%	JP Morgan	75.9	0.6%
Westpac	0.0	0.6%	Caixa Geral	0.0	0.6%
Total of this table:	**771.3**	**100.0%** of US$ 1,019.5bn	**Total of this table:**	**694.7**	**100.0%** of US$ 703.9bn.
Of total depreciation:	**39%** of US$ 1,992.8bn	**87.4%** only banks with depr.	**Of total depreciation:**	**35%** of US$ 1,992.8bn	**63.9%** only banks with depr.

As already mentioned, project bonds and IDFI have now been established become a complement to the commercial project finance bank loan. The PFI - Project Finance International has considered these supplements since 2009 in their LEAGUE TABLES and further differentiates IDFI by their funding location in developed and developing countries. The figure below shows a continuous increase in the sum of project bonds and IDFI. Since 2013 project bonds have taken a much more relevant share in percentage of the total financing complements. An interesting trend can be seen in the isolated view of IDFI in developed countries in 2012. The worldwide demand for commercial project finance bank loans declined significantly in comparison to previous year. It seems that the IDFI tries to counteract this crisis with an increased, almost doubled credit provisioning. When in 2013 the total demand increased again, the IDFI reduced their commitment significantly.

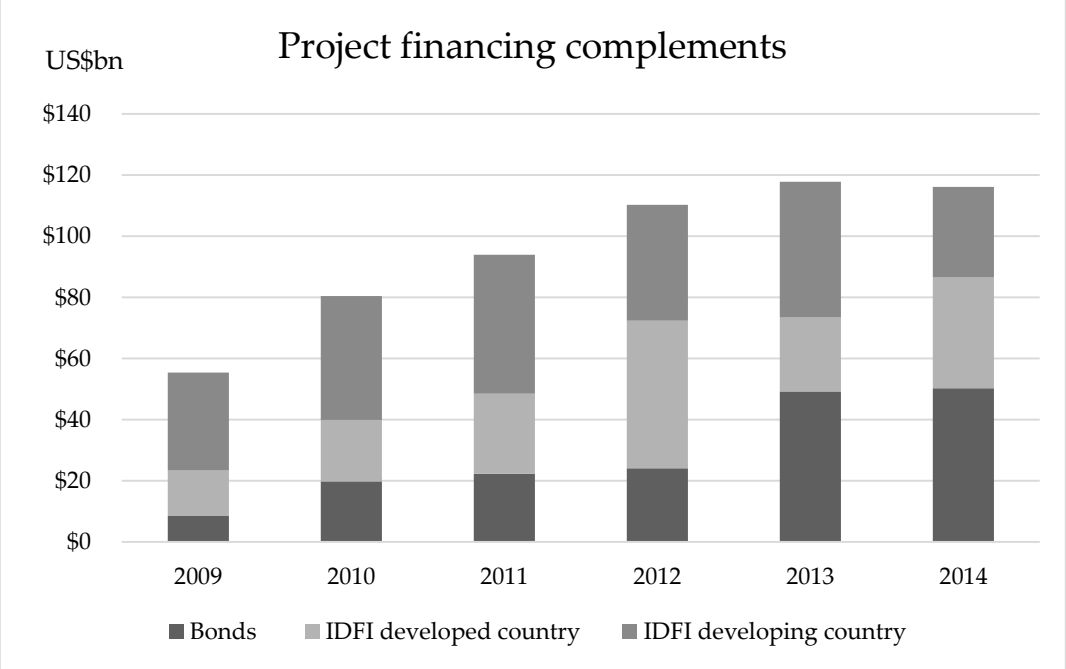


Figure 39: Project bonds and IDFI's (Source: own representation based on Thomson-Reuters (2010, 2011, 2012, 2013, 2014, 2015))

To provide further input regarding the figure above, the figure below illustrates the market share of project bonds and IDFI. From 2009 to 2011, the proportion of project bonds and IDFI is together at about 30%. With an IDFI share of 30% and another share of 8% for project bonds, the total share increased to 38% in 2012. The decrease of the IDFI in 2013 and 2014 was compensated by project bonds, so that the additional project finance complements remain at a relatively high level. In the figure below, the decline on the project finance market in 2012 and the counteracting of the IDFI is clearly visible. It cannot be determined how strong the decline of the project finance market would be without the influence of IDFI. On the other hand, it cannot be determined at this point either how much power the IDFI would have had in a greater crisis of the project finance market or a long-term reduction of the project finance market if it hadn't been for Basel III.

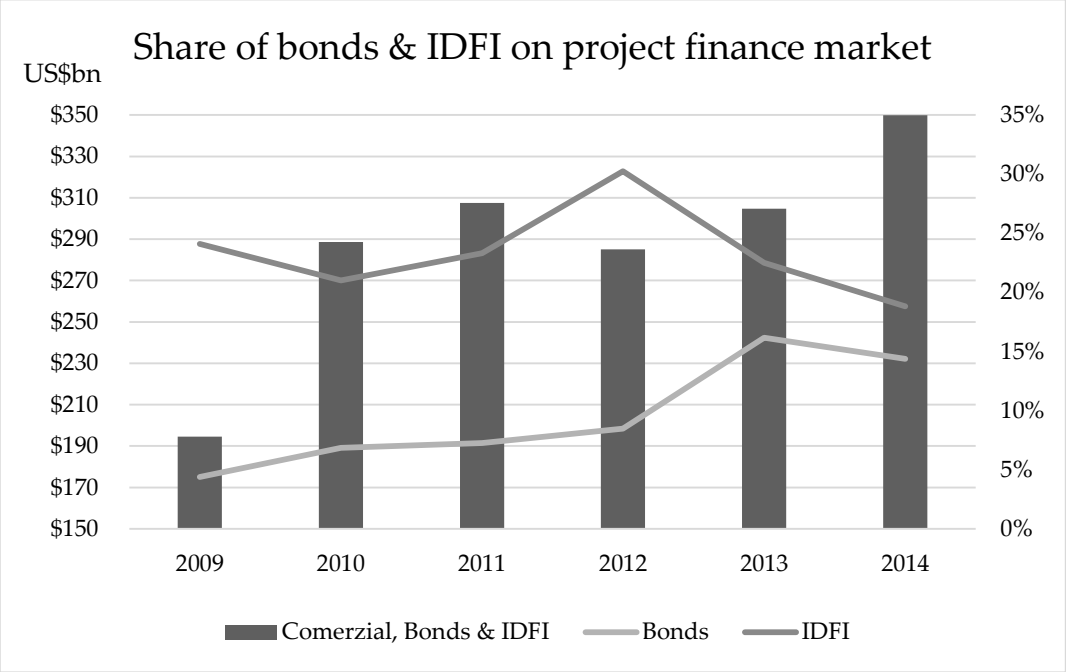


Figure 40: Bonds and IDFI market share (Source: own representation based on Thomson-Reuters (2010, 2011, 2012, 2013, 2014, 2015))

4.2.3 Conclusion

The data analysis shows that the collecting of quantitative data and a careful preparation and presentation in charts and tables can provides new knowledge. Important is not only the knowledge gained from a single chart but also linking of the findings between the charts and tables. The focus was on knowledge acquisition, but it was also important to collect questions which can be answered by another variable. These questions can possibly be answered later in the overall analysis of all cases or in the context of the expert interviews and thus provide new insights. Also, the exclusion of a variable is a knowledge gain. So spill-overs from sectoral effects onto the project finance market can be excluded. The fact that fracking in the US caused a strong increase of the Oil & Gas sector in 2014 is confirmed by an increase of the project locations in North America and also by an increase of the MLA locations in North America. Overall, this led to a slight increase in the total project finance market from 2013 to 2014.Very striking is the sharp drop of the project finance market in India. This concerns both the MLA locations and the project locations and it confirms that India has a very national market with only a few active foreign banks and there are few domestic banks

doing business abroad. Projects in Asia remain sound with Asian banks continuously increasing their commitment in project finance. It has to be clarified whether foreign banks withdraw from the Asian market and local banks compensate the difference, or whether Asian banks increasingly participate in project financings in foreign countries. A further result is that from more than 700 project finance banks only approximately the first 50 MLA banks have a significant stake in the project finance market and that this stake is independent from market fluctuations. The figures show that an optimal commitment is between US$100m and US$150m for each project. This batch size is independent of the market situation. Furthermore, it cannot be derived that the Bucket 4 banks are withdrawing more from the project finance market than the Bucket 1 banks. Banks with depreciations have a significantly lower commitment post-financial crisis. In addition, project finance is a very capital intensive finance form from the banks' point of view. Thus banks and especially their project finance business unit react very sensitively to capital reductions through depreciation or to an increase in capital requirements through Basel III. Another finding is a continuous increase in the sum of project bonds and IDFI. The IDFI tries to counteract this crisis with an increased, almost doubled credit provisioning.

4.3 LITERATURE REVIEW

The literature review is the third of three cases. In order to ensure the claim of scientificity, the precise method, which has already been established in the literature, is first described in detail theoretically and afterwards transferred into the practice.

4.3.1 Theoretical adjustment of the literature review

Literature review, in this case, also means data analysis, which is based on qualitative data from texts. The literature review follows an empirical-qualitative exploration within a scientific context. The fact that Basel III is already in implementation and based on the assumption that further non-quantitative data exist, this qualitative data material should support the case study research. This is synonymous to the empirical-quantitative exploration. In the empirical-qualitative exploration at first the data source has to be determined and then the exploratory

qualitative data analysis is carried out. In this case, it is not just another form of data, but it is also a different data source compared to the quantitative data analysis. The distinction between different data sources and evaluation methods ensures a stable triangulation. Empirical-qualitative exploration strategies use quantitative data from various sources to generate new economic findings and hypotheses. The open form of qualitative data collection increases the probability to obtain new insights into a subject from detailed material. By a special presentation and analysis of qualitative data, the empirical-qualitative exploration supports previously unrecognized phenomena as well as effective connections and processes. (Döring, Bortz, 2014) In this exploration strategy lies the hope, to not only determine the change in the project finance market, but also to develop new or additional financing techniques.

As with quantitative data, qualitative data can be resorted using existing data, third-party data collections or own data collections. The present study uses existing data from different databases. While quantitative data is available as electronic datasets in data archives, qualitative data, in particular texts, is basically available everywhere. This data source draws on texts that are natural and unaffected from the research process and are often in collected form readily accessible in archives or libraries. The classical test theory: objectivity, reliability and validity as central quality criteria of quantitative measurements can also be used in qualitative research in a modified form. (Altheide, Johnson, 1994; Kirk, Miller, 1986) Objectivity means interpersonal consensus that different researchers come to similar conclusions when they examine the same facts by the same methods. This requires a precise description of the methodological approach (transparency) and a certain degree of standardisation. Whether evaluators or interpreters agree is seen as a validity problem in qualitative terminology. Only if there is an intersubjective consensus among evaluators can an interpretation be considered valid and scientifically substantiated. As in quantitative research, validity is also the most important quality criterion of data collection in the qualitative approach. However, the most important criterion of validity is the interpersonal consensus (consensual validation). If several people agree on the credibility and meaning content of the material, this is considered as evidence of its validity. (Kirk, Miller, 1986; Mayring, 2010; Scheele, Groeben, 1988)

Data collection comes before data analysis and evaluation. Quality material in the form of texts can be evaluated both quantitatively and qualitatively. For a complex subject of investigation theoretically, the variety of the material has to be

organised as impartially as possible, without destroying or distorting the structure of the article. An initial overview provides »inventories« that contain collections of the important aspects or elements of the subject of investigation. Then types or structures can be formed which describe the arrangement of the individual elements and typical feature combinations. Facts are highly dynamic, so that processes have to be reconstructed. Causes and reasons for the events within the process have to be located. The aim is to explore entire systems that hypothetically explain the whole subject of investigation in its various manifestations and interactions. The literature review within the context of this case will be evaluated and interpreted using the qualitative content analysis. With the variety of methods the technique of the selected method has to be sensibly adjusted to the investigation material. Thus, the methods are only a rough guide for a series of evaluation steps. Qualitative evaluation methods interpret verbal and non-numeric material and act in intersubjectively comprehensible steps. Valid interpretations must be consensus that means, accepted by several investigators or experts as appropriate interpretations. (Legewie, 1994; Oevermann et al., 1979) The literature review in this work is based on the example of the global-evaluation-method whose components are briefly outlined in the figure below:

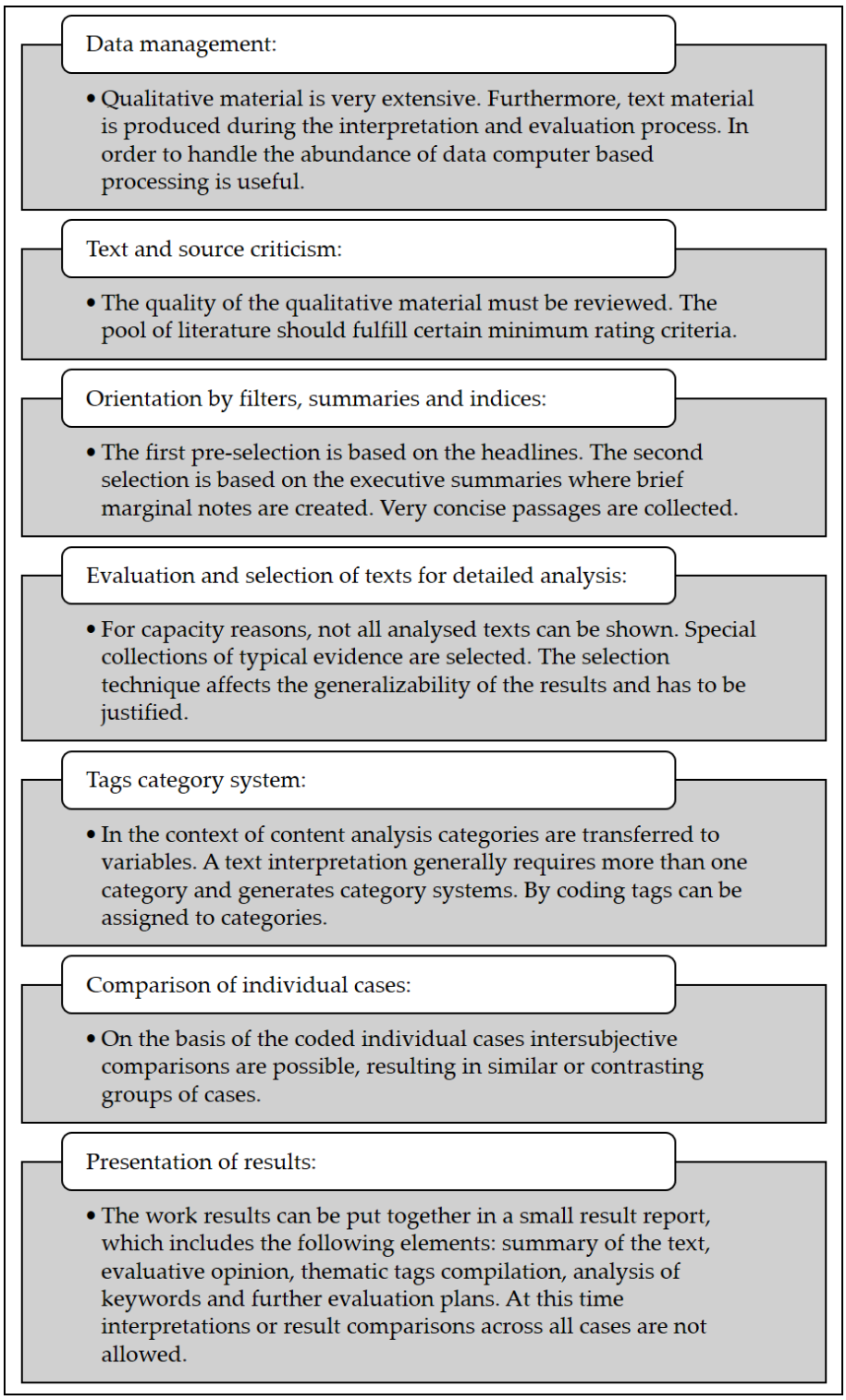


Figure 41: Global evaluation (Source: own representation based on Dö ring, Bortz (2014))

Within the validation of interpretation results two issues are import:

- The validity of interpretations - internal validity.
- The generalizability of interpretations - external validity.

Just as in the validation of data, the interpersonal consensus is used as a criterion in the validation of interpretations. It is not necessary for consensus to be reached right at the beginning, but it can be achieved in the course of professional discussions. Therefore, external specialists and experts should be also consulted in order to avoid thinking fixed patterns of thinking that the researcher may have formed. If consensus cannot be achieved, this should be made transparent in the final report. Several alternative explanations have to be presented. An interpretation should be systematically reviewed using an alternative interpretation approach. (Gerhardt, 1985; Scheele, Groeben, 1988)

While generalizability within quantitative research is accomplished by sampling-parameters of populations, the qualitative research uses the concept of »exemplary generalization«. (Döring, Bortz, 2014; Wahl et al., 1982) Thus, here the representative character is also examined for each individual case. The expert interviews, which were carried out as part of the review of internal validity, also are to assess the representative character of the external validity. Accordingly, the results of all three cases are summarised and only then validated in expert interviews. In order to ensure the claim of scientificity, the precise method of expert interviews is described in detail in chapter 5.1.

4.3.2 Analysis of early indications of changes in the project finance market

After the theoretical adjustments of the literature review were presented, now follows the practical implementation. This is a detailed description of the fundamental individual process steps. The orientation is carried out strictly according to figure 41 »Global evaluation« from the previous chapter. The first step is the selection of the databases. For most databases access permissions are required. Access to a variety of databases was realized through guest passes at two universities and at the German National Library of Economics »ZBW«. A large number of databases was used to meet the requirements of triangulation. In view of the variety of available databases the following first filter were set: The subsequent research focuses exclusively on databases with the discipline

»Economics«. This filter limited the databases to 21. In the next step keywords had to be defined for a standardised research within the database. The keywords were defined with the help of the following mind map.

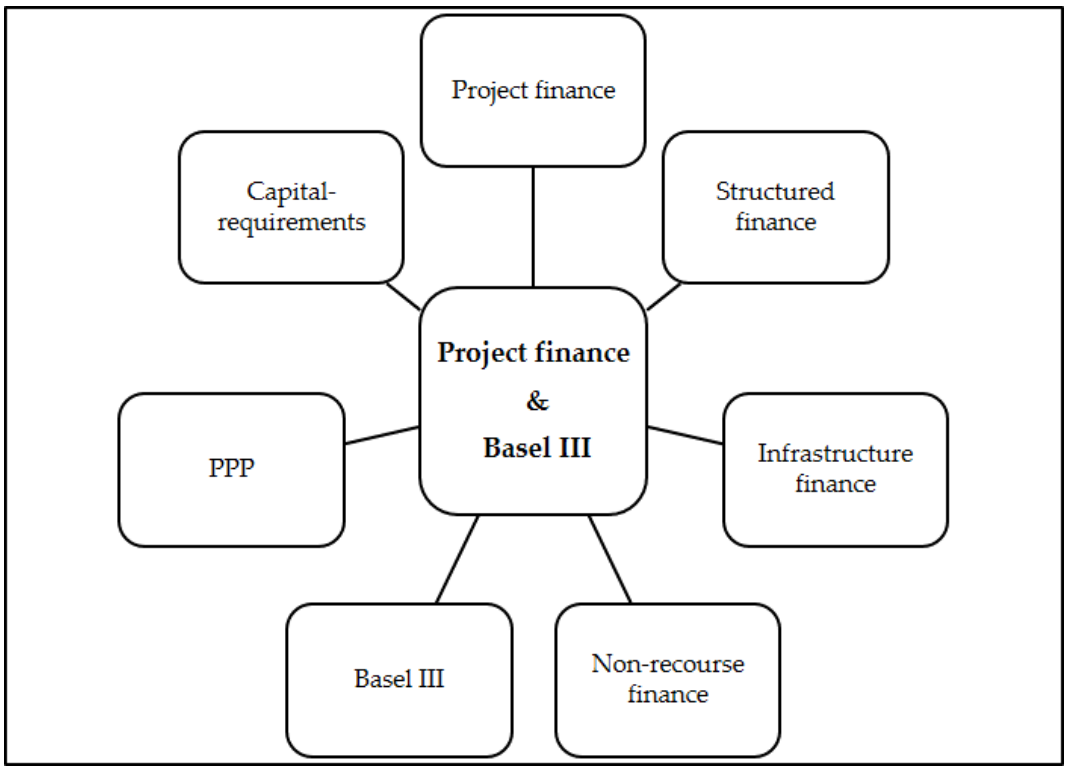


Figure 42: Mind map for database keywords (Source: own representation)

All nine keywords were entered separately or by an »or« function. More filters were set where possible: Full text; References available; Scholarly (peer reviewed) journals, and published in June 2011 (the publication date of Basel III) or later. The search in all databases was carried out on 12 November 2014. In all, the search returned more than 3000 hits. So far, a computer-based processing has not been useful, but a structured and systematic investigation is still very important. For this reason, the first selection process was based on a careful categorisation of the headlines into the following categories: relevant, uncertain and irrelevant. After reading the executive summaries, entries in the »uncertain« categories were directly added to one of the other two categories. This selection process reduced the huge number of journals to just over 600. In a further step, all executive summaries were read and the headlines and the associated authors collected with

computer-based processing. The computer-aided collection eliminated double entries of journals included in multiple databases. After this selection process 71 journals from seven databases remained. These journals were all read from beginning to end, market with keywords and collected in an Excel spreadsheet with the related journal rating note. An important factor in the qualitative research is the quality, the validity and reliability of the collected data. Therefore, within the meaning of triangulation were collected only keywords that occurred at least twice independently. To achieve the highest possible quality, at least one journal in the respective group of keywords had to be rated C or better. The VHB-Jourqual, the Association of Business Schools and the Journal quality list ensure as rating agencies the quality of the selected journals. (Harvey et al., 2010; Harzing, 2014; o. J.) Moreover, the few monographs were rated according to their publishers. This was based on the »SENSE Ranking of Academic Publishers« list. The table below show the remaining 11 journals, 9 monographs and their associated rating and keywords.

Table 35: List of keywords and their associated rating and reference (Source: own representation)

Keyword	Rating	Reference
Basel III in context with Project finance	B	Yescombe (2013)
	B	Liang (2012)
	E	Kraus (2013)
	E	Jacob et al. (2013)
	E	Brodehser, Kleiner (2013)
The potential of project finance	B	Tan (2014)
	E	Kraus (2013)
	E	Möglich, Raebel (2014)
Standardisation	B	Finnerty (2013)
	E	Ehlers (2014)
	E	Newzella (2013)
	E	Jacob et al. (2013)
Separation of project phases	B	Yescombe (2013)
	B	Vinter et al. (2013)

	E	Ehlers (2014)
	E	Möglich, Raebel (2014)
Development Banks	A	Leader, Ong (2011)
	A	Dewar (2011)
	B	Scannella (2012)
	B	Hellowell, Vecchi (2013)
	E	Möglich, Raebel (2014)
	E	Jacob et al. (2013)
Project bonds and funds	A	Dewar (2011)
	B	Tan (2014)
	B	Vinter et al. (2013)
	B	Scannella (2012)
	E	Newzella (2013)
	E	Möglich, Raebel (2014)
	E	Zenke (2012)
Institutional investors	B	Vinter et al. (2013)
	E	Brodehser, Kleiner (2013)
	E	Zenke (2012)
Rating	B	Finnerty (2013)
	B	Buscaino et al. (2012)

First of all, the keywords showed that the literature review did not present any world innovations. All keywords are known and have already been defined at the beginning of this work. However, by certain modifications or combinations new opportunities and trends in project financing were determined. Here, the combinations could not always be as clearly defined as the keywords in the table above. This also shows the multiple nomination of authors under different keywords. In the following, the logical combinations will be summarised and the

gained new insights explained in detail.

The potential of project finance and Basel III

All authors agree regarding the impact of Basel III and especially its impact on project finance: Basel III will have a negative impact on project finance and that particularly due to the high financing volume, the long loan maturities and the rather average rating. (Jacob et al., 2013; Kraus, 2013) However, no accurate calculation spreadsheet detailing a possible impact of Basel III as in the first case study was provided. What was presented, though, were the growth rates of capital requirements between 2% and 7%, but no calculation basis for these values was provided. (Yescombe, 2013) The great potential of project finance in the future is undisputed. On the one hand, the literature speaks of a significant funding log jam in infrastructure in recent years and, on the other hand, studies are cited that there is an enormous need for investment up to 2020. (Möglich, Raebel, 2014; Tan, 2014) These are no solutions but important framework conditions which are essential to finding solutions. It is important to know that there will be a demand for project finance in the future, because it would not make sense to find a solution for a product without demand. Furthermore it is important to know exactly which problems will affect project finance market in the future and to find effective solutions to prevent these problems at an early stage. In general, all authors agree that there is no better financing form for large-scale projects than project finance. The distribution of risks on competences has always proven itself in the past and the achievable yields for equity and debt capital providers are very attractive. Scannella (2012) is of the opinion that "A new regulatory framework, more friendly with long-term investments, should involve accounting standards, prudential principles, corporate governance, and fiscal incentives" On the one hand, the regulatory framework of Basel III will be in its trial period until 2019, so that changes and adjustments can still be made. On the other hand, there is hardly any resistance, neither from scientists in the literature nor from those involved in politics, so that changes or adjustments especially for long-term project financing are not expected, not even by the Bank for International Settlements.

Standardisation, separation of project phases and ratings

Ehlers (2014) is convinced that "a major reason for the apparent mismatch between infrastructure investment demand and the supply of infrastructure finance is the lack of a pipeline of properly structured projects." Furthermore he says that fix costs for project finance experts, who can handle these complex

structures, could be an entrance barrier for possible investors, when such a pipeline and consequently a guarantee of follow-up projects is not ensured. "Creating a pipeline of suitable projects requires a coherent and trusted legal framework for infrastructure projects." (Ehlers, 2014) With this pipeline also the typical different project phases have to be considered. Ehlers (2014) says that "Each phase exhibits different risk and return characteristics, and each faces different incentive problems and calls for a different role for governments, banks and capital markets. Hence, each phase requires a different mix of financial instruments to cover different risk and return profiles – and so targets different types of investors." This type of financing is also known as »mini-perm financing« and for the participants always includes a follow-up financing risk and interest rate risk. (Jacob et al., 2013; Newzella, 2013) Möglich, Raebel (2014) point out that bonds are often protected from monoline insurers by a so-called »wrap«. This wrap leads to a rating-uplift which is often necessary to meet the investment grade qualification which the project structure itself would not fulfil. With the financial crisis such a rating uplift by means of wrap was no longer possible due to the downgrading of most monolines. As a result, this led to an emission slump of project bonds.

Institutional investors, project bonds and funds

Compared to banks, institutional investors (such as insurance companies, pension funds) have an adverse maturity transformation risk. They take very long-term deposits (mostly over 30 years and more), but they usually only find very short-term investments for these deposits. They are therefore particularly suitable to accompany infrastructure financing. However, the insurance companies mostly do not have the required expertise to handle the complexity of these transactions. Because of this lack of know-how they are unable to structure, analyse and to follow up this type of financing. Against this backdrop, a cooperation of banks and institutional investors might be an option. (Scannella, 2012; Zenke, 2012) Banks provide the structuring expertise, while the institutional investors accompany the financing of long-term liquidity. This win-win situation is shown in the following figure:

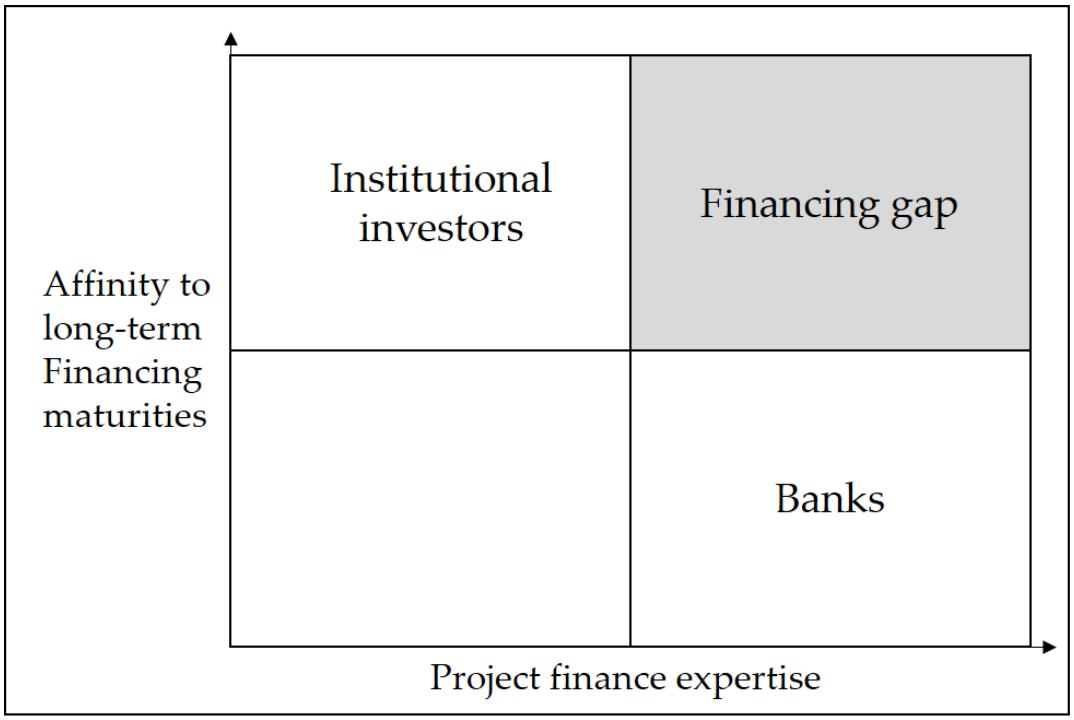


Figure 43: Win-win situation of a cooperation between a bank and an institutional investor (Source: own representation)

The involvement of institutional investors can be done in different ways in relation to the investment period and the type of investment. With respect to the timing, the above-mentioned advantages of a separation of the construction and operation phases apply. In addition to this, there are the following options for institutional investors to participate in a project:

- Participation in refinancing
- Participation in counterparty credit risk
- Participation in counterparty credit risk and in refinancing.

Within the scope of the participation in the refinancing, the institutional investor participates solely in the refinancing, i.e. in the funding of the project. The default risk of the project remains with the structuring banks. From the perspective of structuring banks a participation in the refinancing is always a good idea in constellations where the funding partner either has a better rating and the transaction benefited in this way from lower refinancing costs, or if the structuring bank cannot provide the refinancing funds to attractive conditions in view of the

long loan term. Here, the financing-related maturity transformation risk exceeds the risk taking of a bank. From the perspective of an institutional investor, a provision of refinancing funds without exposure to the counterparty credit risk is suitable when the investor is looking for an investment for his liquid assets, but has no own expertise in the analysis and evaluation of infrastructure and project finance risks. The investor can leave the structuring of the transaction entirely to the banks. An analysis of project risks is redundant, since the investor merely provides the refinancing funds for the transaction without participating in the project risk. Economically, the project financing risk of the underlying project is replaced by the corporate credit rating of the structuring banks. As shown, it has increasingly been the case that banks face high maturity transformation risks carefully due to regulatory reasons of Basel III. A participation of an institutional investor in the refinancing therefore represents an adequate opportunity to a demand for long-term financing even if the structuring bank is not able to provide the liquidity for the requested time period. (Brodehser, 2012; Dewar, 2011; Vinter et al., 2013)

Within the scope of the participation in the counterparty credit risk, the institutional investor participates exclusively on counterparty credit risk of the project; the refinancing of the project rests with the structuring banks. From the point of view of banks a participation in the counterparty credit risk is suitable in those cases where the banks continue to provide liquidity or refinancing for the project, but at the same time would like to reduce their counterparty credit risk with respect to the transaction. This may have transaction-based, cross-transaction-based or even bank-related reasons and the decision is based on the bank's individual risk profile for a project. From the perspective of an institutional investor a participation in the counterparty credit risk of a project without provision of the refinancing only makes only sense if that the investor already has the appropriate expertise to evaluate transaction or project financing risks sufficiently, but does not wish to provide liquidity. This uncommon case applies to the investment units of large institutional investors which are specialized in alternative investments. (Möglich, Raebel, 2014; Tan, 2014)

In case of an institutional investor's participation in both counterparty credit risk and in refinancing, both areas are fully passed on to him. From the structuring bank's point of view, in this form of participation the motivation is the same as for a participation in the refinancing only. Nevertheless, the institutional investor should have a sufficient expertise in the analysis and evaluation of infrastructure and project finance risks. It is not necessary for the institutional investor to maintain a comparable structuring expertise as the structuring bank because the investor can build on an already existing structure with his risk analysis.

In addition to the above participation model a variety of hybrid structures are conceivable in practice which often represent a combination of the above-mentioned participation models. The most likely hybrid structures should take place in financing projects in which the institutional investor participates in the transaction as early as the beginning of the construction phase and the first-time acquisition of debt. However, the structuring banks assume the counterparty credit risk up to a successful completion of the construction phase under a guarantee against the institutional investor. This design allows the banks to structure a transaction and to generate income from this structuring. In return they receive the refinancing of an institutional investor right from the beginning of the construction phase. Thus the banks do not run the risk of not being able to find an institutional investor for the transaction after completion of the construction phase. The long-term financing is concluded with the finalising of the structure. His long-term available cash allows the institutional investor to participate in an adequate investment with matching maturities and without participating in the relatively volatile construction phase. This risk is borne by the banks, which can rely on their expertise of extensive sector knowledge and are best able to assess the risk. Once the assets have stabilized, the funding is complete, i.e. the underlying counterparty credit risk has been transferred to the institutional investor. In the above situations the value contribution of the banks is primarily in the structuring power of the financed project, while the institutional investors provide liquidity for the entire duration of the financing. In addition to the above-outlined participation models are for an institutional investor in infrastructure financing even other services conceivable that are taken over by the banks for institutional investors. Because of their structuring-experience banks usually have an advantage in the ongoing management of credit exposure instead of institutional investors. So banks can support institutional investors in management of portfolios in project finance. The limited staff in project finance of institutional investors could focus on this way to the analysis and evaluation of new transactions, while the portfolio management is taken over by the banks. (Brodehser, 2012; Möglich, Raebel, 2014)

Development banks, project bonds and funds

Even (Scannella, 2012) believes that "The banking sector alone will not be able to provide the amounts of debt that are required by large-scale energy projects." Furthermore he thinks that the »Europe 2020 Project Bond Initiative« can be an effective countermeasure, which supports banks in the long-term project financing. It is a credit support measure promoted by the European Commission and provided by the European Investment Bank. This support, presented in detail below, is even transferable to the many new programmes of other development banks, e.g. »AIIB – Asian Infrastructure Investment Bank« and the »NDB – New Development Bank BRICS«. The financial support aims to assure long-term financing for infrastructures. The focus of support measures are infrastructure projects in transport, energy and communications. The financial support could take the form of an additional layer of debt at the subordinated level or a debt service guarantee. The debt service guarantee can be obtained in the form of a contingent credit line provided to the project entity. The project company issues project bonds on the capital market to finance an infrastructure project and private investors, which are usually institutional investors, buy these project bonds. Then the project company repays the bond from its current revenues. Only if the bond cannot be serviced by the current revenues does the guarantee come into effect and the holders of the bond will be serviced by the guarantee payments to the maximum of the previously determined guarantee sum. With the additional debt at the subordinated level credit to the project company to the maximum amount of 20% of the investment sum can be issued. The credit is an alternative to payment guarantees and both forms of credit enhancement can lead to an upgrade of the rating of the project. This leads to an improved rating of project bonds and gives the chance to raise funds in the bond market at low interest rates. The credit enhancement will be useful to both accelerate financial close of bankable projects and to make bankable other projects. (Leader, Ong, 2011; Scannella, 2012) The figure below shows a combination of both alternatives.

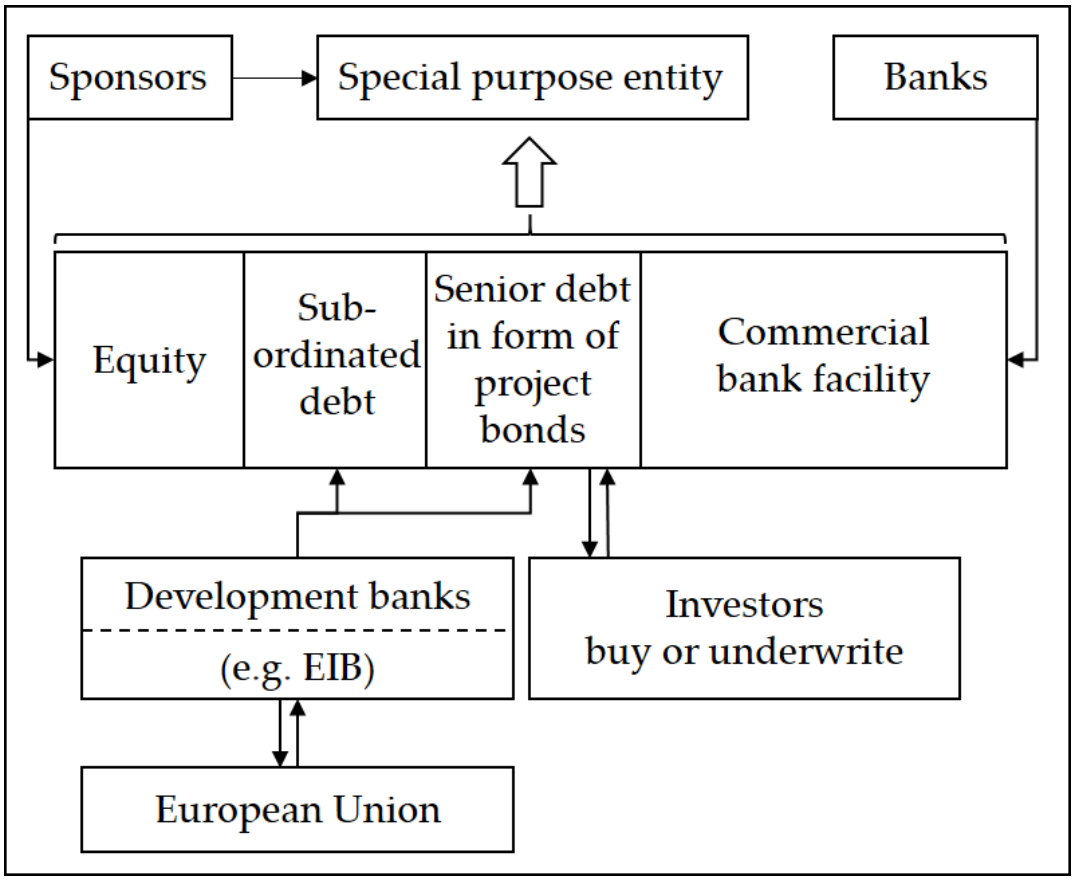


Figure 44: Europe 2020 Project Bond Initiative (Source: own representation)

The European Union needs to assess the eligibility conditions that the project company is economically and technically sound and cost-effective, has stable and strong cash flows and has a real prospect of financial viability. This intervention will enhance the credit quality of the senior bonds, thus making these bonds eligible for the portfolios of institutional investors. Improved ratings by public payment guarantees or credits encourage the participation of private investors. Scannella (2012) thinks that "The credit enhancement is a powerful instrument to boost appetite on project bonds. (…) This promotes insurance companies, pension funds, and infrastructure funds, to buy project bonds." With regard to the regulatory treatment of EU project bonds for insurance investors EIOPA checked in their "Technical Report on Standard Formula Design and Calibration for Certain Long-Term Investments" of 19 December 2013 a reduction of the risk surcharge (spread shock) for EU project bonds. (EIOPA, 2005) Given the novelty of the EU project bonds, there is no performance history, and EIOPA considers itself unable

to analyse the data with an accuracy that could justify a reduction in the risk surcharge. From 2012 to 2014 only five projects were supported with credit enhancement facilities with an amount of around EUR498m by means of the Project Bond Initiative of the EIB. Currently, there are also three more projects in the pipeline, their potential credit enhancement by the Project Bond Initiative should be around EUR380m. (Möglich, Raebel, 2014)

4.3.3 Conclusion

In the latter case, the focus was initially on the collection and analysis of data. Access to a variety of databases ensured that the requirements for triangulation were met. Filters were set and keywords for the database-input defined. 71 journals were studied, findings with keywords selected and provided with the corresponding rating grade. For the triangulation only those keywords were selected that occurred independently at least twice. In terms of the quality, the validity and reliability of the collected data, at least one journal in the respective group of keywords must be rated C or better. Finally 11 journals and 9 monographs remained and the following scientific evidence was established:

Basel III will have a negative impact on project finance and that is particularly due to the high financing volume, the long loan maturities and the rather average rating. An accurate calculation was not presented. On the other hand, the great potential of project finance in the future is undisputed. This is explained with a significant funding log jam in infrastructure in recent years and an enormous need for investment up to 2020. A new or adjusted regulatory framework of Basel III especially for long-term project finance, will probably not be achieved.

A solution approach lies in the combination of standardisation, separation of project phases and project ratings. Standardisation could reduce fix costs for project finance experts which is an entrance barrier for possible investors. With the separation of the different project phases other financial types, e.g. mini-perm financing, are revived. By the downgrading of most monoline insurers as a consequence of the financial crisis rating-uplifts with wraps, which were often necessary to meet the investment grade qualification, were not possible anymore.

Another approach offers a cooperation of banks and institutional investors. The involvement of institutional investors can be done in different ways in relation to the investment period and the type of investment. In this win-win situation, banks provide the structuring expertise, while the institutional investors accompany the financing of long-term liquidity. The aforementioned advantages of separation of construction and operation phase will be realised. In practice hybrid structures are conceivable which often represent a combination of the above participation models. Furthermore, this way the limited staff in project finance of institutional investors can focus on the analysis and evaluation of new transactions, while the portfolio management is taken over by the banks.

Last but not least, the development banks support the infrastructure finance market with different financial measures. The European Investment Bank set up a programme called "Europe 2020 Project Bond Initiative" which can be an effective countermeasure to supports banks in the long-term infrastructure financing. The programme supports infrastructure projects in transport, energy and communications. Further development banks follow the EIB. The financial support could take the form of additional debt or a debt service guarantee. With the additional debt credit can be issued to the project company to the maximum of 20% of the investment sum. Both forms of credit enhancement can lead to a rating upgrade of the project company. This gives the chance to raise funds in the bond market at low interest rates. The credit enhancement will be useful to both accelerate financial close of bankable projects and to make bankable other projects. Another important support is to grant insurance companies easier access to long-term project bonds but the EIOPA considers itself unable to analyse the data with an accuracy that could justify a reduction in the risk surcharge.

4.4 CASE-CROSS-BORDER ANALYSIS AND EVALUATION OF RESULTS

Scientific case study research first requires a focused analysis of the individual case. An analysis has already been done within each of the conclusions at the end of the individual cases. In the following, a case-cross-border analysis and evaluation of the individual results of the single cases will be done. In doing so the results of the field research, the data analysis and the literature review will be usefully combined. This combination increases the internal and external validity and at the same time the reliability of the results. This stability will answer the scientific hypotheses and questions along a chain of evidence and exclusions, as in the figure below.

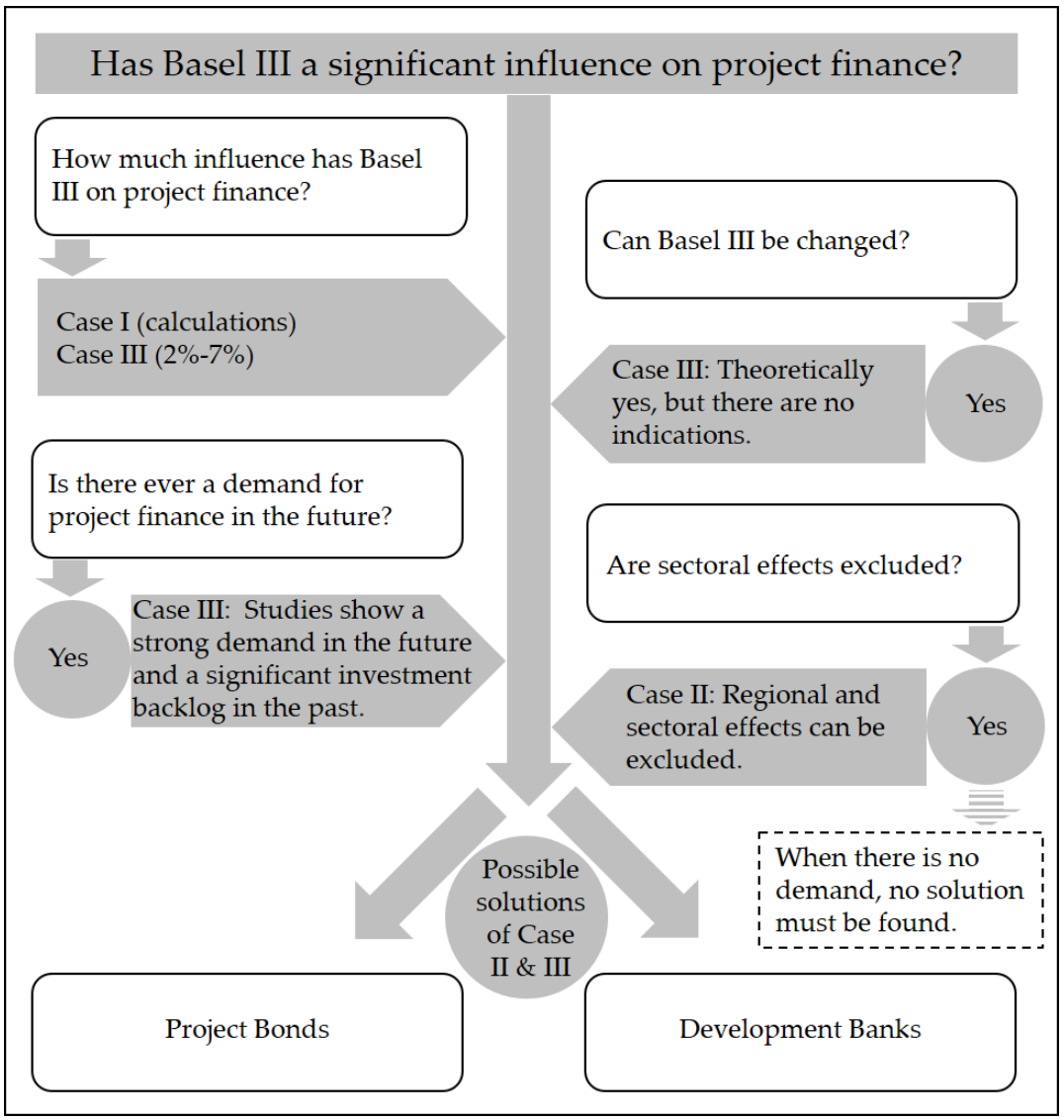


Figure 45: The chain of evidence and exclusions (Source: own representation)

The question of whether Basel III has any significant influence on project finance, was the starting point of this investigation. The aim is to generate not only a simple yes or no answer, but to obtain the most accurate understanding of the individual mechanisms, thus making the impact measurable. Finally, solutions and action alternatives will be presented.

In the first case, the combination of field and laboratory research shows the impact of the changing regulatory framework conditions on the commercial financial bank facility, which is the dominating financing form. On the basis of this comparison, the ROE in the project finance business is derived. A first result illustrates that the spread between two varying ratings under Basel II is lower than under Basel III and thus ratings are gaining importance under Basel III. Consequently, the demand disproportionately increases for projects with a better rating and the interest in projects with a lower rating disproportionately falls. Although this phenomenon applies to all investors, the impact gets greater as the banks increase in size. Furthermore, an increase in the gross margin leads to a disproportionate increase in the ROE. Hence there is no linear relationship between the gross margin and the ROE. Whether banks will still continue to be involved in the project finance business unit in view of such a drastic deterioration cannot be answered with this case. The findings from the field research are consistent with the findings from the literature review: Basel III will have a negative impact on project finance which is particularly due to the high financing volume, the long loan maturities and the rather average rating. Although an accurate calculation was not presented, the presumptions in the journals match the calculations of the field research.

Basel III is an ongoing process which will not be fully implemented until 2019. Furthermore, Basel III is based on Basel II which includes a lot of exclusive regulations for project finance. Therefore, there may be adjustments in the regulatory framework of Basel III, from which the project finance will automatically benefit as well as adjustments especially for project finance. However, according to the literature consulted a new or adjusted regulatory framework of Basel III especially for long-term project finance will probably not be achieved – Case III.

An important point is also the future development of demand for project financing under ceteris paribus conditions. The great potential of project finance in the future is undisputed and repeatedly emphasized in Case III. This is justified with significant funding log jam in infrastructure in recent years and an enormous need for investment up to 2020.

Case II, the data analysis, shows that the collecting of quantitative data and a careful preparation and presentation in charts and tables can provide new knowledge. Important is not only the knowledge gained from a single chart but also linking of the findings between the charts and tables. Also, the exclusion of a

variable is knowledge gain. Thus, spill-overs from sectoral effects onto the project finance market can be excluded.

Finally, it is becoming apparent that there are two not entirely unknown financial engineering techniques, on which the hopes for a successful future of the project finance market are based. Therefore, development banks and project bonds have to be increasingly supported in the future. Another solution approach lies in the combination of standardisation and separation of project phases, but this solution approach can join both under the project bonds and among the development banks. In conclusion, with respect to the figure above it has to be checked, how high the supplements by the financing techniques in the individual project have to be. This can be done on the basis of the calculations in the first case. Since the first case, however, does not reach the level of external validity of the other two cases, there will be an expert interview in the next section which aims at preventing mistakes and increasing the level of the entire scientific research.

5 RESULT ANALYSIS AND VALIDATION

5.1 THEORETICAL ADJUSTMENT OF EXPERT INTERVIEWS

The three different cases in the previous chapter brought new insights. The individual findings were associated in a meaningful way in the context of a cross-border analysis. The derivation of the same results from different data sources is the triangulation, which serves as the basis of qualitative research for scientifically recognized and reliable findings. Before transferring findings to a new and future-oriented project finance model, in this chapter expert interviews will exclude possible errors and generate a higher external validity.

The principle of the theory-based approach takes into account the existence and application of theoretical pre-knowledge in the subject of research. Here a balance between the two principles is to be found (transferred to this work, between the three cases), and the knowledge gained is to be maximised. (Flick, 2009) The third principle is the rule-governed procedure during the production of knowledge. In addition to these essential principles, additional principles apply to the qualitative research, regarding, for example, the situation and person-dependent interpretation. (Gläser, Laudel, 2010) In connection with the research techniques, there is not *the* »qualitative interview«, but a variety of interview variants, which differ depending on the application, evaluation strategy or the implementation of the basic principles. In the following, the individual interview forms will not be described in detail, but reference will be made to the overview by Helfferich (2005). Even with the preparation techniques of the interviews, the question about the appropriateness of the process arises. In addition to suitable means of presentation mainly the recording techniques have to be wisely selected. Original wording or commented transcriptions represent the most common cases, but are not necessarily required in this work. Since only the content-thematic side of the material is of interest, the summary protocol was applied as a transcription method. With increasing levels of abstraction the scope of material decreases, because individual units of meaning are integrated, bundled or can be dropped because they are already collected in the general text. (Mayring, 2010) A second parallel processing method has been implemented, in which the construction of descriptive systems took place. With their help, the data material was assigned to different keywords which were already defined in the case study research. During the construction of these keywords there is now tension between the collected

evidence from the case study research and an additional external validation of the results. The qualitative content analysis was selected as evaluation method, which follows the previous election. The strength of the qualitative content analysis lies in its methodical controlled approach, which by combining also reduced the data material while preserving the main content.

Within the scope of qualitative methods there are descriptions, interpretations, understanding of contexts and the drawing up of classifications or typologies. The qualitative interview is characterized by unbiased, non-predetermined and very comprehensive information supplying an approach to the subject matter and is thus suitable for a differentiated and detailed description of individual opinions and impressions. In particular, the collection of detailed suggestions for improvement, to explore the causes and to create typologies are qualitative methods ideal. (Lamnek, 2005) The qualitative interview exists in various versions. (Helfferich, 2005) For a more detailed comparison of these types of interviews, however, it quickly became clear what form is most suitable for this work. The narrative interview was not an option because there were no biographical or autobiographical questions addressed. Likewise the focused or discursive interview seemed inappropriate, since neither a stimulus nor a discursive nature of the research question is given. Ultimately, the in-depth interview fell through because the investigation does not target any exploration of unconscious motives and attitudes through psychological interview techniques. However, the problem-focused interview initially appeared to be suitable, because this form of interview specifically focuses on the problem issues. However, at second glance at this interview form also revealed gross inconsistencies with the research question. Firstly, no individual and collective action structures and processing patterns of social reality are examined; and, secondly, it should not be based on an existing scientific concept. As this work moves in relatively unfamiliar territory and also focuses on the exploratory character, the problem-focused interview was not used. (Lamnek, 2005; Mayring, 2002; Witzel, 1982)

The interview form that was finally used, is the semi-structured, guideline expert interview. It contributes to the exploratory nature of the study and aims to achieve a comprehensive and complete collection of thematic information. Therefore experts with a substantive interest in the research topic were consulted in a constructive conversation. Hopf (1978) called the expert interview a plain vanilla type of qualitative interviews that in a slightly structured, guided way and with unconventional hypotheses explore a specific scientifically little developed

research field. Expert interviews are one of the most frequently used methods in empirical qualitative research. A characteristic factor of the expert interview is a guideline. In addition to the orientation of a guideline, in which the order and design of the questions are be more flexible, the open questioning of the experts on a specified topic and their unlimited answers are further characteristics of the expert interview. In this context, the degree of standardisation should be mentioned, these semi-structured, guideline expert interviews may be categorised as »non-standardised«. The duration of an interview may be between 30 minutes and several hours. The sample size depends on the specific research issue. According to Döring, Bortz (2014), there is the individual interview with an interviewer and an interviewee and the group interview with the interrogation of several interviewees. The most important thing is the explanation and the justification by the carefully selected experts and thus the sample size. Again, quality counts above quantity. (Bogner et al., 2005; Gläser, Laudel, 2010) Taking into account the triangulation according to Yin (2014), it is necessary to either consult one expert and another data source or at least two experts. The characteristics of expert interviews should also comply with the general requirements for qualitative interviews. Among them are the range, a reasonable specificity and profundity, and the personal context in which the interview occurs. If these requirements are taken into account, the qualitative interview can have many benefits. So the open design of the interview situation leads to increased motivation of the participants. The focus on the relevant issues from the perspective of the subscriber and the free response options continue to lead to a true and full information of the subjective view of the interviewee. It is also possible to provide backgrounds, to ask clarifying questions and to discover new, unknown facts. On the other hand, they are a time-consuming and costly analysis and there is a lack of quantification and high demands on the part of the interviewer. (Brüsemeister, 2008; Lamnek, 2005)

A guideline for an expert interview is not a fixed, predetermined and structured questionnaire, but rather a list of research interests, which act as a framework and reminder for the interviewer. The guideline represents the background knowledge of the researcher based on thematic issue areas. An interview guideline continues to support the narrative sequences on the part of the interviewee. The orientation at the guideline may not be too strict, therefore, the guideline is often compared to a balancing act. On the one hand, the interviewer must not cling to the guidelines and on the other hand, the interviewer may not deviate freely from the guidelines. One of the formal aspects is that the guideline should not be overloaded or confusing but easy to handle. There should be no

larger and abrupt conceptual and thematic leaps, but a natural reminders, and the flow of the argument should be observed. (Helfferich, 2005; Hopf, 1978; Witzel, 1982)

The qualitative content analysis is concerned with the analysis of communication material and contains different concepts. The overall objective of the analysis is the drawing of conclusions about certain aspects of the communication. Here is the information material, the logged and recorded communication, explicit as an information carrier and not as an object of research interest. As systematic and rule-governed process, the qualitative content analysis is to explore issues in their complexity and to understand the things that are outside the text. (Mayring, 2010) During the evaluating of the texts information will be systematically with the help of an analysis grid. This extracted information will be assigned to the categories of the analysis grid and thus further processed almost regardless of the original text. The reference to the text remains only by an indication of the source. (Gläser, Laudel, 2010) In connection with the mentioned category system there is theory-guided approach, which illustrates a further aspect of the qualitative content analysis. The communication material is analysed by taking into account the theoretical considerations. Variables are derived from the existing knowledge of the research subject from the case study research that was used as a basis for the evaluation categories. The category system may be altered during the extraction, new categories may be added and dimensions of existing categories can be changed. However, no existing categories should be removed from the case study research to ensure that they do not disappear from the evaluation. No preliminary characteristic values should be fixed in order to avoid a conflict between the principle of openness and the theory-based approach. It also prevents the problem that the empirical findings do not match the theoretical knowledge. Extraction is essentially interpretation and means to read the text and to decide which of the information contained is relevant to the investigation. The responsibility to decide whether or not information is considered redundant or not during processing remains with the author and depends on his individual understanding. Since the results of each interpretation step are held separately, it can be traced, which and how interpretations have influenced the evaluation process. As a conclusion, an explanatory figure showing the expert interviews in context with the case study analysis and the validation of the results is given.

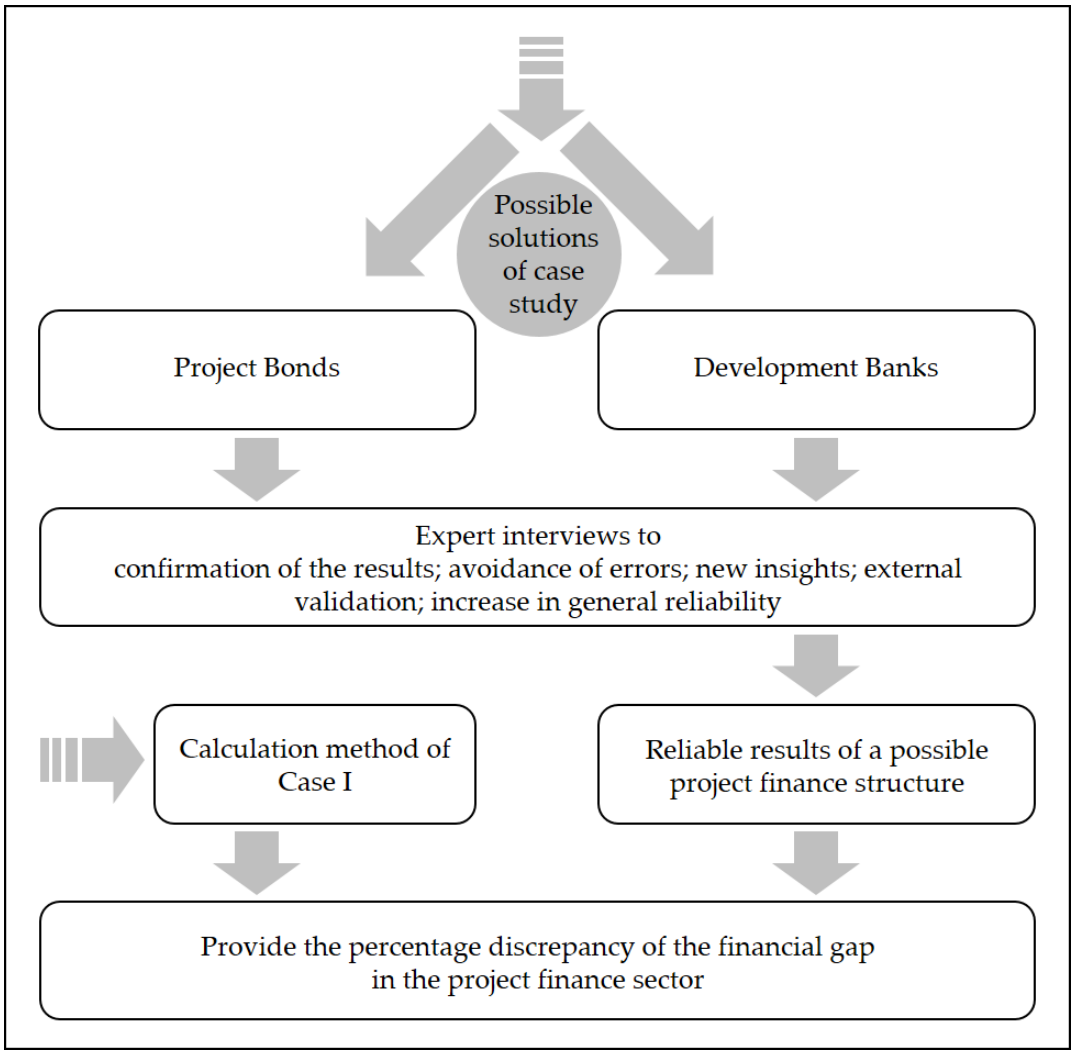


Figure 46: The integration of expert interviews in the research process (Source: own representation)

5.2 EXPERT INTERVIEWS

The analysis of potential regulatory-induced credit squeezes in theory is now followed by a verification using explorative expert interviews in practice. Based on personal and digital networks appropriate experts were identified and asked for their participation in the survey. The actual survey was conducted in November and December 2015. A total of 3 experts were interviewed. The following rationale is not a justification, but it illustrates that quantity does not equal quality and shows the context-dependent function of the expert interviews within the scope of the qualitative scientific research analysis. In this context it is important to mention that

with the clean and detailed case study research in the previous chapter a scientific triangulation has already been implemented. The expert interviews merely prepare the transfer of the knowledge gained onto the newly developed project finance model. The main task of the expert interviews is the identification of sources of error and the assessing of the implementation and application of the newly project finance model in practice. So why three experts? And what makes an expert an expert? Primarily it is important for the expert to have several years of practical reference to project finance in order to be able to assess the practicability of the project finance model. When it comes to expertise in the field of banking and finance specifically, the selection prefers experts from banks. All other project participants drop out. Furthermore, the bank should be one that operates without specialisation in the classical project finance business. At this point of the originally more than 700 banks only the Top 50 remain. Moreover, the selection prefers only the relevant project finance markets, i. e banks from North America, Europe and Asia Pacific. Finally, the bank has to be subject to the regulatory framework of Basel III. An expert with this qualification can give a fairly accurate picture of the current project finance market in his region. Since this is the absolute elite of the top management in the banking sector, access to these experts is extremely difficult. For this reason it is a great achievement that an expert from each region could be interviewed.

All three interviews were conducted by phone. The interview for the European region was conducted in German, the interviews for North America and Asia Pacific were conducted in English. It is important to mention that these are the personal opinions of the experts and not the opinions of the respective bank. This restriction provides a priori a basis of trust, which counteracts a potential bias of the interviewee and guarantees an unselfconscious and objective discussion. A detailed elaboration and recapitulation were done right after the respective interview. The interviews were recorded and then transcribed as described in the previous chapter. The transcription along with a short vita of the respective experts is attached in Annex 2. The analysis of the data, i.e., the extraction, analysis and interpretation of the expert interviews, was conducted using the qualitative content analysis by Gläser, Laudel (2010; 2010).

Basel III is still in the implementation process and there is a variety of non-defined variables. This fact makes it difficult and prevent the implementation of a written, standardised or even closed survey. The use of a non-standardised interview form which permits a mutual discussion and pretends no response

categories is therefore preferable. A face-to-face interview, even if only by phone, also has the advantage that ambiguities and communication problems can be resolved during the interview. The guideline presented below contains the essential findings gained from the case study and was presented to the experts prior to the interview. The guideline was used as the basis of a common level of understanding and thus led to a constructive and active participation of the interviewee from the outset. This increased activity once again ensured scientific specialization, and thus the quality of the subject to be explored. The use of an interview guideline limits the chances of a possible derailment of the interview significantly. The interviewee may, on the one hand, flexibly navigate between the question categories and set individual priorities. On the other hand, the general orientation of a guideline ensures a careful processing of the main topics. Another aspect that supports the use of expert interviews, is the exploratory character. This aspect is also important, because in practice the reference framework and the identification of the problems of Basel III and project finance cannot be solved in a sufficiently structured way. The explorative, guideline-based expert interviews now considered all of these requirements. Moreover, the qualitative research does not focus not on the taking of representative sample sizes, but on the individual analysis of the single case for possible basic patterns. (Lamnek, 2005) However, a careful summary of each interview and its exact documentation during further preparation and analysis steps allow intersubjective traceability.

The structure and content of the guide is as follows:

Table 36: The structure and content of the guideline (Source: own representation)

Topic of doctoral thesis: "Effects of Basel III on the business segment of international project finance" Hypothesis: The increase in capital costs resulting from regulation renders the implementation of large projects within the scope of project finance more difficult. With a downturn in demand or declining profitability, project finance is losing its relative appeal in the orientation of the banks' business policy. Project finance has to be complemented by other forms of financing, or replaced,

to financially ensure the realization of large projects also for the long-term.

The qualitative research design contains a case study with three independent cases. Each of the following three pillar represents one of the cases.

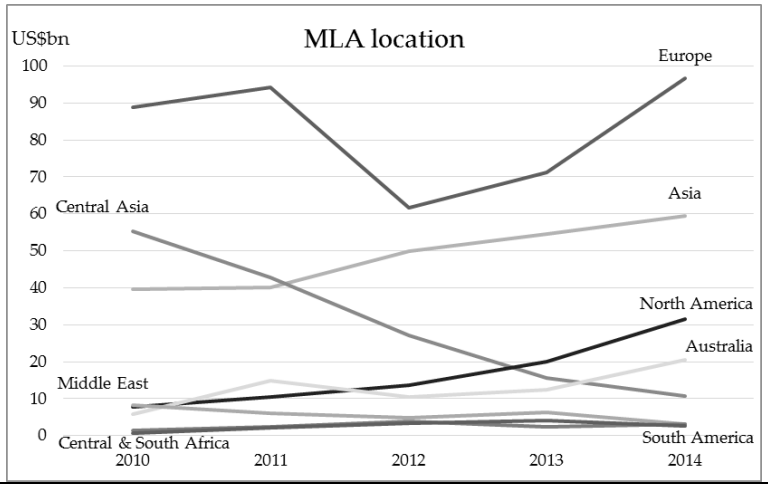
Pillar I:

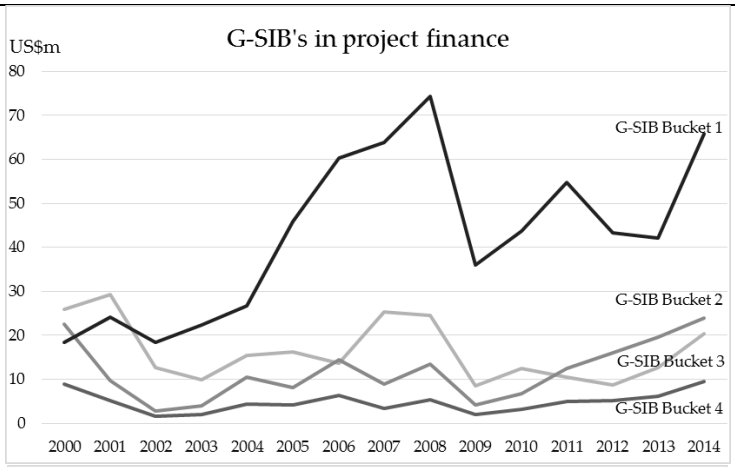
Field research – An exemplary project is calculated under Basel II and Basel III.

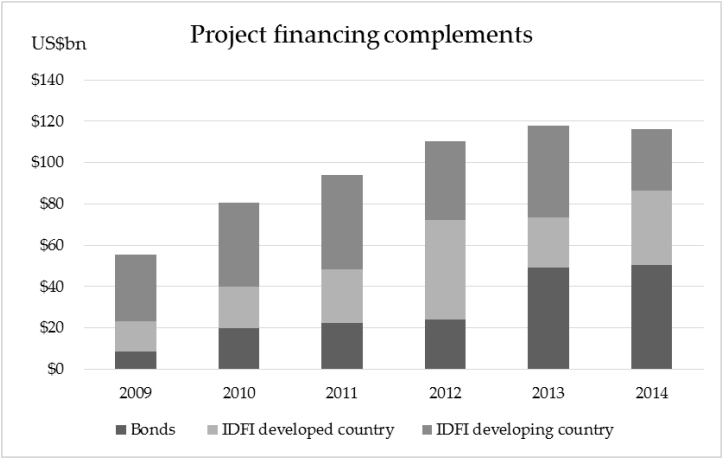
The first case shows that the equity provision under Basel II is significantly lower than in all calculation bases under Basel III. Furthermore, the larger the bank the more capital must be provided. Ratings are gaining importance and the demand of banks increases disproportionately for projects with a better rating and the interest in projects with a lower rating falls disproportionately. Although this phenomenon applies to all banks, the impact gets greater with the increasing size of the bank.

Pillar II:

Data Analysis – Data were collected and logically converted into graphics.







Pillar III:

Literature review – Literature databases were reviewed and analysed.

Basel III will have a negative impact on project finance and that is particularly due to the high financing volume, the long loan maturities and the rather average rating.

A solution approach lies in the combination of standardisation, the separation of project phases and project ratings.

A further approach offers a cooperation of banks and institutional investors.

Last but not least, the development banks support the infrastructure finance market with different financial measures.

After an introduction into the topic the guideline can be divided into three pillars. The three pillars correspond to the three cases of the case study and their main findings. As part of the interviews, pillar for pillar was presented to the expert and he was asked for his extensive practical experience. The results of the expert interviews and the accompanying analysis will be presented in the next chapter.

5.3 RESULT ANALYSIS

After the expert interviews were conducted, the results will be analysed in this chapter. A scientific survey has been carried out with the case study in chapter 4 »Empirical investigation of the project finance business unit «. So it would be surprising if in the context of the expert interviews completely different results appeared. This was not the goal of the expert interviews. Rather, the expert interviews are supposed to confirm the results once again and to highlight critical factors. Since this is a fact-based analysis of expert interviews, there is a simple transcription, which focuses exclusively on the isolation of facts. The complete transcription is provided in Annex 2. The isolated facts are sorted to the respective expert and topic with the topic referring to the respective insights of each conclusion and the case-cross-border analysis in chapter 4 »Empirical investigation of the project finance business unit «. So there are the following four main topics:

- Basel III and project finance
- Standardisation, separation and ratings
- Combination, development banks and institutional investors
- Project finance by country.

The following table presents an overview of the four main topics and the associated opinion of the expert. For legal reasons it is to make once again clear that the expert statements are personal opinions and must not reflect the opinion of their company.

Table 37: The opinion of the experts sorted by topic (Source: expert interviews Annex 2)

Topic: Basel III and project finance	
Mr. Chan	(…) The return on equity for the bank definitely is much lower than it used to be because of the capital requirements. So, the bank is required to hold more equity therefore the return on equity on financing transaction, much less liquidity (…) I think, project finance by nature is funding of critical infrastructure and the need for critical infrastructure will always be there. And there has to be a way, so borrowers will have to find way to fund these projects. I think this is inelastic actually, when projects used to be developed they will be developed – no matter where the fund is come from. So that part is inelastic. (…)
Mr. Murray	(…) So I tend to agree that Basel III will lead to a reduction in supply of project finance capital from the banks because it does impact them both in terms of setting a side more capital for those types of project especially once that are longer dated and or lower credit quality (…) so today we have not seen the impact really of the tightening of the rules under Basel III in the market (…) So I do think eventually Basel III will kick in but I will say so far as not. (…) So we are definitely seeing the potential for Basel III to reduce capacity we also seeing other banks that are not subject to in financial institutions not subject to Basel III step-in to fill the void. (…) So I guess that the broad summery is this, that yes I agree Basel III and Dodd Frank is going to cause commercial banks to reduce exposure to the asset class. (…)
Mr. Taiber	(…) The capital accumulation function of banks is, in my view, on the one disturbed by Basel III on the asset side, i.e. long-term credit lending, but it is my opinion also relatively disturbed on the liability side, namely due to the fact that insurance companies have administrative barriers with higher burden for long-term bank bonds. (…) Project finance may well be the responsibility of the banks, but it is due to the regulatory framework quasi made impossible or at least very difficult. (…)

Topic: Standardisation, separation and ratings	
Mr. Murray	(…) I think Banks should be more in the initial phases of de-risking which is the construction as well as the sort of you know ramp-up-period in projects and then most of these projects really should be financed with permanent capital from pension bonds and insurance companies and others who have long-term requirements for a steady stream of cash. (…) there is a very specific requirement for a skill set to analyses this project, that will lead to an increased usage of the rating agencies in project financing, not that they haven't been active in the past but they will become more and more active (…)
Mr. Taiber	(…) Yes, rating structures can support bonds, because that makes the purchase easier for insurance companies or other institutional investors, which simply need the ratings. But the regulatory framework requires to make an own credit analysis and do not trust alone on ratings. So also no, ratings are just no longer alone the panacea. (…) Supportive is a certain liquidity and a certain standardisation on the financing side, so that institutional investors know certain conditions of project bonds, e.g. a specific bond's life or other specific criteria have been met. Then the project bonds must not be analysed in detail such as in principle. (…) A hybrid financing style could be a win-win situation where banks finance the development phase and the afterwards funding could be done by institutional investors. - Of course the yield is in the brownfield phase no longer so attractive. (…)

Topic: Combination, development banks and institutional investors	
Mr. Chan	(…) multilateral and ECA are really stepping up and they are taking a much larger margin on providing liquidity (…) so the ECAs and multilaterals they are filling the gap (…) the pool of liquidity has become more diversified (…) we are seeing institutional investments providing liquidity so when I say institutional investors I'm talking about maybe funds or maybe superannuation (…) companies are more driven by the ROE so they just want fix income return and project financing does offer them better return than traditional debt products like government bonds so they are also found in the market as well (…) If bank debt is not available to support them, yes there have to be alternative solutions to fill the void and ECA Multilateral that´s one part that could fill the void and I do see projects bond and capital-market-solutions or institutional investors like I said always funds superannuation funds will definitely step up and the yield (…)
Mr. Murray	(…) other sources of capital that are stepping up are ECA's LMA'S and development banks have become active local capital markets in the varies countries have become active and bond investors you know the insurance companies and others who were smaller historically in terms of the percentage of long-term project financing that they have done have now stepped into the mix on top of that you have dedicated mass funds in the energy and power space dedicated mass funds in infrastructure that have stepped up and you also seeing some senior secured loan and bond funds that are being established to fil in the gap. (…) There are numbers of ways that is being filled in and will be filled in so I think the total supply of capital will continue to be you know for all different types of project. (…) it makes a lot more sense for institutional investors with free money and long dated liabilities to finance infrastructure generally. So the move towards the bond market away from the banks (…)

Mr. Taiber	(…) it is probably more difficult for insurance companies to buy bank bonds, from regulatory point of view (…) Yes, well, at the end of the day you have to find other ways of financing, e. g. investors with liabilities of pension funds pension obligations. (…) The regulation and accounting rules may lead to inefficiency through certain asset class limits or certain funds' limits that make a strong investment in project finance virtually impossible. (…) Yes, and it's just generally not as easy to put a bond structure on a project financing, because the project finance sometimes needs a degree of flexibility which such a bond per se does not have. (…)
Topic: Project finance by country	
Mr. Chan	(…) Asia Pacific there is preference for doing door-to-door loan tenor where is in Australia for example mini perm market just because of the market dynamics and the convention at that particular market (…) EU they're probably one of the early adopters of Basel III compare to the others, so as a result because of that it is easier for them to lend long-term is definitely much more difficult because the cost of fund I mean come back to first one (…) Japanese banks or some of the Singaporean banks they have really stepped up to fill the gap left by the European banks. (…)
Mr. Murray	(…) the Japanese have stepped up in a very big way to fill the gap the Chinese banks have now entered the scene with huge amounts of capital that they are offering and the local banks in local markets for example (…)The Japanese have always been around, but they have stepped-up to fill the void in a bigger way then they have in the past. And then the Chinese banks also very big, coming in. (…) US banks financing a lot in America projects or international projects. (…) lot of middle East financial institutions kind of I think also are very focused on their own region and that's way they play not much else. (…)

Mr. Taiber	(…) Project finance has always been a very capital-intensive business and American banks have only little involvement there. (…) American banks have made very regional business, or they are very well represented in the global business in the capital market and investment banking. (…) Middle-East, I would say that there was missing experience and knowhow. (…)In view of Japanese banks that basically had no domestic business, have urgently sought after other assets. (…) India is a special market and also a special economic. The decrease in EU is also in connection with the market exit of WestLB. (…)

All in all, the results of the case study were confirmed by the experts. Thus, Basel III will take a significant influence on the classic project finance, but there has been is no indication of any influence in the market up to now. Moreover, the experts agree that basically there must be a financing solution, because it is out of question that there will be an ongoing development of large-scale projects with immense capital requirements in the future. This absolute need creates a very high price elasticity in the project financing market, which is reason why Basel III is not reflected in the market until now. In addition the experts agree that there will not be one single solution but a mixture of the different presented components. However, the experts admonish the simplicity of the solution. For a standardisation, first practical experience have to be gathered to create a history from which mistakes can be identified and adjustments made. Finally, for the present work this means that the analyses have provided a sustainable concept, which meets scientific requirements and contains a high degree of internal and external validity as well as reliability. In the next chapter this concept will now be transferred into a future-oriented project finance model.

5.4 RESULT TRANSFER INTO A SUSTAINABLE PROJECT FINANCE MODEL

The results of the case study research represent a mix of different financial products. The mechanism and effectiveness of some the featured solutions can only be described, while other solutions can be transferred into a constructed model to mathematically almost exactly determine their effectiveness. The following figure shows the additional components in a future oriented project finance structure.

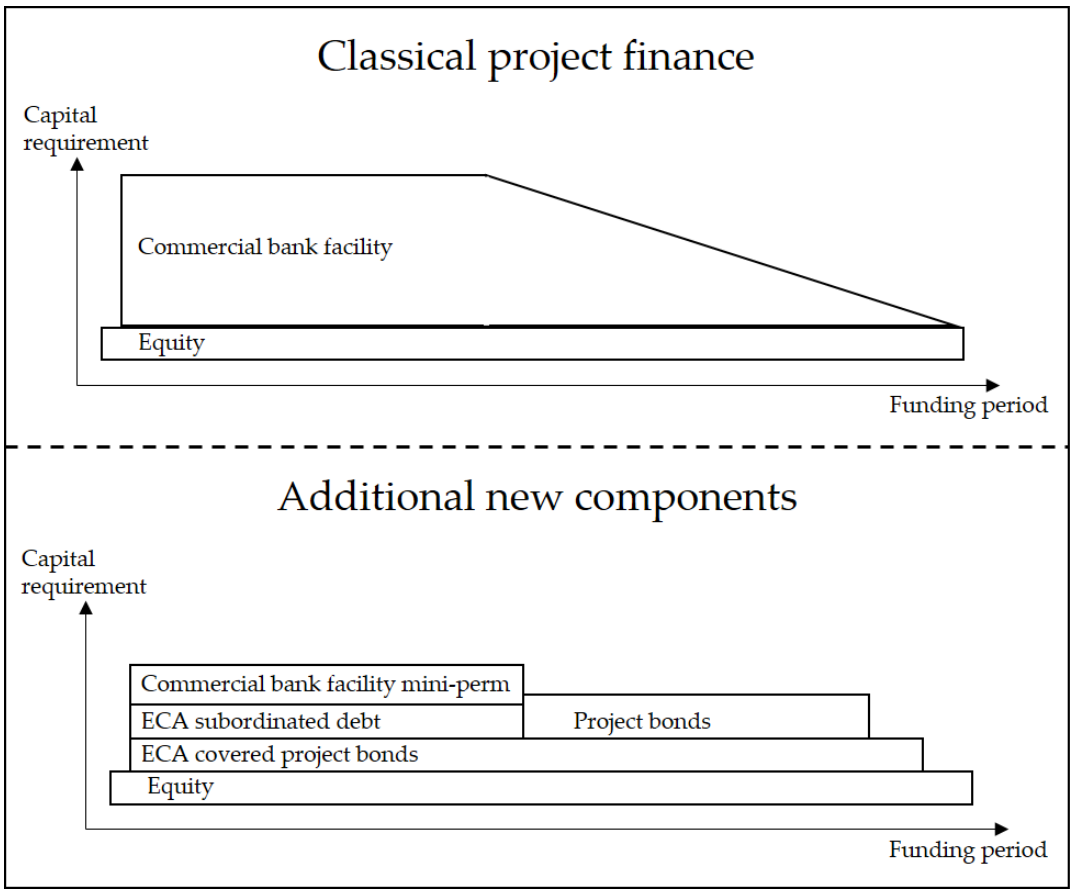


Figure 47: Classic structure vs. additional new components (Source: own representation)

The featured solutions which cannot be determined mathematically, like the shorter loan life through mini-perm financing or smaller commitments through additional funding, were already discussed in detail within the expert interviews. Finally, the results that can mathematically be determined will now be transferred into a new project financing model. In doing so, reference will be made to the relevant project finance case from chapter 4.1.2 »Observation of a project finance case under changing regulatory framework conditions«. The focus of the calculation is on the support of the ECAs with the provision of subordinated debt. In principle, the support of subordinated debt is done indirectly by collateral obligations for commercial banks. Within the financial structuring of a project, ECAs or development banks provide their commitment in the form of collaterals for commercial banks. The commercial bank receives collaterals for the event of a possible failure of the SPV and may reduce the capital for the RWA in the amount

of the collaterals. To support a maximum number of projects, the ECA tries to keep the amount of collaterals per project as low as possible. In the following calculation, therefore, the amount of the collaterals will be calculated, which is necessary to compensate the gap between Basel II and Basel III. For this purpose, the percentage of collaterals is increased, until the »equity provision in percent of EAD« of Basel III corresponds again to the »equity provision in percent of EAD« of Basel II. The necessary number of costings is again calculated in an Excel spreadsheet and the results are presented in the table below. Beforehand, the following important parameters are to be understood:

- Collaterals have no influence on the rating.
- The rating spread between the different rating classes remains constant.
- Collateral adjustments have effects on the correlation (R) and on the RWA, but not on the EAD.
- Therefore, a comparison of the »equity provision in percent of EAD« is made.
- If through collateral adjustments the »equity provision in percent of EAD« in both regulations is the same, then the »net margin« is also the same and, consequently, irrelevant. The focus remains on the percentage of the collateral adjustment.

From a logical consequence ECAs try to compensate economic fluctuations and are more active in difficult to normal economic times. Thus, a calculation in strong and normal economic times is omitted. The countercyclical buffers in this case are 50% and 100% and the net margins are 125bps and 207bps.

Table 38: The need of collaterals to fill the gap between Basel II and Basel III (Source: own representation)

Basel II	Equity provision of x% of EAD
Basel III, non G-SIB, countercyclical buffer 0%	Collaterals of 24% of the facility are required to reach the result of x% of Basel II
Basel III, bucket 1, countercyclical buffer 0%	Collaterals of 30% of the facility are required to reach the result of x% of Basel II
Basel III, bucket 4, countercyclical buffer 0%	Collaterals of 39% of the facility are required to reach the result of x% of Basel II

The table reflects the extremes of Basel III. It is a fallacy to convert the figures from the table one-to-one into reality. It is important to interpret the table as a dynamic process. The price range of the net margin has such a large scope that, for example, a project's net margin at 125bps is higher than the net margin at 75bps which is supported by Basel II compensating collaterals amounting to 24%. Conversely, this means that collaterals between 24% and 39% of the funding amount can compensate the negative effects of Basel III in economically weak periods. But this also means that from a financial perspective the ECAs have to take great efforts to achieve a compensation of the effects of Basel III. With a market size of US$260bn in 2014, according to the best calculation, a support of around US$65bn would be necessary to compensate the consequences of Basel III. According to the experts this amount would be Utopian and make a compensation by ECAs alone impossible. (Thomson-Reuters, 2014) It seems to be case that the price elasticity has a greater potential than the support by the ECAs. Consequently, the ECAs should vary their support in two different ways: On the one hand, there should be an adaptation to the varying economic periods. On the other, there should be an adaptation to the bank’s size. The following figure illustrates an optimal ECA support. It has to be taken into account that the additional non-calculated factors also act positively and that a more accurate determination of the percentage ECA support will be possible only a long time after the implementation of Basel III, based on historical empirical values.

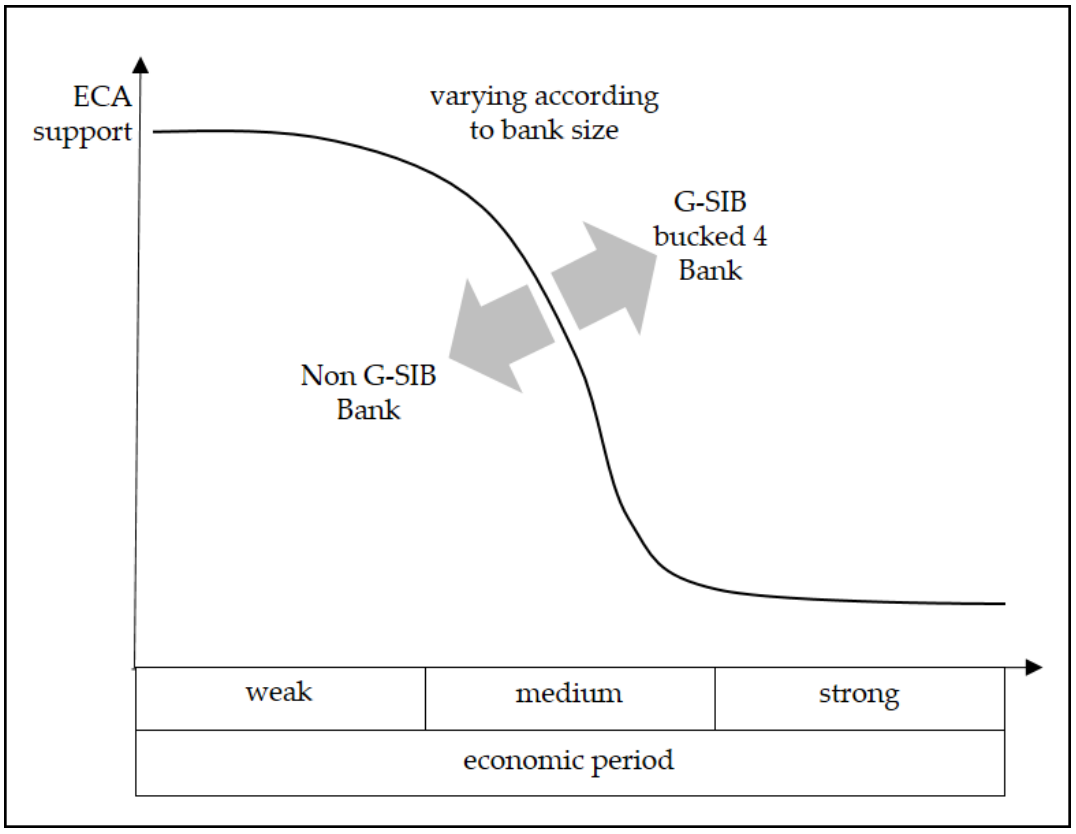


Figure 48: Optimal ECA support (Source: own representation)

6 VIEW AND PERSPECTIVE FOR THE BUSINESS SEGMENT OF PROJECT FINANCE

The financial crisis gave rise to significant changes in bank regulations. At the same time, because of the financial crisis the capital ratio and thus the willingness of the banks to grant credit deteriorated. On account of a huge number of changes of the economic and legal framework conditions, classic project financing finds itself at a crossroads. The financial crisis and, as a result, the stricter requirements of Basel III regarding the granting of credit have rendered the financing of projects more and more complicated, especially in view of the changed readiness of the banks to take risks. The legal and regulatory framework conditions in the project financing business segment have also become more complex.

In the scope of this work, typical characteristics of a classical project finance structure were presented. Subsequently, the influence of the financial crisis has been described in detail as a link between project finance and the regulatory framework of Basel III. As part of the empirical research strategy first a precise definition and analysis of the hypotheses took place. In the further course of the empiric investigation the epistemological foundations together with the principles of the case study research led to the criteria-based selection of appropriate cases. As part of the criteria-based selection of appropriate cases, three major cases were been determined: field research, data analysis and literature review. Finally, the individual results of the single cases were analysed and evaluated in a case-cross-border analysis. The derivation of the same results from different data sources is triangulation, which forms the basis of qualitative research for scientifically recognized and reliable findings. This combination increases the internal and external validity of the results. Before the findings were transferred to a new and future-oriented project finance model, expert interviews excluded possible errors and generated a higher external validity. This validity will answers along a chain of evidence and exclusions the scientific hypotheses and questions. In connection with the hypotheses the question arose whether the classical project financing models can still be used in the future and whether there are possibilities / potentials for the advancement of project financing.

Hypothesis I:

The increase in capital costs resulting from regulation renders the implementation of large projects within the scope of project finance more difficult.

Yes, this is true.

Within the first case, the combination of field and laboratory research shows the impact of the changing regulatory framework conditions on the commercial bank facility, the dominating financing form. The impact on the banks' internal process costs and the underwriting fee is so marginal that they can be neglected in the overall calculation. Basel II do not classify different types of banks, as it will be done under Basel III. In addition, Basel III also attempts to address varying market conditions with the countercyclical buffer. A first result illustrates that the spread between two varying ratings under Basel II is lower than under Basel III and thus ratings are gaining importance under Basel III. Consequently, the demand increases disproportionately for projects with a better rating and the interest in projects with a lower rating falls disproportionately. The equity provision under Basel II is significantly lower than in all calculation bases under Basel III. Furthermore, the larger the bank the more capital must be provided. In an extreme case almost twice as much equity has to be provided. Basel III will have a negative impact on project finance and that is particularly due to the high financing volume, the long loan maturities and the rather average rating.

Hypothesis II:

With a downturn in demand or declining profitability, project finance is losing its relative appeal in the orientation of the banks' business policy.

No, not necessarily.

The calculations in Case I and in the sustainable project finance model have shown that the most powerful weapon is the margin range. In a balanced and offer-driven market the margin rates are so high that the banks are in a very profitable area and in a demand-driven market, there are good solution approaches which

are summarised in the following hypothesis. Banks with a low accumulated profitability in the project finance business unit across the overall economic cycle have to reorganize their business unit or abandon the project finance business unit with the implementation of Basel III in 2019.

Hypothesis III:

Project finance has to be complemented by other forms of financing, or replaced, to financially ensure the realization of large projects also for the long-term.

Complemented – yes, but not fully replaced.

First of all, a new or adjusted regulatory framework of Basel III especially for long-term project finance, will probably not be achieved. The results of the case study research represent a mix of different financial products. Nevertheless, in spite of changed basic conditions it is to be expected that there will be a demand for suitable financing opportunities in the area of the financing of major, capital-intensive projects.

Finally, it is becoming apparent that there are two not entirely unknown financial engineering techniques, where raise hopes for a successful future of the project finance market. Therefore, development banks have to be increasingly supported in the future. Another solution approach lies, in fact, in the combination of the standardisation and separation of the project phases, but this solution approach can be used both with project bonds and development banks. The featured solutions which cannot be determined mathematically, like the shorter loan life through mini-perm financing or smaller commitments through additional funding, have already been discussed in detail in the expert interviews. When transferring the results into a new project financing model the impact is determined mathematically. As a result, collaterals between 24% and 39% of the funding amount can compensate the negative effects of Basel III in economically weak periods. But from a financial perspective this also means that the ECAs have to make great efforts to achieve a compensation of Basel III. According to the experts, such an amount would be Utopian and make a compensation by ECAs alone impossible.

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Annex 1

Supervisory Slotting Criteria for Specialised Lending

Supervisory Rating Grades for Project Finance Exposures

Basel-Committee: para. (2006: para. Annex 6) – (starting on the following page)

	Strong	Good	Satisfactory	Weak
Financial strength				
Market conditions	Few competing suppliers or substantial and durable advantage in location, cost, or technology. Demand is strong and growing	Few competing suppliers or better than average location, cost, or technology but this situation may not last. Demand is strong and stable	Project has no advantage in location, cost, or technology. Demand is adequate and stable	Project has worse than average location, cost, or technology. Demand is weak and declining
Financial ratios (e.g. debt service coverage ratio (DSCR), loan life coverage ratio (LLCR), project life coverage ratio (PLCR), and debt-toequity ratio)	Strong financial ratios considering the level of project risk; very robust economic assumptions	Strong to acceptable financial ratios considering the level of project risk; robust project economic assumptions	Standard financial ratios considering the level of project risk	Aggressive financial ratios considering the level of project risk
Stress analysis	The project can meet its financial obligations under sustained, severely stressed economic or sectoral conditions	The project can meet its financial obligations under normal stressed economic or sectoral conditions. The project is only likely to default under severe economic conditions	The project is vulnerable to stresses that are not uncommon through an economic cycle, and may default in a normal downturn	The project is likely to default unless conditions improve soon

	Strong	Good	Satisfactory	Weak
Financial structure				
Duration of the credit compared to the duration of the project	Useful life of the project significantly exceeds tenor of the loan	Useful life of the project exceeds tenor of the loan	Useful life of the project exceeds tenor of the loan	Useful life of the project may not exceed tenor of the loan
Amortisation schedule	Amortising debt	Amortising debt	Amortising debt repayments with limited bullet payment	Bullet repayment or amortising debt repayments with high bullet repayment
Political and legal environment				
Political risk, including transfer risk, considering project type and mitigants	Very low exposure; strong mitigation instruments, if needed	Low exposure; satisfactory mitigation instruments, if needed	Moderate exposure; fair mitigation instruments	High exposure; no or weak mitigation instruments
Force majeure risk (war, civil unrest, etc),	Low exposure	Acceptable exposure	Standard protection	Significant risks, not fully mitigated
Government support and project's importance for the country over the long term	Project of strategic importance for the country (preferably export-oriented). Strong support from Government	Project considered important for the country. Good level of support from Government	Project may not be strategic but brings unquestionable benefits for the country. Support from Government may not be explicit	Project not key to the country. No or weak support from Government
Stability of legal and regulatory environment (risk of change in law)	Favourable and stable regulatory environment over the long term	Favourable and stable regulatory environment over the medium term	Regulatory changes can be predicted with a fair level of certainty	Current or future regulatory issues may affect the project
Acquisition of all necessary supports and approvals for such relief from local content laws	Strong	Satisfactory	Fair	Weak

	Strong	Good	Satisfactory	Weak
Enforceability of contracts, collateral and security	Contracts, collateral and security are enforceable	Contracts, collateral and security are enforceable	Contracts, collateral and security are considered enforceable even if certain non-key issues may exist	There are unresolved key issues in respect if actual enforcement of contracts, collateral and security
Transaction characteristics				
Design and technology risk	Fully proven technology and design	Fully proven technology and design	Proven technology and design — start-up issues are mitigated by a strong completion package	Unproven technology and design; technology issues exist and/or complex design
Construction risk				
Permitting and siting	All permits have been obtained	Some permits are still outstanding but their receipt is considered very likely	Some permits are still outstanding but the permitting process is well defined and they are considered routine	Key permits still need to be obtained and are not considered routine. Significant conditions may be attached
Type of construction contract	Fixed-price date-certain turnkey construction EPC (engineering and procurement contract)	Fixed-price date-certain turnkey construction EPC	Fixed-price date-certain turnkey construction contract with one or several contractors	No or partial fixed-price turnkey contract and/or interfacing issues with multiple contractors
Completion guarantees	Substantial liquidated damages supported by financial substance and/or strong completion guarantee from sponsors with excellent financial standing	Significant liquidated damages supported by financial substance and/or completion guarantee from sponsors with good financial standing	Adequate liquidated damages supported by financial substance and/or completion guarantee from sponsors with good financial standing	Inadequate liquidated damages or not supported by financial substance or weak completion guarantees

	Strong	Good	Satisfactory	Weak
Track record and financial strength of contractor in constructing similar projects.	Strong	Good	Satisfactory	Weak
Operating risk				
Scope and nature of operations and maintenance (O & M) contracts	Strong long-term O&M contract, preferably with contractual performance incentives, and/or O&M reserve accounts	Long-term O&M contract, and/or O&M reserve accounts	Limited O&M contract or O&M reserve account	No O&M contract: risk of high operational cost overruns beyond mitigants
Operator's expertise, track record, and financial strength	Very strong, or committed technical assistance of the sponsors	Strong	Acceptable	Limited/weak, or local operator dependent on local authorities
Off-take risk				
(a) If there is a take-or-pay or fixed-price off-take contract:	Excellent creditworthiness of off-taker; strong termination clauses; tenor of contract comfortably exceeds the maturity of the debt	Good creditworthiness of off-taker; strong termination clauses; tenor of contract exceeds the maturity of the debt	Acceptable financial standing of off-taker; normal termination clauses; tenor of contract generally matches the maturity of the debt	Weak off-taker; weak termination clauses; tenor of contract does not exceed the maturity of the debt
(b) If there is no take-or-pay or fixed-price off-take contract:	Project produces essential services or a commodity sold widely on a world market; output can readily be absorbed at projected prices even at lower than historic market growth rates	Project produces essential services or a commodity sold widely on a regional market that will absorb it at projected prices at historical growth rates	Commodity is sold on a limited market that may absorb it only at lower than projected prices	Project output is demanded by only one or a few buyers or is not generally sold on an organised market

	Strong	Good	Satisfactory	Weak
Supply risk				
Price, volume and transportation risk of feed-stocks; supplier's track record and financial strength	Long-term supply contract with supplier of excellent financial standing	Long-term supply contract with supplier of good financial standing	Long-term supply contract with supplier of good financial standing — a degree of price risk may remain	Short-term supply contract or long-term supply contract with financially weak supplier — a degree of price risk definitely remains
Reserve risks (e.g. natural resource development)	Independently audited, proven and developed reserves well in excess of requirements over lifetime of the project	Independently audited, proven and developed reserves in excess of requirements over lifetime of the project	Proven reserves can supply the project adequately through the maturity of the debt	Project relies to some extent on potential and undeveloped reserves
Strength of Sponsor				
Sponsor's track record, financial strength, and country/sector experience	Strong sponsor with excellent track record and high financial standing	Good sponsor with satisfactory track record and good financial standing	Adequate sponsor with adequate track record and good financial standing	Weak sponsor with no or questionable track record and/or financial weaknesses
Sponsor support, as evidenced by equity, ownership clause and incentive to inject additional cash if necessary	Strong. Project is highly strategic for the sponsor (core business — longterm strategy)	Good. Project is strategic for the sponsor (core business — longterm strategy)	Acceptable. Project is considered important for the sponsor (core business)	Limited. Project is not key to sponsor's longterm strategy or core business
Security Package				
Assignment of contracts and accounts	Fully comprehensive	Comprehensive	Acceptable	Weak

	Strong	Good	Satisfactory	Weak
Pledge of assets, taking into account quality, value and liquidity of assets	First perfected security interest in all project assets, contracts, permits and accounts necessary to run the project	Perfected security interest in all project assets, contracts, permits and accounts necessary to run the project	Acceptable security interest in all project assets, contracts, permits and accounts necessary to run the project	Little security or collateral for lenders; weak negative pledge clause
Lender's control over cash flow (e.g. cash sweeps, independent escrow accounts)	Strong	Satisfactory	Fair	Weak
Strength of the covenant package (mandatory prepayments, payment deferrals, payment cascade, dividend restrictions…)	Covenant package is strong for this type of project Project may issue no additional debt	Covenant package is satisfactory for this type of project Project may issue extremely limited additional debt	Covenant package is fair for this type of project Project may issue limited additional debt	Covenant package is Insufficient for this type of project Project may issue unlimited additional debt
Reserve funds (debt service, O&M, renewal and replacement, unforeseen events, etc)	Longer than average coverage period, all reserve funds fully funded in cash or letters of credit from highly rated bank	Average coverage period, all reserve funds fully funded	Average coverage period, all reserve funds fully funded	Shorter than average coverage period, reserve funds funded from operating cash flows

Annex 2

Expert Interview

The Expert:	Mr Quinci Chan
Track Record:	
Current Position:	Associate Director, Infrastructure and Energy National Australia Bank
2010 – 2012	Manager, Energy and Infrastructure WestLB AG
2010 – 2010	Asia Business Analysis Advisor Linklaters
2005 – 2009	Manager Saha International

The views expressed in this article are those of Mr. Quinci Chan and do not necessarily reflect the views and policies of the National Australia Bank.

Teleconference on 18th of December 2015 from 4.30 p.m. to 5.10 p.m.

Author	[…]The Topic of the doctoral Thesis is: Effects of the financial crisis on the business segment of international project finance. – And I build the following hypothesis: That the increase in capital costs resulting from regulation renders the implementation of large projects within the scope of project financing more difficult. Project financing is losing its relative appeal in the orientation of the banks' business policy. It has to be complemented by other forms of financing, or replaced, to financially ensure the realisation of large projects also for the long-term.

	The deductive exploration in my doctoral Thesis provides: A rule: The increase in cost of capital leads to a reduced demand of financing. A case: Basel III leads to an increase of cost of capital, and A result, – which is to discuss. So, the guideline-expert-interview provides on the one hand a guideline, which is in this case the PDF at hand, and on the other hand your free opinions, statements or your experience from the project finance market in your daily business. This leads us to the first Pillar: The economic analysis of the impact of Basel III on the bank lending behaviour – with the Liquidity cover ratio and the capital requirements with the focus of Structured Finance and International project finance with usually long-term commitments far more than 15 years and huge commitments far more than US$100mil per project? So, what is your opinion and what are your experience from the market?
Chan	Yes, I 'mean, definitely. Let me answer in a few different parts. The return on equity for the bank definitely is much lower than it used to be because of the capital requirements. So, the bank is required to hold more equity therefore the return on equity on financing transaction, much less liquidity and we want in that it used to be – Starting point – In terms of demand for financing, from the borrower side he has to stop them they still looking for long-term financing – now from the bank side I guess every bank is different actually because even those there are many different international banks competing in the same market because aware that banks is dominating and the timing which (…) implemented in different country's there is – some banks are more advantage position than others – now definitely in terms of doing 10, 15, 20, year project financing the view of advertise from NAB is much lower than it used to be looking at these long-term financing. I do see a lot of banks particularly the Japanese banks and maybe some local banks they still have very strong advertised will be longer dated assets so the borrower from there in when they have financing requirements they still getting supported by some banks that do these longer dated transactions. You get a field of place where some banks can do these long dated transactions and some cannot. Next I guess the other part for that is because of this I find in the region anyway multilateral and ECA are really stepping up and they are taken a much larger margin on providing liquidity then they used to because every commercial bank is in the same playing filed as others so the ECA's and Multilaterals they are filling the gap. So in terms whether projects are still be financed the answer is definitely yes. And they are still

	able to get these long dated tenors from some banks in the market. And remaining liquidity is filled by Multilateral and ECA's now also what we found out is because the pool of liquidity has become more diversify so where is traditional project financing its all international banks in Asia Pacific we are seeing institutional investments providing liquidity so when I say institutional investors I'm talking about maybe funds or maybe superannuation (…) companies there more driven by (…) then ROE so they just want fix income return and project financing dose offer them better return than traditional debt products like government bonds so they are also found in the market as well and yes so I think that the important things I guess the highlight is it depends which bank you work at – but its interesting because different markets have different conventions as well so in Asia Pacific there is preference for doing door to door loan tenor where is in Australia for example mini perm market just because of the market dynamics and the convention at that particular market – I guess is that feedback offered - you need to expend on any particular part?
Author	Year that's perfect. That's interesting, because that leads us directly to pillar number two – the chart-analysis which you can see on the bottom of page no. 1. Basel III is still in the implementation process since 2013 and we see in the historical data analysis of project financing that if Basel III would have an impact on project financing, why we couldn't see this impact in the charts? Why project financing is still increasing after the decision to implement Basel III in the year 2012? How would you explain the charts?
Chan	You have a very long time series there. Ok, 13, 14 years' time series – I mean the increase leding up to 2009 I think that's very easily explainable – just back then leading up to the financial crisis the market was very aggressive and loan pricing was very low but then and overall business demand and the way that the global economy was going so that why the peek is at that point and then you see 2009 that gap is understandable and then the pick up from 2009 to 2010 2011 I cant see that I can't match the time serious exactly but that increase in 2009 I guess that makes sense slowly as people absorb the shock resume business that what line picket up-. The last few years 2011 2012 2013 I mean that's still depending on how you look at it between the three different lines. I don't know the full rational behind – to be honest.
Author	Perfect maybe we can come directly to the next chart. The chart shows the graphs of the EU, Asia-Pacific, Central Asia, Middle-East and America,

	but it's not a typically chart which we known from journals like PFI or others, where country means the location of the project finance Company – in this chart country means the location of the headquarter of the financing bank. For example: in a Project is the BNP involved, than the commitment from the BNP belongs to the EU in a Project is the Mizuho involved, than the commitment from Mizuho belongs to Asia-Pacific and so on…
Chan	This is where the deals are closed? It's not where the banks are baised, right?
Author	No, that's where the banks are based. So if I would look on the Asia-Pacific chart, there we have the NAB, the Somitomo, there's a Mizuho. And if we look on the EU chart, there we have the BNP-Pariba for example. So it shows the commitments of banks and where they are based. So it has nothing to do with the project location or deal-closing-location.
Chan	Ok, well I can only comment like in sort of them where the EU so you know EU they're probably one of the early adopters of Basel III compare to the others, so as a result because of that it is port earlier for them to lend long-term is definitely much more difficult because the cost of fund I mean come back to first one – a lot of banks their cost of funds will be flat of the tenner so the view was you know the longer the tenor were they get liquidity on the loan but the internal cost will still be the same they lend 1 year 2 year or 20 years so not more liquidity for them long-term because the get a better spread but know with the new bases III there is actually the bank has to pay a premium to lend the hole long-term assets and that premium is actually quite steep, so that's understandable that EU banks there much less active and we see that as well so all the so called traditional PF-lenders you said BNP they not that active in the pf market anymore they have new to different asset class to you know structured commodity finance where the tenor is shorter minig that makes sense. As I said in Asia cause the adoption is obviously slower and behind it is still makes sense for them, they have stepped up actually to fill that gap that left by the European banks
Author	When you say: "it is slower", you mean the implementation of Basel III?
Chan	Yeh, I mean the implementation the timing of implementation and the way they adopted in different countries so observation I have is Japanese banks or some of the Singaporean banks they have really stepped up to fill the gap left by the European banks and I guess I don't know exactly what the timing of the Basel III implementation between the different

	countries show … you find some correlation between them and this graph. Maybe I guess I don't know the full answer, like the legal view to see there is anything where the timing of adoption of Basel II or Basel III has a impact on these graph. This is based on where the bank is domiciled – right?
Author	Yeh. And Asia-Pacific
Chan	India is interesting, I think probably when I was with WestLB maybe 3 years ago they really did become one of the leadest in PF in the region. One of the top MLA's I think in 2011 or 2010 you'll have in the graph, but then afterwards the Indian interest rate went up so the cost of funds went up for them and I think that's Basel III is linked but just think is just they have economy the cost of borrowing went up.
Author	I agree. Ok, then we come to the last chart and I want to combine it with the last pillar III. Pillar III contains a Literature-Review or a journal analysis. The keywords: financial crisis; Basel III, structured finance, project finance, rating agencies – resulted over 5000 hits and with filters like headline, abstract and rating criteria's - a quantity of over 70 journals leads to the following tenor, that a mixture of different tools like mini-perm-financing, lower commitments, more ECA's and governmental support, bond and fund structures or new market participations like Alliance Insurance company, GE-Capital and Siemens-Financial – are a need for a successful ongoing project financing market. When Basel III is getting more and more relevant for banks in the next years, do you think there is one key element that has an important role or do you think as well as the journals that a combination of different tools is the solution. Maybe with a comment to the last chart where we see an increasing ECA relevance and also an increasing project finance bond market which has dibbled form 2012 to 2013.
Chan	I think, project finance by nature is funding of critical infrastructure and the need for critical infrastructure will always be there. And there has to be a way, so borrowers will have to find way to fund these projects. I think this is inelastic actually, when projects used to be developed they will be developed – no matter where the fund is come from. So that part is inelastic. If bank debt is not available to support them, yes they have to be alternative solutions to fill the void and ECA Multilateral that´s one part that could fill the void and I do see projects bond and capital-market-solutions or institutional investors like I said always funds superannuation funds will definitely step up and the yield makes sense for them to invest in this asset class. So I definitely see going for the banks

	will use more originating these deals to review of … to a sum or institutional investors and I see these trend now in Asia to be completely honest project finance that concept is not very developed in Asia if you can do a research you see most of activities in Europe and Americas. Asia that will become more going forward I think transaction will be – but that will take time and I think the market will revolved to fill the need for critical infrastructure. I don't think the inability of banks to fund long-term debt - is gonna stop and hold up projects.
Author	You said before, that the Australian market is a mini-perm-financing market – could this although be an alternative financing structure?
Chan	Yes. Australia has always been a mini-perm-market. Yes, because of, or I guess, that a few reason Australia is historically is a closed off market I guess its dominated by the four domestic banks witch NAB is one of them and they have been very discipline in taken long-term exposure and there're foreseen people to refine them – because for banks perspective mini perm it is great you don't have to take all that long-term risk and in a revenue perspective it is good as well because you get term you are able to refinance so you get a new upfront fee etc. etc. It keeps your business going. I haven't really seen that in Asia just because in Asia there is a lot of liquidity so there are lot of banks competing in the market opposed to Australia – so the borrower is able to still get long-term financing because of this competition and I think right now still banks even though they make lot less many then before from the ROE perspective they still need to make many and they except that lower ROE to support these financing to generate the income.
Author	Ok, thank you very much for your support. […]

The Expert:	Mr Thomas Murray
Track Record:	
Current Position:	Managing Director Apollo Global Management LLC
2013 - 2014	Managing Partner Austin Partners LLC
2002 - 2012	Global Head – Project Finance WestLB AG
1998 - 2002	Director – Syndicated Loans Group Credit Suisse First Boston
1998 - 1998	Vice President – Structured Finance Group GE Capital
1993 - 1998	Vice President – Project Finance Banque Paribas
1992 - 1993	Associate – Project Finance NatWest Markets

The views expressed in this article are those of Mr. Thomas Murray and do not necessarily reflect the views and policies of the Apollo Global Management LLC.

Teleconference on 17th of December 2015 from 4.30 p.m. to 5.10 p.m.

Author	[…]The Topic of the doctoral Thesis is: Effects of the financial crisis on the business segment of international project finance. – And I build the following hypothesis: That the increase in capital costs resulting from regulation renders the implementation of large projects within the scope of project financing

	more difficult. Project financing is losing its relative appeal in the orientation of the banks' business policy. It has to be complemented by other forms of financing, or replaced, to financially ensure the realisation of large projects also for the long-term. The deductive exploration in my doctoral Thesis provides: A rule: The increase in cost of capital leads to a reduced demand of financing. A case: Basel III leads to an increase of cost of capital, and A result, – which is to discuss. So, the guideline-expert-interview provides on the one hand a guideline, which is in this case the PDF at hand, and on the other hand your free opinions, statements or your experience from the project finance market in your daily business. This leads us to the first Pillar: The economic analysis of the impact of Basel III on the bank lending behaviour – with the Liquidity cover ratio and the capital requirements and maybe especially in your case with a linkage to the Dodd Frank act on the bank lending behaviour with the focus of Structured Finance and International project finance with usually long-term commitments far more than 15 years and huge commitments far more than US$100mil per project?
Murray	So I tend to agree, that Basel III will lead to a reduction in supply of project finance capital from the banks because it does impact them both in terms of stetting a side more capital for those types of project especially once that are longer dated and or lower credit quality but one point I would make is that Basel III is not been implemented yet or is slowly being implemented and so today we have not seen the impact really of the tightening of the rules under Basel III in the market banks because they are fresh with liquidity and they need to put up money to work - have been very aggressive in offering up financing to all different types of projects including very large projects in the LNG space and the infrastructure spaces as well as becoming more aggressive going down market into even projects which have merchant price risks. So I do think eventually Basel III will kick in but I will say so far as not. I would also say that there has been diminished supply from a number of banks including like WestLB and some of the other German Landesbanks and the Caja's in Spain there have been a number of banks that have stepped up to fill the gap principally the Asian banks as well as the regional banks so in the US we've had a number of US-regionals step-in to provide project financing, the Japanese have stepped up in a very big way to fill the gap the Chinese banks have now entered the scene with huge

	amounts of capital that they are offering and the local banks in local markets for example – we just looking at a deal in Peru there we decided not to pursue because there is so much local bank demand the pricing did not meet our expectations and so we took a pass on the deal – So we are definitely seeing the potential for Basel III to reduce capacity we also seeing other banks that are not subject to in financial institutions not subject to Basel III step-in to fill the void. Unfortunately from my perspective given I work not as an asset Manager, the competition has not - the point as much as I was hoping it would and come our way the other sources of capital that are stepping up are ECA's LMA'S and development banks have become active local capital markets in the varies countries have become active and bond investors you know the insurance companies and others who were smaller historically in terms of the percentage of long-term project financing that they have done have now stepped into the mix on top of that you have dedicated mass funds in the energy and power space dedicated mass funds in infrastructure that have stepped up and you also seeing some senior secured loan and bond funds that are being established to fil in the gap. So I guess that the broad summery is this, that yes I agree Basel III and Dodd Frank is going to course commercial banks to reduce exposure to the asset class. There are numbers of ways that is being filled in and will be filled in so I think the total supply of capital will continue to be you know twintefull for all different types of project
Author	That's interesting, because that leads us directly to pillar number two – the chart-analysis which you can see on the bottom of page no. 1. Basel III is still in the implementation process since 2013 and we see in the historical data analysis of project financing that if Basel III would have an impact on project financing, why we couldn't see this impact in the charts? Why project financing is still increasing after the decision to implement Basel III in the year 2012? How would you explain the charts?
Murray	Your question is: we had a dip at the beginning of the financial crisis but then we have steady increase in project financing?
Author	Yes, that's correct.
Murray	Ok, so I mean first of all I think this in part is a function of the projects-that-come-to-market so I mean project financing assuming there are no capacity constraints witch I believe there are limited capacity constraints because I guess that other stepped-up to the plate to fill up the gap, then really project financing is driven more by the supply of project that

	require financing residently availability from banks or others, right? So is this chart only bank market? Or is this also total?
Author	It is the total loan market.
Murray	Ah ok, just loans. So if you look what happen here in 2008 and 2009 I will bet you, you will find that debt demand for project financing also went down and for loans went down and I will bet you, that the supply from banks was probably relative to others sources of capital maybe a little less but not materially less but I don´t know if I confirm. The reason for that is that no. one the banks were all – like WestLB – kind of dealing with increased capital costs and dealing with raising money in foreign markets if you look at you know a lot of these deals are dominated in US dollars and other currencies. It is fine to get access to these currencies at cheap pricing etc. was difficult. But also there was just less activity because the economy was in bad shape. Then is the economy stabilised in 2009 slowly started to see increases even so if you probably look there is probably better shift away from certain types of subsectors in project finance in more to each other's. I would think that you may have seen a less renewables as a percentage maybe then just in 2007, 2008 you probably have US more oil and gas related project financing you know in LNG and possibly in pipes and processing in storage of hydrocarbins and so in part I think you know I don't have the date in front of me and I don't know exactly kind of how this war come out that I would go back and look at this to see how the demand for project finance shifted and would in the various subsectors. But in any case I mean just locking at this chart obviously you've had a steady growth since then although it's kind of going back to historical levels that hasn't jumped back up to the kind of 2006, 2005, 2007 big spike that we had but it's kind of steadily moving up and I think that's a part of a functional effect that infrastructure and project finance are project finance support infrastructure and infrastructure is something that the costs and the needs updating, you can differ capex of major infrastructure for a little while but in the end of the day you now the world keep its roads operational needs to keep its transportation infrastructure its power infrastructure, its oil and gas infrastructure, has to continue to receive capital and so to some extend its probably not as on a global basis as maybe some other industries.
Author	Perfect maybe we can come directly to the next chart. The chart shows the graphs of the EU, Asia-Pacific, Central Asia, Middle-East and America, but it's not a typically chart which we known from journals like PFI or others, where country means the location of the project finance Company – in this chart country means the location of the headquarter of the

	financing bank. For example: in a Project is the BNP involved, than the commitment from the BNP belongs to the EU in a Project is the Mizuho involved, than the commitment from Mizuho belongs to Asia-Pacific and so on…
Murray	Oh, it means Banks Participation?
Author	Yes.
Murray	Yes that makes a lot more sense. Couse I was look at this and think wow EU is huge But it means EU Banks and that makes a lot more sense. You can see what – you know – my seems, and I didn't know that when you did this but the seem is – you see what happens in the EU-banks. The EU-banks have a kind of increase continuing / increase participation and also a number of them pull back ,you know, if you look back to 2008 2007 you might see a less participation, well not 2007 but 2008 you might see a less participation, but I mean in the end of the day, EU-banks were the best majority appears Banks pre financial crisis and what you're seeing is that over time we're becoming less and less important also I think we found in 2012 it looks like we found a kind of a stable point to grow some and I think that is representative of the banks that didn't survive this financial crisis like the Cajas like some of the Landesbanks including WestLB and some of the smaller banks like lloyds and you know others – satisfy? That cause the reduction and demand from them. But know goes in a still existing like the credit Agricol like the BNP-Paribas like the others – continuing to their lending become again a strategic business for them. So I think that's what you think for the EU. I think on the APAC side you definitely seeing an increase in activity. The Japanese have always been around, but they have stepped-up to fill the void in a bigger way then they have in the past. And then the Chinese banks also very big, coming in. Central Asian banks – Who that be?
Author	That's first and most of all India. Russia is only a very small stake but India dominates all and there the bank in charge is The State Bank of India.
Murray	Ok, sorry I can't really speak to that so I don't know. America I can speak to and that is that we had a merger was really very very small percentage some of the banks in Latin America but it was a very small percentage of the total bank market but as I mention the regional banks have now stepped-up to do a number of project financing especially as renewable energy has become popular here in the US and as local infrastructures

	starts or take hold these guys start to feel like there developing capabilities. That being sad American Banks are really financing only US Projects or country of their location so I mean if you have Chilean bank its financing Chilean projects and such. But what you really will see is the US banks financing a lot in America projects or international projects. – And the Middle East again, I can't really speak to. I mean there's been some activity there but lot of those are you know lot of middle East financial institutions kind of I think also are very focused on their own region and that's way they play not much else.
Author	I agree. Ok, then we come to the last chart and I want to combine it with the last pillar III. Pillar III contains a Literature-Review or a journal analysis. The keywords: financial crisis; Basel III, structured finance, project finance, rating agencies – resulted over 5000 hits and with filters like headline, abstract and rating criteria's - a quantity of over 70 journals leads to the following tenor, that a mixture of different tools like mini-perm-financing, lower commitments, more ECA's and governmental support, bond and fund structures or new market participations like Alliance Insurance company, GE-Capital and Siemens-Financial – are a need for a successful ongoing project financing market. When Basel III is getting more and more relevant for banks in the next years, do you think there is one key element that has an important role or do you think as well as the journals that a combination of different tools is the solution. Maybe with a comment to the last chart where we see an increasing ECA relevance and also an increasing project finance bond market which has dibbled form 2012 to 2013.
Murray	So I think a few things. Number one that it makes sense that basel III is being implemented and that banks are not being allowed to commit you know 20 year financings because of the nature of the banking business is not long-term. Their deposits are not necessarily long-term and their funding is not long-term and it makes a lot more sense for institutional investors with free money and long dated liabilities to finance infrastructure generally. So the move towards the bond market away from the banks, first of all I think is gone continue but else I think it makes a lot of sense. I think Banks will should be more in the initial phases of de-risking which is the construction as well as the sort of you know ramp-up-period in projects and then most of these projects really should be financed with permanent capital from pension bonds and insurance companies and others who have long-term requirements for a steady stream of cash. So I think it goes in this direction, I also think that will lead to, because there is a very specific requirement for a skillset to

	analyses this project, that will lead to an increase usage of the rating agency's in project financing, not that they haven't been active in the past but they will become more and more active and I also think that there will be an increase usage of dedicated debt funds because not all insurance companies and pension funds will have the volume of capital to put this work in this space that requires - that could justify a large in-house resource team and so there will be funds and we start to see that already, but there will be funds that are dedicated / that there will take institutional money and invest on their behave. – So that's my broad point, I think you also see a depending on the situation you will see many other forms of financing come in to play, including those banks who don't play who don't appear to Basel III. So you gonna see like the Chinese banks, I don't think they actually final to Basel rules – Do you know if do or not?
Author	Yes, they do. The big player in project finance and those countries like China, Japan, Australia, Hong Kong, Korea and Singapore have already fully implemented.
Murray	Ok, so then that point is a mud point because when they have committed, then they have committed. So I think then taking them away and the problem what the Chinese have, - that maybe they have commit to it but the costs of funds or so or they not care or whatever but we seeing them in playing in a very big way right now – but if there are committed I think they will pull back and then like I said you gonna look at institutional money financing a lot of these projects. The other think you gonna keep in mind is that project finance really should be, can be bifurcated into two sorts of categories – one to me is the large stable infrastructure projects that have investment grade characteristics, once that are you know where the asset is subject to limited or low competition you know and where the risk profile is limited as a result, and then you have other projects that are you know like merchant power projects like certain toll roads –they are greenfield's with traffic risk, that may actually have you know that are really more Sub-Investment Grade risk profile so when you break this two things up I think you gonna find the big institutional money focused on the more save projects and then you gonna find different class of investors which could include you know shorter term bank money, could include mezzanine capital, could include alternative asset manager, kind of high-heeled capital, play an aspect. So there is gonna be a bifurcation depending on risk profile I think of the assets. But for the most part project finance are the saver assets – right?

Author	You point out the risk profile – do you think that ratings and especially more ratings for project finance could help – also with a focus on the bond and fund market? You see the doubled bond market from 2012 to 2013 but it's still a subordinate size by comparison to the loan market.
Murray	Yes, I think ratings are gonna be critical. Critical for all insurance companies in order to get – in the US – the capital treatments as they need and so yes, they gonna play a very important role. I think a much bigger role than they have in the past.
Author	What is your assessment? Did projects often had a rating by official rating agencies?
Murray	Not that much, any kind of public bond issue for project finance has at least one rating and sometimes two and usually it is S&P or Moody's but there are a number of private placements that – in the US – don't get a rating or they go directly to the NAIC] National Association of Insurance Commissioners [which is a kind of body that is involved in monitoring, rating, insurance company assets.
Author	Ok, thank you very much for your support. […]

The Expert:	Mr. Werner Taiber
Track Record:	
Current Position:	CEO Meriten Investment Management GmbH
	Country Executive for Germany Bank of New York Mellon
2005-2012	WestLB AG Member of the board

The views expressed in this article are those of Mr. Werner Taiber and do not necessarily reflect the views and policies of the Meriten Investment Management GmbH or the Bank of New York Mellon.

Teleconference on 10th of December 2015 from 2.00 p.m. to 2.31 p.m.

Author	[…]Das Thema meiner Doktorarbeit lautet: Effects of the financial crisis on the business segment of international project finance. Ich habe folgende Hypothese aufgestellt: Die Erhöhung von regulierungsbedingten Kapitalkosten erschwert die Umsetzung von Großprojekten im Rahmen der Projektfinanzierung. Die Projektfinanzierung verliert an relativer Attraktivität in der geschäftspolitischen Ausrichtung der Banken. Sie muss entweder durch andere Finanzierungsformen ergänzt oder ersetzt werden, damit auch künftig die Realisierung von Großprojekten finanziell gesichert wird. Die Arbeit folgt der deduktiven Exploration, bestehend aus: Regel: Die Erhöhung von Kapitalkosten verringert die relative Attraktivität der Kreditfinanzierung; Fall: Basel III führt zu einer Erhöhung von Kapitalkosten; und Ergebnis: welches anhand der Analysen zu diskutieren ist.
Mr. Taiber	Und natürlich, dass es wahrscheinlich schwerer wird für Versicherungsinstitute, Bankanleihen zu kaufen, regulatorisch gesehen, aus einer Solvency II Sicht. Also das würde ich nicht unterschätzen und außen vor lassen bei der Betrachtung, weil die Kapitalsammelstellenfunktion von Banken ist aus meiner Sicht zum einen gestört durch Basel III auf der Aktivseite, sprich langfristige Kreditvergabe, aber sie ist meiner Meinung nach auch relativ gesehen

	gestört durch die Liability-Seite, nämlich der Tatsache geschuldet, dass eben Versicherungen nach Solvency II auch langes Geld bei Banken einer höheren Belastung unterlegen ist. Also das würde ich auf jeden Fall noch einmal prüfen.
Author	Ja, habe ich geprüft und ist ein guter Hinweis an der Stelle. Mein Forschungsdesign ist auf drei Säulen aufgebaut, um nach der qualitativen Forschung ein repräsentatives Ergebnis zu erzielen, da ich für eine quantitative Untersuchung auf noch keine validen Zahlen zurückgreifen kann, da eben Basel III noch nicht komplett umgesetzt ist und der Prozess der Umsetzung noch bis 2019 andauern wird. Aber, wie Sie es gerade schon angesprochen haben, wir haben mit Basel III zum einen die Liquidity-Cover-Ratio und die Capital-Requirements als neue planbare Regularien und da möchte – frei formuliert – auf Ihre Erfahrungen zurück kommen aus der WestLB als eine Bank, die zu den Top 10 der PF-Banken zählte als auch Ihre strategische Sicht als CEO der Investmentboutique Meriten und als Country Executive for Germany der BNY als eine Bank, die zwar zu den systemrelevanten Banken zählt, sich jedoch als Investmentbank fast gar nicht in der Strukturierten Finanzierung bewegt.
Mr. Taiber	Gar nicht. Wobei Sie aufpassen müssen. Also ich bin natürlich bei der Investmentboutique Meriten. […] Da dürfen Sie mich jetzt nicht mit dem klassischen Geschäft von der BNY Mellon direkt in Verbindung bringen und die BNY Mellon ist also aus meiner Sicht gar nicht der Strukturierten Finanzierung vertreten.
Author	Das ist korrekt. Die BNY Mellon spielt nur eine Untergeordnete Rolle mit nur einem einzigen Projekt aus 2011 i.H.v. Mio. 38 € – also kein nennenswerter Player. Die Frage beinhaltet lediglich die strategische Neuausrichtung und strategische Positionierung von Banken generell und explizit der Strukturierten Finanzierung mit den Einflüssen von Basel III zum einen und zum anderen charakterisiert die Strukturierte Projektfinanzierung die langfristige Kreditherauslage von 10-15 Jahren und auch noch deutlich länger und hohe Beteiligungen von über Mio. 100 € in der Projektfinanzierung in Einzelengagements als einzelne Bank im Konsortium. Das heißt hohe Commitments und lange Laufzeiten. Und hierzu nochmal Ihre Stellungnahme zur strategischen Neupositionierung, wenn die Projektfinanzierung im Wandel ist mit vielleicht zukünftig kleineren Commitments und kürzere Laufzeiten: Was passiert mit der Strukturierten Finanzierung und für wen könnte sie interessant werden?

Mr. Taiber	Ja gut, am Ende des Tages muss man andere Wege finden der Finanzierung und ich glaube, das ist ja jetzt auch nichts radikal Neues, dass die Investoren stärker direkt gefragt sind und man natürlich idealerweise eigentlich schaffen sollte, die zum Beispiel die Verbindlichkeiten, die die Investoren haben, also z.B. die Pensionsgelder und die Aktivierung oder die Nutzung der Pensionsverpflichtungen und die damit einhergehende langfristige Verbindlichkeit mit entsprechend langfristigen Aktiva zu verknüpfen, das ist ja per se und von den Cashflows her durchaus was sehr Sinnvolles weil sie natürlich auch einen gewissen, obwohl wir im Augenblick auch nicht von Inflation sprechen, aber einen gewissen Inflationsschutz haben. In der Regel sind die Finanzierungen letztendlich variabel verzinslich und es bieten alle Möglichkeiten es so zu lassen oder durch Swaps entsprechend anzupassen auf der Passivseite, sie sind entsprechend langlaufend und damit haben sie eine hohe Deckung der langlaufenden Verbindlichkeiten, was allerdings der schönen Ökonomie gegenüber steht und das muss man dann einfach nochmal prüfen, ist in der Tat wiederum die Regulatorik bzw. auch die, aus meiner Sicht, die Regulatorik und die Accounting-Regeln. Die möglicherweise eine Ineffizienz bzw. auseinander laufen der Buchung und Darstellung der Verbindlichkeiten und der Aktiva haben bzw. eben Restriktionen, sei es über bestimmte Asset-Klassen-Limite oder über bestimmte Fonds-Limite, eben eine starke Investition in Projektfinanzierungen quasi unmöglich machen.
Author	Also habe ich es richtig verstanden, dass wir zum einen sagen müssen: Es kann langfristig nicht mehr die Aufgabe der Banken sein –
Mr. Taiber	Es könnte sein, aber es wird kaum noch möglich sein. So würde ich es vielleicht formulieren. Es kann schon die Aufgabe der Banken sein, aber es wird regulatorisch bedingt einfach quasi unmöglich gemacht oder zumindest stark erschwert.
Author	Ok – Dann stellt sich nämlich direkt die Frage auf der zweiten Seite zur Säule II: Dort habe ich die Projektfinanzierung in der Vergangenheit visualisiert. Wir sehen in dem ersten Chart quasi in dem obersten Balken, wie sich die gesamte Projektfinanzierung generell entwickelt hat und vielleicht im Verhältnis dazu der untere Balken, der ausschließlich die Beteiligung der Systematic-Relevant-Banks in der Projetfinanzierung darstellt, die neben den Anforderungen von Basel III noch einen zusätzlichen Eigenkapitalpuffer aufbauen müssen – wenn ich mir den Verlauf der Kurve anschaue ist es natürlich klar, dass es nach 2008 in der Finanzkrise zu einem Einbruch kam, wie auch im Vergleich zu 2001.

	Aber vielleicht können Sie das mal interpretieren, warum dann die Finanzierung nach 2012 mit den schon avisierten Capital-Requirements nach Basel III es auch bei den Systematic Relevanten Banken weiterhin wieder zu einem Anstieg in der Strukturierten Projektfinanzierung kam.
Mr. Taiber	Also aus meiner Sicht ist es so, dass das klassische normale, wenn ich das so nennen darf, Kreditgeschäft – Corporate Kreditgeschäft – aus vielleicht verschiedenen Gründen weniger geworden ist, also die berühmt-berüchtigte Kreditklemme, die findet ja nur in einigen Staaten Europas statt, wenn überhaupt, oder bei einigen Banken in Europa statt. Damit einhergehend suchen die Banken händeringend nach Aktiva, nach rentablen Aktiva, und die Unternehmen haben zum einen ihre Liquiditätssituation nach den Erfahrungen der Krise 2008 und 2009 zunächst mal generell deutlich angehoben. Das heißt, der Cashbedarf ist ohnehin geringer geworden. Das Zweite ist, die konjunkturelle Situation und Verunsicherung hat dazu geführt, dass Investitionsprojekte vielleicht nicht so aggressiv angegangen werden. Das dritte ist, dass aus meiner Sicht, und das kann man wahrscheinlich auch mit Zahlen belegen, dass Unternehmen viel stärker auch den Kapitalmarkt genutzt haben, das heißt, wir haben eine zusätzliche Refinanzierungsquelle gewonnen und all das hat dazu geführt, dass die Nachfrage bei den Banken nach term-loans im Grunde genommen für klassische Corporate-Finanzierungen tendenziell abgenommen hat. Das wäre meine These. Und die Banken händeringend danach gesucht haben nach Alternativen und die Projektfinanzierung. Ich meine selbst eine Deutsche Bank ist in die Richtung gegangen, die Projektfinanzierung dort durchaus als Ersatz für das klassische Kreditgeschäft gesehen worden ist. Und natürlich die Banken weniger Eigenhandel dargestellt haben, viel stärker auch politisch unter Druck gekommen sind, Realwirtschaft zu unterstützen und von daher solche Projekte quasi wie gerufen kamen. Eine Kombination aus verschiedenen Dingen, wie immer im Leben.
Author	Interessant. So sieht auch mein Fazit nach der Recherche aus. Kommen wir zur zweiten Skala: da habe ich eine besondere Darstellungsform gewählt, die es so zuvor noch nicht gab. Denn wenn man zuvor in der Projektfinanzierung die Verteilungen auf „Countries“ anschaute, beinhaltete dies immer die „Location“ der Project-Company. Ich habe eine Darstellung erstellt, in der „Countries“ die Location der finanzierenden Bank darstellt. Zum Beispiel alle EU-Banken, die sich in der Projektfinanzierung beteiligt haben – alle amerikanischen Banken, die sich in der Projektfinanzierung beteiligt haben usw. und diese Darstellung wird in der zweiten Grafik wiedergegeben. So dass, wenn ich

	mir die Charts anschaue, zum Beispiel EU Banken nach 2012 im Verhältnis zu fast allen anderen Banken einen starken Einbruch in 2011 noch einmal haben. Sowie als weiteres Beispiel, der Chart Central-Asia, hauptsächlich getrieben durch die State Bank of India, die ebenfalls ihr Engagement in der Projektfinanzierung Stark zurückfährt. Das sind auf den ersten Blick die beiden Ausreißer in der Grafik. Was sind Ihre Interpretationen und Kommentare zu den Charts?
Mr. Taiber	Zur zweiten Grafik glaube ich: also, warum ist Amerika so weit unten? Da würde ich sagen – Erstens: Das war immer ein sehr kapitalintensives Geschäft und Amerikanische Banken haben sich dort relativ gesehen wenig getummelt. Weil sie auch in ihrem Heimatmarkt in der Regel stärker entweder sehr regionales Geschäft gemacht haben, bzw. im globalen Geschäft natürlich auch sehr stark im Kapitalmarkt- und Investmentbanking unterwegs waren. Das wäre das Erste. Das Zweite ist: Middle-East, würde ich mal sagen, da kann ich die Liquiditätsströme nicht beurteilen, aber ich könnte mir vorstellen, dass dort die Erfahrung gefehlt hat, sich in diesem Segment zu tummeln. Sie brauchen ja schon eine gewisse Erfahrung auch. Bei den asiatischen Banken und da wäre vielleicht ein Blick ganz interessant - wenn Sie den für sich selber noch einmal machen - im Hinblick auf Japanische Banken. Da trifft auch sehr stark zu, dass sie im Grunde genommen kaum inländisches Geschäft hatten und sie dringend nach Assets gesucht haben. Also von daher kann ich mir sehr gut vorstellen, dass Asia-Pacific an der Stelle wächst durch Japan.
Author	Ja, das ist der Fall. Führend durch Mitsubishi, Mizuho und Sumitomo. Das sind die führenden Banken in der Projektfinanzierung mit globaler Beteiligung.
Mr.Taiber	Central-Asia muss ich jetzt passen. Das könnten tatsächlich die Inder sein. Und da muss man natürlich sehen, das ist schon ein Sondermarkt und auch eine Sonderkonjunktur – würde ich es mal nennen. Da gehen ja auch die Volumina runter, also da könnte ich mir vorstellen, dass es Probleme bzw. geschäftsstrategische Entscheidungen dieser indischen Bank gewesen sind.
Author	Ok, in der Literatur wird zur EU, in der obersten Linie, insbesondere zu dem Knick ab 2012, Stellung genommen, dass der Grund aus der Euro-Banken-Staaten-Krise mit Italien Griechenland und Protugal nach der Finanzkrise hierzu führte. Und dass hieraus auch den Banken die Liquidität fehlte.

Mr.Taiber	Ja, d'accord und eine WestLB ist aus dem Markt raus.
Author	Ja, guter Einwand, ich glaube das ist spürbar, wenn eine Top-10-Bank den Markt verlässt.
Mr.Taiber	Ja.
Author	Auch mit den zuvor getroffenen Annahmen kommen wir jetzt zur letzten Grafik, wo Sie eingangs sagten, dass andere Alternativen im Kapitalmarkt verstärkt zum Einsatz kamen / kommen müssen, und das würde mit Ihrer Meinung einhergehen, dass die Non-Recourse-Bonds, die in die Internationale Projektfinanzierung fließen, weiter jährlich ansteigen und auf einem noch nie dagewesenem Niveau sind. Hingegen bleiben die ECA gedeckten Tranchen auf einem fast gleichbleibenden, leicht ansteigenden Niveau. Der Bond-Markt in der Projektfinanzierung hat sich gegenüber 2012 in 2013 mit fast 50 Milliarden US$ verdoppelt.
Mr.Taiber	Ja, wobei es halt grundsätzlich nicht so einfach ist, einen Bond auf eine Projektfinanzierung zu legen, weil da brauchen sie doch manchmal eine gewisse Flexibilität, die so ein Bond natürlich per se erstmal nicht hat. Also die können sie wahrscheinlich zu einem, denk ich mal, Grundrauschen nutzen. Also das war immer ein großes Problem – Projektfinanzierungsbonds sozusagen zu begeben. Also von daher eigentlich eine ganz erfreuliche Entwicklung.
Author	Welche Weichen müssten gestellt werden? Und dies nehmen wir gleich als Anlass, um zur Säule 3 zu gelangen, wo meine Recherchen auf einer Literaturauswertung fußen. Hier habe ich die aktuelle Literatur nach Stichwörtern: Finanzkrise, Basel III, Strukturierte Finanzierung, Projektfinanzierung und Ratingagenturen durchsucht, und habe in einem ersten Lauf über 5000 Treffer erzielten. Nach einer Beurteilung der Überschriften und Abstracts waren es dann noch 150 und darunter 74 besser als „D" geratete Journals, deren Aussagen wir gerade auch schon feststellten: wie eine bereitere Aufstellung, neue Marktteilnehmer kommen hinzu, wie Siemens und die Allianz, die dort aktiver werden, es wird über Mini-Perm-Financing gesprochen, es wird über kleinere Commitments gesprochen, es wird über mehr governmental support gesprochen, also alles, was für die Projektfinanzierung zukünftig von größer werdender Relevanz sein könnte. Und in dem Zusammenhang wieder Bonds und Fonds Finanzierungen – Wie sehen Sie das? Sie sagten ja unterschiedliche

	Lösungsansätze, ja, jedoch ist der Bondmarkt eine schwierige Lösung. Was würde dem Bondmarkt die Tür öffnen?
Mr.Taiber	Was würde dem Bondmarkt die Tür öffnen -
Author	Ratingstrukturen - eventuell?
Mr.Taiber	Ja, Ratingstrukturen sicherlich, weil das natürlich dann auch wiederum den Kauf einfacher macht für Versicherungen oder andere institutionell, die einfach die Ratings brauchen. Was man natürlich auch nicht vergessen darf, ist, im Rahmen der ganzen Regulierung, natürlich jetzt auch von den Investoren verlangt wird, auch unter Sovency II, das haben Sie sicherlich auch schon recherchiert, dass sie ihre eigene Kreditanalyse machen müssen und das sie sich nicht mehr nur auf Ratings verlassen dürfen. Also von daher: ja, Ratings helfen. Aber nein, Ratings sind eben nicht mehr allein glücklich machend nach dem Motto: guck mal hab doch Single-A gekauft, brauch ich mir gar nicht anzugucken, kann ich kaufen. Da gibt es durchaus auch einen Effekt, der jetzt das nicht unbedingt direkt unterstützt. Eine gewisse Liquidität, auch eine gewisse Standardisierung möglicherweise, eine Standardisierung auf der Finanzierungsseite, weil, wenn es standardisiert ist, dann wissen sie im Prinzip, wenn ich einen Projektfinanzierungsbond kaufe, dann hat der vielleicht eine bestimmte Laufzeit, der hat bestimmte Kriterien erfüllt und ich muss nicht im Prinzip das Projekt so detailliert betrachten, weil ich ein gewisses Grundrauschen immer habe. Was natürlich helfen könnte und am Ende wäre das vielleicht so eine Hybridfinanzierungart, da könnte ich mir vorstellen, dass sich das durchsetzt, dass die Banken quasi die Erstellungsphase finanzieren, ähnlich wie bei einer Immobilienfinanzierung, also die Development-Phasen, wenn sie so wollen, Projektentwickler, dann hätten sie da auch irgendwo 1, 2, 3 Jahre. Da ist auch der Juice letztendlich drin, weil da ist natürlich das Risiko und dann könnten sie die Ausfinanzierung machen über quasi ein Brownfield mit vielleicht 1, 2 Jahren Erfahrung über standardisierte Bonds.
Author	Ja, das ist ein guter Ansatz.
Mr.Taiber	Also das würde vielleicht sogar die jeder-gewinnt-Lösung sein. Problem bei der Lösung ist natürlich, dass sie in der Ausfinanzierug – dann in der Brownfield-Phase – natürlich eine Rendite haben, die nicht mehr so attraktiv ist.

Author	Ja. Was halten Sie von einem Konstrukt, welches ich aus der Literatur Review entwickelt habe, das die stärkere Einbeziehung der Versicherungen vorsieht und wenn man dann hingeht und beispielsweise deutsche Versicherungen würden ein Basel III konformes Rating bei der BaFin beziehen und in eigenen Teams bestände dann die Möglichkeit, Bonds zu bewerten und zu raten und das Risiko zu beurteilen und hätte mit den langen Laufzeiten bei attraktiver Verzinsung eine maßgeschneiderte Anlageform.
Mr.Taiber	Dort bin ich jetzt nicht ganz genau im Thema, aber da muss man natürlich gucken, die BaFin wird wahrscheinlich nicht hingehen und sagen: hier hast du ein Ratingtool, die wird immer nur sagen: was hast denn für eins genutzt, zeig mal und dann wird sie eine Meinung haben. Und zum Zweiten, vergessen Sie nicht, die EIOPA, also die Europäische Aufsichtsbehörde für das Versicherungswesen und die betriebliche Altersversorgung zum Beispiel, also die ganzen „E's" dieser Welt. Die würde ich gerade in der Doktorarbeit / Dissertation würde ich die schon sehr stark betrachten, weil die deutschen Aufsichtsbehörden im Grunde genommen ja nur noch umsetzen. Also gucken Sie nach den E's, also gucken Sie: was sagt eine ESMA vielleicht im Fondsbereich, was sagt eine EIOPA im Bereich Versicherungen, was sagt eine EZB bei den Banken, wie die ja eigentlich letztendlich offiziell die Regulierung übernommen haben und die Umsetzung in den jeweils nationalen Märkten, dann durch die BaFin, durch die Bundesbank usw. oder andere gemacht wird. Aber letztendlich können Sie eine nationale Lösung bzw. nationale Regularien, darauf kann man leider nicht mehr zurückgreifen, sozusagen als letzter Hinweis. […]
Author	Perfekt, das war es. Vielen Dank für Ihre Unterstützung. […]