



EIOPA/13/513
19 December 2013

**Technical Report on
Standard Formula Design and Calibration for
Certain Long-Term Investments**

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1. Executive Summary

1.1 Background

The European Council of June 2012 expressed its determination to stimulate smart, sustainable, inclusive, resource-efficient and jobcreating growth in the context of the Europe 2020 Strategy, and initiated the Compact for Growth and Jobs. This action to be taken by the Member States and the European Union aims at relaunching growth, investment and employment as well as making Europe more competitive.

Investment in the drivers of growth, productivity and competitiveness generally requires finance over an extended time horizon.

In this context the European Commission (EC) asked EIOPA in a letter from 26/9/2012 to examine whether the calibration and design of regulatory capital requirements for long-term investments in certain asset classes under the envisaged Solvency II regime necessitates any adjustment or reduction under the current economic conditions without jeopardising the prudential nature of the regime.¹

1.2 Scope of the analysis

EIOPA should cover the following assets in its analysis:

- Infrastructure financing and other long-term financing through project bonds, other types of debt and equity;
- Small and Medium sized Enterprises (SME²) financing through debt and equity;
- Socially Responsible Investments (SRI) and social business financing through debt and equity;
- Long-term financing of the real economy through securitisation of debt serving the above mentioned purposes.

The adequateness of the standard formula calibration and dependency of regulatory capital requirements on the match between long-term investments and insurance liabilities was examined. Further areas of

¹ http://ec.europa.eu/internal_market/insurance/docs/solvency/20120926-letter-faull_en.pdf.

² Throughout the analysis the SME definition of the European Commission is used: less than 250 employees and either turnover not exceeding € 50 m or balance sheet total not exceeding € 43 m. (http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm).

analysis were non-regulatory obstacles to long-term investments and the impact of the standard formula calibration on investment decisions.

As there are fundamental differences in the calculation of regulatory capital requirements for banks and insurers, due to the different business models, a comparison of risk charges for individual assets would not be meaningful. Because a broader perspective is necessary EIOPA is addressing this issue at the level of the Joint Committee.

1.3 Adequateness of the standard formula treatment for certain long-term investments

Below the findings for the individual investments are summarised. A number of them are relatively novel. The resulting lack of reliable performance data has been a major challenge. EIOPA expects significant improvements in this area over the coming years that may allow a reassessment of the capital requirements.

Private Equity/Venture Capital

Private Equity (PE) comprises the sectors venture capital, buyout, growth capital and mezzanine. Given the focus on fostering growth and the crucial importance that the availability of early-stage or expansion capital has in this context EIOPA decided to focus on Venture Capital as a source of SME equity financing. But private equity funds invest also in SMEs and the available literature covers only the adequateness of the standard formula for private equity in general. EIOPA reviewed therefore also the calibration for this broader category.

EIOPA analysed the riskiness of Venture Capital based on historical data for an index of listed venture capital funds. This index includes mainly the shares of general partners while insurers invest as limited partners. For this reason another index, which describes the market prices for shares of limited partners in venture capital funds, was also considered. For private equity an index of listed funds of funds that invest in private equity and venture capital funds was analysed. In times of market stress, large drops can be observed for all of these three indices. This supports the current standard formula calibration.

The lower calibrations for Private Equity proposed by industry are usually calculated using Net Asset Values (NAV) – i.e. appraisal values

- from a database of Private Equity funds. EIOPA has considerable concerns regarding this approach:

The databases suffer generally from biases. It is also not obvious that the average standard formula insurer would achieve the level of diversification implied by the use of a large number of funds in the calibration. A third concern is that the use of periodically updated appraisal-based prices may lead to the artificial smoothing of returns. In addition to methodological concerns regarding the use of appraisal values from a private equity database, EIOPA sees no clear economic rationale why the prices buyers are willing to pay for private companies should be less volatile than for public ones.

In summary, the analysis performed by EIOPA supports the current calibration.

SME loans

SME loans have historically played only a minor role in the portfolios of European insurers. Insurers may lend directly to SMEs, buy loans from banks or co-invest alongside them. SMEs may have more difficulties to get access to finance in a crisis as they rely heavily on banks. They are also less geographically diversified.

As market prices are generally not available EIOPA has analysed default rates for SME loan portfolios. The evidence supports the current calibration.

Socially Responsible Investments (SRI)

There seems to be no generally accepted definition of SRI. EIOPA has taken a pragmatic approach: To warrant a separate category for SRI the definition should be broad enough to allow insurers a meaningful allocation. It should also be easy to decide whether a particular investment falls into such a SRI category or not. Finally, there has to be a sufficiently long history of reliable market data to support a specific calibration.

The academic evidence on the under- or outperformance of SRI compared to other investments is inconclusive. The main economic argument for a higher risk of SRI is the reduced diversification that results from limiting the investment universe. The argument for lower risk rests mainly on the assumption that a company with high

environmental, social or ethical quality (a “good” company) is less risky.

A review of the equity risk calibration would have to be based on a suitable index from the set of established SRI indices with a sufficiently long history. But in many cases the composition of these indices is very similar to conventional ones.

There is a general dilemma: For practical reasons there have to be enough investment opportunities to allow a meaningful allocation and a long enough history of reliable market data for the calibration. But this implies a relatively broad definition of SRI. The resulting significant overlap with conventional investments makes it difficult to argue for a better risk profile.

In summary, the results support the current calibration.

Social Businesses

For the purposes of the analysis the definition of social businesses in the Regulation on European Social Entrepreneurship Funds as adopted by the European Parliament on 12 March 2013 was used. According to it a social business has to be unlisted and the achievement of measurable, positive social impacts has to be a primary objective.

Given this characteristics social businesses are unlisted and will generally not issue bonds listed on an exchange. There are some unlisted funds investing in social businesses. But EIOPA does not see that a robust calibration could be produced on this basis.

According to the Impact Assessment by the European Commission on the proposal for the Regulation there is “a ‘trade-off’ between expected financial returns and ‘social’ returns (which can be characterized as taking on more risk for the same return or lower return for the same risk)”.³

Based on the lack of reliable data and the focus on social returns at the possible expense of financial returns a more favourable treatment than for conventional investments cannot be justified from a prudential perspective.

³ European Commission (2011): Commission Staff Working Paper Impact Assessment accompanying the document “Proposal for a Regulation of the European Parliament and of the Council on European Social Entrepreneurship Funds”. p. 13.

Infrastructure project debt and equity

The analysis conducted by EIOPA has covered investments in infrastructure project debt and equity (both directly and via funds). Debt and equity of corporates in the infrastructure sector were excluded as a clear delineation was not feasible to prevent non-infrastructure activities would benefit from a potentially more favourable treatment.

A main challenge has been the lack of comprehensive and publicly available performance data for unlisted infrastructure assets. This represents not only an obstacle for regulators but also for insurers as potential investors in infrastructure. EIOPA encourages therefore efforts to improve the availability of relevant information in this area. A number of initiatives have been started to address the problem.

As infrastructure project equity is generally unlisted historical market prices are not available. A starting point for the risk assessment could be historical cash flows. But gathering reliable and relevant data is very difficult. Moreover, strong assumptions would be necessary to deduct on this basis a historical volatility of fair values. The results would be highly sensitive to changes. Due to the data limitations and the methodological challenges EIOPA sees no basis for recommending a lower calibration for infrastructure project equity.

The area of infrastructure project debt financing has been dominated by banks. The number of infrastructure projects bonds issued in Europe was quite small and they were often guaranteed by monoline insurers. Consequently, the available historical evidence for the credit risk of project infrastructure debt comes predominantly in the form of default and recovery rates.

EIOPA has made considerable efforts to get relevant data on default and recovery rates. After a request for more granular information by EIOPA Moody's published a report with default and recovery rates for specific infrastructure segments with a potentially lower risk profile.

Marginal default rates indicate that the risk profile of unrated infrastructure project debt improves over time. This could be reflected by using the time since the start of the project as additional variable in the spread risk calculation. But it creates a number of technical challenges. At the same time the resulting investment incentives would

be probably limited as the risk charges in the first year of the project need to reflect the higher risk of the construction phase.

Faced with these challenges EIOPA looked into infrastructure segments with a potentially lower risk profile (projects with availability based revenues or a public off-taker). The available data suggest that unrated availability based infrastructure and Baa rated corporates had similar fundamental credit risk. On this basis a small reduction in the spread risk charge would be possible (calculation based on credit quality step 3).

But there are a number of drawbacks: The empirical basis is limited and the data is proprietary. Moreover, the special treatment adds complexity to the standard model while the positive effects in terms of investment incentives are limited. For these reasons EIOPA sees insufficient grounds to provide a positive recommendation for a change in the current calibration. If there was such a change though, it would have to be ensured that the scope of application is clearly defined and unambiguous.

Some stakeholders have suggested that the risk of rated infrastructure project debt is lower than implied by the current standard formula calibration. Among the reasons put forward are higher recovery values, higher rating stability and the improved risk profile after the construction period. While these factors may have a meaningful effect over the medium or longer term EIOPA has not found sufficient evidence for significant differences in short-term losses due to defaults for investment grade issues. There was also not enough data to quantify a potentially lower risk of rating downgrades. Improvements in the risk profile of a project over time should in principle be reflected in a higher rating in the course of the regular updates.

Based on these considerations EIOPA sees not enough evidence to recommend a lower calibration.

A particular case of rated infrastructure project bonds are Europe 2020 project bonds. In this initiative the EIB provides a credit enhancement for the senior bonds issued to finance selected infrastructure projects in Europe. The enhancement is structured to achieve a certain rating for the senior bonds and is determined in a collaborative process with

the rating agencies. The improved rating reduces the spread risk charge.

Rating agencies may be reluctant to reflect some positive qualitative factors in their rating or struggle to assign an appropriate weight to them. But EIOPA is not able to quantify their effect with a degree of accuracy that would be necessary to justify a further reduction of the risk charge for Europe 2020 project bonds.

Guarantees for SME loan securitisations by the European Investment Fund

The European Investment Fund (EIF) provides full guarantees on interest and principal for SME loan securitisations. According to the draft implementing measures this would only be reflected in the spread risk charge if the result was a better external rating. An unrated EIF guaranteed securitisation would be treated like any other unrated securitisation.

A guarantee with properly designed contractual arrangement and a creditworthy guarantor should reduce the credit risk for the investor. But the market price of the instrument may not move in lockstep with the prices of similar instruments directly issued by the guarantor (for example due to differences in liquidity).

This makes it difficult to account for guarantees in the spread risk framework set out in the Solvency II Framework Directive.

The guarantee should in principle lower spread volatility. But there are no market prices available. There are also no readily available proxies that could be used to quantify the effect of the guarantee.

For this reason EIOPA can make no suggestion how to take such guarantees into account.

1.4 Proposed recalibration of the spread risk charge for securitisations

Securitisations play an important role in financing the real economy. There have been considerable differences in the spread and default behaviour of different securitisation categories. EIOPA decided to take a broader perspective and to review the calibration for securitisations in general:

1. The potential positive effects on the overall economy in the form of added lending capacity by banks are not limited to a specific type of underlying asset.
2. SME loans are not the only channel of funding for the real economy. Leasing and auto loans may for example also play an important role.
3. Several other types of securitisations (e.g. prime European RMBS) have displayed low credit risk.
4. A broader approach seems more in line with the general level of granularity in the standard formula (especially as the volumes for SME and infrastructure loans are low, both in absolute and relative terms).

Given the complexity and poor performance of some securitisations, especially those backed by subprime mortgages, securitisations are often met with a degree of scepticism. However, many securitisations have performed quite well in terms of default rates since 2007.

According to the draft implementing measures the spread risk charge for securitisations depends on modified duration and rating. There have indeed been clear differences in the performance of securitisations across credit rating classes. But wide variations in terms of risk could also be observed within rating classes.

This suggests that a more granular approach for the calculation of capital requirements is warranted. For this purpose additional categories had to be defined and criteria for the decision into which category a securitisation falls were needed

The chosen approach for the securitisations recalibration proposal is an extension of a 2011 EIOPA proposal. The new approach retains the criteria modified duration, rating and seniority. But they are complemented by requirements on the structure of the securitisation, the quality of the underlying assets, the underwriting process and the transparency for investors. Securitisations that meet all these criteria (called 'Type A' securitisations) are expected to have a lower risk profile than those which do not (called 'Type B' securitisations). EIOPA has validated the effectiveness of the criteria.

A number of the criteria are adaptations from the eligibility criteria for securitisations that the European Central Bank (ECB) uses in its refinancing operations. This source has several advantages: First, the criteria have been in place for many years and have gone through extensive operational and legal due diligence. Second, they represent for a part of the EU a kind of market standard. This should make it easier for originators to comply with them. Third, the criteria for banking and insurance sector should in principle be similar.

With the proposed approach the efforts necessary to determine the standard formula risk charge for a securitisation are markedly higher than for other investments. But the more favourable treatment in terms of spread risk charges for qualifying securitisations is only justifiable if there can be a sufficient degree of confidence in their better risk profile. To mitigate potential negative effects transitional arrangements are suggested.

For the calibration traded securitisations that can serve as “proxies” for the categories were identified. The corresponding risk charges were then calculated based on their historical spreads. The more granular approach made it impossible to use spread information from standard indices. The calibration was therefore based on indices custom-built by the index providers for the Association for Financial Markets in Europe (AFME).

Based on the results of the calibration exercise EIOPA suggests the following new spread risk charges for securitisations

For senior tranches of Type A securitisations:

Credit quality step	0	1	2	3	4	5	6
Risk factor FUP'_i	4.30%	8.45%	14.80%	17-20.00%	82 %	100%	100%

For other securitisations:

Credit quality step	0	1	2	3	4	5	6
Risk factor FUP'_i	12.50%	13.40%	16.60 %	19.70%	82 %	100%	100%

Without strong evidence supporting the opposite, EIOPA proposes that the current maximum modified duration caps should be seen as an absolute minimum.

1.5 Process followed by EIOPA

The first step was to gain a thorough understanding of the economic rationale for the asset classes and their specific risk profiles. For this purpose EIOPA analysed the available literature on the adequateness of the Solvency II calibration as well as academic and practitioners' literature on performance and riskiness.

The second step was to search for data that could serve as a basis for a potential refinement of the regulatory capital requirements for each asset class.

To gather information EIOPA spoke with dozens of stakeholders from industry associations, investment firms, data providers and rating agencies as well as with academics specialised in the respective field.

The preliminary findings were presented in a discussion paper published in April 2013. This gave stakeholders the opportunity to inform the further technical work on these issues, in particular in relation to available data. 16 public and non-public responses were received.

As a final step, the input on the discussion paper was combined with the results of the further analysis to produce the underlying recommendation on the design and calibration of the standard formula for the asset classes in scope.

1.6 The impact of regulatory capital requirements and non-regulatory obstacles on long-term investing

Due to the maturity profile of their liabilities insurers are often seen as a natural source of long-term financing. They could in turn benefit by diversifying their holdings and earning illiquidity premia. For two reasons EIOPA thinks that the currently foreseen capital charges will allow the insurance sector to provide meaningful amounts of long-term financing:

The first reason is that the effect of the standard formula calibration on the aggregate demand of the insurance sector for long-term assets is "dampened" by a number of factors: Non-regulatory considerations may dominate (e.g. because investment behaviour is driven by the

need to achieve a certain rating). Internal models users as a large potential source of investments are also not immediately affected by the standard formula calibration. Moreover, illiquid investments reduce the volatility of own funds as they benefit from the use of appraisal values.

The second reason are the incentives for investing in longer-term infrastructure or corporate debt created by the combined effect of a reduced interest risk charge (due to a better match of assets and liabilities) and the “kinked approach” in the calibration of the spread risk sub-module. This aspect is missed by many studies on the implications of the standard formula calibration for investment behaviour because they focus on the stand-alone risk charges.

Insurers have to overcome considerable non-regulatory barriers: Many of the asset classes are relatively heterogeneous and access to relevant performance data is complicated by the lack of market prices. There are also new risks involved like construction and political risks. At the same time the illiquidity of these assets with maturities that may extend over several decades makes it difficult to reverse investment decisions.

These considerations suggest that a lower standard formula calibration for some long-term assets would not automatically result in a meaningful increase in investments. Other factors may dominate. In the end insurers will only allocate more funds if it makes sense from an economic perspective.

1.7 Structure of the technical report

The chapters 2 to 6 set out the analysis and the findings for each of the asset classes. The structure of the chapters has been chosen to make the process as transparent as possible: The first section contains the relevant part of the discussion paper.⁴ The second section

⁴ The discussion paper described briefly for each asset class the potential treatment in the standard formula as outlined in the “Technical Specification on the Long Term Guarantee Assessment (Part I)” (hereafter LTGA TS) (https://eiopa.europa.eu/fileadmin/tx_dam/files/consultations/QIS/Preparatory_forthcoming_assessments/final/A/A_-_Technical_Specification_on_the_Long_Term_Guarantee_Assessment_Part_I_.pdf). The technical specifications should not be seen as a complete description of the currently foreseen Solvency II framework, since for the purpose of feasibility of testing exercises, shortcuts and ad hoc simplifications have been included. When looking at the risk charge for a specific asset class at the sub-module level, one should be aware that the actual contribution to the SCR for the undertaking as a whole after taking into account diversification benefits

summarises the comments received from stakeholders. The next sections set out any further analysis that EIOPA has performed since the publication of the discussion paper (e.g. on SME loans). The last section combines the gathered evidence to come to a final conclusion. Chapter 7 describes the new spread risk calibration that EIOPA proposes for securitisations.

Chapter 8 explores the impact of regulatory capital requirements and non-regulatory obstacles on the availability of long-term financing from the insurance sector.

and the loss absorbing capacity of technical provisions and deferred taxes is significantly lower. In QIS5 for example both factors lowered the SCR by 35.1 % and 23.7 % respectively (EIOPA (2011); EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II, p. 31).

2. Private Equity, Venture Capital and SME

2.1. Content of the discussion paper

2.1.1. Preliminary analysis

Introduction

Private equity is currently a small asset class for insurers; of the €8.44 tn in investments by European insurers,⁵ only 1% to 2% are held within the private equity asset class⁶. In 2011, investments by insurers into private equity funds accounted for at least 6% of all investment into private equity funds⁷.

Across Europe private equity and venture capital funds are collective investment schemes that make investments in unlisted companies. Approximately 1,945 private equity fund managers are active in Europe; as of 2010 these firms managed 4,200 active funds with €524bn of capital under management (4% of the €14tn assets held by the EU asset management industry). They have invested in more than 25,000 European companies. Over 80% of the investments (by number of companies) are in SMEs.⁸ To further the analysis of SME investments, EIOPA has therefore looked at the private equity asset class.

A private equity fund is typically structured as a 10 year, closed-end, limited partnership. At inception, institutional investors make an unfunded commitment to the limited partnership, which is then drawn on over the term of the fund. While investors ordinarily make this investment with the expectation of remaining committed to the fund for the entire duration of the fund's life, under adverse conditions, an insurer may have to sell its investment earlier on the secondary market. There is therefore a question of the appropriate discount to fund value (the discount is the realised difference between sales price and book value) during distressed conditions, in the event that the

⁵ Insurance Europe (2013): European Insurance — Key Facts. August 2013. p. 17.

⁶ Globally there is an average asset allocation of 2.7% of total assets into Private Equity (Preqin (2012): Preqin Special Report: Insurance Companies Investing in Private Equity. p. 3).

⁷ Figures from European Private Equity and Venture Capital Association (EVCA). Direct investments from insurers into private equity funds totalled 6% of investments. Additionally, insurers may invest into funds of funds, in aggregate funds of funds totalled 19% of the private equity fund investments in 2011. No split is available for the insurance industries' share of funds of funds investments.

⁸ Numbers provided to EIOPA by EVCA.

insurer wants to sell. Efforts to quantify this effect are discussed in the Analysis section below.

An insurer may invest via a fund of fund structure for a more diversified exposure. Alternatively, an insurer may also invest directly into a private equity fund provided it has sufficient resource to structure and monitor these investments effectively.

The broad private equity asset class may be defined via investments of the following sectors:

- i. Buyout – Acquire an investment, predominantly a controlling stake, in an established company. Buyout investments will frequently use some form of leverage.
- ii. Venture capital – Equity investments into start-up or young companies. While closely associated with technology, healthcare, and biotechnology fields, venture funding is also used for more traditional businesses.
- iii. Growth capital – Equity investments into relatively mature companies who are looking to expand.
- iv. Mezzanine – A fund that provides (generally subordinated) debt facilities to support buyout financing.

The buyout sector is the most important in terms of volume. In 2011 €25.9bn was invested into buyout sector funds, 4.9bn into venture capital, 4.5bn into growth capital, 2.8bn into Mezzanine, and 1.7bn into generalist funds (a fund that may focus on any of the above).

Current Solvency II treatment under the standard formula

The Technical Specification of the LTGA classifies private equity as “type 2 equity” within the equity-risk sub-module of the standard formula. The stress is the sum of 49% and the symmetric adjustment (a value within the range -10% and +10%). There is a correlation of 75% between type 1 and type 2 equities, and implicitly private equity has a 100% correlation with all other type 2 equities (Non-EEA or non-OECD member equity, unlisted equity, hedge funds, commodities, and other alternative investments). This choice of calibration is discussed further in the “Analysis” section below.

Analysis

The following is a summary of the calibration analysis from EIOPA for private equity and venture capital. While the ultimate focus has been towards venture capital, literature and data is more widely available for the private equity asset class as a whole, and in any case then applicable to the venture capital subset. There have also been a number of papers and articles written about the private equity calibration in the standard formula and the resource of the long term investments taskforce has allowed a timely opportunity to review any new industry research. These are referenced below.

Private equity

The choice of a calibration method for private equity is a challenging issue given: its unique characteristics, absence of any single ideal performance standard and the fact that there are few indexes. Private equity exhibits illiquidity, infrequent pricing and J-curve effects⁹, which makes measurement of returns and benchmark selection difficult.

To guide the earlier standard formula calibration of the “type 2 equity” stress the LPX 50 Total Returns Index was used. This index contains a combination of the 50 largest listed and most liquid private equity firms. It is frequently used in industry as a performance benchmark for the private equity asset class. During the financial crisis the largest annual fall of this index was approximately 70%, and the 99.5th private equity stress included in EIOPA’s consultation paper on the equity risk sub-module is 69%.¹⁰

The choice of the LPX index has been written about extensively since the publication of the calibration document. The concern voiced is that the private equity portfolio represented by the index is a poor proxy for the typical private equity investments of insurers and that consequently the risk profiles are different:

- i. An index of 50 companies may carry too much idiosyncratic risk to be considered a good measure for all private equity.

⁹ The J-curve is a phenomenon of the life cycle of typical PE investments: The returns are typically negative in the early “investment phase”, break even in the “maturation phase”, and become positive in the later “harvesting phase”. The entire life cycle of a fund may last a decade or more implying that the time required in realising longer-term investment return can be significant.

¹⁰ CEIOPS (2009): Consultation Paper No. 69. Draft CEIOPS’ Advice for Level 2 Implementing Measures on Solvency II: Article 109 b. Equity risk sub-module. p. 22.

Typically private equity funds and funds of funds will have a more diversified portfolio.

- ii. Some buyout firms in the LPX 50 index are more leveraged (and therefore riskier) than the average private equity firm.¹¹
- iii. The performance of unlisted PE firms and funds may be different to the listed companies represented in the index.
- iv. The listed companies within the index are the management companies. This is not the same as the value of the portfolios under management, although there is some indirect correlation between the two. Part of the return for firms in the LPX50 index is due to management fees and other non-investment driven returns, not only the performance of any underlying investments. This may make the LPX50 more or less volatile than the portfolio under management.

It would be technically very challenging, if not impossible, to quantify these effects. Nevertheless, EIOPA recognise that they will impact the calibration to various degrees. EIOPA has therefore investigated a number of alternative calibration approaches proposed by industry, the most common of which use a data set from a database of unlisted fund performance¹². Some widely used databases of PE performance are provided by: Thomson Reuters, Cambridge Associates, Prequin, and Pevera. These databases cover a wide data set (many hundreds or thousands of funds; the Prequin database contains data from 1,882 funds) across a wide range of geographical areas, vintage years, and product types. Using the underlying performance data it is possible to create a synthetic index before calculating corresponding Value-at-Risk and correlation metrics.

Using this approach industry papers find a lower 99.5th percentile measure. EVCA calculate a stress of 29% using Prequin data and 25% using Pevera data; Partner's group calculate a 30% stress using Thomson Reuter's data; and the CRO Forum suggest a stress of 42% for a diversified portfolio (although higher for an un-diversified

¹¹ Arias, L./ El Hedi Arouri, M./Foulquier, P (2010): On the Suitability of the Calibration of Private Equity Risk in the Solvency II Standard Formula. EDHEC Financial Analysis and Accounting Research Centre Publication. p. 25.

¹² e.g. EVCA (2012): Calibration of Risk and Correlation in Private Equity; Partners Group Research (2011): Private equity under Solvency II: Evidence from time series models; and CRO Forum (2010): Calibration recommendation for the market risks in the Solvency II standard formula.

portfolio) using a Thomson Reuters index. However, as we explain below, these papers do not adequately take account of a number of biases within the data sets.

Intuitively, it is also no surprise that the figures are lower than the LPX 50 index. While one private equity fund may have high risk characteristics, there will be some diversification when we analyse the risk characteristics of multiple funds. This diversification can be between investment strategies and geographies, or between time frames when considering funds from different vintage years¹³. Using the database approach and calculating risk and return characteristics across many hundreds of funds will inherently allow for considerable diversification.

If an insurer was to maximise its diversification within the private equity asset class, it would invest across multiple funds of funds. These funds of funds charge management fees and performance fees that will change the risk/return characteristics of the data, an effect that has not been quantified in any of the industry papers.¹⁴

Under an internal model approach insurers have the ability to demonstrate to national supervisory authorities that their investment strategy gains this level of diversification. The standard formula is limited as there must be just one number to represent the investment in Private Equity by the standard European insurer. Due to the small amount of private equity investments in the average insurer portfolio, EIOPA believe that these methods may overstate an appropriate level of diversification within the asset class, and by consequence understate the risk.

EIOPA also recognises that it is difficult for any database to be free from biases. A database of unlisted fund performance – or an index – is likely to suffer from at least one of the following biases:¹⁵

¹³ This diversification effect is helpfully illustrated in Diller, C./Herger, I. (2009): Assessing the risk of private equity fund investments.

¹⁴ For comparison, Ammann and Moerth (Ammann, M./Moerth, P. (2005): Impact of Fund size on Hedge Fund Performance. *Journal of Asset Management*. Vol. 6. No. 3. pp. 219-238) compare the returns characteristics of funds against funds of funds (FoF) in the hedge fund universe. Between 1994 and 2005 FoF suffered from a 1.84% load on returns due to the extra layer of management fees and performance fees.

¹⁵ Gupta (Gupta, V. (2012): Benchmarking Private Equity. Russell Investments paper) discusses biases with respect to private equity fund performance. Discussion of these biases more generally in the context of measuring investment fund performance may be found from numerous sources.

- i. Survivorship bias – It is often argued that there is survivorship bias inherent in any private performance data. This has been a common area of research for the financial sector more broadly.¹⁶ In an index, the worst performing funds or companies may fall out as they fail, while the successful funds will remain in the index biasing any performance in an upwards direction. If a database includes only active managers, failed PE funds may be erased from the history.
- ii. Backfill/Instant history bias – A database may add funds once they have achieved success and include their entire history in the process.¹⁷ This bias may be synthetically generated by database collection methods.
- iii. Mark-to-Market or reporting bias – Private equity is not typically reported on a mark-to-market basis. Due to the illiquid nature of PE appraisal-based prices or NAV estimates are often used. This may lead to artificial smoothing of the returns. The prices are “stale” as they do not reflect all information available. Performance of PE may, therefore, be more volatile and more correlated with other asset classes than reported.
- iv. Self-reporting or selection bias – Databases are subject to the manager’s willingness to report performance in an industry where voluntary performance reporting dominates. If some instances, poor performers may elect not to report.
- v. Database selection bias – The selection of funds within a database will only be a subset of the investible universe. The weightings towards particular investment types, geographic regions, or vintage years may skew the characteristics of the data.

The industry papers reviewed by EIOPA take only minimal account of these biases. While different databases may suffer from the above

¹⁶ For example, Elton et al (Elton, E.J./Gruber, M.J./Blake, C.R. (1996): Survivorship bias in mutual fund performance. *Review of Financial Studies*. Vol. 9. pp. 1097-1120) conclude that almost all prior mutual fund studies suffer from survivorship bias. Additionally, Fung and Heish (Fung, W./Heish, D.A. (2000): Performance Characteristics of Hedge Funds and Commodity Funds: Natural vs Spurious Biases. *Journal of Financial and Quantitative Analysis*. Vol. 35. pp. 291-307) calculate a survivorship bias on returns of around 1% in mutual funds, 2.5% in commodity funds, 3% in hedge funds, and 1.5% in funds of hedge funds.

¹⁷ The back-fill bias may change the shape of a returns distribution. Fung and Heish (Fung, W./Heish, D.A. (2000): Performance Characteristics of Hedge Funds and Commodity Funds: Natural vs Spurious Biases. *Journal of Financial and Quantitative Analysis*. Vol. 35. pp. 291-307) calculate a returns bias of 3.6% in commodity funds, 1.4% in hedge funds, and 0.7% in funds of hedge funds.

biases to a greater or lesser extent, any robust standard formula calibration requires an elimination or at least quantitative estimation of their effects.

The reporting bias is one of the most significant of the above, although it is not yet clear to EIOPA how much of an adjustment should be made for its impact. The study by EVCA attempts to remove smoothing by adjusting the data for autocorrelation. They consider the lag in the dataset to be only statically significant for one quarter, and of minimal consequence. However, other studies find a statistically significant lag of a greater number of quarters. Conroy (2007) finds the longest significant lag at four quarters; by adjusting for this staleness the quarterly standard deviation increases from 13% to 25%.¹⁸ Woodward (2009) considers a lag effect of up to five or six quarters in her analysis of time series data for buyout funds; by adjusting for this the risk measure more than doubles.¹⁹

An alternative way of adjusting stale values is to consider the price difference between net asset values and listed market values (a discount when listed market values are below net asset values). While EIOPA does not have data for unlisted funds, the universe of listed funds gives a useful starting place. One publication co-authored by Prequin and LPX compares the LPX 50 Total Returns index (originally used to aid calibration) and LPX NAV index – an index constructed from the balance sheet net asset values of the 50 constituent companies.²⁰ It notes an average discount at the reports time of writing in June 2012 of 30%, and a much larger discount that exceeded 60% during the stressed market conditions of 2008.

This discount is a consequence of a variety of factors including: liquidity, disclosure, the J-curve effect, and relationships with credit markets (from interest rates and credit spreads) and equity markets (through investor sentiment). Its presence increases the volatility of the data and correlation with other equity markets. It should still be recognised, however, that some of this discount might be due to the

¹⁸ Conroy, R. (2007): Private Equity, Capital Structure, and Payout Policy. *Journal of Applied Corporate Finance*. Vol. 19. No. 3. pp. 96-108. Conroy uses data from Venture Economics with time series from 1989 to 2005. He adjusts for auto-correlation using a Dimson Beta regression method.

¹⁹ Woodward, S.E. (2009): *Measuring Risk for Venture Capital and Private Equity Portfolios*.

²⁰ Prequin/LPX (2012): *Listed Private Equity – Opportunities for Institutional Investors*. Special Report.

fact that the shares do represent a claim to the earnings of the management company and not the underlying fund.

Another study by Lahr and Kaserer (2010)²¹ looks at a sample of listed funds that include some management firms, but also a sizable population of pure funds. These pure listed funds are just the same as their unlisted counterparts, except that shares in the fund are tradable on the financial markets. A long term average discount of 21% is calculated. While it is clear from the paper that there is volatility in this discount over time, this volatility is not explicitly calculated.

For unlisted funds, however, data is not so publically available. Any market transactions take place on the secondary markets. To further this area of research EIOPA welcome any data on market transactions.

Analysing the data from the available studies EIOPA notes that a time series of private equity data may appear relatively uncorrelated with other asset classes (across the investment cycle), and most significantly the MSCI World Index (used to calibrate the “type 1 equity” stress). However, the tail correlations remain high. For example, after the dotcom bubble, and during the financial crises, there were significant losses in both the MSCI World Index and private equity markets. EIOPA has seen no evidence to justify any alterations in the private equity correlation assumptions.

Venture capital and growth capital

As already stated, EIOPA’s primary consideration has been to investigate channels for investment into SMEs. The European Commission is implementing regulation for an EU-wide “passport” for venture capital funds in an effort to make it easier for venture capitalists to raise funds across Europe for the benefit of start-ups²². The provision of this regulation has provided EIOPA with a useful definition for any calibration considerations.

²¹ Lahr, H./Kaserer, C. (2010): Net Asset Value Discounts in Listed Private Equity Funds. CEFS Working Paper No. 2009-12.

²² The passport will be available for venture capital funds that: invest 70% of their committed capital into unlisted SMEs; provide equity or quasi-equity to these SMEs; do not employ leverage; and have managers whose assets under management do not exceed €500m (above this threshold funds will be regulated by the EU’s new alternative investment rules (AIFMD)). Further information can be found on the website of the European Commission (http://ec.europa.eu/internal_market/investment/venture_capital/index_en.htm).

By definition venture capital is the financing of early-stage companies, with potentially high returns, but also high risks. The inherent riskiness of the investment philosophy would seem to suggest the venture capital investments has greater volatility than the wider private equity asset class. Nevertheless, EIOPA has considered the available datasets to examine this assertion. While a venture capital investment into one company is highly risky, an investment into a venture capital fund will, to some extent, diversify this risk.

The approach of using a database of unlisted private equity funds may also be applied to this subclass. The subset of funds fitting the relevant venture and growth capital considerations can be analysed using the same methods. However, for the same concerns discussed above, EIOPA is yet to analyse the approach in more detail. It is noted, however, that analysis within the CRO Forum and ECVA papers referred to in footnote 12 indicates greater volatility for venture capital funds than the private equity database as a whole.

To remain consistent with previous calibrations, EIOPA has first investigated the volatility of venture capital investments using the LPX index family. LPX publishes the LPX Venture Index (LPX VE), an index containing 30 of the largest and most liquid venture capital firms. While this may suffer from the same limitations as the LPX 50 index, it allows an initial comparison between the venture capital subclass and the wider private equity asset class.

In the aftermath of the dotcom bubble the largest annual fall for the LPX VE is 61%, and during the financial crises of 2008 the largest annual fall is also 61%. These figures are comparable to the largest 69% annual fall from the LPX 50 series.

EIOPA has also analysed the Dow Jones Venture Capital Index (DJI). This is an index constructed with data from the Dow Jones Venture Source database; a database tracking 67,000 venture-backed companies in the US, Canada, Europe, China, Israel, and India. Firms are established at market value at each round of financing: seed, early, and late funding stages. A late funding stage may be seen to be more comparable to a growth capital category. A firm exits the index when there is an IPO, an acquisition, or the firm shuts down. To ensure a complete time series values are interpolated between

financing stages.²³ The largest annual fall for this index is 67%. The figures from these indices suggest that a venture capital calibration should be no less than that for private equity.

EIOPA has considered the correlations between the LPX VE and the MSCI World Index, and the DJI and MSCI World Index. In the recent history market shocks of the dotcom bubble and the 2008 financial crises the data indicates a high tail correlation in both cases.

Preliminary Results

The evidence EIOPA has gathered so far supports the current private equity calibration within the “type 2 equity” sub-module. The data that has so far been put forward to support lower regulatory capital requirements suffer from severe limitations. Pending any improved data sets or other insights a change in the current calibration based on this evidence seems not justified.

Similarly, the venture capital subset suffers from the same limitations as private equity. While the data suggests similar characteristics at the 99.5th percentile to private equity, the risk is perhaps even higher. This is, however, inconclusive unless data limitations are solved. Again, the evidence gathered so far supports the currently foreseen treatment.

In periods of market stress the analysed data sets show correlated falls across the private equity markets and wider equity markets. This is in line with the current standard formula correlation assumptions and EIOPA has seen to date no evidence to justify an alteration.

2.1.2. Questions

Q2: Further to the information in the introduction of 3.1.1, what are the most common investment channels for the average insurance firm to invest in Private Equity, Venture Capital, and in particular SMEs? Is there data available to support this answer?

Q3: Are there methods or data that EIOPA could use to quantify or eliminate the biases described in paragraph 16?

²³ More details may be found on the Sand Hill Econometrics website (<http://www.sandhillecon.com/index.html>).

- Q4: Regarding paragraphs 19 to 22, is there suitable data on secondary market transactions that allows the quantification of the discount to NAV (in particular under stressed market conditions)?
- Q5: How can the risk characteristics effects of the additional layer of fees (described in paragraph 14) be quantified when investing via funds of funds?
- Q6: Are there any further market indices for private equity or venture capital that EIOPA should consider?
- Q7: What economic factors contribute to the risk-profile of private equity investments and how?

2.2. Input on the discussion paper

The focus of the responses was largely on private equity as a whole rather than on venture capital, a focus that is also followed in this section.

Channels of investing

Private equity funds are the main channel of investment. There are also small amounts of fund of fund investments. Some insurers may co-invest directly into private companies, particularly if they have a more established private equity portfolio.

Where insurers invest via fund of funds the return will be influenced by additional levels of performance and management fees. As the level of fees is not volatile they will have a larger effect on the return rather than on the risk of the investment. Several responses asserted that the management fee typically wipes out any performance fee. Even if the fund manager does generate gains sufficient to earn a performance fee, this will often only be earned once capital is returned at the end of a funds life. As a consequence it has no bearing on downside risk. Due to the limited effect on volatility from fees, and the limited investments in fund of funds, the impact of these fees on the risk characteristics of private equity is not considered further.

Insurance Europe and EVCA provided the results from surveys on investment volumes. One survey, covering aggregate insurance firm assets of €3trn puts private equity investments at 0.6% of assets. A second survey, covering €1.4trn assets indicated an exposure of 2.5%. These results suggest that the figure of 1% to 2% used in the consultation paper is not unreasonable.

The latter survey aggregated 19 responses from insurers holding on average investments with 57 private equity funds. Across this range of funds there will be diversification effects across different fund types, time frames, geographies, and fund vintage years reducing volatility (as described in the earlier discussion paper).

According to QIS5 figures the average European insurer manages €3bn in assets which is considerably below the €75bn for the survey respondents. The corresponding figure for insurers that will use the standard formula is probably lower. If this average European standard

formula insurer invested 1-2 % of assets into private equity it might not achieve the same level of diversification, particularly as many funds ask for minimum commitments of several million euros (often €10m or more).

If a large insurer with a diversified private equity portfolio is convinced that a lower risk charge is warranted there is the possibility to demonstrate this to the supervisor and use an internal model. Many large insurers intend to use such models. The standard formula has to reflect the risk profile of an average insurer which may not be able to achieve the same level of diversification.

Data

Several respondents from the insurance industry suggested building a database based on actual investments by insurers in private equity to overcome biases in performance data. This is an interesting idea but would take a significant amount of time to put into place (particularly if it was to be ensured that the dataset is consistent over time and as free as possible from bias).

Another suggestion were the CepreX Private Equity indices. While these were not mentioned in the initial discussion paper, they again use a database approach, constructed using transaction information provided by CEPRES. The index retrospectively amends historic prices at the time when a company exits the portfolio, essentially smoothing historic prices based on the ultimate performance of a fund. While this may be useful for analysing the return of the asset class, it will have limited applicability to any calibration of volatility.

Also mentioned was data from the California Public Employees' Retirement System (CalPERS). This currently manages \$32bn in the asset class across a combination of direct, partnership, and fund-of-fund investments (an exposure range similar to insurance companies). But CalPERS itself highlights a two quarter lag in any performance reporting received from partnership funds once again demonstrating the challenges in the calibration of a market consistent measure of volatility.

While not denying the existence of biases in performance data EVCA emphasised that private equity may be less prone to them than public

market indices (in particular to survivorship bias, self-reporting bias and database selection bias).²⁴

As noted in the discussion paper an alternative to the use of Net Asset Values is the use of an index built from listed entities. Respondents voiced concerns that some indexes, like the LPX, may overstate the volatility of the broad asset class. A possible improvement of the approach would be to build an index of listed funds which invest as limited partners in PE funds.

Relevance of observed transaction prices

Some respondents voiced doubts about the relevance of transaction prices as private equity is by nature a long-term hold-to-maturity investment and insurers are normally not forced to sell.

Solvency II measures risk over a 12-month period based on fair values (“the amount for which they could be exchanged between knowledgeable willing parties in an arm’s length transaction”). Net asset values are appraisal values that do not immediately respond to changing conditions. Such changes may be reflected with a delay (or not at all) due to the smoothing of valuations and reporting lags described in the discussion paper. The evidence provided by actual transactions should therefore be considered when analysing the risk of private equity.

Some respondents voiced also doubts whether transaction prices reflect the fair value of investments as PE is not traded in active, deep, liquid and transparent markets. It was also emphasised that the large discounts observed during the financial crisis were due to the distress of individual sellers and not due to poor fundamental performance of the asset class.

PE has some distinctive features: The asset class is very heterogeneous, investments are not listed and the number of potential buyers is limited. As a result a surge of potential sellers in a stressed situation will probably have a significant impact on transaction prices.

²⁴ The main argument is that index inclusion based on market capitalisation means that well performing companies have a better chance to enter into an index while poor performing ones will finally drop out. The relevance of these biases for assessing the risk of investments in listed equities is not absolutely clear as an insurer could earn the index return (at least approximately) by mirroring the index changes in its portfolio.

Large discounts in times of market stress can therefore be seen as a consequence of the specific features of the asset class.

In the calibration for a 1-in-200 year event the possibility that insurers would have to sell in a stressed market should not be disregarded. The illiquidity of the asset class is a feature that can have positive impacts on the returns, but it must also be recognised in a calibration of volatility.

Even though EIOPA has only a limited amount of data on discounts it seems plausible to assume that the level of discounts would be considerable in a 1-in-200 event.

Risk profile of private equity

Respondents identified the availability of debt financing,²⁵ the prices of listed comparables and the level of investment activity (deals and exits) as relevant risk factors. The beta may be higher than one due to leverage. This suggests a strong correlation with the listed equity markets.

2.3. SME loans

Introduction

SME loans play so far only a minor part in the portfolios of European insurers. According to the 2011 European Commission report on SME's access to finance 87% of loans in Europe were granted by banks while insurers are not even mentioned as a source.²⁶ Among the six largest insurance companies in France mortgages and loans represented only 2.9% of the balance sheet total at the end of 2012. Even though an estimate is impossible the share of SME loans was clearly considerably lower.

National legislations have – to different extents – restricted the origination of loans by non-banks.²⁷ Notwithstanding such national

²⁵ It was pointed out that private equity firms might be less flexible in financing than larger listed companies.

²⁶ 4% obtained their loan from a private individual such as a family member or friend, while 8% obtained their loan from another source, such as micro-finance institutions or government-related sources (European Commission (2011): SMEs' Access to Finance. Survey 2011. Analytical report. p.7.)

²⁷ For instance, under the current regime in France loans are to be granted only when collateralized at 75% or more, or guaranteed by a credit institution or an insurance undertaking from another group as the grantor, or when the obligor's stock is listed on a trade exchange (Code des Assurances art. R332-13).

specificities Solvency II allows insurers to invest in SME loans as long as the quality of the portfolio is ensured and the risk is adequately managed (“prudent person principle”).

As banks have been the major source of loan financing for SMEs, insurance companies may have difficulties getting access to the information relevant for assessing SME credit risk. This information is very granular and often the product of a long-time close business relationship between bank and SME. Insurers may therefore struggle to develop the skills that are necessary to evaluate and manage the risks associated with SME loans risks in a way compliant with the prudent person principle.

Nevertheless, there have recently been some initiatives that allow insurers to invest into SME loans alongside banks:

- i. Insurers buy a part of SME loan portfolios from banks while banks retain a share and collect payments. The loans can be newly originated at the initiative of the insurance company (i.e. de facto direct financing).
- ii. Undertakings co-hold newly originated SME portfolios with banks via jointly managed fund-like structures
- iii. Insurers invest in shares of newly launched funds which are structured by the asset management subsidiaries of banks and hold loans originated by the bank. These funds target also other investors apart from insurance companies

As the look through-approach applies the risk charge for these investment vehicles has to be calculated on the basis of the underlying loans. According to the draft implementing measures the spread risk charge depends on the duration and the external rating of the instrument. The spread risk charge for unrated loans (which SME loans generally are) is between the charge for rated bonds and loans with credit quality steps 3 and 4.

Analysis

Different definitions for SMEs are used. The European Commission defines a SME as a firm with less than 250 employees and either turnover not exceeding € 50 m or balance sheet total not exceeding €

43 m.²⁸ In its 2011 report on SMEs' access to financing sources, EC uses only the first criteria.²⁹ The definition used for the capital requirements of banks focuses on the second criteria.³⁰ In the US the NAICS (North American Industry Classification System) provides a SME definition which differs across industry sectors; however, criteria are also the number of employees (usually less than 500) and annual turnover (less than \$28.5M).³¹

According to the 2012 EBA report "Assessment of SME proposals for CRD IV/CRR"³² "...SMEs tend to face structural financing obstacles, as they are largely dependent on bank financing whereas larger companies have a more diversified source of funding because of their access to capital markets. The dependence on banking loans and the less-diversified sources of income make SMEs more vulnerable to downturns in the economic cycle". Carbo-Valverde & al. (2008) argue – based on a Spanish data set, that this is aggravated by the dependence of SME on trade credit for export finance, which is even more restricted in a downturn.³³

One example for the vulnerability of SME in a crisis is the situation in Ireland. Recent statements by the Irish Central Bank Director suggested that 50 % of all SME loans held by Irish banks, accounting to a total amount of around €50 bn, are currently in distress.³⁴

This suggests a high tail-correlation between the credit risk for individual SMEs (as SMEs would suffer greatly from a credit crunch) as well as high tail-correlation with other asset classes (due to the high cyclicity of SME access to finance)³⁵.

²⁸ http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm.

²⁹ European Commission (2011): SMEs' Access to Finance. Survey 2011. Analytical report. p.3.

³⁰ European Union (2006): DIRECTIVE 2006/48/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 June 2006 relating to the taking up and pursuit of the business of credit institutions (recast). Annex VII Part I Art. 5.

³¹ Altman & al. (2008): The value of qualitative information in SME risk management. Journal of Credit Risk. Vol. 40. No 2. p. 21.

³² EBA (2012): Assessment of SME proposals for CRD IV/CRR. p.6.

³³ Carbo-Valverde, S./Rodriguez Fernandez, F./ Udell, G. (2008): Trade credit the financial crises and firm access to finance. Working paper. p.5.

³⁴ <http://www.irishexaminer.com/business/half-of-50bn-sme-loans-in-distress-228162.html>.

³⁵ European Commission (2009): Cyclicity of SME finance, p. 8. A statistically significant correlation between bank lending volumes and GDP growth was not observed for the whole sample but only for a subset including France, Germany, the UK, Spain and Italy among others.

Altman & al (2008)³⁶ devise a default prediction model (i.e. a scoring model) on a very large (5,7M) sample of American and British SMEs covering the period from 2000 to 2005. The model is quite accurate (AUC (Area Under Curve) going from 0.78 to 0.80, and the accuracy (default/non default) ranging between 74 and 75%). The list of relevant and significant variables for assessing creditworthiness includes, depending on availability, usual finance ratios (EBITDA/assets, Cash/assets, etc.), audit qualification, age, subsidiary (yes/no), size of the firm and relative amount of trade creditors or debtors.

Moreover, most banks also use credit and account balance data which was gathered during a long business relationship.

This indicates that a proper analysis of the credit quality of an SME exposure will require a similar amount of financial information as is usually necessary for large corporate firms. This information, however, is considerably more difficult to obtain, and unless insurance companies engage into direct lending and establish a tight business relationship, they might have to rely on partnership with originating banks in order to monitor the riskiness of SME loans.

A quantitative risk analysis is necessary to assess the adequateness of the current calibration of the spread risk module for SME loans. But this is confronted with the same obstacle as with other asset classes covered in the report: The Solvency II framework uses mark-to-market or market consistent values. But SME loans are not traded in active markets making historical price data unavailable. Securitisations of SME loans are no suitable proxy as tranching alters the risk profile.

For these reasons a credit quality analysis is performed based on empirical literature and EBA data. This allows a comparison with the risk profile of corporate bonds that were used to calibrate the spread-risk sub-module. In the following paragraphs, the results from several studies are set out:

Altman & al (2008) provide aggregate annual default rates for the sample used in their study. They vary from 0.76% to 1.45% between

³⁶ Altman & al. (2008): The value of qualitative information in SME risk management. *Journal of Credit Risk*. Vol. 40. No 2. pp. 15-55.

2000 and 2005. The sample covers a stressed period in the wake of the dotcom crash and 9/11. The default rates are comparable with those of corporate issues rated Ba by Moody's between 1970 and 2010.³⁷

Similarly, Dietsch & Petey (2004), using a French sample covering the years 1995 to 2001, and a German one spanning from 1997 to 2001, provide a breakdown of annual default probabilities for different turnover categories.³⁸ Probabilities of default (PDs) range from 0.14% to 2.63%. Despite the wide dispersion this is consistent with an average Ba corporate rating.

In a very recent study, Dietsch & Fraise (2013) provide the following annual default rates for a very large portfolio of six major French banking groups:

	2006	2007	2008	2009	2010	2011
Very small businesses	1.36	1.25	1.27	2.25	1.87	1.82
Small firms	1.11	1.01	1.06	1.95	1.63	1.51
Medium-sized firms	0.70	0.64	0.66	1.10	0.76	0.81

Figure 6: Annual default rates for very large portfolio of six major French banking groups³⁹

The values are again consistent with an average Ba-rating

EBA provides in its already quoted report on SME regulatory PDs which are based on its 2010 stress testing exercise.⁴⁰ While these regulatory PDs incorporate a margin of safety they are consistently higher than average corporate regulatory PDs (3.63% against 2.34%). This value refers to the Retail portfolio, where exposures are lower than 1 M€ (thus most likely SMEs that are in the lower end of the size-spectrum). The PDs are consistent with a Ba to B rating.

³⁷ The average 12-month default frequency for Ba rated issues was 1.16%, compared with 0.181% for Baa and 4.47% for B (Moody's (2011): Moody's Annual Corporate Default and Recovery Rate Study, 2011, p.32).

³⁸ Dietsch, M./Petey, J. (2002): The credit risk in SME loans portfolios: Modeling issues, pricing, and capital Requirements. Journal of Banking and Finance. Vol. 26. No 2. pp. 303-322.

³⁹ Dietsch, M./Fraise, H. (2013): How different is the regulatory capital from the economic capital: the case of business loans portfolios held by major banking groups in France. SGACP Economic and Financial Discussion Notes.

⁴⁰ EBA (2012): Assessment of SME proposals for CRD IV/CRR. p. 90.

Jacobson & al (2005),⁴¹ using a specific definition for SMEs, argue that there is no conclusive evidence for SMEs being less risky than larger firms and deserving lower regulatory capital requirements for banks. In developing the methodology for rating SME loan securitisations Standard & Poor's analysed also the risk profile of European SME loan portfolios.⁴² The analysis takes into account publicly reported insolvency statistics for SMEs in Germany, the U.K., France, and the Netherlands as well as annual and cumulative default rates for securitised European SME loan portfolios from Germany, Spain, the Netherlands and Belgium. Annual default rates ranged from 2 to 4% and the cumulative default rates over five years reached up to 12%.⁴³ Again, this does not support a lower calibration.

It is often argued that a risk assessment for SMEs based only on average default rates overestimates actual credit risk as correlations for SMEs are empirically lower than for corporate exposures.⁴⁴ In a classical Asymptotic Single Risk Factor (ASRF) framework, as used in Basel II, a lower correlation would – all other things equal - indeed imply a lower 99.5% loss quantile. However, a direct transfer for the Solvency II calibration is not possible as it relies on market value changes and not economic losses. Furthermore, the annual default rates from several studies set out above referred to diversified loan portfolios (i.e. they already reflected any diversification benefits).

Another factor to consider in addition to the fundamental credit risk of SME loans are the prices at which they could be sold. As SME loans are highly illiquid the buyer will probably demand a meaningful liquidity premium. The result is that price drops in a crisis are exacerbated as the liquidity preference increases.

Indeed, as credit risk is reportedly higher for SMEs than for large corporate, the relative shock to market value should be, as result,

⁴¹ Jacobson, T./Linde, J./Roszbach, K. (2005): Credit risk versus capital requirements under Basel II: Are SME loans and retail credit really different? *Journal of Financial Services Research*. Vol. 28. No 1-3. pp. 43-75.

⁴² Standard & Poor's (2013): CDOs: European SME CLO Methodology and Assumption. pp. 2-3 and 19-20.

⁴³ These figures vary across countries.

⁴⁴ See for instance Dietsch/Petey (2004) and Foulcher, S./Gourieroux, C./Tiomo, A. (2005): Latent Variable Approach to Modelling Dependence of Credit Risks: Application to French Firms and Implications for Regulatory Capital. *Cahiers du CREF* 05-01 for SME asset correlations; see Cespedes, J. (2002): Credit risk modelling and Basel II. *Algo Research Quarterly*. 5(1). p. 57; Frey, R./McNeil, A. (2003): Dependent defaults in models of portfolio credit risk. *The Journal of Risk*. 6(1). pp. 59–92. Jobst, N. J./de Servigny, A. (2005): An empirical analysis of equity default swaps II: multivariate insights. Working Paper. Standard & Poor's, among others, for estimates of asset correlations for corporate obligors.

larger for SME loans, at a given duration level. At most, one might argue that this would perhaps be offset by lower asset correlation between individual exposures, when calibrating on a diversified SME portfolio. In any case, there is no evidence to support the idea that the credit risk of SME loans, under an economic loss approach, is lower than for corporate exposures. This shouldn't be any different under the metric of a 99.5% market price change.

Results

The analysis above has looked at economic risk drivers and historical default rates for SME loans. There is no evidence to support a lower calibration for SME loans than is currently foreseen.

2.4. Final results

Private Equity/Venture Capital

Given the focus on fostering growth and the crucial importance that the availability of early-stage or expansion capital has in this context EIOPA decided to focus on Venture Capital as a source of SME equity financing. But private equity funds invest also in SMEs and the available literature covers only the adequateness of the standard formula for private equity in general. This area was therefore also covered.

EIOPA analysed the riskiness of Venture Capital based on historical data for two indices. The LPX VE is an index of listed venture capital funds. This index includes mainly the shares of general partners while insurers invest as limited partners in a fund. For this reason a similar analysis was performed for the Dow Jones Venture Capital Index (DJI) that tracks the development of market prices for shares of limited partners.

Both in the aftermath of the dotcom bubble and during the financial crisis of 2008 the largest annual fall for the LPX VE was 61%. The largest annual drop in the DJI was 67%. This does not suggest that a lower calibration is warranted.

In line with the current standard formula correlation assumptions the analysed data sets show simultaneous falls in private and public equity markets in periods of market stress.

In summary, the historical data analysed support the current calibration for private equity and venture capital within the “type 2 equity” sub-module.

The lower calibrations for Private Equity proposed by industry are usually calculated using Net Asset Values (NAV) – i.e. appraisal values - from a database of private equity funds. EIOPA has considerable concerns regarding this approach:

First, the databases suffer generally from a number of biases: Survivorship bias, backfill/instant history bias, mark-to-market or reporting bias, self-reporting or selection bias and database selection bias.

Second, the use of a private equity database with a large number of funds for the calibration implies a level of diversification that an average standard formula user may not achieve.

Third, the use of periodically updated appraisal-based prices may lead to artificial smoothing of returns. Due to the smoothing of valuations and reporting lags prices do not reflect all currently available information.

From a purely economic perspective it is also not obvious why the prices buyers are willing to pay for private companies should be less volatile: The value of public and private companies is subject to the same economic factors. From a buyer’s perspective public and private companies are also to a certain degree investment substitutes. It is therefore not clear why the prices they are willing to pay for private companies would fall by only 25 or 30 % after stock markets dropped by 39 %. Last but not least taking a public company private should have no impact on the fundamental risk profile.^{45,46,47}

⁴⁵ A potential counterargument is that private equity funds invest in different types of companies. SMEs will certainly represent a large portion. PE will also be attracted to businesses with stable cash flows. But for listed companies the recent history suggests that in a stress situation all market segments suffer in a similar way. A focus on certain sectors implies also a reduced potential for diversification

⁴⁶ Another argument in favour of lower risk is the potentially better governance and a long-term perspective. But economic factors like interest rates and investor psychology may determine short-term price fluctuations. It is also often said that long-term considerations play a larger role for family owned businesses. The GEX (German Entrepreneurial Index) contains owner-dominated companies. If these companies have really a long-term perspective the chart of the GEX shows that in a stressed situation this provides no protection against significant drops in the stock price.

In summary, both empirical evidence and economic considerations support the current calibration.

SME loans

SMEs are less diversified in terms of their financing sources than larger companies as they largely dependent on bank financing. They are also less diversified in terms of their income sources.⁴⁸ This suggests a higher vulnerability in a downturn.

Given that SME loans are generally not traded in organised markets a calibration of the spread risk charge based on market prices is not possible.

The spread-risk sub-module for bonds and loans has been calibrated on data for corporate bonds. As SME loans are normally unrated their spread risk charge is between the charge for rated bonds and loans with credit quality steps 3 and 4 (which – based on the rating scale used by Moody's - correspond to the rating categories Baa and Ba).

A comparison of the historical default rates for SME loans as reported in a number of studies with the historical default rates for issues in the rating categories Baa and B does not support a more favourable treatment for SME loans. As the default rates were calculated for large portfolios of SME loans they already include any diversification benefits.

As SME loans are highly illiquid the buyer will probably demand a meaningful liquidity premium. The result is that price drops in a crisis are exacerbated as liquidity preference increases.

In summary, the evidence supports the current calibration for SME loans.

⁴⁷ A third argument for lower risk is that PE funds hold normally a majority stakes or are the sole owner. A buyer of a listed company will normally have to pay a control premium. This suggests there are potential differences in the absolute price level. But it is not clear why there should be differences in the relative changes (except for better governance and long-term perspective – see above).

⁴⁸ SMEs have generally fewer business lines and are often focused on a particular geographical area. It would in principle be possible to build a portfolio of loans to SMEs from different countries. But the SMEs would still do a smaller proportion of their business in international markets than larger companies.

3. Social Businesses

3.1. Content of the discussion paper

3.1.1. Preliminary analysis

Introduction

For the purpose of the analysis the definition of social businesses from the text of the Regulation on European Social Entrepreneurship Funds as adopted by the European Parliament on 12 March 2013 is used:⁴⁹

‘qualifying portfolio undertaking’ means an undertaking that:

(i) at the time of an investment by the qualifying social entrepreneurship fund is not admitted to trading on a regulated market or on a multilateral trading facility (MTF) as defined in point (14) and point (15) of Article 4(1) of Directive 2004/39/EC;

(ii) has the achievement of measurable, positive social impacts as its primary objective in accordance with its articles of association, statutes or any other rules or instruments of incorporation establishing the business, where the undertaking:

– provides services or goods to vulnerable or marginalised, disadvantaged or excluded persons;

– employs a method of production of goods or services that embodies its social objective;

or

– provides financial support exclusively to social undertakings as defined in the first two indents;

(iii) uses its profits primarily to achieve its primary social objective in accordance with its articles of association, statutes or any other rules or instruments of incorporation establishing the business and with the predefined procedures and rules therein, which determine the circumstances in which profits are distributed to shareholders and owners to ensure that any such distribution of profits does not undermine its primary objective;

(iv) is managed in an accountable and transparent way, in particular by involving workers, customers and stakeholders affected by its business activities...’

An essential element of this definition is that the social business has the achievement of measurable, positive social impacts as a primary objective. Profits are primarily used to achieve this primary objective instead of distributing them. Finally, the social business is not listed on a regulated market.

An example is a business in Germany that organizes exhibitions and business workshops in total darkness. Blind guides lead attendees through a completely dark environment, where they learn to interact

⁴⁹ http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P7-TA-2013-0072&language=EN#def_1_2

by relying on other senses than sight. Further examples for social businesses can be found in Annex 4.

Current Solvency II treatment under the standard formula

The LTGA TS classifies equity investments in social businesses as “type 2 equity”.⁵⁰ The stress is the sum of 49% and the symmetric adjustment (a value within the range -10% and +10%).⁵¹ There is a correlation of 75% between “type 1 equity” and “type 2 equity”.⁵²

According to the LTGA TS social business debt is subject to interest rate, spread and potentially market risk concentration risk charges.⁵³ The treatment is not different from the calculation for any other bond or loan.

Analysis

EIOPA has researched the existing literature and liaised with stakeholders. The preliminary results are as follows:

The social focus of social businesses correlates with a strong focus on inclusive development, and on tackling social challenges across EU societies. Social businesses will typically not offer dividends to investors, but will re-invest any financial surpluses in the business. Investors in social businesses are happy to make a “trade-off” between expected financial returns and “social returns” (which can be characterised as taking on more risk for the same returns or lower returns for the same risk).⁵⁴

As the European Social Investment Taskforce notes “Social investors ... seek a financial return – usually the aim across the portfolio is to at least recover the capital so that it can be recycled elsewhere, but may charge below commercial rates, and overall aim to break even as opposed to generate financial returns.”⁵⁵

⁵⁰ See SCR 5.34.

⁵¹ See SCR 5.36.

⁵² See SCR.5.43.

⁵³ See sections SCR 5.4., SCR 5.8. and SCR 5.9.

⁵⁴ European Commission (2011): Commission Staff Working Paper Impact Assessment accompanying the document “Proposal for a Regulation of the European Parliament and of the Council on European Social Entrepreneurship Funds”. p. 13.
(http://ec.europa.eu/internal_market/investment/docs/social_investment/20111207ia_en.pdf.)

⁵⁵ Ibid.

The trade-off mentioned above indicates that investments in social businesses have no lower risks than comparable investments. Moreover, there is no clear economic rationale why social businesses would have a lower risk compared to “conventional” investments. It seems also not clear that a social business would generate any direct payments to investors (of course there are the social benefits plus the advantage of being seen as responsible corporate citizen).

Given the characteristics outlined above social businesses are not listed and unlikely to issue bonds listed on an exchange. EIOPA has so far not found any data that could be used to derive in a reliable way a capital charge for social businesses.

Preliminary Result

The evidence gathered so far supports the calibration currently foreseen for debt and equity investments in social businesses.

3.1.2. Questions

Q8: What data could be used to produce a reliable calibration for investments in social businesses?

Q9: What data can be used to calculate the correlation between social businesses and other asset classes?

Q10: What could be the economic rationale for a different calibration than for other debt and equity investments?

Q11: What is the volume of current investments by insurers in businesses with similar features as set out in the definition above?

3.2. Input on the discussion paper

One respondent provided another example for a social business

3.3. Final results

The evidence supports the calibration currently foreseen for debt and equity investments in social businesses.

There is no reliable data to produce a calibration for investments in social businesses available.

4. Socially Responsible Investments (SRI)

4.1. Content of the discussion paper

4.1.1. Preliminary analysis

Introduction

Finding a workable definition of SRI in the context of regulatory capital requirements is a challenge. In 2003 the European Social Investment Forum (Eurosif) stated that "SRI encompasses a wide number of extra-financial criteria within the realm of Corporate Social Responsibility (CSR). The sectors various applications range from a passive respect of one or many of those criteria to an active approach where investors directly promote social responsibility with the companies in which they invest."⁵⁶ The scope of SRI as defined by Eurosif at that time can be found in Annex 1.

Over the years the idea of Responsible Investing has been extended to take also environmental and governance aspects into account. Consequently, in its latest European SRI Study 2012 Eurosif used the abbreviation SRI for "Sustainable and Responsible Investment" and defines it on its website as follows: "Sustainable and Responsible Investment (SRI) combines investors' financial objectives with their concerns about social, environmental, ethical (SEE) and corporate governance issues. SRI is an evolving movement and even the terminology is still very much in the evolving phase. Some SRI investors refer only to the SEE risks while others refer to ESG issues (Environmental, Social, Governance)".⁵⁷

There are also "Principles for Responsible Investments" backed by the United Nations. For their purposes Responsible Investments are defined as follows:⁵⁸

"Responsible investment is an approach to investment that explicitly acknowledges the relevance to the investor of environmental, social and governance (ESG) factors, and the long-term health and stability of the market as a whole."

⁵⁶ Eurosif (2003): Socially Responsible Investment among European Institutional Investors. 2003 Report. p. 6. (http://www.eurosif.org/images/stories/pdf/eurosif_srireprt_2003_all.pdf).

⁵⁷ <http://www.eurosif.org/sri-resources/intro-to-sri>

⁵⁸ Principles for Responsible Investment (PRI) Initiative (2012): What is responsible investing?. p. 1. (<http://www.unpri.org/viewer/?file=wp-content/uploads/1.Whatisresponsibleinvestment.pdf>).

In addition there are different approaches to SRI, e.g. exclusion or inclusion of certain investments and the “best-in-class” approach.

EIOPA is in no position to judge what the “right” definition of SRI is. The selection of the investments analysed has to be based on pragmatic considerations: There should be enough investments available to allow a meaningful allocation by insurers to it. Moreover, it should be easy to decide whether a particular investment falls into the category. Finally, there has to be a long enough history of reliable market data. Once a data source has been chosen (e.g. an SRI equity index) a definition at least similar to the one applied for compiling the data has to be used. For pragmatic reasons EIOPA has restricted its analysis to established SRI indices and the definition of SRI they imply.

Current Solvency II treatment under the standard formula

Depending on whether and where they are listed the LTGA TS classifies SRI equity investment as “type 1 equity” or “type 2 equity”.⁵⁹ The stress is the sum of 39% and the symmetric adjustment (a value within the range -10% and +10%) in case of “type 1 equity” and 49% and the symmetric adjustment for “type 2 equity”.⁶⁰ There is a correlation of 75% between “type 1 equity” and “type 2 equity”.⁶¹

According to the LTGA TS SRI debt is subject to interest rate, spread and potentially market risk concentration risk charges.⁶² The treatment is not different from the calculation for any other bond or loan.

Analysis

The analysis consists of two parts, a review of the academic literature on performance and risk of SRI and a brief look at SRI bond and equity indices.

⁵⁹ See SCR 5.34.

⁶⁰ See SCR 5.36.

⁶¹ See SCR.5.43.

⁶² See sections SCR 5.4., SCR 5.8. and SCR 5.9.

Academic literature review

The academic literature is inconclusive on the performance of SRI compared with conventional investments. Below the possible arguments for lower or higher risk of SRI are listed that can be extracted from the literature by disregarding the return dimension:⁶³

The main argument for the higher risk of SRI is the reduced diversification that results from limiting the investment universe to a subset of all possible investments. Another argument is that the range of activities a company can pursue is restricted and therefore its operations are possibly less diversified.

The argument for lower risk rests on the assumption that a company with high environmental, social or ethical quality (a “good” company) is less risky and that the market price does not fully reflect this. There are different possible reasons for the first assumption: Good companies may have a lower risk of being the target of negative press, NGO actions, consumer boycotts and lawsuits. Another benefit may be that environmentally responsible actions cause cost reductions by reducing waste. Good corporate behaviour may also be a source of differentiation while bad behaviour may harm a company’s brand. A ‘good’ company may attract a highly educated workforce, be more successful in motivating the employees and generate less principal-agent friction costs, because its good governance allows to align the interests of managers and investors.

Apparently there are no studies that cover the adequateness of the foreseen Solvency II regulatory capital requirements for SRI investments.

Numerous studies have investigated the performance of shares of socially responsible companies and investment funds consisting of these shares. The results are not conclusive (i.e. there is no clear evidence for under- or outperformance compared to other investments).⁶⁴ The under- or outperformance of fixed income SRI funds has received significant less attention. In a study by Derwall and

⁶³ The following is based on Rathner, S. (2012): The Performance of Socially Responsible Investment Funds: A Metaanalysis. Department of Economics and Social Sciences Working Paper No. 2012-03.

⁶⁴ For an overview see Rathner, S. (2012): The Performance of Socially Responsible Investment Funds: A Metaanalysis. Department of Economics and Social Sciences Working Paper No. 2012-03.

Koedijk (2009) socially responsible fixed-income funds performed no worse than their conventional peers.⁶⁵

Analysis of SRI bond indices and SRI stock indices

As there are different possibilities to interpret “socially responsible” (see section “Introduction”) there is no objective way to determine whether a given asset belongs to this class or not. Providers of dedicated indices and funds use different sets of criteria.⁶⁶

Based on these considerations the scope of the investigation was restricted to stocks and bonds included in suitable SRI equity and fixed-income indices.

Depending on the definition of SRI used there can be a large overlap with general stock indices. An example is the “EURO STOXX Sustainability 40 Index” which offers “a consistent, flexible and investable blue-chip representation of the largest sustainability leaders in the Eurozone, i.e. the Eurozone leaders in terms of long-term environmental, social and governance criteria”⁶⁷. It includes the following banks and insurance companies: BBVA, Santander, BNP Paribas, Societe Generale, Intesa Sanpaolo, Allianz, Generali, AXA, ING and Munich Re.

Apparently SRI fixed income indices play a much smaller role than the corresponding stock indices. The only one found so far is the “ECPI Ethical Index Global Composite Bond EUR”⁶⁸. It does not contain sub-indices for rating classes and therefore does not seem to be appropriate for the calibration of spread risk.

⁶⁵ Derwall, J./Koedijk, K. (2009): Socially Responsible Fixed-Income Funds. *Journal of Business Finance & Accounting*. 36(1) & (2). pp. 210–229. January/March 2009. p. 227.

⁶⁶ There are for example information providers who make assessments with respect to the relevant dimensions (‘ratings’). Inclusion in an index or in the potential investment set of a fund could then be restricted to assets with a minimum rating.

⁶⁷ http://www.stoxx.com/indices/index_information.html?symbol=SUBE

⁶⁸ The description of this index can be found under http://www.ecpigroup.com/PDF_Indici/ECPI_Euro_Ethical_Corporate_Bond.pdf

Preliminary Results

The evidence gathered so far supports the currently foreseen treatment of SRI.

EIOPA can see at the moment no clear economic case for a lower risk of SRI investments relative to conventional ones.

For the purpose of checking the equity risk calibration an adequate index from the set of established SRI indices with a sufficiently long history would have to be chosen. But in many cases they display a large extent of overlap with conventional indices in their composition (e.g. the "EURO STOXX Sustainability 40 Index" mentioned above).

With a narrow definition of SRI the overlap would be limited. But this implies a significant reduction in diversification.

Apart from the fundamental doubts whether a more favourable treatment could be justified there would also be some practical problems in implementing it: A clear and objective definition has to be found. It would then have to be decided when exactly a different treatment should apply (e.g. already to an individual SRI stock which might very well be also included in a general index or only for a sufficiently diversified portfolio of SRI stocks). In addition, in case SRI stocks would represent a significant proportion of all equity investments and warrant a lower risk charge the corresponding charge for non-SRI equity would have to be increased.

To justify a different treatment for SRI debt the case would have to be made that the spread risk of SRI debt differs significantly from the spread risk of non-SRI debt within the same rating class. EIOPA has so far seen no evidence for this and there seems to be a lack of suitable data.⁶⁹

The general dilemma seems to be that for practical reasons enough investment opportunities to allow a meaningful allocation by insurers

⁶⁹ The "ECPI Ethical Index Global Composite Bond EUR" contains bonds with different rating classes from AAA to BB but no sub-indices. To check the calibration for spread risk the individual components of the index would have to be identified and an analysis similar to the one performed for the calibration of the spread risk charge in general would have to be conducted. Then the results of both calibrations, the one for spread risk in general and the one for spread risk of SRI bonds, could be compared to each other. This analysis could of course also be performed for bonds gathered from another source.

and a long enough history of reliable market data are needed. But this implies a broader definition of SRI. As a result there is significant overlap with conventional investments and a different treatment would be difficult to justify.

4.1.2. Questions

Q12: What is in your view a suitable definition of SRI that allows a clear distinction between SRI and non-SRI?

Q13: What empirical data is available for a SRI calibration based on the definition you suggested?

Q14: Do you have any suggestions how the problems outlined in paragraph 68 could be overcome?

Q15: Do you agree with the qualitative analysis of SRI risks and the preliminary conclusion EIOPA has drawn from it?

4.2. Input on the discussion paper

Few respondents provided input on SRI.

It was suggested to make the distinction between SRI and non-SRI investments based on a robust ESG rating methodology adapted to each sector. This methodology could be developed internally or purchased from globally recognised ESG rating service providers like MSCI.

No data sources were identified but the expectation was voiced that at some point in the future a reliable market data history will be available.

It was highlighted that a number of academic studies show that the integration of ESG criteria improves performance and reduces risk. The inclusion of these non-financial factors results in a more comprehensive assessment of the investment risks over the longer-term. It was suggested that the calibration of the regulatory risk charge should depend on the actual ESG ratings used within the analysis.

Some respondents agreed with the qualitative analysis of SRI risks and the preliminary conclusion EIOPA drew in the discussion paper.

The overlap between SRI and conventional indices

The discussion paper pointed at the large overlap in the composition of some SRI indices with their “conventional” peers. Good examples are the MSCI World ESG Index and the MSCI World SRI Index. CEIOPS used the MSCI World Index to produce a calibration for the Type 1 equity risk charge. The MSCI World ESG index uses a best in class approach and aims at a low tracking error to the underlying equity markets. The five largest constituents as of end May 2013 were Johnson & Johnson, Google, IBM, Procter & Gamble and HSBC.⁷⁰

The MSCI World SRI index excludes companies involved in nuclear power, tobacco, alcohol, gambling, military weapons, civilian firearms, GMOs and adult entertainment and applies a “Best-In-Class” approach to the remaining universe of securities. The five largest constituents as of end May 2013 were Johnson & Johnson, IBM, Procter & Gamble, Roche and Vodafone.⁷¹

The charts below show the performance of the two indices relative to the MSCI World Index.

⁷⁰ <http://www.msci.com/products/indices/esg/>.

⁷¹ <http://www.msci.com/products/indices/esg/sri/>.

Cumulative Index Performance — Gross Returns (Sep 2007 – May 2013) — USD



Figure 7: Cumulative Index Performance MSCI World ESG and MSCI World⁷²

Cumulative Index Performance — Gross Returns (Sep 2007 – May 2013) — USD

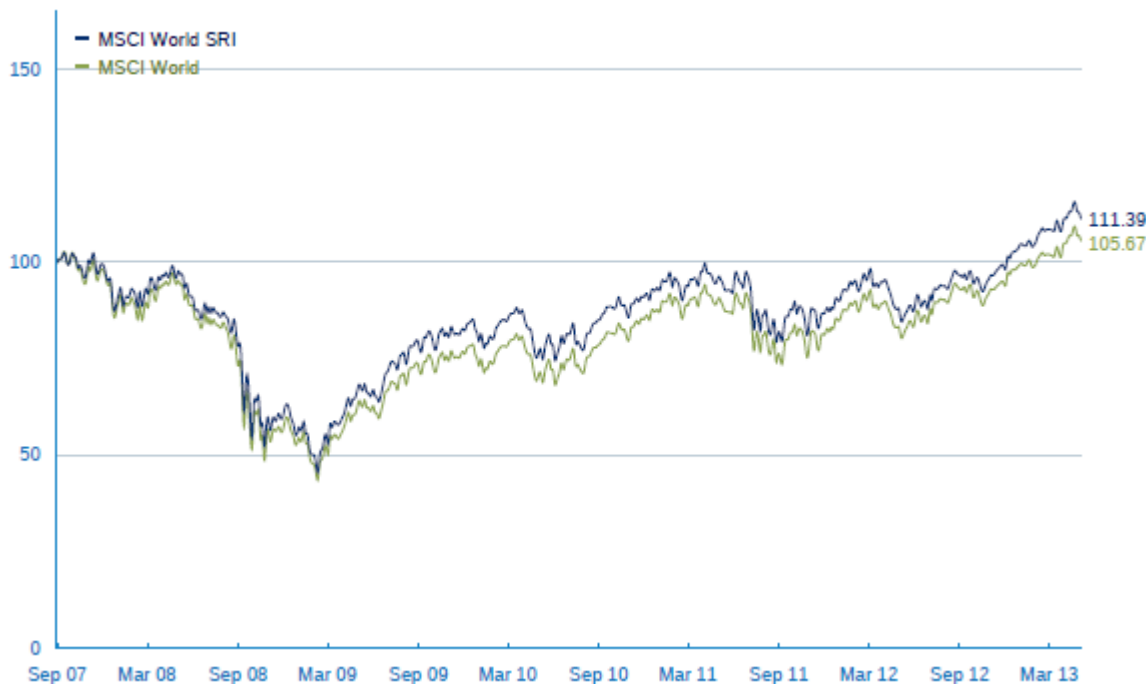


Figure 8: Cumulative Index Performance MSCI World SRI and MSCI World⁷³

⁷² http://www.msci.com/resources/factsheets/index_fact_sheet/msci-world-esg-index.pdf.

⁷³ http://www.msci.com/resources/factsheets/index_fact_sheet/msci-world-sri-index.pdf.

The similar composition of the indices results obviously in a similar risk profile.

4.3. Final results

The evidence supports the currently foreseen treatment of SRI.

EIOPA can see no clear economic case for a lower risk of SRI investments relative to conventional ones.

For the purpose of checking the equity risk calibration an adequate index from the set of established SRI indices with a sufficiently long history would have to be chosen. But in many cases they display a large extent of overlap with conventional indices in their composition. Examples are the MSCI World ESG Index and the MSCI World SRI Index (the MSCI World Index was used by CEIOPS to produce a calibration for the Type 1 equity risk charge).

The performance of the two SRI indices is nearly identical to the performance of the MSCI World Index. This does not suggest substantial differences in the risk profile.

With a narrow definition of SRI the overlap would be limited. But this implies a significant reduction in diversification.

Apart from the fundamental doubts whether a more favourable treatment could be justified there would also be some practical problems in implementing it: A clear and objective definition has to be found. It would also have to be decided in which cases a different treatment should apply (e.g. already to an individual SRI stock which might very well be also included in a general index or only for a sufficiently diversified portfolio of SRI stocks). If SRI stocks represented a significant proportion of all equity investments and warranted a lower risk charge the corresponding charge for non-SRI equity would have to be increased.

To justify a different treatment for SRI debt the spread risk of SRI debt would have to differ significantly from the spread risk of non-SRI debt within the same rating class. EIOPA could not find evidence for this and the answers to the discussion paper have provided no hint to a data source that could provide the basis for a calibration of the spread risk charge.

The general dilemma seems to be that for practical reasons enough investment opportunities to allow a meaningful allocation by insurers and a long enough history of reliable market data are needed. But this implies a broader definition of SRI. The resulting significant overlap with conventional investments makes it difficult to justify a different treatment.

5. Infrastructure investments

5.1. Content of the discussion paper

5.1.1. Preliminary analysis

Introduction to Infrastructure and its investment vehicles

As infrastructure is a heterogeneous and relatively new asset class it seems useful to lay down some basic properties that are relevant for the considerations in the next sections.

The OECD glossary defines infrastructure as “The system of public works in a country, state or region, including roads, utility lines and public buildings”.⁷⁴ In the investment context, it typically includes:

Economic infrastructure	Social infrastructure
<ul style="list-style-type: none">• Transport• Utilities• Communication• Renewable energy.	<ul style="list-style-type: none">• Schools• Healthcare facilities, senior homes• Governmental buildings• Sports structure

Figure 1: Types of infrastructure

It must be acknowledged that the infrastructure sector as such is difficult to define even within the investors and economics’ universe. Some will include construction companies because they build the so-called infrastructure. Others will include energy generation within the infrastructure sector,⁷⁵ with all the variety this entails (even pure fossil energy extraction), while some will separate utilities or energy from infrastructure.

An obvious obstacle will therefore appear when examining vertically integrated companies, for instance a power provider that does extraction of uranium, power generation, and power distribution: For some, only the distribution part, which necessitates the construction of a grid network, might be considered as infrastructure.

⁷⁴ <http://stats.oecd.org/glossary/detail.asp?ID=4511>.

⁷⁵ For instance, Peng & Newell, in a 2008 study on Australian infrastructure sector performance, include companies exclusively doing energy generation, without differentiating between fossil energy extraction, power generation (renewable or fossil) (Newell, G./Peng, H.W. (2008): The role of US infrastructure in investment portfolios. *Journal of Real Estate Portfolio Management*, (14:1), pp. 21-33). The energy generation represents more than a third of their sample.

Telecommunications also provide the same difficulties: while the building of optic fiber cable networks is considered as infrastructure⁷⁶, some investors and academics don't include telecommunication companies in the infrastructure sector. This makes the use of benchmark indices, as well as the different studies, whether academic or produced by the industry, particularly complex in this context.

Infrastructure building and operating can involve public actors, and therefore exhibit various levels of public involvement. For instance cooperation between public sector and private sector can take the special form of a Private-Public Partnership (PPP), where the administrative authority generally acts as the main contractor (known as the offtaker⁷⁷ in project finance).

Private actors' involvement regarding infrastructure assets is usually linked to its nature:

- i. Some infrastructures will be mostly operated and supervised by public authorities (schools, public buildings), and therefore always take the form of PPPs. The operator, when there is one, will receive its operating fees from a public authority.
- ii. Other infrastructures will be operated by private agents, but under a public service delegation agreement, which fosters heavy supervision by a public authority (port or airport building and operating, water supply, waste disposal facility, railway building, transport facilities in urban areas, etc.). This will usually still fall under the category PPP.
- iii. Finally, other infrastructures will be built and operated in an environment with little public involvement: this covers mainly power plants (gas, coal, wind farms, etc.) or energy commodities extraction and treatment facilities (refinery, mines), as well as toll roads. Most of these infrastructure projects will not be built and operated within the context of a PPP.

Investors' exposure to infrastructure can take many forms:

⁷⁶ The European budget allocation 2014-2020 proposed in 2011 by the EC devotes €50bn to infrastructure building, 40 of them within the "Connecting Europe Facility" (roughly 10 bn for energy infrastructures, 20 bn for transport infrastructures, and 10 bn for ICT/digital infrastructures – mainly broadband cable networks).

⁷⁷ Recipient of the final product of the project.

Debt Capital			
Bonds		Loans	
Corporate bonds	Project bonds (incl. guarantee mechanisms)	Infrastructure loan securitisation	Corporate loans Project loans
Equity Capital			
Listed		Unlisted	
Corporate equity	Listed infrastructure equity/bond funds	Direct investment (unlisted infrastructure, incl. project finance equity)	Unlisted equity funds

Figure 2: Infrastructure Investment Vehicles

Given the extremely wide range of infrastructure investments, EIOPA decided to exclude corporate debt and equity from the scope of the study. Indeed, they are hardly distinguishable from already existing asset classes in the Solvency II framework. Consequently, it seems not justified to introduce separate risk categories for these types of assets in the standard formula. Moreover, some delineation problems would ensue as these companies might conduct a wide range of operations (as highlighted above).

With respect to long-term investment by insurers in the infrastructure sector the following three investment vehicles seem to be the most promising:

- Direct project finance (bonds, loans or equity)
- Infrastructure investment funds (listed and unlisted)
- Infrastructure loan securitisation vehicles

It has proved difficult to gather price data on infrastructure loan securitisation vehicles (see section 3.5). An area where EIOPA is interested in further study are the so-called “monotranche securitisation loans”, i.e. loan portfolios that have been securitised but with no subordination relation between the different securities being issued.

Introduction to Infrastructure Project finance

Generally speaking, an infrastructure project can be split in four main stages :

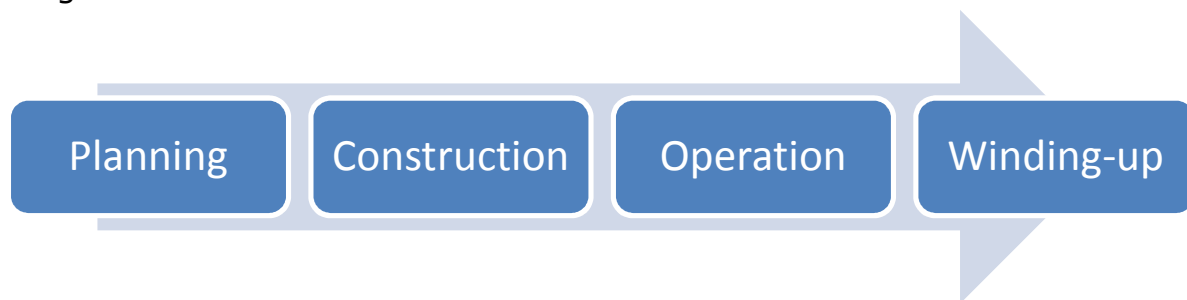


Figure 3: Infrastructure Project phases

The duration of each phase is deeply linked to the infrastructure specifications, especially in terms of building complexity and lifetime. The Winding-up phase might not be reached if the built infrastructure does not meet current expectations or the initial need. There are specific terms for certain development stages:

“Greenfield” involves an asset or structure that needs to be designed and constructed. Investors fund the building of the infrastructure asset as well as the maintenance when it is operational.

“Brownfield” involves an existing asset or structure that requires improvements, repairs, or expansion. The infrastructure asset or structure is usually partially operational and may already be generating income.

“Secondary” means fully operational.

Investment behavior of private investors is mainly driven by the return of their investments and infrastructure projects are no exception. As such, there is a need to determine the nature of revenues generated by an infrastructure project. Usually, these financial resources depend only on the level of usage at the chosen price. Financial viability studies are performed at early stages of the project, which assess the uncertainty of this level and take into account possible guarantees provided by another party such as a government or public authority. The main characteristic to be considered is the nature of revenues to private investors. In the context of this analysis two forms are of particular importance:

- i. *Availability-Based Projects*: These are typically projects where the government procures essential facilities or services in return for payments linked to availability rather than usage

levels. Projects typically include schools, hospitals and government accommodation, but also roads and transit.

- ii. *Demand based projects*: These are projects where the assets are subject to a long-term contractual pricing framework underwritten as targeting a pre-defined range of returns to investors. This includes for example toll roads with a limited downside risk. They often have inflation-linked returns with exposure to economic growth.

Globally, infrastructure project investments in 2011 represented USD 405bn⁷⁸ all around the world (+13% against 2010). The breakdown is as follows:

- i. *Loans*: 328bn (81%)
 - Banks are the main players but they are reducing their lending.
 - New ways of insurers investing in infrastructure loans are developing.
 - Insurers may hold loans on their balance sheet, either by direct issuance or mostly via transfer of credit claims from banks to insurers, through securitisation or otherwise.
- ii. *Equity*: 62bn (15%)
 - Equity is held mostly by infrastructure funds, pension funds or project stakeholders (construction companies or operating companies)
 - The amount of money raised by infrastructure funds is decreasing.
 - In Europe, equity accounts for less than 5% of total infrastructure investments.
 - However, a growing trend can be observed: Private equity funds are acknowledging the desire of many actors (e.g. pension and sovereign funds) to get out of listed markets that are deemed too volatile, and try to offer adapted investment vehicles. Offering access to low risk, unlisted infrastructure equity is a possible way, and it may very well affect insurance companies.
- iii. *Infrastructure bonds*: 16 bn (4%)
 - They represent only a very minor part of total funding.
 - However, new possibilities of credit enhancement through guarantees make for a promising trend which could expand the market for such securities (for instance the EU2020 Project Bond Initiative).⁷⁹

⁷⁸ <http://mediacommun.ca-cib.com/sitegenic/medias/DOC/15951/2012-01-26-agefi-detteinfra.pdf>

⁷⁹ According to an EU forecast € 1-5 billion per annum at the beginning of the Initiative and in the range of € 10-20 billion by 2020.

The volume of infrastructure investments on insurance companies' balance sheets is for now still negligible. For example, in Germany, infrastructure investments on average currently make up less than 1% of institutional investors' portfolios.⁸⁰ However EIOPA is trying to anticipate future developments such as insurance companies issuing direct loans to infrastructure corporations or buying portfolios of infrastructure loans from banks.

Infrastructure Project Equity

Project finance equity is the fraction of the investment capital raised by the project which does not give right to fixed payments, as opposed to project debt. In contrast to usual corporate stock, project equity has normally an expiration date.⁸¹ Depending on whether the project company has property of the underlying asset, the return of invested capital will either come from the proceeds of the sale of the asset, or only from the dividend payments made during the life of the project.⁸² These features make project equity similar to private equity investments.⁸³

Project equity is, by nature, unlisted and therefore no market values are available⁸⁴. As pointed out in the section on Private Equity and Venture Capital EIOPA is skeptical about the usefulness of reported Net Asset Values (NAV) for calculating a Solvency II market consistent 99,5% equity shock. According to Blanc-Brudé, "all existing papers on unlisted infrastructure investment focus on private equity funds and use data from private equity databases".⁸⁵

As a consequence, the vast majority of performance data available for this kind of investment is of very limited use for calibration purposes. Moreover, investors typically target an exit after five to seven years which creates substantial additional risks due to volatile exit values.

⁸⁰ RCFFS/Deka Bank (2012): Risk and Return Profiles for Equity and Debt Capital Investments in Infrastructure. p. 2.

⁸¹ Aside from highly specific risk given the undiversified nature of the underlying activity.

⁸² Most contracts have a zero terminal value, as they end with the project.

⁸³ Which is usually a close-ended process where the investment fund is created for a fixed period and capital is recouped in the end.

⁸⁴ Although there are listed investment funds, albeit very few, which invest only in project equity.

⁸⁵ Blanc-Brude, F. (2013): Towards Efficient Benchmarks for Infrastructure Equity Investments. EDHEC Risk Institute. p. 47.

A way around the issue of missing market values could be to select suitable listed equity representatives for project equity. Roughly speaking one can distinguish between the following categories of infrastructure sector companies:

- i. Broad companies, which tend to own infrastructure-related businesses, such as construction companies and diversified communications providers, rather than direct infrastructure assets.
- ii. Core companies, which exhibit some characteristics of pure-play companies by virtue of regulation or contractual agreement, and many have loosely related infrastructure side businesses. They typically have lower margins, are not capital intensive, and/or do not derive cash flows from long-duration contracts.
- iii. Pure-play companies, which typically own or operate assets that naturally exhibit fundamental infrastructure characteristics, such as high barriers to entry and relatively inelastic demand.⁸⁶

In principle, it might be possible to select a representative set of pure-play companies and to use them as a proxy for project equity. But there are substantial difficulties: According to industry representatives project equity investments are very heterogeneous. They are also keen to point out that by careful contract design the political risks that listed companies in regulated industries (e.g. utilities) are subject to, can be substantially mitigated. If such specificities exist, it is impossible to integrate them into a standard formula. The results of some empirical studies relevant for a possible capital charge calibration based on such proxies are discussed below in the listed infrastructure funds section.

A qualitative analysis of the risks associated with infrastructure projects can provide an idea about the riskiness of infrastructure project equity. The table below contains the main infrastructure project risks identified by Blanc-Brude and Grimsey & Lewis.⁸⁷ These

⁸⁶ There are some “pure play” infrastructure equity funds (DSW, Meridian PPP, Magellan Core Infrastructure).

⁸⁷ Blanc-Brude, F. (2013): Towards Efficient Benchmarks for Infrastructure Equity Investments. EDHECEDHEC Risk Institute; Grimsey, D./Lewis, M.K. (2002): Evaluating the Risks of Public Private

risks are exogenous (out of the control of equity owners) or endogenous (within the control of equity owners).

Risk type	Exogenous/endogenous	Revenue scheme
Construction risk (cost escalation, delays, etc.)	Endogenous (managed by contracts with the construction company)	Availability/Demand
Operating risk (higher than expected operating and maintenance costs)	Endogenous (managed by contracts with the operating company)	Availability/Demand
Revenue risk	Exogenous	Demand only
Regulatory/Political risk (legal changes or unsupportive government policies; this might also include a potential default on payment due to budgetary difficulties, or contract renegotiation)	Exogenous	Availability/Demand (PPP or Privatisation mainly)
Financial risks (inadequate hedging of revenue streams, respect of cover ratios, cost of debt and refinancing, etc.)	Endogenous (bad management of cash flows and excessive initial rates of debt instruments) Exogenous (higher than expected refinancing in a later stage of the project life)	Availability/Demand
Handback risk (lower than expected value of the asset at handover)	Exogenous	Availability/Demand

Figure 4: Infrastructure risks

Some of these risks, as highlighted by Blanc-Brude (2013), can be mitigated by an efficient contract design at the origination of the project (particularly construction risk), but faulty design is a possibility. Most of those risks, however, are typical for all companies, with the added downside that a project company doesn't benefit from any diversification in its activities.

On the other hand, most PPP schemes will be availability-based, and the infrastructure asset will belong to the public authority from the beginning, thus eliminating revenue and handback risks. This could provide an argument for PPPs being less risky than private infrastructure projects. However, in certain countries, the regulatory/political risk is likely to be very high for PPPs or privatisation of public services,⁸⁸ where the delegating authority has a

Partnerships for Infrastructure Projects. International Journal of Project Management. Vol. 20. No. 2. pp. 107-118.

⁸⁸ Utility companies often operate in this context.

very strong bargaining position, and is likely to try and modify revenue sharing when it becomes too favorable to the equity owners.

Grimsey & Lewis,⁸⁹ using the example of a water treatment project, argue that usually, there is very few upside potential for equity owners: Most risks are very well managed through contract designs, but this tends to cap the potential revenues at their level in the base case scenario. Most likely, when things don't go as planned, they will turn out worse than expected.

Another relevant factor for the risks of infrastructure project equity is the usually high leverage of such projects (usually a leverage ratio of more than 3 to 1).⁹⁰ Blanc-Brude (2013) argues that this is actually a signal of lower equity risk:⁹¹ To attract a high amount of debt, the profitability of the project has to be demonstrable to investors at the origination, and therefore incentives to minimize risk are created. However, Moody's project finance bank loans' default and recovery rates study shows that, although infrastructure project are at the lower end of the default rate spectrum within project finance, they do not exhibit higher leverage ratios, suggesting that those issues are uncorrelated.⁹² On the contrary, basic corporate finance theory states that – other things being equal - the more an entity is leveraged, the more sensitive to asset profitability its return on equity is.

Based on the above EIOPA cannot see a convincing qualitative argument that the overall risk of infrastructure project equity is fundamentally lower than for usual corporate equity. As a matter of fact, infrastructure projects still exhibit average default rates that are at the limit of the Investment/Speculative Grade frontier in the corporate universe (see below).

Current Solvency II treatment under the standard formula

Investments in project equity would currently be treated under the equity risk sub-module of Solvency II, most likely as "type 2 equity"

⁸⁹ Grimsey, D./Lewis, M.K. (2002): Evaluating the Risks of Public Private Partnerships for Infrastructure Projects. International Journal of Project Management. Vol. 20. No. 2. pp. 107-118.

⁹⁰ The leverage ratio is the proportion of debt divided by the proportion of equity. For instance, with 75% debt and 25% equity the leverage ratio is 3.

⁹¹ Blanc-Brude, F. (2013): Towards Efficient Benchmarks for Infrastructure Equity Investments. EDHEC Risk Institute.

⁹² Moody's Investor Services (2012): Default and Recovery Rates for Project Finance Bank Loans, 1983-2010.

since the probability is high that the equity will be unlisted, meaning a 49% shock plus or minus the symmetric adjustment. If this equity investment fulfills the criteria to be of a strategic nature, it would be subject to a 22% shock.

Project bonds

Project bonds are fixed income debt securities, with their coupons being serviced by the revenue streams generated by the project. In the traditional model of project finance, debt is mostly raised by bank syndication, meaning that project bonds, and particularly infrastructure project bonds, play a relatively minor role, especially in Europe, as demonstrated by the figures related to the overall volume of bond financing compared to loan or even equity finance.

To perform a proper calibration for project bonds with a 99,5% confidence level, a sufficiently large volume of historical price data is needed. The preliminary results of the EIOPA analysis raise some doubts whether such data is available. According to the EC Impact Assessment for the Europe 2020 Project Bond Initiative pilot "prior to 2008 a very limited number of EU infrastructure projects accessed the bond markets via privately guaranteed bonds. Essentially, this private guarantee is provided by insurance companies known as "monolines" and they guarantee the timely payment of 100% of the interest and principal. Moreover, in 2009-2010, the infrastructure bond markets in the EU have shown de facto no activity".⁹³

So far EIOPA has not been able to identify a project bond index. The price behavior of bonds guaranteed by a monoline insurance company reflects to a large extent the creditworthiness of the guarantor and not the riskiness of the project. Therefore it is of very limited use for an analysis. The "wrapped bonds" resulting from the monoline guarantee had a rating of AAA, reflecting the rating of the insurer and allowing investors to ignore the characteristics of the underlying project.⁹⁴

⁹³ European Commission (2011): Impact Assessment Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. A pilot for the Europe 2020 Project Bond Initiative. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL. p. 9.

(http://ec.europa.eu/economy_finance/financial_operations/investment/europe_2020/documents/sec2011_1237_en.pdf)

⁹⁴ Ibid. p. 43.

Comprehensive research efforts on the topic are only starting now.⁹⁵ The only performance study for project bonds EIOPA has found so far was conducted by Sawant in 2010.⁹⁶ He analysed the returns of 60 emerging market infrastructure bonds from 15 countries and five sectors – therefore unfortunately none from EU countries – with an average tenor of 12.7 years and average rating of BBB– over the period December 2002 to March 2009. The result was that the risk-return profile was not attractive.

An important development in this field relates to the provision of financial guarantees by different public or private sponsors, the main effort being the well-publicized EU 2020 Bond initiative, sponsored by the European Investment Bank (EIB). In the Europe 2020 project bond initiative the EIB provides junior debt or a corresponding guarantee of up to 20% of the senior debt amount. The aim is to achieve a “single A” rating. The level of the needed enhancement is determined in close cooperation with the rating agencies. The process includes a thorough scrutiny of the project by the EIB. The inclusion of the project in the program can therefore be seen as a seal of quality (According to EIB staff members none of the projects supported by the EIB has ever failed).

Current Solvency II treatment under the standard formula

Project bonds shall be treated under the bond sub-category of the spread risk sub-module under the Solvency II framework. It is worth mentioning that the progression of the calibration according to duration is not linear but follows a so-called “kinked approach”. As a result the marginal increase in capital requirement is lower as duration increases. This creates incentives for holding longer term bonds. Generally, due to its design guarantees such as those provided by the European Investment Bank in the framework of the EU2020 bonds cannot directly be taken into account in the spread risk sub-module calculation. Those mechanisms would act as credit enhancement and could have an indirect effect on the spread risk charge due to a better final rating.

Project loans

⁹⁵ For example led by the EDHEC risk institute in partnership with Natixis.

⁹⁶ Sawant, R.J. (2010): Emerging Market Infrastructure Project Bonds: Their Risks and Returns. Journal of Structured Finance. Vol. 15. No. 4. pp. 75-83.

Project loans represent the vast majority of infrastructure debt and insurers are increasingly taking on a role of long term lenders. This is done directly through the origination of loans (possibly jointly with banks as co-origiators with some risk retention), especially project loans, or indirectly through the investment in instruments issued by a special purpose vehicle, which itself holds loans on the asset side of the insurers' balance sheet. This recent involvement of insurers is not taken into account in current insurance prudential framework and the unavailability of market prices for infrastructure loans means that their potential contribution to a calibration consistent with the Solvency II market consistent framework is limited. A possible way to use the available information would be to infer a hypothetical spread behavior from empirical default and recovery rates of loans, but such method presents many shortcomings and would require very strong assumptions.⁹⁷

Other useful creditworthiness information can be retrieved from Moody's study on default and recovery rates on project loans.⁹⁸ It states essentially that the 10 year cumulative default rates are consistent with "low-investment grade/high-speculative credit grade" and are actually on average higher than corporate Ba (that is to say speculative grade quality) in the first two years of the project and then decrease. This reflects the high initial construction phase risk, followed by the less risky operation period. The infrastructure sector as defined by Moody's is by far the least risky within the project finance perimeter (though still below Baa corporate grade on average), but this finding has to be put in perspective for the delineation reasons already put forward above: Many would include the Media & Telecom and Power sectors, which are treated by Moody's as separate categories, in the infrastructure category, and they exhibit significantly higher default rates.

⁹⁷ The assumption would be that the 'fundamental' part of the spread is determined by the expected loss calculated as the product of the hazard rate (derived from the PD) and loss given default (LGD). There is some evidence that the LGD in the infrastructure sector is lower relative to other sectors (see Moody's (2012): Default and Recovery Rates for Project Finance Bank Loans, 1983-2008). Assuming that ratings take only into account the PD an infrastructure bond would have on average a lower fundamental spread than a bond from another sector with the same rating. But a lower fundamental spread does not necessarily mean lower spread volatility, which would depend on hazard rate volatility, which is unknown. Furthermore, is it doubtful that market prices would actually reflect empirical default rates, as it is not the case for corporate bonds credit spreads. The fact that market would also implicitly value LGD at its fundamental observed level is uncertain.

⁹⁸ Moody's Investor Services (2012): Default and Recovery Rates for Project Finance Bank Loans, 1983-2010.

The study also shows significantly higher ultimate recovery rates than in the corporate debt universe (76.4% on average, 72.6% for infrastructure projects as defined by Moody's). However, distressed sales recovery rates might very well be a better reflection of market consistent recovery rates for illiquid assets such as loans, and they are on average substantially lower (47.8%). The assessment of the construction phase as being riskier is confirmed by recovery rates, which are lower in early stage defaults, making a project in its construction phase unambiguously less creditworthy. Annex 3 provides a more in-depth assessment of the study.

Current Solvency II treatment under the standard formula

In Solvency II, loans other than mortgage loans are treated in the sub-category for bonds and loans in the spread risk sub-module of the standard formula, and are consequently subject to the same requirements as bonds. The allocated risk charge depends on the duration and the external rating of the instrument. Unrated loans and bonds get a spread risk charge that is between the charge for rated bonds and loans with credit quality steps 3 and 4.

Infrastructure Investment funds

Infrastructure investment funds are a wide category, and include also funds that invest only in corporate stock of large infrastructure or utilities companies (which are out of the scope). Following the perimeter definition set out in paragraph 76, only funds investing in project finance (debt or equity) should be considered. However, due to the extreme scarcity of data for those particular funds, analysis will have to be carried out using a broader range of funds. As a consequence, the reported figures on infrastructure funds performance should be interpreted very cautiously.

Listed funds

There are 21 listed infrastructure funds in Australia, which has long been a pioneer in the domain, and a few more in the rest of the world. Prequin counts 46 in total. Preliminary figures show an extremely high dispersion of performance; According to Inderst,⁹⁹ there is no thorough analysis on the topic available. One first, major, caveat for any further calibration is that private investors experience with infrastructure

⁹⁹ Inderst, G. (2010): Infrastructure as an Asset Class. EIB Papers. Vol. 15. No. 1. p. 82.

funds is rarely longer than 4 to 5 years. Second, and consequently, one is faced with two major issues: a dearth of data, as well as, more surprisingly, the absence of any theoretical work to structure the debate in any way.

Although a number of new infrastructure bond funds are raising money these days, it is still too early to have any hindsight on such investments, even more so to infer a Solvency II calibration for infrastructure project funds. Preqin's infrastructure database contains 29 debt/mezzanine funds, of which 14 are closed and 11 are raising capital. The five funds using the term "debt" and the one using "loan" in their names are vintages of 2010.

A study performed by Meridiam Fund uses data that is seemingly better suited to capture true market consistent project equity risk. It analyses the performances of 5 listed funds that invest in infrastructure project equity. The observed population has characteristics that make it potentially relevant for the calibration of a dedicated infrastructure project equity sub-module. But sample size and time span (2 years of monthly data) mean that the data are not sufficient to produce a Solvency II consistent calibration (see Annex 2).

Eligible proxies could be corporate infrastructure equity indices. Literature on listed infrastructure indices traces back to pioneering work by UBS,¹⁰⁰ or Newell and Peng.¹⁰¹ In many cases the results are highly sensitive to the specific index chosen.¹⁰² Sawant finds the following results for the distributions of listed infrastructure indices:¹⁰³

- i. High correlation with general stock market indices;
- ii. Negative skews (indicating that negative returns are more likely);

¹⁰⁰ UBS (2006): Asset Bubble, Structural Change or Fundamental Re-Rating? Q-Series: Infrastructure & Utilities. UBS Investment Research, United Bank of Switzerland.

¹⁰¹ Newell, G./Peng, H.W. (2008): The role of US infrastructure in investment portfolios. *Journal of Real Estate Portfolio Management*, (14:1), pp. 21-33; Newell, G./Peng, H.W. (2008): European Infrastructure Investment: A Valuable Addition to the Mixed-Asset Portfolio." *Fibre Series*, RICS, London; Newell, G./Peng, H.W. (2009): The significance and performance of infrastructure in China. *Journal of Property Investment & Finance*, (27:2), pp. 180-202.

¹⁰² "...depending on the construction of the index and the period chosen, volatility can be somewhat higher or lower than for broader indices" (Inderst, G. (2010): *Infrastructure as an Asset Class*. EIB Papers. Vol. 15. No. 1. p. 81)

¹⁰³ Sawant, R.J. (2010): Emerging Market Infrastructure Project Bonds: Their Risks and Returns. *Journal of Structured Finance*. Vol. 15. No. 4. pp. 75-83.

- iii. High kurtosis (fat tail).

Blanc-Brude examines returns and volatilities of major infrastructure indices consisting of infrastructure companies (see table below).¹⁰⁴

¹⁰⁴ Blanc-Brude, F. (2013): Towards Efficient Benchmarks for Infrastructure Equity Investments. EDHEC Risk Institute.

Table 1: Risk return characteristics of major infrastructure indices in June 2012

	MSCI World Infra (sector capped)	MSCI World Infra	S&P Global Infra	FTSE Macquarie Global Infra	UBS World Infra	UBS World Infra & Utilities	UBS World Infra & 50-50 & Utilities	Gloal Infra & S&P Composite	500 FTSE Share	All
Performance†										
3 year	14%	13%	17%	14%	17%	14%	15%	16%	17%	
5 year	-5%	-6%	-7%	-7%	-6%	-6%	-6%	-3%	-3%	
7 year	10%	8%	16%	13%	23%	14%	16%	10%	10%	
10 year	3%	3%	6%	5%	9%	5%	6%	3%	3%	
Risk*										
3 year	14%	13%	17%	14%	17%	14%	15%	16%	17%	
5 year	18%	17%	22%	17%	25%	17%	21%	21%	22%	
7 year	16%	15%	20%	16%	22%	16%	19%	19%	19%	
10 year	16%	15%	18%	16%	20%	16%	17%	18%	18%	
Sharpe ratio#										
3 year	0.7	0.5	0.6	0.4	0.8	0.5	0.6	1.0	0.7	
5 year	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.2	-0.2	
7 year	0.3	0.2	0.4	0.4	0.5	0.4	0.4	0.2	0.2	
10 year	0.1	0.1	0.3	0.2	0.4	0.2	0.3	0.1	0.0	

† annualised monthly returns, * annualised standard deviation of monthly returns, # ratio of annualised excess monthly returns over 3-months risk-free rate to annualised standard deviation of monthly excess returns
All data in US\$, source: Datastream & author's calculations

Table 2: Characteristics of major infrastructure indices before and after 2008

	MSCI World Infra (sector capped)	MSCI World Infra	S&P Global Infra	FTSE Macquarie Global Infra	UBS World Infra	UBS World Infra & Utilities	UBS Gloal 50- 50 Infra & Utilities	S&P 500 Composite	FTSE All Share
Performance									
Pre-dislocation*	12%	13%	21%	17%	26%	17%	20%	9%	9%
Post dislocation†	-5%	-6%	-7%	-7%	-6%	-6%	-6%	-3%	-3%
Risk									
Pre-dislocation	12%	13%	11%	13%	11%	13%	12%	14%	13%
Post dislocation	18%	17%	22%	17%	25%	17%	21%	21%	22%
Sharpe ratio									
Pre-dislocation	0.7	0.8	1.6	1.1	2.1	1.1	1.4	0.4	0.5
Post dislocation	-0.3	-0.4	-0.3	-0.4	-0.3	-0.4	-0.3	-0.2	-0.2

* June 2002 to June 2005 † June 2007 to June 2012
Source: Datastream & author's calculations

The calculation of annualised standard deviations of monthly returns as a measure of risk gives some insight regarding infrastructure equity. Tables 1 and 2 show key performance metrics for several major infrastructure indices as well as the S&P composite and the FTSE All share indices between 2002 and 2012. Looking at risk figures over 10 years in Table 1, one can easily calculate a very rough first approximation of the 99.5% VaR within the Solvency II calibration

framework and it implies minimum figures in a range between 45% and 60%, which is higher than the currently foreseen calibration. More importantly, if we look at Table 2 which separates the data in two five-year periods before and after 2008, one can easily see that the risk significantly increased “post-dislocation” (i.e. June 2007 to 2012) for all funds but one, and implies minimum figures between 51% and 75%.

In terms of correlation/diversification, Inderst notes that studies of the (global and national) listed infrastructure indices show high correlations with general stock market indices, typically in the region of 50–80 percent.¹⁰⁵

Current Solvency II treatment under the standard formula

Provided that funds are able to make the relevant information with the necessary degree of granularity available (which is still not entirely clear) the look-through principle applies under the Solvency II framework. This means that the same risk charges apply as if the insurer invested directly in the underlying assets (infrastructure corporate equity, loans or bonds, depending on the investment strategy) of the fund.

Unlisted funds

According to Blanc-Brude “unlisted infrastructure equity funds are a very recent invention. Their volume grew ten-fold in less than 5 years, with US\$3.6bn of capital raised in 2004 turning into US\$37.1bn in 2008. As of July 2011, there were 195 unlisted infrastructure equity funds seeking to invest, or having invested, cumulative capital commitments of \$160 billion”.¹⁰⁶

¹⁰⁵ Inderst, G. (2010): Infrastructure as an Asset Class. EIB Papers. Vol. 15. No. 1.

¹⁰⁶ Blanc-Brude, F. (2013): Towards Efficient Benchmarks for Infrastructure Equity Investments. EDHEC Risk Institute.

Available studies show that unlisted infrastructure funds have an average return of more than 8% and annualised volatility of around 6%

Overview of the study results on the risk-return profile of unlisted infrastructure funds

Study	Duration	Calculation frequency	Average annual return	Annualised volatility	Sharpe ratio
Peng and Newell (2007)	Q3 1995 – Q2 2006	quarterly	14.1%	5.8%	1.47
Newell et al. (ongoing)	Q3 1995 – Q2 2009	quarterly	14.1%	6.3%	1.34
	Q2 2007 – Q2 2009	quarterly	8.2%	6.7%	0.32
Finkenzeller et al. (2010)	Q4 1994 – Q1 2009	quarterly	8.2%	3.8%	-
Prequin ¹	2004 - 2008	annual	7.4%	-	-

Figure 5: Study results on risk-return profile of unlisted infrastructure funds¹⁰⁷

Existing studies are mainly based on Australian unlisted funds. Peng and Newell analyse quarterly returns of 5 unlisted infrastructure funds and utilities funds in Australia.¹⁰⁸ Results show that the volatility of unlisted infrastructure funds is lower than that of the listed assets, but higher than for bonds and direct property. According to a more recent study by Newell,¹⁰⁹ taking into accounts effects from the crisis, five-year rolling volatility results suggest little change for unlisted infrastructure during the financial crisis, again in contrast to increased volatility of the listed assets and even direct property.

Finkenzeller et al. analyse similar data over a longer time period between Q4 1994 and Q1 2009, including the impact of the financial crisis.¹¹⁰ The authors make adjustments to get “de-smoothed” and “unlevered” returns for better comparability with transaction-based indices of listed assets (removing a gearing level of 60 percent). Unlisted infrastructure and utility showed returns similar to equities and bonds, but returned less than direct property and listed infrastructure. However, unlisted infrastructure displayed the lowest volatility, even lower than bonds and direct property. Again, listed infrastructure is found to have higher returns and much higher risk than unlisted infrastructure.

¹⁰⁷ RCFFS/Deka Bank (2012): Risk and Return Profiles for Equity and Debt Capital Investments in Infrastructure. p. 43.

¹⁰⁸ Peng, H.W./Newell, G. (2007): The Significance of Infrastructure in Australian Investment Portfolio. Pacific Rim Real estate Society Conference.

¹⁰⁹ Newell, G./Peng, H.W./De Francesco, A. (2011): The Performance of Unlisted Infrastructure in Investment Portfolios. Journal of Property Research. 28(1). pp. 59-74.

¹¹⁰ Finkenzeller, K./Dechant, T./ Schäfers, W. (2010): Infrastructure: a new dimension of real estate? An asset allocation analysis. Journal of Property Investment & Finance. (28:4). pp. 263-274.

The most up-to-date performance data are published by CFS.¹¹¹ They use their own index of five equally-weighted Australian unlisted infrastructure funds over the ten years to June 2010. The study confirms the low volatility compared to other asset classes and the high risk-adjusted returns over one, three, five and ten years. The rolling 12-month return slipped only briefly into negative territory in 2009.

In summary the Australian performance studies of unlisted funds find relatively high risk-adjusted returns and relatively strong resilience in the market downturn. However, strong caveats are necessary, some of them already mentioned by the authors themselves:

- i. Small and incomplete sample of funds (different sizes and inception years – only two funds before the year 2000);
- ii. Data gathering from different sources;
- iii. Results depend on the specific period analysed; and
- iv. Appraisal-based valuation of unlisted infrastructure and direct property, which tends to underestimate volatility and correlations with listed instruments, and overestimates their diversification potential.

Many other questions remain. In addition to the availability of data, there are a number of difficult questions, including the construction of appropriate indices for unlisted assets, the likely existence of survivor (and other) biases, the frequency of data, the appropriate measures for return and risk, the diversity of vehicles, the impact of fees, the effect of gearing and the appropriate performance measurement methodology in general.

In terms of diversification, according to Inderst,¹¹² studies seem to generally confirm a diversification opportunity as correlations with other asset classes turn out to be rather low. This is shown by correlation values ranging between 0.05 and 0.27 for equities across the different studies, and between -0.10 and 0.17 for bonds. The correlation coefficients between unlisted and listed infrastructure are

¹¹¹ CFS (2010): Unlisted infrastructure: a proven performer. Infrastructure Research Note, Colonial First State Global Asset Management, August.

¹¹² Inderst, G. (2010): Infrastructure as an Asset Class. EIB Papers. Vol. 15. No. 1. p. 92.

somewhat higher. Unfortunately, no historical correlation data are known for unlisted infrastructure funds in regions other than Australia. Furthermore, none of the known empirical studies measures the correlation of unlisted infrastructure with private equity or other asset classes.

Current Solvency II treatment under the standard formula

Provided that funds are able to make the relevant information with the necessary degree of granularity available (which is still not entirely clear) the look-through principle applies under the Solvency II framework. This means that the same risk charges apply as if the insurer invested directly in the underlying assets (infrastructure corporate equity, loans or bonds, depending on the investment strategy) of the fund.

Preliminary Results

In its analysis EIOPA has looked at available data as well as economic determinants for the risks of infrastructure projects.

Directly owned project infrastructure equity is unlisted. The resulting lack of historical market values makes a reliable calibration very difficult. To circumvent this problem listed infrastructure could be used as a proxy in terms of risk. But there are some indications that the risk profile may be different. Moreover, the choice of a suitable listed infrastructure index might have a material impact on the results. The considerable inherent idiosyncratic risks and the generally high degree of leverage support the currently foreseen calibration.

For directly owned infrastructure debt instruments (whether bonds or loans), a similar lack of data seems to exist. The analysis of historical default and recovery rates performed by EIOPA was inconclusive. Moreover, so far no evidence was found that infrastructure debt with a certain rating exhibits a different behaviour in market prices (and thus spreads) than other corporate bonds with the same rating.

Investment funds can be divided into two main categories: Funds investing in a broad range of infrastructure linked assets, or pure player investing only in infrastructure projects, usually through equity. Regarding the former, the economic literature assessing their risk seems to be inconclusive. The evidence EIOPA has gathered so far

supports the current treatment foreseen within the Solvency II framework for such investments. No calibration can be done for infrastructure projects because of insufficient data.

5.1.2. Questions

Q16: What is the overall volume of infrastructure investments by insurers? What is the volume for types of investment vehicles (shares of funds, loans, bonds, project equity, etc.)? What is the volume for different types of infrastructure (energy, traffic etc.)?

Q17: Do you expect loans to become a more significant part of infrastructure investments by insurers in the future? What portion in terms of overall investments and term of infrastructure investments can be expected?

Q18: What is the volume of investments by insurers in bonds issued by monotranches loan securitisation vehicles? To what extent is this realised through a partnership with the originating financial institution?

Q19: What kind and degree of expertise do insurers need for infrastructure investments via different vehicles? Do insurers have this kind of expertise and what developments do you expect in this respect in the future?

Q20: What are potential data sources that might be useful to perform a calibration analysis for the investments mentioned in this section?

Q21: Do you have any suggestions how market data for listed infrastructure could be used for calibrating infrastructure project equity? What would be suitable indices and subsets of the infrastructure project universe? Why would the risk profiles be comparable?

Q22: Consider the following statement: "The high degree of leverage often used in infrastructure project finance results in a high sensitivity of equity values to changes in the total value of the project and thus a high overall risk". Do you disagree? Why?

Q23: Do you have suggestions as to how a more granular treatment for unrated loans could be introduced in the framework of the standard formula?

Q24: To what extent will insurers rely on full or partial internal models to achieve a more granular treatment of unrated loans?

5.2. Input on the discussion paper

Volume of investments in infrastructure

The feedback received from respondents indicates that insurers are generally interested in increasing their investments in infrastructure projects as they are assumed to provide very attractive risk/return patterns regularly associated with very modest risks. One respondent quotes a recent McKinsey Global Institute report,¹¹³ which estimates that institutional investors allocate on average 3% of their assets to infrastructure investment and have a 6% target (i.e. a doubling) to be reached in five years. Some respondents expect infrastructure investments to increase up to a level of 10% to 20% of insurers' portfolios.

The specific case of Monotranche loan securitizations

Monotranche loan securitisations are securitisations of loan portfolios. All instruments have the same rank (no subordination). They are normally issued by banks.

Given the novelty of these instruments there are yet no performance data available.

Responses from stakeholders indicate that the use of monotranche securitisations to refinance infrastructure loans is so far restricted to the French market (due to specific sovereign guarantee mechanisms).

As there is no subordination between the tranches a monotranche loan securitisations is expected not to fall under the definition of 'tradable securities or other financial instruments based on repackaged loans' in Art. 1bis draft implementing measures. To calculate the risk charge under the standard formula the look-trough is used and the charge is finally determined by the nature of the underlying debt.

Data

¹¹³ McKinsey Global Institute (2013): Infrastructure Productivity: How to save \$1 trillion a year, p.24.

One respondent suggested the EUR Private Equity Infrastructure Index (NMXIEUTR Index) for equity investments. But contrary to the orientation taken towards direct infrastructure investment in this work, the index does not specifically address core infrastructure. It is more of an infrastructure-themed index and therefore out of the scope. The LPX factsheet for the index shows also clearly that the risk characteristic of the index (understood as the annualised standard deviation based on monthly log-returns in EUR over a period of 3 years) is very similar to that of the MSCI World and S&P 500 Indices, and therefore does not support a different treatment.¹¹⁴

One suggestion proposes listed funds which invest exclusively in infrastructure project SPEs with well-defined revenue risk characteristics as potential proxies for unlisted infrastructure. But given the small number of such funds at the moment the respondent sees this only as a long-term perspective.

Relevant information on characteristics and performance of infrastructure project debt in the past is mainly held by banks (including multilaterals).

Some of the data collection exercises related to the implementation of Basel II Internal Rating Base Models were undertaken by Standard's & Poor's and Moody's. Recognizing the lack of publicly available investment data on the subject, compared to longer established asset classes, Natixis and Meridiam have launched 3 year research chairs with the EDHEC Risk Institute.

Input from the consultation indicates that future and on-going data collection efforts in these areas may produce useful results.

Alternative calibration

Blanc-Brude and Ismail (2013) produced a paper in response to the EIOPA discussion paper.¹¹⁵ It proposes a simple method to derive the equity loss function for a generic infrastructure project over its life-cycle. In the absence of actual usable data, the authors develop a parametric model which is calibrated using expert judgment. Through Monte Carlo simulations (repeated random sampling) a 99.5% VaR for

¹¹⁴ http://www.lpx-group.com/nmx/uploads/media/Newsletter_NMX_Europe_31052013.pdf

¹¹⁵ Blanc-Brude, F./Ismail, O.R.H. (2013): Measuring Infrastructure Equity Risk., EDHEC Risk Institute. April 2013. Contribution to EIOPA on long-term investment.

project equity of about 22% is calculated. While the approach is interesting it has some limitations:

1. The loss function is defined as the deviation of the current net asset value from the net asset value under the base case scenario projected at the outset of the project. This implies a different definition of risk than in Solvency II. Moreover, the approach is based on the net asset value of the project (i.e. on projected cash flows). General financial market conditions and other exogenous factors affecting the transaction price (but not necessarily the appraisal values) are therefore not necessarily reflected
2. The generic project used as base case is a Project Finance Initiative (PFI) school project in the UK (i.e. social infrastructure). As discussed later in this chapter there are indications that social infrastructure project equity has a different risk profile than other infrastructure investments (Blanc-Brude and Ismail make the same case). An extension of any result for this segment to infrastructure project equity in general would therefore seem problematic.
3. In the end the results are model-based and not based on actual data.

The crucial distinction between listed and unlisted assets

Many respondents mentioned the report by J.P. Morgan Asset Management "Global Real Assets (May 2013): A case for Core Infrastructure". It emphasises the differences between listed infrastructure and unlisted (private) infrastructures. The report comes to the conclusion that listed infrastructure has similar characteristics as global equity. This is in line with the previous evidence EIOPA has gathered that listed infrastructure behaves not significantly different than other listed equity investments. In contrast the returns of private infrastructures exhibit according to the study a much lower volatility and are nearly uncorrelated with both listed infrastructure and global equity.

However, EIOPA identified potentially problematic shortcomings with the J.P. Morgan paper, mostly in the sample selection process:

J.P.Morgan focuses only on “mature” infrastructure assets. Out of a pool of 200 assets in the OECD, they sub-select 50 mature assets from the US and EU-15 countries from which cash flows are extracted to build the index. The selection process excludes assets that entail construction, licensing or traffic risks. Assets with significant capex needs are also omitted. The resulting significant selection bias makes it hard to justify a recalibration of the unlisted infrastructure asset class as a whole on the basis of this paper. However, as can be seen below, EIOPA does arrive to similar conclusions on the specific sub-category of lower risk social infrastructure projects.

Another limitation of the approach is that strong assumptions are needed to derive market values based on the cash flows that the project generated in later years. The resulting values and consequently the derived risk measurement figures are very sensitive to these assumptions.

The findings regarding listed infrastructure are supported by further analysis undertaken by EIOPA concerning a number of infrastructure indices that have been created to proxy the performance of listed infrastructure assets. The main problem is that most of those indices include firms that have an infrastructure theme, but are not exclusively focused on physical asset construction and operation. Unlike unlisted infrastructure assets, which are most often directly investments made in project finance, listed assets mostly correspond to corporate investments. This leads to the already mentioned problem of delineating which company represents a direct investment in the underlying infrastructure from what simply corresponds to an investment in a firm with an infrastructure theme.

Major indices for listed infrastructure reported market capitalizations in excess of US1Tr in June 2012, but mostly consisting of utilities (for example, the UBS World Infrastructure index had USD200 bn market capitalization, while the UBS World Infrastructure + Utilities index had USD1.4Tn).

Several academic papers examine the performance of listed infrastructure. Looking at a sample of 32 infrastructure entities listed

in Australia, Peng and Newell (2007)¹¹⁶ find that for the period between 1995 and 2006, listed infrastructure exhibits higher returns, but also higher volatility than equity markets. Bird et al (2011)¹¹⁷ find that listed infrastructure proxied by the UBS indices for Australia and the US displays much higher volatility and has a higher market beta than listed utilities. Using a sample of 1.458 listed firms in the transport, telecoms and utilities sectors, Rothballer and Kaserer (2011)¹¹⁸ find that infrastructure stocks have lower market risk than equities in general but not lower total risk, i.e. they find high idiosyncratic volatility. The authors argue that construction risk, operating leverage, the exposure to regulatory changes and the lack of product diversification explains this volatility. Finally, examining three major listed infrastructure indices between 2002 and 2009, Sawant (2010)¹¹⁹ also finds that return distributions show high volatility. These findings suggest that infrastructure equity indices do not provide a good proxy for an exposure to the underlying infrastructure

There may also be little ground to the claim that - due to diversification effects - investments in listed infrastructure funds would be less risky than direct investments in listed equity. A study by Blanc-Brude (2013) shows that in comparison with listed infrastructure equity listed infrastructure funds may have a higher risk. One driver is high vehicle-level leverage (Blanc-Brude 2013)¹²⁰. This has been a particular problem since the beginning of the financial crisis. Based on post-financial crisis data Blanc-Brude shows that infrastructure offered little defensive characteristics because vehicle-level leverage risk became significant after 2008. The overall conclusion of Blanc-Brude is that the indices used in the existing research (covering both infrastructure firms and funds) fail to confirm the hypothesis of less volatile investments creating a better inflation hedge and delivering more predictable dividend income than the market average.

¹¹⁶ Peng, H.W./Newell, G. (2007): The Significance of Infrastructure in Australian Investment Portfolio. Pacific Rim Real estate Society Conference.

¹¹⁷ Bird, R./Liem, H./Thorp, S. (2011): Infrastructure: real assets and real returns. European Financial Management. doi: 10.1111/j.1468-036X.2012.00650.x

¹¹⁸ Kaserer, C./Rothballer, C. (2011): Is infrastructure really low risk? An empirical analysis of listed infrastructure firms. *published as*: The risk profile of infrastructure investments - Challenging conventional wisdom. Journal of Structured Finance. Summer 2012.

¹¹⁹ Sawant, R. J. (2010): Emerging Market Infrastructure Project Bonds: Their Risks and Returns. Journal of Structured Finance. Winter 2010. Vol.15. No. 4. pp.75-83.

¹²⁰ Blanc-Brude, F. (2013): Towards efficient benchmarks for infrastructure equity investments: a review of the literature on infrastructure equity investments and directions for future research. EDHEC –Risk Institute. p. 40.

These findings support the decision by EIOPA to focus on infrastructure project equity where the instruments are generally unlisted

However, unlike what the conclusion of the JP Morgan paper appears to imply, there is no consensus on the adequate treatment of unlisted assets. Indeed, a key issue is that all existing academic papers on unlisted infrastructure investment focus on private equity funds and use data from private equity databases (VentureOne, ventureExpert, CEPRES etc.). Using underlying deal data, a paper by Bitsch et al (2010)¹²¹ looks at the investment characteristics of individual investments made by unlisted infrastructure PE funds. One of their main conclusions is that while infrastructure private equity deals have higher average and median returns than their private equity control group, they offer no evidence of more stable cash flows. Blanc-Brude (2013) concludes that while these results may be considered counterintuitive in the context of the commonly held narrative on the topic, there is no other evidence on this subject.

The relevance of leverage

A number of commentators have emphasised that the high leverage used in project finance is no indicator for higher risk. They point at the specificities of project finance as set out in the Blanc-Brude paper cited by EIOPA.¹²² Moody's "Project Finance Default Study" (2013)¹²³ makes also a case for the robustness and low default risk of project finance debt despite high leverage: "While most project finance borrowers are highly leveraged, thinly-capitalized special purpose vehicles with limited financial flexibility, project finance loans are structured to be both highly robust to a wide range of potentially severe risks, and also to minimize any post-default economic loss."

A high initial leverage ratio certainly indicates a low perceived business risk at the outset of a project. But the low proportion of equity implies significant losses for equity holders in case of any materially adverse development.

The interpretation of the role of leverage is in any case not central for the results of the analysis EIOPA performed.

¹²¹ Bitsch, F./Buchner, A./Kaserer, C. (2010): Risk, return and cash flow characteristics of infrastructure fund investments. EIB Papers. Vol.15. No. 1. pp. 106-136.

¹²² Blanc-Brude, F. (2013): Towards efficient benchmarks for infrastructure equity investments: a review of the literature on infrastructure equity investments and directions for future research. EDHEC –Risk Institute. p. 40.

¹²³ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011.

5.3. Risk profile of unrated infrastructure project debt over time

A relevant feature of infrastructure project debt mentioned by several respondents is that its risk profile, unlike corporate debt, improves sharply over time. According to the Moody's Project Finance Default Study (2013): "Marginal annual default rates for project finance bank loans are consistent with high speculative grade credit quality during an initial three year period following financial close, but fall significantly thereafter trending towards marginal default rates consistent with single-A category ratings by year 10 from financial close... This characteristic of project finance bank loans is significantly different from the marginal annual default rates we have observed for corporate issuers, which are broadly stable for investment grade rating categories".¹²⁴ This statement refers to project finance in general.

Figure 9 shows that the marginal default rates are initially well above the corresponding figures for Baa rated corporates but drop to the same level after 7 years. In later years they are comparable to the figures for A rated corporates.

EXHIBIT 12.2

Chart of Data Presented in Exhibit 12.1

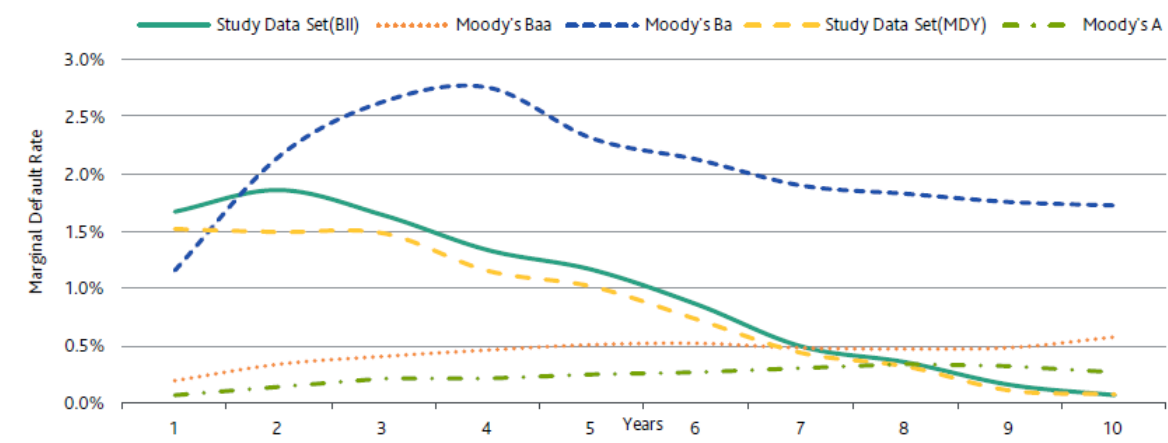


Figure 9: Annual marginal default rates for project finance bank loans¹²⁵

¹²⁴ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011. p. 3.

¹²⁵ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011. p. 19.

The following graph from the Moody’s study suggests that infrastructure project debt has a lower risk profile, compared to other industry sectors:

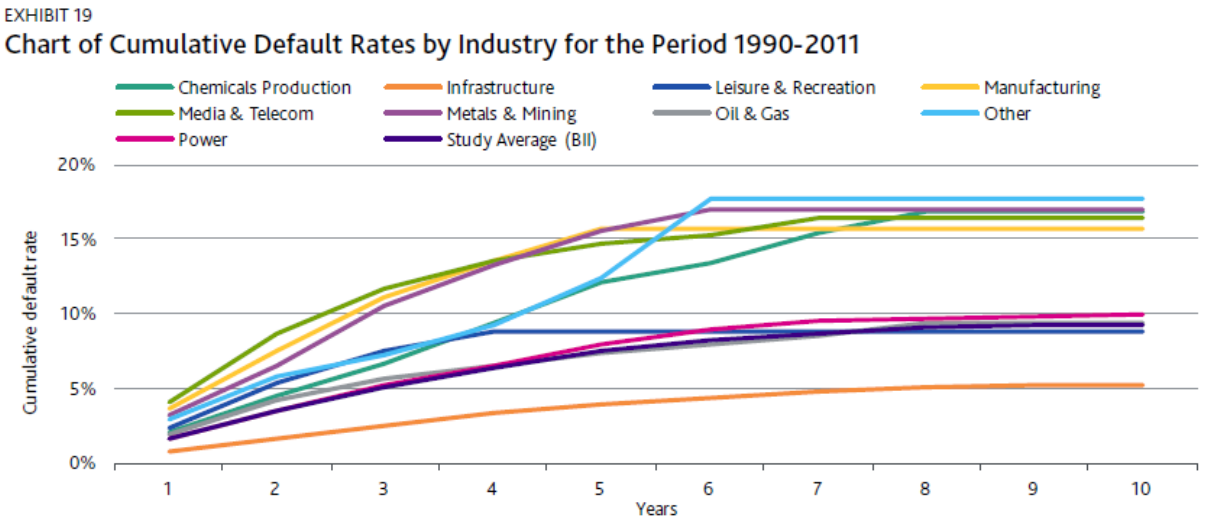


Figure 10: Cumulative default rates for project finance bank loans in different sectors¹²⁶

The area of infrastructure project finance has been dominated by banks. Consequently, the available historical evidence for the credit risk has the form of default and recovery rates. This means it is not possible to assess the adequateness of the spread for unrated infrastructure project debt with the same methods used for bonds (based on spreads observed in bond markets).

In the draft implementing measures the spread risk charge for unrated debt lies between the charges for credit quality 3 and 4 rated debt (corresponding to Baa and Ba by Moody’s in the mapping used for the LTGA). A possible approach is to compare the fundamental credit risk (level and volatility of default and recovery rates and correlations) of infrastructure projects with the corresponding figures for rated corporate issues. If for example infrastructure project debt and Baa rated corporates had a similar fundamental credit risk profile one could assign the same spread risk charge.

This is clearly a very crude approach as spreads are not only driven by fundamental credit risk but also by factors like liquidity and investor

¹²⁶ Moody’s Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011. p. 25.

psychology. There are also problems with respect to the reliability and the amount of available data on historical default and recovery rates. But in case one is willing to accept these considerable drawbacks it seems to be the only way to produce a calibration based on the available historical evidence without very strong assumptions (e.g. on the type of underlying distribution).

According to the Moody's study default and recovery rates in the project finance sector (of which infrastructure is a part) are not correlated (in contrast to the corporate sector).¹²⁷ This lowers the risk of infrastructure project debt in a stress situation (even though quantifying the effect is difficult).

The Moody's study also sets out that infrastructure has higher recovery values than corporate issues.¹²⁸

Another relevant figure is the absolute level of marginal default rates. Figure 9 does certainly not suggest that the currently proposed standard formula treatment under Solvency II (with risk charges for unrated loans between the ones for Baa and BB rated bonds) is too high for the first years of the infrastructure project (with the high risks associated with the construction phase). But it may seem problematic that - to provide an example - after 10 years the risk charge for an unrated infrastructure project finance loan with an initial maturity of 25 years (i.e. with 15 years residual maturity) would be higher than for a 5 year Baa-rated bond.

The problem is mitigated by the fact that infrastructure debt is in many cases amortising. This results in a lower duration and consequently in smaller differences between the risk charges for different rating classes. The effect can be illustrated by the following example: The actual duration of a 25 year amortising infrastructure loan with a rate of 3% at inception was only 11.6 years (based on the March 2013 Euribor curve).

The observed marginal default rates do not support a lower spread risk charge for unrated infrastructure debt from the outset of the project.

¹²⁷ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011. pp. 30-31.

¹²⁸ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011. p. 30.

To account for the improved risk profile over time an additional variable would have to be introduced that describes the age of the project. But there are several reasons why EIOPA does not recommend such an approach:

- It would add complexity. The problem would be compounded when applying the look-through principle to an investment in an infrastructure fund.¹²⁹
- In case the project SPV issued debt at different points in time two otherwise absolutely identical debt instruments (except for the issuance date) could have a different treatment.
- Changing the treatment of a loan mechanically based on the elapsed time since origination seems problematic. The only basis for determining the “switching points” would be data from the Moody’s study.
- The marginal default rates for different ages in the Moody’s study are based on a number of projects. The use of these figures in the standard formula calibration would imply that the insurer holds a sufficiently diversified portfolio of unrated project debt with a similar age.
- A lower calibration that applies only after a number of years creates probably only limited incentives to invest at the outset of the project when funding is most needed.

The problem of determining the “switching points” could be avoided by assuming that the insurer holds a portfolio of unrated infrastructure debt originated at different times. The marginal default rate of the portfolio could then be calculated as a weighted average. But this makes assumptions about the portfolio composition necessary and it seems not very likely that many insurers will hold such a “time diversified” portfolio in the foreseeable future.

In addition to the level of marginal default rates one could also look at their volatility over time. But there are clearly constraints to that given the limited number of observations and the low marginal default rate.

¹²⁹ No prudential framework across all financial sectors allows for this kind of granularity (which would be high unsupervisable).

In summary, there is some evidence for a favourable risk profile of unrated infrastructure debt but the initial default rates above the level for Baa rated corporates indicate no room for a reduced risk charge unless the treatment changes during the life of the project. Given the difficulties described above it seems more promising to focus on the lower end of the risk spectrum in the infrastructure sector (see next section).

5.4. The specific case of PPP/PFI and availability-based infrastructure projects

Analysis

Some stakeholders pointed to a lower risk profile of PPP/PFI and availability-based types of arrangements. EIOPA has found some evidence that unrated project debt from these segments has a better risk profile than unrated infrastructure project debt finance in general.

In an experimental approach, Blanc-Brude suggests to focus on the contractual and regulatory characteristics of infrastructure.¹³⁰ This allows in his view the creation of more coherent building blocks for designing an efficient infrastructure portfolio which are better proxies for the specific and systematic (and thus remunerated) sources of risk for infrastructure equity.

Blanc-Brude focuses as an example on social infrastructure PFI projects (PFI refers to a public sector procurement structured under the UK Government's Private Finance Initiative). Such projects are characterized by a long-term commitment from the public sector to pay a pre-agreed income as long as a certain public service is delivered according to specification. These contracts transfer all risks of construction, operations and maintenance to the investors and use project financing through a dedicated SPV financed with an average of 10% equity and 90% debt.¹³¹

Blanc-Brude constructs an equally weighted portfolio of 5 listed PFI investment funds representing a market capitalization of GBP3.8bn.

¹³⁰ Blanc-Brude, F./Ismail, O.R.H. (2013): Response to EIOPA's consultation on standard formula design and calibration for certain long-term investments. EDHEC Business School. (http://docs.edhec-risk.com/mrk/000000/Press/EDHEC-Risk_Institute_Response_to_EIOPA_May_2013.pdf).

¹³¹ Blanc-Brude, F. (2013): Towards efficient benchmarks for infrastructure equity investments: a review of the literature on infrastructure equity investments and directions for future research. EDHEC –Risk Institute. p. 40.

PFI index		FTSE All Shares
Price return	2.86%	1.61%
Risk	3.00%	12.48%
Sharpe Ratio	0.810	0.10
Market beta	0.094	n.a.
99.5% VaR	9%	30.54%
Total return	7.52%	5.02%
Risk	3.04%	12.50%
Sharpe Ratio	2.326	0.37
99.5% VaR	3.94%	27.17%

Figure 11: Risk characteristics listed PFI index¹³²

It can be seen that such a portfolio of investment funds exposed to a large pool of PFI equity with a long term investment horizon was significantly less risky than the overall market.

The main issue with this data, while promising, is that its scope and its span (only the period 2010-2012 for the full sample) are much too limited. The results would also only be relevant for the particular social infrastructure sub-sectors as the analysis above has shown that listed infrastructure equity in general does not clearly exhibit lower risk or lower volatility than listed equities.

However, such disaggregated building blocks of listed indices, as Blanc-Brude calls them, might potentially be relevant for an assessment of the calibration once more data will have been collected. The construction is planned for the next two years. More importantly, because such building blocks are constructed precisely with a view to

¹³² Blanc-Brude, F./Ismail, O.R.H. (2013): Response to EIOPA's consultation on standard formula design and calibration for certain long-term investments. EDHEC Business School. (http://docs.edhec-risk.com/mrk/000000/Press/EDHEC-Risk_Institute_Response_to_EIOPA_May_2013.pdf).

include more exhaustively all project risks, they are in this respect much more likely to be appropriate proxies for unlisted social infrastructure project finance than other existing indices.

As described previously the results of the Moody’s study indicated that the marginal default rates of unrated infrastructure debt are initially even above those for Ba rated corporate issues but drop later to levels comparable with Baa rated corporates. To reflect this in the standard formula the treatment would have to “switch” after a few years. But this is technically very difficult and may not achieve the desired results in terms of incentives.

The problems could be avoided if there was a segment in the infrastructure sector with lower marginal default rates in the first years than the sector as a whole.

According to the Moody’s report the marginal default rates for PFI/PPP projects are consistent with the figures for corporate issuers in the Baa rating category. But they are still higher in the first four years.¹³³ Due to the reduced level of revenue uncertainly availability-based projects might have a lower risk profile. As a last step one could restrict the scope further to social infrastructure (hospitals, schools etc.) which is subject to little or no construction risk.

EIOPA has therefore approached Moody’s research services to obtain more granular data on infrastructure segments from the database that provided the information for the study “Default and Recovery Rates for Project Finance Bank Loans, 1983–2011”.

Moody’s published in October 2013 disaggregated information on sub-categories of project finance bank loans in an addendum to the study¹³⁴. The table below shows marginal default rates for both the broad infrastructure sector and sub-sectors:

EXHIBIT 3
Marginal Annual Defaults by Project Type and by Region

	Year	1	2	3	4	5	6	7	8	9	10
Broad Infrastructure											
World (note 1)		0.97%	0.96%	0.83%	0.74%	0.51%	0.37%	0.18%	0.17%	0.07%	0.00%

¹³³ See exhibit H7 in: Moody’s Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011. p. 59.

¹³⁴ Moody’s Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011 Addendum.

EXHIBIT 3

Marginal Annual Defaults by Project Type and by Region

	Year	1	2	3	4	5	6	7	8	9	10
OECD (note 2)	0.73%	0.73%	0.68%	0.67%	0.41%	0.26%	0.16%	0.14%	0.09%	0.00%	
Europe (note 3)	0.57%	0.59%	0.57%	0.60%	0.38%	0.26%	0.14%	0.18%	0.12%	0.00%	
PFI/PPP within Broad Infrastructure											
World (note 1)	0.53%	0.55%	0.56%	0.62%	0.44%	0.37%	0.24%	0.21%	0.14%	0.00%	
OECD (note 2)	0.49%	0.49%	0.49%	0.57%	0.41%	0.33%	0.26%	0.23%	0.16%	0.00%	
Europe (note 3)	0.38%	0.35%	0.35%	0.44%	0.33%	0.29%	0.19%	0.26%	0.18%	0.00%	
Availability-Based within Broad Infrastructure											
World (note 1)	0.19%	0.13%	0.16%	0.20%	0.17%	0.22%	0.29%	0.40%	0.28%	0.00%	
OECD (note 2)	0.15%	0.09%	0.11%	0.14%	0.18%	0.23%	0.31%	0.43%	0.30%	0.00%	
Europe (note 3)	0.16%	0.09%	0.11%	0.14%	0.18%	0.24%	0.32%	0.45%	0.32%	0.00%	
Availability-Based PFI/PPP within Broad Infrastructure											
World (note 1)	0.21%	0.15%	0.18%	0.23%	0.20%	0.26%	0.36%	0.51%	0.37%	0.00%	
OECD (note 2)	0.17%	0.10%	0.12%	0.16%	0.20%	0.27%	0.36%	0.51%	0.37%	0.00%	
Europe (note 3)	0.18%	0.11%	0.13%	0.16%	0.21%	0.27%	0.37%	0.53%	0.39%	0.00%	
Moody's A	0.07%	0.15%	0.22%	0.22%	0.25%	0.27%	0.30%	0.34%	0.32%	0.27%	
Moody's Baa	0.20%	0.35%	0.42%	0.47%	0.52%	0.53%	0.49%	0.48%	0.49%	0.59%	
Moody's Baa3	0.30%	0.55%	0.64%	0.62%	0.82%	0.82%	0.78%	0.91%	0.85%	0.89%	
Moody's Ba1	0.66%	1.23%	1.66%	1.74%	1.61%	1.71%	1.38%	1.00%	0.98%	1.10%	

Figure 12: Marginal annual default rate by project type and year¹³⁵

The figures are based on the historic credit performance of 1,398 Broad Infrastructure projects as well as 832 PFI/PPP projects, 510 Availability-Based projects and 446 Availability-Based PFI/PPP projects (all within Broad Infrastructure). Moody's defines "PFI/PPP-availability-based" as "payments by an Off-taker to an Issuer for operating and maintaining a public asset per contracted standards. In PFI/PPP transactions based on Availability Payments, the Issuer's revenue is not subject to a material element of price or volume/traffic risk as long as performance remains acceptable" The definition of Project Finance is aligned to that proposed in the Basel 2 Framework.¹³⁶

¹³⁵ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011 Addendum. p. 4.

¹³⁶ Basel Committee on Banking Supervision (2004): International Convergence of Capital Measurement and Capital Standards. A revised framework. Bank for International Settlements. Par. 221 and 222. p.61:

"221. 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.

222. 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

The main conclusion from the table above is that the risk profile is less dependent on the institutional arrangement (i.e. PFI/PPP or not) than on the source of revenues (i.e. the fact that revenue risk is reduced through availability-based payments). In the first years marginal default rates for the PFI/PPP sub-sample are much higher than for the availability-based sub-sample. This is all the more remarkable as there is a significant overlap between the two sets (i.e. the differences are to a large degree due to higher marginal default rates for PFI/PPP projects without availability-based payments).

The following graph illustrates the development of the marginal default rates for availability-based projects over time:

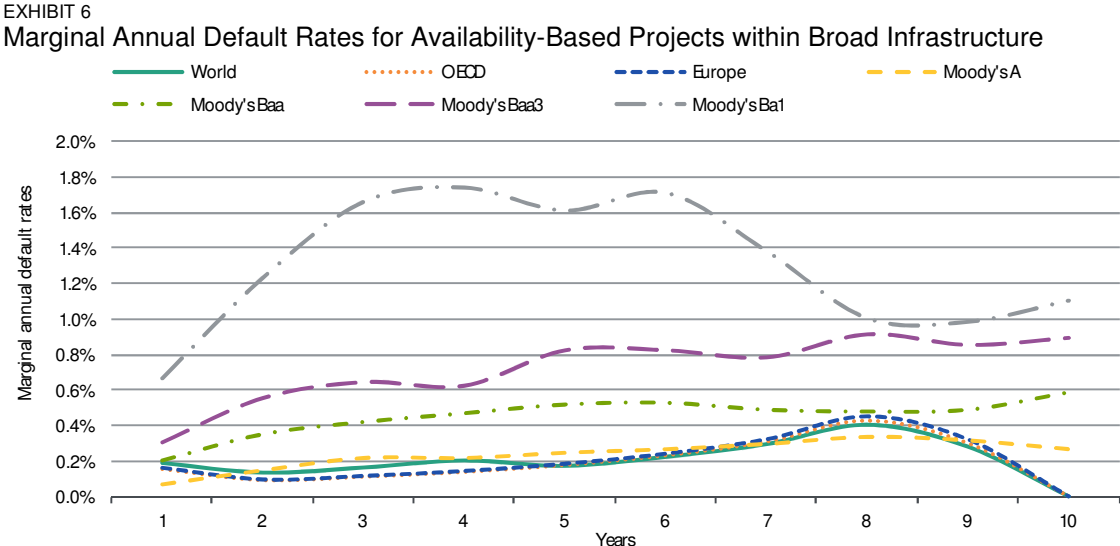


Figure 13: Marginal annual default rates for availability-based projects¹³⁷

The marginal default rates are at all times below the benchmark Moody's Baa index, related to Credit Quality Step 3 in the UECAI framework but exceed the level for A rated corporates at several points.

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...."

¹³⁷ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011 Addendum. p. 6.

The following table shows that the ultimate recovery rates for infrastructure in general and for PFI/PPP in particular are higher and less volatile than for corporate loans:

Variability of Ultimate Recovery Rates

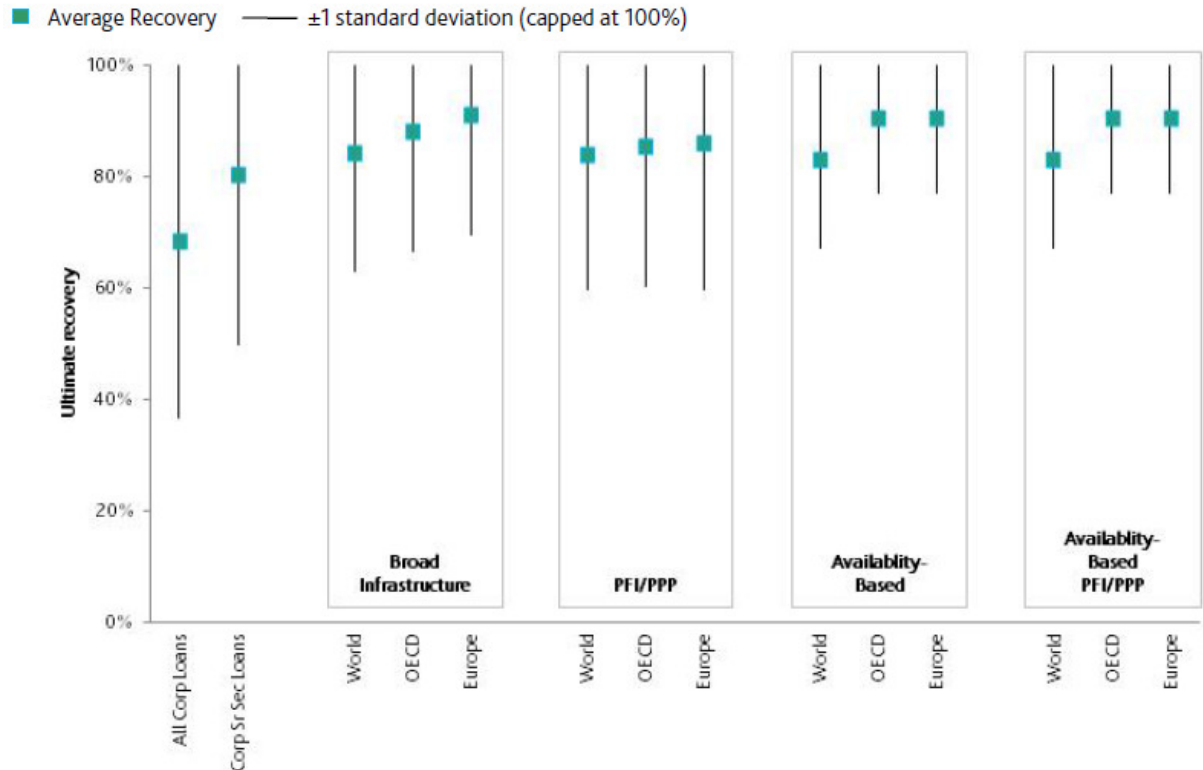


Figure 14: Average and standard deviation of ultimate recoveries for infrastructure sectors¹³⁸

There are however a number of limitations in terms of the database:

- There is some subjectivity in the classification of projects as PFI/PPP.
- The number of observations is limited and the number of defaults is quite small. This creates particular issues, notably the slight increase in marginal default rates in year 8 which is probably an outlier due to the small size of the data set. This trend was not present in the larger PFI/PPP data set with 954 projects, or in the data set of 832 PFI/PPP projects.
- The data is based on information provided by a consortium of banks. The collected data is proprietary and EIOPA was not able to validate the information or the methodology of the analysis carried out by Moody's. There are consequently

¹³⁸ Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011 Addendum. p. 9.

significant aspects of the information which EIOPA was not able to validate such as the banks involved in providing the data, size of the loans involved, and origin country of the loans.

- Another area of concern is the inconsistency resulting from the comparison between a longer history of corporate bonds and a shorter history of unrated infrastructure debt which may lead to a flawed calibration.

In summary: According to the Moody's data the historical marginal default rates for availability based unrated infrastructure debt never exceeded the figures for Baa rated corporates and were for certain ages of the project at a level with A rated corporates. The average recovery rates for the infrastructure sector as well as for the PFI/PPP segment were above the level for corporate loans and less volatile.¹³⁹ A potential conclusion from the data could therefore be to calculate the spread risk charge for unrated availability based infrastructure debt based on credit quality step 3.

But apart from the data issues this change would have a number of significant drawbacks:

- The resulting granularity is higher than in other areas of the standard formula and will probably encourage demands for the introduction of a similar special treatment for other investments.
- It provides incentive for investments in unrated rather than rated instruments because the risk charge is the same as for credit quality step 3 (which is generally accepted as the lowest investment grade assets that firms generally invest in).
- It introduces additional burdens for insurers and supervisors who have to decide whether a loan qualifies for the lower risk charge.¹⁴⁰
- It creates delineation problems and thus a potential opportunity for arbitrage as resilient criteria are needed to define availability based infrastructure debt.

¹³⁹ These figures have to be interpreted with care as the underlying number of defaults is quite small.

¹⁴⁰ In other areas of the standard formula the categorisation of assets depends on easy to validate criteria (e.g. place of listing).

- The proposed change is small so that the overall economic effect would be quite limited.

Conclusion

EIOPA has made considerable efforts to get the most comprehensive data available on historical credit risk for infrastructure debt. When it became clear that the publically available information was not sufficient EIOPA liaised with Moody's to obtain additional data.

The area of infrastructure project debt financing has been dominated by banks. Consequently, the available historical evidence for the credit risk has the form of default and recovery rates. This makes it impossible to assess the adequateness of the spread for unrated infrastructure project debt with the same methods used for bonds (based on spreads observed in bond markets).

The data published in the Moody's study suggest that unrated availability based infrastructure and Baa rated corporates had similar fundamental credit risk. The results are in line with often voiced views about infrastructure: The default risk is highest during the construction phase, recovery values are higher for physical asset and the lower revenue risk of infrastructure with availability based payments or a public off-taker translates into a better risk profile.

But the focus on specific segments of the infrastructure sector results necessarily in a small sample size. Moreover, the credit data underlying the Moody's study is proprietary. There are also methodological issues when a spread risk charge calibration is derived based on a number of observed annual marginal default rates and recovery rates.

A specific treatment for unrated availability based infrastructure would increase complexity and create delineation problems. It would also incentivise the allocation of funds to unrated investments.

Based on the available evidence the suggested change can only be small. For a modified duration of 10 years the risk charge would drop from 23.40 % to 20 %.

Given the modest impact and the drawbacks outlined above, a change in the current calibration is not recommended.

5.5. Risk profile of rated infrastructure project debt

Analysis

It has been suggested by stakeholders that the risk of rated infrastructure project debt is lower than implied by the current standard formula calibration.

As already mentioned in the discussion paper the number of infrastructure project bonds in the past was quite limited. Only some of them were listed and many were guaranteed by monoliners. As a result it is impossible to follow the approach based on market prices CEIOPS used for producing a calibration for spread risk.

What is available is the behaviour of initial spreads for infrastructure loans over time. The chart below compares the margin over LIBOR for global corporate bonds and infrastructure project finance debt:

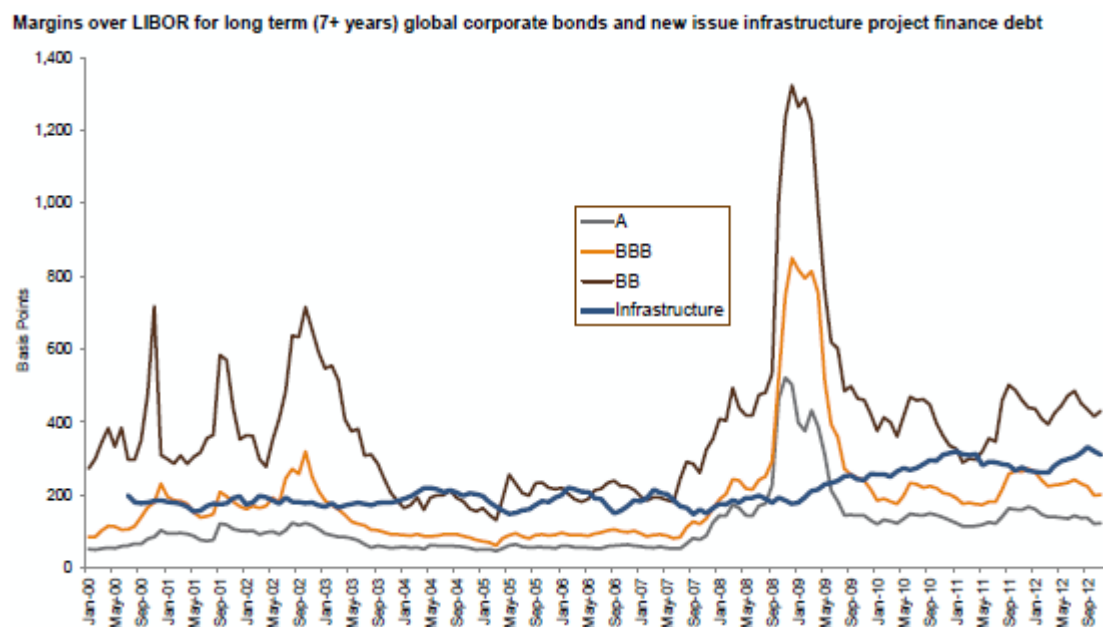


Figure 15: Margin over LIBOR for global corporate bonds and infrastructure project finance debt¹⁴¹

The chart suggests that during the financial crisis spreads for unrated infrastructure project debt expanded significantly less than for BBB and A rated corporate debt. During other periods their behaviour seems to be similar, even though infrastructure spreads are always markedly higher than for A rated corporate debt.

¹⁴¹ The information was provided by J.P.Morgan Asset Management.

But some qualifications are in place: While a substantial number of bonds are traded on a continuous basis there is only a limited number of projects initiated at discrete points in time. There might in particular have been only very few new projects in 2008 and 2009. Moreover the composition of projects can be expected to vary over time as in periods of tighter credit conditions certain projects will no longer be financed. This may dampen the increase of observed spreads during a crisis.

A possible reason why the risk profile of rated infrastructure debt is lower than implied by the standard formula could be that fundamental drivers of credit risk like default rates, recovery rates and frequency of rating downgrades for infrastructure project debt are systematically more favourable than for corporate bonds in the same rating class. Data on corporate bonds prices was used to derive the spread risk charge in the standard formula.

Below some potential causes for such systematic differences are explored

No consideration of recovery rates

It is often claimed that rating agencies base their rating only on default probabilities and not on recovery rates (which tend to be higher for infrastructure). This is the case for Fitch and Standard & Poor's but not for Moody's.¹⁴² Moody's ratings are based on the expected loss. This mean that infrastructure project debt with a significantly higher recovery rate and the same default probability as a corporate issue would in principal receive a higher rating by Moody's.

EIOPA has found no study that compares default and recovery rates for project infrastructure debt and other issuers in the same rating category. But there is a Moody's study for rated infrastructure debt covering both US Municipal Infrastructure debt and corporate infrastructure debt over the period from 1983 to 2012.¹⁴³ The former sector has several specificities and the study voices some doubts regarding the comparability of default rates with the corporate

¹⁴² Ghosh, S. (2013): A Study of Differences in Standard&Poor's and Moody's Corporate Credit Ratings. Leonard Stern School of Business .p. 2.

¹⁴³ Moody's Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1.

sector.¹⁴⁴ As explained previously the risk profiles of infrastructure companies and infrastructure project debt deviate significantly. But given the absence of other studies it might be instructive to see to what extent Moody’s rating methodology for infrastructure corporates produced ratings that resulted in similar risk profiles compared to other corporates.

The table below shows that the average recovery rates for infrastructure corporate debt are generally higher than for non-financial corporate debt:

Recovery Rates for Defaulted Corporate Infrastructure Debts

Sector	Senior Secured	Senior Unsecured
Regulated Utilities	\$82.52	\$59.16
Unregulated Utilities	\$60.96	\$41.45
Others	\$65.93	\$60.05
Average Corporate Infrastructure Debts	\$68.72	\$53.01
Average Non-Financial Corporate Issuers	\$49.30	\$36.50

Figure 16: Average recovery rates for infrastructure corporate debt and non-financial corporate debt¹⁴⁵

But over the short-term the higher recovery rates translate not automatically into significant differences in credit loss rates (i.e. the actual loss incurred by the lender due to defaults). The figures below show the credit loss rates for A and Baa rated corporate infrastructure and non-financial corporate unsecured issues:¹⁴⁶

¹⁴⁴ Moody’s Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1. p. 10.

¹⁴⁵ Average trading prices on an issuer's bonds 30 days after its initial missed payment or bankruptcy filing. (Moody’s Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1. p. 14).

¹⁴⁶ In contrast the loss rates for Ba rated corporate infrastructure and non-financial corporate unsecured issues differ considerably (Moody’s Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1. p. 16).

EXHIBIT 12

Single-A Unsecured Debt Credit Loss Rates

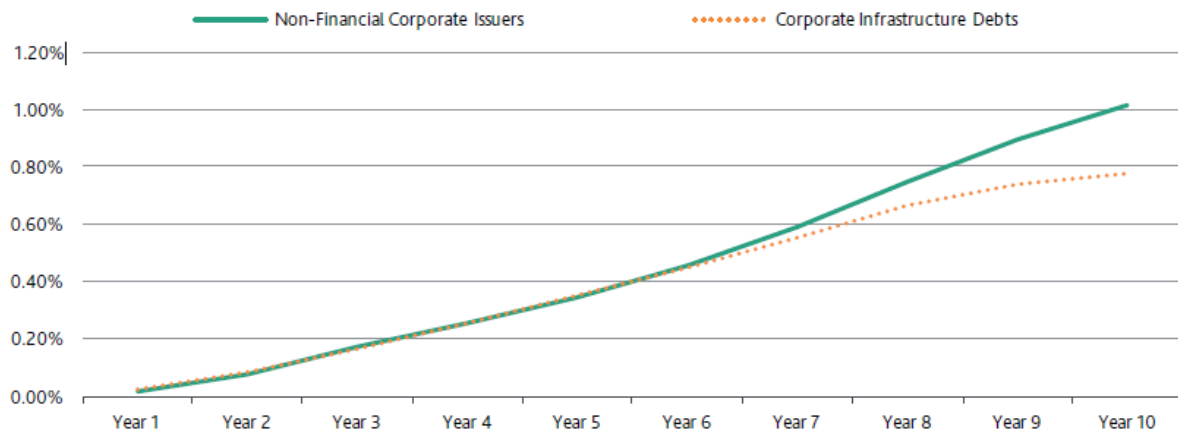


Figure 17: Credit loss rates for A rated corporate infrastructure and non-financial corporate unsecured issues¹⁴⁷

Baa Unsecured Debt Credit Loss Rates

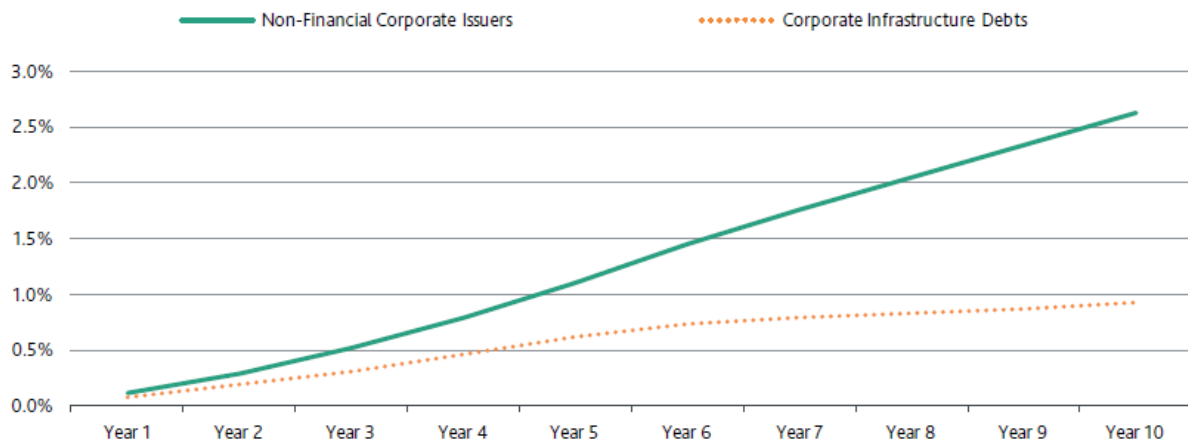


Figure 18: Credit loss rates for Baa rated corporate infrastructure and non-financial corporate unsecured issues¹⁴⁸

This indicates that Moody’s managed to calibrate the ratings for investment grade issues so that infrastructure corporates and other non-financial corporates in the same rating category suffered credit losses over the short-term that were comparable in absolute terms. In the medium term there are significant differences. This is a necessary consequence of the higher rating stability for corporate infrastructure.

As mentioned there are substantial differences between infrastructure corporates and infrastructure project debt and a different rating methodology is applied. But at least it seems possible to account for

¹⁴⁷ Moody’s Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1. p. 14.

¹⁴⁸ Moody’s Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1. p. 15.

the higher recovery rates for infrastructure while ensuring that infrastructure debt and non-infrastructure debt have similar short-term credit losses.

Fitch and S&P base their rating on the probability of default.¹⁴⁹As a consequence it is possible that higher recovery rates for infrastructure project debt translate into lower credit losses compared with corporate issues in the same rating category. But according to one representative from a rating agency the ratings from the three agencies for projects with a low default probability normally fall into the same category. Moreover, given the low default probabilities of investment grade issues even large differences in recovery rates do not translate into significant absolute differences in short-term credit losses.

In summary, EIOPA has found not sufficient evidence to assume that short-term losses due to actual defaults for project infrastructure debt and non-financial corporate debt differ substantially in absolute terms.

Higher rating stability

It has been pointed out that infrastructure debt has higher rating stability. This was clearly the case for corporate infrastructure debt in the Moody’s study over a five-year period. The tables below show the five-year migration rates for corporate infrastructure debt and non-financial corporate issues:

Corporate Infrastructure Debts

Rating From:	Rating To:								
	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	Withdrawn
Aaa	45.53%	31.63%	4.59%	2.50%	0.00%	0.00%	0.00%	0.00%	15.76%
Aa	0.60%	49.12%	31.15%	4.57%	0.36%	0.25%	0.03%	0.11%	13.81%
A	0.02%	3.07%	56.34%	19.16%	1.955	0.32%	0.11%	0.92%	18.11%
Baa	0.01%	0.21%	9.53%	53.93%	7.92%	1.93%	0.69%	1.11%	24.67%
Ba	0.00%	0.04%	2.07%	22.00%	27.40%	4.24%	1.10%	2.97%	40.19%
B	0.00%	0.00%	2.32%	11.00%	18.35%	14.51%	4.25%	8.17%	41.41%
Caa-C	0.00%	0.00%	0.035	5.14%	14.49%	12.99%	6.21%	13.34%	47.80%

¹⁴⁹ Ghosh, S. (2013): A Study of Differences in Standard&Poor’s and Moody’s Corporate Credit Ratings. Leonard Stern School of Business. p. 2.

Non-Financial Corporate Issuers

Rating To:									
Rating From:	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	Withdrawn
Aaa	47.68%	21.17%	4.32%	0.33%	0.01%	0.12%	0.04%	0.14%	26.19%
Aa	2.55%	42.81%	23.73%	3.81%	0.75%	0.26%	0.03%	0.15%	25.92%
A	0.09%	3.84%	49.64%	17.50%	2.76%	0.77%	0.16%	0.50%	24.76%
Baa	0.08%	0.46%	9.07%	48.61%	8.36%	3.20%	0.84%	1.60%	27.78%
Ba	0.02%	0.10%	1.18%	10.26%	23.21%	11.88%	1.82%	8.45%	43.09%
B	0.04%	0.02%	0.24%	1.46%	5.83%	22.09%	6.04%	19.79%	44.49%
Caa-C	0.00%	0.00%	0.02%	0.39%	1.43%	6.56%	9.49%	37.66%	44.45%

Figure 19: Five-year migration rates for corporate infrastructure debt and non-financial corporate issues¹⁵⁰

The differences over a 12-month period are clearly less marked:

Corporate Infrastructure Debts

Rating To:									
Rating From:	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	Withdrawn
Aaa	83.91%	11.11%	0.50%	0.25%	0.35%	0.03%	0.03%	0.00%	3.82%
Aa	0.60%	86.72%	9.43%	0.43%	0.12%	0.03%	0.00%	0.00%	2.66%
A	0.01%	1.20%	88.53%	6.09%	0.33%	0.07%	0.08%	0.09%	3.60%
Baa	0.00%	0.04%	2.94%	87.29%	3.37%	0.55%	0.32%	0.14%	5.36%
Ba	0.00%	0.01%	0.17%	8.99%	75.38%	4.36%	1.34%	0.47%	9.28%
B	0.00%	0.04%	0.23%	1.27%	12.10%	66.51%	6.69%	2.08%	11.08%
Caa-C	0.00%	0.00%	0.00%	0.56%	4.21%	15.85%	53.80%	9.02%	16.57%

Non-Financial Corporate Issuers

Rating To:									
Rating From:	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	Withdrawn
Aaa	85.77%	7.44%	0.96%	0.00%	0.09%	0.01%	0.01%	0.00%	5.73%
Aa	0.78%	84.44%	8.79%	0.56%	0.07%	0.05%	0.00%	0.00%	5.31%
A	0.03%	1.50%	86.34%	6.06%	0.55%	0.15%	0.04%	0.03%	5.31%
Baa	0.02%	0.06%	3.38%	85.31%	4.00%	0.83%	0.21%	0.16%	6.04%
Ba	0.01%	0.05%	0.27%	5.20%	74.30%	8.05%	0.64%	1.06%	10.43%
B	0.01%	0.03%	0.10%	0.31%	4.30%	73.79%	6.57%	3.92%	10.98%
Caa-C	0.00%	0.02%	0.02%	0.10%	0.36%	7.97%	63.65%	15.61%	12.28%

Figure 20: 12-month migration rates for corporate infrastructure debt and non-financial corporate issues¹⁵¹

EIOPA has found no corresponding figures of rating migrations for infrastructure project debt. As there are substantial differences between infrastructure corporates and infrastructure projects (construction phase, diversification of revenue sources etc.) it is not obvious that the results for infrastructure corporates can be transferred.

Improvement of credit risk over time

¹⁵⁰ Moody's Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1. p. 28.

¹⁵¹ Moody's Investors Service (2012): Infrastructure Default and Recovery Rates, 1983-2012H1. p. 27.

Stakeholders have argued that Baa-rated PFI/PPP project infrastructure debt has similar default rates to A-rated non-financial corporate debt. They point at the results of the Moody's study on project finance that were already discussed in detail in section 5.3. It shows that unrated PFI/PPP projects have initially default rates comparable with Baa-rated non-financial corporate debt that drop after 8 years below the default rates for A-rated issues.¹⁵²

A general problem with this interpretation of data from the Moody's study is of course that assumptions have to be made about how the infrastructure debt would have been rated. More specifically, the argument seems to depend on the assumption that the better risk profile after a few years would not have been reflected in a higher rating.

Another argument put forward is that ratings for project infrastructure debt do not reflect the better risk profile after the end of the construction period. But this would only be correct if a potentially better risk profile after the construction phase would not be reflected in the regular review of the rating.

Conclusions for the standard formula calibration

The calibration of the standard formula is based on fluctuations of credit spreads. These changes reflect fundamental factors as well as risk perceptions by market participant.

A possible reason why the risk profile of rated infrastructure project debt is lower than implied by the standard formula could be that fundamental drivers of credit risk like default rates, recovery rates and frequency of rating downgrades for infrastructure project debt are systematically more favourable than for corporate bonds in the same rating class.

But EIOPA has found not sufficient evidence for significant differences in short-term losses due to defaults for investment grade issues. More information would be needed to be able to decide whether the risk of rating downgrades is lower. Potential improvements in the risk profile of a project over time should in principle be reflected in a higher rating in the course of the regular updates.

¹⁵² See exhibit H7 in: Moody's Investors Service (2013): Default and Recovery Rates for Project Finance Bank Loans, 1983-2011. p. 59.

High and stable recovery rates and a lower downgrade risk could translate into lower spread volatility. High recovery rates would provide some protection against a changed market perception of default probabilities (e.g. due to a severe rating downgrade). But whether it is actually the case depends on a multitude of factors (the initial market price may for example already reflect the downside protection). Moreover, it is not clear how a spread risk calibration could be produced on this basis.

In summary, EIOPA has found no conclusive evidence that the risk of rated infrastructure project debt is lower than implied by the current standard formula calibration.

5.6. Europe 2020 project bonds

Europe 2020 project bonds could be an attractive way for insurers to invest in infrastructure. Compared with a direct investment in infrastructure project equity it will require less expertise and a lower minimum allocation. The credit enhancement provided by the EIB reduces the risks already during the construction phase.

EIOPA has looked at the available information on Europe 2020 project bonds and liaised with stakeholders.

As set out above there is no conclusive evidence that rated infrastructure project debt in general would warrant a lower spread risk charge than currently foreseen. The remainder of this section discusses whether Europe 2020 project bonds have particular features that may warrant a lower calibration.

Performance data is obviously not available.

Some specific features may contribute to a favourable risk profile:

- The credit enhancement provided by the EIB reduces default risk and increases recovery rates for senior creditors.
- The EIB has extensive experience in infrastructure financing. The role as subordinated creditor provides proper incentives for EIB to carefully scrutinise the projects.
- There is significant political commitment to make the Euro2020 initiative a success. Public off-takers in the European

Union may generally be reluctant to default on the EIB but particularly so with the Euro2020 initiative.

- The EIB could potentially act as a senior creditor in case of distress.

The standard formula treatment may be inadequate if Euro2020 are less risky than other infrastructure debt in the same rating category. A potential reason could be that the rating does not properly take into account the specific features of Europe 2020 project bonds.

The rating agencies have specialised methodologies to rate infrastructure projects. Among the relevant factors are the type of infrastructure, the creditworthiness of the off-taker and the payment scheme (availability/demand based).

The rating agencies have outlined how they would incorporate the EIB credit enhancement in the determination of a rating. Essentially, the funds provided by the EIB are added to the other available funds for payments to senior creditors.

EIOPA has found no indication that the rating methodology applied to Europe 2020 project bonds does not adequately reflect the first two positives for Euro 2020 project bonds listed above.

Ratings agencies may be reluctant to reflect the other qualitative factors mentioned above in their rating or struggle to assign an appropriate weight to them.

The improved rating due to the EIB credit enhancement reduces the risk charge for Europe 2020 project bonds. Some of the factors mentioned above may not be reflected in the rating. These factors are clearly relevant. But EIOPA is not able to quantify their effect with a degree of accuracy that would be necessary to justify a further reduction of the risk charge for Europe 2020 project bonds.

5.7. Final results

The analysis conducted by EIOPA has covered investments in infrastructure project debt and equity (both directly and via funds). Debt and equity of corporates in the infrastructure sector have been excluded. This avoids delineation problems and ensures that non-infrastructure activities do not benefit from a potentially more

favourable treatment. Infrastructure equities exhibited also similar risk characteristics as other non-infrastructure equities.

A main challenge has been the lack of comprehensive and publicly available performance data for unlisted infrastructure assets. This represents not only an obstacle for regulators but also for insurers as potential investors in infrastructure. EIOPA encourages therefore efforts to improve the availability of relevant information in this area. A number of initiatives have been started to address this.

As infrastructure project equity is generally unlisted historical market prices are not available. A starting point for the risk assessment could be historical cash flows. But gathering reliable and relevant data is very difficult. Moreover, strong assumptions would be necessary to deduct on this basis a historical volatility of fair values. The results would be highly sensitive to changes.

Due to the data limitations and the methodological challenges EIOPA sees no basis for recommending a lower calibration for infrastructure project equity.

The area of infrastructure project debt financing has been dominated by banks. The number of infrastructure projects bonds issued in Europe in the past was quite small. A significant portion of them was also guaranteed by monoline insurers. This limits their usefulness for a calibration as the spreads reflect to a significant degree the creditworthiness of the guarantor.

Consequently, the available historical evidence for the credit risk of project infrastructure debt comes predominantly in the form of default and recovery rates. This makes it impossible to assess the adequateness of the spread for unrated infrastructure project debt with the same methods used for bonds (based on spreads observed in bond markets).

EIOPA has made considerable efforts to get relevant data on default and recovery rates. The most comprehensive study has been published by Moody's. When it became clear that the publically available information was not sufficient EIOPA liaised with Moody's to obtain more granular data on specific infrastructure segments with a potentially lower risk profile

The data in the comprehensive Moody's study indicate that the risk profile of unrated infrastructure project debt tends to improve over time. But the initial marginal default rates clearly exceeded the level for Baa corporates (which would provide no room for a change in the current calibration). The improved risk profile could be reflected by introducing the time since the start of the project as additional variable in the spread risk calculation. But this creates technical challenges and the resulting investment incentives might be limited.

Given this problems EIOPA looked into infrastructure segments with potentially lower risk profile (projects with availability based revenues or a public off-taker). The data provided by Moody's suggest that unrated availability based infrastructure and Baa rated corporates had similar fundamental credit risk. On this basis a small reduction in the spread risk charge would be possible (calculation based on credit quality step 3).

But there are a number of drawbacks: The empirical basis is limited and the data is proprietary. Moreover, the special treatment adds complexity while the positive effects in terms of investment incentives are limited. This makes it impossible to give a definitive recommendation for or against this change.

Some stakeholders have suggested that the risk of rated infrastructure project debt is lower than implied by the current standard formula calibration. Among the reasons put forward are higher recovery values, higher rating stability and the improved risk profile after the construction period. While these factors may have a meaningful effect over the medium or longer term EIOPA has not found sufficient evidence for significant differences in short-term losses due to defaults for investment grade issues. More information would be needed to be able to quantify the potentially lower risk of rating downgrades. Improvements in the risk profile of a project over time should in principle be reflected in a higher rating in the course of the regular updates.

Based on these considerations EIOPA sees not enough evidence to recommend a lower calibration.

A particular case of rated infrastructure project bonds are Europe 2020 project bonds. In this initiative the EIB provides a credit enhancement for the senior bonds issued to finance selected infrastructure projects

in Europe. The enhancement is structured to achieve a certain rating for the senior bonds and is determined in a collaborative process with the rating agencies. The improved rating reduces the spread risk charge. Rating agencies may be reluctant to reflect some positive qualitative factors in their rating or struggle to assign an appropriate weight to them. But EIOPA is not able to quantify their effect with a degree of accuracy that would be necessary to justify a further reduction of the risk charge for Europe 2020 project bonds.

6. Securitisations

6.1. Content of the discussion paper

6.1.1. Preliminary analysis

Introduction

The list of assets in the EC letters includes securitisations of infrastructure, SME, SRI and social business debt (in the following "securitisations considered").

According to the information EIOPA has gathered so far the volume of SRI and social business debt securitisations seems to be negligible. There is a meaningful amount of SME loan securitisations. It is more difficult to make an authoritative statement for infrastructure debt securitisations as they are not a commonly used category of securitisations as SME loans are.

Following the structure of the standard formula as set out in the LTGA TS the analysis is restricted to the treatment of securitisations in the spread risk sub-module.

Faced with difficulties in gathering data on market prices for infrastructure debt securitisations EIOPA decided to focus initially on SME loan securitisations.

Current Solvency II treatment under the standard formula

The spread risk charge depends on rating and modified duration. The LTGA TS provides a full table with all the necessary information.¹⁵³ A securitisation rated AAA with a modified duration of 3 years for example has a spread risk charge of 21 %.

Analysis

The riskiness of a securitisation depends on the risk characteristics of the underlying asset pool as well as how the cash flows from the pool are divided among investors. In principle a higher risk in the underlying pool can be compensated by a more conservative financial

¹⁵³ see SCR.5.97.

structure (e.g. credit enhancements). Rating agencies take both factors into account.

Given these considerations it is not a priori clear why a SME loan securitisation with a certain rating should be more or less risky than a securitisation of other assets with the same rating.

One element in the EIOPA analysis is to look at the historical behavior of spreads for SME loan securitisations. For this purpose a sufficiently long history of prices for a sufficiently large number of SME loan securitisations is needed. The Markit Floating Rate European ABS European SME CLOs Index was identified as the most commonly used index in the industry.

An analysis of the spread behavior for the securitisations included in the index was performed following the methodology used for deriving the calibration in the "draft implementing measures Solvency II"

EIOPA is not yet in a position to share the preliminary results. A still open question is whether the number of securitisations included in the index is sufficient to produce reliable results. The AAA-rated SME securitisations considered had a volume of 30.2 billion EUR at the end of 2006. This dropped to 1.6 billion in the middle of 2011. If the result is negative, additional data points could be added.

Further consideration is also needed to decide whether the results for the SME loans included in the analysis also apply for loans to SMEs falling under the definition of the European Commission.

6.1.2. Questions

When answering the questions below please be aware that EIOPA is generally also interested in information that is useful for comparing the securitisations considered with other securitisations in terms of risk

Q25: What is the volume of securitisations of infrastructure, SME, SRI and social business debt? On what definition for the different debt categories are the numbers based?

Q26: What is the volume of investments by insurers in these securitisations?

- Q27: What are potential sources for historical price data for the securitisations considered?
- Q28: What are the characteristics of the securitisations considered with respect to their underlying asset pool (granularity, legal form, collateral, individual risk assessment, diversification, etc.)?
- Q29: What are the characteristics of the securitisations considered with respect to their financial structure (tranching, credit enhancements etc.)?
- Q30: What are the characteristics of the securitisations considered in terms of their originator?
- Q31: How robust are the payments generated by the securitisations considered? Why?
- Q32: How difficult is it to assess the riskiness of payments? What accounts for the differences?
- Q33: What risk-relevant information is disclosed on the securitisations considered? Does this information allow a reliable risk assessment? To what extent is the investment a „black box“?
- Q34: How knowledgeable are investors about the securitisations considered (experience, internal capacities for risk assessment vs. reliance on ratings, etc.)?
- Q35: To what extent do investors rely on ratings with respect to the securitisations considered? What accounts for any differences?
- Q36: To what extent do the securitisations considered differ in terms of the information asymmetry between originator and investor?
- Q37: What is the economic rationale, if any, for a higher or lower risk of the securitisations considered compared with other securitisations?

6.2. Input on the discussion paper

Data

Respondents point at banks and agency-developing banks (e.g. KfW) as potential sources for performance data.

Risk profile of SME loan securitisations

A recurring theme is the strong performance of European SME loan securitisations in terms of downgrades and actual defaults over the last years. Respondents identified the following contributing factors:

- No “originate to distribute” model
- Granular and diverse loan pools
- High over-collateralisation
- No use of leverage
- No maturity transformation (“pass through”).

Several stakeholders emphasised the significant improvements in the transparency of structures, the knowledge of investors and in disclosure (e.g. due to the PCS initiative and the loan-by-loan data requirements of central banks in their refinancing operations) since the financial crisis.

One respondent provides the following reasons why a repetition of the considerable spread volatilities observed in the financial crisis for high quality securitisations should be in future less likely:

1. Investors understand today much better the different credit behaviour of high quality securitisations and products such as US sub-prime (i.e. no contagion effect).
2. Several initiatives have substantially increased transparency. In the financial crisis the actual (or perceived) lack of transparency encouraged panic selling by investors unable to assess the risks accurately.

PCS initiative

The Prime Collateralised Securities Initiative (PCS) suggests the introduction of a specific treatment for high quality securitisations. Among other characteristics these securitisations meet transparency criteria, use no leverage and maturity transformation and are not issued under the “originate to distribute” model. PCS claims that

securitisations in this category were more resilient during the crisis. According to PCS most European SME loan securitisations in the past met the proposed criteria.

6.3. Guarantees provided for SME loan securitisations by the European Investment Fund

To improve the access of SMEs to finance the European Investment Fund (EIF) provides full guarantees on interest and principal for SME loan securitisations. The guarantee can be provided bilaterally to the buyer or “wrapped” into the security.

According to the draft implementing measures guarantees are not directly taken into account in the calculation of capital requirements. Guarantees only lower the risk charge if they result in a better external rating. An unrated EIF guaranteed securitisation is treated like any other unrated securitisation.

Provided the guarantor is creditworthy and the contractual arrangements are properly designed a guarantee can lower the credit risk for the investor. But the security is still subject to the risk of changes in market prices. It may not move in lockstep with the market prices for similar instruments directly issued by the guarantor (e.g. because of differences in liquidity).¹⁵⁴

This makes it difficult to account for guarantees in the spread risk framework of the Solvency II Framework Directive. In contrast Basel III measures credit risk based on default and recovery rates. The guaranteed product inherits the treatment of the guarantor.

Even though the spread behaviour of the guaranteed instrument is probably different than for other instruments issued by the guarantor the guarantee should have an effect. But the SME loan securitisations guaranteed by the EIF are not actively traded. This means there is no price data to quantify the impact of the guarantee.

¹⁵⁴ Given the fact that the spread behaviours of the guaranteed instrument and of instruments issued by the guarantor may deviate significantly the simple solution to use the entity rating of the guarantor investor for calculating the spread risk charge seems inadequate. This could result in the strange outcome that an unrated instrument gets a more favourable treatment than an otherwise identical rated one.

A potentially useful area of analysis could be situations where the payments of a financial instrument are fully guaranteed by another entity. But the search for suitable candidates was not successful.

In summary, a guarantee that reduces variations in the credit risk of an instrument should also lower spread volatility. But other factors like changes in liquidity may dominate. EIOPA has also found no suitable data to quantify the effect.

6.4. Final results

For a number of reasons EIOPA has decided to propose a recalibration of the spread-risk charge for securitisations. The underlying considerations and the chosen approach are set out in chapter 7. Therefore this topic is not further discussed here.

The European Investment Fund (EIF) provides full guarantees on interest and principal for SME loan securitisations. According to the draft implementing measures this would only be reflected in the spread risk charge if the result was a better external rating. An unrated EIF guaranteed securitisation would be treated like any other unrated securitisation.

A guarantee with properly designed contractual arrangement and a creditworthy guarantor should reduce the credit risk for the investor. But the market price of the instrument may not move in lockstep with the prices of similar instruments directly issued by the guarantor (e.g. because of differences in liquidity).

This makes it difficult to account for guarantees in the spread risk framework of the Solvency II Framework Directive.

In contrast Basel III measures credit risk based on default and recovery rates. The guaranteed product inherits the treatment of the guarantor.

The guarantee should in principle lower spread volatility. But there are no market prices available. There are also no readily available proxies that could be used to quantify the effect. For this reason EIOPA can make no suggestion how to take such guarantees into account.

7. Proposed recalibration of the spread risk charges for securitisations

7.1. Introduction

The provision of financing to borrowers in the real economy has historically been the domain of banks and leasing companies (for simplicity in the following “banks”). They have dedicated organisational structures to perform loan underwriting, risk monitoring and resolution of non-performing loans in a cost-efficient manner. Unless insurers want to build up similar capabilities they have to invest alongside banks in loan portfolios or via securitisations.

Securitisations have some principally appealing features. They allow investors exposures to different types of risks and thus offer potentially increased diversification. Compared with a direct investment in the underlying asset pool structuring the loans into various tranches can also reduce the risk for investors.

Borrowers should benefit via decreased financing costs from a broader base of potential lenders. Securitisation can also help to overcome the lending capacity constraints banks currently face and therefore allow banks to expand their lending activities.

But the financial crisis has also clearly revealed the potential dangers and risks embedded in securitisations: The interests of originators and investors may not always be aligned. The originator is also typically better informed about the quality of the underlying assets.

The request by the European Commission to analyse the treatment of long-term investments fostering sustainable growth mentioned explicitly debt financing of SMEs and infrastructure. For several reasons EIOPA has decided not to limit the analysis to SME and infrastructure loan securitisations but to look into the calibration for securitisations in general:

1. The potential positive effects on the overall economy in the form of added lending capacity by banks are not limited to a specific type of underlying asset.

2. SME loans are not the only channel of funding for the real economy. Leasing and auto loans may for example also play an important role.
3. Several other types of securitisations (e.g. prime European RMBS) have displayed low credit risk.
4. A broader approach seems more in line with the general level of granularity in the standard formula than a potential special treatment for SME and infrastructure loan securitisations (especially as their volumes are low, both in absolute and relative terms).

7.2. Approach chosen

Given the complexity and poor performance of some securitisations, especially those backed by subprime mortgages, securitisations are understandably often met with a large degree of scepticism. However, many securitisations have actually performed quite well in terms of default rates since 2007.¹⁵⁵

According to the draft implementing measures the spread risk charge for securitisations depends on modified duration and rating. There have indeed been clear differences in the performance of securitisations across credit rating classes.^{156,157} But wide variations in terms of risk could also be observed within rating classes. All of this suggests that a more granular approach for the calculation of capital requirements is warranted.

For this purpose additional categories have to be defined and criteria for the decision into which category a securitisation falls are needed.

There are clear differences in the risk profiles of RMBS, CMBS, ABS etc. But the example of European prime RMBS and American subprime RMBS shows that a simple distinction based on underlying assets would be insufficient.

¹⁵⁵ Moody's Investors Service (2012): Default & Loss Rates of Structured Finance Securities: 1993-2011. p. 12 and 21; Fitch (2012): EMEA Structured Finance Losses. "The Credit Crisis Four Years On" Series. Special Report.

¹⁵⁶ See figures 13, 16, 17, 21, 25 and 28 in: Fitch (2012): EMEA Structured Finance Losses. "The Credit Crisis Four Years On" Series. Special Report.

¹⁵⁷ Ratings can be useful. But insurers should not trust them blindly. There are a number of mechanisms in the upcoming regulation to avoid overreliance on ratings.

The chosen approach is an extension of the 2011 EIOPA proposal. It suggested to make a distinction between securitisations based on rating, modified duration, seniority and granularity. As in the currently envisaged Solvency II regulation, re-securitisations were treated separately.

The new approach retains for the following reasons the criteria modified duration, rating and seniority and the special treatment of resecuritisations:

A high rating proved to be no guarantee for low risk. But securitisations in lower rating categories showed on average significantly higher default rates and spread volatility.¹⁵⁸

The most senior position in the hierarchy of claims provides additional protection against miscalculations of the loss rate in the asset pool. Many non-senior American subprime RMBS received for example initially high ratings and suffered later substantial losses.

The re-securitisation of existing securitisations creates leverage in the structure. The performance of these transactions has been poor (e.g. CDOs).¹⁵⁹

In contrast to the 2011 proposal the current one does not use granularity as a determinant for capital charges. In the past high granularity did not necessarily guarantee low risk (securitisations backed by US subprime mortgages were for example usually highly granular). Additionally, the Basel Committee on Banking Supervision stated in a recent document: "...academic research and analysis conducted by the Committee suggest, for a given tranche's external rating, granularity effects may not be a major risk driver"¹⁶⁰

As the criteria described above are not sufficient to eliminate poor performing securitisations the following sections develop a set of additional criteria on the structure of the securitisation, the quality of

¹⁵⁸ See figures 13, 16, 17, 21, 25 and 28 in: Fitch (2012): EMEA Structured Finance Losses. "The Credit Crisis Four Years On" Series. Special Report.

¹⁵⁹ Moody's Investors Service (2012): Default & Loss Rates of Structured Finance Securities: 1993-2011. p. 48; Fitch (2012): EMEA Structured Finance Losses. "The Credit Crisis Four Years On" Series. Special Report. p. 13.

¹⁶⁰ Basel Committee on Banking Supervision (2012): Revisions to the Basel Securitisation Framework. Consultative Document. p. 13.

the underlying assets, underwriting processes and on the transparency for investors. Securitisations that meet these criteria (for simplicity 'Type A' securitisations) are expected to have a lower risk profile than those which do not ('Type B' securitisations).

Given the purpose of the request by the European Commission EIOPA has not reviewed the calibration for resecuritisations.

7.3. Requirements on categories and criteria

The decision about suitable categories and criteria should be based on a number of requirements:

There should be meaningful differences in the risk profiles of the categories and for each category sufficient empirical evidence for calibrating the risk charges has to be available.

Another important consideration is consistency with the banking sector rules. While there are differences in terms of risk measurement between the banking and insurance sector the same risk drivers should in principle be relevant for both. Nevertheless, there might be reasons to deviate from the approach chosen in the banking regulation.¹⁶¹

The fact that the development of the new banking requirements for securitisations is still on-going makes achieving consistency with the banking sector difficult. Material and unjustified differences in terms of regulatory capital requirements for insurance and banking sector would create a considerable risk of regulatory arbitrage. Therefore it seems appropriate to review the framework for insurers once there is clarity about the banking framework (see "review clause" in section 7.7).

As another requirement the criteria should ensure (to the extent possible) that only securitisations with a lower risk profile fall into a category with lower capital requirements. The criteria should also be unambiguous and the effort for checking compliance should be

¹⁶¹ For example, there are discussions on the Basel level about a more granular treatment for junior tranches in the calculation of regulatory capital. For banks, this approach might be more warranted compared to the insurance sector, as banks typically invest in and/or hold equity tranches of securitisations. Insurers, on the other hand, are more likely to invest in the senior tranches.

reasonable. Last but not least, the approach should be in line with the general granularity of the standard formula.

A balance needs to be struck between these requirements. Adding additional criteria may for example increase the accuracy but also produce higher costs for insurers (in terms of costs for verification) and/or originators (in terms of costs for meeting the criteria).

A crucial question is the suitable number of categories. One possibility would be to create the four categories (senior, Type A), (non-senior, Type A), (senior, Type B) and (non-senior, Type B).

The most common types of securitisations European insurers invest in are mortgage backed securities and asset backed securities (e.g. securitisations backed by auto loans).¹⁶² The majority of these securitisations should already meet the requirements developed in the next section or may fall under the proposed transitional arrangement. There is also no reason for incentivising insurers to invest in securitisations that do not meet the criteria. This means there is no necessity for separate categories (senior, Type B) and (non-senior, Type B).

It remains to decide whether there should be a separate category (non-senior, Type A). EIOPA has found no data on the amount of investments by insurers in non-senior tranches. But according to Insurance Europe, a European federation national associations of insurers and reinsurers, "insurers tend to invest in the least risky tranches" (this suggests senior and not mezzanine or equity tranches).¹⁶³ The latter display also a wider dispersion in terms of returns than senior tranches.¹⁶⁴ A separate category (non-senior, Type A) seems therefore not warranted.

Another reason for limiting the number of categories is the otherwise resulting level of complexity and granularity. Last but not least the

¹⁶² Insurance Europe/Oliver Wyman (2013): Funding the future. Insurers' role as institutional investors. p. 25.

¹⁶³ Insurance Europe/Oliver Wyman (2013): Funding the future. Insurers' role as institutional investors. p. 25.

¹⁶⁴ EIOPA has found no study which examines explicitly the performance of senior, mezzanine and junior tranches. But it can be assumed that mezzanine and junior tranches would tend to have lower ratings. The credit loss rates in these lower rating classes have been substantially higher (i.e. the dispersion in performance has been much wider).

amount of spread data available to calibrate some of the categories would be very limited.

Based on these considerations, EIOPA differentiates only between the category (senior, Type A) and a second category comprising all the other securitisations.

As the performance of resecuritisations was generally poor and insurers should not be incentivised to invest in them a more granular approach for them seems not warranted.

To sum up, with the proposed approach the risk charge could be looked up in following table (there would also be a distinction based on duration):

Credit quality step	Securitisations	
	Senior Type A	Other
0		
1		
2		
3		
4		
5		
6		

7.4. Development of the criteria

EIOPA has developed a set of mostly generic criteria which need to be met by a securitisation to be considered as Type A.

This section sets out the general considerations underlying the criteria, discusses how they can be validated, describes the used sources and examines the overlap with criteria used for determining external ratings.

General considerations

The securitisations meeting the criteria should be substantially less risky than the rest. There are at least two approaches for developing corresponding criteria. The first is to identify risk drivers based on an economic analysis. The second is to identify securitisations that performed well or poor in the past and to determine the properties that distinguished them. Both approaches have their merits: The first helps to identify risks that might be relevant but have not yet materialised (e.g. tail risks). The second has an empirical basis and can be used to identify factors that were relevant in the past. EIOPA has combined both approaches when developing and selecting criteria.

Criteria are defined with regard to (i) structural features, (ii) asset class eligibility and related collateral characteristics, (iii) listing and transparency features and (iv) underwriting processes.

The purpose of criteria on structural features is to eliminate unnecessary risks in securitisations. As an example the requirement for a legal true sale of the assets backing a securitisation to the special purpose vehicle (SPV) aims at avoiding additional counterparty and

legal risks (even though in general synthetic transactions have not performed poorly in the past). The additional counterparty risk in synthetic transactions materialises only when the originating bank defaults (and would have to make payments on the credit default swap). Although historically this has been a rare event, it seems sensible to take such “tail risks” into account when determining the appropriate capital charge for producing the 99.5 VaR.

The transparency requirements aim at ensuring that the investor is in a position to make an informed investment decision. These requirements are in many cases market standards. EIOPA has also liaised with industry to ensure that these criteria are not unduly burdensome.

The financial crisis has shown that structural features and transparency requirements cannot offset the poor quality of underlying assets. This makes it necessary to develop additional criteria in this area.

Looking at the experience of past crisis is helpful. But the rear mirror does not necessarily help to avoid future troubles. Therefore sound underwriting processes are a key element.

EIOPA is very aware that with the chosen approach the efforts necessary to determine the standard formula risk charge are markedly higher than for other investments. But the more favourable treatment in terms of spread risk charges for qualifying securitisations is only justifiable if there can be a sufficient degree of confidence in their better risk profile. The next section discusses how compliance with the requirements can be checked.

Verification of the criteria

Insurance undertakings would be responsible for checking the compliance of a securitisation with the proposed requirements and should be able to demonstrate that the criteria are met to the national supervisory authorities if necessary.

Compliance can be demonstrated by referring to information provided in the prospectus or the applicable data repository (in the case of loan level data). The prospectus is a formal legal document filed with the relevant regulatory bodies in each jurisdiction. As this reduces the risk

of misrepresentations by the originator it should be the preferred source of information. The criteria refer to very fundamental properties of the securitisation that are relevant for all investors (e.g. servicing continuity provisions). These areas should therefore be covered in the prospectus.

Other potential sources are investor reports issued by the originator. In case neither prospectus nor investor reports provide the required information the insurer can refer to a written statement by the originator. In case of misrepresentations the insurer can file civil charges.

Sources

A number of the criteria are adaptations from the eligibility criteria for securitisations that the ECB uses in its refinancing operations. This source has several advantages: First, the criteria have been in place for many years and have gone through extensive operational and legal due diligence. Second, they represent for a part of the EU a kind of market standard. This should make it easier for originators to comply with them. Third, the criteria for banking and insurance sector should in principle be similar.

Some of the ECB criteria provided a useful starting point but had to be adapted. Others impose restrictions on eligible jurisdictions that reflect the role of the ECB as central bank for the Euro area (e.g. US securitisations are not eligible). As EIOPA has to take a broader perspective these criteria were not incorporated. Finally, wording changes were necessary to reflect the style requirements for the Delegated Acts.

Additional sources were criteria developed by rating agencies and market participants.

Overlap with external rating requirements

A fundamental question is certainly to what extent there is an overlap between the criteria proposed by EIOPA and the criteria that rating agencies use (i.e. what is the actual benefit of combining external ratings with additional criteria). The combined approach has a number of advantages:

Some of the criteria proposed by EIOPA emphasise the importance of simple structures. This may exclude a complicated structure even though a detailed assessment could show that it is actually low risk. But it reduces also the room for misjudgement. Another example are the criteria on underlying assets: The inclusion of non-performing loans or loans to credit impaired borrowers results not automatically in a poor performing securitisation. But it creates additional risk.

A second advantage is the emphasis on disclosure and transparency for investors. This aspect might naturally not play a crucial role in the assessment by a rating agency.

Last but not least, the criteria used by rating agencies might change over time.

7.5. Draft legal wording and explanation of proposed criteria

This section sets out the proposed criteria. It provides for each of them legal drafting and explains its purpose, effectiveness and where applicable the available evidence.

Seniority

Draft legal wording: *After the delivery of an enforcement notice and where applicable an acceleration notice the tranche is not subordinated to other tranches in respect of receiving principal and interest payment.*

Purpose: see section 7.2.

Structural features

Legal true sale

Draft legal wording: *The cash flow generating assets backing the securitisation shall be acquired by the securitisation special purpose vehicle in a manner which is enforceable against any third party, and is beyond the reach of the seller and its creditors including in the event of the seller's insolvency.*

Purpose: The legal true sale criterion is important to ensure that the SPV holds the full rights to the underlying assets and is protected from a potential default of the seller.

Effectiveness: The true sale requirement excludes synthetic securitisations.¹⁶⁵

Evidence: No empirical evidence has been found that synthetic securitisations have generally performed worse than true sales. But synthetic transactions entail additional credit risk as the underlying assets stay on the balance sheet of the originator and credit default swaps are used to transfer their credit risk to the SPV. The investor is therefore exposed to the risk that the bank defaults. As another drawback the definition of a credit event in credit default swap contracts may not be trivial and give thus rise to legal risks.

No severe clawback provisions

Draft legal wording: *There are no severe clawback provisions in the jurisdiction of the seller. This includes but is not limited to rules under which the sale of cash flow-generating assets backing the asset-backed securities can be invalidated by the liquidator solely on the basis that it was concluded within a certain period ("suspect period") before the declaration of insolvency of the seller or where the transferee can prevent such invalidation only if it can prove that it was not aware of the insolvency of the seller at the time of sale.*

Purpose: Clawback provisions exist in some jurisdictions. The purpose of this requirement is to ensure that the rights of investors in the SPV to the underlying assets are not impaired by severe clawback provisions.

Servicing continuity

Draft legal wording: *There shall be provisions to ensure that a default by the servicer does not lead to a termination of servicing. In addition, there shall be provisions for the replacement of derivatives counterparties and liquidity providers.*

Purpose: This requirement reduces the risk that a default of the servicer results in an interruption of servicing (i.e. administration, collection and recovery). Such provisions can for instance include triggers for the appointment of a back-up servicer and a high-level action plan that outlines the steps to be taken once a back-up servicer is appointed and how the administration of the loans will be

¹⁶⁵ AFME has suggested that this criterion would exclude certain types of infrastructure securitisations but no evidence was provided.

transferred. Similar provisions are necessary for derivatives counterparties and liquidity providers.

Asset class eligibility and related collateral characteristics

Eligible underlying assets

Draft legal wording: *The cash flow generating assets backing the securitisation shall belong to one of the following asset classes: (i) residential mortgages; (ii) loans to small and medium-sized enterprises (SME); (iii) auto loans; (iv) leasing; (v) consumer finance and (vi) credit card receivables.*

Purpose: The closed list includes only common types of underlying assets. Securitisations of “exotic” underlyings with potentially very heterogeneous risk profiles and limited information available do not qualify. Securitisations of specific underlying assets with unfavourable risk profile are also excluded.

Effectiveness: Collateralised Debt Obligations (CDOs), Whole Business Securitisations (WBS), securitisations of trade receivables and Collateralised Loan Obligations (CLOs) - except for SME CLOs – and Commercial Mortgage Backed Securitisations (CMBS) are excluded from Type A.¹⁶⁶

Evidence: The underlying of CLOs and CDOs is typically speculative-grade corporate debt. The credit performance of CDOs (excluding CLOs) has been poor.¹⁶⁷ This was not the case for CLOs. But 72.3 % of European leveraged loan CLOs was downgraded between mid-2007 and end 2012 (the only category with a higher percentage were CDOs of ABS).¹⁶⁸

Homogeneous cash flows

Draft legal wording: *The cash flow generating assets backing the securitisation consist of only one type of assets as set out in [the eligible underlying asset criterion].*

¹⁶⁶ Auto Leases are included in the category Leasing.

¹⁶⁷ Moody's Investors Service (2012): Default & Loss Rates of Structured Finance Securities: 1993-2011. p. 48.

¹⁶⁸ Standard & Poor's (2013): Transition Study: Pre-Crisis European Structured Finance Still Exhibits Few Defaults. p. 5.

Purpose: The homogeneous asset pool reduces complexity. It allows for reporting in a single template and a simpler assessment of the risk drivers. Insurers can easily gain exposure to different types of underlying assets by investing in separate securitisations.

Effectiveness: Securitisations backed by a mixed pool of assets are excluded.

Type of underlying assets

Draft legal wording: *The cash flow generating assets backing the securitisation shall not consist, in whole or in part, actually or potentially, of credit-linked notes, swaps, other derivatives instruments or synthetic securities. This restriction does not include derivatives used strictly for hedging foreign exchange and interest rate risks.*

Purpose: The instruments mentioned above would introduce an additional layer of complexity and risks (including counterparty credit risk). For this reason only derivatives used strictly for hedging foreign exchange and interest rate risk are permitted.

Effectiveness: Securitisations which include structured products or derivatives not used for hedging are excluded.

Rating requirements

Draft legal wording: *The securitisations shall have a credit assessment of at least credit quality step 3 at issuance and at any time subsequently.*

Purpose: A high rating has been no guarantee for low risk but initially low rated issues have performed generally poorly. For this reason Type A securitisations are required to have two ratings of at least triple B minus by a nominated ECAI (Caveat: The mapping between ratings and quality steps has not yet been decided).

No credit impairment

Draft legal wording: *The securitization shall not contain loans that were granted to credit impaired obligors*

A credit impaired obligor is a borrower (or where there is a guarantor, the guarantor) who

- (i) has declared bankruptcy, agreed with his creditors to a debt dismissal or reschedule or had a court grant his creditors a right of enforcement or material damages as a result of a missed payment within 3 years prior to the date of origination; or*
- (ii) is on a state register of persons with adverse credit history; or*
- (iii) has an assessment of creditworthiness by a market accepted credit agency or by the originator indicating a significantly increased risk that contractually agreed payments will not be made compared to the average obligor for the type of loan in the relevant jurisdiction.*

Purpose: This criterion excludes loans for which at the time of origination the recent credit history of the borrower or an assessment by the originator or a market accepted credit agency raised doubts that interest and/or principal payments will be made in full.

Effectiveness: Many US subprime RMBS and UK non-conforming RMBS are excluded (see section 7.9). According to AFME and the German Association of the Automotive Industry (VDA) many auto loan and auto lease securitisations would also be excluded. The concern is that many current borrowers would meet the conditions (i) or (ii). AFME suggested to weaken the requirement by allowing that the borrower might have a negative credit history (i.e. conditions (i) or (ii) are met) if the credit assessment is positive (i.e. (iii) is not met). EIOPA does not support the proposal because the conditions (i) and (ii) have been carefully drafted to ensure that only borrowers with severe credit impairment are excluded. The originator should not be able to “override” the clear evidence for a significantly increased credit risk by referring to a positive external or internal rating.

No non-performing loans

Draft legal wording: *The cash flow generating assets backing a securitisation shall not contain loans which are in default as defined in point 44 of Annex VII to Directive 2006/48/EC at the time of issuance of the securitisation or when incorporated at any time after issuance.*

Purpose: Loans should at least be performing when incorporated in the securitisation at the time of issuance or during the life of the transaction.¹⁶⁹

Effectiveness: According to AFME securitisations of credit card receivables could be excluded but no evidence has been provided.¹⁷⁰

At least one payment

Draft legal wording: *The securitisation, except for securitisations backed by credit card receivables, shall be backed by loans for which at least one payment has been made.*

Purpose: The requirement decrease the probability of defaults on loans shortly after incorporation in the securitisation by ruling out that a securitisation consists only of newly originated loans.

Effectiveness: Some US subprime RMBS are excluded (see section 7.9).

Listing and transparency features

Listing requirement

Draft legal wording: *The securitisation shall be admitted to trading on a regulated market in the countries which are members of the EEA or the OECD.*

Purpose: The requirement ensures a minimum level of standardisation and makes sure that sufficient information on the transaction and the underlying asset pool is readily available to existing and potential investors on an on-going basis. The registration for trading does not mean that the securitisation is actually listed.

Effectiveness: The requirement excludes private placements. This affects most of the currently existing US securitisations. They are usually either filed with the Securities and Exchange Commission (SEC) or are subject to legally required standards (US Article 144a

¹⁶⁹ For instance by means of substitution or replacement of the loans.

¹⁷⁰ AFME proposed the following modification: “The cash flow generating assets backing a securitisation shall not contain loans which are in default as defined in point 44 of Annex VII to Directive 2006/48/EC non-performing, **except for credit cards whereby the cash flow generating assets backing a securitization shall not contain loans which are both charged off and in default as defined in point 44 of Annex VII to Directive 2006/48/EC**, at the time of issuance of the securitisation or when incorporated at any time after issuance”

Rule). But there is no reason why US securitisations could not get admission for trading on a regulated market.

Transparency, reporting & disclosure requirements

Draft legal wording:

Loan by loan reporting: *Comprehensive loan-level data in compliance with standards generally accepted by market participants is made available to existing and potential investors and regulators at issuance and on a regular basis. Standards issued by central banks shall be considered as generally accepted.*

General reporting: *Relevant information on the transaction in accordance with standards generally accepted by market participants is made available to existing and potential investors and regulators at issuance and on a regular basis.*

Purpose: Readily available and sufficiently detailed information on the underlying pool of loans and the transaction structure is essential for assessing the risks and determining the quality of a securitisation. The availability of sufficiently granular information on the underlying loans is of particular importance. As a result of the loan-level data initiative of the ECB this degree of granularity can be seen as a market standard in the Euro Area. Loan level data is also required by the Bank of England in its refinancing operations.

There should be no substantial differences in the informational needs of insurers and banks investing in securitisations. The Basel Committee is currently working on transaction level disclosure requirements. This will hopefully result in generally accepted standards. For this reason it seemed the best approach to simply refer to “generally accepted market practices” instead of producing a detailed list of necessary information.

Underwriting process

No self-certification

Draft legal wording: *In the case of residential mortgage-backed securitisation, the securitisation shall not contain residential mortgages that were marketed and underwritten on the premise that the loan applicants and, where applicable, their intermediaries were made aware that any information provided might not be verified.*

Purpose: This requirement is essential to exclude mortgage loans where the loan applicant and - where involved - intermediaries might be incentivized to misrepresent essential information (e.g. to overstate income).

Effectiveness: Excludes a large portion of US subprime RMBS as well as a significant part of UK non-conforming RMBS.

Process for assessing creditworthiness

Draft legal wording: *For residential mortgages, the assessment of the creditworthiness shall meet the requirements as set out in [Art. 14 Par. 1 and Par. 2 (a) Mortgage Credit Directive] or equivalent requirements as set out in non-EEA jurisdictions.*

For consumer finance loans, the assessment of the creditworthiness shall meet the requirements as set out in [Art. 8 Par. 1 Consumer Credit Directive] or equivalent requirements as set out in non-EEA jurisdictions.

Purpose: The proposed criteria on the underlying assets would have worked well to exclude poor performing securitisations in the past. But it is impossible to anticipate where risks will arise in the future. Sound underwriting processes are therefore an important safeguard.

This criterion ensures that they meet high quality standards and requires that the lender assesses the borrower's ability to repay the credit in a proper manner, taking into account all relevant information.

7.6. Considerations on CMBS and infrastructure loan securitisations

The credit performance of the broader CMBS category has been poor.¹⁷¹ The spread volatility for the Markit iBoxxCMBS Index has also been significantly higher than for all indices allocated to Type A.

A relatively small segment with higher rating stability can be identified by using limits on the debt amount that has to be refinanced relative to the value of the property and the rent (see Annex 8). But the criteria are complicated and the empirical basis is quite limited. There is also no evidence that the spread volatility for the transactions in the

¹⁷¹ Fitch (2012): EMEA Structured Finance Losses. "The Credit Crisis Four Years On" Series. Special Report. pp. 8-10.

segment would have been significantly lower than for the broader category.¹⁷²

From a prudential perspective CMBS should therefore be excluded from Type A. Consequently, commercial mortgages have been excluded from the list of eligible assets.

EIOPA has not found a sufficient amount of infrastructure loan securitisations to make reliable statements on their risk profile. Given the lack of data the easiest solution from a prudential perspective is to exclude infrastructure loan securitisations from 'Type A'. But this has to be balanced against the importance of infrastructure financing for sustainable growth.

7.7. Transitional arrangement and review clause

This section sets out the proposed transitional arrangement and the review clause and explains their rationale.

Transitional arrangement

A securitisation has to meet all the criteria developed in the previous section to benefit from the lower capital charge. This should principally apply also to securitisations issued before the entry into force. But there are reasons why a transitional arrangement for legacy securitisations should be considered:

First, a legacy securitisation may actually have met a criterion like "at least one payment" at origination but providing evidence might be very difficult or even impossible if this kind of information was not included in the prospectus or other investor documents.

Second, the purpose of criteria like "at least one payment" and "no non-performing loans" is to ensure that no loans for which the quality is questionable from the very outset are included. Some legacy securitisations may have not met these requirements. But when the rules apply the loans of potentially low quality will already have seasoned. If their credit performance turned out to be poor and resulted in severe losses in the loan pool this would be reflected in the credit rating of the securitisation and the minimum rating requirement would be violated.

¹⁷² Lower volatility in fundamental credit risk could in principle have resulted in lower spread risk.

Securitisations with a credit assessment of at least credit quality step 3 (which meet the other criteria mentioned in the transitional arrangement) have performed relatively well and it might not be warranted to treat them as Type B. A similar argument can in principle be made for the criterion “no credit impairment” (even though a longer seasoning period would clearly be desirable).

Third, the Mortgage Credit Directive is not yet in force. This makes it problematic to require compliance with its underwriting provisions for already existing securitisations.¹⁷³

Fourth, transparency and disclosure requirements (including the listing requirement) are important to allow investors informed decisions and to impose market discipline. But to apply the same market discipline retroactively on the securitisations insurers hold may lead to unintended consequences. Insurers may sell with the result that their holdings of securitisations with a better risk profile actually decrease.

Finally, it may seem unreasonable to require that currently outstanding securitisations meet criteria based on regulation which was not in force at the time of issuance of these transactions (e.g. criteria on underwriting processes and servicing continuity).

For these reasons and to mitigate the unintended consequences of potentially excluding better performing legacy securitisations from Type A (e.g. in the form of “forced” selling by insurers as the return on regulatory capital becomes unattractive) the following transitional arrangement is proposed (draft legal wording):

“A securitisation that was issued prior to the entry into force of this regulation shall only receive the treatment set out in XY [treatment as (senior, Type A)] if the following criteria are met:

- *Legal true sale;*
- *No severe clawbacks;*
- *Eligible underlying assets;*
- *Homogeneous cash flows;*
- *Type of underlying assets;*
- *Ratings;*
- *Seniority”*

¹⁷³ The Consumer Credit Directive is already in force for a number of years. For non-European jurisdictions a seasoning argument as in the previous paragraphs can be used.

The listed criteria should be easily verifiable.

Transitionals should only be introduced if there is no material risk that the capital charges are insufficient. This problem could arise if a material number of securitisations qualifies as Type A under the transitional arrangement but fails some of the other criteria.

At the time when the capital requirements apply most “grandfathered” securitisations will have been issued several years ago. If the inclusion of non-performing loans or loans without initial payment resulted in a poor performance this will be reflected in the rating. This argument applies to a lesser degree also to loans which were granted to credit impaired borrowers.

The transparency and disclosure requirements are important to allow investors informed decisions and to impose market discipline but might be less relevant for legacy deals.

A potential area of concern is the treatment of securitisations from the sectors that were in the calibration allocated to Type B (US subprime RMBS, UK non-conforming RMBS and CMBS). The latter would not qualify for grandfathering as they do not comply with the “Eligible Underlying Assets” criterion. The still outstanding volumes for the former two categories are low and the volumes of new issuances have significantly dropped since the financial crisis. As a consequence the vast majority of still outstanding securitisations will have been issued a number of years ago when the rules apply. If the credit assessment is then still high enough there is less reason for concern that the risk charge is too low.

Review Clause

As already mentioned the future treatment of securitisations in the banking sector is still under discussion. This creates the potential problem of regulatory arbitrage between the banking and insurance sector. For this reason the following review clause is suggested:

“To mitigate the potential for regulatory arbitrage the European Commission will review the calibration of the spread risk sub-module for securitisations following the publication of the final Revisions to the Basel Securitisation Framework.”

7.8. Approach to the calibration

The previous sections developed a categorisation for securitisations. This section outlines the approach for deriving the spread risk charges for the different categories.

The principal idea is to identify traded securitisations that can serve as “proxies” for the categories and to calculate the corresponding risk charges based on their historical spreads.

Out of the universe of traded securitisations only components of the following indices that were used in 2011 to produce the calibration in the draft implementing measures are considered:

Floating Rate European ABS Indices from Markit:

- Markit iBoxx Prime RMBS excl. Granite Index
- Markit iBoxx Europe ex UK RMBS indexMarkit iBoxx Eurozone RMBS Index
- Markit iBoxx UK Non-Conforming RMBS Index
- Markit iBoxx UK Credit Card Index
- Markit iBoxx SME CLO Index
- Markit iBoxx CMBS Index
- Markit iBoxx Auto Loan Index
- Markit iBoxx Auto Lease Index

US Fixed and Floating and UK Fixed Rate indices for ABS from the Bank of America Merrill Lynch Global Index System:

- US ABS Master Fixed ROA0
- US ABS Master Floating ROF0
- US CMBS – CB10, CB20, CB30, CB40,
- Fixed Rate Sterling Non-Gilt Securitized USEA

The Bank of America Merrill Lynch indices ROA0, ROF0 and USEA contain a number of subsectors. Separate subsector time series were calculated where necessary.

The use of these indices is based on the assumption that the spread behaviour of the index components is a suitable representation for the spread behaviour of the securitisations that insurers invest in.

A possible approach would be to “map” each individual securitisation in the indices into a category. The risk charge for each category could then be derived based on the spread behaviour of the securities that were allocated to it.

A simple criterion for the mapping could be compliance with the requirements for a category. The calibration for a category would then be based on the spread behaviour of securitisations that would have fallen into this category.

It is relatively straightforward to sort the index components based on the criteria seniority, rating category and maturity. But to decide for each component in the indices whether the type A criteria were met would be extremely burdensome. Therefore a simpler approach is chosen:

Based on their historical risk profile the indices are in a first step allocated to Type A and Type B. Then the “consistency” of this allocation with the Type A criteria is reviewed.

Indices mapped to Type A should have displayed lower spread risk. The credit performance for the broader category of securitisations represented by the index should also have been better. On this basis a possible mapping could be:

Type A	Type B
Markit iBoxx Prime RMBS excl. Granite Index Markit iBoxx Eurozone RMBS Index (for AAA) Markit iBoxxEurope ex-UK (for AA to BBB) Markit iBoxx UK Credit Card Index Markit iBoxx SME CLO Index Markit iBoxx Auto Loan Index Markit iBoxx Auto Lease Index ROA0 parsed (Automobile) ROA0 parsed (Credit Card) ROF0 parsed (Automobile) ROF0 parsed (Credit Card) USEA parsed (Credit cards)	Markit iBoxx CMBS Index Markit iBoxx UK Non-Conforming RMBS ROA0 parsed (Home Equity Loan) ROA0 parsed (Utilities) ROA0 parsed (Manufactured Housing) ROF0 parsed (US Home Equity Loan) USEA parsed (CMBS) USEA parsed (Utilities)

Figure 21: Mapping of indices to Type A and Type B

Based on historical performance there are certainly other possible allocations. But to ensure adequate risk charges they have to “fit” with the criteria for Type A:

The spread risk for the securitisations in Type A indices was in aggregate lower. If a securitisation in the indices mapped to Type B would meet the criteria for Type A its risk charge would be too low (at least on average). This means there should be only a very limited number of such cases. The opposite case seems less problematic (at least from a prudential perspective): The risk charge for a securitisation from a Type A index which is classified as Type B would be on average too high.

The main aim is to avoid insufficient risk charges. This means that it has only to be validated that the indices used for the Type B risk charge calibration (as set out in the table above) contain only a limited number of securitisations which would have qualified as Type A. This reduces the necessary efforts considerably.

Not all criteria should be considered in the compliance check:

For some of them the results would be not very meaningful as only very few securitisations in the past would have met them (e.g. loan level data disclosure).

Another consideration should be how difficult and costly a modification to achieve compliance would be. A synthetic subprime RMBS would for example not meet the structural requirements. But structuring it as a true sale would be comparatively easy. It would therefore seem problematic if such securitisations failed only this criterion.

A retrospective assessment of underwriting processes would be extremely difficult.

Based on these considerations only the criteria on the underlying asset pool and the "no self-certification" requirement are used in the next section.

No sub-indices for senior and non-senior tranches were publically available. The calibration was therefore based on indices custom-built by the index providers for the Association for Financial Markets in Europe (AFME).

7.9. Effectiveness of the criteria

This section explores how effective a number of criteria on the eligible assets are in eliminating securitisations that are included in indices allocated to Type B. Most of the data has been provided by Fitch. For a

sample of securitisations EIOPA has compared them with the information in the prospectus.

ROA0 (US Home Equity Loan portion) and R0F0 (US Home Equity Loan portion)

The following table shows whether the securitisations with a rating of AAA or AA that are currently included in the index portions complied with the criteria “no self-certification”, “no credit impairment”, “no non-performing loans” and “at least one payment”:

CUSIP	Deal name	(Self-Cert) % Stated Documentation	(Credit Impaired) % Credit Score < 620	(Non-Performing Loans) % DQ At Issuance	(At Least 1 Payment) % <1 Pymt At Issuance	Overall
03072SP82	AMERIQUEST 2005-R09	24%	37%	0%	2%	FAIL
161546FV3	CHASE 2003-04	35%	43%	0%	39%	FAIL
12628KAM4	CSAB 2006-03	85%	1%	5%	2%	FAIL
126671R24	CWABS 2003-05	26%	61%	1%	1%	FAIL
126671R32	CWABS 2003-05	26%	61%	1%	1%	FAIL
126673DN9	CWABS 2004-07	32%	68%	18%	30%	FAIL
12668WAV9	CWABS 2007-04	27%	63%	0%	61%	FAIL
36242DSS3	GSAA 2005-01	0%	27%	1%	0%	FAIL
64352VED9	NEW CENTURY 2003-5	32%	21%	0%	33%	FAIL
64352VHM6	NEW CENTURY 2004-A	40%	24%	0%	0%	FAIL
64352VMN8	NEW CENTURY 2005-A	29%	36%	0%	53%	FAIL
64352VMP3	NEW CENTURY 2005-A	29%	36%	0%	53%	FAIL
68403BAA3	OPTION ONE 07-FXD2	31%	59%	3%	0%	FAIL
760985XV8	RFC 2003-RS7	43%	26%	4%	15%	FAIL
760985YU9	RFC 2003-RZ4	11%	6%	1%	21%	FAIL
94980GAG6	WF HELT 2004-2	2%	45%	2%	4%	FAIL
94980GAH4	WF HELT 2004-2	2%	45%	2%	4%	FAIL
94980GAJ0	WF HELT 2004-2	2%	45%	2%	4%	FAIL
75971FAX1	Renaissance 2007-3	30%	56%	0%	6%	FAIL
75971FAY9	Renaissance 2007-3	30%	56%	0%	6%	FAIL
88156VAA6	Terwin Mortgage 2006-10SL	70%	0%	0%	0%	FAIL

Figure 22: Evaluation of still existing securitisations against criteria¹⁷⁴

None of the securitisations met all four criteria and all but one deal failed three out of four criteria. The additional costs of incorporating only performing loans with at least one payment in a securitisation would be relatively low. It is therefore comforting that all securitisations would have failed the criteria “no self-certification” or “no credit impairment” by a wide margin.

In principal this analysis would have to be extended to those securitisations that are no longer in the index or have a lower rating. But the robust performance of the highly rated securitisations that are still in the index over a number of years suggests that their quality is

¹⁷⁴ The information was provided by Fitch ratings.

above average. Yet none of them would have qualified as Type A. It is therefore highly unlikely that omitted securitisations would have been compliant. Fitch performed a similar assessment for all US subprime transactions rated by Fitch. Again, none of the transactions would have qualified as Type A.¹⁷⁵

The following table illustrates the effectiveness of the “no credit impairment” criteria. It shows the characteristics of subprime mortgages at the end of 2007:

Table 2
Subprime Mortgage Characteristics
December 31, 2007

Characteristic	Total	Adjustable Rate	Fixed Rate
Number of Loans	3,542,728	2,274,513	1,268,215
Average Balance (\$)	181,347	199,621	148,573
Average Loan Age (Months)	26	22	33
Average FICO	621	617	628
FICO < 580 (%)	24.2	25.4	22.0
580 ≤ FICO < 620 (%)	25.6	26.9	23.3
620 ≤ FICO < 700 (%)	40.3	39.7	41.4
700 ≥ FICO (%)	9.9	8.0	13.3
% with Second Lien	22.3	29.9	8.7
% with LTV > 90 percent	35.9	43.3	22.6
% with Prepayment Penalty (PPP)	72.6	74.4	69.4
Average PPP Term (Months)	30	26	37
% Full Documentation	66.4	62.4	73.6
% Potentially Prime	19.9	12.1	33.9
Initial Interest Rate	7.99	8.03	7.92
Current Interest Rate	8.62	9.01	7.92
Margin (ARMs Only)	N/A	6.01	N/A
% Missing 1+ payments	47.1	54.6	33.6
Serious Delinquency Rate	17.4	22.5	8.3
% from California	14.1	15.8	11.1

Source: Federal Reserve Board staff calculations from First American LoanPerformance data.

Notes: FICO scores, LTV values and 2nd lien percentages are at time of origination. Potentially prime are loans that at time of origination had less than 80 percent LTV, were fully documented, owner occupied, and had a FICO score of at least 620.

Figure 23: Characteristics of subprime mortgages¹⁷⁶

¹⁷⁵ The tables fill dozens of pages. EIOPA will provide the information to EC in electronic form.

¹⁷⁶ Frame, S./Lehnert, A./Prescott, N. (2008): A Snapshot of Mortgage Conditions with an Emphasis on Subprime Mortgage Performance. p. 5.

Roughly 50 % of all borrowers had a FICO score of less than 620. Based on this information it is impossible to know exactly how many securitisations would have been excluded by the “no credit impairment” criterion. But a single low score borrower would have been sufficient. Originators also often combined mortgages with higher and lower scores to achieve an acceptable average credit quality. This seems to be consistent with the information provided by Fitch that all subprime RMBS they rated included borrowers with a FICO score of less than 620.

Markit iBoxx UK Non-Conforming RMBS

The table in Annex 10 shows for all still outstanding UK non-conforming RMBS deals rated by Fitch the percentage of mortgages with a country court ruling against the borrower or payments in arrears when the securitisation was originated. It also includes the percentage of borrowers with unverified income.

The table shows that all but one securitisation would have been excluded from ‘Type A’ based on the “no self-certification” and “no non-performing loans” requirements.

Markit iBoxx CMBS and USEA (CMBS portion)

Commercial mortgages are not included in the list of eligible underlying assets.

7.10. Determination of the risk charge

The previous sections discussed the allocation of indices to the different categories. This section sets out the methodology that was used to calculate the risk charges with the spread data from these indices as input and discusses potential weaknesses of the approach.

Description of the methodology

The chosen approach is similar to the one used for the draft implementing measures calibration in 2011.

At that time only monthly spread data for the Markit indices was available. As EIOPA had now access to daily data they were used instead. For the BAML indices monthly data (i.e. the spreads at the beginning of each month) were used again. The wider BAML indices are calculated on a daily basis but to produce the data for the relevant segments they had to be “parsed”. For technical reasons this was only possible on a monthly basis.

The time period was extended to include the most recent data points. This means that historical spread data from the period 31/12/2006 to 30/09/2013 (BAML indices) and 1/1/2007 to 25/09/2013 (Markit indices) are used. For the implementing measure calibration the last data point was 30 June 2011.

With the unsmoothed daily or monthly spreads as input the risk charges are derived:

In a first step daily or monthly aggregated spreads for each combination of rating and "Senior Type A"/"Other" are determined. For the calculation the spreads for all indices allocated to a category are weighted by the current market value of the securitisations included in the respective index. The produced figure approximates the spread for a portfolio of all securitisations in the indices allocated to a specific category (e.g. all AAA rated senior tranches in Markit or BAML indices that were allocated to Type A). With this approach spread data from sparsely populated indices can also be used and diversification benefits are taken into account.

At the end of the first step spread data is available for the classes "Markit AAA Senior Type A", "BAML AAA Senior Type A", "Markit AAA Other", "BAML AAA Other", "Markit AA Senior Type A" and so on. The following table shows the average market volumes for all classes (in EUR):

Data Source	Type	Rating	Market Value
Markit	A	AAA	237,408,125,125
Markit	A	AA	36,585,334,639
Markit	A	A	16,635,918,042
Markit	A	BBB	6,666,298,244
Markit	B	AAA	25,157,044,716
Markit	B	AA	19,220,838,838
Markit	B	A	8,299,451,887
Markit	B	BBB	9,864,325,313
BAML	A	AAA	202,941,038,451
BAML	A	AA	3,839,928,500
BAML	A	A	2,806,046,122
BAML	A	BBB	3,112,771,268
BAML	B	AAA	389,975,174,341
BAML	B	AA	103,120,388,256
BAML	B	A	60,040,447,793
BAML	B	BBB	33,397,473,427

Figure 25: Average market volumes for different classes in EUR

In the second step the 12-month spread changes for consecutive overlapping time periods are calculated for each class. This means for example for the classes based on BAML data that annual spread changes for the time periods 1.1.2007-1.1.2008, 1.2.2007-1.2.2008 and so on are determined with the 12 months between 1.9.2012 and 1.9.2013 as the most recent period.

Based on the set of calculated annual spread changes the empirical 99.5 VaR is then derived for each class.

In the last step the empirical VaR for each category is derived by combining the empirical VaRs for the associated classes. For the category "AAA senior Type A" these are for example the classes "Markit AAA Senior Type A" and "BAML AAA Senior Type A".

To determine the respective weights an assumption about the relative share of European and American securitisations in the portfolio of an average European standard formula insurer has to be made. EIOPA has found no data on the current allocation. But there are a number of reasons to assume a limited share of US securitisations:

Smaller insurers invest predominantly in Europe. Securitisations are also a relatively new and complex asset class. Smaller insurers will therefore probably prefer to invest in countries where they are familiar with the economic and legal conditions and can easily access information. Another reason for a limited allocation to the US by standard formula insurers is the additional currency risk.

Assuming a high allocation to the US would also produce counterintuitive results in terms of the allocation to different underlying assets: Only the BAML US indices for Auto Loans and Credit cards are allocated to type A. In consequence these types of securitisations would have a disproportionally high weight in the calibration for Type A compared to the volumes for such securitisations in Europe.

Based on these considerations an allocation of 5 % to the US is assumed.

EIOPA performed no analysis for securitisations with rating below investment grade or without a rating. It is suggested to use the calibration from the draft implementing measures.

Potential weaknesses of the calibration approach

As every other approach the chosen methodology has a number of potential weaknesses:

- The indices used to calibrate are rebalanced monthly. This means for example that an initially AAA rated securitisation that was downgraded drops out of the AAA index at the end of the month. As a result the spread data for the index do not fully capture the downward spread risk.
- The empirical approach used to calibrate the stress does not allow for extrapolation of the stress beyond the historical data. It results in the 99.5th stress being within the last circa 7 years of historical data.
- The calibration of the securitisation assets used data at a sub-indices level in order to match the characteristics of the criteria of Type A and Type B securitisation. As a result for some categories only limited data was available (e.g. only one index for Type A with credit rating BBB).
- The calibration was carried out using rolling-period data. According to some academic research rolling-period data may understate the true stress.
- For some lower rated indices (A or BBB) there are inconsistency between spread and price. This is due to some market participants not providing spread data if the price change is significant (e.g. more than 40%). Due to resource and time constraints it was only possible to identify and check some of the discrepancies.

The potential distortions arising from the monthly rebalancing are mitigated by two factors: According to the academic literature rating downgrades are to a substantial degree anticipated by spread movements. In addition, the frequency of downgrades for AAA rated securitisations from sectors that would fall into Type A has been very low (see Annex 9).

7.11. Validation of the index data

A number of tests have been performed on the spread data:

1. A search for large percentage changes over periods of one day and one month.
2. A search for large movements of spreads, prices and Weighted Average Life. An indication for potential data errors are large

changes in one variable without corresponding movements in the other two. Another reason for further queries is an inconsistency in the direction of changes (e.g. a large drop in spreads with a simultaneous large price drop).

3. A visual check for outliers

The first test was performed to all spread data. Only the indices with the highest weight in the calibration and additional samples were subjected to the second and third test.

There has also been a plausibility check on the development of spreads over time. Based on the developments in financial market over the last years one would expect low spread levels in 2007, then a sharp rise in the period spanning the second half of 2008 and the first quarter of 2009, followed by a drop in spreads and in some cases new increases due to the tensions in the Eurozone.

Another test was consistency in terms of data and results between the EIOPA analysis and the 2011 exercise to produce the calibration in the draft implementing measures.

After the validation EIOPA has a reasonably high confidence in the spread data for high rating classes (in particular for the period 2007 to 2009 which is crucial for the calibration).

There is less confidence in the spread data for lower ratings (especially BBB). The spreads for the Markit indices had in many cases to be based on a very small number of reports by market participants. This results in a number of inconsistencies.

7.12. Results

The combination of BAML and Markit data using the weights as discussed in section 7.10 produces the following empirical 99.VaRs:

Type	Rating	emp. 99.5 VaR
A	AAA	4.32%
A	AA	8.47%
A	A	14.79%
A	BBB	38.74%
B	AAA	12.50%
B	AA	13.40%
B	A	16.59%
B	BBB	19.70%

As already mentioned the spread data for BBB had some deficiencies. This suggests that the result for Type A BBB is an outlier. It has to be adjusted to “fit” with the other values. On this basis a value between 17 and 20 could be considered.

This range can be derived in different ways. It should be stressed that all approaches produce similar results and thus confirm the proposed range:

1. For securities with low liquidity, as is specifically the case for Type A – BBB indices, the price data is more reliable than spread data. The empirical 99.5 VaR for one-year changes in price for this category is 17 %
2. There are no data quality issues for higher rated securitisations. An extrapolation of the results for them produces a figure of 20.02 %.
3. The risk factor for credit quality step 3 in the draft implementing measures calibration is 20 %. A higher figure for securitisations with a better risk profile would seem counterintuitive.

Based on the historical evidence EIOPA suggests therefore the following spread risk charges for senior tranches of Type A securitisations:

Credit quality step	0	1	2	3	4	5	6
Risk factor FUP'_i	4.30%	8.45%	14.80%	17-20.00%	82 %	100%	100%

For other securitisations the following calibration is proposed:

Credit quality step	0	1	2	3	4	5	6

Risk factor FUP'_i	12.50%	13.40%	16.60 %	19.70%	82 %	100%	100%
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For comparison, the draft implementing measures set out the following calibration for securitisations:

Credit quality step	0	1	2	3	4	5	6
Risk factor FUP'_i	7%	16%	19%	20%	82 %	100%	100%

Due to a lack of relevant data EIOPA was not in position to perform a thorough review of the maximum modified durations. In the absence of evidence it is therefore recommended to keep or increase the current caps in the draft implementing measures (as corrected in the LTGA technical specifications part I). They were derived in the 2011 calibration exercise. Without strong evidence supporting the opposite the current caps should be seen as an absolute minimum.

8. The impact of regulatory capital requirements and non-regulatory obstacles on long-term investing

It is natural to look to insurers as a source for long-term financing as the nature of their liabilities allows them to have a longer time horizon than many other institutional investors. Insurers could in turn benefit by diversifying their holdings and earning illiquidity premia.

This chapter sets out some of the factors that influence the propensity of insurers to invest in the long-term assets covered in this analysis. It shows that the foreseen Solvency II capital requirements are only one of several drivers for the investment decisions of insurers. Many non-regulatory obstacles may prevent insurers from long-term investments. There are also clear indications that the current standard formula calibration will not prevent insurers from providing substantial amounts of long-term financing if it makes economic sense for them. As a result lower risk charges may not produce the large increases in investment volumes some people hope for.

The first section outlines some determinants for investment decisions by insurers. In the second section non-regulatory obstacles for investments in the assets that are considered in this analysis are identified. The third section discusses the effects of regulatory capital requirements in general. In the fourth section the changes in the SCR that would result from a shift into certain long-term investments are quantified. The fifth section provides a summary of the results.

8.1. Relevant drivers of investment behaviour by insurers

This section sets out some of the most important drivers for asset allocation decisions by insurers. It should become clear that many factors have an impact on their investment decisions.

Below some of the relevant drivers for the investment behaviour of insurers are described in detail. While not all of them are insurance specific they are considered from an insurance perspective.

Cash Flow Profile

The cash flow profile of their liabilities is an essential driver for the investment decisions of insurers. The need to have sufficient funds

available whenever insurance liabilities come due restricts them in their investment choices. A shortfall can have very undesirable consequences like a fire-sale of illiquid assets.

With longer-term insurance contracts and more predictable payments to policyholders it becomes easier to invest in illiquid long-term assets.¹⁷⁷

In addition to the expected payments for insurance benefits, the expected cash inflows from premiums and investment proceeds play also an important role in determining investment decisions. The expected liability payments may exceed the expected cash inflows from premiums and investment proceeds (e.g. due to low or decreasing premium income and investment returns). In this case investment decisions are constraint. The expected shortfall has to be made up by asset sales or the proceeds from maturing debt. As a result undertakings may invest in more liquid or shorter maturity assets. The insurer may also decide to hold more liquid assets if the expected net cash flows are only slightly positive.

If the insurer guarantees policyholders a certain level of benefits, investments with regular and predictable cash flows are particularly attractive. Assets without contractually fixed payment or fixed-income instruments with early repayment or call options (without make whole clause)¹⁷⁸ are naturally less useful to match fixed liabilities.

The liability cash flows depend also to a larger or smaller extent on the behaviour of policyholders. This is in part driven by external factors and alternative options available. A sudden increase in interest rates may for instance lead policyholders to lapse their savings product in order to reinvest the proceeds.¹⁷⁹ The resulting need for liquidity has an influence on investment behaviour.

Risk/return profile

Modern portfolio theory and asset pricing models focus on the contributions of assets to the overall risk/return profile of the portfolio.

¹⁷⁷ An example for a relatively long-term contract with predictable benefits is an in-force annuity.

¹⁷⁸ A make whole clause requires the debtor to compensate the creditor for foregone interest payments in case of early repayment.

¹⁷⁹ Policyholder behaviour does not always follow a rational, i.e. utility optimising, pattern.

The individual risk/return profile¹⁸⁰ is irrelevant.¹⁸¹ As a consequence the dependencies between the returns of individual investments are an essential factor in investment decisions. Investments with returns that are only weakly correlated with the returns of the overall portfolio may be highly attractive despite a relatively low expected return because they offer diversification benefits.

In principle, different assets can serve similar purposes from a portfolio perspective (e.g. infrastructure and real estate as inflation protection).

Assets with a high minimum investment relative to the overall size of the portfolio are relatively less attractive as the insurer would have to bear a significant amount of idiosyncratic risk.

The perceived risk depends also on the dispersion of returns within an asset class. An insurer may find the general risk/return profile of an asset class attractive but choose not to invest for fear to pick a “loser”.

The perception of the risk/return profile for certain assets is often cyclical (i.e. risks are underestimated in good times and exaggerated in downturns). An example is investor attitudes towards equities during and after the dotcom bubble.

Asset Liquidity

Liquidity (and depth) of a market are determinants of investment decisions because they effect the reinvestment, disinvestment, or replacement risk. Necessarily, liquidity needs vary among types of insurers and product portfolios. Given the structure of their liabilities insurers are generally in a better position to invest in illiquid assets and to earn an illiquidity premium than other investors. But while the long-term nature of liabilities means that insurers may not be forced to sell an illiquid asset they may nevertheless want to do so. One reason could be that the initial assumptions underlying the investment decision are no longer valid. The illiquidity premium has to offer sufficient compensation. The required level will increase with the level of uncertainty as the possibility to reverse the decision becomes more valuable. It also increases with the maturity of the asset.

¹⁸⁰ expressed for instance by the volatility of returns

¹⁸¹ This trade-off is at the centre of methods like Markowitz' portfolio theory, the capital asset pricing model (CAPM) and (more) recent risk adjusted return models.

Financial reporting

The valuation of assets and liabilities for financial reporting can have a substantial impact on asset allocation (e.g. market consistent vs. historic cost accounting).¹⁸² For instance, anecdotal evidence in the UK indicates that the introduction of a more realistic balance sheet regime for with-profit insurers was accompanied by some de-risking in their asset allocation. Accounting rules can hence also work as a catalyst to investment decisions.

Expertise

Insurers need the necessary expertise to evaluate an investment opportunity. If necessary they have to acquire it. The associated costs are higher if the asset class is relatively new. They are also higher for illiquid assets due to the absence of market prices as reliable and easy accessible performance data. Another cost driver is heterogeneity.

The costs to acquire this expertise are also higher if the investment involves risks that are new for the insurer. An insurer may for example have to learn how to manage the legal risks due to incomplete contracts in long-term infrastructure projects.

Another situation arises if the insurer has to change the way it operates. If an insurer provided loans to SME directly without cooperation with a bank it would have to build processes to deal with non-performing loans. To gain this expertise considerable investments would be necessary.

An insurer may decide not to develop the necessary skills if the perceived potential benefits do not outweigh the costs. One reason may be that the investable amounts are too low.

The lack of expertise – or the cost to acquire it - can be a major impediment to investments. To reduce the costs involved in building the expertise investment advice may be sought by an external party or investment decisions directly be delegated to it (e.g. fund manager).

¹⁸² Committee on the Global Financial System (2011): Fixed income strategies of insurance companies and pension funds. CGFS Papers. No. 44. pp. 21-25 and 37-38.

But the insurer must still be knowledgeable enough to choose the right advisor or agent and to monitor him.

8.2. Non-regulatory obstacles for investments in the assets covered in the analysis

This section highlights some of the non-regulatory reasons why insurers may choose not to invest in certain long-term assets. Some of the barriers will become less relevant over time as standards and benchmarks develop. Insurers will also become more knowledgeable about the investment opportunities.

Infrastructure

The OECD performed in 2011 a study on infrastructure investments by pension funds.¹⁸³ As there are substantial similarities between insurers and pension funds several references to the findings are made below. Another study cited is a survey by Meridiam (an infrastructure fund) among investors.¹⁸⁴ While only a part of the respondents were insurance companies the results seem relevant with respect to the perception of infrastructure risks by investors. One aspect to consider is that the investors polled had already invested. This means that the responses may not necessarily be representative for the average potential investor in infrastructure (e.g. the respondents are probably more knowledgeable).

Maturity and risk/return profile

It is often claimed that infrastructure investment offer stable (potentially inflation adjusted) long-term cash flows with low correlation to other assets.

But as infrastructure is a relatively new asset class there may be limited or no data on past performance available. The OECD study identifies a shortage of performance data and a lack of benchmarks as an obstacle to investing. The latter factor is also named by 13 % of respondents in the Meridiam survey. Standard and Poor's cites offshore wind farms in Western Europe as an example for large-scale projects with little proven track record of yield.¹⁸⁵

¹⁸³ OECD (2011): Pension Fund Investment in Infrastructure. A Survey. pp. 68-69.

¹⁸⁴ Meridiam (2013): Infrastructure: The LP perspective, in Infrastructure Investor Report April 2013.

¹⁸⁵ Standard and Poor's (2013): Out of the shadows: The rise of alternative financing in infrastructure. p. 5.

The infrastructure asset class is also quite heterogeneous. In combination with the difficulty to access comprehensive and reliable performance data this results in a lack of transparency in the infrastructure sector. This is seen in the OECD study as another barrier (also named by approx. 20 % of respondents in the Meridiam study). As a consequence an insurer may refrain from investing for fear of picking a “loser” (even though the risk/return profile for infrastructure investments in general is perceived as attractive).

The OECD study identifies several other factors that may contribute to a negative perception of the risk/return profile:

- Lack of political commitment over the long term
- Regulatory instability (with respect to the regulation for the infrastructure asset)
- Fragmentation of the market among different level of governments

These factors were also a concern for investors in the Meridiam survey (approx. 70 %, 37 % and 25 % of respondents respectively). According to Meridiam investors acknowledge that “infrastructure is under greater public and political scrutiny than other asset classes due to its essential and highly visible role in society, [...and thus] fear that the regulatory environment in which they invest may shift suddenly according to the prevailing political wind”.¹⁸⁶

Another relevant factor is the attractiveness of assets that are perceived to have similar properties to infrastructure and may therefore be seen by investors as potential substitutes. Roughly 60 % of respondents to the Meridiam survey for example considered real estate as comparable with unlisted infrastructure equity as both have underlying physical asset and command a real usage fee.

A last factor to consider is that - depending on the chosen investment vehicle - small and medium sized insurers may find it difficult to achieve a sufficient level of diversification. Direct investments in infrastructure project equity for example require often a large minimum amount. The resulting level of idiosyncratic risk may be unacceptable for the insurer.

¹⁸⁶ Meridiam (2013): Infrastructure: The LP perspective, in Infrastructure Investor Report April 2013. p. 20.

Due to the factors set out above the insurer may perceive the risk/return profile of infrastructure investment as not attractive. Not surprisingly, the OECD study lists a perception that the opportunities in the market are too risky as an obstacle.

Liquidity

Infrastructure investments are normally not traded in organised markets. This makes it difficult and costly to exit if the initial assumptions underlying the investment are no longer valid. The likelihood that this might happen increases with maturity which is often several decades for infrastructure investments. The illiquidity of infrastructure investments was named by roughly 20 % of respondents in the Meridiam study as an obstacle.

Expertise

Infrastructure is a relatively new and heterogeneous asset class. Infrastructure investments are generally unlisted. The absence of market prices makes it more difficult to get access to comprehensive and reliable performance data. The OECD study identifies a lack of expertise as an obstacle for investing.

In addition insurers investing in infrastructure have to manage risks that have so far not played an important role in their investments. Infrastructure projects often involve construction risk as well as political risk. There is also legal risk: Given the long maturity of the projects it is impossible to make provisions for all possible contingencies (incomplete contracts).

There are different possibilities to mitigate or even avoid certain risks: Insurers can for example invest only in brownfield projects where the infrastructure is already in operation. Another option is to invest in Europe 2020 project bonds where the EIB guarantee provides protection during the construction phase. Political risk can be significantly reduced by investing only in countries with a stable rule of law. Another option to reduce the level of expertise needed are investments in claims with higher seniority (i.e. debt instead of equity).

The level of necessary expertise will vary considerably depending on the chosen investment vehicle, type of infrastructure etc. An example

for an area where a high level is required are direct investments in infrastructure projects.

The relative novelty, heterogeneity and difficulties to access reliable and comprehensive performance data indicate that the costs can be significant. This is especially true for small and medium sized insurers as many costs are independent of the investment volume. Consequently, the OECD study identifies a problem of scale.

The following table shows the results of a global survey conducted by Blackstone. It shows that while approximately 50 % of the polled insurers were moderately confident in their capability to assess the risks of infrastructure debt and equity properly only roughly 10 % were very confident. For investment-grade fixed income the corresponding value was 71 %.

**HOW LIKELY ARE YOU TO INCREASE ALLOCATIONS TO EACH ASSET CLASS?
HOW CONFIDENT ARE YOU THAT YOUR ORGANISATION IS CAPABLE OF ASSESSING THE RISKS PROPERLY WITHIN EACH OF THE ASSET CLASSES?**

	Very likely to invest	Moderately likely to invest	Very confident in assessing risk	Moderately confident in assessing risk
Investment-grade fixed income	48%	40%	71%	28%
Higher-yield strategies/bank loans	58%	30%	68%	26%
Hedge funds	9%	41%	18%	45%
Real estate debt	12%	40%	25%	45%
Real estate equity	18%	37%	26%	44%
Infrastructure debt	6%	43%	10%	56%
Infrastructure equity	8%	37%	9%	49%
Private equity	8%	46%	17%	53%

Base: Total (n=206)
Source: The Economist Intelligence Unit, May 2013

Figure 25: Confidence of insurers in their capability to assess the risks of different asset classes¹⁸⁷

Summary

Infrastructure investments could offer insurers stable (potentially inflation adjusted) long-term cash flows with low correlation to other assets. There are however several obstacles like the heterogeneity and relative novelty of the asset class, the difficulties in gathering relevant

¹⁸⁷ Blackrock (2013): Global Insurance: Investment strategy at an inflection point? p. 25.

and comprehensive performance data, illiquidity and scalability. Their effects can reinforce each other: Due to the illiquidity it is difficult to reverse an investment decision. At the same time heterogeneity, relative novelty and difficulty to gather relevant information increase the perceived level of uncertainty. Combined with the long maturity of infrastructure investments this may deter an insurer from investing.

Private Equity

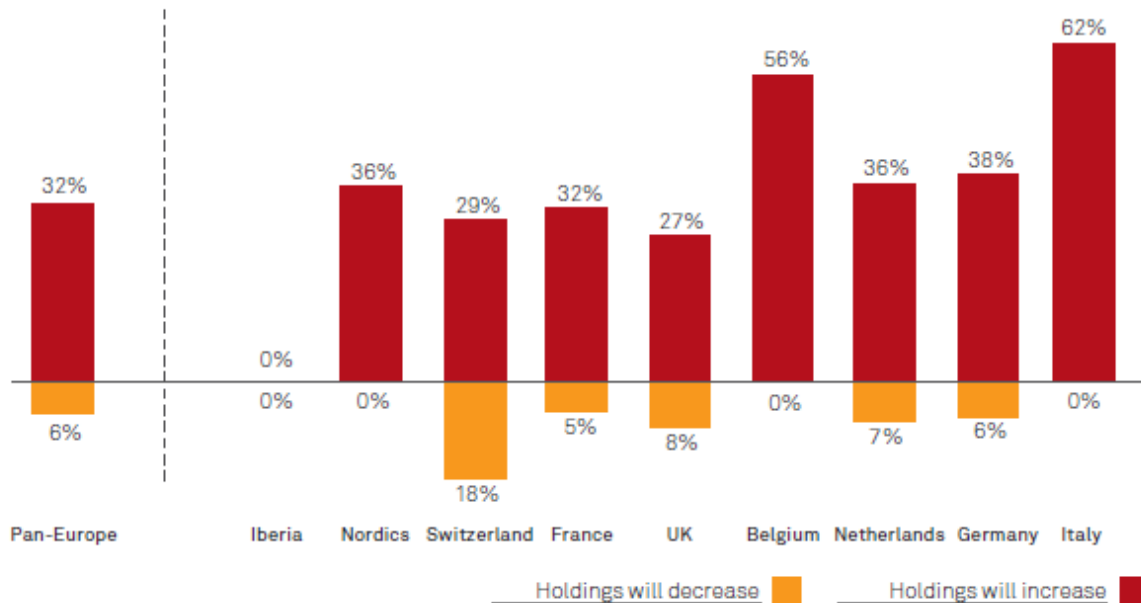
Private equity investments promise potentially higher returns with potentially higher risks. They could offer insurers diversification benefits (e.g. by allowing an equity exposure to SMEs with stable business models). Some of its specific properties mean that many of the considerations for infrastructure set out above apply also to Private Equity: Private equity is illiquid and returns display a wide dispersion (which makes it very important to choose the right fund). Reporting biases and the use of Net Asset Values (NAV) complicate the analysis of historical performance data.

The chart below shows that despite industry concerns about regulatory capital requirements 32 % of insurers polled in 2011 by Blackrock expected their investments in private equity to increase while 6 % assumed a reduction:¹⁸⁸

¹⁸⁸ Blackrock (2011): Balancing Risk, Return and Capital Requirements. The Effect of Solvency II on Asset Allocation and Investment Strategy. p. 14.

Thinking About the Likely Effects of Solvency II, in Light of the Regulation's Capital Requirements, how are Your Holdings in Each of the Asset Classes Below Likely to Change?

Private Equity



SME loans and SME loan securitisation

There are large differences across SME loans in Europe. Unless they engage in maturity transformation or use a swap SME loan securitisations “inherit” the properties of the underlying loans.

Relatively short maturity and variable interest rates make SME loans and SME loans securitisations seem less suitable for matching long-term fixed liabilities.¹⁸⁹ One motive for an insurer to invest could be to gain exposure to SME credit risk while avoiding locking-in currently low interest rates.

Given the dependency of SMEs on bank financing and their local focus SME loans may offer only limited diversification benefits in a crisis situation. Due to subordination the senior tranche of an SME loan securitisation has a lower risk profile than the underlying SME loan portfolio.

Insurers will generally lack the expertise to provide loans directly. The debt financing of SMEs has been traditionally the role of banks. They often build a long-term relationship with the companies and acquire

¹⁸⁹ In principle the insurer could enter into an interest rate swap and produce fixed-interest-payments.

over time detailed knowledge. Many factors affect the credit quality and the credit evaluation is therefore much more involved than for more standardised business like mortgages and consumer loans. Insurers are therefore at a disadvantage compared with banks when they originate loans.

One of the key competencies of banks is the work-out for non-performing loans which involves renegotiations with borrowers as well as the seizure and sale of assets. Insurers have traditionally not assumed such an active role.

Given this structural factors insurers will probably invest alongside with banks or via SME loan securitisations. This creates potentially principal-agent problems.¹⁹⁰

Socially responsible investments and Social Businesses

The situation for these types of investments depends very much on how similar they are to “conventional” ones. “Non-conventional” SRI companies as well as Social Businesses are normally small and have very distinctive characteristics. Investments in them are generally unlisted and have a low volume. Returns can be very low or non-existent.

Other considerations such as reputation may trump pure risk/return considerations. But the highly idiosyncratic character of investments and the low volumes may prevent from allocating meaningful amounts.

8.3. The effect of regulatory solvency requirements¹⁹¹

Insurers would also hold (economic) capital in the absence of regulatory requirements: Policyholders require a minimum level of capital to do business with the insurer. Moreover, the owners may also prefer a certain level of capital to protect the value of the insurer as a going-concern.

¹⁹⁰ Among the mechanisms to alleviate these problems is the retention of credit risk (“skin in the game”).

¹⁹¹ For the purpose of this discussion we ignore the Pillar 2 requirements (e.g. prudent person principle, ORSA), which naturally also form a (though not necessarily binding) constraint to insurers’ investment decision.

Regulatory capital requirements have only an influence on investment behaviour if they make an alternative unattractive that the insurer would have chosen without them. Their effect depends very much on the regulatory solvency position of the insurer. For an insurer that is currently in breach of the Solvency Capital Requirements or close to it, regulatory capital is the main focus while non-regulatory considerations probably dominate if the insurer is well capitalised.¹⁹²

Insurers will of course not only look at the current (economic) situation but also at future prospects. Therefore regulatory considerations have also an effect on the investment decisions of currently well-capitalised insurers. This is particularly the case for long-term illiquid assets like infrastructure and venture capital.

Yet the focus of insurers is probably not on the absolute change in regulatory capital requirements but on the change relative to the existing level and relative to own funds. Given the enormous amount of assets insurers hold even a small relative shift (with limited effects on the regulatory solvency position) into long-term investments would translate into very large absolute volumes.

Another relevant factor is the valuation of long-term investments for the Solvency II balance sheet. Many of them are illiquid and market prices unavailable. The appraisal values that are used instead are often less volatile. This reduces the fluctuations in own funds and consequently in the solvency ratio.

A study by H6ring suggests that ratings are an important driver for investment behaviour.¹⁹³ He investigates whether the market risk capital requirements outlined for Solvency II will significantly impact the investment strategies of European insurance companies. Comparing the standard formula requirements for market risk with the rating requirements of a representative insurance undertaking,¹⁹⁴ he concludes that the regulatory requirements are not the binding constraint for investments. This is particularly the case once

¹⁹² In general, undertakings have three options available to improve their solvency position: Raise additional capital, reduce insurance technical risk or reduce investment risk. As access to fresh capital can be restricted and a short-term reduction in the insurance risk profile is difficult the most likely short term option is an adjustment of the investment portfolio.

¹⁹³ H6ring, Dirk (2013): Will Solvency II market risk requirements bite? The impact of Solvency II on insurers' asset allocation. The Geneva Papers on Risk and Insurance. Issues and Practice. Vol. 38. Issue 2. April 2013.

¹⁹⁴ The 99.5% risk assumption corresponds approximately to an A rated institution.

diversification effects (within and across risk modules) – as applied under Solvency II - are taken into account. Industry representatives have voiced doubts regarding the methodology of the study. One concern is that differences in the determination of own funds are not taken into account.

Most of the larger insurers intend to use an internal model to calculate their Solvency Capital Requirement. They are already investing in assets like infrastructure project equity and some of them have already indicated their interest to increase their allocation in the future. For these internal models users the calibration of the standard formula has no relevance. Furthermore, internal models allow them to take into account the risk profile of the individual investment (the asset classes considered are very broad and heterogeneous). Another advantage of an internal model is that undertakings are forced to gain a very good understanding of the underlying risks to get regulatory approval.

It might also be instructive to look at the experience with the current regulatory regime. Solvency I has no explicit capital requirement for market risk. Capital requirements depend on the volume of premiums and technical provisions. Assets covering technical provisions are subject to restrictions on asset eligibility and volume of investment. The residual free assets do not face any quantitative restrictions.¹⁹⁵

The current regulatory framework has generally not been regarded as overly restrictive. For instance, the quantitative investment limits have generally not been a major obstacle to insurers' investment choice.¹⁹⁶ Nevertheless, the historical level of investments in the assets in question (or in similarly structured ones) has generally been relatively low. While the current environment certainly differs from the past (e.g. low interest rates) and the anticipated regulatory changes certainly had an influence on investment behaviour this clearly suggests the existence of potent non-regulatory obstacles.

¹⁹⁵ The fact that Solvency I is a minimum harmonising Directive complicates the assessment because under national law countries can implement additional requirements, such as risk based capital requirements, which complicates a comparison.

¹⁹⁶ In some cases though waivers to investment limits have been applied to cater for specific counterparty exposures. These waivers usually are conditional to stringent risk management requirements.

In summary, there is a number of reasons why regulatory solvency requirements in general and the standard formula calibration in particular may have only a limited effect on the propensity of insurers to invest in certain long-term assets: The constraints due to regulatory solvency requirements may play a minor role (e.g. because investment behaviour is driven by the need to achieve a certain rating). Moreover, internal model users are not directly affected by the standard formula calibration. Also, illiquid investments benefit from the use of appraisal values for the purpose of own funds calculation.

8.4. Effect of a shift into long-term investments on the SCR for an average European life insurer

Introduction

The stand-alone risk charge for a particular asset is different from the actual prudential cost of holding it. Studies often do not account for the combined effect of risk diversification, potential benefits of improved asset-liability matching, and the loss-absorbing capacity of technical provisions and deferred taxes. Examples for such studies are Morgan Stanley (2010), Fitch (2013), Committee on the Global Financial System (2011), Allianz (2013) and Insurance Europe (2013).¹⁹⁷ Their analysis is distorted by failing to reflect true changes in capital, and the given return on capital figures is understated.

According to aggregate QIS 5 figures, the actual impact on the SCR may be only 41.2 % of the initial stand-alone risk charge.¹⁹⁸ To illustrate this and to show the reduction in the SCR that can be achieved by a better asset-liability match, EIOPA has carried out some calculations for an average European life insurance company. Based on its initial asset portfolio the incremental change in SCR (the marginal VaR) resulting from a small shift from cash into other assets can be calculated. This allows a quantification of the actual change in regulatory capital as a consequence of a change in investments. Taking an example from below, if this average company invests €10m into an A rated 10 year zero bond, the stand-alone risk charge is

¹⁹⁷ Morgan Stanley/Oliver Wyman (2010): 'Solvency 2: Quantitative & Strategic Impact'. p. 10; Fitch (2013): European Project Bonds Making Slow Start. p. 4; Committee on the Global Financial System (2011): Fixed income strategies of insurance companies and pension funds. p. 35. Allianz (2013): Finanzielle Repression und Regulierung: Paradigmenwechsel für Versicherungen und Einrichtungen der betrieblichen Altersversorgung. p. 9; Insurance Europe/Oliver Wyman (2013): Funding the future. p. 34.

¹⁹⁸ EIOPA (2011): EIOPA report on the fifth Quantitative Impact Study (QIS5) for Solvency II. p. 31.

10.5% of the invested amount (i.e. €1.05m), but the Marginal VaR is just €0.1m, a 1% charge. In decisions on portfolio composition an insurer will look at the change in the SCR and not at stand-alone risk charges.

Annex 6 sets out background information and assumptions. The assumptions have been sensitivity tested to ensure the robustness of the Marginal VaR figures (see Annex 7).

Initial balance sheet

The initial investment portfolio for the average European life insurer has the following structure:

Assets	Market value
Corporate Bonds	340
Government bonds	260
Covered bonds	60
Equity	120
Property	40
Mortgage Loans	50
Cash	50
Reinsurance asset	80
Total assets	1000

Ratings asset portfolio	%
AAA	17%
AA	21%
A	42%
BBB	20%

The fixed income book has maturing cash flows between the years 0 and 20 with a duration of 7 years. The market value of the liability portfolio is 850 and its duration 9 years. The liabilities mature between the years 0 and 30.

SCR changes due to a shift into long-term investments

This subsection sets out the impact of reallocating one percent of the portfolio from cash into other investments on the SCR. The stand-alone risk charges are calculated on the same basis as in many studies and capture only the risk charge from the spread risk or equity risk sub-module.^{199,200} The Marginal VaR is calculated on a comprehensive

¹⁹⁹ A spread risk charge for bonds, loans and repackaged loans and an equity charge for infrastructure funds and private equity.

²⁰⁰ The inclusion of the interest rate risk charge would result in higher differences between the stand-alone risk charge and the Marginal VaR.

basis reflecting the full SCR impact with changes in the interest rate risk charge, diversification with other risk modules, and the loss absorbing capacity of technical provisions incorporated.

Asset class	Stand-alone risk charge (% of investment)	Marginal VaR % (change in SCR as % of investment)
Infrastructure investments		
Project bond; 10 years duration; AA rated	8.4%	-0.1%
Project bond: 5 years; A rated	7%	1.4%
Project bond: 10 years; A rated	10.5%	1.0%
Project bond: 15 years; A rated	13%	0%
Project bond: 5 years; BBB rated	12.5%	4.1%
Project bond: 10 years; BBB rated	20%	5.6%
Project bond: 15 years; BBB rated	25%	5.9%
Infrastructure loan: 10 years; unrated	35%	7.3%
Infrastructure loan: 20 years; unrated	40%	8.5%
Listed infrastructure equity fund ²⁰¹	39%*	20.3%
Other long term investment categories		
SME loan portfolio: 5 years; ²⁰² unrated	15%	5.4%
Private equity/ venture capital*	49%	24.1%
SME repackaged loan: A rated; 2 years	38%	17.9%
SME repackaged loan: A rated; 3 years	57%	26.9%
SME repackaged loan: BBB rated; 3 years	60%	28.4%

*The risk charge of the infrastructure equity fund and private equity investments is subject to the equity sub-modules symmetric adjustment. This alters the risk charge within the bounds of +/- 10%.

²⁰¹ Where an undertaking has knowledge of the underlying investments within the fund they may apply the principles of the look-through. The risk-charge would then be based on the individual charges of the underlying infrastructure loans and equity investments, which may result in a slightly lower charge.

²⁰² In practice loans would be amortised over the life of repayments. While it depends on the precise nature of repayments, an amortized loan of 5 years may equate to a maturity of approximately 10 years.

Summary

When considering a change in asset allocation insurers will look at the change in the SCR. Due to the combined effect of risk diversification, potential benefits from an improved asset-liability matching, and the loss-absorbing capacity of technical provisions and deferred taxes, this change is substantially lower than the stand-alone risk charge. The reduced interest risk charge due to a better match of assets and liabilities and the “kinked approach” in the calibration of the spread risk sub-module create incentives to shift from high quality short maturity bonds into longer maturities.²⁰³

8.5. Summary

Regulatory capital requirements are not and should not be the sole driver for investment decisions by insurers. A large number of non-regulatory factors are also relevant.

Several factors limit the effect of regulatory solvency requirements in general and the standard formula calibration in particular: Non-regulatory considerations may dominate (e.g. because investment behaviour is driven by the need to achieve a certain rating). Moreover, internal model users are not affected by the standard formula calibration. Finally, illiquid investments benefit from the use of appraisal values for the purpose of own funds calculation.

Many studies focus on the stand-alone risk charge for a particular asset which is different from the actual prudential cost of holding it. When considering a change in asset allocation, insurers will look at the change in the SCR. Due to the combined effect of diversification, potential benefits from an improved asset-liability matching, and the loss-absorbing capacity of technical provisions and deferred taxes this change is substantially lower than the stand-alone risk charge. The reduced interest rate risk charge due to a better match of assets and liabilities and the “kinked approach” in the calibration of the spread risk sub-module create incentives for duration matching of assets and liabilities.

²⁰³ A marginal shift of funds from an A- rated project bond with 5 years duration into a project bond in the same rating category with 15 years duration would for example reduce the SCR by 1.5 % of the invested amount.

Insurers have to overcome considerable non-regulatory barriers before investing in certain long-term asset classes: They are relatively heterogeneous and the lack of market prices makes access to relevant performance data difficult. They also involve new risks like construction and political risks. Moreover, their illiquidity in combination with long maturities means that poor investment decisions may be difficult to reverse.

In light of those findings, lower capital requirements do not necessarily translate into higher investments (or vice versa). Other factors may dominate the undertaking's decision.²⁰⁴ One has also to be aware of potentially unwanted consequences for the availability of funding in other areas: Due to constraint resources and the relative maturity of the industry,²⁰⁵ an increased allocation to one asset class essentially implies lower investments in other classes.

Insurers could benefit from investing in the assets covered in the analysis by diversifying their holdings and earning illiquidity premia. The standard formula capital charges do not stop the insurance sector as a whole from gaining meaningful exposure to these assets. But insurers will only invest if the risk/return profile from an economic perspective is attractive and the non-regulatory obstacles can be overcome.

In practice, Solvency II will not make insurance companies more difficult to run but the way in which risk is measured requires a more thorough recognition of risks inherent in the business. Industry argues that Solvency II will limit investment opportunities. EIOPA considers that through the prudent person principle which removes restrictions on the type of assets an insurer can invest in Solvency II would actually create opportunities to invest in a wide range of asset classes.

²⁰⁴ This also has to be taken into account in the discussions of whether insurers can and should fill the “gap” that is left by retreating banks. Essentially, to keep the status quo a considerable leveraging down by banks can only be compensated by other market participants leveraging up or by a considerable change of how the economy is financed in general.

²⁰⁵ Aggregate net cashflows for the insurance industry in some markets, from operating and investment income are now close to zero, or even slightly negative, thus suggesting that an increased focus on one particular assets will require a corresponding divestments from another.

Annex 1: A Broad Scope of Responsibility: What is Socially Responsible?²⁰⁶

Corporate governance/board membership	Environmental and social performance
Sustainability and related reporting	Human Resources management
Political involvement	Worker's/Contractor's rights
Intellectual property	Socio-economic impacts in developing countries
Business risk assessment + Reputation risk assessment	Community involvement
Procurement policy and practice	Social-ethical or moral issues
Environmental and social impact of products	Compliance with SEE regulation
Environmental and social management	

Source: Eurosif²⁰⁷

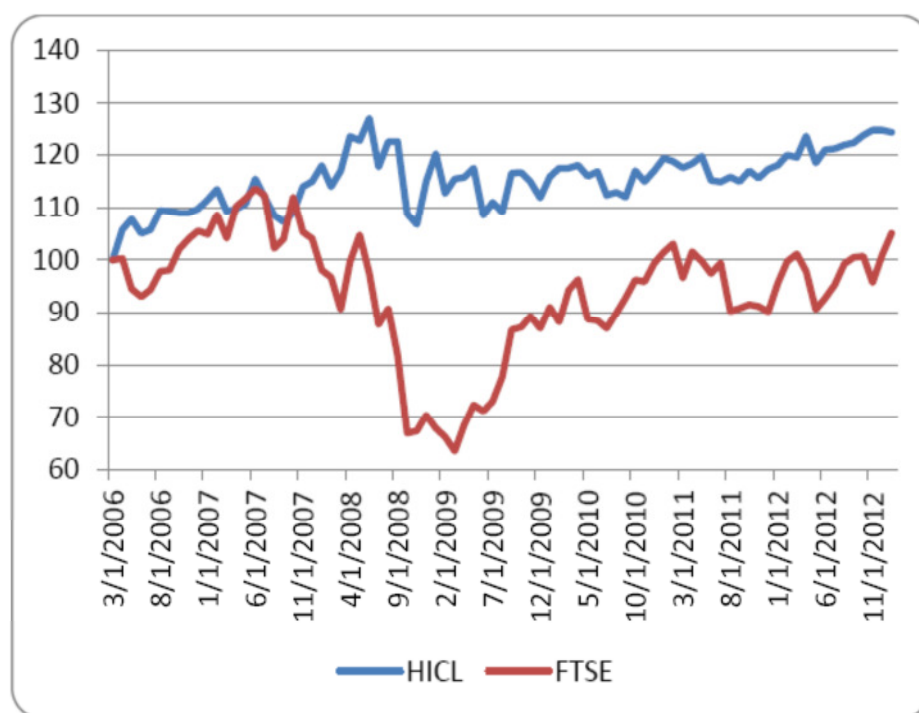
²⁰⁶ This annex was already included in the discussion paper published in April 2013.

²⁰⁷ Eurosif (2003): Socially Responsible Investment among European Institutional Investors. 2003 Report. p. 6.

Annex 2: Meridiam study of listed funds investing in infrastructure equity²⁰⁸

HICL vs. FTSE All Shares

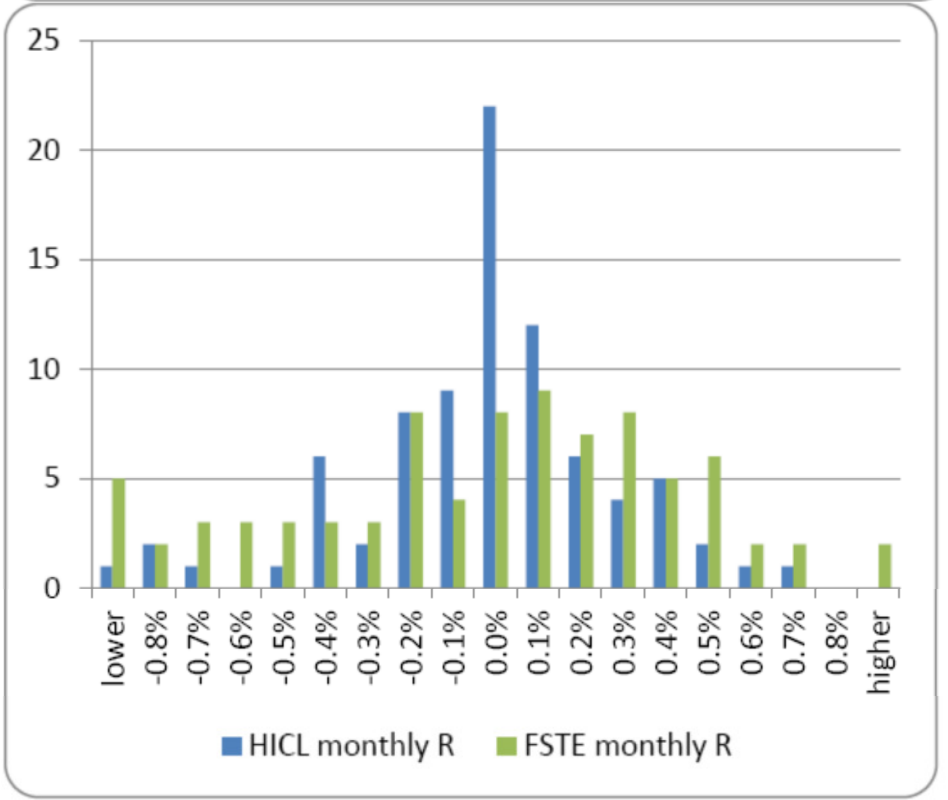
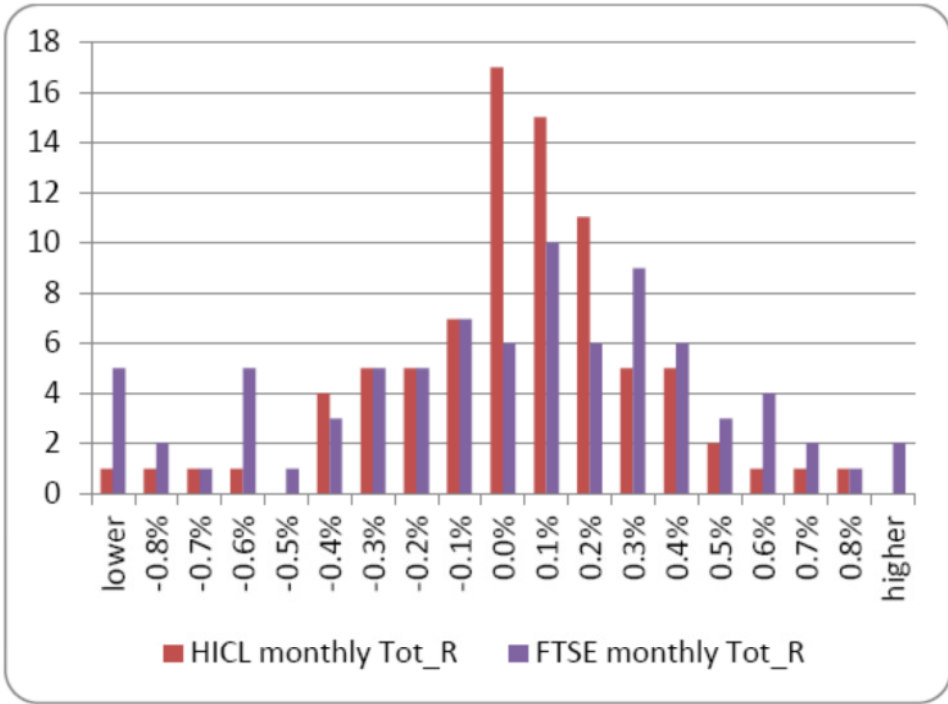
HICL is building a portfolio of Social infrastructure or equivalent project finance SPV equity, without targeting short term exit sales. It currently holds 79 investments with participations ranging from 20 to 100% (mostly majority stakes).



Annualised monthly data for 2006-2012		
	HICL	FTSE ALL SHARES
Price return	3.19%	0.71%
Risk	10.62%	17.18%
Sharpe Ratio	0.086	-0.09
Market beta	0.277	n.a.
99.5% VaR	24%	44%
Total return	8.74%	4.18%
Risk	10.64%	17.19%
Sharpe Ratio	0.596	0.11
Market beta	0.278	n.a.
99.5% VaR	19%	40%

HICL vs. FTSE monthly return distributions

²⁰⁸ This annex was already included in the discussion paper published in April 2013.

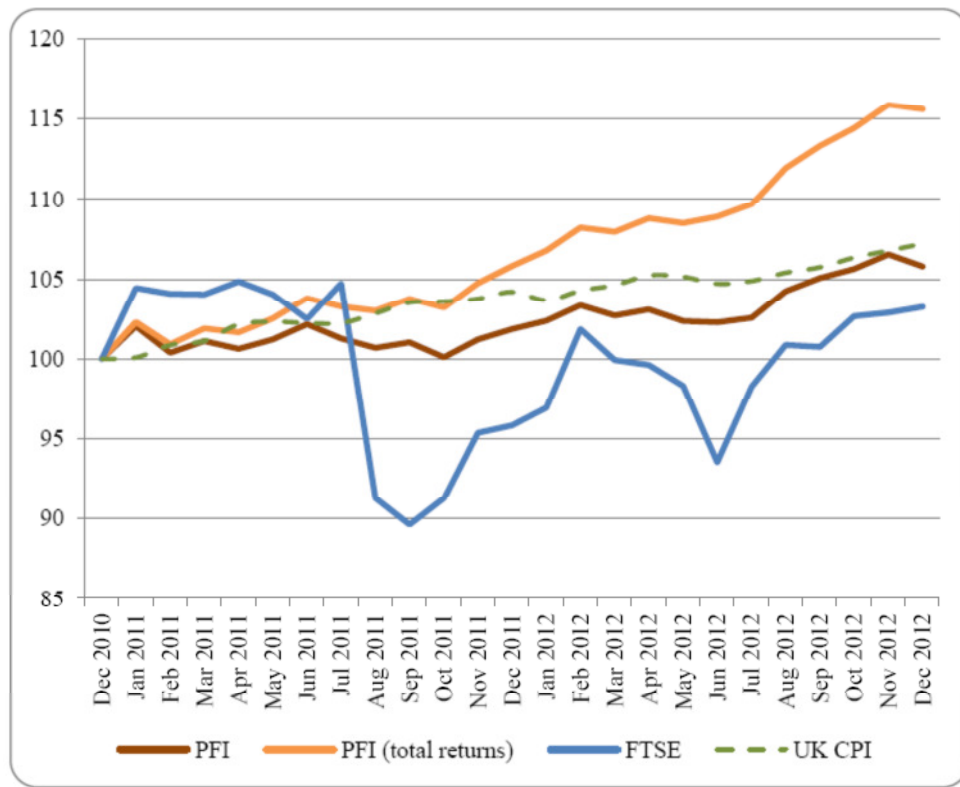


Listed PFI Index (2010-2012)

5 listed investment companies holding PPP/PFI equity in SPV and collecting availability payments.

Annualised monthly data

	PFI index	FTSE All Shares
Price return	2.86%	1.61%
Risk	3.00%	12.48%
Sharpe Ratio	0.810	0.10
Market beta	0.094	n.a.
99.5% VaR	9%	30.54%
Total return	7.52%	5.02%
Risk	3.04%	12.50%
Sharpe Ratio	2.326	0.37
99.5% VaR	3.94%	27.17%



Annex 3: Analysis of results from Moody's and S&P studies regarding credit risk associated to project finance²⁰⁹

The purpose of this annex is to present the main results from studies by Moody's and S&P regarding the credit risk associated to project finance, and more specifically infrastructure projects, debt instruments (bank loans and securities such as bonds).

The main source is the Moody's report "Default and Recovery Rates for Project Finance Bank Loans, 1983-2008". The database used by Moody's consists of banks' project finance loan portfolios from a consortium of leading project lenders. Loans were included in the database if they fell under the Basel II definition of Project Finance²¹⁰, which was retained by Moody's to define the study's perimeter.

The dataset includes 2639 projects accounting for 45% of all project finance transactions originated from the end of 1983 to the end of 2008.

The definition for default is Basel II's definition, as put forth by BCBS 128: „A default is considered to have occurred with regard to a particular obligor when either or both of the two following events have taken place.

- The bank considers that the obligor is unlikely to pay its credit obligations to the banking group in full, without recourse by the bank to actions such as realising security (if held).
- The obligor is past due more than 90 days on any material credit obligation to the banking group. Overdrafts will be considered as being past due once the customer has breached an advised limit or been advised of a limit smaller than current outstandings.”

The elements to be taken as indications of unlikeliness to pay include:

- The bank puts the credit obligation on non-accrued status.

²⁰⁹ This annex was already included in the discussion paper published in April 2013.

²¹⁰ Art. 220 & 221 (BCBS 128) "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"

- The bank makes a charge-off or account-specific provision resulting from a significant perceived decline in credit quality subsequent to the bank taking on the exposure.
- The bank sells the credit obligation at a material credit-related economic loss.
- The bank consents to a distressed restructuring of the credit obligation where this is likely to result in a diminished financial obligation caused by the material forgiveness, or postponement, of principal, interest or (where relevant) fees.
- The bank has filed for the obligor's bankruptcy or a similar order in respect of the obligor's credit obligation to the banking group. »

The database includes 213 projects where the project company has defaulted on its debt. Only 116 have emerged from default, and the recovery rate is computed based only on this subset.

An important methodological precision is that the estimation of Recovery Rates is performed at the aggregated project level, bundling together different loans whether from different lenders, or with different characteristics (seniority, maturity, amortization profile, etc.). While this may influence the estimated value, Moody's also performed a basic consistency check at the facility level (which showed similar results). This is mostly due to the fact that for a given defaulted project, there is often only one lender and one facility in the database²¹¹. When there are many, the report states that some discrepancies regarding the timing of the recovery process and the bank's methodologies to evaluate the recovery rate also explain the results.

9 sectors were defined in order to classify the projects: Chemicals Production, Infrastructure, Leisure & Recreation, Manufacturing, Media & Telecom, Metals & Mining, Oil & Gas, Power and Other.

As already mentioned earlier in the report, ***the definition for infrastructure is not widely accepted***, and Moody's used the following: "strategically important, capital intensive assets, utilities, services and primary industries, fulfilling major economic and social needs. The infrastructure sector is characterized by inelastic demand for outputs or services, potentially underpinned by natural monopoly assets, which support predictable and resilient long term revenues". It is important to notice that this definition doesn't include Power generation projects, as

²¹¹ The 116 projects which have experienced an ultimate recovery, only correspond to 180 facilities.

well as Media & Telecom projects, which are included in other definitions of infrastructure.²¹²

It also has to be acknowledged that the sub-sector for PFI/PPP was deemed too small a sample to infer robust estimators, meaning the supposed better creditworthiness of those projects cannot be assessed from the Moody's study. As much of the industry's critics regarding the current calibration focuses on PPPs, one therefore has to recall that the Moody's study doesn't give much quantitative information to conclusively evaluate the credit risk of this type of projects independently.

The main findings of Moody's study are now summarized in the following:

First of all, 10y cumulative default rate for project finance are consistent with 10y cumulative default rate for low investment grade/high speculative grade. Two remarks must be made on the table reproduced below:

- Due to small sample size, the cumulative default rates by cohorts from projects started between 1984 and 1990 are not computed, which means that the economic cycle of the 80's decade doesn't appear in the data ;
- Similarly, the study ends at the end of 2008, and therefore doesn't allow the computation of cumulative default rates with a 10Y horizon for projects started after 2000. Furthermore, it is unquestionable that this data doesn't reflect the financial crisis that started in 2007 in the wake of the subprime mortgages bust. The fact that the data set contains a much larger amount of project

The default rates pattern puts project finance as a whole between Baa (S&P BBB) and Ba (BB) in the corporate universe²¹³. The following table summarises the cumulative default rates by date of origination, as well as the average value.

²¹² And are included in many Infrastructure market indices.

²¹³ The benchmark corporate data set still barely includes the financial crisis started in 2007-2008.

Cumulative default rates by origination year cohorts for the period 1990 – 2008 (in %)											
	n(0)	1	2	3	4	5	6	7	8	9	10
1990	47	0.00	10.6	10.6	15.10	24.30	26.90	26.90	26.90	26.90	26.90
1991	64	0.00	7.80	7.80	11.10	17.90	21.60	21.60	21.60	24.20	24.20
1992	91	5.50	7.70	11.20	17.10	19.70	19.70	19.70	21.40	21.40	21.40
1993	108	1.90	4.70	9.70	12.90	12.90	12.90	15.60	15.60	15.60	15.60
1994	134	3.00	6.90	10.20	10.20	11.10	13.10	13.10	14.30	14.30	1.80
1995	225	2.30	4.90	6.00	7.90	10.00	10.00	10.80	14.60	15.70	15.70
1996	281	1.90	3.90	6.10	8.50	9.00	11.90	14.50	15.90	15.90	15.90
1997	349	1.50	4.60	8.30	9.10	11.90	15.50	17.50	18.10	18.10	18.10
1998	443	2.60	5.60	7.20	9.90%	14.70	16.50	17.00	17.00	17.50	17.50
1999	582	2.30	3.80	6.50	11.50	14.00	15.10	15.50	15.90	15.90	15.90
2000	695	1.40	4.00	10.10	13.20	14.60	14.90	15.20	15.20	15.20	
2001	810	2.40	9.50	13.20	14.40	14.60	14.90	15.10	15.10		
2002	915	7.00	11.90	13.40	13.80	14.00	14.20	14.40			
2003	947	4.50	6.00	6.30	6.70	6.80	7.00				
2004	1006	1.50	1.90	2.30	2.70	3.10					
2005	1057	0.30	0.80	1.10	1.40						
2006	1085	0.40	0.70	1.10							
2007	1178	0.30	0.90								
2008	1368	0.50									
Study Data 1990-2008		2.00	4.10	6.00	7.60	8.90	9.90	10.60	11.20	11.40	11.50
Moody's Baa 1983-2009		0.20	0.54	0.97	1.47	2.03	2.60	3.13	3.66	4.20	4.82
Moody's Ba 1983-2009		1.21	3.43	6.17	9.04	11.44	13.64	15.60	17.48	19.32	21.13

Source: Moody's "Default and Recovery Rates for Project Finance Bank Loans, 1983-2008"

Significantly, the table shows that the cumulative default rates are actually higher than the average Ba corporate data in the first years after the financial close of the project: the curves intersect only after the 2nd year, which is consistent with the observation that more defaults occur during the early stage of the project (or the construction phase, when relevant). **During this early stage, the creditworthiness can be considered as quite speculative for general project finance.** The following table, displaying the cumulative default rates by sectors, confirms the average picture, as one can notice that even the "narrow" infrastructure category still displays more default risk than the Baa corporate grade until after the 10th year, although it is by far the category with the smallest number of defaults. Media&Telecom projects are well below the Ba corporate grade, while Power projects are also riskier than Ba rated corporate in the early stages.

Cumulative default rates by industry for the period 1990 - 2008										
	1	2	3	4	5	6	7	8	9	10
Chemicals Production	2,2	4,9	7,4	10,6	14,5	16,1	18,6	20,6	20,6	20,6
Infrastructure	0,6	1,3	2,2	3,0	3,8	3,9	4,1	4,4	4,4	4,4
Leisure & Recreation	3,1	7,0	10,0	11,4	11,4	11,4	11,4	11,4	11,4	11,4
Manufacturing	3,9	8,9	13,1	14,5	16,5	16,5	16,5	16,5	16,5	16,5
Media & Telecom	5,2	11,2	15,6	18,0	19,4	21,5	25,1	25,1	25,1	25,1
Metals & Mining	2,7	5,9	9,4	13,2	15,9	17,7	17,7	17,7	17,7	17,7
Oil & Gas	1,5 0	3,30	4,70	6,30	7,8	9,2	10,4	12,0	12,0	12,0
Other	4,2	9,7	15,3	18,3	22,6	29,0	29,0	29,0	29,0	29,0
Power	2,2	4,4	6,3	7,8	9,0	9,9	10,6	11,1	11,5	11,7
Average	2,0	4,1	6,0	7,6	8,9	9,9	10,6	11,2	11,4	11,5
Moody's Baa 1983-2009²¹⁴	0,2	0,5	1,0	1,5	2,0	2,6	3,1	3,7	4,2	4,8
Moody's Ba 1983-2009²¹⁵	1,2	3,4	6,1	9,0	11,4	13,6	15,6	17,5	19,3	21,1

Source: Moody's "Default and Recovery Rates for Project Finance Bank Loans, 1983-2008".

The above frequencies of default, however, cannot be used to quantify the average one-year default rate, as they are default rates conditional to survival, while the average one-year default rate should be the unconditional one-year probability.

The infrastructure sector as defined by Moody's has indeed the lowest average default rate of the sample; it is not a small sample, as it accounts for a third of the total dataset (867 on 2639). But Power and Media & Telecom projects are also sizeable contributors to the set (840 and 270 respectively), and adding them to the infrastructure category would notably increase the estimated default probability, as both of them exhibit a frequency of default higher than the global sample (11,0% and 14,8%, respectively).

²¹⁴ rounded

²¹⁵ rounded

Average Default Rates By Industry			
Industry	Count of Projects in Study Data Set	Count of Defaults in Study Data Set	Average Default Rate (%)
Chemicals Production	101	11	10.9
Infrastructure	867	19	2.2
Leisure & Recreation	39	5	12.8
Manufacturing	39	6	15.4
Media & Telecom	270	40	14.8
Metals & Mining	121	14	11.6
Oil & Gas	326	19	5.8
Other	56	7	12.5
Power	840	92	11.0
Total	2639	213	N/A
Average	N/A	N/A	8.0

Source: Moody's "Default and Recovery Rates for Project Finance Bank Loans, 1983-2008"

Computing the average default rate of the sample by combining infrastructure, Power and Media&Telecom into a broader "Infrastructure" category yields an average default rate of 7,6%.

This figure cannot be interpreted in a straight forward manner, because it isn't consistent with the one-year average default rate which is usually used to evaluate creditworthiness.

Another fact that is worth mentioning is that, although the report doesn't feature a complete analysis of annual default rates by sectors, the global dataset shows a clear correlation of the default rate with the economic cycle, exhibiting spikes in 1992, 1998-1999 and 2002-2003.

As far as recovery rates are concerned, ultimate recovery rates for project finance are consistently high, across all regions and sectors, however, the level is markedly sector-dependent. Their level is comparable to corporate bank loans recovery rates, although gearing and tenors are usually higher than for bank loans. Average corporate recovery rates as computed by Moody's or S&P are closer to 40% - although they usually rely on a default definition that is not Basel II compliant, are estimated only on samples of publicly rated companies (as opposed to the data set of the Project Finance study) and correspond mostly to debt securities rather than bank loans.

Consistent with the higher frequency of default observed at early stages of the project, average ultimate recovery rates for construction phase defaults (67.5%) are lower than average ultimate recovery rates for operations phase defaults (80.1%). More generally, the data shows that average ultimate recovery rates are higher for projects that default in the later stages of the project life.

An important finding of the study is that average ultimate recovery rates realized through a work-out process (76.4%) exceed significantly average recovery rates achieved through distressed sale exits (47.8%). Namely, of the 213 defaults, 116 have led to an ultimate recovery, while 34 have been sold by the lenders ("Distressed Sale"). If one can agree that the "true" LGD level should be estimated after the work-out process has been completed, however, the Distressed Sale LGD estimate gives valuable information as to how market transactions would price Project Finance debt LGD. This empirical fact leads to the following remarks:

- As is widely documented for the corporate universe, recovery rates are structurally higher for bank loans than for bonds, because of the higher bargaining powers of the lender as opposed to that of the security holder. ***A consequence might be that, as far as bonds are concerned, one cannot take for granted the high recovery rate values for infrastructure project loans***²¹⁶. It is not obvious, however, that the "distressed sale" recovery rate of a loan, which is a less liquid asset that only few agents are willing to hold on their balance sheet, is a good proxy for the recovery rate of a bond.
- It has to be remembered that, as opposed to the Basel II Risk Weighted Assets for loans held in the banking book, the Solvency II framework assumes market consistent fair-value: a distressed sale thus gives better information on the market value of an infrastructure project loan in an adverse environment, since it is a transaction price.
- The higher level of recovery rates for project finance can be explained by the fact that lenders are very important stakeholders within the project and can greatly influence its contractual equilibrium and its general course, because the project wouldn't even start without the initial funding. Generally speaking, information provisions by the project company and monitoring capabilities by senior lenders is greater than for usual corporate

²¹⁶ The Moody's "Default and Recovery rates for Project Finance debts, 1992-2008" study exhibits an average recovery rate of 82%, however showing high sensitivity to seniority. But those results seem to be quite uncertain given the very low sample size of the study, as is discussed below.

lending. However, the question whether (re)insurance undertakings, which so far are not significant actors in the project finance funding market, can rapidly acquire the capacities and expertise that banks currently have in managing such investments, ought to lead to caution regarding the potential use of banking data for the calibration of the SCR shocks.

The following table displays ultimate recovery rates by sectors, as well as information on time to default and time to emergence.

Industry	Count	Average Years to Default	Count	Average Ultimate Recovery Rate (in %)	Average Years to Emergence
Chemicals Production	7	5.2	6	100.0	1.7
Infrastructure	12	4.7	11	72.6	4.3
Leisure & Recreation	4	3.1	2	78.2	1.0
Manufacturing	5	2.9	5	49.2	2.7
Media & Telecom	25	2.2	20	60.2	2.0
Metals & Mining	14	3.8	10	58.3	2.8
Oil & Gas	12	4.3	10	73.4	2.2
Other	3	3.7	2	55.5	2.2
Power	68	3.8	50	88.5	2.3
Total	150	3.6	116	76.4	2.4

Source: Moody's "Default and Recovery Rates for Project Finance Bank Loans, 1983-2008".

Finally, an interesting fact reported in the Moody's study is that average ultimate recovery rates for project finance bank loans were essentially independent of economic cycle at default as well as economic cycle at emergence. Years prior to 2000, however, were excluded from this observation because of small sample sizes.

The second source that was used to assess the average credit quality of Infrastructure projects was Moody's report on "Default and Recovery Rates for Project Finance Debts, 1992-2008" which was released in November 2009. This report has not been updated since.

This study focuses on debt securities issued by project companies. While filling an obvious data gap, the study cannot be exploited for quantification purposes, for the following reasons:

- The dataset suffers from the limitations of a very small sample size (only 599 individual rated projects from 1992 to 2008).

- A significant amount of them is bearing credit enhancement from a monoline insurer (38%), which influences the trajectory to default. Furthermore, the worldwide demise of monoline insurers happened just after the final date of the observations in the dataset.
- The dataset is worldwide, and many projects that defaulted on their bonds are located in emerging countries (South America, Asia), which is not so relevant for an assessment within the Solvency II framework.
- Due to the available projects, categories are not identical to those of the loan study, rendering comparisons difficult.

The sectors identified by the study are the following: airports, mining, oil & gas, PPP, power, rail infrastructure and toll road.

A broad definition of Infrastructure would include airports, PPP, power, rail infrastructure and toll roads. The average 1Y default rates, which cannot be judged as statistically significant, exhibit a very wide range, as shows the following table:

Average One-Year Default Rates, by Broad Sector, 1992-2008	
Sector	Average one-year Default Rate (%)
Airports	0.00
Mining	33.33
Oil & Gas	0.62
Other	0.07
PPP	0.00
Power	1.15
Rail Infrastructure	23.53
Toll Road	4.39

Source : Moody's "Default and Recovery Rates for Project Finance Debts, 1992-2008".

According to this data PPPs seem to be quite low credit risk investments, but Rail infrastructure and Toll Roads project, which undoubtedly would qualify as infrastructure projects, exhibit default frequencies that would put them at the low end of speculative grade investment in the corporate world. The same is true for Power projects.

The other conclusion of the study is that recovery rates for such Project Finance Bonds are actually quite high (82%). However, the sample is extremely small (as some of the default didn't allow observing recovery rates, there are only 17 observations), are based only on 30-day post default recovery price, which is not consistent with the methodology used

for corporate recovery rates calculations²¹⁷, and are skewed by multiple pari passu issuances from the same projects (only 10 projects are actually concerned).

²¹⁷ This methodology considers ultimate recoveries coming from complete work-out processes rather than transaction prices shortly after default.

Annex 4: Examples for Social Businesses²¹⁸

- In Italy, a medical centre provides high-level specialised assistance to people in need (immigrants for example), particularly in areas poorly served by public services.
- In Romania, a company with five members of staff and five volunteers has been working since 1996 to provide cultural services in the Romanian language to approximately 90 000 blind people by adapting media (especially audio books and films) to their needs.
- In 2004, in France, a business launched an innovative concept of water-free car washing services by using biodegradable products and employing unqualified or marginalised staff in order to reintegrate them in the labour market.
- In Hungary, a foundation set up a restaurant employing disabled staff (40 employees) and provided them with training and childcare to ensure the transition to stable employment.
- In The Netherlands, a company teaches reading using innovative digital tools and a method based on playing. This method is particularly suitable for hyperactive or autistic children but can also be used for illiterate people and immigrants.
- In Poland, a social cooperative comprising two associations employs long-term unemployed and disabled staff. It provides a variety of services: catering and food services, small construction and handicraft jobs and employability training for disadvantaged people.
- In Denmark, a business exclusively hires employees with autism spectrum disorder (ASD).
The business' objective is to tailor a working environment for specialist people such as people with ASD in order to let them solve valuable tasks for the business sector at market terms.

Source: Impact assessment of the European Commission on the proposal for a Regulation on Social Businesses²¹⁹

²¹⁸ This annex was already included in the discussion paper published in April 2013.

²¹⁹ European Commission (2011): Commission Staff Working Paper Impact Assessment accompanying the document “Proposal for a Regulation of the European Parliament and of the Council on European Social Entrepreneurship Funds”.

http://ec.europa.eu/internal_market/investment/docs/social_investment/20111207ia_en.pdf.

Annex 5: Summary of Questions in the Discussion Paper

Channels for SME financing

Q1: Are there any further channels for SME financing by insurers that EIOPA should consider?

Private Equity, Venture Capital and SME

Q2: Further to the information in the introduction of 3.1.1, what are the most common investment channels for the average insurance firm to invest in Private Equity, Venture Capital, and in particular SMEs? Is there data available to support this answer?

Q3: Are there methods or data that EIOPA could use to quantify or eliminate the biases described in paragraph 16?

Q4: Regarding paragraphs 19 to 21, is there suitable data on secondary market transactions that allows the quantification of the discount to NAV (in particular under stressed market conditions)?

Q5: How can the risk characteristics effects of the additional layer of fees (described in paragraph 14) be quantified when investing via funds of funds?

Q6: Are there any further market indices for private equity or venture capital that EIOPA should consider?

Q7: What economic factors contribute to the risk-profile of private equity investments and how?

Social Businesses

Q8: What data could be used to produce a reliable calibration for investments in social businesses?

Q9: What data can be used to calculate the correlation between social businesses and other asset classes?

Q10: What could be the economic rationale for a different calibration than for other debt and equity investments?

Q11: What is the volume of current investments by insurers in businesses with similar features as set out in the definition above?

Socially Responsible Investments (SRI)

Q12: What is in your view a suitable definition of SRI that allows a clear distinction between SRI and non-SRI?

Q13: What empirical data is available for a SRI calibration based on the definition you suggested?

Q14: Do you have any suggestions how the problems outlined in paragraph 69 could be overcome?

Q15: Do you agree with the qualitative analysis of SRI risks and the preliminary conclusion EIOPA has drawn from it?

Infrastructure Investments

Q16: What is the overall volume of infrastructure investments by insurers? What is the volume for types of investment vehicles (shares of funds, loans, bonds, project equity, etc.)? What is the volume for different types of infrastructure (energy, traffic etc.)?

Q17: Do you expect loans to become a more significant part of infrastructure investments by insurers in the future? What portion in terms of overall investments and term of infrastructure investments can be expected?

Q18: What is the volume of investments by insurers in bonds issued by monotranches loan securitisation vehicles? To what extent is this realised through a partnership with the originating financial institution?

Q19: What kind and degree of expertise do insurers need for infrastructure investments via different vehicles? Do insurers have this kind of expertise and what developments do you expect in this respect in the future?

Q20: What are potential data sources that might be useful to perform a calibration analysis for the investments mentioned in this section?

Q21: Do you have any suggestions how market data for listed infrastructure could be used for calibrating infrastructure project

equity? What would be suitable indices and subsets of the infrastructure project universe? Why would the risk profiles be comparable?

Q22: Consider the following statement: "The high degree of leverage often used in infrastructure project finance results in a high sensitivity of equity values to changes in the total value of the project and thus a high overall risk". Do you disagree? Why?

Q23: Do you have suggestions as to how a more granular treatment for unrated loans could be introduced in the framework of the standard formula?

Q24: To what extent will insurers rely on full or partial internal models to achieve a more granular treatment of unrated loans?

Securitisation of SME debt

Q25: What is the volume of securitisations of infrastructure, SME, SRI and social business debt? On what definition for the different debt categories are the numbers based?

Q26: What is the volume of investments by insurers in these securitisations?

Q27: What are potential sources for historical price data for the securitisations considered?

Q28: What are the characteristics of the securitisations considered with respect to their underlying asset pool (granularity, legal form, collateral, individual risk assessment, diversification, etc.)?

Q29: What are the characteristics of the securitisations considered with respect to their financial structure (tranching, credit enhancements etc.)?

Q30: What are the characteristics of the securitisations considered in terms of their originator?

Q31: How robust are the payments generated by the securitisations considered? Why?

- Q32: How difficult is it to assess the riskiness of payments? What accounts for the differences?
- Q33: What risk-relevant information is disclosed on the securitisations considered? Does this information allow a reliable risk assessment? To what extent is the investment a „black box“?
- Q34: How knowledgeable are investors about the securitisations considered (experience, internal capacities for risk assessment vs. reliance on ratings, etc.)?
- Q35: To what extent do investors rely on ratings with respect to the securitisations considered? What accounts for any differences?
- Q36: To what extent do the securitisations considered differ in terms of the information asymmetry between originator and investor?
- Q37: What is the economic rationale, if any, for a higher or lower risk of the securitisations considered compared with other securitisations?

General

- Q38: What are the main factors for the level of investments by insurers in the asset classes considered in this discussion paper at present and in the past?
- Q39: To what extent does a lack of expertise prevent insurers from investing in the asset classes considered in this discussion paper?
- Q40: What role does the economic risk/return profile play in the decision by insurers not to invest in the asset classes considered in the discussion paper?
- Q41: Are there elements in the currently foreseen Solvency II rules outside the regulatory capital requirements that might prevent insurers from long-term investing?
- Q42: What are the main obstacles for long-term investments by insurers?
- Q43: Are there other measures than changes to the SII requirements that might incentivize more efficiently long-term investing by insurers?

Annex 6: Underlying assumptions for constructing the representative European Life Insurer

Liabilities

The cash flows of the liability portfolio have a duration of 9 years with the last payment in 30 years. This is based on information collected in the QIS4 exercise: The median duration of liability portfolios was 8.9 years, although 10% of life insurers had durations of less than 5 years, and 10% of more than 17.2 years.²²⁰

Assets

The QIS5 report provides the average portfolio composition set out below.²²¹ Separate information for life and non-life insurers is not available. However, as investments by life insurers represent more than 80% of total assets, the figures should be a good proxy.²²²

Assets in % (using valuation of solo entities, excluding unit-linked assets)	
Reinsurance assets	8%
Corporate bonds and Covered bonds	28%
Sovereign bonds	26%
Equity	12%
Mortgage loans	5%
Property	4%
Cash	5%
Investment funds	5%
Other	7%

These percentages were used as a basis for the construction of a suitable initial portfolio.

As there are no categories for "Investment funds" and "Other" in the standard formula the funds invested in them were allocated to "Corporate bonds and Covered bonds" and "Equity".²²³

²²⁰ CEIOPS (2008): CEIOPS' report on its fourth Quantitative Impact Study (QIS4) for Solvency II. p. 182.

²²¹ EIOPA (2011): EIOPA report on the fifth Quantitative Impact Study (QIS5) for Solvency II. p. 37.

²²² Unit-linked assets were removed from the data as their composition is determined by policyholders.

²²³ The long-term investments discussed in the report appear not as a separate category. There is a small amount of private equity and infrastructure equity within the equity category. Because banks have been the primary

Life insurers try to reduce balance sheet volatility by matching asset and liability cash-flows. The match might not be perfect: For the representative European-based life insurer in the study by Hoering the liability duration of the average European life insurer exceeds the asset duration by 2.1 years.²²⁴ On this basis the initial portfolio is constructed – a largely matched portfolio with some unmatched liabilities at long durations.

QIS5 results indicated aggregate own funds as 13% of assets.²²⁵ For simplicity, 15% has been used in this exercise.

Risk modules of the standard formula

To fully capture diversification effects assumptions have to be made about risks other than market risk.

It is assumed that the insurance company writes only life business. Operational risk is not taken into account as the operational risk charge is added in the SCR calculation (i.e. no diversification benefits) and has therefore no impact on the marginal VaR. The risk charges for the life underwriting and counterparty default risk modules are taken from QIS5. After diversification, the life underwriting risk was 35% of market risk and the counterparty default risk 11%.²²⁶ These figures have been used to calculate the SCR of the initial portfolio.

Results from QIS 5 show that the use of the adjustment for the loss absorbing capacity of technical provisions resulted in an average reduction of 28% in the basic SCR.²²⁷ Deferred taxes accounted for an average 19% reduction.²²⁸ These results are based on slightly outdated figures and firms' approaches may have developed since. The SCR is therefore reduced by a cautious 40% for these two effects. The assumption around this constant factor is described in Annex 7.

The table below describes the components that contribute to the Basic SCR:

European funding vehicle for infrastructure loans and SME loans, these are absent as distinct categories, and may exist only as small quantities within the Investment funds or other asset categories.

²²⁴ Hoering, D. (2012): Will Solvency II market risk requirements bite? The impact of Solvency II on insurer's asset allocation. ICIR Working Paper Series. No. 11/12. p. 15. The study uses a combination of QIS5 data and sample data from the balance sheets from a selection of European insurers. The data provided in the study was also used to check the reasonability of the other assumptions with respect to the asset portfolio.

²²⁵ EIOPA (2011): EIOPA report on the fifth Quantitative Impact Study (QIS5) for Solvency II. p. 37.

²²⁶ EIOPA (2011): EIOPA report on the fifth Quantitative Impact Study (QIS5) for Solvency II. p. 67.

²²⁷ EIOPA (2011): EIOPA report on the fifth Quantitative Impact Study (QIS5) for Solvency II. p. 69.

²²⁸ EIOPA (2011): EIOPA report on the fifth Quantitative Impact Study (QIS5) for Solvency II. p. 69.

Risk category SCR	Charge
Market risk	92
Life insurance risk	32
Counterparty default risk	10
Diversification	-26
LAC	-43
Basic SCR after LAC	65

Annex 7: Sensitivity testing of simplifications and assumptions

- Risk-free rate:** The calculations were performed with the Scenario 0 curve from the LTGA exercise with valuation date 31 December 2012. To account for the uncertainty about the eventual risk-free rate, term structures from other LTGA scenarios were also tested. The change in basic SCR from the use of a different scenario was minimal. Consequently, any impact on the marginal VaR results is negligible.
- Asset portfolio:** The composition of the asset portfolio affects the level of diversification within the market risk module. This impacts also the marginal change in the SCR as a result of a portfolio shift. Variations in the composition of the asset portfolio altered the Marginal VaR figures by +/- 2%. But even with a 2% increase the Marginal VaR charges are substantially lower than the stand-alone risk charges.
- Liability pattern:** The liability pattern is designed to model the duration and run-off characteristics of a European insurance entity. It has only payments at selected years (see figure 2). To test the impact of this simplification the pattern in figure 3 with the same market value and duration characteristics was constructed. The overall SCR changed by less than 1% with this alternative.

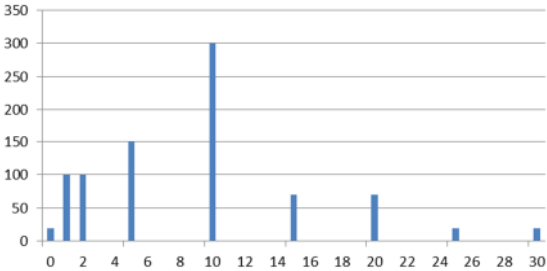


Figure 26: Liability pattern underlying SCR calculations

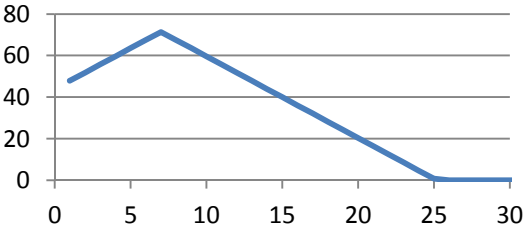


Figure 27: Alternative liability pattern

- **Payment pattern of bonds:** For simplicity, all fixed income assets are assumed to have a single payment at the end of their maturity. In reality, most fixed income investments will have regular payments. Further analysis was carried out to analyse the impact on changes to the SCR, using bonds with various coupon rates and maturities. The resulting duration changes had a minimal impact on the SCR.
- **Fixed counterparty default risk charge:** The counterparty default risk charge has been held constant for the purpose of these calculations. In practise, any movement out of cash (which has a counterparty default risk charge) into other assets (which have a market risk charge) may alter this charge. However, cash balances have only a minor effect on the counterparty default risk charge and this assumption has no material impact on the results.
- **Constant factor for loss absorbing capacity of TPs:** In reality the shift from cash to other investments is a movement from an almost risk-free asset to a more risky one. Depending on how much of the risk the firm transfers to the policyholder, there may well be greater capacity to offset this volatility by the loss absorbing capacity of technical provisions. As a result the marginal VaR figures would be lower than calculated. The ultimate effect would be firm specific and depend on the allocation of returns between policyholder benefits and shareholders. For this reason no further assumptions have been made when considering the representative EU insurer.

Annex 8: Criteria for lower risk CMBS segment

Limit on exit debt level for CMBS

Draft legal wording: All loans with a scheduled Balloon Payment shall have a Tail Period of at least 2 years.

- Each loan with a Tail Period of more than 2 years but less than 5 years shall not have a Balloon Payment equivalent to more than [30]% of original property value or an Exit Debt Yield of less than [20]%
- Each loan with a Tail Period of at least 5 years shall not have a Balloon Payment equivalent to more than [65]% of original property value or an Exit Debt Yield of less than [10]%

Where:

'Balloon Payment' is a loan amount scheduled to be outstanding at the loan maturity date.

'Tail Period' is the length of time between the scheduled maturity of the loan and the legal final maturity of the securitisation.

'Exit Debt Yield' is the property net rental income as a proportion of the Balloon Payment.

Purpose: The loans underlying the CMBS have to be refinanced if their maturity is shorter than the maturity of the securitisation. Limiting the outstanding principal amount at maturity (both in terms of the property value and relative to the net rental income) reduces this refinancing risk.

Effectiveness: Excludes CMBS transactions with high balloon payments. According to evidence provided by Fitch, 84% of the currently outstanding Fitch-rated European CMBS would fail this criterion. In case of US CMBS this percentage falls to 74% as full amortising CMBS transactions are far more common in the US.

Evidence:

The only supporting information is the following statement by Fitch:

"Of the 244 EMEA CMBS transactions that we have had ratings on during the period 1 July 2007 to 30 June 2013, 23 could qualify as being 'high quality' on the definition set.

The definition used was: no loan in the pool having a balloon balance of more than 30% LTV without a tail period of at least 5 years. Even if the LTV were increased to 60% there would be few extra transactions included. Debt yield would make it even more robust.

NPL transactions were excluded, but included credit-linked transactions (bear in mind some of these have been subject to downgrades due to the tenant being downgraded).

Below are figures for the proportion of tranches with each of the ratings that either PIF, remained at the same rating category or were downgraded by less than 1 category:

High quality – after criteria has been applied:

AAA	AA	A	BBB	BB	B
90.9	88.9	100.0	100.0	0.0	0.0

All EMEA CMBS:

AAA	AA	A	BBB	BB	B
63.7	61.0	62.0	48.0	39.2	43.8

European SME CLOs

		Rating as at 31-Dec-2009											
	(%)	PIF	AAA	AA	A	BBB	BB	B	CCC	CC, C, D	WD	Total No.	
Rating as at 1-Jan-2009	AAA	18.7	54.0	7.9	14.4	2.9	1.4	0.7	0.0	0.0	0.0	139	
	AA	16.0	2.0	42.0	12.0	18.0	0.0	6.0	4.0	0.0	0.0	50	
	A	8.3	0.0	0.0	56.7	11.7	11.7	5.0	5.0	1.7	0.0	60	
	BBB	13.0	0.0	0.0	0.0	34.8	18.8	8.7	18.8	5.8	0.0	69	
	BB	8.9	0.0	0.0	0.0	0.0	42.2	17.8	15.6	15.6	0.0	45	
	B	5.9	0.0	0.0	0.0	0.0	0.0	52.9	5.9	35.3	0.0	17	
	CCC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	88.9	0.0	9	
	CC, C, D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	10	
	Total No.		53	76	32	60	44	41	30	27	36	0	399
	Total %		13.3	19.0	8.0	15.0	11.0	10.3	7.5	6.8	9.0	0.0	100.0

European CMBS

		Rating as at 30-Sep-2013											
	(%)	PIF	AAA	AA	A	BBB	BB	B	CCC	CC, C, D	WD	Total No.	
Rating as at 1-Jul-2007	AAA	43.7	12.3	8.0	7.1	6.3	1.7	2.3	0.6	2.3	15.7	350	
	AA	40.7	0.6	15.3	5.6	11.9	6.2	5.6	4.5	6.2	3.4	177	
	A	42.9	0.6	1.2	9.8	7.4	6.1	8.0	8.0	11.7	4.3	163	
	BBB	28.2	0.0	0.0	2.3	12.4	5.1	3.4	10.7	29.4	8.5	177	
	BB	34.3	0.0	0.0	0.0	0.0	2.0	2.9	2.0	38.2	20.6	102	
	B	35.4	0.0	0.0	0.0	0.0	0.0	2.1	6.3	27.1	29.2	48	
	CCC	44.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.4	11.1	9	
	CC, C, D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	
	Total No.		401	45	57	55	77	38	41	47	146	119	1,026
	Total %		39.1	4.4	5.6	5.4	7.5	3.7	4.0	4.6	14.2	11.6	100.0

Annex 10: Evaluation of outstanding UK non-conforming RMBS deals rated by Fitch against criteria²³⁰

Deal ID	Deal Name	Arrears	UnverifiedIncome	CCIs
87147493	Southern Pacific Securities 05-3 Plc	4.6	68.8	45.5
87147507	Money Partners Securities 2 Plc	3.2	49.4	16.9
87147544	Southern Pacific Securities 06-1 plc	5.2	69.6	46.7
87147551	Preferred Residential Securities 06-1 PLC	20.9	57.6	33.0
87147552	Southern Pacific Financing 06-A Plc	3.0	59.2	25.8
87147577	Newgate Funding Plc Series 2006-1	8.6	67.5	12.6
87147580	Leek Finance Number Seventeen PLC	6.1	57.2	7.1
87147650	Money Partners Securities 3 Plc	3.8	50.4	19.5
87147659	Eurosail 2006-1 Plc	5.1	71.1	35.5
87147662	Clavis Securities plc Series 2006-01	0.5	55.6	0.0
87147668	ALBA 2006-1 plc	9.8	69.7	2.4
87147697	ResLoC UK 2007-1 plc	3.9	40.7	12.1
87147699	Clavis Securities plc Series 2007-01	1.6	50.2	0.3
87147702	ALBA 2007-1 plc	4.9	37.3	6.0
87147706	Bluestone Securities plc - Series 2007-01	14.5	73.5	18.7
87147710	Newgate Funding Plc Series 2007-2	6.4	60.2	19.1
87147723	Ludgate Funding Plc Series 2007 FF1	1.1	43.0	0.0
87147729	EuroMASTR Series 2007-1V plc	21.1	77.5	35.6
87147743	Great Hall Mortgages No. 1 plc (Series 2007-2)	5.6	55.3	11.7
87147757	Eurosail-UK 07-3 BL Plc	14.6	61.9	29.9
87147788	Eurohome UK Mortgages 2007-2 plc	5.5	75.5	27.6
87147799	Eurosail-UK 07-4 BL Plc	5.6	57.1	29.7
87147839	Eurosail Prime-UK 2007-A PLC	0.0	45.7	0.0
87147981	Preferred Residential Securities 8 Plc	0.0	0.0	0.0
87147995	Leek Finance Number Fifteen PLC	4.0	57.4	13.5
87148155	Bluestone Securities plc - Series 2005-01	6.0	66.7	20.6
87148171	Southern Pacific Financing 05-B Plc	7.3	71.3	16.7
87148183	Money Partners Securities 1 Plc	5.6	55.1	19.5
87148189	Mortgages No. 7 PLC	7.2	64.2	18.3
87148258	Great Hall Mortgages No. 1 plc (Series 2007-1)	5.2	59.5	10.1
87148263	Eurosail-UK 2007-1 NC Plc	23.3	63.5	41.1
87148268	Newgate Funding Plc Series 2007-1	7.3	55.5	17.4
87148270	Landmark Mortgage Securities No.2 Plc	9.2	59.7	26.6
87148274	Eurohome UK Mortgages 2007-1 plc	2.4	68.3	9.6
87148299	Kensington Mortgage Securities plc. - Series 2007-1	4.3	69.8	17.8
87148314	Eurosail-UK 2007-2 NP Plc	8.0	51.6	21.5
87148316	Leek Finance Number Nineteen Plc	5.3	52.3	8.6
87148323	Mansard Mortgages 2007-1 PLC	19.9	76.3	22.2
87148385	Eurosail-UK 2007-5 NP Plc	5.0	46.3	20.3
87148397	Newgate Funding Plc Series 2007-3	9.7	54.7	14.2
87148400	Eurosail-UK 2007-6 NC Plc	18.1	55.3	43.9
87148409	Mansard Mortgages 2007-2 PLC	0.0	85.2	13.1
87148461	EMF-UK 2008-1 Plc	0.0	48.7	17.0
87148464	Ludgate Funding Plc's Series 2008-W1	3.8	0.0	100.0
87148467	Mortgage Funding 2008-1 Plc	21.2	53.3	32.0
87148505	Newgate Funding Plc Series 2006-2	5.4	68.0	12.7
87148512	Landmark Mortgage Securities No.1 Plc	4.2	82.3	19.5
87148540	Bluestone Securities plc - Series 2006-01	17.6	73.0	21.3
87148586	Eurosail 2006-2BL PLC	15.1	51.3	34.3
87148624	Leek Finance Number Eighteen Plc	4.0	51.8	9.8
87148625	Marble Arch Residential Securitisation Ltd No 4	25.2	49.8	17.1
87148634	Mansard Mortgages 2006-1 PLC	5.3	71.7	18.4
87148644	ALBA 2006-2 plc	4.9	55.8	6.8
87148645	Newgate Funding Plc Series 2006-3	7.8	54.6	19.5
87148647	Eurosail 2006-3 NC Plc	7.0	76.2	42.6
87148653	Money Partners Securities 4 Plc	3.5	58.9	21.3
87148658	Ludgate Funding Plc Series 2006 FF1	2.8	58.3	1.5
87148666	Eurosail 2006-4NP Plc	3.8	69.8	21.7
87148679	Great Hall Mortgages No. 1 plc (Series 2006-1)	5.2	50.6	11.2
87148865	Farringdon Mortgages No. 1 Plc	8.5	79.3	37.5
87148871	Southern Pacific Securities 05-1 Plc	0.8	71.8	43.4
87148906	Marble Arch Residential Securitisation Ltd No 3	6.7	86.1	38.7
87148914	Southern Pacific Securities 05-2 Plc	4.7	69.3	43.0
87148927	Farringdon Mortgages No. 2 Plc	22.2	69.2	42.2
87148952	Residential Mortgage Securities 21 Plc (RMS 21)	1.4	84.1	17.4
87148962	Leek Finance Number Sixteen PLC	4.9	56.4	14.1
87168373	Leek Finance Number Twenty One PLC	7.9	44.5	5.4
87562978	Leek Finance Number Twenty Two PLC	10.4	51.4	8.5
89354261	Residential Mortgage Securities Plc 25 (RMS 25)	5.1	38.0	15.1

²³⁰ Information provided by Fitch ratings.