ADB

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Enabling Monetization of Infrastructure Assets in India

Structuring of Commercially-Viable Securitization of Infrastructure Loans

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Asian Development Bank

Currency equivalent

(As of February 2016)

United States dollar (USD) 1.00 = Indian rupees (INR) 67

Abbreviations

	ABS	-	Asset-Backed Security
	ADB	-	Asian Development Bank
	ALM	-	Asset-Liability Mismatch
	COD	-	Commercial Operations Date
	CRIS	-	CRISIL Risk and Infrastructure Solutions
	EIS	-	Excess Interest Spread
	FPI	-	Foreign Portfolio Investors
	ICAI	-	Institute of Chartered Accountants of India
	LIC	-	Life Insurance Corporation of India
	PSB	-	Public Sector Bank
	PTC	-	Pass Through Certificates
	SPV	-	Special Purpose Vehicle
	TDS	-	Tax deducted at Source

Executive Summary

Infrastructure debt finance in India dominated by PSBs…

Globally, infrastructure is financed by entities with matching long-term liabilities, such as insurance and pension funds, sovereign wealth funds, etc.

In India, however, PSBs are pivotal in funding infrastructure projects, with the exposure of PSBs to the infrastructure sector being 17.6% of the total outstanding bank credit. This, coupled with deterioration in infrastructure assets in the country, has led to an increase in both asset-liability mismatches and non-performing assets (NPAs).

PSBs need INR 3 trillion (USD 45 billion) to meet Basel III capital adequacy norms…

Guidelines issued by the Reserve Bank of India (RBI) on Basel III norms, due to be fully implemented by April 2019, mandate higher capital adequacy requirements for banks.

Assuming a credit growth of 12%, PSBs need INR 3 trillion to meet the Basel III norms. While additional equity infusion from the government and possible equity dilution will help bridge the gap partially, PSBs need to explore alternate avenues to raise an additional INR 1.9 trillion (USD 28 billion) by 2019 – 20.

Infrastructure securitization can be one of the viable tools to meet the tier-1 capital gap of PSBs…

Securitization can help release funds, by converting illiquid assets into marketable securities, sold to institutional investors.

Given the high exposure of PSBs to infrastructure sector, and higher recoveries vis-à-vis other corporate assets, infrastructure assets are best suited for securitization in India.

Securitization well entrenched in India, market barriers present…

While India's securitization market has been in existence since the early 1990s, banks have been key investors of securitized papers, to meet their priority sector lending targets.

The participation from institutional investors has been subdued, largely due to the prevalent challenges of the securitization market in India. The Finance Budget 2016 has introduced multiple reforms for securitization of standard assets, addressing one of the key challenges of securitization. However, other market barriers remain, which will need corrective measures to unlock the potential of securitization in India.

A snapshot of the challenges is presented below:

Challenge	Corrective Measure

Distribution tax regime deducts tax before income is distributed to investors: results in lower net yields, vis-à-vis bonds/G-secs.	The Finance Budget 2016 has amended the tax regime - securitized papers now taxable at the hands of the investors, making them at par with other bond market instruments.
Lack of investor appetite for equity/mezzanine tranches.	Support for equity/mezzanine tranches may be provided by originator and other market makers.
Low liquidity of securitization papers deters investors with shorter horizon periods, such as Mutual Funds.	Push from regulatory authorities is required for the development and expansion of a secondary securitization market.

Optimal structure for infrastructure securitization to incorporate investor expectations, given the nascence of the securitization market in India…

India's securitization market is limited in diversity, with no prior instances of infrastructure asset securitization. Investors for securitization in India are institutional investors (insurance and pension funds, mutual funds), who are traditionally risk-averse and unwilling to bear the construction risk in the infrastructure sector.

Against this back-drop, it is essential to ensure that the asset pool for securitization consists of quality assets, and appropriate credit enhancement mechanisms are provided, to extend adequate protection to investors throughout the tenure of the transaction.

Underlying asset pool to consist of 20 – 30 (predominantly) roads assets, with a remaining tenure of 10 – 15 years...

PSBs' outstanding credit portfolio consists of projects majorly in the power (62%) and roads sector (19%). Since thermal-power generation based projects may not be amenable to securitization due to low recoveries (~20%), the underlying asset pool will mainly consist of roads assets.

Roads projects in India are typically sized between INR 2 – 3 billion (USD 30 – 45 million), with an average remaining tenure of 10 – 15 years. A pool of 20 – 30 such projects will be most suited to securitization, due to its marketability as well as the protection provided by the inherent diversity provided by the pool.

Complete asset pool to be sold through a single class of AA and above rated security, supported by a three-tiered credit enhancement structure…

In order to maximize the capitalization benefits to the originators, it is envisaged that a single class of AA and above rated securities will be issued to institutional investors.

The underlying asset pool will require additional support to further improve its credit quality, and will be provided by credit enhancements in the form an excess interest spread, and a two-tiered external structure of a cash collateral and a guarantee facility. An illustration of the structure and support provided by the credit enhancement is depicted below:

Figure 1 Optimal Structure for Infrastructure Securitization

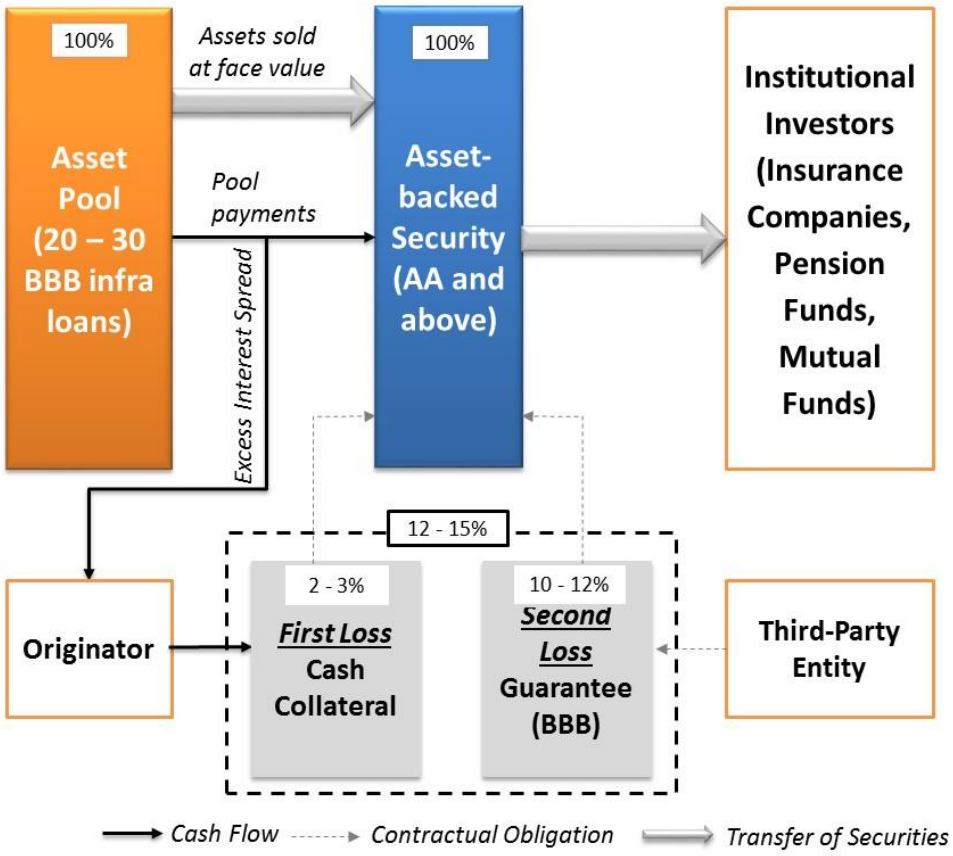
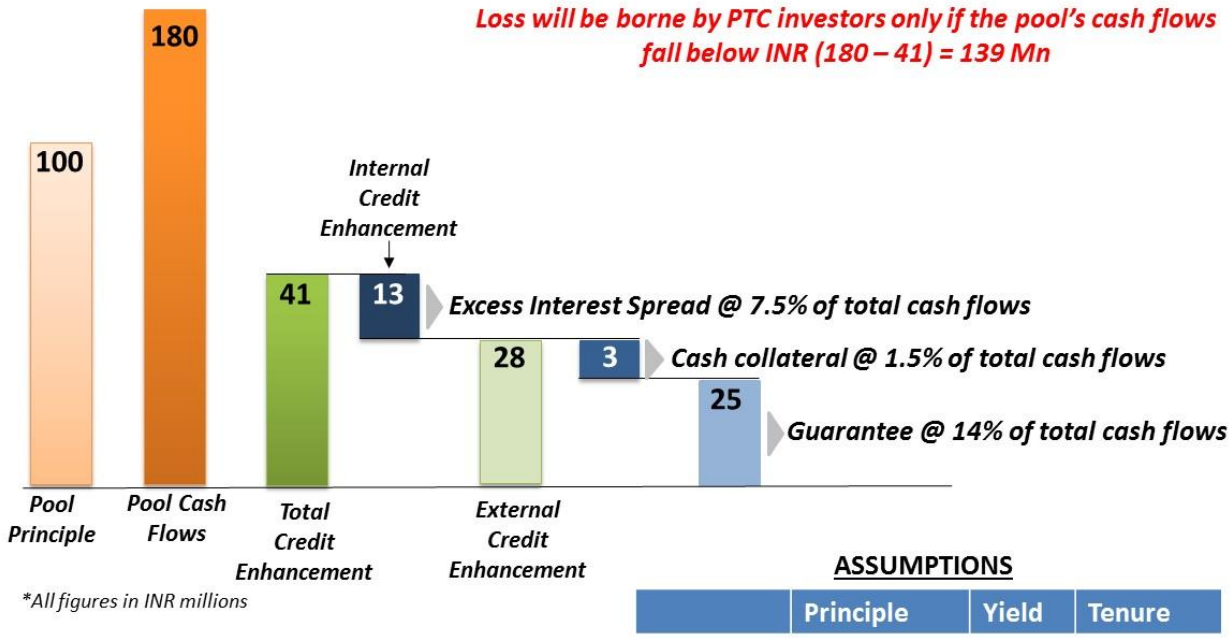


Figure 2 Support from Credit Enhancement: Illustration



ASSUMPTIONS

	Principle	Yield	Tenure
Asset Pool	INR 100 Mn	10%	10 years
ABS	INR 100 Mn	8%	10 years

Since rating agencies in India typically require the originators to provide the cash-collateral, provision of the guarantee facility will negate the capitalization benefits and be unattractive to the originators. Given the absence of commercial entities willing to providing guarantee facilities for securitization transactions in the medium term, the facility could be extended by the originator or a government-promoted entity functioning as a market maker.

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I. Introduction

1. In June 2015, Asian Development Bank (ADB) appointed CRISIL Infrastructure Advisory to undertake a technical study aimed at establishing a viable structure and framework for the monetization of infrastructure loan assets in India.

2. India's banking sector is under pressure as banks, weighed down by bad loans and weak profitability, are reaching their exposure limits in infrastructure lending. The problem is more acute with public sector banks (PSBs); in the past year, PSBs have accumulated nearly 86% of non-performing assets (NPAs) of the banking sector as compared to their 75% asset base.

3. Compounding the banking sector's problems are the new Basel III norms on bank capital, which will be fully implemented by 2019. Various studies have estimated that India's banking sector needs INR 2.5-6.0 trillion (USD 37-90 billion) of capital to meet these norms. The finance ministry has estimated that PSBs would need an additional INR 3 trillion (USD 45 billion) by the end of 2018-19 of which the banks themselves need to raise INR 1.9 trillion (USD 28 billion) (the government will fund the rest).

4. The problems afflicting India's banking sector also affect the country's infrastructure sector, as banks fund close to 60% of the sector's requirements. It is estimated that the debt requirement of the infrastructure sector is high at INR 30 trillion (USD 448 billion).

5. In this context, this study assesses the monetization of infrastructure assets to:

   I. Strengthen the capital position of PSBs so that they are well placed to fund new credit growth opportunities and meet Basel III requirements;

   II. Improve fund flow to the infrastructure sector by securitizing infrastructure assets, thus enhancing their access to institutional investors such as pension funds, insurance funds and mutual funds.

6. The first deliverable under this study was a report on **Module 2: Analysis of Market and Policy Frameworks Governing Securitization in India.** It covered an analysis of the requirements of the infrastructure sector and securitization market in India, and presented the regulatory, legal, taxation and accounting frameworks governing securitization in India. A brief summary of the implications of the study and impact of the Finance Budget 2016 on key issues are presented below:

Section	Summary
Securitization	The securitization market in India is relatively nascent, and dominated

Market in India	by retail assets, with no prior instances of infrastructure securitization. As a result of this, potential investors for infrastructure securitized papers require protection from the risks inherent in the construction sector. This is addressed by incorporating risk mitigation techniques in the optimal structure – by way of selection of the asset pool and providing adequate credit enhancements (covered in this report). **Impact of Finance Budget 2016** *Finance Budget 2016 has proposed the establishment of an LIC sponsored dedicated fund to provide credit enhancement to infrastructure projects in India, which will further aid in addressing the credit enhancement requirements of infrastructure securitized papers.* The absence of a secondary market for securitized papers deters investors with shorter horizon periods such as mutual funds. Thus, support from the regulatory authorities in India will be required to promote the secondary securitization market.
Regulatory Framework	At present, most domestic investors are permitted to invest in securitized papers, though there is a regulatory ceiling for investments for certain investor classes such as insurance and pension funds. FPIs are permitted to invest only security receipts issued by asset re-construction companies. **Impact of Finance Budget 2016** *Finance Budget 2016 has permitted FPIs to invest in PTCs of securitization trusts, which will expand the existing investor base for infrastructure securitized papers.*
Legal Framework	The legal framework for securitization transactions is provided by the Finance Act, 2013 and poses no significant challenges for infrastructure securitization in India.
Accounting Framework	The accounting framework for securitization in India, guided by ICAI AS – 30, is at par with the international accounting standards for securitization transactions and has no major implications for infrastructure securitization in India.

Taxation Framework	The current distribution tax regime was a key challenge of the securitization market in India, as all investors were taxed at 30%, deducted by the trust, on the income from securitized papers. The high tax on securitized papers made them unattractive to investors in India. **<u>Impact of Finance Budget 2016</u>** *As per the Finance Budget 2016, a complete overhaul of the tax regime for securitized papers was proposed – securitized papers will now be taxed on the hand of the investors, at their effective tax rate. While the trust will still have to deduct TDS at 30%, investors can claim tax credit against the deducted TDS. As a consequence of this reform, securitized papers are now yield positive for investors, and at par with other debt instruments such as bonds/G-secs.*

7. This report is the second deliverable under this study. This report presents an optimal structure for securitization of infrastructure assets in India, against the backdrop of investor expectations and inherent challenges of the market. The report is structured as follows:

    I. Introduction (this section)

    II. Optimal Structure for Infrastructure Securitization in India:

        a. Asset Pool Characteristics (including amortization profile, financial covenants)

        b. Transaction Structure

        c. Credit Enhancement

        d. Mechanism of the Optimal Structure

    III. Annexures

II. OPTIMAL STRUCTURE FOR INFRASTRUCTURE SECURITIZATION IN INDIA

8. The optimal structure for infrastructure securitization has been detailed in this section vis-à-vis three key tenets underpinning securitization in India:

   i. Part A details the characteristics of the asset pool that will be suited for securitization, given the nascence of the market and the investor expectations in India.

   ii. Part B gives transaction structure to maximize benefits accruing to originating banks.

   iii. Part C presents the credit enhancements required to provide adequate risk-adjusted returns to institutional investors, and the enhancement issuing entities.

9. A diagrammatic representation of the recommended optimal structure, with a detailed understanding of its mechanism is provided in Part D.

10. As detailed in Module 2, a securitization trust would first be required to be established, to facilitate the pooling of assets and issuance of PTCs. The securitization trust will be capitalized using the proceeds of the consideration received from investors, for the sale of PTCs.

A. Asset Pool Characteristics

11. India's securitization market is limited in diversity as compared to other developed markets with mainly private sector banks and NBFCs originating portfolios dominated by retail assets. There have been no prior instances of securitization of infrastructure loans.

12. As explained in Module 2, investors for securitized infra papers in India are likely to be institutional investors such as insurance and pension funds. These investor classes have been traditionally risk-averse, and their investment objectives as well as regulations do not permit investment in high-risk instruments rated below AA[1].

13. Against this backdrop, underlying pool for securitization needs to consist of quality assets, which have achieved commercial operation and have demonstrated a minimum repayment history of 6 months – 1 year, to mitigate the inherent construction risk in the infrastructure sector.

[1] For a summary of key regulations for investment in infrastructure securitized papers in India, refer Annexure – 1.

14. Presently, PSBs' outstanding post-COD loan portfolio is dominated by power projects (62%), with the balance consisting of roads and highways sector (19%), telecom sector (12%) and other sectors such as ports and aviation, (7%).

15. However, thermal power based assets have low recovery rates, and may not be amenable to securitization in India. Thus, the underlying receivable pool is expected to comprise mainly of roads and highways assets, since it has higher recovery rates (~60%) and has the second-largest share of PSBs' post-COD infrastructure assets (19%).

16. Assets in the roads and highways sector are typically sized between INR 2 – 3 billion (USD 30 – 45 million), with an average remaining tenure of 10 – 12 years. Ensuring adequate diversity in the pool through the tenure of the transaction, assets with similar cash flow characteristics in other sub-sectors (non-thermal power, ports, and aviation) can also be included in the pool.

17. Given the trade-off between the marketability of a smaller pool and the in-built protection provided by a larger, diversified pool, it is envisaged that a mid-sized pool consisting of 20 – 30 assets, with a minimum stand-alone credit rating of BBB, will be conducive to securitization in India.

B. Transaction Structure

18. The structuring of transaction cash flows gives the originators the flexibility to tailor instruments to meet investor requirements based on the risk appetite and tenor requirements. The two most commonly used transaction structures in India are par structure and premium structure[2].

19. The par structure, being widely prevalent in India, is better suited for infrastructure securitization, due to the comfort investors derive from its familiarity.

C. Credit Enhancement

20. The securitization market appetite in India exists largely for papers rated AA and above, with post-COD assets. Since the average rating of infrastructure assets in India is BBB, external support will be required to improve the credit quality of the underlying asset pool.

21. While the pooling of multiple, diverse loans will provide a statistical advantage, additional support may be required to further enhance the credit rating of the securitized papers and make them attractive to investors.

[2] Refer Annexure – 2 for details.

22. Typically, securitization transactions in India are supported by a tiered structure of internal credit enhancement mechanisms (incorporated within the allocation of the cash-flows) and external credit enhancements (provided by external entities)[3]. While external credit enhancement mechanisms are more reliable, as they are independent of the performance of the pool, they also increase the counter-party risk of the investors to entities other than the borrowers.

23. The extent and nature of credit enhancement required depends on numerous factors, such as the investor expectation, the desired rating level, credit characteristics of the underlying asset pool and the cost of the credit enhancement.

24. For securitization of infrastructure assets, due to the absence of an investor appetite for sub-investment grade tranches, it is envisaged that the internal credit enhancement could be provided through an excess interest spread only.

25. In line with the requirement of rating agencies in India, the first-loss protection would be provided by a cash collateral facility provided by the originating banks. Usually the first loss protection is at least one instalment of pool cash flows and needs to be maintained as a cash collateral (as required by rating agencies in India in the past transactions).

26. The second loss protection mechanism could be an external guarantee facility, which will be provided against a guarantee fee paid by the securitization trust.

27. The quantum of credit enhancement required would be around 12-15%[4] of the pool cash flows (20-25% of pool principal), with 2-3% provided by the cash collateral and the larger portion of 10-12% provided via a guarantee facility. An upfront guarantee fee of 1 – 2% of the guaranteed amount, could off-set the guarantee outflows in a steady state, making the facility viable for the issuing entity[5].

28. Given the nascent securitization market in India, commercial market players may be unwilling to provide the guarantee facility in the medium term, and could thus be provided in two ways:

    I. Directly by the originator or

    II. By a government-promoted entity, functioning as a market maker.

[3] Refer Annexure – 3 for details.

[4] As per estimates through Monte-Carlo simulation of 30 BBB rated infra loans. For detailed assumptions used in the Monte Carlo simulation method, refer Annexure – 5.

[5] For an illustration of the viability of the guarantee fee, refer Annexure – 6.

29. The originator has to hold capital to the extent of the enhancement provided. The difference in the amount of capital required in the above two scenarios is very minimal , as illustrated below:

Table 1 Effect of Credit Enhancement on banks' capitalization: Illustration

Capital Required* **(as a % of pool size)**	**Cash Collateral** **(Amount x RW x CAR)**	**Guarantee** **(Amount x RW x CAR)**	**Investment in PTCs to meet MRR** **(Amount x RW x CAR)**	**Total**
Scenario 1: Cash Collateral Only	**3%** *(3% x 1250% x 9%)*	-	**0.126%** *(7% x 20% x 9%)*	**3.126%**
Scenario 2: Cash Collateral + Guarantee (back-stopped by ADB)	**3%** *(3% x 1250% x 9%)*	**1.35%** *(15% x 20% x 9%)*	-	**4.35%**

*Assuming a Tier – 1 CAR of 9%

D. ADB Support mechanism

30. ADB could participate to support the guarantee facility through one of the following ways:

    I. If the second loss protection is provided by the originator, ADB could back stop the guarantee of the originator, which could be further secured by a sovereign guarantee.

    II. If the guarantee is provided by a third-party government-promoted entity, ADB could provide a direct loan to the government promoted entity providing the guarantee.

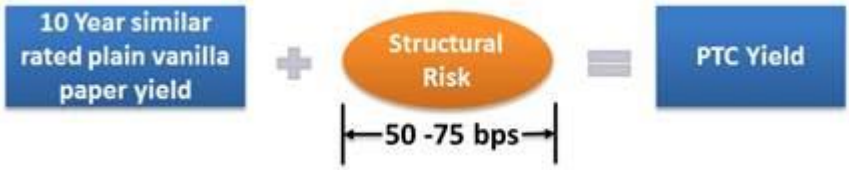
E. Mechanism of the Optimal Structure

31. The optimal structure for infrastructure securitization comprises of a single-class of AA and above rated securities issued to institutional investors, supported by an excess

interest spread, and a cash collateral account as the first-loss protection and an external third-party guarantee as the second-loss protection.

32. As explained in Module 2, the investors expect the yield of the securities to be at a premium of 50 – 75 bps over the prevailing rates for 10 year-rated plain vanilla corporate bonds of same rating, to incorporate the structural risk of securitized transactions. For example: AAA rated securitised papers is expected to have a premium of 50-75 bps over the average prevailing AAA rated corporate bonds.

Figure 3 Pricing Mechanism for Infrastructure PTCs



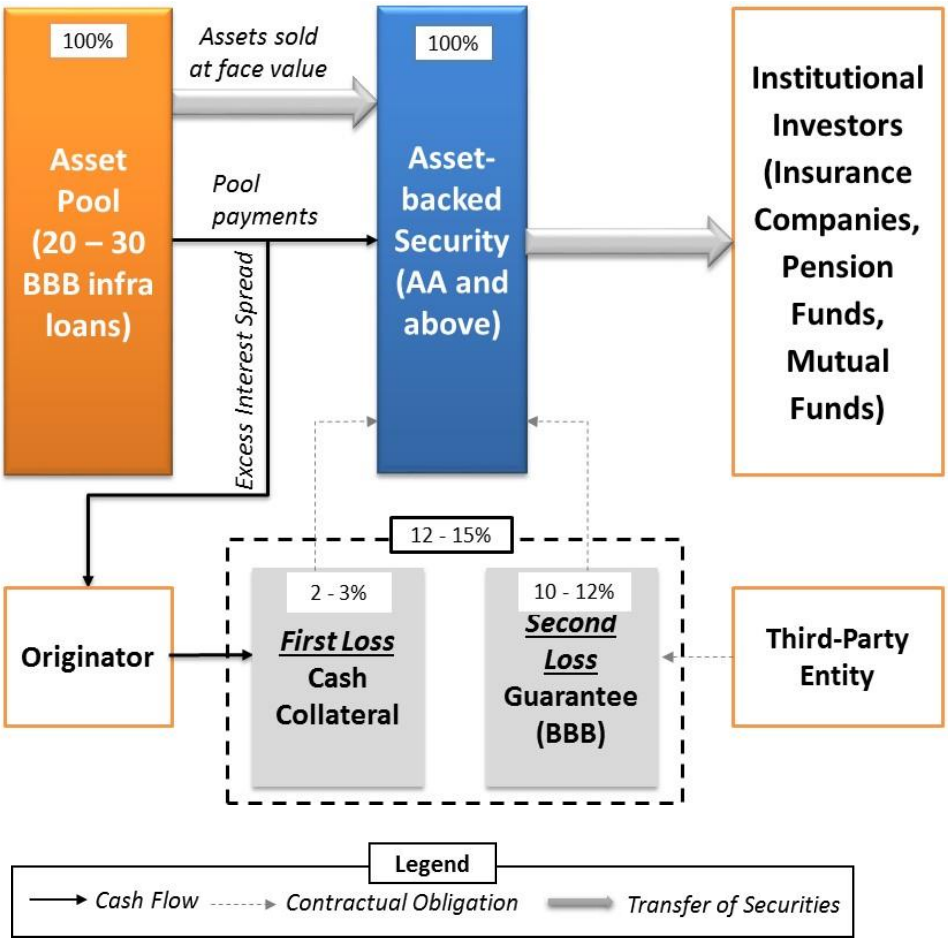
33. The amortization of the securitized papers will match the amortization profile of the underlying asset pool, with higher debt obligations in the initial years (due to interest on a higher principle outstanding), and tapering in the subsequent years[6].

34. This structure results in higher capitalization benefits for originators, as the complete asset pool is sold to investors. Additionally, as the credit enhancement will pre-dominantly be provided externally, there will be adequate protection to the investors throughout the tenure of the security, independent of the underlying pool performance.

35. A diagrammatic representation of the optimal structure is presented below:

[6] An illustration of the amortization profile of the asset pool is presented in Annexure – 4.

Figure 4 Optimal Structure for Infrastructure Securitization in India



III. KEY MISSION FINDINGS

It is critical to ensure that the securitization market for infrastructure assets can co-exist with Infrastructure Debt Funds (IDFs), institutions established to fund infrastructure in India.

36. IDF-MFs can complementarily exist with infrastructure securitized papers as they are permitted to invest in securitized debt instruments, with no capping in the investment limit. Given the lack of quality investment options in the infrastructure sector for IDF – MFs, securitized papers could function as an ideal investment instrument for IDF – MFs.

37. Presently, IDF – NBFCs are not permitted to invest in securitized papers – they can only invest directly into post-COD infra projects. The team shall consult with the RBI (which regulates IDF – NBFCs) to explore the possibility of permitting IDF – NBFCs to invest in securitized papers of post-COD infra assets. Infrastructure securitized papers however, will not adversely affect the growth of IDF – NBFCs, as these institutions could still re-finance the securitised infrastructure projects, which will lead to prepayment in the underlying asset pool.

Infrastructure loans in India are based on floating interest rates, linked to the banks' base rate. Given the nature of liabilities of institutional investors in India, they are unwilling to take on the interest rate risk of floating instruments.

38. In the absence of interest rate swap market in India, the floating rate risk needs to be borne by one of the three entities, which could be explored and negotiated during the transaction stage:

    i. **Originator:** better suited to bear the risk, as the interest payments will be linked to its base rate. Originators could provide a fixed coupon rate to investors, for a premium/fee. Interest rate risk in few MBS transactions was borne by the originators in the past.

    ii. **Investors:** investors could bear the floating rate risk through higher coupon rates adjusted to price in interest rate risk.

    iii. **Third-party entity:** In the absence of interest rate swap market, the government promoted entity providing the guarantee facility, could also provide a guarantee against the interest rate risk, for a fee.

39. There is a possibility of the securitisation trust renegotiating the terms from floating rate to fixed rate with the developer, after the sale of assets by the originator. But, it is difficult to get the consent from the developers of all the projects in the pool. However, this renegotiation of few assets in the pool could offset interest rate risk.

Institutional mechanisms to monitor the underlying asset pool will be critical to ensure the comfort of investors.

40. Monitoring and oversight mechanisms for the underlying asset pool need to be provided by a third-party, to provide the required comfort to the investors.

41. IDFs investing in the securitized papers could monitor the quality of underlying assets, or an independent monitoring authority could be set up during the transaction stage.

IV. ANNEXURES

A. Annexure 1: Summary of Key Regulations for Investors

Table 2 Key Regulations for Investment in Infrastructure Securitized Papers

Investor Class	Investment in Infrastructure Sector	Investment in Securitised Instruments	Requirements Regarding Credit Rating
Life Insurance Funds	Minimum 15% in infra & housing	Maximum of 10% of corpus can be invested in securitized assets	All approved instruments have to be rated AA or above*
Pension/ Provident Funds	No minimum or maximum limits	Maximum of 5% of corpus can be invested in ABS, Units of Real Estate / Infrastructure Investment Trusts	Varies for different schemes, no instrument below BBB
Mutual Funds	No minimum or maximum limits; Infrastructure Debt Funds – minimum 90%	No minimum or maximum limits	No minimum or maximum requirements
Alternative Investment Funds	Category-1 infrastructure funds to invest 75% in Infra; others have no limits	No minimum or maximum limits**	No minimum or maximum requirements

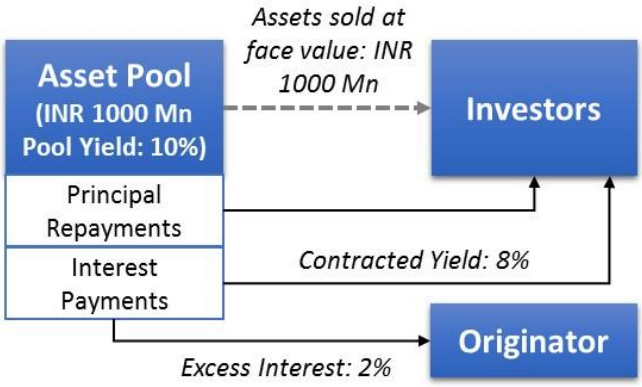
B. Annexure – 2: Securitization Structures in India: Par and Premium

1. Mechanism

a. Par structure

42. Investor pays a consideration equal to the principal component (par value) of future cash flows. In return, the investor is entitled to receive scheduled principal repayments from the pool in addition to the contracted yield (called PTC yield) every month. Typically, the asset yield is greater than PTC yield, which results in excess cash flows every month, often referred to as excess interest spread or EIS. For example, a pool of assets with a principal amount of Rs 1 billion with a collective yield of 10% may be sold to investors at a yield of 8%. In this case, the investors are entitled to principal amount of Rs 1 billion along with a yield of 8%. The excess 2% yield from the pool of assets acts as EIS, effecting offering protection (to that extent) against any shortfalls in the cash flow of the pool of assets.

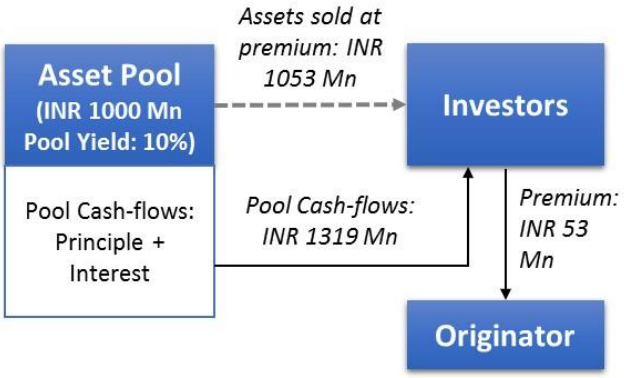
Figure 5 Par Structure



b. Premium structure

43. The investor is entitled to the entire cash flows (EMIs) from the pool every month. The investor pays a consideration greater than principal component of future cash flows. The purchase consideration is the net present value of the entire cash flows discounted at a contracted rate (PTC yield). This structure does not involve an excess interest spread. For example, in case of a pool of assets with a principal amount of Rs 1 billion with a yield of 10%, the total cash flows amount to Rs 1.13 billion. In a premium structure, investors are entitled to the entire cash flow of Rs 1.13 billion, for which the purchase consideration may be slightly higher than Rs 1 billion, say Rs 1.05 billion.

Figure 6 Premium Structure



2. Illustration

a. Assumptions

i. Loan Amount – INR 1 billion

ii. Pool Yield: 10%

iii. Investor's Yield: 8%

iv. Tenure: 5 years

b. Cash-flows for Par Structure:

Table 3 Par Structure - Cash-Flows

Asset Pool					Investors				Excess Interest
Year	**Principle**	**Interest**	**Total Cash-Flows**	**POS**	**Principle**	**Interest**	**Total Cash-Flows**	**POS**	
0				1000				1000	
1	164	100	264	836	164	80	244	836	20
2	180	84	264	656	180	67	247	656	17
3	198	66	264	458	198	52	251	458	13
4	218	46	264	240	218	37	255	240	9
5	240	24	264	0	240	19	259	0	5
Total	**1000**	**319**	**1319**		**1000**	**255**	**1255**		**64**

c. Cash-flows for Premium Structure

Table 4 Premium Structure - Cash Flows

Asset Pool					Investors				Excess Interest
Year	**Principle**	**Interest**	**Total Cash-Flows**	**POS**	**Principle**	**Interest**	**Total Cash-Flows**	**POS**	
0				1000			1053		
1	164	100	264	836	180	84	264	874	-
2	180	84	264	656	194	70	264	680	-
3	198	66	264	458	209	54	264	470	-
4	218	46	264	240	226	38	264	244	-
5	240	24	264	0	244	20	264	0	-
Total	**1000**	**319**	**1319**		**1053**	**266**	**1319**		**-**

C. Annexure – 3: Credit Enhancement Techniques

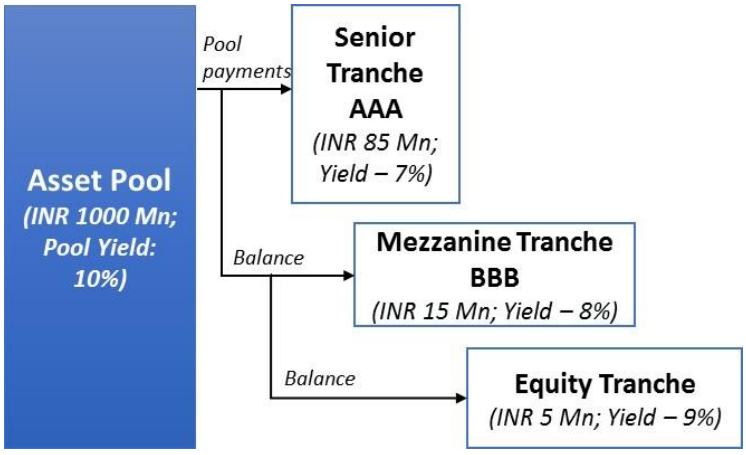
1. Internal Credit Enhancements

44. Internal credit enhancements are provided directly by the cash-flows of the underlying receivable pool and are incorporated in the legal structure of the securitization transaction. India, credit tranching and excess interest spread are the most widely used forms of internal credit support.

a. Credit Tranching

45. Credit tranching involves the issuance of multiple classes (or tranches) of securities, with different risk-return profiles. Lower, junior tranches are higher risk tranches, which serve as protection mechanisms for the higher-rated senior tranches, through subordination in claim over the pool cash-flows. The cash-flows are prioritized to pay the senior most tranches first, while the losses are absorbed by the junior most tranches. For instance, a pool of INR 1 billion (USD 15 million) and yield of 10%, could be sold in three tranches, as depicted in the diagram below. The mezzanine and equity tranches receive their payment only after the debt obligations of the senior tranche are met.

Figure 7 Credit Tranching: Illustration



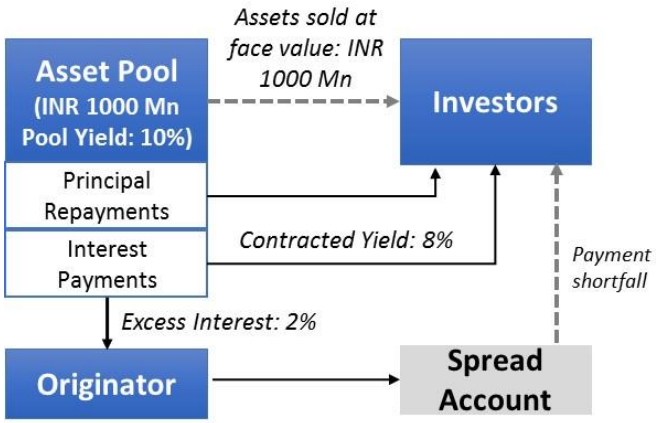
46. Credit tranching helps in the creation of securities which caters to the different risk-return frameworks of various investor classes. However, in nascent markets such as India, there is no appetite for lower rated tranches, and have to be usually retained by the originators, resulting in significant reduction of capitalization benefits.

b. Excess Interest Spread

47. Excess interest spread is the difference between the yield of the underlying asset pool and yield contracted to be paid out to the investors. The spread may either revert back to the seller, or may be captured in a bankruptcy-remote reserve account, called as the

spread account. For instance, a portfolio with a yield of 10%, pay out 8% to the investors, with the differential 2% being the excess interest.

Figure 8 Excess Interest Spread - Illustration



48. It is the most widely used form of credit enhancement, and usually represents the first line of protection against credit losses.

2. External Credit Enhancements

49. External credit enhancements are provided by the originator and/or other third-party firms, and increases the counter-party risk of investors, to entities other than the borrowers. In India, the credit enhancements usually take the form of a cash collateral or a guarantee facility.

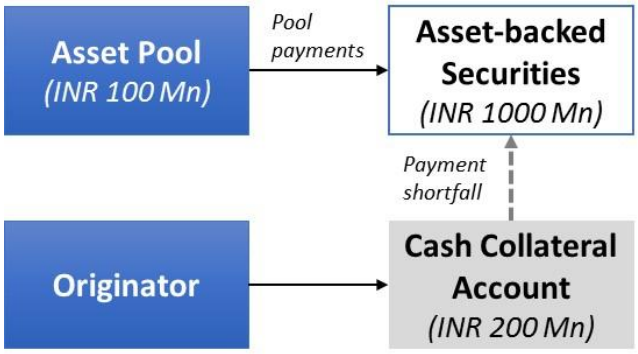
a. Cash Collateral

50. In a cash-collateral account, the provider maintains funds (usually equivalent to one instalment) in a distinct, bankruptcy-remote account, in the form of cash or cash equivalents (money market instruments).

51. It is usually funded at the time of the issue of the funds, and covers any shortfall in payments to the extent of the account size.

52. Rating agencies in India require originating banks to provide a cash collateral for securitization transactions, and thus results in additional cost for originators.

Figure 9 Cash Collateral - Illustration

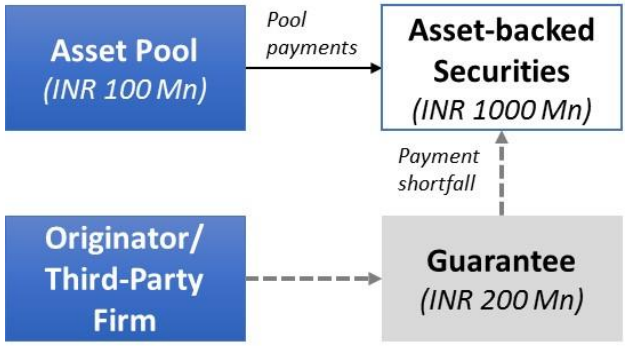


b. Guarantee Facility

53. A guarantee facility is an unconditional, irrevocable commitment provided by originator/third-parties to meet any shortfall in payments to investors, either partially or fully.

54. Unlike the cash-collateral, it is an unfunded commitment and the credit quality of the guarantee depends on the credit rating of the issuer and the extent to which the cash-flows are guaranteed.

Figure 10 Guarantee - Illustration



D. Annexure – 4: Illustration of Amortization Profile

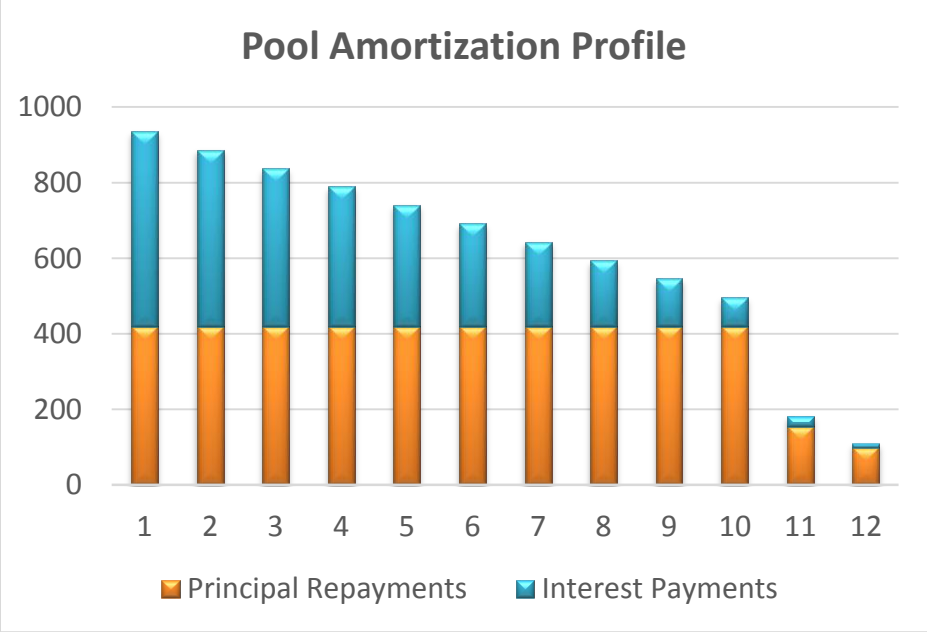
a. Asset Pool Assumptions

Table 5 Asset Pool Assumptions for Amortization Profile

Sr. No.	Sector	Credit Rating	Loan Amount	Tenure	Interest Rates
1	Roads	BBB+	200	10	12.28%
2	Roads	A-	200	11	11.10%
3	Roads	BBB	250	10	12.28%
4	Roads	A	200	10	11.00%
5	Roads	A	200	11	11.00%
6	Roads	A-	200	10	11.10%
7	Roads	A-	250	10	11.10%
8	Roads	BBB	250	12	12.28%
9	Roads	BBB+	250	10	12.28%
10	Roads	BBB	200	10	12.28%
11	Roads	A-	200	12	11.10%
12	Roads	A	250	10	11.00%
13	Roads	BBB	200	10	12.28%
14	Roads	A-	250	12	11.10%
15	Roads	BBB	200	10	12.28%
16	Roads	A	250	12	11.00%
17	Roads	A	200	10	11.00%
18	Roads	BBB	200	11	12.28%
19	Roads	BBB+	250	10	12.28%
20	Roads	A	250	12	11.00%
Total			**4450**		

b. Amortization Profile

Figure 11 Illustration of Amortization Profile



E. Annexure – 5: Assumptions for Monte Carlo Simulation

55. The cumulative default rate for a specified period is the number of defaults among rated entities expressed as a percentage of the total number of rated entities whose ratings were outstanding throughout the period. Cumulative default rate can be calculated at each rating level, and can be calculated over multiple periods.

56. For instance, a five-year cumulative default rate for 2006-2010 can be calculated as the ratio of total defaults at the end of 2010 to the total number of instruments rated during the period. Only those instruments whose ratings are outstanding during the entire period are included in the calculation (referred to as static pool). Let us say an instrument had an outstanding rating on January 1, 2006, but it was withdrawn in 2008. This instrument will not be included in the calculation. In the case of 'AA' category default rate for 2006-2010, the static pool is chosen considering the rating of AA at the beginning of the period (January 1, 2006). The number of defaulted instruments in the static pool during the period determines the default rating for the AA category.

57. The average cumulative default rates are published for the whole universe of rated instruments and also for each specific rating category. The average cumulative default rate for a period is the simple mean of the default rates calculated over a period of time – for example, in the case of a five-year default rate, an average of default rates over 2000-2005, 2001-2006, 2003-2007 and so on is calculated.

58. The average cumulative default rate overrides any aberration due to economic conditions, i.e., the annual default rates during 2008 and 2009 are higher than that of other years.

59. The tables below give the average cumulative rate of S&P for the period 1981-2013 and the calculated marginal default rates.

Table 6 S&P - Global average cumulative default rates by rating modifier 1981-2013 (%)

S&P rating	CRISIL rating	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
AAA		0.00%	0.03%	0.13%	0.24%	0.35%	0.47%	0.53%	0.62%	0.68%	0.74%	0.77%	0.81%	0.84%	0.91%	0.99%
AA+		0.00%	0.06%	0.06%	0.11%	0.17%	0.24%	0.30%	0.36%	0.43%	0.50%	0.57%	0.64%	0.72%	0.80%	0.89%
AA		0.02%	0.03%	0.09%	0.23%	0.38%	0.51%	0.65%	0.78%	0.88%	0.99%	1.09%	1.16%	1.28%	1.36%	1.45%
AA-		0.03%	0.10%	0.20%	0.29%	0.39%	0.50%	0.59%	0.65%	0.72%	0.79%	0.87%	0.95%	0.98%	1.05%	1.12%
A+	AAA	0.06%	0.11%	0.24%	0.40%	0.53%	0.64%	0.78%	0.93%	1.10%	1.29%	1.46%	1.65%	1.88%	2.14%	2.36%
A	AA+	0.07%	0.17%	0.27%	0.42%	0.57%	0.78%	0.99%	1.18%	1.42%	1.69%	1.91%	2.07%	2.21%	2.31%	2.52%
A-	AA	0.08%	0.20%	0.34%	0.48%	0.69%	0.91%	1.20%	1.42%	1.59%	1.74%	1.88%	2.04%	2.19%	2.29%	2.38%
BBB+	AA-	0.14%	0.38%	0.66%	0.95%	1.27%	1.62%	1.86%	2.12%	2.43%	2.73%	3.02%	3.19%	3.41%	3.75%	4.17%
BBB	A+	0.20%	0.51%	0.80%	1.24%	1.69%	2.12%	2.55%	2.98%	3.44%	3.91%	4.42%	4.86%	5.24%	5.37%	5.60%
BBB-	A	0.32%	0.97%	1.73%	2.63%	3.51%	4.30%	5.03%	5.71%	6.27%	6.84%	7.48%	8.00%	8.50%	9.24%	9.75%
BB+	A-	0.43%	1.25%	2.35%	3.47%	4.56%	5.66%	6.61%	7.31%	8.19%	9.05%	9.64%	10.29 %	10.85 %	11.28 %	12.05 %
BB	BBB+	0.68%	2.08%	4.07%	5.92%	7.66%	9.12%	10.45 %	11.54 %	12.54 %	13.39 %	14.23 %	14.98 %	15.35 %	15.59 %	15.90 %
BB-	BBB	1.13%	3.47%	5.91%	8.26%	10.33 %	12.40 %	14.10 %	15.75 %	17.15 %	18.33 %	19.26 %	19.97 %	20.78 %	21.58 %	22.28 %
B+	BBB-	2.31%	6.26%	10.15 %	13.52 %	16.05 %	18.02 %	19.82 %	21.43 %	22.84 %	24.25 %	25.36 %	26.23 %	27.05 %	27.79 %	28.45 %
B	BB-	4.73%	10.55 %	15.19 %	18.51 %	21.02 %	23.29 %	24.79 %	25.84 %	26.79 %	27.67 %	28.50 %	29.28 %	29.99 %	30.61 %	31.37 %
B-	B	7.92%	15.37 %	20.55 %	24.12 %	26.93 %	28.98 %	30.64 %	31.65 %	32.32 %	32.94 %	33.66 %	34.29 %	34.64 %	35.04 %	35.49 %
CCC/C	C	26.87 %	36.05 %	41.23 %	44.27 %	46.75 %	47.77 %	48.85 %	49.67 %	50.64 %	51.35 %	51.99 %	52.76 %	53.67 %	54.40 %	54.40 %
Investment grade		0.11%	0.30%	0.52%	0.79%	1.07%	1.35%	1.61%	1.86%	2.10%	2.35%	2.59%	2.79%	2.98%	3.17%	3.37%
Speculative grade		4.02%	7.86%	11.19 %	13.86 %	16.03 %	17.82 %	19.33 %	20.60 %	21.74 %	22.78 %	23.66 %	24.42 %	25.09 %	25.69 %	26.28 %
All rated		1.53%	3.02%	4.33%	5.43%	6.35%	7.14%	7.82%	8.39%	8.92%	9.42%	9.85%	10.21 %	10.54 %	10.84 %	11.14 %

Marginal Default Rates:

60. To estimate the extent of credit enhancement required to enhance the rating of a bond from the source rating to the target rating, default rates will be applied to the annual bond obligations to arrive at the annual defaults for both the source rating and target rating. The default rates to be applied will be the marginal default rates and not the cumulative default rates. The method for calculation of marginal default rates is shown below

$$It + 1 = \frac{Ct + 1 - Ct}{(100\% - Ct)}$$

where It+1 = Marginal default rate for t+1 year

Ct+1 = Cumulative default rate for t+1 year

Ct = Cumulative default rate for t year

The above formula calculates the percentage of bonds which hadn't defaulted till year t, and which are expected to default in year t+1.

Table 7 S&P - Marginal default rates by rating modifier (%)

S&P rating	CRISIL rating	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
AAA		0.00%	0.03%	0.10 %	0.11 %	0.11 %	0.12 %	0.06 %	0.09 %	0.06 %	0.06 %	0.03 %	0.04 %	0.03 %	0.07 %	0.08 %
AA+		0.00%	0.06%	0.00 %	0.05 %	0.06 %	0.07 %	0.06 %	0.06 %	0.07 %	0.07 %	0.07 %	0.07 %	0.08 %	0.08 %	0.09 %
AA		0.02%	0.01%	0.06 %	0.14 %	0.15 %	0.13 %	0.14 %	0.13 %	0.10 %	0.11 %	0.10 %	0.07 %	0.12 %	0.08 %	0.09 %
AA-		0.03%	0.07%	0.10 %	0.09 %	0.10 %	0.11 %	0.09 %	0.06 %	0.07 %	0.07 %	0.08 %	0.08 %	0.03 %	0.07 %	0.07 %
A+	AAA	0.06%	0.05%	0.13 %	0.16 %	0.13 %	0.11 %	0.14 %	0.15 %	0.17 %	0.19 %	0.17 %	0.19 %	0.23 %	0.26 %	0.22 %
A	AA+	0.07%	0.10%	0.10 %	0.15 %	0.15 %	0.21 %	0.21 %	0.19 %	0.24 %	0.27 %	0.22 %	0.16 %	0.14 %	0.10 %	0.21 %
A-	AA	0.08%	0.12%	0.14	0.14	0.21	0.22	0.29	0.22	0.17	0.15	0.14	0.16	0.15	0.10	0.09

				%	%	%	%	%	%	%	%	%	%	%	%	%
BBB+	AA-	0.14%	0.24%	0.28 %	0.29 %	0.32 %	0.35 %	0.24 %	0.26 %	0.32 %	0.31 %	0.30 %	0.18 %	0.23 %	0.35 %	0.44 %
BBB	A+	0.20%	0.31%	0.29 %	0.44 %	0.46 %	0.44 %	0.44 %	0.44 %	0.47 %	0.49 %	0.53 %	0.46 %	0.40 %	0.14 %	0.24 %
BBB-	A	0.14%	0.24%	0.77 %	0.92 %	0.90 %	0.82 %	0.76 %	0.72 %	0.59 %	0.61 %	0.69 %	0.56 %	0.54 %	0.81 %	0.56 %
BB+	A-	0.20%	0.31%	0.29 %	0.44 %	0.46 %	0.44 %	0.44 %	0.44 %	0.47 %	0.49 %	0.53 %	0.46 %	0.40 %	0.14 %	0.24 %
BB	BBB+	0.32%	0.65%	0.77 %	0.92 %	0.90 %	0.82 %	0.76 %	0.72 %	0.59 %	0.61 %	0.69 %	0.56 %	0.54 %	0.81 %	0.56 %
BB-	BBB	0.43%	0.82%	1.11 %	1.15 %	1.13 %	1.15 %	1.01 %	0.75 %	0.95 %	0.94 %	0.65 %	0.72 %	0.62 %	0.48 %	0.87 %
B+	BBB-	0.68%	1.41%	2.03 %	1.93 %	1.85 %	1.58 %	1.46 %	1.22 %	1.13 %	0.97 %	0.97 %	0.87 %	0.44 %	0.28 %	0.37 %
B	BB-	1.13%	2.37%	2.53 %	2.50 %	2.26 %	2.31 %	1.94 %	1.92 %	1.66 %	1.42 %	1.14 %	0.88 %	1.01 %	1.01 %	0.89 %
B-	B	2.31%	4.04%	4.15 %	3.75 %	2.93 %	2.35 %	2.20 %	2.01 %	1.79 %	1.83 %	1.47 %	1.17 %	1.11 %	1.01 %	0.91 %
CCC/C	C	4.73%	6.11%	5.19 %	3.91 %	3.08 %	2.87 %	1.96 %	1.40 %	1.28 %	1.20 %	1.15 %	1.09 %	1.00 %	0.89 %	1.10 %
Investment grade		7.92%	8.09%	6.12 %	4.49 %	3.70 %	2.81 %	2.34 %	1.46 %	0.98 %	0.92 %	1.07 %	0.95 %	0.53 %	0.61 %	0.69 %
Speculative grade		26.87 %	12.55 %	8.10 %	5.17 %	4.45 %	1.92 %	2.07 %	1.60 %	1.93 %	1.44 %	1.32 %	1.60 %	1.93 %	1.58 %	0.00 %
All rated		0.11%	0.19%	0.22 %	0.27 %	0.28 %	0.28 %	0.26 %	0.25 %	0.24 %	0.26 %	0.25 %	0.21 %	0.20 %	0.20 %	0.21 %

F. Annexure – 6: Illustration of the viability of the Guarantee Facility

a. Assumptions

Asset Pool					
Project No.	**Sector**	**Credit Rating**	**Loan Amount**	**Tenure**	**Interest Rates**
1	Roads	BBB+	200	10	12.28%
2	Roads	A-	200	11	11.10%
3	Roads	BBB	250	10	12.28%
4	Roads	A	200	10	11.00%
5	Roads	A	200	11	11.00%
6	Roads	A-	200	10	11.10%
7	Roads	A-	250	10	11.10%
8	Roads	BBB	250	12	12.28%
9	Roads	BBB+	250	10	12.28%
10	Roads	BBB	200	10	12.28%
11	Roads	A-	200	12	11.10%
12	Roads	A	250	10	11.00%
13	Roads	BBB	200	10	12.28%
14	Roads	A-	250	12	11.10%
15	Roads	BBB	200	10	12.28%
16	Roads	A	250	12	11.00%
17	Roads	A	200	10	11.00%
18	Roads	BBB	200	11	12.28%
19	Roads	BBB+	250	10	12.28%
20	Roads	A	250	12	11.00%
Total			**4450**		

External CE					
Guarantee	20.00%	**Guarantee Corpus**	890.0	**Recovery Rate**	60%
Cash Collateral - No of Instalments	0.25	**Cash Collateral**	104.89	**Guarantee Fee**	2%

Portfolio Defaults												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
No. of Assets Defaulting	0	1	1	0	1	0	0	1	0	0	0	0
Asset Defaulting	0	1	2	0	3	0	0	4	0	0	0	0

b. Outcomes

Loss to Guarantee Fund													
Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**
Payment Defaults	0	38	72	72	112	112	112	137	137	137	33	0	**963**
Recovery	0	23	43	43	67	67	67	82	82	82	20	0	**578**
Absorbed by Excess Interest	0	15	29	29	45	45	39	30	22	13	5	0	**272**
Absorbed By Cash Collateral	0	0	0	0	0	0	6	25	33	41	0	0	**105**
Loss to Guarantee Fund	0	0	0	0	0	0	0	0	0	0	8	0	**8**
Balance Fund Corpus	**890**	**890**	**890**	**890**	**890**	**890**	**890**	**890**	**890**	**890**	**881**	**881**	
Balance Cash Collateral	**105**	**105**	**105**	**105**	**105**	**105**	**99**	**74**	**41**	**0**	**0**	**0**	

Loss to Guarantee fund as % of guaranteed amount is approximately 1%. Hence, an upfront guarantee fee of 1% or more, will make the facility viable for the guarantor.