THE SECURITISATION & STRUCTURED FINANCE HANDBOOK

2020

10th Edition

How new asset classes and innovative structures are deepening the structured finance market in India

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Northern Arc has been at the forefront of innovation in the Indian structured finance market and over the past decade has launched many new structures and developed multiple non-conventional asset classes in India. Some of the structures it has pioneered include Multi Originator Securitisation (MOSEC®), India's first Collateralised Loan Obligation (CLO) post Reserve Bank of India's guidelines in 2012, Replenishment Based Persistent Securitisation (PerSec™), Single Originator Partially Credit Enhanced (SPiCE™) Bond and Pooled Bond/Loan issuance.

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Default by infrastructure financing behemoth IL&FS substantially altered the dynamics of Indian debt markets in FY2018-19. India's Non Banking Finance Companies (NBFCs) significantly depend on mutual funds and banks for their borrowings. Post the IL&FS default, both these traditional funders took a back seat creating a credit-freeze leaving many NBFCs in the lurch. These NBFCs were left with no other choice other than asset monetisation via Pass Through Certificates (PTC) and Bilateral Sales (also called Direct Assignments) to fund their debt repayments and incremental disbursements. For the first time ever, more than 100 NBFCs participated in securitisation transactions in a fiscal year of which more than 20 were first time entrants to this market. The year saw the market size touching almost INR2 trillion (~US$29bn) – market size now rivals that of many developed markets like Australia and Canada. The year saw many innovative on-balance-sheet and off-balance-sheet structures being tried, and many new asset classes emerged.

Historical context on Indian securitisation market

The first securitisation in India took place in the early 1990s post which the industry saw a number of such transactions taking place. The market remained largely unregulated until 2006 when RBI came out with the first set of guidelines to regulate the PTC transactions. The guidelines were further amended in 2012 to include Direct Assignment transactions and to include concepts like minimum holding period and Minimum Retention Ratio (MRR) to further align originator's incentives. Post regulation period saw a slow but steady growth of the market. Traditional asset classes like mortgage loans, commercial vehicle loans, construction equipment loans and micro finance loans continued to dominate the space. Few innovative structures like Multi Originator Securitisations (MOSEC®) did happen in the market which gave a significant boost to micro loan securitisation. However, the market was mostly dominated by plain vanilla 1 Tranche or 2 Tranche structures. The investor base to FY 2017 also remained restricted to banks and a few NBFCs by and large.

Tectonic shift...?

With a strong foundation and vintage in place, there are noticeable changes that have taken place in the market over the past couple of years.

Emergence of new asset classes

September 2018 witnessed India's first Collateralised Loan Obligation (CLO) transaction post 2012 guidelines. The year also saw transactions happen with underlying being consumer durable loans (mobile phone loans as underlying), student loans, agriculture supply chain loans and personal loans. The trend continued in FY 19 as well with asset classes like lease rentals and used two-wheeler loans being added. Non-conventional asset classes including gold loans, two-wheeler loans, consumer durable loans, personal loans, agriculture supply chain loans, wholesale term loans, lease rentals, student loans, school financing loans now constitute more than 25% of the PTC market. The overall market saw a staggering year-on-year growth of 105% with almost two-thirds of this growth driven by the transactions taking place in these asset classes.

Widening of investor base

The steady vintage has attracted the attention of new investor classes as well. Mutual funds, looking to add diversification in their portfolios, have shown keen interest in these asset classes and have lapped up most of these pools. As shown in Exhibit 2, Mutual Funds are now one of the biggest investor class in the PTC market as compared to FY 2018 wherein they had only 12% PTC market share.

In 2016-17, regulators also allowed foreign portfolio investors to invest in PTCs. They have entered the market and have done a few transactions. Additionally, a few transactions with consumer durable loans have also been placed with HNIs (High Net Worth Individuals).

Emergence of innovative structures

The past couple of years have also seen a number of innovations take place. These have included Replenishment Based Structure (PERSEC™), Covered Bond, Collateralised Loan Obligation, Pooled Loan Issuance, Single Issuer Partially Credit Enhanced (SPiCE™) Bond etc. Multi Originator Securitisations which were mostly happening in MFI sector expanded to sectors like two-wheeler, commercial vehicle as well.

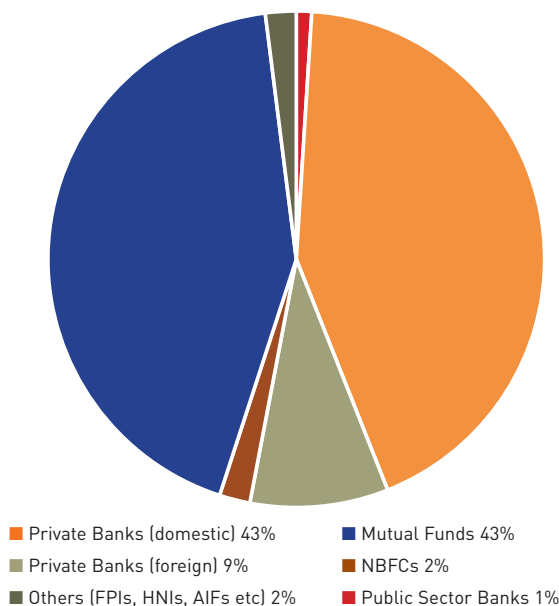**Share of asset class in the overall market**　　　　　　　　　　　　　　　　Exhibit 1
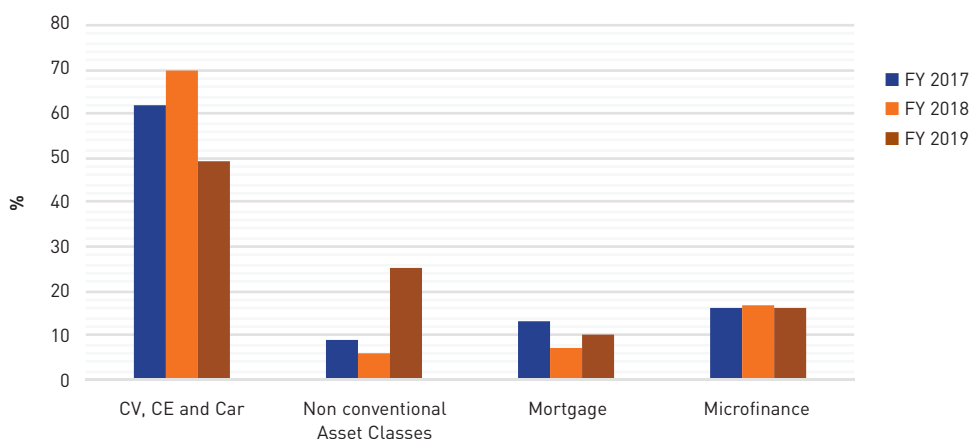
Source: Indian Securitisation Market Review FY 2018-19, ICRA

Investor distribution (FY 2019)　　　　**Exhibit 2**

- Private Banks (domestic) 43%
- Mutual Funds 43%
- Private Banks (foreign) 9%
- NBFCs 2%
- Others (FPIs, HNIs, AIFs etc) 2%
- Public Sector Banks 1%

Source: Indian Securitisation Market Review FY 2018-19, ICRA

Two of these structures are explained in more detail below:

PERSEC™

Globally a fairly popular structure, PERSEC™ or Persistent Securitisation can be an excellent solution for the ALM crisis affecting the Indian NBFC sector. The structure ensures a regular stream of funding for the originator while reducing prepayment and reinvestment risks for the investors.

- The structure is divided into two phases – Replenishment Period and Amortisation Period.
- During the replenishment period, principal collections are used to purchase the follow-on receivables.
- Seller's beneficial junior interest in the trust ensures that there is sufficient support in the form of overcollateral in addition to excess interest spread during the life of pass-through certificates.
- Principal collections during the amortisation period are used to retire the principal balance outstanding of the pass-through certificates.

The benefits to investors include:

- The structure provides investors with sticky assets. For instance, a lot of MFI/Fintech pools have an average tenor of only four to six months and run down completely within a few months. By introducing a replenishment cycle of three to six months, the average tenor of the PTC can be almost doubled.
- Pricing lock-in for a longer tenor.
- The investor is protected from prepayment risk during the replenishment period.
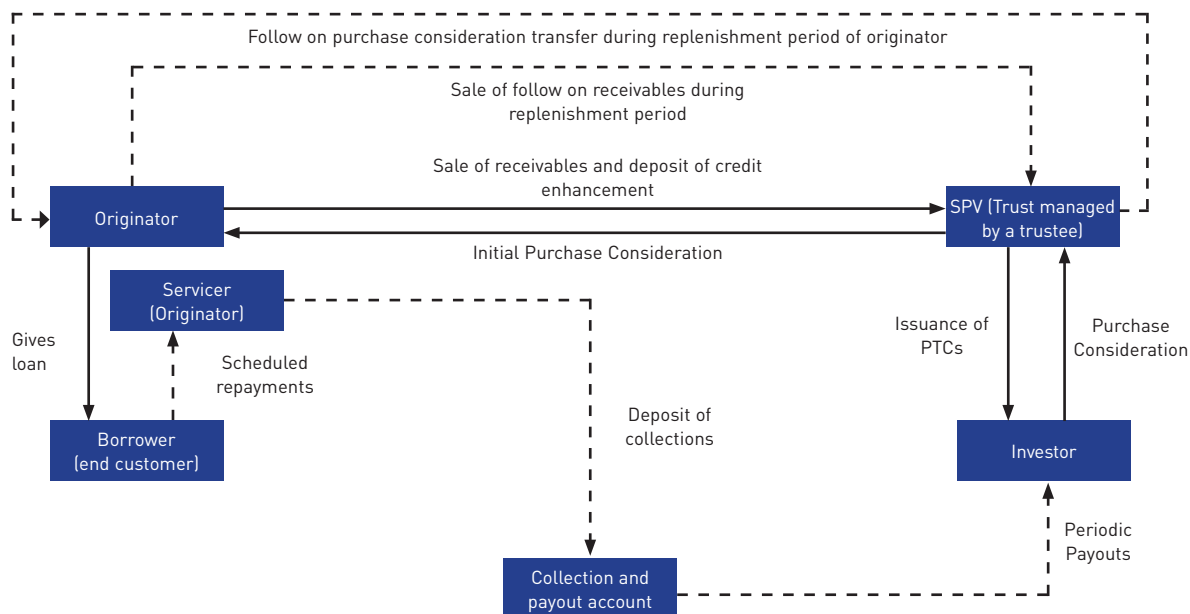
The benefits to originators include:

- Allows an originator to raise long-term funding using shorter tenor assets.
- Follow-on purchase keeps a steady flow of funding enabling better treasury management.
- Better all in pricing due to fixed costs being spread over a longer tenor and fixed costs being spread over a larger base.

Persistent securitisation – distribution of credit risk

In securitisation, the distribution of credit risk is based on the principle of subordination. Subordination involves forming at least two tranches of claims to payments from the pool of receivables, with the claims from the senior tranche taking precedence over the subordinated or junior tranche. Should credit defaults occur, they will be offset first by the claims in the junior tranches. Credit risk is therefore reduced in the senior tranches, as they do not bear losses until the junior tranches have defaulted. The position known as the first-loss piece, which bears the losses arising from the first payment defaults occurring in a securitisation deal, is a specific type of subordinated tranche. In most cases, the first-loss piece is taken on by the originator and should be considered accordingly in the originator's risk management activities.

In case of persistent securitisation, there is no principal amortisation during the replenishment period and such structures have a higher duration than that of other forms of amortising securitisation.

Prepayment risk – as the structure allows the Special Purpose Vehicle (SPV) to acquire an incremental pool from the residual cash flows after paying the interest to

| Persistent Securitisation (PERSEC™) structure | Exhibit 3 |

Follow on purchase consideration transfer during replenishment period of originator

Sale of follow on receivables during replenishment period

Sale of receivables and deposit of credit enhancement

Originator

SPV (Trust managed by a trustee)

Initial Purchase Consideration

Servicer (Originator)

Gives loan

Scheduled repayments

Issuance of PTCs

Purchase Consideration

Borrower (end customer)

Deposit of collections

Investor

Periodic Payouts

Collection and payout account

PTC investors, the prepayment risk is minimised and is lower compared to other types of amortising securitisation.

Servicer risk – The structure involves longer exposure to the servicer as during the replenishment period, the SPV buys the pool from the seller using the residual cash flows in the SPV account. Hence the credit risk related to the servicer is higher.

In order to mitigate the servicer risk, the trigger events are defined upfront which, if activated, stop the incremental purchase and initiate the amortisation of the PTCs. Examples of these events include:

- Downgrade in the rating of the PTC or the servicer.
- Collection efficiency in the pool going below a certain threshold.
- Inability of the originator to provide incremental pool (this could also result in a step up of the PTC coupon).

Pool selection risk – there is a risk that the client (originator)

will try to incorporate deteriorated quality of loans in the incremental pool. In order to minimise the uncertainty for the investors, eligibility criteria are defined for the incremental pool that can be purchased. Such criteria may include:

- Follow-on pool to have a minimum seasoning of certain months.
- The residual tenor of the loans to be within a certain number of months.
- The concentration of any particular geographical unit (city, district or state) to not exceed a certain threshold.
- Review by rating agency and portfolio reviewer on an ongoing basis and so on.

Persistent securitisation – estimation of losses
The model for estimating losses in a persistent securitisation transaction is similar to the transaction loss estimation model we use for any other securitisation transaction.

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Pooled Loan Issuance (PLI) structure   **Exhibit 4**
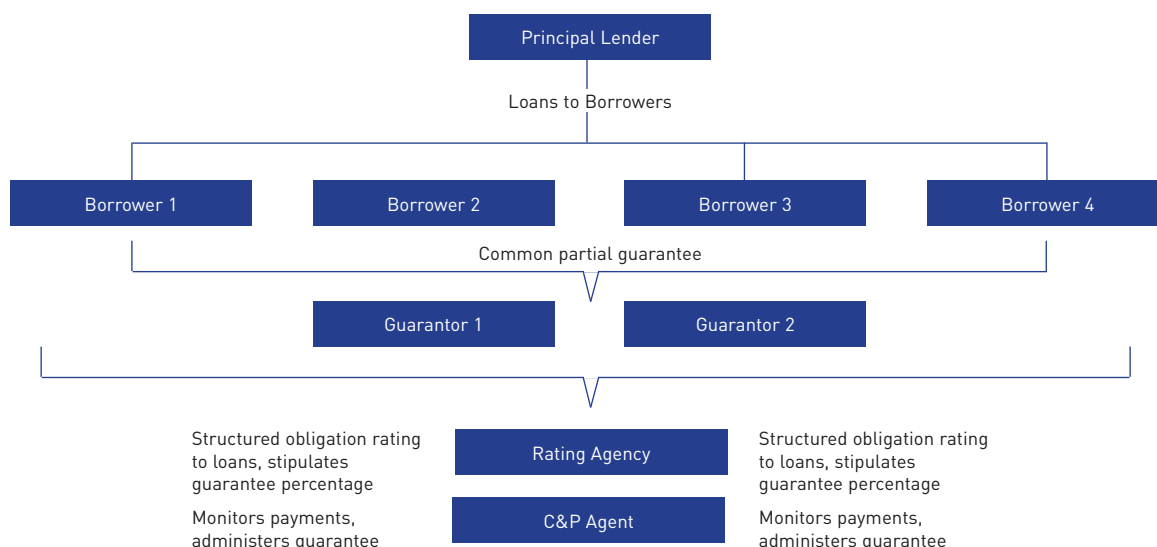
Source: Northern Arc Capital

However, in this case, the loss estimation model must be re-run during the replenishment period whenever principal collections are used to purchase the follow-on receivables.

A detailed methodology for estimation of loss distribution for a securitisation transaction was discussed in the *Securitisation & Structured Finance Handbook 2018*, 'Estimating loss distribution for a securitisation transaction'. To get the loss distribution, the underlying pool of loans are divided into different homogenous groups and the losses for every group is calculated through Vasicek's ASRF model. Intergroup correlation amongst these homogenous groups is incorporated by using Cholesky decomposition. Servicer default risk can also be incorporated in the model by stressing the input probability of the default estimate by a servicer risk premium.

Pooled Loan Issuance (PLI)

- Under a PLI structure, a bank or an NBFC (the "Principal Lender"), provides loans ("Identified Loans")

to identified Microfinance Institutions/other NBFCs/corporates (the "Borrower" or "Borrowers").

- Each of these Identified Loans are made as per terms agreed upon between the Principal Lender and the Borrower/s in keeping with the Principal Lenders underwriting and credit evaluation practices.

- The Identified Loans so offered are pooled together and credit enhanced by way of a common partial guarantee (the "Guarantee") offered by identified guarantors to the structure (the "Guarantor" or "Guarantors"). This is unconditional, irrevocable, payable on demand guarantee, favouring the Principal Lender that covers a percentage of the initial outstanding principal value of the total Identified Loans.

- Owing to the diversification of borrowers and the availability of credit enhancement through partial guarantee, the structure can result in each of the

Identified Loans being assigned a rating (qualified as Structured Obligation), that is higher than the rating of the individual borrowers.

The borrowers under the structure are able to issue on-balance-sheet liabilities which are rated much higher than their standalone ratings. This provides them with access to a completely different investor base. The risks to the lenders are substantially reduced since the guarantee normally covers each entity's outstanding amount significantly at the time of disbursement. Guarantee in percentage terms also builds over time thereby reducing the residual risk for the investor even further.

Pooled Loan Issuance (PLI) – allocation of exposure

Allocation of exposure is required in a PLI as the guarantee is a common partial guarantee applicable to loans from all the entities. Based on the following factors, the guarantee is allocated across the entities in the PLI.

- Entity Probability of Default (PD) – the higher the entity's PD, the higher the guarantee allocation.
- Tenor – the longer the tenor, the probability of default is increased and hence the guarantee allocation is higher.

- Loss Given Default (LGD) – defined based on seniority and asset type; the higher the LGD, the higher the allocation of guarantee.
- Correlation (by asset class) – correlation matrix; allocation of guarantee is higher to the entities with higher correlation; a correlation matrix P is formed based on the correlation between multiple entities in the PLI.

Pooled Loan Issuance (PLI) – loss estimation

For estimating the default probabilities for a PLI, both the entity wise probability of default and the correlation between multiple entities defaulting at the same time need to be considered. This is because the identified loans so offered are pooled together and credit enhanced by way of a common partial guarantee by guarantors to the structure.

### Estimation of entity default probabilities

The entity's probability of default is computed by categorising entities into three risk categories – high, medium and low – based on internal/external rating mechanism. Based on the historical disbursements and defaults in each bucket, the Pluto Tasche model is run to calculate historical PDs (Pluto Tasche is used as we have low default history). For calculating Point in Time (PIT)

Pooled Loan Issuance (PLI) – loss estimation   **Exhibit 5**

Source: Northern Arc Capital

| Estimation of loss for PLI – Model | Exhibit 6 |
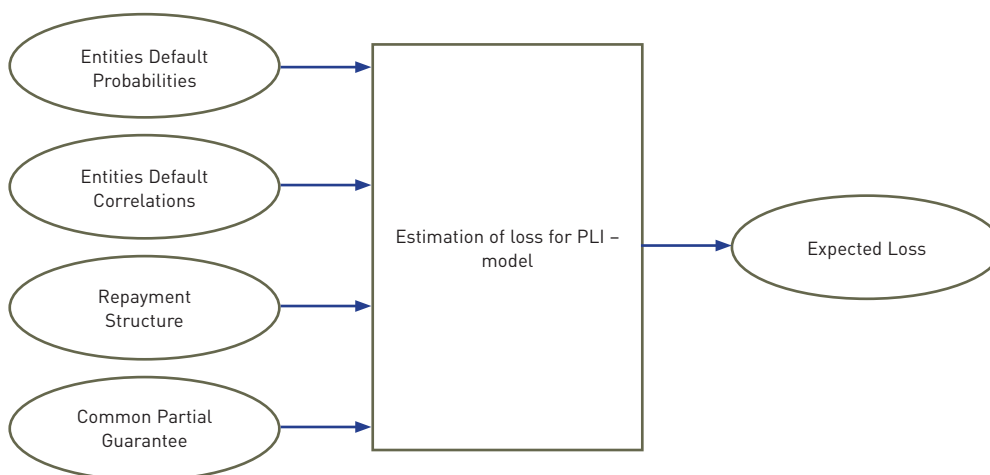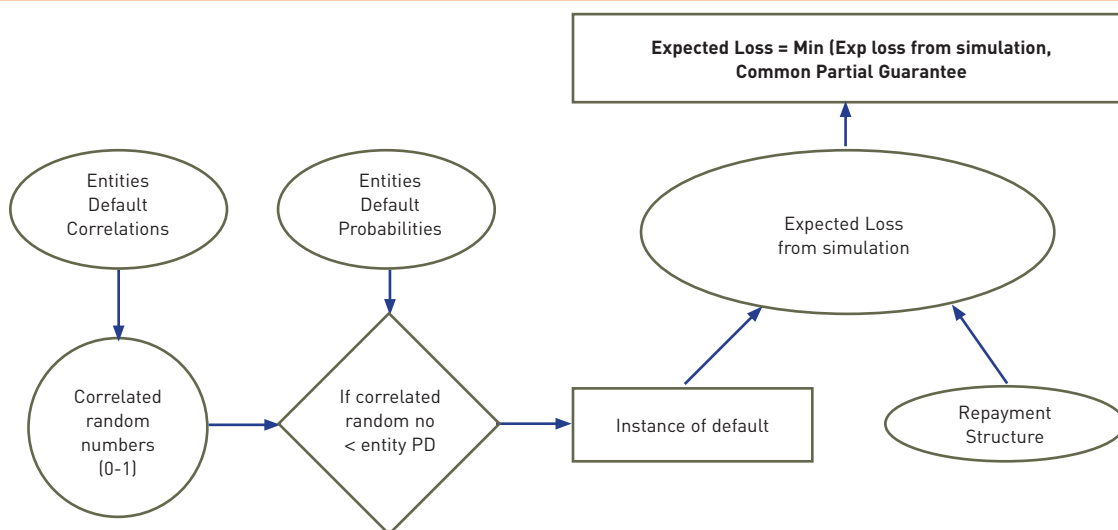
Source: Northern Arc Capital

future PDs, logit regression is used with a macroeconomic factor as variable.

Generation of correlated random numbers

Monte Carlo simulation is used to generate a matrix of random numbers between 0 and 1 (with the dimension of the matrix equal to the number of entities in the PLI times the number of simulations).

Cholesky decomposition is used in the Monte Carlo method for simulating systems with multiple correlated variables i.e. the default correlations. The matrix of random numbers is decomposed to give the lower-triangular L. Using this matrix L, correlated random numbers are generated from uncorrelated numbers by multiplying them with matrix L.

The same is explained below in detail:

The Gauss copula is defined implicitly from the multivariate normal distribution. Specifically, from Sklar's theorem the Gauss copula is:

$$CP(u_1,…,u_d)=\Phi P(\Phi^{-1}(u_1),…,\Phi^{-1}(u_d)),$$

where Φ denotes the standard normal distribution function, and ΦP denotes the multivariate standard normal distribution function with correlation matrix P.

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If X_1, X_2 are random variables with (Pearson) correlation coefficient ρ, then Spearman's rho is:
$$\rho S(X_1, X_2) = (6/\pi) \arcsin(\rho/2).$$

This makes it easy to generate random variables that have a desired value of Spearman's rho.

Simulation – In order to simulate from the Gauss copula, multivariate standard normal distribution is used with an appropriate correlation matrix P. Simulating from a multivariate normal distribution with covariance matrix Σ can be done using a weighted sum of independent standard normal random variables, where the "weight" matrix L can be obtained by the Cholesky decomposition of the covariance matrix Σ.

Therefore, an algorithm to simulate n iterations from the Gauss copula with correlation matrix P is:

1. Compute P=2 sin (rmatrix π/6) ; where rmatrix is the desired correlation matrix & P is the generated correlated matrix to be used for Cholesky Decomposition.

2. Perform a Cholesky decomposition of P, and set L as the resulting lower triangular matrix.
   L = chol(Σ) where P=LL' ; L is the lower triangular matrix; L' is the transpose of L.

3. Repeat the following steps n times:
   a. Generate a vector Z=(Z1,…,Zd)' of independent standard normal variates
   b. Set X=LZ
   c. Return U=(Φ(X1),…,Φ(Xd))'

Identification of instance of default and expected loss

In a simulation, if the correlated random number generated

Simulation   Exhibit 7
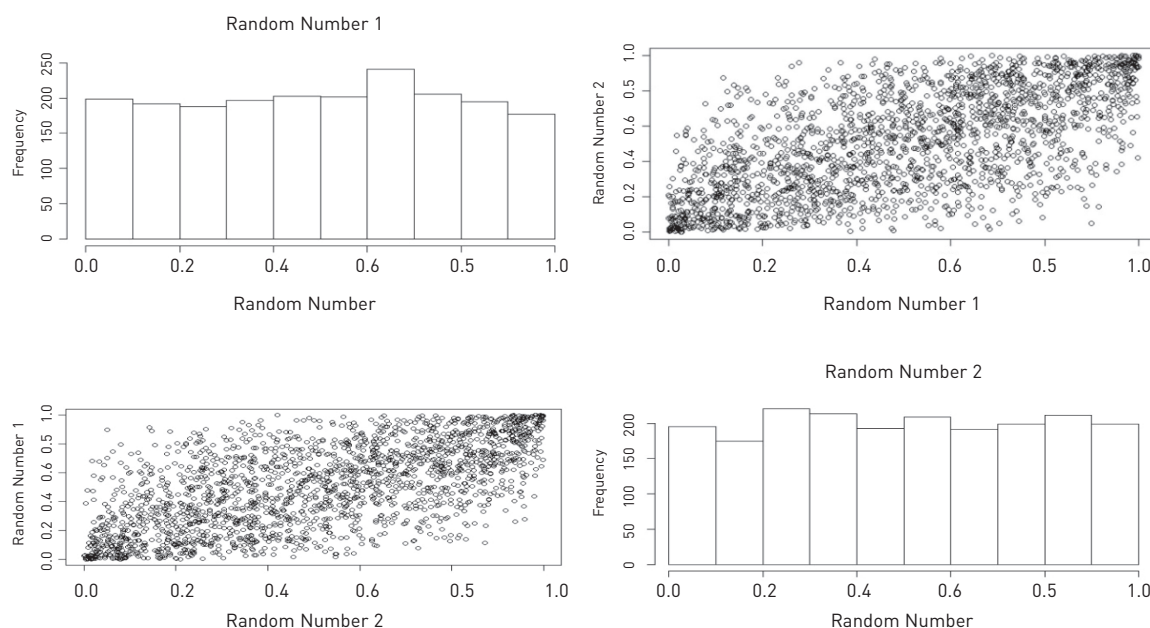
Note: The diagonal plot shows the histogram and the off-diagonal plot shows the scatter density diagram of correlated random numbers between 0 and 1 generated using this approach in R.

Source: Northern Arc Capital

between 0 and 1 is lower than the entity probability of default, it is identified as an instance of default. During any simulation, there is a possibility that there might not be a default in any entity or that there might be defaults in multiple entities. The desired correlation between the random numbers is equal to the correlation between entities in the PLI. For all such simulations where there is default, the expected loss is calculated based on the principal outstanding from the entity(ies) at that point in time (based on repayment schedule).

Conclusion

The Indian structured finance market seems poised for strong growth over the coming years. A large part of this should be driven by innovation taking place in asset classes and structures. Furthermore, investor breadth is also increasing in the overall market. Structures like Pooled Loan Issuances and Collateralised Loan Obligations due to their diversification benefits and hence lower unsystematic risks, are gradually finding increasing acceptance in the investor universe. New asset classes are also adding to the diversification in investors' overall portfolios.

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