MICROFINANCE RECOVERY ANALYSIS
USING TIME SERIES OF NORTHERN ARC PORTFOLIO DATA

Introduction

India has witnessed a fair share of macroeconomic shocks and events over the past few years. While some of them have had a pan-India impact like demonetization, others like the devastating floods in Kerala and cyclone Fani have affected only certain regions. Northern Arc, through its investments in the sector over the past decade has a large repository of data covering millions of loans across geographies, economic cycles and entities. On an average, Northern Arc has around 200 live pools of securitization transactions at any given time with access to 2 million repayment data points every month. For every loan account securitized by Northern Arc Capital, a repository is created containing granular data pertaining to borrowers like demographics, data related to loan parameters and periodic repayment details with expected vs actual cashflows. Month on month loan level performance is tracked for millions of live records at any point in time basis actual payment. All of this is anchored on the inhouse technology platform called *Nimbus*, a state-of-the-art platform built using agile methodology. This data enables an evolving understanding of credit portfolio behavior over time across various parameters and their interlinkages - geography, originator, loan size, loan cycle, demographics, credit bureau score etc. and is particularly helpful during times of crises. In this note, we attempt to decode the aggregate performance of MFI loans post events that resulted in shocks to portfolio, and analyze the resultant time taken to return to normalcy.

Analysis – base data and assumptions

Three events that resulted in severe economic implications have been considered for this analysis – demonetization, Kerala floods and cyclone Fani. While demonetization was a nation-wide event impacting all MFIs, Kerala floods and cyclone Fani were localized events affecting specific districts severely. For all these events, static pools of live loans in affected geographies from the Northern Arc Capital securitization portfolio just prior to the event are considered. Fresh portfolios securitized in affected geographies post the events are not considered as these pools might not contain affected clients. The following key metrics were used to assess recovery patterns –

- Periodic collection efficiency: This gives the percentage of regular demand collected for a month. Trends of periodic collection efficiency at a portfolio level and loan level are plotted. While the *mean* provides a good point-in-time assessment of recovery, the volatility of collections gives an interesting insight into behavior recovery over a period of time and is a more nuanced reflection of what happens on the ground post an event of shock.

    Periodic collection efficiency of portfolio =($ \sum_{i=1}^{n} Demand_i - \sum_{i=1}^{n} Overdue_i / \sum_{i=1}^{n} Demand_i $), where
    - *$Demand_i$ is the demand for customer i*
    - *$Overdue_i$ is overdue of customer i*
    - *n is total number of customers*

    Mean collection efficiency of portfolio (µ) = $\sum_{i=1}^{n} CEi / n$, where
    - *CEi is the collection efficiency of each loan*
    - *n is the total number of loans*

    Volatility of collection efficiency of portfolio (σ) = $\sqrt{\sum((CEi - µ)^2)/n}$, where
    - *CEi is the collection efficiency of each loan*
    - *µ is the mean collection efficiency*
    - *n is the total number of loans*

- PAR (Portfolio at risk) trends: PAR 0, PAR 30 and PAR 90 (wherever applicable) are plotted.
    PAR is defined as outstanding loan portfolio which is at default risk and can be measured in percentage terms of overall portfolio. PAR 0 is mentioned and is calculated similarly for PAR 30 and PAR 90.
    PAR 0 (%) =($ \sum_{i=1}^{m} Principal\ outstanding_i $)/Total portfolio outstanding), where
    - *m is total number of overdue loans with payments past due (>0 days)*

- Recovery rates: Recovery rates indicate percentage of borrowers with payment of at least one instalment in a month. These are plotted for different buckets to differentiate behavior of regular and overdue customers. Recovery rate for one of the buckets (1-30 days past due) is mentioned and is calculated similarly for other buckets.

Recovery rate $_{1-30 \text{ bucket}}$ = $p_{1-30 \text{ bucket}}$/$n_{1-30 \text{ bucket}}$, where
  - $p_{1-30 \text{ bucket}}$ is number of customers who paid one or more instalments in 1-30 bucket
  - n_{1-30} is total number of customers in 1-30 bucket

## Performance of MFI loans post macroeconomic shocks

There could be some selection bias built into the study given that the loans in the Northern Arc portfolio are cherry picked through an algorithm using millions of data points over a decade long microfinance time-series. However, given the size and granularity of the portfolio, the long time-series and the high level of diversification across originators, states and districts, it is considered to be a fair representation of the behavior of the microfinance sector over time.

Demonetization: November 2016

For the analysis of the impact due to demonetization, loan data of 3.7 million customers from over 400 districts were considered. The key findings are as follows –


PAR trends
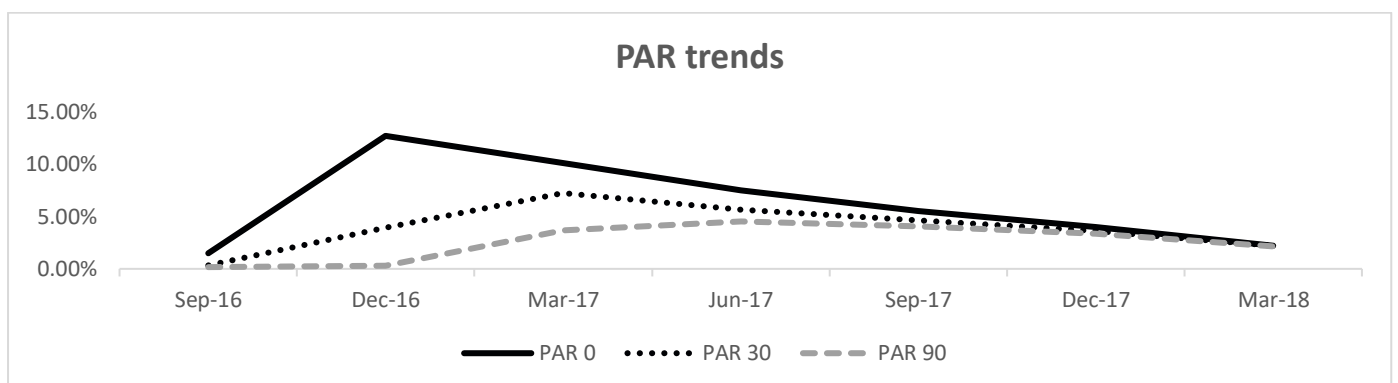
- While PAR levels significantly increased immediately after demonetization, there was a gradual reduction across all PAR buckets due to focused collections efforts.
- PAR 90 level finally settled at ~2% by Mar-18.
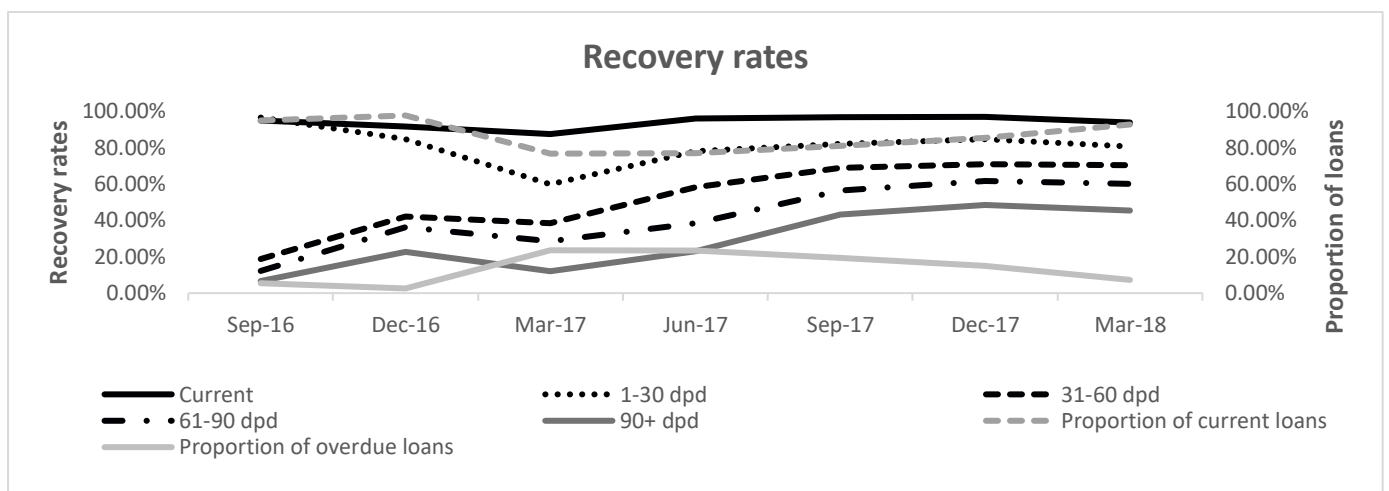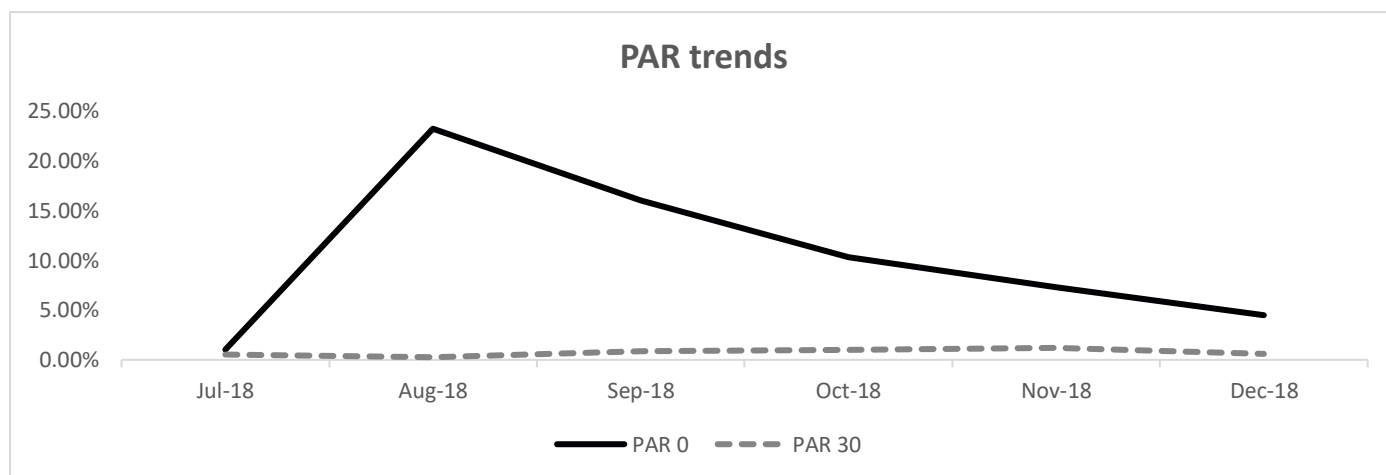

Recovery rates

- A sharp increase was observed in recovery rates across all buckets.
- The recovery rates consistently increased post the event for 6-9 months before flattening at a higher level.
- Proportion of current loans has always been higher compared to overdue loans for MFIs. There was a gradual conversion of overdue loans to current loans.

Kerala floods: August 2018

The devastating floods in Kerala occurred in August 2018. For the purpose of this exercise, 27,000 loans from 9 impacted districts were considered.

Periodic collection efficiency and volatility
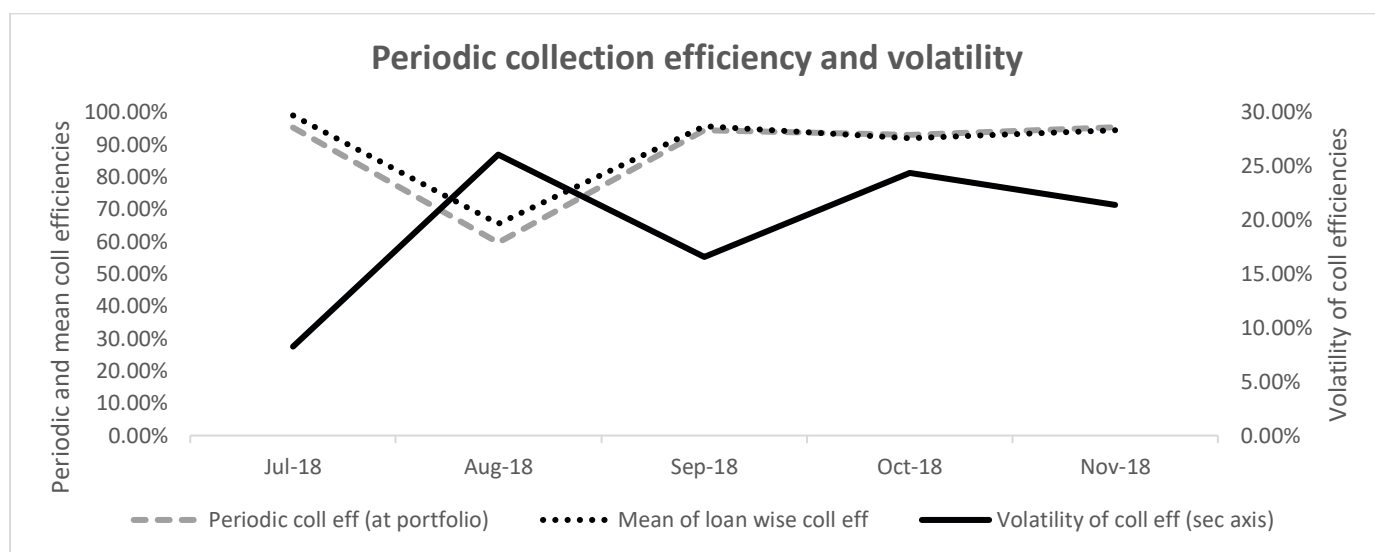
- Collection efficiency levels dropped from 96% (pre-event) to 60% in Aug-2018.
- CE levels immediately picked up in month of Sep-18.
- While mean of loan level collection efficiency dipped and stayed around portfolio level, volatility increased from 8% to 26% and then subsided to ~15-20%. The volatility number gives an important insight into the process of recovery. Not all borrowers get affected equally and repayment behavior differs across clients and geographies and MFIs till it returns to normal levels.


PAR trends

- PAR 0 increased from 0.2% to 23% in Aug-2018 and then reduced consistently in subsequent months.
- There was no impact on PAR 30 as only one instalment of borrowers got affected due to this event.
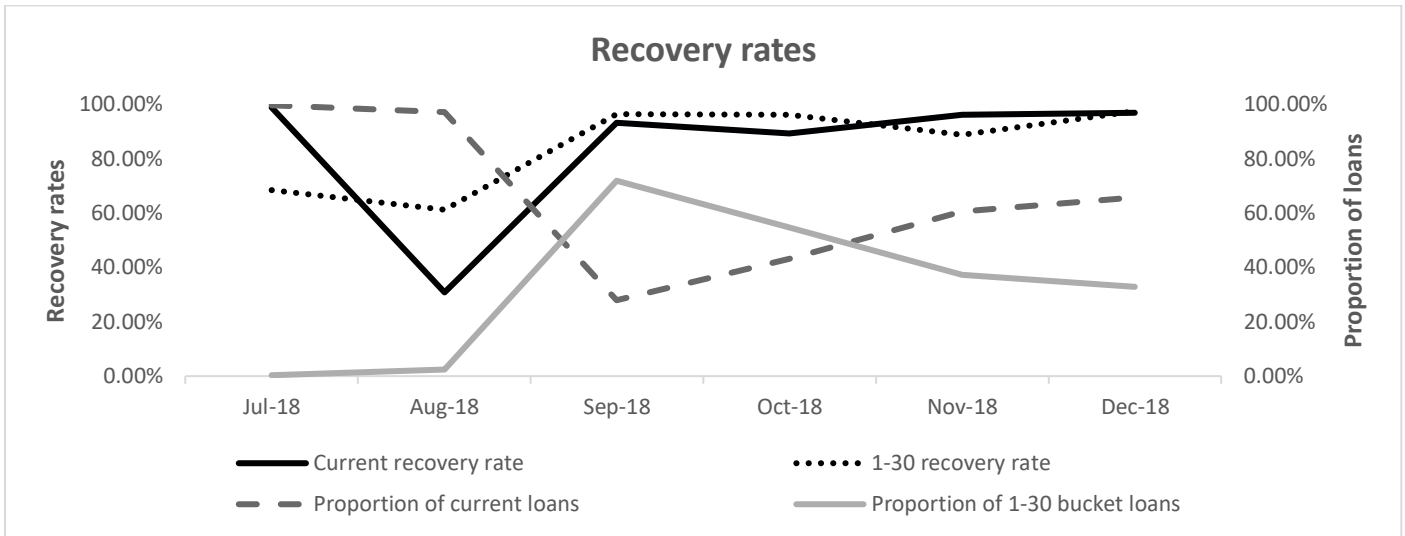
Recovery rates

- Recovery rates dipped only during event month and picked up to regular levels immediately in subsequent month.
- There was no impact on buckets > 1-30 dpd.
- Proportion of loans in 1-30 bucket was higher for two months post the event.

Cyclone Fani: April 2019

Cyclone Fani hit the coasts of the eastern states of India in 2019, impacting primarily Odisha, West Bengal and Andhra Pradesh. To understand the impact on asset quality and recovery patterns, 75,000 loans from 14 districts have been considered.

Periodic Collection Efficiency and volatility
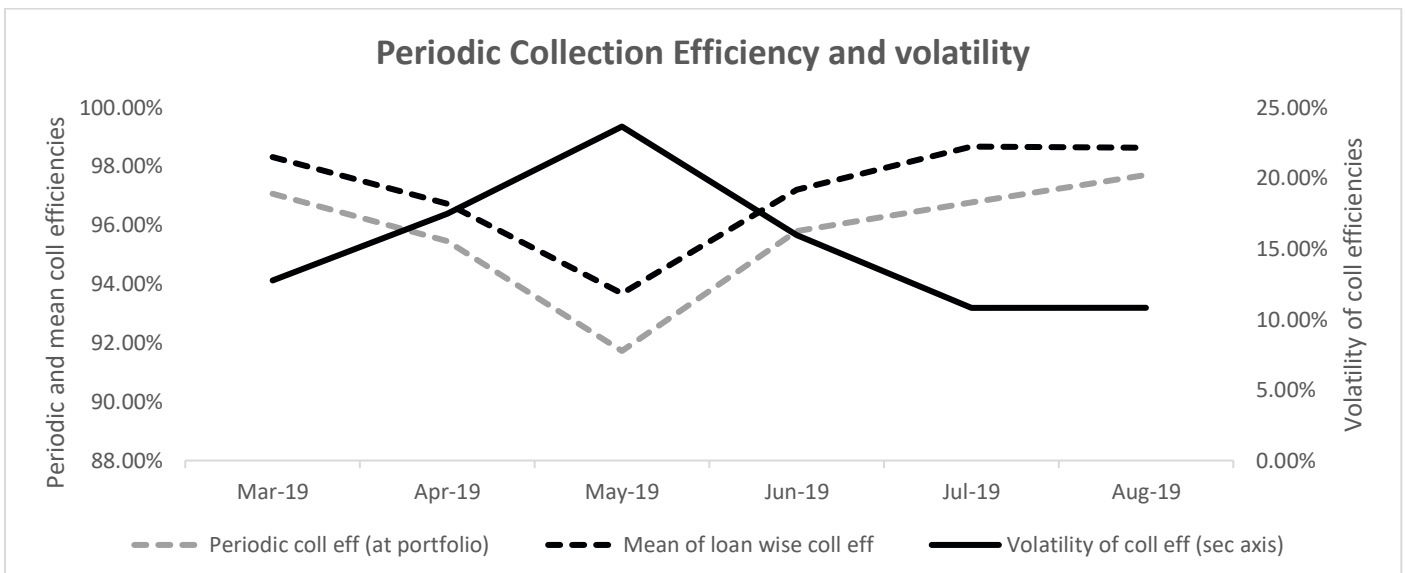
- Periodic collection efficiency dropped from 97% to 90% immediately after the event.
- The collection efficiency levels picked up immediately and industry started operating at pre-event levels in about 2 months.
- While mean of loan level collection efficiency dipped and stayed around portfolio level, the volatility increased from 13% to 24% and then reduced to pre-event levels.
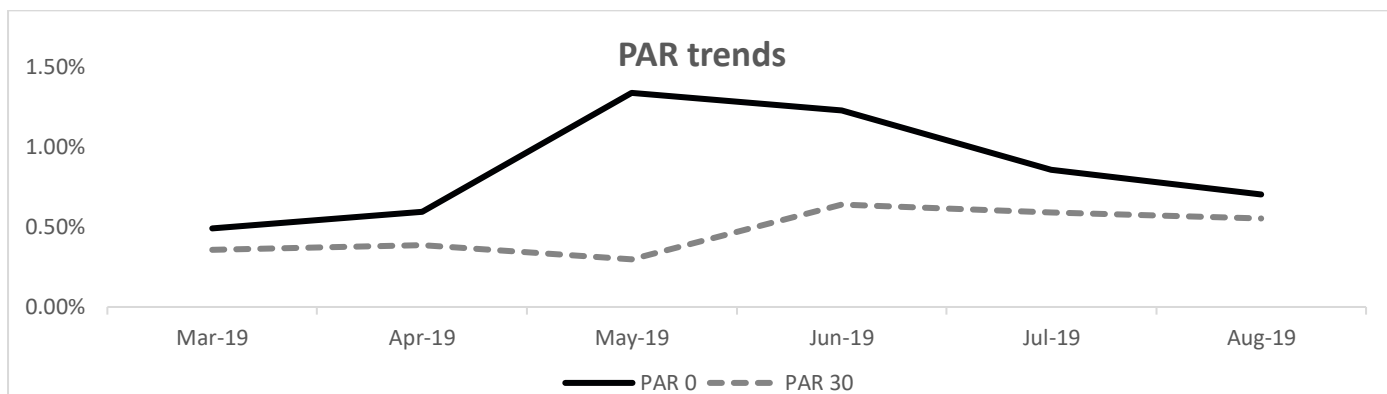
PAR trends

- PAR also has a similar trend - PAR levels increased immediately after the event and recovered immediately over a 1-2 months period.
- Due to the frequent occurrence of cyclones, coastal districts of Odisha are well adapted and hence we observe a very quick recovery here.
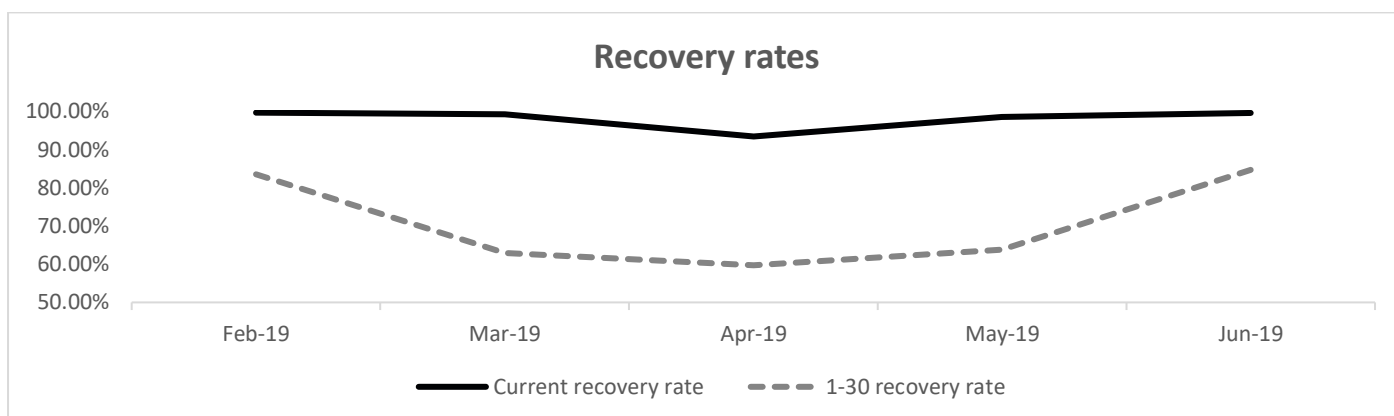
Recovery rates

- Not much impact was observed in the current bucket recovery rates, but 1-30 bucket recovery rates got impacted.
- 1-30 recovery rates picked up over a 2-3 months period.
- Proportion of loans in current bucket was always greater than 99%.

Conclusion

Given the size and granularity of the Northern Arc portfolio, the long time-series of portfolio performance and the high level of diversification across originators, states and districts, the Northern Arc portfolio is a fair representation of the behavior of the microfinance sector over time.

Historically it has been observed that although Microfinance loans do get impacted immediately post a crisis, collection efficiencies recover quickly, even where local geographies are severely affected. The volatility of collections gives an important insight into the process of recovery. Not all borrowers get affected equally and repayment behavior differs across clients, geographies and MFIs till it returns to normal levels. While the post demonetization recovery across the country is an illustration of behavior post a nation-wide systemic shock, events like cyclone Fani and the Kerala floods also offer important insights. While these may seem like episodes of local crisis, for the borrowers operating in these areas the effect is devastating. Often their homes, livelihoods and lives get completely disrupted and they are required to start afresh. Data however consistently shows that over a period, they recover and start repaying their loans. Since they find it hard to pay multiple installments to become current, often improvement may not be visible in the PAR buckets. However, for all practical purposes these loans become current and eventually get repaid.