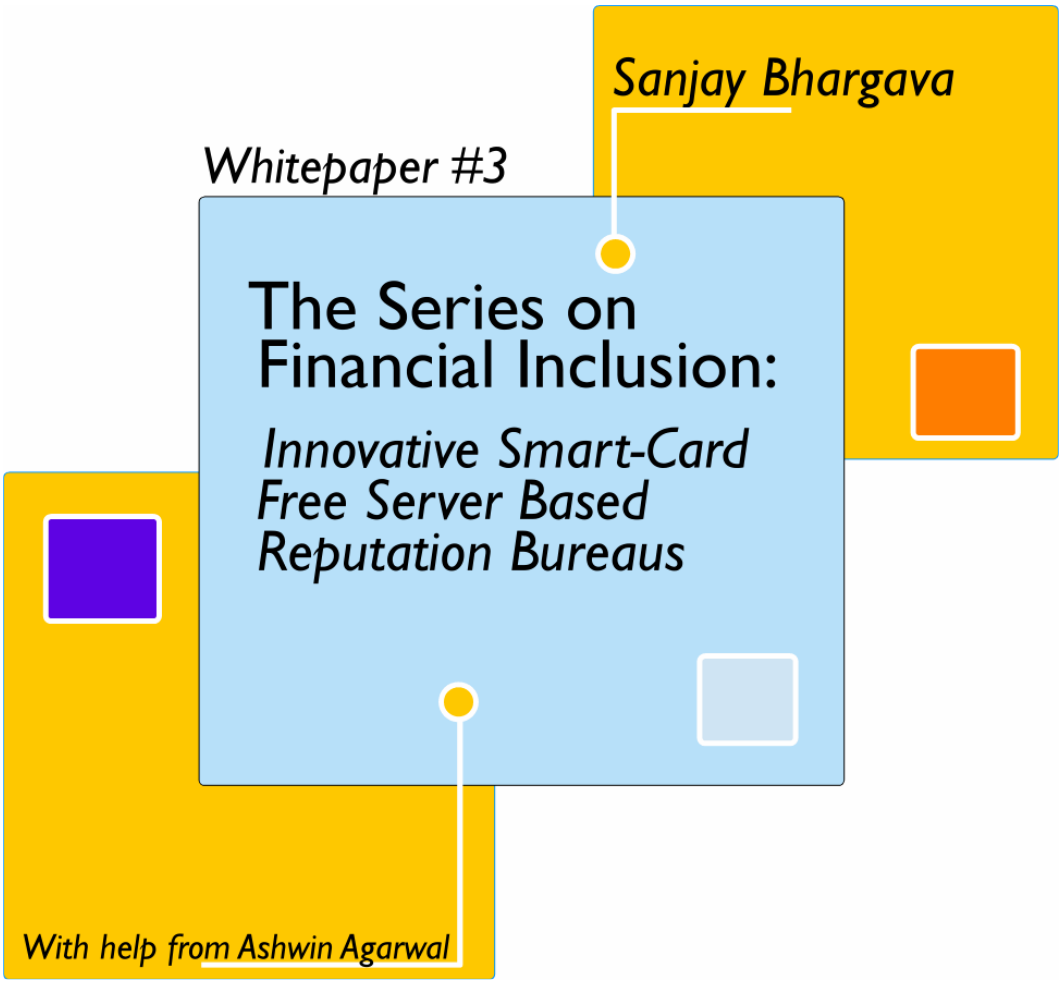

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The goal of Universal Financial Access by 2013 is a difficult task. Importantly, it requires that all Indians are provided access to a sustainable flow of credit. An integral part this future credit system is the establishment of a "reputation bureau" which Indians value and can easily be a part of.

The Need for Credit

These whitepapers have referenced 300 million working Indians as the number of people that should be affected directly by UFA. Indeed we can imagine that the need for credit per person would be Rs 10,000 for emergency credit needs, loans for transport/ consumer durables of Rs 75,000, loans for education/ entrepreneurship of Rs 100,000 and Loans for housing of Rs 500,000. This adds up to around Rs 800,000 of loans per person. With 300 million people the need for credit is Rs 240 trillion (as with all numbers in these whitepapers, these numbers are illustrative of the need for action, however should not be taken as totally accurate calculations). No matter what the actual number is, the amount of credit that a rising Indian society will need is massive.

The whitepaper on Business Correspondents showed how roughly 3 trillion Rs could be raised to fund this massive need for credit. The lack of available funds initially is not an issue because the 300 million Indians are not ready for a full Rs 800,000 infusion of cash. Many are too poor to sustain repayments on massive loans. This also touches upon an increasingly important area: the ability of individuals to pay back loans so that we avoid an Indian credit crisis.

As unsecured lending increases, will the current method of peer pressure and lending to women be enough to keep the system safe? If there is Rs 240 trillion floating through the system, and default rates touch 5%, the system would collapse much like has happened in the United States. This would mean that Rs 12 trillion would be non performing assets, an amount that could have massive implications. Defaults are a function of ability to pay back loans (through personal income) and deterrents through higher rates and lesser availability of funds. Current lending rates of 25%+ are not a road out of poverty but more a road into a debt trap. Therefore Indians need to rethink the way lending is done and aim to revolutionize the way we link savers to borrowers.

Four Main Points

India has the opportunity to create a credit system that learns from the failures of others. This whitepaper takes the view that innovation and technology can solve problems of interest rates and availability of funds. There are four main points that this paper considers as important at a practical level.

- There should be one or two national identity based "reputation bureau" that talk to each other
- A server-centric approach is far cheaper and better than a smart card approach.

- Numeric signatures are better than fingerprint biometrics.
- Reputation bureaus can drive down costs by making the credit appraisal process instant and by lowering defaults thus making the dream of viable low cost unsecured lending a reality.

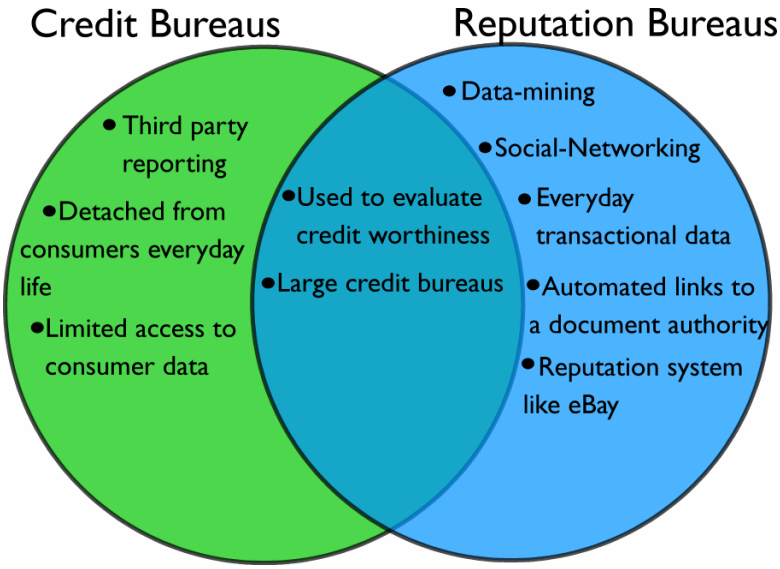
The main recommendation for action in this whitepaper is for the government to invite proposals to build one or two reputation bureaus. For the winning bids the government should make a minority investment and take a board seat to facilitate the creation of well regulated reputation bureaus quickly.

The paper talks about smart card free server based bureaus because the author believes in that approach. When proposals are requested the government should specify what needs to be done and not how it is to be done. It is possible that the final solution may combine various approaches or have an innovative bent that no one has thought of.

It is the authors hope that innovators will further improve on the approaches laid out in this paper. If nothing else, this paper would like to encourage innovative thinking about this age-old problem.

Reputation Bureaus

There is a difference between a standard credit bureau and a reputation bureau. The following graphic displays the main differences and highlights the similarities.



In a credit bureau the information used to evaluate consumers is obtained from third parties. For instance a utility company would report if you missed a payment. In a reputation bureau the consumer would be less removed from the bureau and scores would be more connected with the consumer's everyday life.

Techniques such as data mining would be employed to evaluate transactional data of the person.

However the most important facet would be the use of social networking to enhance the accuracy and reliability of the consumers score. The concept is very much the same as microfinance's self help groups that use peer pressure to eliminate issues of asymmetrical information and encourages reliable borrowers to seek out other reliable borrowers in a method known as assortative matching (*Morduch*, *The Microfinance Promise*). What is truly unique about a reputation bureau is that it allows friends, family and business associates to vouch for a person's credit worthiness. The level of involvement between people can vary from being a cosigner on a person's mortgage to just a general "thumbs up" suggesting they engage in proper business practices (much like eBay). It would then follow that if a person defaults on a loan or fails to make a payment, the person who has vouched for the defaulting borrower would also see a drop in their own credit score which matches their own level of support for the defaulting borrower. A successful repayment of a loan and generally good credit history would result in a similar improvement of the consumer who vouched for the loan payee.

Asymmetrical Information occurs when the borrower knows something about his credit-worthiness that the lender does not.

Assortative matching occurs when people of equal credit worthiness find each other to join group lending schemes. Good borrowers will find other good borrowers.

In this way the reputation bureau can have all the effects of microfinance group meetings without actually requiring a group of people to ever meet. This in turn would lower loan servicing fees and would then lower interest rates.

What Must Happen

For this to work there are other things that must happen first. Most importantly people must place real value on how high their reputation scores are. This can be solved by incorporating the reputation score into everyday life. Imagine a situation where even if you interview for a job it is standard procedure to check your reputation score. Secondly the system must ensure the singular identity of each person. If a borrower can default and then just try to establish a new reputation score under a new identity, then the system will ultimately be a failure. This can be prevented by tying benefits to the reputation identity such as your pension and other financial benefits that people do not want to lose. This can also be done by using time in the system as an important variable in the algorithm that calculates your reputation score. If you establish a new identity you start at the bottom of the ladder.

The reputation system has the power to combine the credit bureau system with the microfinance system of group lending. The fact of the matter is that this system is leapfrogging what has been created in the US. If the US were to build its bureau now, it would most likely build it this way also.

Leveraging Algorithms

Reputation bureaus are learning systems and can initially facilitate small loans. As

experience grows larger more complex loans can be given. The algorithm for calculating the reputation score needs to be designed well. It should take documents into account in addition to transactional and social networking data. In India there are many fake documents and it is easy to produce fake documents. Technology can again be used to determine if a document submitted is fake or genuine with automated links to the document issuing authority.

Servers vs. Smart Cards

Smart cards are often considered the best option to store data about consumers and link them to the financial infrastructure. However a more cost effective and also a more secure option are servers that store all the data themselves. With a server you can create a virtual credit card on a mobile phone or any browser based device where you can access the credit card server. This is essentially mobile or browser based banking and it also gives the user the option to access the server and control the server options.

Controlling the server options means that you can access the server with a browser on a device like a computer or a mobile phone and change options as such. You could specify that only charges from Mumbai are valid or that charges over Rs 5000 are fraudulent. With a smart card you would have to have a smart card reader to access the data and settings. In the server set-up your access device can be any thin client browser. Indeed the cost of storing data and computing power is low enough to make this a reality.

While the card/ smart card paradigm is familiar, the server coupled with mobile phone access will be proven to be the more low cost method and can be made much more secure. This paper does not assert that cards will go away or that they are bad, but what is true is that the server/ mobile set-up is cheaper and can increase connectivity and functionality beyond current capabilities.

Advantages

Smart cards are more expensive and they require smart card readers. This makes them less ubiquitous. Hacking a smart card is easier then hacking a well protected server. A person can lose a smart card or it could get corrupted. The final solution should take into account not only the cost of setting up the system but also the ongoing costs and the ubiquity that can be achieved with the system.

A real time server based system will break down if connectivity with the server is not available. With mobile phones they have their own batteries so continuous electric power is not required and network availability especially for data is good and getting better. A real time system makes fraud difficult and does not suffer from data synchronization problems.

When all these factors are taken into account the author believes in a server

and mobile based real time solution. Financial and numeric literacy will be required to use such a solution but these are required in any case and are not show stoppers as has been shown by the widespread use of mobile phones.

Numeric Signatures vs. Biometrics

Most of us are aware of what biometric devices can do for security and identification purposes. The ability to identify users based on physical traits is useful and secure. However biometric devices are costly to implement with scale and often impractical because they can break down and require diligent upkeep. Replicating the biometric system across India would require far more maintenance and upfront cost than is realistically affordable, especially if the goal is to service the underprivileged. The alternative is the use of numeric signatures which is effectively low cost numeric encryption.

An example of a numeric signature system is as follows. Assume that a consumer has a mobile phone through which he can access a bank account (mobile banking). The consumer also chooses a 4-digit pin # (let us pretend the pin # is 1234). Finally, the consumer is issued a booklet the size of a credit card by his bank which contains many 10 digit number strings that are to be used to complete any transaction. Each 10 digit number can only be used once and can only be used by the person to whom it was issued. Once the consumer runs out of 10 digit strings, he can get a new booklet free of charge from the bank. The 10 digit strings would look like this: 23x95x8x9x. To complete the numerical encryption, the consumer must enter his pin in the correct order where the x's are placed. For instance, our consumer would enter 23**1**95**2**8**3**9**4**.

Notice the three levels of security that this system provides.

- All transactions must be entered from the phone that is linked to the specific bank account.
- All transactions require the use of a 10 digit number string from a booklet issued to the consumer. A different booklet issued to a different consumer will not be able to complete the transaction.
- All transactions require the knowledge of the users 4 digit secret pin.

In many ways this system provides more security than a credit/ debit card where you effectively only need the 4 digit pin and the credit card to complete a transaction. However a fraudster would have to possess all three pieces to break the numerical signature.

Cost Advantages

An additional reason to support the numeric signatures over biometrics is the fact that there are no devices or cards issued which will reduce account servicing costs. The activation process for an account is also much simpler when you do not

have to catalogue every user's finger print. In fingerprint biometrics you also have to be aware that if a fraudster can compromise one aspect such as creating a fake fingerprint or a fake biometric device then the system is ruined. Numeric signatures require that the fraudster compromises all three levels of security.

Conclusions

It is clear that the solutions which keep simplicity, cost effectiveness and security in mind will win out in the end. The innovative solutions proposed in this paper fit these three criteria while also providing increased flexibility for users through proven technology.

Creating a system of reputation networks that connect users through mobiles and numerical signatures might be a foreign idea, but what matters most is its inherent practicality. Indeed, before ATMs many skeptics said that the ATM system would never work because consumers needed the high touch aspect of tellers. Now branch free banking is as ubiquitous as any other kind of infrastructure.

Further progress beyond the ATM, credit card and credit bureau model is now needed if we are to extend valuable financial services to an ever greater population. New technology and a rethinking of processes will eventually produce the change required.

Government Action

The main recommendation for action in this whitepaper is for the government to invite proposals to build one or two reputation bureaus. For the winning bids the government should make a minority investment and take a board seat to facilitate the creation of well regulated reputation bureaus quickly.

The paper talks about smart card free server based bureaus because the author believes in that approach. When proposals are requested the government should specify what needs to be done and not how it is to be done. It is possible that the final solution may combine various approaches or have an innovative bent that no one has thought of.