MF Analytics Ltd

**BRAC Micro Credit Securitization Series I:
Lessons from the World's First Micro-Credit Backed Security
(MCBS)**

Ray Rahman
Saif Shah Mohammed

Boston
March 20, 2007

About MF Analytics:

Founded in 2005, MF Analytics is a financial services house focused on emerging markets in general, and in particular, the micro-finance and the SME sectors. MF Analytics provides structuring of securities, analytics and reporting to Micro Finance and Small and Medium Enterprise (SME) Institutions, development banks and the investment management community.

MF Analytics was the principal technology driver for the world's first micro finance securitization issued by BRAC, the world's largest NGO, which closed in August 2006 in Dhaka, Bangladesh. For this groundbreaking transaction, the company designed and developed algorithms for mining through millions of micro credit loans and micro credit borrowers. This analysis enabled the design of a financial structure that made this benchmark transaction possible. Our proprietary algorithms have transmuted previously non-quantified financial uncertainty to quantifiable risk and then designed and created a financial structure that hedges these risks. Additionally, our algorithms allow us to provide operational maintenance of the financial product, particularly the updating of a dynamic pool of securitized receivables.

MF Analytics provides MFIs the services needed to take the pain and frustration out of undertaking the complexities inherent in a securitization program. We work with both the arrangers and investor on behalf of the MFI in assessing the risks of the deal, providing the analytics and modeling needed, and coming up with an appropriate structure for the transaction. In addition, we would work with rating agencies in their rating of the deal. Our services helped BRAC gain its securitization with the first ever AAA rating of a bond in Bangladesh. After the bonds are issued, MF also provides ongoing reporting and collateral monitoring as it currently is doing for the BRAC deal.

Table of Contents:

Introduction

BRAC Micro Credit Securitisation Series I, closed in August 2006, was the world's first securitization of micro-credit receivables and the first of a new type of investment called Micro-Credit Backed Security (MCBS). This securitization was also the first AAA rated transaction within Bangladesh.

In general terms, the transaction size is $180 million in local Bangladesh currency. It consists of 12 equal tranches with the asset pool backing each tranche mirroring the overall risk profile of BRAC's micro-credit portfolio. The tenor of the transaction is 6.5 years, with each tranche maturing in 12 months. It is a fixed rate private placement sold predominantly to local Bangladesh investors. BRAC is the Servicer, and Eastern Bank Limited (EBL) is the trustee.

Having arranged and structured this transaction, we discuss the story behind it, and the lessons learned for the future. Part I deals with the transaction rationale that convinced BRAC to agree to go forward with a securitization. Part II examines various political economy considerations that went into arranging the transaction. Part III looks at the actual structure of the transaction. It highlights various data and logistical constraints that were addressed in the final structure. Working with BRAC's micro-credit portfolio data exposed certain risks that were not anticipated at the beginning of the structuring process. These risks were necessary to address and mitigate in the final structure.

We are entering the eighth month of the transaction and can now draw some lessons about how well the structure has performed, and what can be taken from it for future transactions. Part IV, thus, examines the performance of the bond and the underlying pool of securitized micro-credit receivables since the beginning of the transaction. We scrutinize the various credit enhancements that were built into the structure, and explore which of them could be reduced or removed in future securitizations. Part V concludes our analysis by relating some final lessons from the transaction and ideas for the future.

I. Transaction Rationale

Established in 1972, BRAC is Bangladesh's largest NGO with nearly 100,000 employees. BRAC takes a holistic approach to development, combining micro-credit activities with healthcare, education and social advocacy. With its 1381 areas offices, 35,000 primary schools and 35 health centers, BRAC has a presence in every district in Bangladesh.

As of March 2007, BRAC's micro-credit program had more than 5.3 million borrowers with outstanding loans. BRAC's micro-credit activities are carried out through three programs targeted at different borrower groups:

1. Dabi – with loans ranging from around US$ 50 to US$ 500 in size, targeting individuals with less than one acre of land.
2. Unnati – with loans ranging from around US$ 150 to US$ 850 in size, targeting individuals with more than one acre of land, or individuals who have graduated from the Dabi group.
3. Progati – with loans from ranging from US$ 350 to US$ 5000 in size, targeting small enterprises.

Loans generally have a one-year maturity. The interest rate is a flat 15%, with collections taken on a weekly basis for Dabi and Unnati, and on a monthly basis for Progati.

The BRAC portfolio has been growing rapidly in the last few years. Between January 2006 and January 2007 the principal outstanding on loans grew by 35% from US$280 million to more than US$380 million, and the number of borrowers grew by more than 10% to more than 5 million.

BRAC has been funding its micro-credit activities from a number of sources, including the savings of its group members/borrowers, donor grants, government loans and donor agencies through loans from PKSF, the apex microfinance institution. In early 2004, BRAC borrowed the equivalent of nearly US$30 million from the local capital markets through its first syndicated loan.

BRAC's financing options had several drawbacks. Donor funding had been volatile and could not be relied upon in long-term planning. BRAC also felt increasing pressure from the government to reduce the interest rates charged to borrowers as a pre-condition for further loans through PKSF. However, BRAC considered its current interest rates necessary for the sustainability and viability of its micro-credit program and felt that they could not be reduced further. Financing through syndications was expensive considering cost of capital as well as transaction costs associated. Future costs were uncertain as interest rates on later transactions would be driven by the volatile local credit market and would likely not adequately reflect the historical performance of BRAC's micro-credit program. In addition, syndications could not be carried out indefinitely without falling foul of regulatory limits on borrowing.

Securitization presented itself as an attractive alternative, or at least complement, to the existing sources of funding. Securitization would allow BRAC to have a more efficient balance sheet. It would improve BRAC's asset/liability management, and reduce leverage. Properly structured, the transaction could obtain a higher rating than BRAC could as an institution, and allow BRAC to raise lower-cost funds. A longer-term transaction would give BRAC the ability to plan out its future growth. And significantly, BRAC would have a broader investor base. Through the transaction, BRAC would be able to remove its dependence upon PKSF funding, thereby alleviating some of the pressure to reduce interest rates.

II. Political Economy Considerations

A. The Approval Process

Bangladesh Bank:

The central bank initially welcomed the concept of securitization as a way to deepen the capital markets. In December 2004, around the time the BRAC transaction was initially discussed, Bangladesh Bank arranged a well-attended workshop on securitizations as a source for funding for infrastructure and development projects.

Yet, over the next two years Bangladesh Bank did little to actually implement many of the proposals that came out of the December 2004 workshop. For whatever reason, the Bank simply refused to pull the trigger on many of the changes one might deem necessary for having more efficient capital markets. For example, in the workshop (and in other public and private discussions with the Bank), the need for a yield-curve, was noted by the local financial community. As we write this report, the yield-curve is still non-existent in the Bangladeshi banking sector.

Our own discussions with Bangladesh Bank about securitizing micro-credit receivables were well-received in the months after December 2004. Based on these interactions with Bangladesh Bank, the structure for the transaction was created and submitted to Bangladesh Bank for approval around June/July 2005. The original signals from the bank indicated that the approval process would be a short one. After all, the structure addressed the concerns that they had raised; namely currency risk concerns and the involvement of local financial institutions. The entire currency risk of the foreign investment was borne by FMO, and two-thirds of the transaction would be subscribed by local investors.

However, once the structure was submitted for approval, Bangladesh Bank became completely unresponsive. We received no indication of how the approval process was going until October at which point they came back with a sudden unexpected thunder-clap: The transaction might not be approved.

Bangladesh Bank raised three objections this time. First, we would have to further reduce the involvement of foreign investors by reducing the size of the tranche covered by a KfW/FMO guarantee. Second, the guarantees would have to be removed completely after the first year. Third, Bangladesh Bank was worried about income from the bonds and fees being remitted outside of Bangladesh by FMO and KfW. This concern was directly related to the overheating of the local US Dollar market in the second half of 2005, that saw the exchange rate move up in a matter of months from around Taka 60/USD to more than Taka 70/USD. Due to the increase in global oil prices, the government-owned Bangladesh Petroleum Corporation was borrowing US Dollars heavily from nationalized commercial banks causing the dollar to appreciate relative to the Taka.

The structure was changed to meet the first two concerns. For the third concern, we were able to show that the impact on the local dollar market from remittances would not be as strong as anticipated by Bangladesh Bank. The structure required FMO to buy a new tranche every six months, which would actually help in the local currency crisis. Further, the regulators were simply an order of magnitude off in their understanding of the size of fees and other remittances.

Their objections having been answered, Bangladesh Bank approved the transaction in December 2005/January 2006.

Securities and Exchange Commission:

Since the bond issued in each tranche would have a one-year maturity under our structure, the existing rules did not require a Securities and Exchange Commission approval. The SEC confirmed this in our conversations with them while the transaction was being structured. However, the Bangladesh Bank approval letter required us to approach the SEC again on this question. In mid-January 2006, we approached the SEC for a final confirmation that the approval process was not required under the rules. The SEC now decided that it would require us to get approval after all because of the six-year term of the transaction, even though the securities issued themselves would be of one-year maturity. Then in early-February 2006, we were again surprised with a long request for documents and analyses. We submitted these documents and analyses almost immediately.

At this point, the SEC also became unresponsive and gave us no indication of the status of the approval process. Interestingly, the SEC itself was in some turmoil over an anticipated change in its Chairman, which occurred in mid-March.

In March 2006, we received a AAA rating for the transaction from the Moody's-affiliated Credit Rating Agency of Bangladesh (CRAB). After this, the SEC did not logically have a reason to withhold approval. Yet, till mid-May we received no feedback from the SEC, or even an outlook on a possible timeframe for approval. Instead, we received a near-continuous stream of requests for further information, much of which had already been provided in previous responses or in the original application package. The arrival of the new Chairman in mid-March certainly helped matters however, as he took on a public stance of trying to cleanse the SEC of inefficiencies and corruption. In June 2006, the SEC finally approved the transaction.

B. What explains the delays in the approval process?

We can only speculate about the reasons behind the delays in the approval process. Some of the concerns expressed by the regulators – such as pressures on the local dollar market – were genuinely felt. Regulators may very well have been uncomfortable with the transaction due to their unfamiliarity with both microfinance and with securitizations. After all, this was a first-of-a-kind transaction with a number of moving parts (as

described in the next section). Further, the bureaucratic regime is not one known for its transparency or nimbleness. Based on informal discussions, we can suggest that some of the delays may have been related to deeper concerns of the government.

PKSF:

Established in 1990, Palli Karma Shahayak Foundation (PKSF) is the apex micro-credit organization in Bangladesh, a private-public partnership between the microfinance NGO's and the government. The organization receives funding from the Government, the IDA/World Bank, USAID, the Asian Development Bank (ADB) and the International Fund for Agricultural Development (IFAD). It lends these funds to partner microfinance organizations at a below-market rate.

PKSF has successfully utilized its funding clout to induce microfinance organizations to strengthen their reporting and auditing processes, as well as implement computerized management information systems at the head-office (and in some cases, area office) level, thereby strengthening institutional capacity. The organization has played some role in coordinating the activities of microfinance organizations to better target groups that may not have been receiving microfinance services. It has also facilitated research on microfinance activities.

BRAC had received US$30-US$40 million in loans from PKSF. But as discussed previously, BRAC felt itself under increased pressure to reduce the interest rates it charged as a precondition for being able to borrow again once the PKSF loans were paid down. One of the rationales for the securitization was thus to move away from dependence on PKSF funding. Therefore, it is reasonable to assume that PKSF may have felt its role as the apex microfinance body in Bangladesh threatened by the prospect of a microfinance organization being able to raise funds through securitization without PKSF involvement.

The Government:

2005 was the UN Year of Micro-credit. In what is arguably the home of micro-credit, the government's reception of the year was schizophrenic. On the one hand, the government sponsored a number of workshops and events to celebrate the year and highlight the achievements of microfinance institutions. On the other, the headlines in Dhaka were at times dominated by statements from the Minister of Finance publicly doubting whether the activities of microfinance institutions had any positive role to play in development. In the last quarter of 2005, there was a public disagreement between the Chairperson of BRAC and the Minister of Finance over the issue of interest rate caps.

The government's apathy to microfinance activity in Bangladesh was not animated solely by policy concerns about high interest rates. Since 2001, the centre-right BNP had ruled Bangladesh in alliance with the rightwing Jamaat-i-Islami. Jamaat represented many of the most conservative elements of Bangladeshi society, and historically, the relationship between these constituents of Jamaat and the activities of the development NGO's has

been a tense one. Further, the NGO's have been vocal about the rights of minorities under the BNP-Jamaat coalition. The influence of Jamaat on government policy since 2001 has been widely reported.

A less well-publicized aspect of the relationship between the government and the microfinance sector in Bangladesh has been concerns about the involvement of microfinance institutions in political activities. With millions of borrowers and beneficiaries of healthcare and education programs, microfinance institutions have an unprecedented ability to mobilize voters. In past years, prominent organizations such as Proshika have been accused of openly partisan activities.

The Proshika case is worth looking at closely to get a sense of government concerns. Like BRAC, Proshika was involved in education and social advocacy along with its microfinance activities. Also like BRAC, Proshika had also been able to scale up its microfinance activities to reach millions of borrowers in nearly every part of Bangladesh. In the mid-1990's, Proshika played a prominent role in the opposition Awami League-led movement for elections under a neutral caretaker government. In the 1996 and 2001 elections, BNP accused Proshika of slanting its voter education material in favor of the Awami League. In April 2004, Proshika was accused of trying to mobilize thousands of its borrowers to assemble in the capital to launch an opposition platform. In May 2004, the BNP/Jamaat government cracked down on Proshika, arresting its chairperson and stopping the flow of donor funding to its programs.

Whatever the merits of the Proshika case, government misgivings about the influence of the large microfinance institutions and their potential for quickly mobilizing thousands for political causes led in 2004 to the drafting of laws deepening government control of NGO's. It was in this climate that the BRAC securitization was proposed to the regulators. Concerns about perception of Proshika's activities had led BRAC to form the Federation of NGO's of Bangladesh (FNB) with other NGO's, breaking away from the Proshika-led Association of Development Agencies in Bangladesh (ADAB), the apex development group. But the government likely felt that BRAC's dependence upon the whims of government funding through PKSF was a vital lever for controlling its activities.

III. Structure Overview

A. Issues

Our analyses of BRAC's information system and portfolio revealed a number of issues that needed to be mitigated in the final structure.

Information and Logistical Issues:

Time Lag: BRAC updates the collection and disbursement data at its 1381 area office computers daily. However, these data are transferred to the Dhaka head office only once a month. The infrastructure simply does not currently exist for more frequent transfers of information to the head office. At the head office, it takes around a week to complete the process of updating and checking the database. (At the time of the structuring, this process took nearly 10-12 days). As a result, the longest gap between a transaction in the field and the information reaching the head office is nearly 42 days. A delinquency or prepayment will in many cases be reported to the head office nearly 42 days after they took place. The structure would have to "solve" this lag.

Changing Collection Dates: BRAC's loans to its borrowers are collected on a weekly or monthly schedule. However, the exact collection dates for a particular loan cannot be known until after the end of the month for a number of reasons.

No collections take place on local holidays, and these holidays are often dependent upon the sighting of the moon. BRAC's system will, during the month, allow the collection schedules to be updated to reflect these local holidays. Similarly, at a country-wide level, national holidays – many of them based on the lunar calendar – require shifts in collections dates.

Furthermore, changes in BRAC's personnel itself can lead to changes in collection dates. At BRAC, each collection officer is assigned two village groups a day to meet borrowers, examine their activities, collect payments, and make new disbursements. The transfer or promotion of a collection officer can result in a change in the day of a week that a particular village group will be visited.

Forecasts of collections from the pool of securitized receivables would have to reflect such uncertainty about collection schedules.

Missing, inconsistent, and unusable data: The monthly data transferred to the head office arrives in the form of CD's or zipdrives carried by couriers from the 1381 area offices. These data are uploaded to the head office servers before any reporting can take place. To say that the transfer process is fail-safe is an understatement. Each month, BRAC's head office finds missing information and corrupted data, and has to ask individual area offices to transfer the information again. But such checks do not spot all missing information.

At each of the area offices, the information for thousands of collections and disbursements are entered each day by a BRAC-trained computer operator hired solely for this purpose. While the software used by BRAC does incorporate some checks on whether information was entered correctly, some mistakes inevitably creep in. As a result, BRAC's data included some inconsistent information.

Further, the software used for data entry at BRAC itself generated some inconsistencies. We were able to spot some of these inconsistencies in our due diligence process, and BRAC corrected them.

Finally, at the field offices, there is no way to fix malfunctioning computers without sending the machines to Dhaka. Sometimes malfunctioning machines are not spotted early, and some of the information transferred to the head office is corrupt and unusable. Because of fires, theft or natural disasters, there is always some underlying risk of spoilage of data.

Notwithstanding these constraints, we found that errors and inconsistencies in BRAC's dataset were relatively rare; less than 1% of the data every month. We also noticed that over time, BRAC's monthly dataset got better. BRAC removed the software-generated inconsistencies that we spotted, its checks on data quality improved and the process of transferring data became more streamlined. However, the structure would have to take into account the risk of some missing, corrupt or inconsistent data.

Data Issues in the Risk Analysis Process:

Unavailability of historical data: One of the limitations that we had to deal with in the structuring process was the incompleteness of the historical information available to us. BRAC area offices had been computerized at different times, and it was only near the end of 2005 that computerization process was completed. Around the same time, BRAC was also in the midst of upgrading the data-entry and database software used at the area offices. While accessible computerized data for some area offices went back a few years, for most area offices, accessible data went back only a few months. Because the upgrades to the area office systems had not been completed, at the time of structuring the deal we were only able to analyze individual loans on a monthly basis, instead of being able to look at the actual dates of transactions. Thus we would only be able to know if a particular loan failed to pay in a particular month, but not the exact date when it failed to pay.

Absence of data on borrower characteristics: The BRAC data available to us at the time of the structuring process included information on where the loan was being used and what the loan was being used for. But important demographic characteristics, such as the estimated age of the borrower, the length of time they had been borrowing from BRAC, information on defaults on previous loans, and even the number of installments missed in the current loan, were missing. These constraints severely limited our ability to create credit scores for individual borrowers.

While the upgrades to BRAC's system allow some of this information to be captured, BRAC's database still does not include useful information that could be easily incorporated. BRAC's healthcare and education programs, for example, are a rich source of information on borrower households. However, these databases still do not speak to each other making accessing data across databases difficult.

Deciphering the meaning of defaults: At the beginning of the transaction, there was some inconsistency in the way that BRAC and the investors understood what constituted a defaulting loan. BRAC defines a defaulting loan as one which failed to pay its total obligation of principal and interest by the end of the one-year period of the loan. Thus, a loan that missed all weekly payments for months but was still to reach the end of its one-year term is considered a "current loan" by BRAC. For BRAC, it is this definition that generates that the astonishing, well-publicized nearly-100% repayment rates.

Such a definition was simply not palatable for the investors. But a problem in creating a definition of default and delinquency more consistent with the conventional understanding of these concepts was the fact that only monthly aggregates of the transactions of individual loans were available at the time of structuring the transaction. Taking into account data limitations, we defined delinquent loans as those loans that failed to pay their aggregate monthly installments in the immediately preceding month.

The definition was stricter than BRAC's own in that many of BRAC's "current" loans were identified as delinquent. However, it was also less strict than BRAC's definition in certain respects in that a loan that was beyond its one-year maturity period but was making its payments on time in the immediately preceding month would not be identified as delinquent. **Table 1** shows the rate of delinquencies (defined as the principal outstanding of delinquent loans over the principal outstanding of BRAC's total current portfolio) for the period January 2005 to April 2006. It also shows the cash-flow impact of delinquencies in this period. It must be noted that Bangladesh did not suffer from any natural disasters in this timeframe. However, even by our arguably stricter definition of delinquencies, the rate of delinquencies has never been greater than 8.25% (within this period).

Analysis of Risk:

Risk Variables identified: In the available data, our analysis identified the location of the borrower and the type of activity of the loan as relevant risk variables. Borrowers in peri-urban and urban areas, for example, were less likely to be delinquent than borrowers in remote parts of the country. We also identified the age of the loan as a relevant risk variable. Loans that were six to eight months old were more likely to be delinquent than newer or older loans. We also found that loan size did have an impact upon delinquencies. The larger loans given in the Progati program to small enterprises almost never missed payments. Delinquencies were much more frequent for the smallest loans in the Dabi program.

Prepayments: Our analysis also revealed the existence of risks to the structure that had not been anticipated in the beginning of the structuring process. We noticed that a significant number of loans prepay before their maturity date. **Table 2** shows the cash impact of these prepayments between January 2005 and April 2006. It is worth noting that in some months, the positive cash impact of prepayments is comparable to the negative impact of delinquencies. Our structure would need to take into account the risk of prepayments not leaving enough cash flow for bond payments in future months.

B. The Structure

The Parties:

BRAC is the Originator in this transaction. BRAC also plays the role of Servicer in this transaction, depositing the collections from the securitized receivables and collateral to the SPV's accounts on a monthly basis, updating the pool of securitized receivables and collateral, and reporting the performance of the pool to the Investors. The Trustee for the SPV is Eastern Bank Limited – a leading local bank.

The Investors in this transaction are FMO of Netherlands, Citibank and two leading local banks, Pubali Bank and The City Bank. Citibank's investment shall (for the first year) be guaranteed by FMO and counter-guaranteed by KfW of Germany. As in most securitizations, BRAC is also the Residual Beneficiary of all cash-flows after fees, principal payments and interest payments are paid out each month by the SPV.

MF Analytics performed all the data analysis and structured the transaction. Furthermore the company will provide continuing support to BRAC to maintain the securitized pool of receivables and collateral and assist in reporting performance to the Investors. RSA Capital was the Lead Arrangers of the transaction. FMO, KfW and Citibank were co Lead Arrangers.

The transaction was rated by the Credit Rating Agency of Bangladesh, the local Moody's affiliate. BRAC's MIS system and MF Analytics' pooling and reporting algorithms were audited by PriceWaterhouseCoopers (PWC). BRAC itself is audited by Ernst & Young Malaysia.

Transaction Structure:

This US$180 million transaction (in equivalent Bangladesh Taka) is divided into 12 equal tranches over six years. Every six months, the Originator shall sell US$15 million worth of micro-credit receivables to the Trust/Special Purpose Vehicle created for this transaction in return for cash. It shall also earmark another US$7.5 million worth of micro-credit receivables as additional collateral. The Trust shall issue US$15 million worth of certificates or bonds of one year maturity backed by the pool of securitized receivables and collateral to the Investors. In return, the Investors shall invest US$15 million in the Trust on or before the date of issue for the tranche.

Each tranche is divided into three Sub-tranches. Sub-tranche A is the FMO investment, amounting to US$5 million. Sub-tranche B is the Citibank investment, also US$5 million. As noted already, Sub-tranche B is guaranteed by FMO for the first two tranches, and counter-guaranteed by KfW. Sub-tranche C, the remaining US$5 million, is issued to the local investors. The certificates issued to the investors in each Sub-tranche are *pari passu*. Each of the tranches is benchmarked to 182 days Bangladesh T-bill. It should be noted that the cost of funds for BRAC from this transaction is between 150 to 200 basis points below what would have been available to it had it gone for a straight loan or syndication.

The Securitized Asset Pool:

The underling asset pool for the securitization consists entirely of BRAC's micro-credit receivables. At the outset of each tranche, the pool or the collateral underlying the tranche is selected to reflect the distribution of loans in the BRAC's current portfolio (excluding all loans that have liens from PKSF and syndications) along three variables:

1. Program (Dabi/Progati/Unnati)
2. Geography (identified by Area Offices)
3. Activity or purpose of the loan (identified by a "Schematic Code")

The securitized loans are selected within these categories randomly. As a result, the pool is not biased towards including loans of a particular size or age.

The pool is over-collateralized by 50%, i.e., at the beginning of each tranche, US$22.5 million (in equivalent Bangladesh Taka) of receivables are pooled as per the criteria noted above. Furthermore, the asset pool is replenished with additional collateral from month to month if the forecasted cash-flow from the pool is less than 140% of the SPV liability in the following month. The average principal outstanding and average disbursement amount of all BRAC current loans is $100 and $166 respectively (as of January 2007).

Paydown Structure for Each Tranche:

The certificates or bonds issued for each tranche are of one year maturity. The bonds are amortized monthly based on a predefined pay-down schedule. Interest is also paid on the outstanding principal outstanding of the bonds on a monthly basis. The pay-down schedules of the certificates reflects the actual pay-down of the underlying securitized receivables. The principal pay-down schedules for the first two tranches is presented in **Table 3**.

With new tranches issued every six months over a course of six years, BRAC is provided a committed, long-term source of funding. The tranches disburse funds at a rate that BRAC can absorb without trouble for distribution to its borrowers. The one-year maturity of the bonds reflects the short-term nature of the underlying micro-credit receivables, allows the securitized pool to track BRAC's portfolio, and provides the Investors an additional level of comfort for investing in this first-of-a-kind transaction.

Credit Enhancements:

A number of credit enhancements were included in this transaction. The 50% over-collateralization of the securitized pool and the replenishment of the pool with additional receivables in the event of projected cash-flows falling below 140% of the following month's SPV liability, have already been discussed. A few additional credit-enhancements were added for good measure.

Substitution: Loans identified as delinquent and loans with missing or corrupted data are removed on a monthly basis from the pool. (The delinquent loans are under our definition

of delinquency. Loans identified as defaulted loans under BRAC's definition are not removed from the securitized pool.) In their place, loans from the same program, geographical region (area office) and type of activity as far as possible are purchased from BRAC as replacements by the SPV. These replacement loans are selected so that they would mature later than delinquent and missing data loans.

Removing Prepayment Risks: Instead of being used to pay the Investors or released to the Residual Beneficiary, prepayments are captured in a provisional account. Once loans with prepayments within the securitized pool mature, these prepayments are released at the rate at which these amounts would have been collected had no prepayment taken place. Prepayment risk is thus totally hedged out from the transaction.

Debt Service Reserve Account: A Debt Service Reserve Account of US$2.5 million was provided by BRAC as an additional credit enhancement at the beginning of the first two tranches. The DSRA amount is expected to be negotiated down after the second tranche.

MF Analytics Pool Maintenance and Reporting Modules:

The structure required the creation of a software package by MF Analytics tailored to this transaction. The package included modules that create the pool of securitized receivables and forecast the cash-flow from the securitized pools and bond pay-down structure at the beginning of each tranche. It also included modules that, on a monthly basis, substitute delinquent and missing loans, trap and release prepayments to completely hedge out prepayment risk, and replenish the pool if necessary with additional collateral. Additional modules fulfill all of the reporting needs of BRAC for this transaction. It is noteworthy to mention that MF Analytics reporting module mines through over 150 million data points each month.

IV. Performance

At the time of the writing of this paper, six payment dates on the first tranche of the transaction have passed. Nearly 70% of the first tranche has already been paid down. We are now in a position to look closely at the efficacy of the structure.

Delinquency Rates:

Bangladesh has not witnessed any natural calamities in the last few months. However, there has been some political turmoil over the parliamentary elections which were cancelled on January 11, 2007 with the declaration of a State of Emergency caretaker government.
Table 4 looks at the delinquency rate of loans in the securitized portfolio. (Delinquency rate for a particular month is defined as the principal outstanding of loans that missed a single payment in the previous month divided by the principal outstanding of the securitized pool.) Delinquencies in the politically volatile period between November and

January never rose above 6.10%. The relatively high delinquency rate in October (just after the flood season) is comparable to the rate from previous years.

Bond Performance:

Table 5 shows the excess cash flow returned to BRAC as residual beneficiary in the first six months, and the future SPV liability covered by the amounts collectible from the securitized pool and cash trapped in the prepayment accounts.

It is clear that the SPV is awash in liquidity. This was expected, and was one of the primary reasons that the AAA rating can be attributed to. By the end of the sixth month, nearly 200% of the SPV's liability in future months is covered by the underlying securitized receivables and the cash trapped in the prepayment account without taking into account the US$2.5 million deposited in the debt service reserve account.

But what would have happened had the credit enhancements not been put in place. **Table 6** and **Table 7** look at the impact of removing the different credit enhancements – over-collateralization, the trapping and controlled release of prepayments, and the substitution and replacement of delinquent loans.

With over-collateralization, but without any other credit enhancements, excess cash-flow never fell below 40%. Further, the securitized pool always covers around 150% of future SPV liabilities.

In contrast, removing over-collateralization and all other credit enhancements would have resulted in the SPV being unable to cover the bond obligations beyond the first two months. It may have been possible to adjust the pay-down structure so that the bond would amortize much more quickly in the first two months. But the SPV would likely never have much liquidity for comfort. With no over-collateralization, the securitized pool barely covers future SPV liabilities. The trapping and controlled release of prepayments would have allowed the securitized pool and trapped cash to cover future SPV liabilities more comfortably, particularly after the fifth month of the transaction. Substitution and replacement of delinquent loans have a similar impact. However, the SPV still would not have been able to cover its liabilities between the second and sixth month.

Over-collateralization without substitution but with the trapping and controlled-release of prepayments would have meant less SPV liquidity in the first six months. In particular, excess liquidity in the fifth and sixth months would be only around 15%. However, in the same two months, the future SPV liability covered by the trapped prepayment cash and the amounts collectible from the pool would increase from 150% to around 200%. With over-collateralization and substitution (but no trapping of prepayments), there would be a slight decrease in excess liquidity, which would still hover around 30% in the later months.

The transaction till date has not required the replenishment of the pool with new collateral, as excess cash-flow has never dipped below 40%. We have thus not analyzed the impact of replenishment upon the robustness of the structure.

Clearly, much of the robustness of the structure can be attributed to over-collateralization. The process of trapping prepayments and releasing them upon maturity adds to the comfort that the SPV shall be able to cover future obligations. However, even without the trapping of prepayments, nearly 150% of future obligations are covered by the receivables from over-collateralized pool. The impact of substitution upon SPV liquidity is also slight. These results suggest under normal circumstances, over-collateralization may be enough as a credit-enhancement. The prepayment and substitution enhancements to the structure really are for extraordinary circumstances with unusually high prepayment or delinquency rates.

V. Looking forward

Servicer Risk:

We have discussed many of the informational and logistical risks that were identified and addressed by the structure. However, a major risk noted by the Investors was Servicer Risk. In the event of BRAC ceasing to exist, it would take a few months for another institution to step in and restart collections from BRAC's borrowers.

A few factors mitigate some of the Servicer Risk. PriceWaterhouseCoopers (PWC) ran a systems analysis of BRAC's MIS system. PWC noted that BRAC's systems were quite robust. In particular, they noted the presence of data backups and system redundancies at both the head office and area office levels. They also independently checked the accuracy of the data. Further, the BRAC database includes the name and location of the individual borrower. Thus, in case the Servicer needs to be replaced, the new servicer will be able to identify and locate the borrowers whose loan has been securitized.

Yet, it is unavoidable that a new servicer will likely take some time to send its own collection officers. Additionally, while all funds collected from the securitized pool can be identified in the current BRAC system the 42-day time-lag for information reaching the head office means that there is always some commingling of funds in BRAC's accounts. In the event of BRAC going bankrupt, there is some risk of not being able to retrieve all the collected funds for the immediately preceding month. However, the presence of a DSRA fund may mitigate some of these risks.

Moving beyond the BRAC Micro Credit Securitization Series I:

We have already discussed how information on borrower characteristics and households was limited. This constrained the risk analyses that could be done. Further, historical data were unavailable. In future transactions, more will be known about the risk profile of BRAC's borrowers from its existing databases.

However, as noted, BRAC is not tapping into rich sources of information that are readily available to it. BRAC's healthcare and education programs collect detailed information on BRAC's group members and their households. Unfortunately, currently these databases cannot be linked to the micro-credit database. Further, BRAC also collects information on the savings of the borrowers. These data were unavailable to us, and can yield valuable information about the risk profiles of BRAC's borrowers.

As more is learnt about micro-credit borrowers, investors also have to be more flexible in their approach to conditions they place on future securitizations. The 50% over-collateralization, for example, was dictated by the investors at the start of the transaction without much analysis. The 40% excess cash-flow requirement and DSRA amount were also a function of some investors' (and regulators') risk aversion and the need to guarantee a AAA rating in this first-of-a-kind transaction. In future transactions, investors should allow analyses of the risk profile of the borrowers to guide optimal structures. Such analyses may also create the possibility of tiering risks to meet the appetites of different investors.

The sharing of information about borrowers among different microfinance institutions may also help these institutions better understand the risk profiles of their own borrowers. It may also allow smaller institutions to pool their portfolios to achieve the necessary scale for accessing funds through securitizations. Sharing of information – particularly in a country like Bangladesh with no national ID cards, let alone credit rating reports – may help mitigate residual servicer risk.

We have noted how BRAC's own MIS system in the area and head offices is quite robust, particularly given the difficult operational conditions. But the 42-day lag between actual collections and information reaching the head office is problematic. BRAC has made tremendous strides in getting the information to the head office quicker. But more frequent updates would reduce the risk for investors in future transactions, while also allowing BRAC to improve its own cash-flow management. BRAC is considering the possibility of linking a few regional offices to the head office through the internet, and transferring information to these regional offices from the area office weekly. It may also be possible to leverage mobile technology for live updates on collections and disbursements.

During the course of the transaction, the very fact that BRAC had to expose and explain its processes and systems to investors, auditors and a credit rating agency helped advance transparency and accountability. Also, issues identified with BRAC's systems or data were rectified as far as possible. BRAC has also made tremendous strides in the last year or so in strengthening its reporting systems. We predicted at the start of this transaction in 2004 that BRAC would mature as a result of this securitization. We were pleased by the fact that this prediction was confirmed.

A securitization such as this is really a learning process for the originator, investors and regulators. It contains lessons for future transactions at many different levels, from political economy considerations to risks identified. The structure that was created for

BRAC Micro Credit Securitization Series I incorporated many of these lessons. The structure has proved to be robust in the first six months of the first tranche. As the transaction moves forward into its new tranches, we hope to learn more lessons about what works in the current structure for replications of this transaction and the creation of new Micro-Credit Backed Securities (MCBS) structures elsewhere.

Tables

Table 1: Delinquency Rate and Cash Impact of Delinquencies, January 2005 and April 2006

Month	Year	Delinquency Rate	Cash Impact
1	2005	8.14%	7.69%
2	2005	7.48%	7.33%
3	2005	8.25%	7.49%
4	2005	7.81%	7.35%
5	2005	6.62%	6.49%
6	2005	6.14%	5.53%
7	2005	6.42%	6.09%
8	2005	5.93%	5.98%
9	2005	5.47%	5.88%
10	2005	6.51%	6.62%
11	2005	4.77%	5.72%
12	2005	4.24%	4.57%
1	2006	4.83%	5.18%
2	2006	4.45%	4.83%
3	2006	4.51%	4.77%
4	2006	4.89%	4.88%
Average		**6.03%**	**6.02%**

Table 2: Prepayment Rate and Cash Impact of Prepayments, January 2005 and April 2006

Month	Year	Prepayment Rate	Cash Impact
1	2005	7.73%	4.22%
2	2005	11.14%	5.04%
3	2005	5.84%	2.81%
4	2005	5.63%	2.95%
5	2005	8.39%	4.36%
6	2005	3.26%	2.74%
7	2005	2.69%	8.83%
8	2005	2.83%	8.81%
9	2005	5.17%	10.82%
10	2005	4.82%	19.02%
11	2005	10.49%	21.17%
12	2005	7.65%	11.99%
1	2006	4.58%	10.11%
2	2006	4.99%	11.86%
3	2006	5.07%	10.01%
4	2006	2.70%	9.12%
Average		**5.81%**	**8.99%**

Table 3: Principal Pay-down Schedules for Tranche 1 and Tranche 2

| Month | % Principal Paid Down | |
	Tranche 1	Tranche 2
1	12.25%	12.000%
2	12.25%	12.000%
3	12.25%	12.000%
4	12.25%	12.000%
5	12.00%	11.750%
6	9.85%	11.500%
7	9.00%	9.750%
8	7.50%	7.500%
9	5.90%	4.500%
10	4.00%	4.250%
11	1.90%	2.000%
12	0.85%	0.750%

Table 4: Delinquency Rate for Tranche 1 Securitized Pool, August 2006 – January 2007

Month	Delinquency Rate
August	2.60%
September	2.80%
October	8.20%
November	6.10%
December	4.00%
January	5.80%
Average	4.92%

Table 5: Tranche 1 Excess Cash Flow and SPV Liability Covered, September 2006 – February 2007

Payment Month	Year	% Excess Cash Flow	% Future SPV Liability Covered
9	2006	99%	157%
10	2006	87%	157%
11	2006	62%	166%
12	2006	79%	172%
1	2007	56%	184%
2	2007	72%	199%

Note: DSRA amount not included in any calculation.

Table 6: Performance of Different Credit Enhancements:
% Excess Cash Flow of SPV Liability Returning to Residual Beneficiary under different scenarios

Payment Month	Year	All Credit Enhancements	Over-Collat., No Cr. Enhance.	Over-Collat., w/ Prepay. Trap.	Over-Collat., w/ Subst.	No Over-Collat., w/ No Cr. Enhance.	No Over-Collat., w/ Prepay. Hedge	No Over-collat., w/ Subst.
9	2006	99%	102%	87%	89%	35%	24%	25%
10	2006	87%	83%	64%	70%	21%	9%	13%
11	2006	62%	40%	24%	44%	-7%	-18%	-5%
12	2006	79%	49%	30%	54%	-1%	-14%	1%
1	2007	56%	49%	16%	30%	-1%	-23%	-15%
2	2007	72%	41%	18%	37%	-6%	-21%	-10%

Note: Calculations do not include DSRA amount of US$2.5 million

Table 7: Performance of Different Credit Enhancements:
% of Future SPV liability for Tranche 1 covered by Amount Collectible from Securitized Pool and Cash Trapped in Prepayment Accounts

Payment Month	Year	All Credit Enhancements	Over-Collat., No Cr. Enhance.	Over-Collat., w/ Prepay. Trap.	Over-Collat., w/ Subst.	No Over-Collat., w/ No Cr. Enhance.	No Over-Collat., w/ Prepay. Trap.	No Over-collat., w/ Subst.
9	2006	157%	152%	155%	156%	101%	103%	103%
10	2006	157%	147%	153%	154%	98%	102%	102%
11	2006	166%	148%	158%	161%	99%	105%	107%
12	2006	172%	148%	165%	165%	99%	110%	109%
1	2007	184%	148%	181%	173%	98%	120%	114%
2	2007	199%	150%	202%	182%	100%	135%	120%

Note: Calculations do not include DSRA amount of US$2.5 million

About the Authors

Ray Rahman
rrahman@mfanalytics.com

Ray Rahman is the founder and CEO of MF Analytics and one of the chief architects of the BRAC deal. Prior to starting MF Analytics, Ray was at Lehman Brothers working with the fledgling Commercial Mortgage-Backed Security (CMBS) industry in the 1990s. While at Lehman, Ray had over $100 Billion of product exposure. He has also worked in Private Equity where he specialized in optimizing supply chain operations and in re-structuring multinational companies with sales of over $1 billion. Ray has led many multinational groups.

He has a BS degree in Mechanical Engineering (high distinction), a BA in Economics (cum laude) from University of Rochester and an MBA from MIT Sloan School of Management.

Saif I. Shah Mohammed
smohammed@mfanalytics.com

Saif I. Shah Mohammed is a co founder of MF Analytics. He worked extensively on the BRAC securitization. He assisted in analyzing risk in BRAC's micro-credit portfolio. He has co-developed the algorithms with Ray Rahman that will select the pool of receivables for the BRAC micro-credit securitization, forecasted the receivables from the pool, and continues to substitute and replace delinquent loans on a monthly basis for the dynamic pool. Saif has also co-developed the algorithms with Ray Rahman to hedge out prepayment risk in the BRAC micro-credit securitization.

Prior to joining MF Analytics, Saif worked as an analyst at Cornerstone Research, assisting industry and faculty experts in developing economic and financial analysis in litigation contexts from 2002 to 2005. Saif currently attends the Columbia University School of Law. Saif graduated from Harvard College in 2002 with a B.A. (magna cum laude) in Economics.