HARVARD UNIVERSITY

JOHN F. KENNEDY SCHOOL OF GOVERNMENT

Users' Guide
to the
KSG Micro Finance Institutions Simulator

SymBanc™V.1

Microfinance Institution Simulator
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Overview of SymBanc™

SymBanc™ V.1 is the new simulation application that teaches the principles of successful microfinance management. Dynamic, highly interactive, and flexible, SymBanc™ allows users to make a wide range of decisions and see the consequences over time. Management choices include:

- identification of the target market and design of loan and savings products;
- staffing and allocation of complimentary resources;
- creation, maintenance, and expansion of a branch network; and
- optimization of funds mobilization and utilization.

The objective of each simulation is to achieve performance targets defined by the user, such as financial sustainability, customer outreach, or market coverage. After specifying basic Market Conditions, users advance the simulation, moving back and forth between the Decision Screens and the Results Screens and adjusting management decisions as appropriate. SymBanc™ can be used either individually or in small groups.

SymBanc™V.1 is only the first stage in the development of the microfinance simulator. SymBanc™V.2 will mirror the complex operating environment of microfinance institutions even more closely and will include enhancements such as:

- an expanded range of potential clients and products;
- a greater variety of market and regulatory environments; and
- more forms of institutional organization and governance.

SymBanc™ V.2 will also include built-in teaching material and will be accessible over the World Wide Web. We invite you to participate in the development of SymBanc™ by trying it and giving us your suggestions for future enhancements. We would also be pleased to answer any questions you might have. Please contact Gary Hirsch at GBHirsch@comcast.net with feedback or inquiries.

Installing the Simulator

After copying or downloading the simulator to your computer, install it by double-clicking on the icon and going through the brief installation process. (If you are downloading, you may need to un-Zip the file first). Start the application by clicking on the button that appears at the end of the installation or (later) by selecting the simulator from the Windows Start menu (under Programs). This is a self-contained application, so you won't need any other software. There is the option for creating Excel spreadsheets with a record of the decisions and key results and you'll need Excel to look at those.

Getting Started

Click **Continue** on the first screen and **Set Up a New Simulation** on the second to get started. You'll be asked to give the simulation a name now and each time you start a new simulation. Naming simulations enables you to keep track of the results from each strategy and to compare the results of strategies to each other. Use names that reflect the strategy such as High Interest or Fast Growth to make it easier to remember which strategy you used. Click on **Save** once you've typed in a name. If you choose the same name as one you already used, you'll be asked if you want to overwrite the earlier results.

The Control Screen

The next screen you will see is the "Control" screen (shown on the next page) that provides a good overview of the decisions and results that are available. Decisions include those about the **Target Market, Loan Product Design, Staffing and Productivity, Information Systems and Savings, and Sources of Funds**. The **Target Market** button and screen will appear only at the beginning of each simulation. Choices you make about the target market at this point will remain in place for the remainder of the simulation. The other decision screens continue to be available during the simulation and decisions on these screens can be changed as often as every month.

Results screens include **Financial Overviews** that are the Profit and Loss statement and Balance Sheet and screens displaying **Revenues, Applicants and Borrowers, Expenses, Loan Loss, and Savings and Funds** as well as variables that are "drivers" for each of these measures of MFI performance. Visiting these screens at the beginning of a simulation will enable you to view results of previous simulations (once you have done some) and help you refine your strategies. The "base" simulation that is displayed on the results screens initially is simply the result of running the simulation forward with all of the decisions at their default (initial) values.
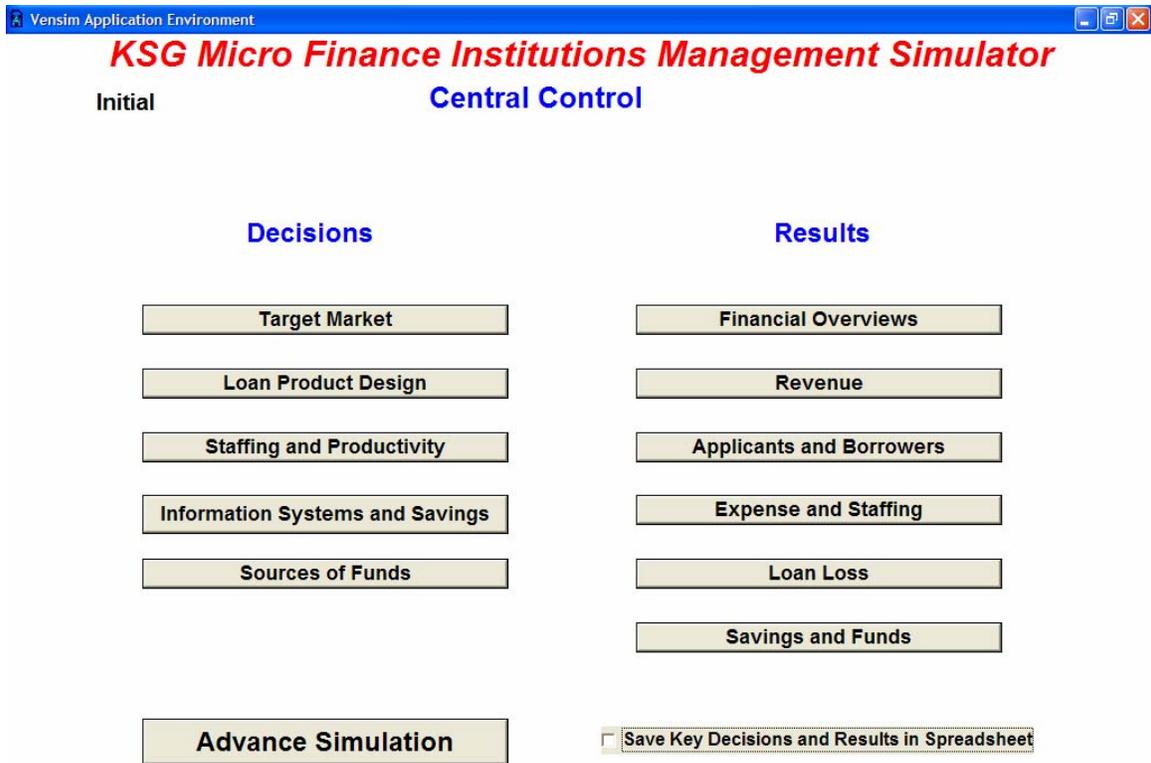
The **Advance Simulation** button at the bottom of the screen (which will appear on all of the other screens as well) moves the simulation ahead by one month each time you click on it. A full simulation occurs over 96 months (8 years), but will terminate sooner if your MFI runs out of cash or you abandon a strategy by clicking on the **Stop** button on any of the results screens.

The other feature at the bottom of the screen is a check box that lets you **Save Decisions and Key Results in Spreadsheet** (Excel) format. Clicking this check box saves a monthly record of decisions and key results to a spreadsheet in the same folder as the simulator is installed. The spreadsheet will be given the same name as the simulation and you'll of course need Excel to look at each one. Don't check this box if you don't want to generate the spreadsheets. (The Results screens themselves provide a lot of information in graphical form.)

Decision Screens

1. Target Market

This screen lets you shape the market you are targeting with each simulation. As indicated earlier, decisions on this screen can only be made initially at the beginning of a simulation and remain in effect for the remainder. The first check box lets you select a strategy that targets **Both Men and Women** as the default or, by "un-checking" the box (clicking once), target the strategy for women only. The next set of "radio buttons" lets you select among

strategies aimed at **New Businesses Only, Existing Businesses Only** (the default)**, or Both New and Existing Businesses**. An additional set of radio buttons allows a choice between making **Agricultural** or **Trade** loans with trade as the default.

So far, the strategies potentially apply to all income groups (although certain loans may be less attractive to particular groups e.g., high interest loans to upper income folks who have alternative sources of credit). The next set of check boxes let you target a strategy further to particular income levels by checking on the top one (**Means Testing to Select Income Group**). Then check as many of the ones below it as you want in order to include different income quintiles in the target market.

The set of checkboxes at the bottom labeled **Scenario Switches** enables you to select particular constraints and economic conditions that are a good test of resiliency for your strategies. Details of each switch are provided in Appendix 1. You may, however, wish to select a switch without knowing its consequences ahead of time – it's more realistic that way!

The remaining buttons at the bottom of the screen and all of the decision screens will send you to the **Control** screen or **Results** screens, **Advance the Simulation** by one Month, or go to the other four decision screens.

2. Loan Design

The next screen enables you to design the loans your MFI is offering. Unlike the previous screen, it will continue to be available throughout the simulation for reshaping loan terms if necessary. The first set of radio buttons provides a selection among **Individual Only, Groups Only,** and **Both Individual and Group Loans** with the last choice being the default. The next three "sliders" (**First Stage, Second Stage, Third Stage**) specify the loan amounts (in dollars) for three stages through which borrowers can move if they successfully repay loans and are motivated to take on larger loans. The slider below the ones for loan amounts will set the **Term of Loans** in months. 12 months is the default if you choose not to change the term. The radio buttons for **Frequency of Payment** provide a choice among **Monthly** (the default), **Weekly**, or **Every Six Months**.

(Note: You can set the sliders by moving the "knob" in the middle or by typing in the value you choose if moving the knob is awkward. If you type in the numbers, don't exceed the limits shown on either side of the slider.)

The next slider sets the **Commission Rate** that is the amount charged for each new loan or renewal as a percentage of the size of the loan. The **Monthly Interest Rate** is the percentage per month charged for the loan. The **Built-In Late Payment Penalty** set by the next slider determines the penalty, if any, built into the cost of the loan and refunded to the borrower if all payments are made on time, but forfeited if the loan becomes delinquent. The penalty is

expressed as a percentage of the interest rate (e.g., a setting of this slider at 25 per cent with a 4 per cent per month interest rate would create a prepaid penalty of 1% of the loan amount added to the cost of the loan). The check boxes in the right-hand column determine if **Collateral** and/or **Compulsory Savings** (set as 10% of the loan amount) will be required. If compulsory saving is required, the slider below the check box sets the monthly interest rate paid to borrowers whose savings are held by your MFI. The final set of radio buttons determines whether payments are calculated based on a **Straight Interest** or **Declining Balance** method.

As you advance to Month 1 and beyond, you will see an **Average Monthly Income** for the targeted population and **Average Payments** for loans at each stage based on the sizes of loan, term, interest rate, and other characteristics selected. (These are not available on the initial loan design screen.) This information should be helpful in deciding whether the loans you are offering are likely to be affordable by the population targeted by your MFI. As indicated at the bottom of the screen, the sizes of the payments also reflect the frequency of payment (monthly, weekly, or every six months) that has been selected. Agriculture loans automatically have payments every six months (regardless of what is showing in the selection for frequency of payment). Again, as with the previous screen, there are buttons at the bottom for getting to the **Control** and **Results** screens and the other decision screens and to **Advance** the **Simulation**.

3. Staffing and Productivity

The decisions on this screen affect the MFI's capacity to generate and manage loans. The first slider is a critical one because it controls **Loan Officer Hiring**, a key driver of MFI growth. The number set on the slider is the number of new loan officers hired per month. The important thing to remember is that the number set on the slider will continue to be hired every month unless you set the slider back to zero or to another number. New hires show up in the display below as trainees and, after an average of one year, move up to being loan officers. Also notice that the slider can be set to a negative number which means firing the number of loan officers indicated in order to cut back on expenses. The limit on the number that can be fired is that there must be at least two loan officers for each branch that is open. You must also close branches in order to fire more loan officers. The next slider sets the monthly **Loan Officer Salary**.

The slider below the one for loan officer salary sets a monthly hiring rate for other staff (**Other Staff Hiring**). That number will, again, continue to be hired each month until the slider is re-set to zero or to another value. Again, firing of staff is subject to the same sort of constraint—that there must be at least two staff in each branch. The next several sliders affect the number of managers, by either **Loan Officers Becoming Managers** or by **Hiring Managers from Outside,** and **Manager Salary** per month. Manager hiring conforms to the same rules as those for loan officers and for other staff.

The slider for **Number of New Branches** is the other important driver of MFI growth. Each simulation starts with one branch. Adding branches has multiple effects. Each new branch adds to the number of branches (after a several month delay to come "on line") and also triggers the hiring of people to staff the branches if there aren't enough excess staff at other branches. The minimum staffing of each branch is two loan officers, two other staff and 1.2 managers (an extra one for every five branches to cover vacations, peak demands, etc.). Closing branches, by selecting a negative value on the slider, reduces the number of branches (immediately), but does not reduce staff at all. This must be done using the staff hiring/firing sliders. Otherwise staff will remain and may lead to remaining branches being "overstaffed". Each new branch entails a $2,000 investment (automatically deducted from cash) and monthly cost equal to half the salaries of people staffing the branch. The current number of branches "on line" and number "in the pipeline" are shown in the lower left-hand corner of the screen. When the second branch is established, another manager and three staff are hired for the "central office".

There are two sliders that govern the **Ratio of Computers to (all) Staff** and **Ratio of Vehicles to Loan Officers**. The higher these ratios, the more productive staff will be. Computers cost $1,200 each and vehicles (motorcycles) $1,800, again automatically deducted from cash as people are hired and equipped. Another determinant of productivity is the incentives offered to loan officers. The applicable incentive is chosen by a set of radio buttons for **None**, encouraging borrower **Movement to Next Stage,** getting **New Borrowers,** and **Reducing Delinquency.** Each incentive focuses attention and increases productivity in a particular loan officer function, but has a cost associated with it as well. Only one incentive at a time can be selected.

The final two sliders control aspects of loan officer time allocation and are expressed as fractions. One applies to the total loan officer time available and sets the **Fraction of Loan Officer Time on Getting New Borrowers.** The remainder of the loan officers' total time available is spent on working with people who are already borrowers. The other slider applies only to the segment of time devoted to getting new borrowers and sets the **Fraction of New Borrower Time on Group Formation**. If Individual Only is selected on the loan design screen, this slider is ignored and the value is zero.

4. Information Systems and Savings

This screen combines two different functions. Information system investments are governed by the controls in the left-hand column. The radio buttons determine whether investments are made equal to a **Fraction of the Loan Portfolio** (one measure of the scale of the operation) set by the top slider or based on an amount selected from the slider below it labeled **Annual Investment in Information Systems.** The latter specifies and annual amount since information systems projects typically take quite a while to complete. However investments are calculated, the bottom slider on the left side allocates **Fraction of Information System Investment on Task Automation vs. MIS.** Task automation systems are necessary for day-to-day operations and for preventing delinquency by identifying payment problems at an early stage. MIS systems require task automation systems to be in place and add value for overall management and specifically for managing delinquencies to prevent defaults.

The check box on the upper right-hand side of the screen determines whether the MFI will **Offer Voluntary Savings**. The next two sliders set the monthly interest rates on **Liquid** and **Fixed Term** savings accounts. The final slider on the screen sets the **Average Term of Fixed Accounts**, the minimum number of months fixed term accounts remain with the MFI.

5. Sources of Funds/Capital

The final decision screen determines the amount of capital drawn from various external sources. There are four sliders for drawing capital from **Donor Funds, Financial Institutions and Government Revolving Funds, Bonds on Capital Markets, and Equity Capital**. You'll also notice two columns of displayed values, one for **Current Funds** already received from each source and **Maximum Funds Available** from each source. Funds from the latter 3 sources is not available until after two, three, and four years of the simulation respectively. Appendix 2 describes the complete set of rules that govern maximum funds available from each source.

There are two ways to access capital. One is to acquire less than the maximum amount available if only a limited amount is needed. This is done by setting the slider to any desired amount less than the maximum, making any other changes desired on the various decision screens, advancing the simulation one month, and then re-setting the slider to zero. Otherwise, you will continue trying to access the desired amount of capital each month. The

other approach, if, for example, the MFI is growing and needs steady infusions of external capital, is to move the slider to the maximum end of its range and let capital be acquired continuously subject to the maximum amount available. (If the maximum drops for a source (e.g., due to growing loan defaults), no more capital can be acquired, but the MFI also does not have to repay the difference.)

Moving Through a Simulation

Once you have made a set of decisions that you are satisfied with, click on the **Advance Simulation** button to move the simulation ahead by one month. (Remember to re-set any sliders you need to such as for hiring or new branch opening rates.) After moving ahead by one month, the main result screen with the Profit and Loss statement and graph of revenue and expense will appear. Buttons at the bottom will allow you to move among the various screens with detailed results (you can also do this from the control screen) to get a more complete picture of what is happening to your MFI. The **Advance Simulation** buttons at the bottom of any of the results screens will let you move the simulation ahead and see how the MFI is evolving. As "time goes on", you will probably want to change your decisions to improve some aspect of the MFI's performance or acquire resources that contribute to growth. Clicking on the **Decisions b**utton at the bottom of any result screen will send you back to the decisions and give you the opportunity to make the desired changes. Clicking on **Advance Simulation** will then move the simulation ahead another month.

You'll find a comfortable rhythm for moving between looking at results and making decisions. It's probably best to move ahead at least a few months at a time since few changes have immediate effects. One thing to be careful about is running out of cash. Looking at the balance sheet (one click away from the P&L screen) will tell you how much money is left in Cash and Excess Reserves. If you run out, the simulation is automatically over and you'll need to start again. If you feel that the strategy you are using doesn't offer much hope, you can click on the **Stop** button at the bottom of any result screen to start over. If you go through an entire 96-month simulation, you will see a final set of results. Clicking on the **New Simulation** button on one of the final result screens will let you name and begin a new simulation. If you checked the box for creating a spreadsheet with decisions and key results, that will occur at this time.

Examining Results--General

All of the result screens have a similar layout. The buttons at the bottom allow you to move easily among them. The screen for results relating to Revenue is shown on the next page. Each has some data in a tabular format that reflects the state of things at the current point in time as you move through a simulation. The tabular data show overall magnitudes and important subdivisions (e.g., borrowers by stage, expenses by type). Below the tables are sets of buttons that cause graphs to "pop up" when they are clicked. These graphs will give you a better sense of how things are changing over time and also how the results in the current simulation compare to those in up to three other simulations.

You can pop up several of the graphs at once and move them around to be able to understand how they might relate to each other. Click on the blue bar at the top and hold down the left mouse button to move a graph. Click on the right or bottom edge to resize it. If the results in the graph are of interest, you can print it out, export it to another application, or save it by clicking on one of the icons at the top of the graph. To close a graph, simply click on the small tab at the upper left-hand corner.

The **Load/Unload Runs** button at the top of each result screen will let you change the set of simulations with which the current one is being compared. As indicated earlier, the current simulation run can be compared with three others at most to avoid too much clutter and confusion. Clicking on the button will bring up a "dialog box" labeled Dataset Control with names of simulations displayed in two columns. The name of the current simulation usually appears at the top of the right-hand column and the three below it are the other simulations whose results appear on the comparative graphs in the order shown. Other simulations below those three can be brought to the top by clicking on them—they move to the top as you do so. Clicking on simulations in this column will enable you to move them around to rearrange which appear in the top four. As you lose interest in particular simulations, click on them and use the left-pointing arrows between the two columns to move them to the left-hand column. (You can have only 16 simulations at most appearing in the right-hand column.) Click on any simulations in the left-hand column that you don't want any more and then click on **Delete** to get rid of them. You can move any simulation stored in the left-hand column to the right with the right-pointing arrows. When you are done rearranging the simulations and have the set you want for comparison, click on **Close** to make the dialog box disappear. To avoid confusion, always have the current simulation appear at the top of this right-hand column.

Examining Results—Specific Screens

The **Financial Overviews** screens display the Profit and Loss statement along with revenue and expense graphs and the Balance Sheet. Buttons below the Balance Sheet produce pop-up graphs for quantities on the balance sheet such as Total Funds Committed to Loans and Reserve for Bad Debt.

The **Revenue** screen (shown on the previous page) displays the current month's values of revenue, broken down by stage and group vs. individual borrowers and average payments for each stage broken into principal and interest components. It has graphs that display revenues by stage over time and graphs that show drivers of revenue such as number of borrowers and revenues per borrower.

The **Applicants and Borrowers** screen similarly breaks out applicants and borrowers by stage and provides access to graphs of drivers such as numbers of loan officers and branches and constraints such as the Throughput Time for new applications which will discourage some applicants as it begins to get longer. The graphs also reflect dropout and movement to later stages. Clicking on the button **Changes in Borrowers** will bring up a screen with additional information in tabular form on rates of change as borrowers repeat and move among stages, drop out, become delinquent, and default on loans.

Expense and Staffing will show total expense broken into its several components, both at the current point in time and over time. Drivers of expense shown in graphs include numbers of staff and branches that create salary and overhead costs and external funding and savings that can create costs for interest payments.

The **Loan Loss** screen provides detail on loan losses broken out by stage and individual vs. group and separates components of delinquency and default. It also provides graphs with particular measures such as arrears and default rates. Graphs of drivers of loan loss include effects of loan officer attention to current borrowers, portfolio quality, and payment size relative to income on delinquency. Also graphed is the effect of information system adequacy on the fraction of delinquent borrowers successfully repaying their loans, one of the determinants of default rate.

The **Savings and Funding** screen shows the amounts of funding obtained from various sources and from savings in voluntary liquid fixed term accounts and in compulsory accounts if those are in use. Numbers of accounts are also displayed. Drivers shown on pop-up graphs include measures that funders use to determine the MFI's eligibility for capital including profitability, capital adequacy, and default rate. The graphs also display standards funders will use in evaluating those measures. Drivers of savings such as a quality of service index and liquidity of funds are also available as pop-up graphs.

The **spreadsheets** mentioned earlier can provide additional information, especially in terms of a record of decisions made during each simulation. A new spreadsheet for the simulation you have been doing will be available once you complete a simulation by coming to the end of 96 months, running out of cash, or clicking on the Stop button on any of the results

screens. (When this happens, the results screens will indicate "Final" in the space where the Month usually appears.) Open Excel and then open the spreadsheet to view its contents. The spreadsheet should be found in the same folder in which the simulator is installed and will have the same name as the one you gave the simulation. You will have to widen the first column to be able to read the variable names. You may also have to reformat the some of the cells to make it easier to read the numbers. (Highlight the cells to reformat, select Format on the Excel main menu and Number and then indicate the desired number of decimal places.)

The decision variables will appear first on the spreadsheet, in the order that the decision screens appear in the simulator. These will help you remember your choices during the simulation. Most are self-explanatory. In general, if a decision variable indicates a choice rather than a numeric value (e.g., whether or not to require means testing or collateral), 0 will indicate not selected and 1 will mean it was selected. A few have more than two logical values or vary in what 0 and 1 mean.

Concentration on Women Switch	0	Women Only
	1	Both Men and Women (Default)
Switch for New vs. Existing Activity	0	New Business Only
	1	Existing Business Only (Default)
	2	Both New and Existing
Switch for Agriculture vs. Trade	0	Agriculture
	1	Trade (Default)
Individual vs. Group Loans vs. Both	0	Individual Only
	1	Group Only
	2	Both (Default)
Frequency Selector	.25	Weekly Payments
	1	Monthly (Default)
	6	Every Six Months
Declining Balance vs. Level Payment	0	Level Payment (Default)
	1	Declining Balance
Switch for Controlling Info. Syst.	0	Based on $ Amount (Default)
	1	Based on Fraction of Portfolio
Loan Officer Incentives	0	None (Default)
	1	Movement to Next Stage
	2	New Borrowers
	3	Reducing Delinquency

Variables reflecting simulation results will appear below the decision variables, again in the same order that the decision screens appear in the simulator.

Appendix 1—Scenario Switches

Scenario Switches (the set of checkboxes at the bottom left of the **Target Market** screen) enable you to select particular constraints and economic conditions that are a good test of the resiliency of your strategies. Switch 1 limits the amount of capital available from donors initially and during the simulation. Switches 2a and 2b introduce repayment crises. Switch 3 introduces a general economic crisis that includes reduced demand for loans and higher interest rates for the money borrowed by the MFI from financial institutions. Switch 4 eliminates interest on funds borrowed from financial institutions that the MFI can receive until it is loaned to borrowers. Several boxes can be checked to combine the features of the different scenarios.

The details of the scenarios tied to the switches are as follows:

1. Switch 1 limits the funds available initially from donors to $200K rather than $800K (plus $200K in seed capital) and also limits maximum funds that can be raised from donors to the initial $200K rather than $3M or $5M. (Note: On the initial screen, the amount available with scen1 checked will appear as $800K because of a limitation in the Vensim simulator software, but will show up as $200K by month 1).

2a. Switch 2a doubles delinquency rates (and, as a result, default rates) between month 36 and month 60.

2b. Switch 2b triples delinquency rates between month 36 and month 48. When Switches 2a and 2b are selected at the same time, the effect is multiplicative (i.e., a six-fold increase in delinquency rates between month 36 and month 48).

3. Switch 3 produces several effects simultaneously:
   - the interest rate for funds the MFI borrows from financial institutions (not donors) triples between month 36 and 48 and then returns to its original value gradually by month 60 (base rate is 2% per month)
   - the same pattern occurs for the market interest rate for voluntary savings (base rate is 1% per month)
   - no new bonds can be issued between month 36 and month 60
   - new loan applications are cut by half between month 36 and 48 and gradually return to normal between months 48 and 60
   - dropouts at each stage increase by 20% (and repeats/upgrades decrease by the same percentage) between months 36 and 48 and return to normal between months 48 and 60

(Note: To include a repayment crisis in addition to these effects, Switch 2a must be checked in addition to Switch 3.)

4. Switch 4 sets interest rate MFI receives on unborrowed funds (funds received from financial institutions and bonds, but not yet lent out to borrowers) to zero rather than the normal 1% per month. This does not apply to donor funds, these are assumed to be drawn as needed.

Appendix 2—Criteria for Access to Capital

The MFI starts with $200K in equity contributed as seed capital by a donor and another $800K in donated capital for lending. It can then draw on the four sources listed above subject to the following restrictions:

- **Donor funds** can be drawn up to $3 Million in total if the MFI targets a general population or up to $5 Million if it targets women only or does means testing and targets only the three lowest income quintiles. There must also be sufficient management time available to provide the equivalent of a full-time manager for a month to handle the application and donor relations (in addition to managers' other responsibilities). It takes six months for donor funds to be fully available.

- Funding can be drawn from **commercial banks and government revolving funds** up to an amount equal to 2.5 times equity, subject to meeting the following three criteria:
- **Profitability**--annual profit must exceed 2.5% of the total amount committed to loans.
- **Capital adequacy--**equity must exceed 12% of the total amount committed to loans.
- **Defaults--**must not exceed 4% of loans.
  Funds are not available from this source until the MFI has been in business for two years. It takes two months for these funds to become fully available.

- Funds from **bonds issued on capital markets** are subject to the same restrictions and are not available until the MFI has been operating for three years.

- **Equity** raised from investors is subject to the same restrictions and is not available until four years after the MFI has begun operations.