

# Asset and Liability Management for Deposit-Taking Microfinance Institutions

Even the most mature microfinance institutions (MFIs) need to pay attention to their balance sheet to manage financial risks. All financial institutions take risks to make money. Risk management helps determine the appropriate balance between risk and reward. As MFIs diversify their funding sources, sound asset and liability management (ALM) is critical to help MFIs assess and manage financial risk.

The current global financial crisis highlights the importance of good ALM. As funds become increasingly scarce and expensive, liquidity management becomes ever more important. The crisis has also underlined issues around leverage: while increased borrowing can help an institution increase its returns, it also exposes the institution to greater risk (as the many over-leveraged institutions caught up in the current crisis know all too well). But none of these issues is a simple switch that can be flipped on or off—they involve balancing priorities and, for most MFIs, managing a mosaic of funding sources and an increasingly complex set of balance sheets.

By examining the structure of the balance sheet, MFIs can identify, measure, and manage financial risks—risks arising from the mismatch of asset and liability currencies (foreign exchange risk), maturities (liquidity risk), and repricing (interest rate risk). Once these risks have been identified and measured, usually through gap analysis, MFI managers can decide what level of risk is acceptable and set limits to maintain asset and liability mismatch at an appropriate level given the organization's risk appetite and growth and profitability targets. This Focus Note

gives an overview of these risks and pays special attention to how they apply to deposit-taking institutions.

Effective ALM is especially important for deposit-taking institutions since the variety of liabilities available to them is, by definition, more complex than those available to nondeposit-taking institutions. Traditionally, MFIs have focused on the asset side of the balance sheet—the client loan portfolio. This makes sense because the core business for most new MFIs is lending, and it is important that they develop the appropriate products, reports, operations, and procedures to support their credit activity and ensure high levels of repayment.

**As MFIs diversify their funding sources, sound asset and liability management (ALM) is critical to help MFIs assess and manage financial risk.**

In their early phases, MFIs are often financed by a combination of grants and concessional funding, so liability management is not as important. As MFIs grow and expand their funding sources to include commercial sources of funding, such as deposits, commercial loans, bond issuance, and equity, it is important to have an equally rigorous set of reports, policies, and procedures for the liability side of the balance sheet, and to examine assets and liabilities together to understand and reduce financial risks. The key tools to measure and manage this risk are a simple set of asset and liability matching tables, a financial risk-management policy, and an asset and liability committee (ALCO).

After a discussion of the key issues involved in ALM, this Focus Note reviews some of the publications and tools currently available for MFIs, funders, and others who are interested in enhancing MFIs' practical knowledge of ALM and how to integrate it into an organization's overall risk-management framework.

## Specifics of ALM for the microfinance sector

The same ALM principles apply equally to both nonprofit MFIs and large commercial banks. But how they act based on the information differs. Defining risk appetite—how much *financial* risk an institution is willing to take to reach its profitability targets—is key. Is the organization comfortable exposing itself to currency, interest rate, and liquidity risk to make those targets, or is the philosophy to concentrate on the core business of offering financial products and services to the underserved and minimize financial risks wherever possible?

The first priority for MFIs should be to deliver a product that works well for poor clients. So it may be preferable to keep the terms of client loan products simple, standardized, and easy to understand. By meeting clients' needs, an institution will help ensure client satisfaction, retention, and continued good repayment rates. Many MFI clients (depending on the country) want a simple product with predictable repayment schedules. This is an important difference between the microfinance sector and formal or commercial financial institutions, which have a variety of clients with different levels of financial risk appetites. As a result, we

typically emphasize active liability management for MFIs, rather than active asset management, and for example, focus on negotiating terms with funds providers or diversifying the liability mix rather than changing the terms of loan products offered to clients or adding a lot of new client products.

## Defining and measuring risk

ALM focuses on measuring and managing risks arising from factors beyond any organization's control, such as foreign exchange rate volatility, interest rate volatility, and availability of funding (liquidity), all of which are a function of the supply and demand for money in the global economy. A sound ALM process enables organizations to minimize the risks inherent in the balance sheet by matching the currencies and terms of assets and liabilities as closely as possible in line with the organization's risk appetite. When terms and currencies of assets and liabilities are perfectly matched, there is no financial risk (note that this does not eliminate other risks—especially credit and operational risks). In practice, it is hard to match these terms exactly, so it is important to measure the mismatch and set ceilings, or limits, on the amount of risk with which the organization is comfortable.

For MFIs, the risks taken to generate profits should be limited to credit risk. Other risks, such as operational and financial risk, should be closely measured, monitored, and managed, and profits should not be derived from taking active positions on how foreign exchange or interest rates may change.

### Box 1. ALM for MFIs Mobilizing Savings

Good ALM is important for all financial institutions. For those MFIs that mobilize savings, it is especially important to do the following:

**Collect and analyze data on aggregate deposit balances by product type.** This analysis, plus senior management experience in marketing and managing the deposit product, will help the MFI determine what percentage of savings deposits is likely to be withdrawn on any given day (with the remainder to be considered long-term or core deposits). It will also help the MFI have an idea of what percentage of time deposits are withdrawn at or before maturity versus those that are rolled over. This analysis will then inform assumptions about savings and time deposits when measuring liquidity risk and interest rate risk in asset and liability matching tables.

**Price savings correctly.** Most customers for savings deposits are happy to have a safe, reliable, secure, and convenient place to store savings and will not demand high interest rates as long as they can easily withdraw savings as needed. Keep in mind the infrastructure and transactions costs of mobilizing savings deposits. Time depositors behave differently than savings depositors. They are typically storing excess liquidity for a set amount of time until they need it for another use. Because they don't have

access to those savings during the time period of the deposit, they look to the rate of interest paid (they are "interest rate sensitive"). For both products, the MFI should consider profitability not by product, but on an overall portfolio basis: How do savings affect the MFI's average costs of funds and, therefore, net interest income? It is also useful to look at profitability on a client basis rather than a product basis—you may lose money on providing a savings product to a client but gain money from other products and services used by that same client.

**Design appropriate products.** What is true for client loan products is also true for savings products—creating a product that meets client demands is important for attracting and retaining customers. However, the MFI must balance client demands with its own need for stable and inexpensive funding sources. MFIs may need to offer both savings and time deposits to attract customers. Financial expenses (e.g., interest paid) on those deposits can be offset by fees charged for opening accounts or for those accounts that fall below a minimum balance (this is also a technique for liquidity management). Product design is key to managing the potential liquidity and interest rate risk generated by deposits, and it is important in the overall pricing of the product.

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Note: For a very thorough discussion of mobilizing savings, including all of the topics listed in this box, see Hirschland (2005).

A key component of measuring financial risks comes in looking at the behavioral nature of the organizations' assets versus the contractual nature of those assets when classifying them for interest rate and liquidity risk. (Assets' behavioral versus contractual characteristics are discussed later in this paper.) Client loans in a majority of MFIs, when viewed from a portfolio and behavioral perspective, are long-term, fixed-rate assets unless the MFI offers truly variable rate loan products or loans that reprice at

maturity due to a change in funding costs. This is a significant difference between the assets of MFIs and assets of other financial institutions, and it is a key distinction when thinking about liability management.

To reduce financial risk embedded in the balance sheet to a minimum, an organization seeks to match the terms of its assets and liabilities as closely as possible. If MFIs have long-term, fixed-rate assets, they should be seeking long-term,

fixed-rate liabilities. An important example of this type of liability is stable savings deposits from customers.<sup>1</sup> Another important source of long-term, fixed-rate funding might be bond issuance or equity (though equity has corporate governance implications that debt issuance does not, and this is beyond the scope of this paper).

## Liquidity risk

### Definition

Liquidity risk is often the most important financial risk for a financial institution. An MFI can be unprofitable for one quarter and still be in business, but it could not survive being illiquid. MFIs often make the mistake of thinking that good liquidity management means using as much liquidity as possible to fund the loan portfolio (the highest yielding asset) as quickly as possible, thus avoiding having “idle cash.” This is not liquidity management; rather, it is profit maximization. Liquidity management balances the profit objectives of the organization with the need to always have some liquidity reserve or cushion in case of timing delays in refinancing, increased portfolio at risk, or other unexpected events.

Liquidity risk is commonly understood as the risk that an organization will not be able to meet its maturing obligations when due. It is useful to expand this definition to include access to adequate liquidity to meet growth projections and to fund ongoing operations in the case of a liquidity disruption. This broader definition is useful for all financial institutions,

but especially for MFIs, where balance sheets are growing rapidly and where events such as natural disasters or political intervention can quickly have an adverse impact on cash flows.

Liquidity risk management is best defined as managing assets and liabilities to ensure enough liquidity to do the following:

1. Meet maturing obligations—in any location, in any currency, when due.
2. Fund projected growth.
3. Continue normal operations through an unexpected liquidity disruption.

Liquidity management as defined here is not the same as cash flow management. Cash flow management concentrates on daily cash flow needs per branch or field office for loan disbursement, operating costs, and so forth. Liquidity management focuses on aggregate liquidity needs for the entire MFI in the future, with a particular emphasis on the next 12 months.

### Measuring liquidity risk

Measuring liquidity risk involves matching the maturities of assets and liabilities to see what funding gaps exist and then using that analysis to adjust maturities of assets and liabilities as necessary, plan for refinancing needs, and plan for adequate liquidity reserves or cushions in case of emergency. When measuring liquidity risk, assets are potential sources of funds to meet maturing liabilities. This is the opposite of the way we normally look at the balance sheet, when we assume liabilities are used to fund the

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<sup>1</sup> In this paper, “savings deposits” means those deposits that may be withdrawn at any time and with no advance notice.

loan portfolio. Liquidity risk is measured using gap analysis and liquidity ratios, and it is further managed with contingency funding plans.

## Gap analysis

Creating a gap schedule for liquidity risk means pulling apart the balance sheet into time buckets, then assigning each type of asset and liability to the time bucket that corresponds to its maturity. When assigning maturities, it is important to consider the actual *behavioral* maturity of the asset or liability as opposed to its *contractual* maturity. This is especially important for MFIs that offer deposit products, since deposits' behavioral and contractual maturities are not the same. It is equally important for MFIs to understand the behavior of client loans on a portfolio basis. If the size of the client loan portfolio has remained stable or has grown since its inception (which is the case in the vast majority of MFIs), those assets should be regarded as having long-term maturities since client loan repayment is not available to pay maturing liabilities.

## Deposit behavior

The best example of the difference between contractual maturity and behavioral maturity is illustrated by savings deposits. *Contractually*, depositors have the right to withdraw all of their savings on any day, but we know that they don't because the savings deposit balances in financial institutions do not decrease to zero at the end of every day. However, we also know that some depositors will withdraw some or all of their

savings on any given day, and MFIs must have cash available to meet those withdrawals.

How do financial institutions determine how much cash they need to keep on hand on a daily basis for potential withdrawals? The answer to this question also helps to determine how to classify the maturity of savings deposit liabilities for the liquidity gap analysis. The best way to determine the behavior of depositors vis-a-vis savings deposits is with a combination of historical volatility analysis and senior management knowledge of product cycles and customer behavior.

A historical volatility analysis requires that the MFI keep track of aggregate daily balances for each deposit product. The longer the data series, the better it is for capturing trends and extreme movements. A simple volatility analysis is done by looking at daily changes, determining the maximum and average change, and converting those changes to percentages for a relative measure of the largest daily outflow and the average daily outflow. A more sophisticated analysis would look at daily changes and different standard deviation levels of those changes to determine a likely one-day withdrawal number and percent.<sup>2</sup> It is also very important to graph these data, because graphing may reveal trends and behaviors that are not shown in a simple statistical analysis.

The volatility analysis should be accompanied by the input and judgment of the MFI's senior management—especially those managers responsible for the deposit product, since

<sup>2</sup> Using a standard deviation analysis, one would look at daily changes over the period analyzed, then choose a change number that represents a confidence level (95.5% = 2 sd, 97.7% = 3 sd, etc.) agreed upon by senior managers and/or regulators. The number corresponding to that confidence level would then be the potential largest daily withdrawal.

they will have a more nuanced understanding of customer expectations and behaviors. The volatility analysis requires that good data be collected by MFIs on deposits by product type (e.g., savings deposits, time deposits, certificates of deposit). *Deposit-taking MFIs should be collecting and storing data at the aggregate level of deposits by product type.* Absent this information, or when MFIs are just beginning to offer deposit products, MFIs should make conservative assumptions about potential withdrawals, and revisit those assumptions over time as data are collected and analyzed.

One way to understand client behavior for different types of deposit products would be to analyze aggregate deposit data from the banking system as a whole. These data are typically available from the Central Bank, usually on a monthly basis, since it has to be reported for reserve purposes. An analysis using Central Bank data will not be as precise, but will give a good approximation of the behavior of different types of deposit customers, which can then help inform product design.

Once a daily outflow percentage has been determined and agreed on, that amount of savings deposits will be classified for maturity purposes as being due on a daily basis. It is important to understand that this amount should be available at all times to meet potential withdrawals (e.g., if the maximum withdrawal occurs on a Monday, cash should be replenished to anticipate a potential withdrawal of the same amount of funds on Tuesday).

The amount shown to be the minimum amount outstanding during the period analyzed will then

be assumed to mature in the long term, because historical analysis has shown that this amount has remained constant over time. These long-term deposits are considered “core” deposits.

The volatility analysis described assumes banking business as usual. However, it is also necessary to do stress analyses. A stress analysis would be based either on data collected during a time of stress (including deposit runs) or on assumptions regarding larger outflows of deposits due to an external event.

The volatility analysis should be done separately by product because products with different contractual provisions behave differently. For example, customers with time deposits are often saving money for a specific use in the future and therefore will withdraw the full amount of that deposit at maturity, or they are interest-rate sensitive and will move funds to other institutions offering higher rates. It is important to do a combined analysis of all savings products that do not have fixed maturities (i.e., those that are like savings accounts or demand deposits, but not like certificates of deposit). This is because a separate analysis of core deposits by product may be too pessimistic, as happens for example when withdrawals from one kind of account simply flow into another.

### **Maturity assumptions related to client loan portfolio**

Keeping in mind that assets are considered sources of funds to repay maturing liabilities, MFIs should classify client loan repayments in time periods to reflect whether and when they are available. Does the MFI use client loan

repayments to repay maturing liabilities, or does it use repayments to make new client loans? What would happen if it used repayments to pay creditors, given that most MFIs have a rapidly growing loan portfolio? What would happen if new client loan distribution was slowed down or delayed while client repayments were used to pay MFI creditors?

To understand how the client loan portfolio behaves, the MFI should look at it at the portfolio level, rather than at an individual client level. Most MFI loan portfolios are consistently growing—it is rare to see an MFI that has a declining balance of client loans. This makes sense, since the core business of MFIs is lending. Maintaining a stable level of client loans means that all repayments of principal are rolled back into the loan portfolio; growing a loan portfolio means that interest repayments and additional financing are also rolled into the loan portfolio. *Thus client loan repayments typically are not used to repay maturing liabilities, but instead those liabilities are refinanced with new borrowings.*

If we accept that this is the way MFIs operate in a business-as-usual environment (no unexpected stresses or liquidity disruptions), then it is useful to classify client loans as maturing in the very long term, or having no maturity. This assumes that those assets are not available to repay liabilities and allows the MFI to plan its refinancing accordingly. This assumption would apply equally to a commercial financial institution whose loan portfolio is stable or growing—it is not specific to microfinance.

Most regulators and many investors require MFIs to construct liquidity gap tables showing client loan repayments available in time periods reflecting their contractual maturity. This measure gives a static view of the balance sheet structure, but it is not useful for planning a refinancing strategy or looking at concentrations of liquidity risk because it will mask the true need for funds.

## Liquidity

Table 1 shows the sources and uses of funds for this MFI assuming that client loans are evergreen—that the client loan portfolio is always renewing and growing.

### Assets

- **Cash** is available as a source of funds in the very short term, as are savings deposits.
- **Time deposits** are shown as available when they mature.
- The **net client loan portfolio** is shown as long term or no maturity. This reflects business as usual, which is that the client loan portfolio is always outstanding or growing.
- **Fixed assets** are shown as long term, or having no maturity, since they cannot be easily and quickly exchanged for cash.
- **Other assets** include one month of interest receivable from clients, since this matches the balance sheet. It is shown as available in the next one month.

### Liabilities

- **Savings deposits** are classified as uses of funds in the short term for the portion that

Table 1. Liquidity Risk

	< 1 month	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months	13-18 months	19-24 months	2-5 years	>5 years	No Maturity	Total	
<b>Assets</b>																			
Cash	40,000																		40,000
Savings Deposits	6,000,000																		6,000,000
Time Deposits	3,000,000	3,000,000	3,000,000																9,000,000
Loan Portfolio, net <sup>1</sup>																			151,710,000
Fixed assets																			4,000,000
Other assets <sup>2</sup>	1,250,000																		1,250,000
<b>Total Assets</b>	10,290,000	3,000,000	3,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	155,710,000	172,000,000
<b>Liabilities</b>																			
Savings deposits	100,000																		1,000,000
Time deposits			250,000			250,000									900,000				500,000
Loans payable (principal)	300,000	7,000,000	700,000	265,000	4,000,000	2,000,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	32,000,000	35,000,000				128,500,000
Interest payable	176,701	2,039,360	343,217	470,697	490,267	152,745	161,598	380,486	81,716	96,842	412,215	206,101	1,200,303	1,200,303	7,200,000				14,612,551
Other liabilities <sup>3</sup>	4,000,000																		4,000,000
<b>Total Liabilities</b>	4,576,701	9,039,360	1,293,217	735,697	4,490,267	2,402,745	1,661,598	2,130,486	2,915,716	1,096,842	563,215	15,206,101	26,200,303	33,200,303	43,100,000	0	0	148,612,551	
<b>Total Equity</b>	4,576,701	9,039,360	1,293,217	735,697	4,490,267	2,402,745	1,661,598	2,130,486	2,915,716	1,096,842	563,215	15,206,101	26,200,303	33,200,303	43,100,000	0	0	38,000,000	38,000,000
<b>Total Liabilities &amp; Equity</b>	4,576,701	9,039,360	1,293,217	735,697	4,490,267	2,402,745	1,661,598	2,130,486	2,915,716	1,096,842	563,215	15,206,101	26,200,303	33,200,303	43,100,000	0	0	38,000,000	186,612,551
Asset - (Total Liability + Equity) Gap <sup>4</sup>	5,713,299	-6,039,360	1,706,783	-735,697	-4,490,267	-2,402,745	-1,661,598	-2,130,486	-2,915,716	-1,096,842	-563,215	-15,206,101	-26,200,303	-33,200,303	-43,100,000	0	0	117,710,000	-14,612,551
<b>Cumulative Gap</b>	5,713,299	-326,061	1,380,722	645,024	-3,845,243	-6,247,987	-7,909,585	-10,040,071	-12,955,787	-14,052,629	-14,615,844	-29,821,945	-56,022,248	-89,222,551	-132,322,551	-132,322,551	-14,612,551		

## Notes:

- Shows the client loan portfolio as having no maturity.
- Other assets includes accounts receivable which are shown as <1 month.
- Other liabilities include one month of salaries and other operating expenses.
- Note that this number is not 0, indicating that the balance sheet doesn't balance. This is due to the additional interest payable to the maturity of funding loans, which is included in this gap analysis, but not on the balance sheet.

has been statistically determined as able to be withdrawn overnight (in this case, 10 percent of the total). The portion that has been statistically determined to remain for the long term is shown as a use of funds in two to five years since the statistical analysis is based on five years worth of data.

- **Time deposits** are shown as uses of funds when they mature, in three and six months.
- **Loans and interest payable** are shown as uses of funds according to the contractual repayment schedule. Note that total liabilities will not match the balance sheet since the balance sheet shows only one month of interest payable, while this schedule shows interest payable until the maturity of the funding loan.
- **Equity** is shown as having no maturity since it will not be repaid except in the event of a winding up of the MFI.

Cumulative gaps for this MFI show negative gaps starting in the second month, with large concentrations of funding needs (shown as net gaps) after five months. The percent of liabilities to be refinanced in the next 12 months divided by total liabilities is 20 percent.

Table 2 is the same as Table 1, with the important difference that the client loan portfolio is shown to be a source of funds as client loans mature. (We assume an average maturity of one year, with equal amounts of the loan portfolio maturing each month.)

Notice that Table 2 shows the MFI with large excesses of liquidity. For funding plan purposes, this would not be a realistic measure of the

MFI's funding needs. What it does show is the structure of the MFI's balance sheet were it to stop doing business and wind down today, and assuming that all clients would continue to repay loans even if new loans are not being made.

### Principles of liability management for liquidity risk

The first principle of financial risk management is to match the terms of assets and liabilities to minimize or eliminate risk. If MFI assets behave like long-term assets as discussed earlier, then they should be matched by long-term liabilities—capital, long-term debt (note that long-term loans that amortize over time are not truly long term), and stable customer deposits. Nonetheless, there always will be payments of interest and principal over time, funds necessary to meet depositors' withdrawals, and monthly operating costs, which mean that terms can never be exactly matched.

Once a gap analysis has been completed, the MFI will have a measure of its refinancing needs. Using this analysis, an MFI might determine that it always should have a certain amount of off balance sheet liquidity (such as an overdraft line or revolving credit facility) available, to smooth any short-term timing mismatches between old funding maturing and new funding replacing it. It might also decide to offer term deposits of a certain tenor, to raise funds now that can be paid back when there are less of other liabilities coming due. MFI management needs to be aware of the behavior of term-deposit clients (a volatility analysis of term deposits should be done in the same way it is done for savings

Table 2. Liquidity Risk 2

	<1 month	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months	13-18 months	19-24 months	2-5 years	>5 years	No Maturity	Total	
<b>Assets</b>																			
Cash	40,000																		40,000
Savings Deposits	6,000,000																		6,000,000
Time Deposits	3,000,000	3,000,000																	9,000,000
Loan Portfolio, net <sup>1</sup>	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500				4,000,000	151,710,000	
Fixed assets <sup>2</sup>	1,250,000																		1,250,000
Total Assets	22,932,500	15,642,500	15,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	0	0	0	0	4,000,000	172,000,000	
<b>Liabilities</b>																			
Savings deposits	100,000																		1,000,000
Time deposits			250,000			250,000									900,000				500,000
Loans payable (principal)	300,000	7,000,000	700,000	265,000	4,000,000	2,000,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	32,000,000	35,000,000				128,500,000
Interest payable	176,701	2,039,360	343,217	470,697	490,267	152,745	161,598	380,486	81,716	96,842	412,215	206,101	1,200,303	1,200,303	7,200,000				14,612,551
Other liabilities <sup>3</sup>	4,000,000																		4,000,000
Total Liabilities	4,576,701	9,039,360	1,293,217	735,697	4,990,267	2,402,745	1,661,598	2,130,486	2,915,716	1,096,842	563,215	15,206,101	26,200,303	33,200,303	43,100,000	0	0	0	148,612,551
Total Equity																		38,000,000	38,000,000
Total Liabilities & Equity	4,576,701	9,039,360	1,293,217	735,697	4,990,267	2,402,745	1,661,598	2,130,486	2,915,716	1,096,842	563,215	15,206,101	26,200,303	33,200,303	43,100,000	0	38,000,000	186,612,551	
Asset - (Total Liability + Equity) Gap <sup>4</sup>	18,355,799	6,603,140	14,349,283	11,906,803	8,152,233	10,239,755	10,980,902	10,512,014	9,726,784	11,545,658	12,079,285	-2,563,601	-26,200,303	-33,200,303	-43,100,000	0	-34,000,000	-14,612,551	
Cumulative Gap	18,355,799	24,958,939	39,308,222	51,215,024	59,367,257	69,607,013	80,587,915	91,099,929	100,826,713	112,372,371	124,451,656	121,888,055	95,687,752	62,487,449	19,387,449	19,387,449	-14,612,551		

## Notes:

- Shows the client loan portfolio maturing in equal amounts each month for one year (average maturity of the loan portfolio).
- Other assets includes accounts receivable which are shown as <1month.
- Other liabilities include one month of salaries and other fixed expenses.
- Note that this number is not 0, indicating that the balance sheet doesn't balance. This is due to the additional interest payable to the maturity of funding loans, which is included in this gap analysis, but not on the balance sheet.

deposits), and management should not count on them as long-term sources of funding, especially in periods of tight liquidity in the markets in general.

The gap analysis for liquidity also could be the basis of a funding strategy for the MFI. In the examples discussed earlier, assets and liabilities included in the gap table are limited to those currently on the balance sheet (except for interest payable on funding loans because they are contractual obligations in the future). MFI management could add future monthly operating costs or other projected expenses to the gap table because those are costs that will have to be financed by new funding or by liquid assets as sources of funds.

### Concentration limits

MFI's also can track the concentration of funding coming due at any given time (e.g., as a percent of total liabilities) or set a ceiling on the amount of liabilities coming due in the next 12 months as a percent of total liabilities. This ceiling should reflect senior management's knowledge of how much financing it is realistic to raise in a 12-month period. The MFI should take care to limit its exposure to any one source of funds. Senior management should set a limit on the percent of funding coming from any single funding type—loans, savings deposits, time deposits—and they should track any large funds providers (defined as any lender that provides more than a certain percent of total liabilities), to ensure that the MFI will be able to easily replace funds should that significant source dry up.

### Liquidity ratios

Client loans make up the majority of assets on an MFI's balance sheet. These assets, while productive, are not liquid (i.e., they cannot be easily converted into cash) unless there is an established securitization mechanism available, which is not often the case. Given the highly illiquid nature of MFI assets, gap analysis alone is not enough to manage liquidity risk. Another important tool is liquidity ratios, which illustrate the structure of the balance sheet as well as its relative liquidity (short term and structural ratios).

Examples of useful liquidity ratios are as follows:

**Maximum percentage of borrowings from any one provider type**—limits concentration risk so that the MFI is not overly reliant on one source of funds (either one provider or one type of fund, e.g., time deposits). Look at this number as a percent and as an absolute number because the absolute number will grow over time as the balance sheet grows, and the MFI may want to reduce the ratio accordingly.

**Maximum percentage of short-term liabilities to total liabilities**—limits reliance on short-term sources of funding, which, while usually cheaper, often can be difficult to replace when there is a liquidity disruption. Short-term liabilities should include principal payments due in less than one year and not only loans whose maturity is less than one year. Look at this ratio as a percent and as an absolute number and adjust the ratio as the balance sheet grows.

**Minimum percentage of realizable liquid assets to total assets**—this ratio measures the proportion of truly liquid assets (cash and assets readily convertible to cash) to give a sense of balance sheet liquidity. It is essential that liquid assets be defined to include only those assets that are easily convertible to cash in a short period. Some examples include securities that can easily be sold and time deposits that can be broken before their maturity. Interest payable on client loans within the very short term might be included as liquid provided that senior managers agree that they could be used as necessary for purposes other than client loan disbursements. Principal repayment on client loans, whether in one week, one month, or any other period less than one year, should not be included as liquid assets because these payments typically are not available for use other than for client loan disbursements. Again, look at both percent and absolute numbers and adjust accordingly.

**Deposits to loans**—measures percent of the client loan portfolio financed by deposits, rather than other types of liabilities.

**Core deposits to loans**—measures percent of the client loan portfolio financed by core deposits.

**Deposits to total liabilities**—measures reliance on deposits as a proportion of overall funding.

Many analysts assume that a liquidity reserve is important only for those institutions that take deposits, since those are the MFIs with the most uncertain liquidity needs. This is true, but even MFIs that do not offer deposits

should establish minimum amounts of liquidity (a liquidity reserve, or “cushion”) in case of a timing mismatch between debt repayment and the arrival of new financing, keeping in mind that there should always be money leftover in case of emergency.

### Cash on hand calculations<sup>3</sup>

Another useful way to look at liquid assets is to determine how much cash the MFI has on hand to finance continued operations in case of a liquidity disruption. This measure is more practical for understanding how much time a liquidity cushion or reserve would buy for an organization before it would be unable to continue its business as usual. The idea behind this calculation is that the MFI will want to have a minimum amount of several weeks of cash on hand to allow it to continue its business as usual (operating costs, financial costs, new loan disbursements) in case of a liquidity disruption.

- A. The starting point for this measure is to determine the demand for cash. Looking at three months worth of data, combine operating costs plus projected loan disbursements plus liabilities repayment (principal and interest). Divide this number by the number of weeks in the three months to get a gross weekly demand for cash. The **gross** weekly demand does not take into account client loan repayments of principal and interest, which will be used to finance new client loan disbursements.
- B. To find a **net** weekly demand for cash, do the same calculations as in A, above, but

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<sup>3</sup> This discussion is derived from Christen (2000).

look at projected loan disbursements minus projected loan repayments to finance the new disbursements. This number can be adjusted as necessary to account for higher nonrepayment rates.

- C. To determine the supply of cash, look at an average cash balance number (12 months of cash balances/12) plus average balance of liquid assets (12 months of securities, or investments readily translatable into cash, time deposits/12).
- D. Another version of the cash-on-hand calculations would also add average overdraft lines available into the calculation of average supply of cash.
- E. Divide the supply of cash (C) by the net weekly demand for cash (B) to determine how many weeks of cash the MFI typically has on hand. Do the same calculation using  $(C+D)/B$ , which shows weeks of cash on hand, giving credit for available overdraft lines.

These calculations should be performed monthly, and senior managers should agree to a minimum number of weeks of cash on hand that is in line with the risk appetite of the MFI. Cash-on-hand calculations are a useful management tool in addition to liquidity ratios, because cash on hand gives a precise idea of how much time an MFI could continue to operate during a liquidity disruption, while liquidity ratios do not.

The “correct” level for these liquidity ratios and measures will depend on the business model,

product mix, and risk appetite of each MFI. It may also be determined by local regulation. In all cases, liquidity ratios and measures should be tracked in the monthly ALCO meetings, and any trends or large variances should be discussed and well understood.

### Contingency funding plans

The gap analysis for liquidity risk described above assumes a business-as-usual environment—no internal or external liquidity disruptions. Using the gap analysis, MFIs should construct likely stress scenarios for their own organization and create a contingency funding plan. Financial institutions usually have negative gaps for liquidity, indicating that they have more long-term assets than liabilities—that they are funding long-term assets with short-term liabilities. MFIs will have a similar liquidity profile, given that a majority of their assets are in the client loan portfolio and it never matures.

It is useful to create stress scenarios that demonstrate the effect of a liquidity disruption that is MFI specific, such as loss of a large funding source, and one that is due to a problem beyond the MFI’s control, such as an economic crisis or natural disaster leading to higher nonrepayments or accelerated savings withdrawals. The MFI’s ALCO would look at the timing and size of the negative gaps resulting from each stress scenario and agree on a set of funding actions to resolve the gap. Funding sources can come from on balance sheet—use of loan repayments/delay in disbursing new loans, early termination of time deposits, sale of securities, and so forth, or from off balance

sheet (incremental) funding sources, such as overdraft facilities, equity injections, or the raising of additional funds through aggressive marketing of deposit products.

All of these actions are discussed, agreed, approved, and documented in the ALCO and then tested periodically. The plans need to be based on the real gap analysis of the MFI assuming various stresses—they are not theoretical—and roles and responsibilities need to be assigned, understood, and agreed by all managers before any crisis occurs.

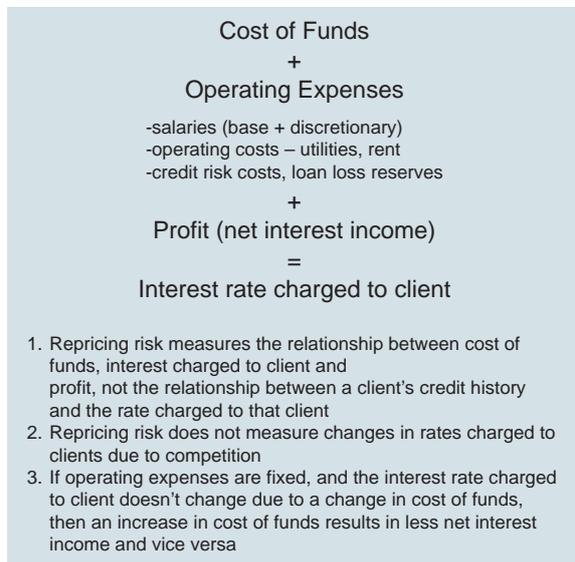
The current crisis in global financial markets is largely a result of a sharp decline in liquidity as banks stopped lending to one another and to nonfinancial institutions as well. It is extremely important that MFIs have a realistic contingency funding plan in place to address the refinancing risk they are taking and to plan for unexpected external shocks.

## Interest rate risk

### Definition

There are different types of interest rate risk, but the most relevant for MFIs is the risk to earnings due to a mismatch in the repricing of assets and liabilities—repricing risk. Repricing risk measures the relationship among an institution's cost of funds, the rate it charges clients on its loan products, and its profit (net interest income). Repricing risk does not look at changes in rates charged to clients due to good credit history or changes in rates due to competition. It looks only at the mismatch of rate changes between assets and liabilities due to a change in the cost

**Figure 1: Cost of funds**



of funds, since the change in the cost of funds is a financial risk that cannot be controlled.

### Importance of correct pricing of the client loan portfolio

MFI senior management needs to have a good funding strategy. The team needs to know exactly what percentage of projected growth is financed by retained earnings and what percentage has to come from new financing. The team needs a good understanding of pricing of the loan product, to ensure that interest income can cover all financial and operating expenses with profit left over to finance a portion of projected growth.

Historically, microfinance loans have been priced according to what the client can afford (what the market will bear). If a client had income of \$100 per month and the MFI determined that the client could afford to pay \$10 per month in principal

and interest, a loan product was constructed to meet those cash flows. The resulting interest rate covered financial and operating expenses and left a large profit margin.

As competition has increased for clients typically served by MFIs, interest rates charged to clients have decreased, whether or not costs of funds have been increasing or decreasing at the same time. Since most MFIs still make the bulk of their profit on net interest income (and not on fees or other income), senior management needs to have an idea of the breakeven rate for the MFI's average cost of funds. What is the maximum amount the MFI can afford to pay for funding and still cover operating and financial expenses and meet growth projections with retained earnings plus new funding? This breakeven rate will inform the MFI's negotiations with funders—the lower the breakeven rate, the more likely MFIs will have to take increased interest rate risk by borrowing short term and lending long term to maintain adequate profit margins.<sup>4</sup>

Competition, and resulting decreases in rates charged to clients, is another strong argument for some portion of funding coming from savings deposits. If managed correctly, these are a long-term and less expensive source of funds. Depending on the local market environment, savings and time deposits should therefore lower the overall cost of funds for an MFI, because it should lower the overall interest and fee expenses on funding liabilities.<sup>5</sup>

### Measuring interest rate risk

When measuring interest rate risk, we consider liabilities as funding our assets (for liquidity we

looked at assets as sources of funds to pay off maturing liabilities). The balance sheet is again pulled apart into time buckets, this time showing when assets or liabilities reprice (when their interest rate changes). Repricing can happen when an asset or liability matures (and thus may be replaced) or when the variable rate changes according to contractual terms (as for liabilities based on Libor or Euribor plus a spread). Repricing risk is measured using gap analysis.

### Examples of repricing profiles for different types of liabilities

Fixed-rate assets and liabilities are considered to be repriced when the principal is repaid, since that principal will have to be replaced, potentially at a new price.

- Fixed-rate loan with principal paid at maturity—full principal amount will be repriced when the loan matures.
- Fixed-rate loan amortizing over time—principal amounts reprice according to the amortization or repayment schedule.
- Variable-rate loan with principal paid at maturity—full principal amount reprices at each repricing date. Shown on the gap schedule as full principal amount repricing at the next repricing date only.
- Variable-rate loan amortizing over time—remaining principal balance reprices on each interest rate reset date. Shown in the gap schedule as the outstanding principal balance repricing at the next repricing date.

Note that the above examples help us to construct a repricing gap analysis that reflects the actual cash (out)flows on liabilities, which

<sup>4</sup> For a comprehensive discussion of this topic, see Christen (2000).

<sup>5</sup> The costs of funds ratio = interest and fee expenses on funding liabilities/average funding liabilities. For a thorough discussion of the correct pricing of savings products, see Hirschland (2005).

then more closely reflect the duration<sup>6</sup> of the liability than the maturity of that liability.

As with gap analysis for liquidity risk, it is important to consider the business-as-usual or *behavioral* repricing of the asset or liability as opposed to its *contractual* repricing. As we saw in the discussion of the behavioral analysis of deposit balances, deposits' behavioral and contractual maturities, and therefore their potential repricing, are not the same. MFIs should reflect accurately their practices regarding repricing of the client loan portfolio. Does the MFI have the contractual right to modify the interest rates on client loans during the term of the loan or at maturity? If so, *has the MFI ever exercised this right?* If it has not, it will not be useful to assume that client loans reprice when they mature.

### Deposit behavior

We assume that liabilities need to be replaced when they mature and that when liabilities are replaced they may come at a new price. Using this assumption and the volatility analysis for deposits described above, an MFI might therefore assume that the principal amount representing deposits that can be withdrawn overnight would be subject to repricing since it is not certain that savings deposits would be replaced by more savings deposits at the same price—they might instead be replaced by new commercial borrowing, or by savings or time deposits at a different price. So the repricing assumptions for savings deposits will match the liquidity assumptions for savings deposits.

For time deposits, it is more correct to assume contractual repricing (but all assumptions should be based on an analysis of deposit behavior by product type). Depositors will either withdraw their funds at or before maturity, which means those amounts will need to be replaced, or they will rollover their time deposits for the same or a different maturity. In all cases, the new liability may be at a new rate of interest.

### Repricing assumptions related to the client loan portfolio

MFI client loans are fixed-rate assets, which might lead us to believe that they should be classified according to their maturities for purposes of interest rate gap analysis. However, it is important to reflect how the MFI does business when classifying client loans for repricing risk. Does the MFI have the right to adjust the interest rate (up or down) at maturity due to a change in cost of funds? If it does have the right, has it ever exercised that right?

This is an important assumption when creating repricing gaps, and it also reflects another difference between the microfinance sector and the formal financial sector. Client loan products usually are designed to be easily understood by the typical microfinance client. Loans are structured to meet client needs, which usually means equal monthly payments that include principal and interest. If clients pay their loans on time for several cycles, they might expect to get a new loan at a lower interest rate, for a larger principal amount, for a longer tenor, or some combination of these factors. In the formal financial sector, it is much more common

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<sup>6</sup> Duration is the weighted average life of an asset or liability, or the weighted average time to maturity using the relative present values of the cash flow as weights.

for financial institutions to pass on changes in their cost of funds to their clients, usually quite quickly when there is a cost increase and with more of a time lag when costs decrease.

MFI clients would not expect (and probably would not understand) to be issued a new loan with a higher rate of interest due to an increase in the MFI's cost of funds, especially if they had paid their loan on time with no problems. Clients' understanding of financial products differs from country to country but it is rare to hear of an MFI increasing interest rates due to an increase in its cost of funds. In fact, the opposite is often true—the MFI lowers interest rates charged to a client if the client has a long history with the organization, or to keep up with competitive pressures in the marketplace (if applicable) even as the MFI's costs of funds has been increasing. This would be the case in the past few years for those MFIs borrowing at Euribor since those rates have been increasing steadily since September of 2005. It would also be the case for MFIs that are increasingly shifting to commercial, rather than concessional, sources of funds, since commercial funds are more expensive.

Once MFI senior management has discussed and understood the actual repricing practice used in their institution, the principal amounts should be reflected in the period that most accurately represents when the portfolio will reprice. If the client loan portfolio has never been repriced due to a change in the MFI's cost of funds, it would correctly be classified as repricing in the very long term. If client loans are regularly repriced due to a change in MFI costs of funds (and this is documented in the client loan document and

in a financial policy), then it is correct to show principal repricing as client loans mature.

The main interest rate risk for MFIs is in the cost of their liabilities. If an MFI has liabilities in different currencies or with different base rates (for example borrowings in U.S. dollars or Euros and borrowings priced at Libor plus a spread or Euribor plus a spread), the MFI should construct a gap schedule for each currency of liability if it represents more than 25 percent of total liabilities. This is because interest rates in different currencies and for different periods move differently, so the change in cost of funds and therefore the profitability impact will be different. Alternatively, the MFI might construct one gap schedule and then assume the largest interest rate move for any of the funding sources and apply that change to all liabilities when calculating the profitability impact as described next.

## Interest rate risk

See Table 3 for an example.

### Assets

- **Cash** is shown as noninterest sensitive as it is not held in interest bearing accounts.
- **Savings deposits** are shown as repricing in the short term, since they can be withdrawn at any time and put to another use with another interest rate.
- **Time deposits** are shown as repricing at their maturity, since that money can then be put to another use at another interest rate, or can be renewed at a potentially new interest rate.

Table 3. Interest Rate Risk

Assets	< 1 month	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months	13-18 months	19-24 months	2-5 years	>5 years	Non-interest sensitive	Total
Cash																	40,000	40,000
Savings Deposits	6,000,000																	6,000,000
Total Assets	3,000,000	3,000,000	3,000,000															9,000,000
Loan Portfolio, net <sup>1</sup>																	151,710,000	151,710,000
Fixed assets																	4,000,000	4,000,000
Other assets <sup>2</sup>																	1,250,000	1,250,000
Total Assets	9,000,000	3,000,000	3,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0	157,000,000	172,000,000
<b>Liabilities</b>																		
Savings deposits	100,000																	1,000,000
Time deposits			250,000			250,000									900,000			500,000
Loans payable fixed rate	300,000	7,000,000	700,000	265,000	4,000,000	2,000,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	2,750,000				64,250,000
Loans payable variable rate	7,312,500	7,312,500	17,500,000	7,312,500	7,312,500	17,500,000												64,250,000
Other liabilities <sup>3</sup>																	4,000,000	4,000,000
Total Liabilities	7,712,500	14,312,500	18,450,000	7,577,500	11,312,500	19,750,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	2,750,000	900,000	0	4,000,000	134,000,000
Total Equity	7,712,500	14,312,500	18,450,000	7,577,500	11,312,500	19,750,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	2,750,000	900,000	0	42,000,000	38,000,000
Asset - (Total Liability + Equity) Gap	1,287,500	-11,312,500	-15,450,000	-7,577,500	-11,312,500	-19,750,000	-1,500,000	-1,750,000	-2,834,000	-1,000,000	-151,000	-15,000,000	-25,000,000	-2,750,000	-900,000	0	115,000,000	0

## Notes:

1. The client loan portfolio is assumed to never reprice due to changes in costs of funds.
2. Other assets includes accounts receivable.
3. Other liabilities include one month of salaries and other operating expenses.

- The **net client loan portfolio** is shown as noninterest sensitive, to reflect the fact that rates charged to clients have never been changed *due to a change in the MFI's cost of funds* (rates charged to clients may have changed for credit or competitive reasons).
- **Fixed assets** are noninterest sensitive as they are noninterest bearing.
- **Other assets** is one month of interest payable, which does not bear interest.

#### Liabilities

- **Savings deposits** are shown as repricing when they potentially mature (as determined by statistical analysis), since they may be replaced with other types of funding carrying another interest rate at that time, or with new savings deposits at a new rate of interest.
- **Time deposits** are shown as repricing at maturity since they also may be replaced with other types of funding carrying another interest rate, or with new time deposits at a new rate of interest.
- **Loans payable fixed rate** will reprice according to their maturity.
- **Loans payable variable rate** will reprice according to the terms of the contract and according to a base rate (e.g., three-month Libor/Euribor, six-month Libor/Euribor). Loan principal is shown as repricing on the variable rate interest reset date.
- **Other liabilities** are one month of salaries and fixed expenses, which carry no interest rate so are categorized as noninterest sensitive. (This number is usually stable over time so we don't worry that they would be replaced by other liabilities that are interest bearing.)

- **Equity** is shown as noninterest sensitive since it is noninterest bearing.

Using this interest rate risk gap analysis, we can see that the MFI has negative gaps starting in the second month. This means it is liability sensitive, or exposed to an increase in interest rates, since this will increase its cost of funds and therefore decrease its profitability or net interest margin.

Table 4 is the same as Table 3, with the important difference that the client loan portfolio is shown to reprice as client loans mature. (We assume an average maturity of one year, with equal amounts of the loan portfolio maturing each month.)

Notice that Table 4 shows the MFI with mainly positive gaps, meaning it is asset sensitive, or exposed to falling interest rates. However, if in practice the MFI does not change rates on its client loans when they mature, it will *not* be better off when rates rise, since it will not increase the rates on its client loans but costs of funds will increase. In reality, net interest margin will increase when interest rates *fall*, not when they increase.

This gap schedule shows the interest rate exposure of the MFI's balance sheet if it were to pass on costs of fund changes (increases or decreases) to its clients. Because most MFIs do not reset interest rates on client loans due to costs of funds changes, the gap schedule filled out in this manner is not useful for measuring and limiting interest rate risk.

Table 4. Interest Rate Risk 2

Assets	< 1 month	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months	13-18 months	19-24 months	2-5 years	>5 years	Non interest sensitive	Total
Cash																	40,000	40,000
Savings Deposits	6,000,000																	6,000,000
Total Assets	3,000,000	3,000,000	3,000,000															9,000,000
Loan Portfolio, net <sup>1</sup>	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500						151,710,000
Fixed assets																	4,000,000	4,000,000
Other assets <sup>2</sup>																	1,250,000	1,250,000
Total Assets	21,642,500	15,642,500	15,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	12,642,500	0	0	0	0	5,290,000	172,000,000
<b>Liabilities</b>																		
Savings deposits	100,000														900,000			1,000,000
Time deposits			250,000			250,000												500,000
Loans payable fixed rate	300,000	7,000,000	700,000	265,000	4,000,000	2,000,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	2,750,000				64,250,000
Loans payable variable rate	7,312,500	7,312,500	17,500,000	7,312,500	7,312,500	17,500,000												64,250,000
Other liabilities <sup>3</sup>																	4,000,000	4,000,000
Total Liabilities	7,712,500	14,312,500	18,450,000	7,577,500	11,312,500	19,750,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	2,750,000	900,000	0	4,000,000	134,000,000
Total Equity	7,712,500	14,312,500	18,450,000	7,577,500	11,312,500	19,750,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	2,750,000	900,000	0	42,000,000	38,000,000
Total Liabilities & Equity	7,712,500	14,312,500	18,450,000	7,577,500	11,312,500	19,750,000	1,500,000	1,750,000	2,834,000	1,000,000	151,000	15,000,000	25,000,000	2,750,000	900,000	0	42,000,000	172,000,000
Asset - (Total Liability + Equity) Gap	13,930,000	1,330,000	-2,807,500	5,065,000	1,330,000	-7,107,500	11,142,500	10,892,500	9,808,500	11,642,500	12,491,500	-2,357,500	-25,000,000	-2,750,000	-900,000	0	-36,710,000	0

## Notes:

1. The client loan portfolio is assumed to never reprice due to changes in costs of funds.
2. Other assets includes accounts receivable.
3. Other liabilities include one month of salaries and other operating expenses.

## **Principles of liability management for interest rate risk**

The only way to avoid repricing risk and the potential negative profitability impact is to match the repricing terms of assets and liabilities (i.e., to match the amount of rate-sensitive assets to the amount of rate-sensitive liabilities in each time bucket). Therefore, if the client loan portfolio is long term and fixed rate, an MFI will want to have long-term, fixed-rate liabilities to fund it. The most obvious examples of long-term, fixed-rate liabilities are capital and long-term (nonamortizing), fixed-rate debt. Core savings deposits are long-term liabilities. They typically are not fixed rate; however, they do have the advantage of being relatively low cost compared with other commercial sources of borrowing. Long-term, fixed-rate commercial loans are often the predominant source of long-term financing for MFIs, but as they mature, their repricing by definition becomes shorter while the client loan portfolio repricing profile stays fixed in the long term. In addition, the principal repayments on fixed-rate loans with amortization over time are in fact a series of repricing principal and therefore do not match the terms of the client loan portfolio. So long-term, fixed-rate loans do not always significantly diminish repricing risk.

## **Calculating the profitability impact of a mismatch in repricing terms**

Once it runs its gap analysis for interest rate risk, an MFI will be able to see whether it is positively gapped (i.e., more assets than liabilities repricing in a given period) or negatively gapped (i.e., more liabilities than assets repricing). Most

formal financial institutions are negatively gapped (as they are for liquidity risk), which reflects their deliberate borrowing of short-term money to fund long-term assets. MFIs are typically negatively gapped as well, but this is more of a function of the type of funding on offer to date rather than a deliberate choice on the part of senior management. It is preferable for MFIs to focus on making profits from the core business of making loans and offering other financial products and services to clients, rather than taking positions based on interest rate mismatching, since this latter strategy requires a good understanding of interest rate movements and also the capability of hedging interest rate risk quickly when necessary. Neither of these options is typically available to MFIs.

Given the typical sources of funding available to MFIs, it is not always possible to match repricing terms of assets and liabilities precisely. In that case, senior management needs to understand the structure of the balance sheet and the repricing risk that comes with it, as well as the profitability impact of its interest rate gaps. The profitability impact is the impact on net interest income when assets or liabilities are replaced at a rate that is different than the original rate, which changes the costs of funds and/or the earnings on assets. A simple way to calculate profitability impact assuming a certain change in interest rates (usually an increase) is illustrated below. This calculator comes from the Office of the Comptroller of the Currency (OCC), one of the commercial bank regulators in the United States. It is a very simplified calculation and includes many assumptions, but it is useful in getting a sense of the profitability impact of repricing mismatch at the balance sheet level.

**Table 5. Sample Net Interest Income Sensitivity Calculation 1  
(using gap numbers from Table 3 , Interest Rate Risk)**

MFI Example

Time Period	Size of Gap	% change	Part of year Gap is in effect (expressed in months)	Impact on Annualized Net interest income
<1 month	1,287,500	1%	11.5/12	12,339
2 months	(11,312,500)	1%	10.5/12	(98,984)
3 months	(15,450,000)	1%	9.5/12	(122,313)
4 months	(7,577,500)	1%	8.5/12	(53,674)
5 months	(11,312,500)	1%	7.5/12	(70,703)
6 months	(19,750,000)	1%	6.5/12	(106,979)
7 months	(1,500,000)	1%	5.5/12	(6,875)
8 months	(1,750,000)	1%	4.5/12	(6,563)
9 months	(2,834,000)	1%	3.5/12	(8,266)
10 months	(1,000,000)	1%	2.5/12	(2,083)
11 months	(151,000)	1%	1.5/12	(189)
12 months	(15,000,000)	1%	0.5/12	(6,250)
Total				(470,540)

Notes:

formula = (periodic gap) x change in interest rate x (time during which net gap in effect) = change in Net Interest Income

Assumptions (the above is a very rough calculation of effect on net interest income):

- All repricing of assets and liabilities occur at the same time, in the middle the time period.
- The resultant gaps are in effect for the next 12 months.
- No other new business is booked - this is a balance sheet snapshot.
- There is an instantaneous change in the overnight rate to a new and constant level.

1 - from US Regulator Office of the Comptroller of the Currency, Interest Rate Risk Comptroller's Handbook June 1997, Appendix E

## Calculating the economic value of interest rate gaps—Economic value and duration

### *Economic value*<sup>7</sup>

Calculating the profitability impact of a mismatch in repricing terms is useful for measuring risk and setting risk limits in the short term—the next 12 months. However, this measure alone does not show the impact of interest rate risk past 12 months, and so it is not complete. MFIs should look at both profitability impact and net economic value of interest rate mismatch.

The change in the economic value of equity is the change in the net present value of an MFI's assets minus the change in the net present value of its liabilities given a certain change in interest rates. By definition, if the value of an organization's assets and liabilities changes, that change must be reflected in an increase or decrease in the value of equity for the balance sheet to continue to balance.

It may be difficult to measure this precisely, especially in an organization with a large

<sup>7</sup> This discussion is entirely derived from "Interest Rate Risk: Comptroller's Handbook," Office of the U.S. Comptroller of the Currency, June 1997 and March 1998, Appendix B and E.

and diverse balance sheet, because it entails generating net present value for expected cash flows for all assets and liabilities and then recalculating those cash flows assuming a certain interest rate change. It is possible to approximate this calculation using the gap report or a duration analysis. Using the example above, simply calculate the profitability impact of interest rate gaps past one year (those gaps from 13 to 18 months until >5 years), keeping in mind that we assume assets and liabilities are repricing in the middle of the given period and that we are now looking out five years, or 60 months, so each time bucket should be weighted appropriately. Once you have calculated the profitability impact of a given interest rate increase given the institution's gaps, you then discount the total number to come up with a net present value of the profitability impact today. That number can then be compared to total equity, and a limit can be set.

#### ***Duration gap analysis***<sup>8</sup>

Duration gap analysis is another way to measure the impact of a change in interest rates on the net asset value (market value of equity) of the institution. This measure typically is used for financial institutions with trading portfolios consisting of large amounts of fixed-income instruments (bonds), because it shows the market value change in an asset or liability due to changes in interest rates. Some microfinance analysts have begun to use duration analysis, treating the client loan portfolio and funding loans like bonds for the purpose of the analysis. The principle is the same for loans as it is for fixed-income securities (bonds)—the net present

value of a stream of cash flows changes when interest rates in the market change. The longer the duration of an asset or liability, the greater the change in its net present value when interest rates change.

The basic premise of duration gap analysis is that it is important to match the *duration* of assets and liabilities and not the *maturities* of those assets and liabilities. The change in the net present value of assets and liabilities results in an increase or decrease in the value of equity. Duration gap is calculated looking at an average weighted duration of assets minus the average weighted duration of liabilities. Any number greater than zero (positive duration gap) indicates that assets have a longer duration than liabilities, while a negative duration gap shows that liabilities have a longer duration than assets. To minimize the interest rate impact, an organization would try to have a duration gap at or equal to zero. By calculating the duration gap, an organization can then dynamically hedge its interest rate risk by increasing or decreasing the duration of assets and liabilities depending on the direction of interest rates. If the institution has a negative duration gap, it should increase the duration of assets. Conversely, if the institution has a positive duration gap, it should increase the duration of the liabilities.

MFI management may therefore want to set limits on the percent change in the economic value of equity to accompany any limits set on the profitability impact (impact on earnings) versus expected profits.

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<sup>8</sup> This discussion is largely derived from Mishkin (2007). See also, Bald (2003).

## Interest rate volatility

Once an MFI has created a gap schedule and wants to calculate the profitability impact, how will it know what is a likely amount for interest rates to change in a given amount of time? No one can predict the future, but one could look at historical volatility of interest rates and then apply senior management knowledge regarding what is currently happening in the economy to determine a rate of change that seems likely, and a rate that would be considered extreme, or a stress.

Determining the volatility of interest rates is much like determining the volatility of deposits. Using a long (3–5 year) time series of data, calculate changes to establish the average and maximum change within the series. Do this analysis for each type of base rate (e.g., six-month Libor or three-month Euribor) because the way these rates move will be different. If a funding loan is based on six-month Libor plus a spread, the analysis should look at the six-month change in six-month Libor to determine the largest change that has occurred, or the average change. A more sophisticated volatility analysis would look at changes using standard deviations, to reflect that the probability of changes occurring has been included to a certain confidence level. Regulators in developed markets usually look at a 100 (1 percent), 200 (2 percent), and 500 (5 percent) basis point change in rates.

## Managing interest rate risk with limits

Once an MFI has measured its gaps and calculated the profitability impact given a certain move in interest rates, it can then compare

that profitability impact against its expected profitability to decide what the appropriate risk/reward tradeoff should be. This might be expressed as percent of profits or percent of revenues, or it could be expressed in terms of months of profit or revenue.

Formal financial institutions hedge their interest rate risk through a combination of ALM (matching terms) and use of interest rate swaps. Interest rate swaps allow an organization to swap floating interest payments for fixed ones or vice versa. In most markets in which MFIs operate, interest rate swaps are not common because they are sophisticated financial instruments, and their use is strictly limited by regulators. Even in markets where interest rate swaps are common, it is unlikely that they would be available to MFIs given the sophistication of the product, the small amount that an MFI would be looking to hedge, and the fact that swap counterparties may not feel comfortable with the credit risk of entering into a swap with an MFI.

## Foreign exchange risk

### Definition

Foreign exchange risk is the risk to earnings due to a mismatch in the currencies of assets and liabilities. MFIs typically have assets denominated in local currency, while liabilities may be denominated in a combination of local currencies and foreign currencies. This mismatch exposes the MFI to the risk of foreign currency appreciation (depreciation of the local currency). As with other financial risks, the way to eliminate or minimize foreign exchange risk is to match the currencies of assets and liabilities. This is

a large part of the argument for funding MFI loans with client deposits or with loans in local currency and/or from local banks. However, depending on the country and the regulatory framework, MFIs are not always able to find local currency sources of funding and must rely on foreign currency sources.

### Measuring foreign exchange risk

There are two ways to measure foreign exchange risk—one measures the net open foreign exchange position of the organization and the second breaks down the foreign exchange position into time periods showing when foreign exchange outflows will occur.

#### *Net open foreign exchange position*

To measure net open foreign exchange position, simply break down the balance sheet by currency and assign all local currency assets and liabilities to one column and all foreign currency assets and liabilities to other columns, always expressing amounts in a common currency so the total matches the balance sheet. There should be as many columns as necessary to reflect the different currencies used in the organization. Once the table is constructed, subtract liabilities from assets in each column to determine the net open foreign exchange position for any given currency. An excess of foreign currency liabilities results in a short position in that currency, meaning the organization will have to convert local currency to foreign currency to repay the obligation. An excess of foreign currency assets results in a long position in that currency and means that foreign currency would have to be converted to local currency (or perhaps into another foreign currency) to meet local currency (or other foreign currency) liabilities.

From a risk perspective, MFIs typically are most concerned with short positions in foreign currencies, because this signals exposure to a depreciation of the local currency. In emerging markets where most MFIs operate, it is common that currencies depreciate against hard currencies, such as the U.S. dollar or Euro. However, in the past several years, many emerging markets currencies have *appreciated* versus the U.S. dollar, due more to dollar weakness than the strength of emerging market currencies (though increased commodity prices have helped strengthen currencies in countries with large commodity exports). Unless an organization is comfortable that it has a system in place to monitor and predict foreign exchange movements, it should not “bet” on its currency appreciating against a foreign currency, because many factors contribute to foreign currency movements.

This asset and liability matching table breaks down the balance sheet by currency to measure the aggregate currency mismatch, or net open foreign exchange position. This measures the MFI’s exposure to currency fluctuations, but it does not give a time component. Most MFIs have client loans in local currency, while their funding is in a mix of local currency and foreign currency. This exposes them to a depreciation of their local currency.

Once the gaps have been determined, measuring the amount of foreign currency mismatch versus capital is one way of dimensioning the degree of foreign exchange risk. Many regulators and investors look at net open foreign exchange position versus capital as an indicator, and common benchmarks or limits are 10 percent for any one currency and 25 percent for all

**Table 6. Example of Net Open Foreign Exchange**

	EUR	LCY	Other FCY	Total
<b>Assets</b>				
Cash		40,000		40,000
Savings Deposits		6,000,000		6,000,000
Time Deposits		9,000,000		9,000,000
Loan Portfolio, net		151,710,000		151,710,000
Fixed assets		4,000,000		4,000,000
Other assets		1,250,000		1,250,000
<b>Total Assets</b>	—	172,000,000		172,000,000
<b>Liabilities</b>				
Savings deposits		1,000,000		1,000,000
Time deposits		500,000		500,000
Loans payable	115,000,000	6,000,000	7,500,000	128,500,000
Other liabilities		4,000,000		4,000,000
<b>Total Liabilities</b>	115,000,000	11,500,000	7,500,000	134,000,000
<b>Total Equity</b>		38,000,000		38,000,000
<b>Total Liabilities and Equity</b>	115,000,000	49,500,000	7,500,000	172,000,000
<b>Net open position (A-TL and Equity)</b>	(115,000,000)	122,500,000	(7,500,000)	—
<b>profitability impact with 10% depreciation</b>	(11,500,000)		(750,000)	(12,250,000)

Note: Amounts in foreign currency are expressed in local currency terms.

combined currencies. The rationale behind this measurement is that if a financial institution has to convert a larger amount of local currency to meet its foreign currency obligations, then that additional local currency (technically a loss) will come from retained earnings (capital).

Another way to evaluate the impact of a short position in foreign currency would be to calculate the earnings impact given a specific devaluation of local currency. This is the same principal we used when looking at the profitability impact of interest rate gaps given a specific interest

rate change, though it does not include a time weighting, as the interest rate calculations did. After constructing gaps, analyze the historical volatility of local currency versus the relevant hard currency to see the average and maximum percent changes. Apply the results of that analysis to calculate how much additional local currency will need to be converted to meet foreign currency obligations. This amount is the potential "loss" of earnings. It could be compared to projected earnings (rather than capital) to measure and then limit the degree of the loss.

### ***Measuring liquidity gaps by currency***

The net open foreign exchange position is useful for getting an aggregate picture of an organization's exposure to foreign currency fluctuations, but it is not useful in deciding how to hedge that exposure because it doesn't show when foreign currency obligations come due.

A simple way to do this is to use the liquidity gap analysis described above, broken down by currency and time period. This would show one set of gaps for all U.S. dollar assets and liabilities, one for Euro assets and liabilities, one for local currency assets and liabilities, and so forth. Since most MFIs have local currency assets funded by some mix of local and foreign currency liabilities, but a small amount of foreign currency assets, we would expect to see a local currency gap schedule showing surpluses of local currency (mainly in the long term because that is how client loans are classified). Foreign currency gap schedules would show negative gaps in most time periods because liabilities are constantly maturing. Armed with a foreign currency gap schedule, the MFI can calculate profitability impact more accurately (historically, how much has the U.S. dollar changed versus local currency in one month? three months? 18 months?) and can also decide on an appropriate hedging strategy, knowing the maturity of its foreign currency liabilities.

### **Foreign exchange risk by maturity**

Tables 7 and 8 break down the balance sheet by maturity *and* by currency, thus giving a more precise idea of when foreign currency

obligations come due. This allows the MFI to measure the potential profitability impact and to plan its hedging strategy. Refer to Table 6, "Net Open Foreign Exchange Position," for total numbers by currency.

Table 7 shows all local currency assets and liabilities by maturity. Table 8 shows all foreign currency assets and liabilities by maturity. (Table 6 shows a mix of Euro and other foreign currency assets and liabilities because the other foreign currency was a small percent of the total balance sheet.)

From Table 7, it is clear that the MFI has a surplus of local currency available in the first three months. That surplus carries through the cumulative gaps for the rest of the table, assuming it is not used. If the local currency surplus was converted to foreign currency to pay for the foreign currency deficit, it would be gone in the first two months.

From Table 8, it is clear that the MFI has a deficit of foreign currency beginning in the first month. As noted, the local currency surplus could be converted to foreign currency to meet this mismatch, but that would cover less than the first two months of foreign currency need.

Looking at tables 7 and 8 together gives a more precise measure of foreign currency need by time period. The MFI can then plan to hedge that foreign exchange risk or to refinance foreign currency liabilities with new foreign currency funding.

Table 7. Liquidity Risk—LCY

	< 1 month	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months	13–18 months	19–24 months	2–5 years	> 5 years	No Maturity	Total	
<b>Assets</b>																			
Cash	40,000																		40,000
Savings Deposits	6,000,000																		6,000,000
Total Assets	3,000,000	3,000,000	3,000,000																9,000,000
Loan Portfolio, net <sup>1</sup>																			151,710,000
Fixed assets																			4,000,000
Other assets <sup>2</sup>	1,250,000																		1,250,000
Total Assets	10,290,000	3,000,000	3,000,000	0	0	0	0	0	0	0	0	0	0	0	0	0	155,710,000	172,000,000	
<b>Liabilities</b>																			
Savings deposits	100,000																		1,000,000
Time deposits			250,000			250,000									900,000				500,000
Loans payable fixed rate	13,980	326,200	32,620	12,349	186,400	93,200	69,900	81,550	132,064	46,600	7,037	699,000	1,165,000	1,491,200	1,642,900				6,000,000
Loans payable variable rate	8,234	95,034	15,994	21,934	22,846	7,118	7,530	17,731	3,808	4,513	19,209	9,604	55,934	55,934	335,520				680,945
Other liabilities <sup>3</sup>	4,000,000																		4,000,000
Total Liabilities	4,122,214	421,234	298,614	34,283	209,246	350,318	77,430	99,281	135,872	51,113	26,246	708,604	1,220,934	1,547,134	2,878,420	0	0	38,000,000	38,000,000
Total Equity	4,122,214	421,234	298,614	34,283	209,246	350,318	77,430	99,281	135,872	51,113	26,246	708,604	1,220,934	1,547,134	2,878,420	0	0	38,000,000	50,180,945
<b>Asset – (Total Liability + Equity) Gap <sup>4</sup></b>	6,167,786	2,578,766	2,701,386	-34,283	-209,246	-350,318	-77,430	-99,281	-135,872	-51,113	-26,246	-708,604	-1,220,934	-1,547,134	-2,878,420	0	117,710,000	121,819,055	
Cumulative Gap	6,167,786	8,746,552	11,447,938	11,413,654	11,204,408	10,854,090	10,776,659	10,677,379	10,541,506	10,490,393	10,464,148	9,755,543	8,534,609	6,987,475	4,109,055	4,109,055	121,819,055		

## Notes:

- The client loan portfolio is assumed to never mature.
- Other assets includes accounts receivable which are shown as <1 month.
- Other liabilities include one month of salaries and other operating expenses.
- Note that the positive total for local currency is offset by the negative total for foreign currencies. The difference between the two is due to interest payable, which is included here, but not on the balance sheet.

Table 8. Liquidity Risk—EUR/foreign currency

	<1 month	2 months	3 months	4 months	5 months	6 months	7 months	8 months	9 months	10 months	11 months	12 months	13-18 months	19-24 months	2-5 years	>5 years	No Maturity	Total	
<b>Assets</b>																			
Cash	0																		0
Savings Deposits	0																		0
Total Assets																			0
Loan Portfolio, net <sup>1</sup>																			0
Fixed assets																			0
Other assets <sup>2</sup>	0																		0
Total Assets	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Liabilities</b>																			
Savings deposits																			0
Time deposits																			0
Loans payable	285,990	6,673,100	667,310	252,625	3,813,200	1,906,600	1,429,950	1,668,275	2,701,652	953,300	143,948	14,299,500	23,832,500	30,505,600	33,366,450				122,500,000
Loans payable variable rate	168,449	1,944,122	327,189	448,716	467,371	145,611	154,051	362,717	77,900	92,320	392,964	196,476	1,144,249	1,144,249	6,863,760				13,930,145
Other liabilities <sup>3</sup>	0																		0
Total Liabilities	454,439	8,617,222	994,499	701,340	4,280,571	2,052,211	1,584,001	2,030,992	2,779,552	1,045,620	536,913	14,495,976	24,976,749	31,649,849	40,230,210	0	0		136,430,145
Total Equity																			0
Total Liabilities & Equity	454,439	8,617,222	994,499	701,340	4,280,571	2,052,211	1,584,001	2,030,992	2,779,552	1,045,620	536,913	14,495,976	24,976,749	31,649,849	40,230,210	0	0		136,430,145
Asset – (Total Liability + Equity) Gap <sup>4</sup>	-454,439	-8,617,222	-994,499	-701,340	-4,280,571	-2,052,211	-1,584,001	-2,030,992	-2,779,552	-1,045,620	-536,913	-14,495,976	-24,976,749	-31,649,849	-40,230,210	0	0		-136,430,145
Cumulative Gap	-454,439	-9,071,661	-10,066,160	-10,767,500	-15,048,072	-17,100,283	-18,684,284	-20,715,276	-23,494,829	-24,540,448	-25,077,361	-39,573,337	-64,550,086	-96,199,935	-136,430,145	-136,430,145	-136,430,145		

## Notes:

1. The client loan portfolio is assumed to never mature.
2. Other assets includes accounts receivable which are shown as <1 month.
3. Other liabilities include one month of salaries and other operating expenses.
4. Note that the positive total for local currency is offset by the negative total for foreign currencies. The difference between the two is due to interest payable, which is included here, but not on the balance sheet.

## Hedging foreign currency exposure

Once an organization knows its foreign exchange exposure, common wisdom says it should hedge the exposure (which effectively matches the currency of assets and liabilities by adding a foreign currency asset and a local currency liability). This can be done with different types of structures or hedging instruments, including forwards, swaps, and options.<sup>9</sup> Before seeking to hedge foreign exchange exposure, it is important to understand the nature of the foreign exchange risk: *how likely is it that the local currency will change significantly in value compared to the foreign currency?* In countries with freely floating currencies, we know the foreign exchange rate will change daily, and we can do a volatility analysis to determine by how much. In countries with freely floating currencies, there is usually a market for foreign exchange hedging instruments, however limited. Typically there are forwards available up to six months or one year. There are many studies and reports on hedging foreign exchange risk for MFIs, and some of them are listed at the end of this note.

What if the MFI is operating in a country with a managed or fixed exchange rate? Does it still make sense to hedge the foreign exchange exposure? Will there be instruments available to hedge the exposure in a country where the rate is heavily managed?

These are important questions to answer because there is an explicit cost to hedging foreign exchange exposure. Senior managers should always evaluate the cost versus benefit of any action. If a currency is fixed or pegged to another currency (U.S. dollar or Euro), it means

the foreign exchange rate will not change. Therefore the amount of local currency required to repay a maturing foreign currency obligation will be the same on the first and last day of the foreign currency obligation and *there is nothing to hedge*. In addition, usually there will not be foreign exchange hedging instruments available in a country with a fixed exchange rate because they are not necessary. It is important to understand how stable a fixed exchange rate regime (or currency board) is and how likely it is that it will be maintained in the long run.

In a country with a managed floating exchange rate, the fluctuations in currency rate are controlled so that changes are limited within a well-defined range (for example, plus or minus 5 percent). With a managed floating exchange rate, the amount that the currency can change is defined by monetary policy, so there is no need to do a volatility analysis to understand how much the value of the currency may change. It will then be up to senior management to decide whether that foreign currency exposure should be hedged given the predictable and limited amount of depreciation possible for the local currency. Again, it is important to have a good sense of the stability of the monetary policy underpinning the managed floating exchange rate to determine whether the policy is likely to hold in the long run or if the managed float will be adjusted or abandoned for some reason. It is also less likely that there will be foreign exchange hedging instruments available in a market with a managed float.

Some MFIs have chosen to hedge their foreign currency exposure by making loans to clients in foreign currency or linked to foreign currency.

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<sup>9</sup> Note that the use of options is often limited by regulators due to suitability and appropriateness issues.

For foreign exchange exposure purposes this is a hedge, but MFI managers should understand that they are passing on the foreign exchange risk to their clients and thereby increasing the default risk for those clients if they were required to repay loans in local currency at an exchange rate that is much higher than that at which they borrowed. In countries where there are MFI clients who are paid in foreign currency or who produce and sell traded goods (those goods that are exported or compete directly with imported goods), making foreign currency or foreign currency indexed loans will make sense because their earnings are tied to foreign currency movements (their foreign exchange risk is matched).

### **Managing foreign exchange exposure with limits**

Another way to manage foreign exchange exposure is by setting limits on the profitability impact of the net open foreign exchange position or foreign exchange gaps by tenor bucket. The same principle applies to this as to interest rate exposure—do a volatility analysis to see how much foreign exchange rates might change, then apply the rate change to the foreign exchange position to understand what the additional cost will be. Measure that additional cost as a percent of profits or revenue to establish a level at which senior management is comfortable.

### **Funding strategy and capital structure**

Most MFIs' client loan portfolios behave like long-term, fixed-rate assets. To minimize foreign

exchange, liquidity, and interest rate risk, the MFI should seek to match the currency and terms of its funding sources while maintaining a sufficient profit margin. Long-term, fixed-rate liabilities are primarily capital and long-term, fixed-rate debt, so MFI management should focus on having the correct mix of capital, deposits, and commercial debt funding the asset side of the balance sheet.

The current global financial crisis has dramatically illustrated the role of leverage in financial institutions and the danger of being over leveraged. Each financial institution's leverage is determined by many factors, including regulation, the business model of the organization, and the risk appetite of owners and senior managers. Regulation will establish a maximum prudent leverage ratio, but beyond that it is up to each financial institution to determine the correct capital structure.

One lesson learned from the current crisis is that it may be more prudent for owners and investors to look at a financial institution's return on assets (ROA) rather than to focus on return on equity (ROE). ROE looks at net income/total equity, so by definition the lower the amount of equity the larger the ROE (and the bigger the leverage). This can look like a very productive use of capital, but it may mask the quality of the assets being supported by equity. By delving further into ROA, investors and others can get a clearer picture of MFI performance. ROA (net income/total assets) can be further broken down into component parts of profit margin (profits/total operating income) and asset utilization (total income/total assets). These ratios can then be further broken down to measure what

percentage of income goes to cover which expenses of the organization, and so forth, which gives a better indicator of how efficiently capital is being deployed.<sup>10</sup>

## Integrating ALM into an MFI governance structure

Effective ALM requires a financial risk management policy that outlines the MFI's risk appetite and limits and assigns clear roles and responsibilities for identifying, measuring, monitoring, and managing financial risks.

### ALCO membership

The ALCO is often the same as the MFI's senior management team or a subset of that team. Depending on the level of sophistication of senior management and of board members, and depending on local regulatory requirements, the ALCO could be a board-level committee or a senior management-level committee with representation from the board of directors. In all cases, the ALCO is an operational committee, so members should be very familiar with the daily operations of the MFI, its funding strategy, growth projections, and credit and deposit products.

### Roles and responsibilities

The ALCO should ensure that managers from both sides of the balance sheet—credit or operational head, manager in charge of deposit products, finance manager (typically responsible for negotiating new funding)—meet regularly and understand how actions on one side of

the balance sheet affect the other side of the balance sheet and the overall financial risks of the organization. Once risk appetite is set, the ALCO will ensure that new products or new sources of funding will not increase the exposure of the MFI to foreign exchange, interest rate, or liquidity risk.

The ALCO does the following:

- Ensures that senior management and the board of directors understand and approve all reports related to ALM, including the assumptions and logic used to create them.
- Recommends limits, ratios, and targets for liquidity, interest rate, and foreign exchange risk for board approval and in line with the MFI's risk appetite.
- Ensures that there is always adequate liquidity to meet the organization's maturing obligations and growth projections and also that there is a liquidity reserve in case of emergency.
- Meets monthly or more frequently as needed to review exposures, including year-to-date trends, significant monthly variances, any cause for concern, or need to change limits or indicators
- Discusses and updates funding strategy and costs.
- Discusses any internal policy changes or external regulatory changes that affect the financial risk management of the MFI.
- Reviews any new products or funding sources, and ensures they are correctly reflected in ALM reports.
- Discusses and manages any human resources issues related to financial risk management.

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<sup>10</sup> For the full discussion of ROE and ROA calculations and their usefulness for evaluating financial institutions, see Christen (2000, pp.84–93).

ALCO meetings should follow the same format each month, to ensure consistency and also to ensure that all members become familiar with the reports, exposures, and limits and how they change over time. ALCO minutes are essential to document discussions, agreements, and action plans and will become the auditable record of ALCO activity.

## Financial Risk Management Policy

A financial risk management policy is different from a finance policy, inasmuch as it will specify financial *risk* indicators and measures to be tracked rather than financial *performance* indicators. Some examples of financial risk indicators are concentration ratios for liquidity and profitability impact ratios for foreign exchange and interest rate risk. Examples of performance indicators are operational self-sufficiency, financial self-sufficiency, ROA, and ROE. If an organization is sufficiently large to have a separate risk management function, financial risk indicators can be tracked by the risk manager while performance ratios can be tracked by the finance head. If the MFI is small, the finance head will track both indicators, but different actions will be associated with monitoring those indicators.

The financial risk management policy will also outline roles and responsibilities of the board and the senior management team related to financial risks. The board of directors typically will approve the policy, including the methodologies for calculating limits and the limits themselves. The policy may establish an ALCO and define who sits on it, how often it meets, and its

responsibilities. Board members and senior managers who are responsible for financial risks should have a good understanding of how those risks are measured, because logic and assumptions used to create reports and calculate ratios will drive limit setting and decision making within the organization. The policy will outline how any exceptions to the policy are to be handled, as well as when the board should be informed of actions and when its approval is required before actions are taken.

Last, the financial risk management policy should be reviewed and updated annually or as needed given the introduction of new products or services.

## Conclusions and Recommendations

ALM is a key element in the successful management of any financial institution, and especially those institutions that mobilize deposits, because they are responsible for protecting their depositors. In the microfinance sector to date, asset and liability and financial risk management have not received the same attention as credit and operational risk management, largely because of the way the sector has developed, with MFIs focused on the development, delivery, and repayment of appropriate products for clients. Now that MFIs are accessing more diverse and commercial sources of funds, and more MFIs are transforming into regulated institutions with the ability to attract private equity and/or offer deposit products, asset and liability and financial risk management are increasingly important.

Given human and financial resource constraints, MFIs need to be realistic in implementing a good ALM system. Priority should be given to having a very good process for measuring, monitoring, and managing liquidity risk, because this is often the most important financial risk for any financial institution.

- **Establish an ALCO function.** This might be a separate committee or might become an additional part of the responsibilities of a senior management committee. The ALCO might be a board-level committee or a senior management-level committee. This will be determined by local regulations, the level of experience of board members and senior management, and the needs of the MFI over time. The ALCO is important because it brings both sides of the balance sheet together to evaluate the risks of the organization in a holistic way, rather than solely focusing on the asset side of the balance sheet with no regard to the liability/funding side.
- **Write a financial risk management policy.** The policy does not need to be long and complicated. It should set out roles and responsibilities of board members and senior management. It should define the financial risks to be tracked, and it should outline how those risks will be measured, monitored, and limited.
- **Create gap reports and liquidity ratios.** Most of the information necessary to create these reports and calculate these ratios is readily available in MFIs' existing systems. The most important first step is to automate a debt repayment schedule so that the MFI has a clear and precise measure of its refinancing needs. The MFI should generate reports and ratios monthly or more frequently as needed.
- **Create a contingency funding plan,** no matter how simple. It is extremely important that MFIs anticipate the events that can cause a liquidity disruption and that they have a plan in place to address that disruption. A contingency funding plan should outline actions to be taken and amounts to be borrowed and should indicate who is responsible for taking each action.
- **Set limits or benchmarks for the gaps and liquidity ratios.** The MFI should monitor levels over time to understand trends and reasons for large variances. After an initial six-month period, the MFI should set limits or benchmarks and assign a risk manager or finance manager to track the gaps and ratios and their trends. Management or the ALCO should discuss any significant changes and learn why they happen.
- **Use gap reports to negotiate more effectively with funders.** Once an MFI is able to measure its financial risks, it will be more informed about the terms it wants from funding sources. While it may not always be possible to match the terms of assets and liabilities exactly, gap reports will help MFIs negotiate to minimize the mismatch.
- **Collect and analyze data** on foreign exchange rates, interest rates, and aggregate deposit levels by product type. This will help MFI management better understand the risk they are taking, given the gaps. It will help to quantify assumptions about depositor behavior and about the profitability impact of a change in interest or foreign exchange rates.
- **Review assumptions, reports, roles, and responsibilities annually or each time a new product (asset or liability) is added to the balance sheet.** The MFI should review limits

and benchmarks annually or if the balance sheet grows by 50 percent, keeping in mind that it is important to look at ratios and at absolute numbers, especially when setting concentration limits for liquidity.

- **Be aware of what you can't do.** Many MFIs will not be able to do everything required for good asset and liability and financial risk management immediately. It should identify those gaps, prioritize risks, and create an action plan for implementing sound practices within an acceptable amount of time. It is better to identify risks that can't be managed and keep the board and senior management aware of those risks than to ignore risks altogether.
- **Do not substitute reports, ratios, and models for the knowledge and common sense of the management and product officers of the MFI.** Quantitative analysis is meant to complement the know-how of managers and to ground their decision making in numbers, not to replace using common sense and good judgment.

## Tools, Trainings, and Other Publications on ALM and on Deposit Mobilization

Publications (microfinance-specific publications are indicated with an asterisk):

Basel Committee on Banking Supervision. 2004. "Principles for the Management and Supervision of Interest Rate Risk." Basel, Switzerland: Bank for International Settlements. <http://www.bis.org/publ/bcbs108.htm>.

\*Bald, Joachim. 2003. *Treasury Management Toolkit*. Frankfurt, Germany: Bankakademie International.

\*———. 2000. "Liquidity Management: A Toolkit for Microfinance Institutions." Frankfurt, Germany: Bankakademie International.

\*———. 2007. *Treasury Management for SACCOs*. Washington, DC: USAID/Chemonics.

\*Christen, Robert Peck. 2000. *Banking Services for the Poor: Managing for Financial Success*. Boston: ACCION.

\*CGAP Technical Guide. 2006. *Foreign Exchange Risk Management Techniques: Structure and Documentation*. Washington, DC: CGAP.

Crabb, Peter R. 2003. "Foreign Exchange Risk Management Practices of Microfinance Institutions." Paper presented to Opportunity International.

\*Deshpande, Rani. 2006. "Safe and Accessible: Bringing Poor Savers into the Formal Financial System." Focus Note 37. Washington, DC: CGAP.

\*Hirschland, Madeline, ed. 2005. *Savings Services for the Poor: An Operational Guide*. Bloomfield, Conn.: Kumarian Press, Inc.

Holden, Paul, and Sarah Holden. 2004. "FX Risk and Microfinance Institutions." Washington, DC: MicroRate and the Economic Research Institute.

\*Microfinance Network and Shorebank Advisory Services. 2000. "A Risk Management Framework for Microfinance Institutions." Eschborn, Germany: GTZ. <http://www.gtz.de/en/publikationen/686.htm>.

Office of the Comptroller of the Currency. 1998. *Interest Rate Risk: Comptroller's Handbook*. Washington, DC: OCC. [www.occ.treas.gov/handbook/irr.pdf](http://www.occ.treas.gov/handbook/irr.pdf).

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\*Robinson, Marguerite. 2004. "Mobilizing Savings from the Public: Basic Principles and Practices." Kampala, Uganda: SPEED-USAID and Women's World Banking. <http://www.microfinancegateway.org/p/site/m//template.rc/1.9.27512>.

\*Schneider-Moretto, Louise. 2005. *Tool for Developing a Financial Risk Management Policy*. New York: Women's World Banking. <http://www.swwb.org/toolkit-for-developing-a-financial-risk-management-policy>.

\*Women's World Banking. 2008. "FX Risk Management in MFIs." New York: Women's World Banking.

## Trainings and online resources (microfinance-specific trainings are indicated with an asterisk):

- ALM Professional. <http://www.almprofessional.com/>
- \*Citi/Women's World Banking Financial Risk Management training
- \*Banyan Global. Tools and Techniques for Effective Financial Risk Management
- \*Understanding and Managing Risk: An Overview, Rochus Mommartz
- Global Association of Risk Professionals. <http://www.garp.com/frmexam/>
- St. Louis Federal Reserve online ALCO training. <http://stlouisfed.org/col/director/alco/whatyouneedtoknow.htm>
- \*Microfinance Currency Risk Solutions. Forthcoming online toolkit for liquidity management. [www.mfxsolutions.com](http://www.mfxsolutions.com)
- Professional Risk Managers' International Association (PRMIA) online trainings. <http://prmia.org/index.php?page=training&option=trainingOnlineCourses>
- RiskGlossary.com on asset liability management.  
[http://www.riskglossary.com/link/asset\\_liability\\_management.htm](http://www.riskglossary.com/link/asset_liability_management.htm)
- Risk Train, a division of Consultancy Matters. <http://www.consultancymatters.com/AboutUs.html>
- Risk Management Association, Knowledge and Training Center, <http://www.rmahq.org/RMA/MarketRisk/>

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- Bald, Joachim. 2003. *Treasury Management Toolkit*. Frankfurt, Germany: Bankakademie International.
- Christen, Robert Peck. 2000. *Banking Services for the Poor: Managing for Financial Success*. Boston: ACCION.
- Hirschland, Madeline, ed. 2005. *Savings Services for the Poor: An Operational Guide*. Bloomfield, Conn.: Kumarian Press, Inc.
- Mishkin, Frederic S. 2007. *The Economics of Money, Banking and Financial Markets*, 8th edition. Appendix 1 to Chapter 9, "Duration Gap Analysis." New York: Addison Wesley.

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