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Microcredit Interest Rates

CGAP

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Carmen Crediticia is the general manager of MicroFin, a young institution serving 1,000 active microloan customers after two years. Carmen wants to make MicroFin sustainable, and her vision of "sustainability" is an ambitious one. She sees a demand for MicroFin's services far exceeding anything that donor agencies could finance. To meet this demand, MicroFin must eventually be able to fund most of its portfolio from commercial sources, such as deposits or bank loans. This will be feasible only if MicroFin's income is high enough so that it can afford to pay commercial costs for an ever-increasing proportion of its funding. Carmen has read that quite a few microfinance institutions (MFIs) around the world have achieved this kind of profitability, working with a wide variety of clienteles and lending methodologies.

Carmen sees that MicroFin's present interest rate, 1% per month, can't come close to covering its costs. MicroFin must charge a higher rate. But how much higher must the rate be, Carmen asks, to position MicroFin for sustainability as she defines it? How should she structure MicroFin's loan terms to yield the rate she needs? And will her poor clients be able to pay this rate?

A. Setting a Sustainable Interest Rate

This section outlines a method for estimating the interest rate that an MFI will need to realize on its loans, if it wants to fund its growth primarily with commercial funds at some point in the future. The model presented here is simplified, and thus imprecise.[1] However, it yields an approximation that should be useful for many MFIs, especially younger ones. Each component of the model is explained and then illustrated with the MicroFin example.

Pricing Formula: The annualized effective interest rate (***R***) charged on loans will be a function of five elements, *each expressed as a percentage of average outstanding loan portfolio:*[2] administrative expenses (***AE***), loan losses (***LL***), the cost of funds (***CF***), the desired capitalization rate (***K***), and investment income (***II***):

$$R = \frac{AE + LL + CF + K - II}{1 - LL}$$

Each variable in this equation should be expressed as a decimal fraction: thus, administrative expenses of 200,000 on an average loan portfolio of 800,000 would yield a value of .25 for the ***AE*** rate. All calculations should be done in local currency, except in the unusual case where an MFI quotes its interest rates in foreign currency.

1 The more rigorous—and much more challenging—method for calculating the interest rate required for financial sustainability is to build a spreadsheet planning model based on a careful monthly projection of an institution's financial statements over the planning period. CGAP has published such a model, *Using Microfin 3.0: A Handbook for Operational Planning and Financial Modeling*, CGAP Technical Tool No. 2 (Washington, D.C.: CGAP, September 2001), www.cgap.org.

2 To average a loan portfolio over a given period of months, the simple method is to take half the sum of the beginning and ending values. A much more precise method is to add the beginning value to the values at the end of each of the months, and then divide this total by the number of months plus one.

Administrative Expense Rate: The limited data now available suggests that MFIs tend to capture most of their economies of scale by the time they reach about 5,000–10,000 clients. Thus, a small, new institution like MicroFin might assume a future portfolio of this size when calculating the administrative expense component of its interest rate. Administrative expenses include all annual recurrent costs except the cost of funds and loan losses—e.g., salaries, benefits, rent, and utilities. Depreciation allowance (provision for the cost of replacing buildings or equipment) must be included here. Also include the value of any donated commodities or services—e.g., training, technical assistance, management—which the MFI is not paying for now, but which it will have to pay for eventually as it grows independent of donor subsidies. Administrative expenses of efficient, mature institutions tend to range between 10%–25% of average loan portfolio.

MicroFin's average outstanding loan portfolio last year was 300,000. It paid cash administrative expenses of 90,000, equal to 30% of average portfolio. However, in fixing an interest rate which will allow future sustainability, MicroFin must also factor in depreciation of its equipment (which will eventually have to be replaced), as well as Carmen's salary as general manager. (A donor agency is currently paying this cost directly, but this is not a permanent arrangement.) When Carmen adds in these costs, last year's administrative expense turns out to have been 50% of average portfolio.

Carmen has not yet been able to do a rigorous financial projection of MicroFin's future administrative costs. In the meantime, for purposes of this pricing exercise she estimates administrative expenses at 25% of portfolio, based on various factors. (1) MicroFin plans to grow far beyond its present clientele of 1,000, and expects to be able to add loan officers without corresponding increases in head office and support personnel. (2) MicroFin expects its average loan size to increase, especially as its growth rate slows down, because its methodology involves gradual increases in size of individual loans. (3) MicroFin has identified a mature MFI whose loan methodology and salary levels are similar to its own, and learns that this institution is running with administrative costs well below 25% of portfolio. Carmen hopes that MicroFin will be below the 25% level quite soon, but uses this estimate to be conservative. Thus, ***AE* = *25%*** in the pricing formula.

Loan Loss Rate: This element is the annual loss due to uncollectible loans. The loan loss rate may be considerably lower than the MFI's delinquency rate: the former reflects loans that must actually be written off, while the latter reflects loans that are not paid on time—many of which will eventually be recovered. The institution's past experience will be a major factor in projecting future loan loss rates.[3] MFIs with loan loss rates above 5% tend not to be viable. Many good institutions run at about 1–2%.

Thus far in its short history, MicroFin has had loan write-offs equal to less than 1% of its average portfolio. Nevertheless, Carmen and her team decide to assume a loan loss rate (***LL***) of ***2%*** for this pricing exercise, because they know that MicroFin's rapid portfolio growth creates a statistical tendency to understate the true long-term loan loss rate.

Cost of Funds Rate: The figure computed here is not the MFI's *actual* cash cost of funds. Rather, it is a projection of the future "market" cost of funds as the MFI grows past dependence on subsidized donor finance, drawing ever-increasing portions of its funding from commercial sources. The computation begins with an estimated balance sheet for a point in the medium-term future, broken out as follows:

ASSETS:	LIABILITIES:
Financial—Liquid Assets[4]	**Deposits**
Cash	**Loans**—Concessional
Investments	—Commercial
—Loan Portfolio	
Fixed—Bldg/Equipment	EQUITY:

3 Loans with any payment overdue more than a year should probably be treated as losses for this purpose, whether or not they have been formally written off.

4 In the absence of any other basis for projecting, assume liquid assets totaling 20–25% of loan portfolio.

Simple Method: For a rough approximation of the "shadow" price of funds, multiply financial assets[5] by the *higher* of (a) the effective rate which local banks charge medium-quality commercial borrowers, or (b) the inflation rate which is projected for the planning period by some credible (usually this means non-governmental) source. Then divide this result by the projected loan portfolio.

Better Method: For a somewhat more precise result, a "weighted average cost of capital" can be projected by distinguishing the various sources that are likely to fund the MFI's financial assets in the future. For each class of funding (deposits, loans, equity), estimate the absolute amount of the MFI's annual cost.

For all ***loans*** to the MFI, use the commercial bank lending rate to medium-quality borrowers. Even low-interest donor loans should be treated this way: then the MFI's lending rate will be set high enough so that it won't have to be raised further when soft donor loans diminish to relative unimportance in the MFI's funding base.

For ***deposits*** captured by an MFI with a license to do so, use the average local rate paid on *equivalent* deposits, plus an allowance for the additional administrative cost of capturing the deposits (i.e., administrative costs beyond the costs reflected above as Administrative Expenses for the credit portfolio).[6] This additional administrative cost can be quite high, especially in the case of small deposits.

Equity, for purposes of this cost-of-funds calculation, is the difference between financial assets (not total assets) and liabilities—in other words, equity minus fixed assets. The projected inflation rate should be used as the cost factor, since inflation represents a real annual reduction in the purchasing power of the MFI's net worth.

Calculate the total absolute cost by adding together the costs for each class of funding. Divide this total by the Loan Portfolio to generate the cost of funds component (***CF***) for the Pricing Formula above.

Last year, MicroFin maintained very little of its financial assets in liquid form: cash and investments averaged only 10% of the loan portfolio. However, Carmen now realizes that this level is imprudently low, and decides to project that liquid assets will be kept at 25% of portfolio, pending further analysis. These liquid assets include cash and income-earning investments. Picking a period three years from now, MicroFin projects that its average ***assets*** of 2,400,000 will include ***financial*** assets of 1,600,000 (portfolio) and 400,000 (cash, investments, and reserves). ***Non-financial*** assets (mainly premises and equipment) are projected at 400,000. Turning to the right side of the balance sheet, MicroFin expects these assets to be funded by 1,400,000 in ***liabilities***—including 600,000 in voluntary deposits, a 300,000 donor loan at a very soft rate of interest, and a 500,000 commercial bank loan—and by its ***equity*** of 1,000,000, equivalent to its donations minus its operating losses to date. Here is MicroFin's projected balance sheet. (Note that it is the *proportion* among these balance sheet items, rather than their absolute *amount*, which drives the pricing formula.)

ASSETS:		**LIABILITIES:**	
Cash	200,000	Deposits	600,000
Investments	200,000	Donor Loan	300,000
Loan Portfolio	1,600,000	Bank Loan	500,000
Bldg./Equipment	400,000	**EQUITY:**	1,000,000
	2,400,000		2,400,000

Local banks pay 10% on deposits of the type that MicroFin plans to mobilize. Carmen estimates that mobilizing these deposits will entail administrative costs of another 5% over and above the costs projected above for administering her loan portfolio. Thus, the annual cost of her projected deposits will be 600,000 x .15 = ***90,000.***

The cost of a commercial-bank loan to a medium-quality borrower is 20%. For the reason indicated above, MicroFin uses this rate to cost both of its projected loans, even though the actual cost of the donor loan is only 5%. The price for these loans, assuming that they were funded from commercial sources, would be (300,000 + 500,000) x .20 = ***160,000.***

The equity amount considered in this part of the calculation is only 600,000 (financial assets minus liabilities). This equity is priced at the projected inflation rate of 15%. The annual cost of this component of the funding is 600,000 x .15 = ***90,000.***

Dividing the combined cost of funds for debt and equity (90,000 + 160,000 + 90,000=360,000) by the Loan Portfolio (1,600,000) gives a weighted cost of funds of about ***21%,*** which Carmen will enter as the ***CF*** component in the Pricing Formula.

5 Funding for fixed assets is excluded from these cost-of-funds calculations without much distortion of the result, since fixed assets' appreciation in value—in line with inflation—more or less approximates the cost of the funds which finance them.

6 Administrative costs associated with deposits can be omitted from this part of the formula ***if*** they were included earlier under Administrative Expense (AE). Either way, it is crucial to recognize that mobilization of deposits, especially small deposits, requires some level of administrative resources over and above those required to manage the loan portfolio.

Capitalization Rate: This rate represents the net *real* profit—over and above what is required to compensate for inflation—that the MFI decides to target, expressed as a percentage of average loan portfolio (not of equity or of total assets). Accumulating such profit is important. The amount of outside funding the MFI can safely borrow is limited by the amount of its equity. Once the institution reaches that limit, any further growth requires an increase in its equity base. The best source for such equity growth is internally generated profits. The rate of real profit the MFI targets depends on how aggressively its board and management want to grow. To support long-term growth, a capitalization rate of at least 5–15% of average outstanding loan portfolio is arguably advisable.[7]

(If an MFI plans to incorporate under a taxable legal structure, it should include an allowance for taxes at this point.)

MicroFin's cost-of-funds projection above posited a liabilities-to-equity ratio of 7-to-5. MicroFin is not likely to find commercial lenders who will be comfortable with a ratio much higher than that (at least until it obtains a license as a bank or other regulated intermediary). Thus, once MicroFin exhausts its donor sources, any increase in its portfolio will require a proportional increase in its equity. If the institution wants to target portfolio growth of, say, 25% per year, then it must increase its equity by this same percentage.[8] Since MicroFin's portfolio is projected to be 1.6 times equity, the interest income needed to raise real equity by 25% is .25 / 1.6, giving us a capitalization rate (***K***) of about ***16%*** of loan portfolio.

Investment Income Rate: The final element to be included in the pricing equation—as a deduction, in this case—is the income expected from the MFI's financial assets other than the loan portfolio. Some of these (e.g., cash, checking deposits, legal reserves) will yield little or no interest; others (e.g., certificates of deposit) may produce significant income. This income, expressed as a decimal fraction of loan portfolio, is entered as a deduction in the pricing equation.

MicroFin's projected Liquid Assets include cash (200,000) and investments (200,000). Assuming that the cash produces no income, and that the investments yield 12%, then investment income ***(II)***, is 24,000, or ***1.5%*** of portfolio.

The Computation: Entering these five elements into the pricing equation produces the annual interest yield the MFI needs from its portfolio.

The pricing formula, again, is

$$R = \frac{AE + LL + CF + K - II}{1 - LL}$$

Carmen has projected administrative expense ***(AE)*** = .25; loan loss ***(LL)*** = .02; cost of funds ***(CF)*** = .21; capitalization rate ***(K)*** = .16; and investment income ***(II)*** = .015. Plugging these values in the pricing formula gives her

$$\frac{.25 + .02 + .21 + .16 - .015}{1 - .02} = .638$$

Thus, Carmen finds that MicroFin needs an annual interest yield of about 64% on its portfolio.[9]

She is acutely aware that some of the assumptions that went into her calculation were rough estimates, so she will review her loan pricing regularly as MicroFin accumulates more experience. By next year, she hopes to have in place a more sophisticated model for month-by-month financial projection of MicroFin's operation over the next 3–5 years. Reviewing quarterly financial statements derived from such a projection will be a much more powerful management tool than the present exercise.

7 The formula in this paper generates the interest rate which will be required when the MFI moves beyond dependence on subsidies. An MFI that wants to reach commercial sustainability should charge such an interest rate even though it may be receiving subsidized support over the near term. Note that as long as an MFI is receiving significant subsidies, its net worth will actually grow faster than the "capitalization rate" projected here, because the computations in this paper do not take into account the financial benefit of those subsidies.

8 MFIs often grow much faster than 25% per year. However, rapid growth can bring serious management problems, especially as the institution moves beyond the 5,000–10,000 client range.

9 Readers who find themselves troubled at the thought of burdening poor clients with such an exorbitant interest rate are asked to suspend judgement until reviewing Section C at the end of this paper.

B. Calculating Effective Interest Rates

Carmen wants to position MicroFin for sustainable growth, based largely on commercial funding sources. In the previous section, she estimated that the MicroFin portfolio would have to yield income at a rate of about 64% per year to make this possible. Her next question is how to structure MicroFin loan contracts to achieve that level of yield.

A microcredit interest rate quoted at (for instance) 3% per month may be equivalent to a much higher "effective" monthly rate, depending on how the loan and its repayment are structured. The real cost to the borrower, and the lending institution's real income from its loan portfolio, can be raised significantly by practices, such as:

- Computing interest on the original face amount of the loan, rather than on the declining balances that actually remain in the borrower's hands as successive installments of principal are repaid (the former method is called a "flat" interest charge);
- Requiring payment of interest at the beginning of the loan (as a deduction from the amount of principal disbursed to the borrower), rather than spreading interest payments throughout the life of the loan;
- Charging a "commission" or "fee" in addition to the interest;
- Quoting a monthly interest rate, but collecting principal and interest weekly, counting four weeks as a "month"; or
- Requiring that a portion of the loan amount be deposited with the lender as compulsory savings or a compensating balance.

As used here, the "effective" interest rate of a particular loan contract is the rate that a client is really paying, based on the amount of loan proceeds actually in the client's hands during each period of the life of the loan. It is equivalent to a rate calculated on a declining balance basis.[10]

A basic financial calculator is sufficient to handle the necessary computations.[11] The user enters the known loan variables, and the calculator computes the remaining variable:

PV Present Value, the net amount of cash disbursed to the borrower at the beginning of the loan

i Interest Rate, which must be expressed in the same time unit as **n**, below

n Term, or number of periods, of the loan

PMT Payment made each period[12]

FV Future Value, the amount left in the client's hands after the loan is repaid, which is usually zero except in the case of a loan with a forced savings component

The illustrations below include a Base Case and seven Alternatives. In the Base Case, where interest is calculated on declining balances, the calculator is used to determine the necessary monthly payment amount. Each of the Alternatives involves two steps. First, the actual

10 In standard financial usage, the impact of compounding is included in calculating an annual "effective" rate: e.g., if I pay 3% every month, the effective annual rate is not 36% (12 x .03), but rather 42.6% ($1.03^{12} - 1$). This latter "compounded" rate is the appropriate one to use when the purpose is comparison of the real cost to a borrower of different interest rate structures, especially when different time periods are involved.

But in this note, when a weekly or monthly rate is annualized, an "Annual Percentage Rate"(APR) method is used, i.e., compounding is *not* taken into account. This produces an annual interest yield that is more in line with the actual income generated by an institution's portfolio; e.g., a portfolio whose effective monthly yield is 3%—almost all of which is used to pay costs rather than being reinvested—will generate about 36% of income per year, not 42.6%. It is important to note that delinquency and other factors can reduce the actual yield on a portfolio well below the APR being charged on the loans which make up that portfolio.

11 Alternatively, the computations can be performed using the financial functions of a computer spreadsheet application such as Excel or Lotus 1-2-3. The CGAP web site contains a spreadsheet model for doing such calculations (www.cgap.org/assets/yieldcal.xls).

12 Microloans are usually structured so that the borrower's payment is the same each period. Where the payment amount changes from one period to another (e.g., because of a grace period), the computation requires a calculator with an Internal Rate of Return function, or a computer spreadsheet.

cash flows received and paid by the client are computed. Next, those cash flows are entered into the calculator to determine the effective rate per period, which is then annualized by multiplying by the number of periods in a year.

BASE CASE — Declining Balance: Loan amount is $1,000, to be repaid in 4 equal monthly payments of principal and interest. Stated interest rate is 36% per year, or 3% per month, calculated on declining balances—i.e., the interest is charged only on the amount of the loan principal that the borrower has not yet repaid. In this base case, the effective monthly interest rate is the same as the stated rate.

> Compute Monthly Payment: PV = 1000; n = 4; i = 36 ÷ 12 = 3. Solving for PMT yields a monthly payment of 269.03.

ALTERNATIVE 1 — Up-Front Interest Payment: same as Base Case (interest calculated on declining balances), except that all interest is charged at the beginning of the loan.

> Compute Cash Flows: Total payments of principal plus interest in the Base Case were 1076.12 [269.03 x 4]. Subtracting 1000 of principal gives total interest of 76.12. Since this is paid up front, it is for all practical purposes deducted from the loan disbursement, leaving the borrower with a net cash disbursement of 923.88 [1000 – 76.12]. Monthly payments are principal only, in the amount of 250 [1000 ÷ 4].
>
> Compute Effective Interest Rate: PV = 923.88; PMT = –250;[13] n = 4. Solving for i yields an effective monthly rate of 3.24%, which is multiplied by 12 for an Annual Percentage Rate (APR) of 38.9%.

ALTERNATIVE 2 — Initial Fee: Same as Base Case, except that a 3% loan commission is charged up front.

> Compute Cash Flows: Net actual disbursement to the borrower is 970 [1000 – commission of 30]. Monthly payments are 269.03, as calculated in Base Case.
>
> Compute Effective Interest Rate: PV = 970; PMT = –269.03; n = 4. Solving for i yields an effective monthly rate of 4.29%, which is multiplied by 12 for an APR of 51.4%.

ALTERNATIVE 3 — Weekly Payments: same as Base Case, except that four months' worth of payments are paid in sixteen weekly installments.

> Compute Cash Flows: Total payments of 1076.12 [269.03 x 4] are broken into weekly payments of 67.26 [1076.12 ÷ 16].
>
> Compute Effective Interest Rate: PV = 1000; PMT = –67.26; n = 16. Solving for i yields an effective weekly rate of 0.88%, which is multiplied by 52 for an APR of 45.6%.

ALTERNATIVE 4 — Flat Interest: Same as Base Case, except that "flat" interest is calculated on the entire loan amount, rather than on declining balances, and is prorated over the four monthly payments.

> Compute Cash Flows: Total interest is 120 [1000 x 3% x 4 mos.]. Total principal plus interest is 1120 [1000 + 120], or 280 each month [1120 ÷ 4].
>
> Compute Effective Interest Rate: PV = 1000; PMT = –280; n = 4. Solving for i yields an effective monthly rate of 4.69%, which is multiplied by 12 for an APR of 56.3%.

ALTERNATIVE 5 — Flat, with Up-Front Interest: Same as Alternative 4 (each period's interest is calculated on entire loan amount), except that all the interest is paid up front at the beginning of the loan.

> Compute Cash Flows: Total interest is 120, paid upon loan disbursement. Thus, the borrower's actual net disbursement is 880 [1000 – 120]. Monthly payments of principal are 250 [1000 ÷ 4].
>
> Compute Effective Interest Rate: PV = 880; PMT = –250; n = 4. Solving for i yields an effective monthly rate of 5.32%, which is multiplied by 12 for an APR of 63.8%.

13 On most financial calculators, present value and payment must be entered with opposite signs: i.e., if PV is positive, PMT must be negative, or vice versa.

ALTERNATIVE 6 — Flat, with Up-Front Interest and Fee: Flat interest is charged on entire loan amount; total interest plus a 3% commission is collected up front, at the time of loan disbursement.

Compute Cash Flows: Total interest is 120 [1000 x 3% x 4 mos.]. Net actual disbursement to client is 850 [1000 – interest of 120 – commission of 30]. Monthly payments are 250 [1000 ÷ 4].

Compute Effective Interest Rate: PV = 850; PMT = –250; n = 4. Solving for i yields an effective monthly rate of 6.83%, which is multiplied by 12 for an APR of 82.0%.

ALTERNATIVE 7 — Compulsory Savings: Same as Base Case, except that as a condition of the loan the client is required to make a savings deposit of 50 along with each month's payment. The savings account yields interest of 1% per month, uncompounded, and is available to the client for withdrawal at any time after the end of the loan.

Compute Cash Flows: The disbursement to the borrower is 1000. Monthly payments are 319.03 [269.03 p + i as calculated in Base Case, plus savings deposit of 50]. At the end of the loan, the savings account yields the client a future value of 203 [200 in deposits plus interest of 0.50 for the second month (during which the savings account has a balance of 50), 1.00 for the third month (during which the account has a balance of 100), and 1.50 for the fourth month (during which the account has a balance of 150)].

Compute Effective Interest Rate: PV = 1000; PMT = – 319.03; n = 4; FV = 203. Solving for i yields an effective monthly rate of 3.26%, which is multiplied by 12 for an APR of 39.1%. *This rate is the yield on the net amount of cash actually in the client's hands. To estimate its annual income, an MFI would apply this rate to a "net" portfolio consisting of loan balances outstanding minus forced savings deposits.*

NOTE: This alternative and the following one assume that the MFI itself receives and holds the compulsory savings. In such a case, the yield to the MFI and the cost to the client are the same.

If the compulsory savings are held by someone other than the MFI (e.g., a bank), then the amounts deposited should not enter into the computation of yield to the MFI. However, these deposits do enter into a calculation of the loan's effective cost to the client. In this latter case, it can be instructive to calculate and compare the client's cost and the MFI's yield. One sometimes finds that forced savings regimes of this type produce an elevated effective cost to the client, significant portions of which are not captured as yield by the MFI.

ALTERNATIVE 8 — Flat, with Up-Front Interest and Fee, and Compulsory Savings: Same as Alternative 6, except that the client is required to make a savings deposit of 50 along with each month's payment. The savings account yields interest of 1% per month, uncompounded, and is available to the client for withdrawal at any time after the end of the loan.

Compute Cash Flows: Total interest is 120 [1000 x 3% x 4 mos.]. Net actual disbursement to client is 850 [1000 – interest of 120 – commission of 30]. Monthly payments are 300 [prin. of 1000 ÷ 4 , plus savings payment of 50]. At the end of the loan, the savings account yields the client a future value of 203 [200 in deposits plus interest of 0.50 for the second month (during which the savings account has a balance of 50), 1.00 for the third month (during which the account has a balance of 100), and 1.50 for the fourth month (during which the account has a balance of 150)].

Compute Effective Interest Rate: PV = 850; PMT = –300; n = 4; FV = 203. Solving for i yields an effective monthly rate of 7.67%, which is multiplied by 12 for an APR of 92.0%.

Carmen Crediticia wants the MicroFin loan portfolio to produce an interest yield of about 64% per year. Armed with her financial calculator and her knowledge of her borrowers, she determines that she can structure income at about this 64% level by offering loans at a nominal interest rate of 3% a month, with four months' worth of interest (calculated on the full original loan principal) deducted at the beginning from the amount of the loan disbursement, and principal repaid in four equal monthly installments.

The table below illustrates how wide a range of yields can be produced by loans with the same nominal (stated) rate, depending on how charges and payments are structured.

	ANNUALIZED INTEREST YIELD				
	Base Case	Alternative 4	Alternative 5	Alternative 6	Alternative 8
Stated Monthly Rate	Interest charged on declining balances, 4 equal monthly payments	"Flat" interest charged on initial balance, prorated over 4 monthly pmts	"Flat" interest charged on initial balance, deducted from loan disbursement	"Flat" Interest (on initial bal.) and 3% commission deducted from loan disbursement	Same as Alt. 6, with forced saving of 50% added to each payment, and 1% per mo. paid on savings
1.0%	12.0%	19.0%	19.8%	35.6%	38.9%
1.5%	18.0%	28.5%	30.3%	46.6%	51.5%
2.0%	24.0%	37.8%	41.0%	58.0%	64.5%
2.5%	30.0%	47.1%	52.2%	69.8%	78.0%
3.0%	36.0%	56.3%	63.8%	82.0%	92.0%
3.5%	42.0%	65.5%	75.8%	94.7%	106.6%
4.0%	48.0%	74.6%	88.3%	108.0%	121.8%
4.5%	54.0%	83.6%	101.3%	121.7%	137.6%
5.0%	60.0%	92.6%	114.8%	136.1%	154.2%
5.5%	66.0%	101.5%	128.8%	151.1%	171.4%
6.0%	72.0%	110.4%	143.5%	166.7%	189.5%

Discrepancies between Interest Yield Calculations and Accounting Systems

The interest rate calculations illustrated in this section are based on the time value of money functions found on a financial calculator or a computer spreadsheet application. Such calculations produce a good picture of the real cost each period to the client. However, in certain cases, such as up-front commissions or interest, flat interest computation, or forced savings, these functions treat cash flows in a way which is different from the treatment of the same cash flows in an MFI's accounting system. In such cases, the yield computed by the financial calculator will differ from the yield shown on the MFI's books.

For instance, in Alternative 2 (1,000 loan principal, 3% **up-front fee**) the initial cash flow is treated as a single net disbursement of $970, whereas the MFI's accounting system will reflect the same transaction as an increase of 1,000 in portfolio, and of 30 in interest income. The average portfolio will be slightly different under the two treatments, and thus there will be a small discrepancy in the calculation of the interest yield. The text illustrates a similar minor discrepancy in the case of **flat interest computations**

More serious discrepancies can result in the case of **forced savings** arrangements. As touched on in Alternative 7, the calculation in the text is based on "net" cash flows that combine offsetting loan and savings flows, while the MFI's books will keep these flows separate.

In the rare cases of **up-front interest**, where an MFI collects all of the interest on a loan at the time of disbursement, a large discrepancy can result. In Alternative 5, the interest of 120 is offset against principal disbursement of 1,000 so that the initial cash flow is only 880, resulting in an APR of 63.8%. On the MFI's books, the loan's principal will start out at 1,000 rather than 880; furthermore, the interest income will be recognized gradually over the course of the loan, if the MFI is accounting on an accrual basis. With this treatment, the accounting yield will be only 57.6%.

In cases like these, a precise expected accounting yield can be projected by laying out the cash flows of a representative loan exactly as they will be reflected on the MFI's books, and then dividing the interest received by the average principal balance outstanding. This can be important in doing yield gap analysis—that is, comparing the actual income which has been booked during a period with the amount that should have been booked according to the terms of the loan contracts.

The CGAP web site (www.cgap.org/assets/yieldcal.xls) contains a spreadsheet model for doing such calculations.

A Note on Flat-Rate Computations

When computing effective interest rates in the above examples, the financial calculator uses a consistent method to determine the outstanding principal balance at any point in the loan. Out of each payment, the calculator computes the amount needed to cover the interest on the previous period's balance. Then, it assigns the remainder of the payment to principal, thus reducing the loan balance for the next period. Under this method, the *proportional division of each payment between interest and principal changes* over the life of the loan. During the earlier payments, the outstanding loan balance is relatively large: thus the portion of the payment devoted to interest is relatively large, and the amount devoted to reducing principal is relatively small. In the later stages of the loan, this situation is reversed.

MFIs which charge interest on a flat-rate basis usually follow a different procedure. For the sake of simplicity, they assume that the division between principal and interest is the same for every payment. In Alternative 4 above, the MFI charges 3% flat interest per month on a 4-month loan of 1,000. The total to be paid by the client is 1,120, split between principal of 1,000 and interest of 120 (3% x 4 months x 1,000). Dividing this total by the number of payments produces a monthly payment of 280. On its books, the MFI would probably allocate 250 of each month's payment to principal [1,000 ÷ 4], and 30 to interest [120 ÷ 4].

When the MFI uses this method to account for its outstanding loan portfolio, the average outstanding balance of its portfolio will be slightly lower than the calculator's method would have produced, because the MFI is reducing the principal balance on early payments faster than the calculator would have. Because this method shows a slightly lower average outstanding portfolio, the interest income will represent a slightly higher percentage in comparison with that portfolio.

This difference can be illustrated in the case of Alternative 4. The calculator computed an effective monthly rate of 4.69%. Implicit in its computation was the following schedule of loan balances:

During the 1st month	1,000.00
During the 2nd month	766.92
During the 3rd month	522.91
During the last month	267.45
Average over life of loan:	639.32

Dividing interest received by the average outstanding balance over the life of the loan, and further dividing that result by four months, gives a monthly effective rate of [120 ÷ 639.32 ÷ 4] = 4.69%.

But if the MFI assigns exactly 1/4 of the principal (250) to each payment, the outstanding balances are as follows:

During the 1st month	1,000.00
During the 2nd month	750.00
During the 3rd month	500.00
During the last month	250.00
Average over life of loan:	625.00

Performing the same computation as above, we have [120 ÷ 625 ÷ 4] = 4.80%. As predicted, the effective yield on the MFI's portfolio appears slightly higher because its accounting method produces a slightly lower average outstanding portfolio.

Why Bother With These Interest Rate Calculations?

The most immediate and obvious use of these computations has already been indicated: if an MFI has determined (e.g., by working through Section A of this note) that it needs an annualized effective yield of 64% to cover its costs and fund its growth, then the calculations in Section B show it how much its current rate structure should be yielding, and guide any adjustment of that rate structure that may be necessary.

Secondly, these methods can be useful when an MFI needs to raise its effective yield without raising its stated loan rate—for instance in an environment with legal limits on stated loan interest rates.

There is a third use for these calculations that is less obvious but quite important. Once an MFI knows how much interest income its portfolio should theoretically be yielding, it can compare this *expected* yield with *actual* interest income shown on its books. Sometimes a large gap appears. Such a gap can result from various factors, such delinquency, delay in depositing payments, fraud, or accounting failures. Discussion of how these and other factors might produce an interest rate gap is beyond the scope of this note. However, if management identifies a substantial gap, it must investigate thoroughly until the cause is identified and if necessary corrected.

C. The Theory and Practice of "Exorbitant" Interest Rates

The prospect of charging a 64% annual interest rate troubles Carmen and her Board of Trustees. Their first concern is the feasibility of such a rate: ***can*** MicroFin charge this much—i.e., how much will the market bear? But they also have ethical concerns: ***should*** they burden their poor clients with a rate this high, even if most borrowers are willing and able to pay it?

1. CAN Microborrowers Pay High Interest Rates?

There is overwhelming empirical evidence that huge numbers of poor borrowers can indeed pay interest rates at a level high enough to support MFI sustainability.

- Informal credit markets already exist in most poor communities. One typically finds lower-income borrowers taking and repaying repeated informal loans at interest rates much higher than any formal MFI would charge.[14]

- Some MFIs make loans to women grouped into "village banks." The women's obligatory savings often remain within their group as an "internal account" that they can lend out to each other on whatever terms they wish. When such an arrangement prevails, the women commonly charge each other an interest rate that is substantially higher than what the MFI charges on its loan to the village bank.

- MFIs charging very high interest rates almost always find that demand far outstrips their ability to supply it. Most of their customers repay their loans and return repeatedly for new loans: this pattern demonstrates the customers' conviction that the loans allow them to earn more than the interest that they have to pay. This phenomenon does not appear to be restricted to particular regions or countries.

- For the past ten years, the author of this paper has been asking in conferences, courses, and (more recently) Internet newsgroups whether anyone present has ever heard of a microfinance program that ran into trouble by driving away clients with interest rates that were too high. No one has yet pointed to a single example. This remarkable piece of data does not indicate that there is no limit to the interest ratees that the microcredit market can bearr, but it does suggest that the limit is probably considerably higher than what even the more aggressive MFIs are predently charging.

Thus, there is abundant proof that poor people's tiny businesses can often pay interest rates that would strangle a larger business. Still, this proposition strikes many as confusingly counterintuitive. There are several approaches to making it more intelligible.

Let us begin with the case of a Bolivian woman who sells merchandise from a blanket that she spreads every day on a street in La Paz. Her sales, and thus her income, are directly proportional to the time she is sitting on the street, offering her goods. Because of her shortage of working capital, she spends two hours of each ten-hour workday traveling to purchase supplies from her wholesaler, whose warehouse is outside the city. These two hours produce no sales or income for her. If a working capital loan allows her to buy inventory for three days at a time instead of one, she can save eight hours in travel time each six-day week. This translates into a 17% increase in selling time, and thus in her sales, every week. If the amount of the working capital loan is double her daily sales, and her gross profit is 25% of sales, then she could afford to pay 40% a month on the loan and still come out slightly ahead. A loan from an MFI at, say, 5% per month would be immensely advantageous to her.

The economists' law of diminishing returns provides a more general explanation of the phenomenon of poor people who can pay high interest rates. Any economic actor has a wide variety of uses to which (s)he could put additional "packets" of capital. Some of these uses can be expected to produce a very high return; others are

14 The highest MFI interest rate observed by the author was a monthly effective rate of 10.1% charged by a village banking program in Mexico during a period when inflation hit 52% a year. Various studies report rural moneylender rates in Mexico as high as 25–30% per month during periods of much lower inflation. Cf. Catherine Mansell Carstens, *Las Finanzas Populares en Mexico* (Mexico City: Editorial Milenio, 1983), 81.

likely to produce a lower return. Imagine a hypothetical woman who has a dozen investment possibilities, each of which would require exactly $100, and each of which produces a different level of return. Further, assume that she begins with no cash whatsoever. If she suddenly receives $100, she will look through her range of investment possibilities and spend her money on the one that offers the very highest return. If she receives a second $100 packet, she will look through the remaining eleven possibilities, and choose the best return out of this group (none of which will be as attractive as the one on which she spent her first $100). Each time she receives an additional packet of $100, her investment choice will be less attractive than any of her previous choices. This example is highly stylized, but it does illustrate the tendency for returns to diminish as each additional unit of capital is added to the equation, all other things being equal. In other words, General Motors cannot pay as high an interest rate on the next dollar it borrows as can a poor microentrepreneur, because GM already has a lot of capital, and has already "used up" the most profitable investment options available to it. Compared to GM, the microentrepreneur can often wring greater relative benefit from additional units of capital, precisely because she begins with so little capital. And because she can use this capital more profitably, she can pay a higher interest rate and still come out ahead.

Another useful perspective on this issue emerges when we look at microborrowers' interest costs in the context of their overall income and expense. Castello, Stearns, and Christen report such an analysis on a sample of MFI borrowers in Chile, Colombia, and the Dominican Republic. These borrowers were paying relatively high effective interest rates, averaging 6.3% per month. But these interest payments made up a tiny fraction of their overall costs, ranging from 0.4% to 3.4%.[15]

This kind of analysis makes it easier to understand the oft-repeated assertion that for poor entrepreneurs, *access* to finance tends to be a much more important issue than the *cost* of that finance.

2. SHOULD Microfinance Institutions Charge High Interest Rates?

The preceding section reviewed the ample evidence that many poor people can pay, and therefore MFIs can charge, rates of interest that are much higher than the rates that commercial banks charge to their usual customers. Moreover, it attempted to explain why this result is not particularly surprising. But given that MFIs can charge such rates, the question remains whether they should. Most MFIs are lodged in grant funded non-governmental organizations whose overarching objective is helping the poor, not maximizing profits. And while many poor entrepreneurs can pay high interest rates, it is also clear that some cannot, and are thus excluded from programs that insist on charging interest high enough to cover all costs.

Some people treat this question as if it comes down to a value judgment: which do you care more about—poor people or profits (...or financial systems...or neoliberal ideology). To avoid any such confusion, let's assume that the only objective we care about is maximizing benefit to poor people. From this perspective, the argument for high interest rates is straightforward. In most countries, donor funding is a limited quantity that will never be capable of reaching more than a tiny fraction of those poor households who could benefit from quality financial services. We can hope to reach most of those households only if MFIs can mobilize relatively large amounts of commercial finance at market rates. They cannot do this unless they charge interest rates that cover the costs laid out in the first section of this note.

15 *Exposing Interest Rates: Their True Significance for Microentrepreneurs and Credit Programs* (Acción International, 1991), 12ff.

As a final thought experiment, we can return to the practical choice faced by Carmen Crediticia in setting MicroFin's interest rate. Leaving aside the 16% that she included for "capitalization" (i.e., profit to finance growth), Carmen's institution is incurring costs of over 45%. [16]

Carmen thinks about two potential customers. Mrs. A's business can produce a return of 100% on the capital she borrows. Mrs. Z's business will produce a return of only 20%. If Carmen prices MicroFin's loans at 45% to recover all her costs, Mrs. A will gladly borrow, because she makes a net gain of 55% (her 100% return minus the 45% interest she pays to MicroFin). Of course, Mrs. A would benefit even more from a lower rate, but this would limit MicroFin's ability to reach others like her.

Still, Carmen is troubled at the thought of charging a price that Mrs. Z can't pay. Mrs. Z may be even poorer than Mrs. A, and Carmen would very much like to help her. Suppose that such a concern leads Carmen to price MicroFin's loan at 15%. Mrs. Z can now participate, and earn a net gain of 5% (her 20% return on capital minus the 15% interest she pays to MicroFin). But to deliver this benefit to Mrs. Z, Carmen has incurred a net loss of 30% (her costs of 45%, less the 15% interest she receives). Reflecting on this, Carmen concludes that delivering a benefit of 5 at a cost of 30 is not an accomplishment to be particularly proud of. Furthermore, she worries that she might be encouraging Mrs. Z to stay in a relatively unproductive business.

Adding it all up, Carmen decides that if she wants to help Mrs. Z, there must be a better way to do it than delivering a subsidized credit. She accepts, with a certain humility, that microfinance is not the only way to attack poverty, and that it is a tool which is most powerful when it is put at the service of poor people *with good investment opportunities*. There are hundreds of millions of such poor people. The new microfinance technologies will never reach most of them unless MFIs price their services at levels that are sustainable, not only in the sense of permitting the survival of the MFI, but more importantly in the sense of permitting the MFI to mobilize commercial funds to pursue its social mission.

16 The Cost of Funds component that Carmen included in her pricing formula is a sort of "opportunity cost," which is higher than the actual cash cost that MicroFin is presently paying for its funds. Nevertheless, the calculated cost is a real one. It reflects the fact that MicroFin, by choosing to tie up its assets in microloans, is foregoing other benefits that these same funds might have produced for poor people.

This paper was written by **Richard Rosenberg**, Senior Advisor at CGAP, and has drawn liberally from Robert Peck Christen, ***Banking Services for the Poor: Managing for Financial Success,*** 1997 (available from ACCION International, 733 15th Street, NW, Suite 700, Washington, DC 10005, USA; tel: 202.393.5113; E-mail acciondc@hers.com). For the reader interested in a much more sophisticated financial projection model, CGAP has published a business planning software package and user's guide called *Using Microfin 3.0*, available on its web site at www.cgap.org

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