A Framework for the Analysis of the Performance and Sustainability of Subsidized Microfinance Organizations with Application to Bancosol of Bolivia and Grameen Bank of Bangladesh
Short Version

by Mark Schreiner

This is a short version of my doctoral dissertation in the Department of Agricultural Economics at the Ohio State University. My committee of Dr. Douglas H. Graham (chair), Dr. Claudio Gonzalez-Vega, and Dr. Mario Miranda have not reviewed this version.

Abstract

In the next ten years, society will spend more than $20 billion on microfinance organizations (MFOs). Are MFOs the best way to help the poor? Will donors see MFOs as a good development gamble? Will MFOs reward workers well? Will investors buy MFOs and start new ones from scratch? I suggest a framework to help answer these questions with numbers.

Performance is meeting goals. *Sustainability* is meeting goals now and in the long term. An MFO has six groups of stakeholders: society, the poor, poor customers, donors, workers, and investors. Each group constrains the rest. Each group has its own goals and thus its own measures of performance.

For society, a good MFO makes more social benefits than social costs.

For the poor, a good MFO is the best use of the funds in the budget earmarked to help the poor. It costs more to measure benefits than to measure costs. Cost-effectiveness analysis can help to judge whether unmeasured benefits could exceed measured costs.

For poor customers, a good MFO gets repeated use.

For donors, a good MFO uses public funds to attract market funds.

For the workers of an MFO, a good MFO means a good job. Such an MFO would not shrink if donors withdrew support.

For investors, good performance means a market return.

I use the framework with two of the best MFOs in the world, BancoSol in Bolivia and Grameen Bank in Bangladesh. I judge both to have been worthwhile. They used public funds to help the poor more than the marginal development project. The net present cost of BancoSol for the poor through 1987-1996 as seen in 1987 was about 6 cents per dollar year of debt produced. At Grameen, the net present cost to the poor through 1983-1994 as seen from 1983 was about $8 per year of membership produced.

The customers at both BancoSol and Grameen repeat, and the workers at the both banks have good jobs. BancoSol attracts market funds, and Grameen does not. This suggests that investors may buy the best MFOs once start-up costs are sunk. But investors do not start the best MFOs, and much less the worse MFOs, from scratch.

At least the best MFOs are worthwhile. The rest may still waste public funds meant to help the poor. Cost-effectiveness analysis is a cheap tool to help judge.

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α	Conversion factor for start and end stocks to average stock
AP	Accounting profit
β	Proportion of equity owned by public entities on behalf of the poor
B	Benefits
γ	Factor for timing of flows
c	Rate paid by an MFO on soft debt
δ	Discount rate
d	Benefit per dollar-year of deposits
D	Average soft debt
$D\cdot(1-m/c)$	Average free soft debt
$D\cdot(m-c)$	Discount on soft debt
DG	Direct grants
Div	Dividends
DX	Discount on expenses
E	Average equity
EG	Equity grants
EX	Exchange rate as dollars per unit of local currency
f	Flow
F	Accumulated flow
FF	Fresh subsidized funds in a year less true profit
γ	Discount factor for fresh funds less true profit less tax less dividends
i	Yield on lending
λ	Conversion factor for nominal to real flows
L	Leverage
LP	Average loan portfolio
$LP\cdot i$	Revenue from lending
m	Opportunity cost of soft debt for an investor
n	Index of time intervals
N	Number of time intervals per year
New	Number of new borrowers
OR	Other revenues without revenue from lending
Out	Number of borrowers outstanding
π	Rate of inflation
PC	Total paid-in capital
PC_{pri}	Paid-in capital from private entities
PC_{pub}	Paid-in capital from public entities on behalf of the poor
PG	Profit grants
PF	Public funds from budget earmarked for the poor
ρ	Opportunity cost of equity for the poor
r	Opportunity cost of equity for an investor
RG	Revenue grants
σ	Surplus per unit of output to offset cost to poor
S	Subsidy, or generic average stock
SF	Subsidized funds other than true profit
τ	Tax rate on true profit

θ	Conversion factor for nominal stock to real stock
t	Years from start of time frame
T	Years in time frame
TE	True expenses
TP	True profit
Y	Years of age of an MFO
ω	Discount factor for outputs naturally measured as flows

List of Acronyms

BRI	Bank Rakyat Indonesia
CBA	Cost-Benefit Analysis
CEA	Cost-Effectiveness Analysis
CPI	Consumer Price Index
DAS	Discounted Average Stock
DFI	Development Finance Institution
EVA	Economic Value Added
GAAP	Generally Accepted Accounting Principles
GNP	Gross National Product
IADB	Inter-American Development Bank
IAS	International Accounting Standard
IMF	International Monetary Fund
KK&K	Khandker, Khalily, and Khan
MFO	Microfinance Organization
NGO	Non-Government Organization
NPC_I	Net Present Cost for Investors
NPC_P	Net Present Cost for the Poor
NPW	Net Present Worth
OECD	Organisation for Economic Co-operation and Development
RC&H	Rosenberg, Christen, and Helms
ROE	Return On Equity
SAROE	Subsidy-Adjusted Return On Equity
SDI	Subsidy Dependence Index
USAID	United States Agency for International Development
YB&P	Yaron, Benjamin, and Piprek

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I thank you, the reader, for reading. I write for you. I hope not only that you will plow through pages of acknowledgments, but also that you will read the text, use the framework, and change it as needed. Our goal should be to improve the lot of the poor, perhaps through MFOs. The work is not done, and I thank you for comments sent to *schreiner.10@osu.edu*.

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Chapter 1: Introduction

"The harvest is plenty, but the laborers are few." Matthew 9:37

The first microfinance project I saw lent pregnant cows to eight elderly women in poor farm households in the mountains of the Dominican Republic near the border with Haiti. The goal was to help the women to establish formal credit and to repay the loan by the sale of the calf. The project also hoped that it would help the household and its neighbors to drink more milk and that it would spark microbusinesses that sold sweets made with milk.

Gant (1992) judged the project based on a brief survey. She did not measure benefits nor costs, and she was silent on repayment. She did report that all the old women liked the project but worried about their indebtedness.

Was the project worthwhile? Was it the best way to help these poor women? The report of Gant is sketchy but good; it admits it does not know. My goal is to set up a framework to check whether microfinance projects are the best way to help the poor.

This executive summary has five parts. First, I ask my main question and suggest an answer. Second, I tell why I want to answer this question. Third, I give my answers to the question for two of the best microfinance organizations (MFOs) in the world, BancoSol of Bolivia and Grameen Bank of Bangladesh. Fourth, I highlight the context of this framework and the new worth it adds. Fifth, I tell what comes next.

A. Questions and answers

Society funds MFOs since it wants to improve the lives of poor people. But the poor are plenty, and the public dollars are few. The poor ask: Is an MFO the best use of scarce development funds? I suggest that in practice the best way to answer this question is cost-effectiveness analysis.

Cost-benefit analysis (CBA) compares costs with benefits. In contrast, cost-effectiveness analysis (CEA) compares costs with outputs. CEA does not put a dollar value on outputs. CEA does tell, however, the amount of benefit per output that would cause benefits to exceed costs. If an MFO uses funds well, then it helps the poor more than the marginal development project.

Society encompasses all the people in the world. The choice to entrust public funds to an MFO affects society since taxes and subsidies change the whole market. The choice has a direct effect on the poor customers of an MFO. The choice also affects all of the poor since a choice to fund an MFO is a choice not to fund some other development project.

Society asks the valuation question: What is an MFO worth? An answer to this question will make it easier to start, buy, sell, and kill MFOs. To ask questions and to look for answers sparks better performance and cuts waste.

Performance is meeting a goal. The performance of an MFO affects at least six groups of stakeholders: society, poor customers, the poor, donors, workers, and investors (Table 1 on page 9). Each group has its own goals, and so each group asks its own questions about performance. In essence, each group asks whether it gets more benefits than costs from an MFO. Each group pursues its own goals, and this constrains how the rest of the groups can reach their goals.

I suggest quantitative measures that sum up performance from the point of view of each group. These measures offer less than full-blown CBA, but they also cost much less. No single measure answers all the questions of all the groups. In fact, no single measure fully answers any

single question of any single group. All I suggest is that an analyst would do well to use these measures first when in search of quick, cheap knowledge of the performance of an MFO.

Two quirks of microfinance prompt the use of CEA and the measurement of performance from the point of view of each group of stakeholders. The first quirk is that it costs much more to measure benefits than to measure costs. I suggest measuring costs but not to measure benefits and then to judge whether benefits could exceed costs.

The second quirk is that the goal of the poor conflicts with the goals of the other groups. The poor want to squeeze as much welfare as they can from the development budget. The other stakeholders have their own goals. This constrains what an MFO can do to help the poor.

My concern is performance from the point of view of the poor. Measures of performance from the points of view of the other groups of stakeholders matter since they can help to predict how each group will act. The analyst can then use this knowledge to improve the performance of an MFO from the point of view of the poor.

I assume that society chooses to fund development projects to help the poor since that is the best way to meet its goal. I do not discuss this goal nor whether development projects are the best way to meet it. A summary measure to replace social CBA is beyond my scope.

The poor customers of an MFO ask whether a loan or a deposit benefits them more than it costs. If poor customers borrow, repay as promised, and borrow again, then their benefits must exceed their costs. This also holds for poor customers who make deposits and keep them. People do what is good for them. Thus I suggest measuring performance from the point of view of customers as repeated use.

The poor ask whether an MFO is the best use of scarce development funds. The budget earmarked to help the poor is limited, so the poor want to check that they get as much as they can from each dollar. Measuring benefits costs a lot, but measuring costs does not. Thus I suggest measuring performance from the point of view of the poor with cost-effectiveness analysis (CEA), the cost to the poor per unit of output.

In a perfect world, donors would ask the same question as the poor, and CEA would answer it. Yet some donors may ask another question. These donors do not take the budget for development as given and then ask whether microfinance helps the poor more than another development project. Rather, these donors take funds for microfinance as given and ask whether an MFO helps the poor more than another MFO. These donors think the best way to meet this goal is to nourish MFOs that grow fast and that attract funds from the market. This may channel scarce development funds to the best MFOs, but it fulfills the goal of the poor only as long as an MFO is the best project. I suggest measuring performance from the point of view of donors as *market leverage*, the ratio of the output of an MFO to the public funds used by an MFO.

Workers use the funds entrusted to an MFO by owners. Workers include board members, managers, and line employees. Most workers are well-paid and enjoy the perk of helping the poor. Low-income countries have few jobs this good. If the MFO shrinks, then workers could lose their jobs and their chance to help the poor. If an MFO cannot earn enough from its business operations to pay its bills and to attract private capital without help from donors, then it will shrink in the long term. Donors can afford to be fickle since they do not bear the brunt of consequences of their choices. Thus access to support waxes and wanes with the whims of donors, and subsidized funds fade as fads fizzle. So workers ask whether an MFO could survive without help from donors. I suggest measuring performance from the point of view of workers as *financial self-sufficiency*, the ability to maintain the real value of subsidized funds trapped in equity while paying market prices for other funds.

Investors want to make money. Thus they ask whether an MFO would earn them a market return. I suggest measuring performance from the point of view of investors as *private profitability*, a return at least as high as that of investments of like risk.

I want to highlight three important links among these measures. First, an MFO could be good from the point of view of the poor without being good from any other point of view except that of poor customers. In most cases, however, strong performance from all points of view improves performance as seen by the poor. Second, poor customers can benefit from an MFO even though the poor as a whole or even though the poor customers themselves would benefit more if the funds in the MFO were shifted to some other project. Third, financial self-sufficiency for workers is less stringent than private profitability for investors. Once an MFO is financially self-sufficient, workers lose most selfish reasons to work for private profitability.

Good analysis of the performance of an MFO from the point of view of the poor will also look at performance from the points of view of the other groups of stakeholders. Each group depends on other groups to reach its goals. The web of agency relationships and their agency costs constrain the help an MFO can give to the poor.

In each link in the web, the principal (base of arrows in Figure 1 on page 4) does not have the same goal as the agent (tip of arrows). The principals cannot costlessly force the agents to do their will, so some funds meant to help the poor leak at each link. An analysis that looks at performance from all the points of view can lead to insights into cheaper ways to resolve the agency conflicts and thus to help the poor more.

B. Why answer these questions?

The cost of a subsidized MFO matters since the poor are plenty but the development dollars are few. Subsidizing an MFO is not bad unless subsidizing something else would help the poor more. The comparison of costs with outputs in CEA is a first step in the wise use of public funds. CBA gives better answers, but it costs too much.

Society checks whether an MFO is the best use of public funds since funds are scarce. Private firms also use scarce funds, but private firms have owners. In the absence of external effects, the owners get the gains and losses of the firm, so society can trust the owners to do their own CBA to make sure that they gain from their investment.

In contrast, most MFOs do not have this kind of owners. Subsidized MFOs get funds when governments, like Robin Hood, tax the rich in high-income countries and then, through donors, fund MFOs that serve poor people in low-income countries. Even if a donor buys shares in an MFO, it does not bet with its own money in the way an investor does. Donors can be owners in name but not in truth. At least in the short term, the reward a donor gets from its support for an MFO may not depend much on the performance of the MFO as seen by the poor.

In the end, the poor bear both the costs and the benefits of public funds used by an MFO. The poor customers of an MFO get the benefits, and they and the rest of the poor bear the costs since they all lose the help the funds would have caused in some other development project.

The problem is that the poor have no voice in the choice to fund an MFO. The gain or cost that trickles down to any one poor person is too small to be worth the fuss to check whether an MFO is the best development project.

The groups that bear the gains and the costs of an MFO do not choose to fund it. Hence CEA. Without it, no one knows whether funds for MFOs are wasted or worthwhile.

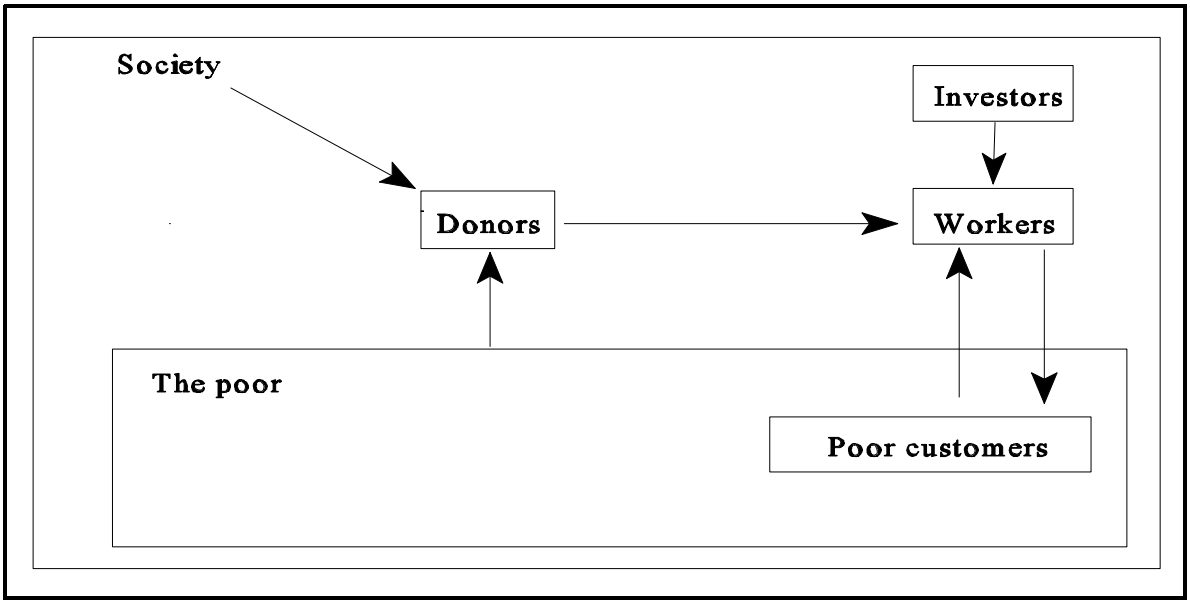

Figure 1: Agency relations among the six groups of stakeholders in an MFO

The scarce funds used by MFOs have an opportunity cost since they could be used to help the poor in other ways. The poor can use loans and deposits, but they can also use more and/or better food, water, health, clothes, houses, schools, tools, markets, or laws. The cost of an MFO is the road not taken.

For example, one rural development bank got subsidies of $85 million a year for four years (Yaron, Benjamin, and Piprek [YB&P], 1997). At a time when enrollment in grade school was low and the death rate of infants was high, this subsidy was one-fifth of the budget for basic education and dwarfed the $52 million spent per year on preventive health care. The bank may have used its subsidy well. But the poor still want to check whether the bank was the best project.

Microfinance is the newest darling of development. The number of MFOs has exploded in the 1990s. A 1996 survey of just 200 of the thousands of MFOs worldwide found 13 million loans worth $7 billion and 45 million deposit accounts worth $19 billion (Paxton, 1996).

In the next decade, more than $20 billion is planned to be budgeted to extend microfinance to 100 million of the poorest households in the world (*The Economist*, 1997a; RESULTS International, 1997). In the United States, House Bill 1129 would earmark $350 million in the next two years for MFOs in low-income countries (*New York Times*, 1997). Some groups even tout MFOs as a way to help U.S. welfare moms get themselves a job (*Wall Street Journal*, 1997a).

More than $20 billion is a lot of money. Does microfinance help the poor? I do not doubt it. But that is not the question. The question is: Does microfinance help the poor more than other ways? Right now, no one knows the answer since no one has compared measures of costs with measures of benefits or with measures of outputs. The goal of this framework is to suggest a disciplined way to check whether an MFO is a good use of scarce development funds.

Many people count the blessings of MFOs for poor customers. Few count the costs of MFOs for the poor as a whole. With no true owners, market feedback cannot discipline the use of public funds in MFOs. The people who work in microfinance—workers, politicians, donors, and scholars—stand to gain from its growth. These groups are small, organized, and vocal. At least in

the short term, their reward does not depend on how well an MFO helps the poor. The poor cannot trust these groups to check whether the crusade for MFOs siphons funds from better projects.

The poor stand to lose if microfinance goes wrong. This group is big, dispersed, and quiet. Some fear that the evangelists of microfinance spread a false gospel and will suck up most development funds even if MFOs are not the best way to help the poor in all cases (Buckley, 1997; Rogaly, 1996; Adams and Von Pischke, 1992). I do not know whether all the people who preach microfinance are selfless or not. I suspect they may be tempted not to be. Their good intentions pave a road to no-one-knows-where.

The need to defend the use of CEA might seem strange. Isn't it clear that subsidies should be justified with CEA if not with CBA? Yet no one has done it. Some have looked at costs. A few have done this well. Even more have looked at benefits. Even fewer have done this well. But I do not know of any good work that compares costs with benefits or even costs with outputs.

Are subsidized MFOs the best way to help the poor? My goal with this framework is to make a firm base for the start of reasoned talk on the answer to this question.

C. The answers for BancoSol and Grameen

BancoSol of Bolivia and Grameen Bank of Bangladesh have sparked much of the zeal for microfinance. As an example of the use of the framework, I look at their performance from the points of view of poor customers, investors, workers, donors, and the poor.

For the poor, good performance means that funds entrusted to an MFO buy more benefits less costs for the poor than some other project. I do not pretend to measure benefits. I just try to measure costs and then to compare them with outputs. I judge both BancoSol and Grameen to have been worthwhile for the poor.

From birth in 1987 until the end of 1996, the benefits of BancoSol for the poor exceeded the costs for the poor as long as the average borrower got more than 6 cents of surplus on the average dollar-year of debt. This seems likely to me.

From 1983 until the end of 1994, the benefits of Grameen for the poor exceeded the costs for the poor as long as the average member got more than $8 of surplus in each year. The required surplus per dollar-year of debt was 10 cents. Given the documented impact of Grameen, this seems likely to me.

For poor customers, good performance means repeated use. If customers did not expect to gain, then they would not repay debts, borrow more than once, nor hold deposits. An MFO could fool customers once, but not twice. In fact, few customers drop out of BancoSol or Grameen. This means BancoSol and Grameen improved the welfare of their poor customers.

For donors, good performance means market leverage. This squeezes the most output from funds earmarked for MFOs since it taps market funds to free scarce public funds for other uses. Grameen has had low market leverage. It has matched each discounted public dollar used for a year with less than one discounted dollar-year of debt lent to the poor. This has stayed the same through time. BancoSol has matched each discounted use of a public dollar for a year with more than two discounted dollar-years of debt lent to the poor. This has increased with time.

For workers, good performance means financial self-sufficiency. If workers can maintain the real size of the MFO, then they can save their jobs and help the poor. I do not think BancoSol would shrink if it lost its small amount of donor support. If Grameen lost support from donors and did not charge more for its loans, then it would shrink. But I would guess that Grameen could charge enough not to shrink without much harm to demand or to default. In any case, donors will

not abandon Grameen.

For investors, good performance means an MFO could earn them a higher return than firms of like risk. Investors would not find BancoSol nor Grameen privately profitable. Investors have not bought their shares, nor would investors want to start new MFOs like them from scratch. Investors do not join donors in the stampede to clone BancoSol and Grameen. They think that they could make more money somewhere else.

The example of the framework as applied to BancoSol and Grameen leads to four insights. First, repeated use shows that the best MFOs do help poor customers. Second, CEA suggests that the best MFOs likely help the poor more than the marginal development project. Third, the lack of financial self-sufficiency of Grameen means that even the best MFOs may need to adjust to last long without more support from donors. BancoSol shows that financial self-sufficiency can be done. Fourth, the lack of private profitability means even the best MFOs scare investors. Investors might buy the strongest MFOs after start-up costs are sunk. But investors still will not start MFOs from scratch.

Microfinance for the poor will remain scarce until its profit attracts market funds. But even market leverage does not guarantee that MFOs are the best way to help the poor. CEA is needed to judge whether subsidized MFOs are worthwhile.

Warning: a few strong MFOs do not a microfinance crusade make. I repeat: just the fact that two of the best MFOs may be worthwhile does not mean that microfinance as a whole is worthwhile nor that most MFOs are worthwhile. I am glad that BancoSol and Grameen make more benefits than costs for the poor. This means, at least in some cases, that MFOs could be the best way to help the poor. Since I ignore the external effects of an MFO, I do not address whether microfinance as a whole is worthwhile. Nor do I measure performance as seen by society. I answer a smaller question: Without external effects, is an MFO a better use of public funds than the marginal development project?

D. New worth added by the framework

This framework is a disciplined way to measure how well an MFO uses public funds to improve the welfare of the poor. It suggests a way to sum up the performance of an MFO from the point of view of each group of stakeholders without the expense of CBA. The framework is less complex than the real world, so it does not replace logic, theory, and reasoned talk. But it does offer a guide to what questions to ask and where to look for answers.

The framework uses basic economics. I did not invent the workhorse concepts of opportunity cost, discounting, surplus, CBA/CEA, or conflicts among self-willed agents. But no one has combined them to judge the performance of an MFO through time. Now analysts can judge an MFO just as they would judge a dam or other public work.

It costs a lot to measure the benefits of MFOs. CEA offers less than CBA, but CEA costs much less than CBA. For most MFOs, I think that a CBA of CBA versus CEA would favor CEA. In some cases, CEA makes CBA moot.

This framework is a child of the standard frameworks for the analysis of public projects (Belli, 1996a; Brent, 1996; Gittinger, 1982; Little and Mirrlees, 1974; Dasgupta, Sen, and Marglin, 1972). The use of CEA with measures of performance from the points of view of other stakeholders makes this framework the sibling of frameworks for the analysis of not-for-profit hospitals (Garber and Phelps, 1997; Jennings, 1993; Wheeler and Clement, 1990; Conrad, 1984; Weinstein and Stason, 1977). Like CBA or CEA, this framework could be used with other public projects. I discuss how to make the most of the sparse data that analysts can get from MFOs and

how to put numbers in units that make sense.

This framework is a response to some of the weaknesses in past frameworks for the analysis of the performance and sustainability of MFOs (Rosenberg, Christen, and Helms [RC&H], 1997; Christen, 1997; Holtmann and Mommartz, 1996; Von Pischke, 1996b; Alfaro, 1996; Christen, *et al*., 1995; SEEP, 1995; Rosenberg, 1994; IADB, 1994; Benjamin, 1994; Yaron, 1992a and 1992b). None of these frameworks distinguish between the groups of stakeholders in an MFO and their unique goals. All of them measure costs, but just from the points of view of investors or of workers, and just in a one-year time frame. None of them discount flows. Society made MFOs to help the poor, but past frameworks do not tell how to measure performance from this point of view.

The most common measure of the performance and sustainability of subsidized MFOs has been the standard Subsidy Dependence Index (Yaron, 1992a and 1992b). I discuss the strengths and weaknesses of the SDI and patch some small mistakes in its design. The standard SDI does not measure social costs nor self-sustainability, but I show that it is equivalent to a subsidy-adjusted return on equity. The SDI is a useful tool, but it is not the only tool needed to analyze an MFO. It is not even the most important tool. In any case, no tool can tell what numbers mean, and no analyst should judge any MFO with any single tool such as the SDI.

No one has measured the cost-effectiveness of an MFO from its birth as seen by the poor. I do this for two of the most famous MFOs in the world, BancoSol and Grameen. Neither has attracted private investors, but both have been worthwhile from the point of view of the poor.

E. Guide to the next chapters

I target the framework to donors and to the analysts who work for them. They are the ones most likely to check the performance of an MFO. The text has some basic math and accounting, but the guts are economic logic.

In Chapter 2, I talk about frameworks. A framework suggests questions and ways to answer them. I define *microfinance*, list some traits of MFOs, and suggest some guidelines for analysis. Measurement is just half of analysis. People must use the numbers to explain and to predict performance, to suggest ways to improve performance, and to guide future analysis.

In Chapter 3, I define and link the concepts of *subsidy* and of *subsidized funds*. I suggest a rule to identify subsidized funds. *Subsidized funds* are public funds lodged in the net worth of an MFO. *Subsidies* are opportunity costs of subsidized funds. I list six forms of subsidized funds.

In Chapter 4, I discuss sustainability. *Sustainability* is meeting a goal now and in the long term. *Self-sustainability* is sustainability without public help. *Microfinance self-sustainability* is self-sustainability in the market niche of the poor. Sustainability is not an end in itself. It is a means to the end of improved welfare for the poor.

Chapters 5 to 9 form the heart of the framework. I suggest ways to measure performance from the points of view of poor customers, investors, workers, the poor, and donors. The measures aim to answer the unique questions drawn from the goals of each group without the expense of CBA. I use BancoSol and Grameen as examples.

In Chapter 5, I suggest a measure of repeated use by poor customers. A low drop-out rate or multiple loans per customer show that gains exceed costs for customers. Both BancoSol and Grameen get repeated use.

In Chapter 6, I review the standard SDI. The SDI tells an investor whether an MFO would have been privately profitable in a one-year time frame. I highlight the economic logic of the standard SDI. I show that the tax-adjusted SDI is like a measure of subsidy-adjusted return on

equity. The SDI is less than zero if and only if the MFO could have earned more than its target hurdle rate without public help. The SDI does not discount flows. I suggest measuring private profitability in the long term as the net present cost of the flows of funds between an investor and an MFO (NPC_I).

In Chapter 7, I suggest a measure of financial self-sufficiency to answer the question of workers. The jobs of workers are safe as long as an MFO could lose help from donors and still maintain the real worth of the subsidized funds in its net worth and pay market rates for the rest of its funds. Financial self-sufficiency for workers is less strict than private profitability for investors. Thus the framework predicts a key conflict; workers will not aim high enough to attract investors. BancoSol was financially self-sufficient in 1994-96 but was not privately profitable. Grameen needed more profit to reach financial self-sufficiency.

In Chapter 8, I suggest a measure of worthwhileness to answer the question of the poor. It costs more to measure the benefits of an MFO than to measure its costs. Instead of cost-benefit analysis, I suggest cost-effectiveness analysis. CEA compares costs with outputs. CEA can handle both deposit and loan outputs. Since the poor own the development budget, I suggest measuring the cost to the poor as the net present cost of flows between this budget and an MFO (NPC_P). I think both BancoSol and Grameen were worthwhile from the point of view of the poor.

In Chapter 9, I suggest a measure of market leverage to answer the question of donors. I discuss why donors might want to ask this question. Grameen has low market leverage. BancoSol has some market leverage.

In Chapter 10, I highlight the links among the five views of performance and the concept of sustainability. I also point out some conflicts between the levels of performance wanted by each group of stakeholders.

In the 9 appendices, I cover some short and/or technical topics.

Stakeholder	Goal to maximize	Question asked	Opportunity cost	Time frame		Measure
				Birth onward	Now onward	
1. Society	Benefits–costs of all people in the world	Are the gains from an MFO more than its costs?	Gain from best other use of public funds	Yes	Yes	Cost-benefit analysis
2. Poor customers	Benefits–costs of poor customers	Are the gains of using an MFO more than the costs?	Gain from best other source of loans/deps.	No	Yes	Repeated use
3. The poor	Benefits–costs of the poor	Is an MFO the best way to help the poor?	Return to the poor in best other dev. project	Yes	Yes	Cost-effectiveness analysis
4. Donors	Benefits to the poor from microfinance	How much microfinance is sparked by donor funds?	Return to the poor in best other MFO	Yes	Yes	Market leverage
5. Workers	Life of an MFO	Would an MFO shrink if donors left?	Inflation and cost to MFO of market debt	No	Yes	Financial self-sufficiency.
6. Investors	Profit	Will an MFO earn more than a firm of like risk?	Return on best investment of like risk	Yes	Yes	Private profitability

Table 1: Characteristics of the points of view of the six groups of stakeholders in an MFO

Chapter 2: The Analysis of MFOs

"Care for each other, not just for yourselves." Philippians 2:4

This chapter sets the stage for the framework in the next chapters. In the first part, I define *framework*. This framework produces quantitative inputs for the qualitative analysis of MFOs. In the second and third parts, I list some norms and guidelines for the analysis of MFOs. In the fourth part, I tell why measurement improves performance.

A. Frameworks guide analysis

A *framework* is a guide to analysis. *Analysis* is a tool to extract knowledge from data to answer a question. This work is a framework for the analysis of the performance and sustainability of subsidized MFOs. The framework shapes thinking since it suggests questions about performance, highlights the links among these questions, and looks at old and new answers to these questions. My goal is to improve the welfare of the poor through better measurement of the performance of MFOs.

The performance and sustainability of an MFO affect at least six groups: society, poor customers, investors, workers, donors, and the poor. Each group has its own goals, and so each group asks its own questions about performance. Each group has its own opportunity cost since each group has its own constraints, wealth, time frame, discount rate, and taste for risk. Some groups look at performance just from now onward; some also look at performance from birth onward (Table 1 on page 9).

B. The analysis of MFOs is qualitative

This framework suggests quantitative measures of performance for all six groups of stakeholders except society. In the end, however, the analysis of MFOs is qualitative. *Quantitative analysis* uses set methods to answer questions with numbers. Quantitative measures should not depend on the person who is the analyst. In contrast, *qualitative analysis* answers questions with methods adapted to each case. Qualitative measures do depend on the person who is the analyst. Qualitative analysis uses raw numbers from quantitative analysis, but it also uses theory, logic, common sense, experience, and values.

With qualitative analysis, all else is not constant. Each case is unique, and no small set of rules covers all cases. Frameworks guide qualitative analysis with lists of questions and of topics. Qualitative analysis requires time, effort, knowledge, wisdom, and pure smarts. These inputs cost a lot to get and differ among analysts.

Frameworks guide quantitative analysis with a small set of rules that tell how to get quantitative data and how to handle it. The inputs needed are more common and cost less than those of qualitative analysis. Frameworks for the quantitative analysis of subsidized MFOs include Christen (1997), RC&H (1997), Von Pischke (1996b), Holtmann and Mommartz (1996), Alfaro (1996), Christen *et al*. (1995), SEEP (1995), IADB (1994), Rosenberg (1994), Benjamin (1994), and Yaron (1992b). In all cases, the crux of the problem for the analyst is not so much to get the right formula as it is to feed the right data to the formula (Schreiner and Yaron, 1998).

The analysis of the performance and sustainability of subsidized MFOs is qualitative. Quantitative frameworks produce numbers as inputs to qualitative analysis. The analyst must still figure out how to extract meaning from the numbers to predict or to give advice. No tool, however fancy, can do the real work of analysis.

No number from any single measure answers all questions. In fact, no single measure fully answers any single question. An analyst can judge with numbers from quantitative analysis just as long as all else is constant. In contrast, qualitative analysis does not pretend all else is constant. The real world is so complex and so uncertain that only the analyst can forecast future performance and suggest ways to improve it.

Suppose one MFO costs the poor $100 per loan disbursed in terms of gains lost from some other development project. A second MFO costs the poor just $50. The analyst cannot conclude from these numbers that the second MFO uses development funds better than the first. Not all else is constant. Each MFO lends to its own customers in its own market, and each loan has its own price and own terms. Borrowers might not get the same gains from each MFO. Furthermore, one MFO might help the poor not just with loans but also with deposits. These and a host of other factors are not constant between the two MFOs. A quantitative framework cannot control for all of them.

Analysis is human. Only a person can make assumptions; collect, transform, and interpret data; and record this process and the information. Only a person can adjust when not all else is held constant. To tease knowledge from data requires human skill. The work is holistic, synthetic, and idiosyncratic. Numbers, computers, and financial ratios cannot guess the future. They cannot replace human work and judgement.

C. DFIs and MFOs

A *microfinance organization* sells loans and deposits to the poor. Most MFOs are tax-exempt not-for-profits. Most use public funds and lack owners to discipline their use of funds. Most of the few MFOs that do sell shares have both private and public owners. Most MFOs are small and lend to urban households and their informal businesses. Few MFOs take deposits.

Development finance institutions are para-statals chartered as banks. A government lends to a DFI, buys its shares, and gives it grants. Most DFIs lend to big farms or to other formal small and medium firms, though some DFIs do lend to the poor. Many DFIs take deposits and get a subsidy from the promise of a government bail-out should they go bankrupt.

MFOs that are non-government organizations (NGOs) outnumber DFIs, but DFIs are bigger and take more deposits. In part, NGOs are a response to the weaknesses of para-statals like DFIs (Gonzalez-Vega and Graham, 1995; Schmidt and Zeitinger, 1994; Adams and Von Pischke, 1992). The name is no mistake; NGOs are not government organizations. But NGOs still suffer from some of the same ills since they lack real owners and do not face market forces.

DFIs in the framework of the SDI (Yaron, 1992b) are like MFOs in this framework. The new term highlights less the few small changes needed for the unique traits of MFOs and more the fact that the SDI answers just the question asked by investors.

MFOs and DFIs look the same to measures of cost except in four ways. First, some MFOs are not tax-exempt. For example, Grameen was scheduled to lose its tax exemption in 1996 (YB&P, 1997). Second, some MFOs may pay dividends. For example, BancoSol paid a dividend in 1997 (*Wall Street Journal*, 1997b). Third, governments own DFIs, but some MFOs could have both public and private owners. For example, investors own some of the shares of BancoSol, and donors own the rest. Likewise, members own part of Grameen. Fourth, compared with DFIs, MFOs tend to get more of their subsidized funds in ways that inflate accounting profit (Schreiner and Yaron, 1998). Thus accounting profit and return on equity (ROE) are even more distorted for MFOs than for DFIs.

D. MFOs versus other public projects

Subsidized MFOs are like most other public projects. They all share the trait that those who bear the costs are not those who get the gains, and they all have a small lobby whose jobs depend on more funding. Like most other public projects, the worth of a subsidized MFO needs to be checked.

MFOs are unusually tempting public projects. MFOs hold a unique promise since they work with pure capital, and capital is often seen as a constraint on development. The poor are poor since they lack assets, and MFOs transfer control of assets.

MFOs are also politically correct. They do not give money away; they lend it at interest. Few dare to oppose helping the poor help themselves. MFOs that get repaid channel funds to those poor people who have good projects and who will take the risk to work at them. If small loans have high prices, then the rich will shun MFOs.

Most MFOs are not government organizations. Unlike BancoSol and Grameen, most MFOs cannot brag of private owners.

The danger is that MFOs lend themselves to abuse. On the surface, lending just requires money. Compared with projects to improve food, water, health, clothes, houses, schools, roads, tools, markets, or laws, MFOs are easy to start and to run (Ladman and Tinnermeier, 1981).

Donors also like MFOs since they can absorb and disburse funds fast. If repayment does not matter, then a donor may prefer to lend than to spend.

MFOs tempt politicians since they transfer wealth but hide the true costs and gains. This shields leaders from public scrutiny (Ladman and Tinnermeier, 1981).

Worse than hiding gains, MFOs hide costs. After all, loans are not gifts. Unrepaid loans *are* gifts, but donors often overlook default since it happens after the current budget. Funds lent are not funds spent. Loans are not expenses but assets. If all goes as planned, funds will recycle when borrowers repay. Financial statements ignore opportunity costs, so donors can see MFOs as perpetual-motion machines. For example, consider the claim of Rosenberg (1994, p. 12):

> Even in the absence of rigorous measurement, most would agree that a hundred dollars delivered to a beneficiary as a microloan is likely to produce a lesser impact than the same hundred dollars would in the form, say, of a year of a girl's primary education. Yet there is an obvious difference between the two investments. The education funding is expended: nothing remains at the end of the year, and new funds must be found for the next year. By contrast, in a good microfinance program the funding for the loan is not expended: the same hundred dollars will be available to provide loan services year after year.

The poor want to know whether the net present worth (NPW) of an investment in an MFO exceeds the NPW of an investment in the education of a girl.

MFOs hide the costs borne by the poor, but they spotlight the gains got by poor customers. We can all see the worth of the loans from Grameen that helped an orphan married at age 12 and abandoned at age 13 to buy land and to send her child to school (RESULTS International, 1996). In contrast, trained financial analysts often overlook the cost of subsidizing an MFO to make such loans. CEA counts not only the faces of a few case studies of poor customers but also the faceless poor left unhelped since development funds went to an MFO rather than to some other project. The choice is not between a subsidized DFI or nothing at all; the choice is between a subsidized DFI or some other project to help the poor.

E. Analysis should predict and improve future performance

The goal of analysis is to suggest the technical, financial, and organizational changes needed to meet a goal (IADB, 1994). Analysis looks to the future because that is where change can be. But the future is unknown, so analysis is grounded in the present and in the past. The best forecast of the future uses knowledge of the past and of the present guided by theory. In fact, theory is just a set of rules to predict the future from the past and present. Analysis should measure, explain, and predict performance.

Good measures answer the questions they claim to answer. They are tools that tell what to change and by how much. They mark progress and set goals.

Analysis should instruct. Analysts who swoop in and out of an MFO do a bad job unless they leave workers with the knowledge and the tools to track progress on their own. No plan will work unless workers can detect mistakes and then change course.

Analysis should help to allot funds on one of four levels. First, if funds are earmarked for an MFO, then the analysis should tell which form of subsidized funds will help the poor the most. Second, if funds are earmarked for microfinance, then the analysis should tell which MFO will use them best. Third, if funds are earmarked for development, then the analysis should tell whether an MFO is the best use. Fourth, if funds are not earmarked at all, then the analysis should tell their best use for society.

F. Guidelines for the analysis of MFOs

Disinterested analyses of MFOs are rare. Most analyses are funded by those who stand to gain if the analyst judges the MFO as strong and/or names more funds as the quick fix. This pressures analysts to say that better performance will come with more time and more funds. Even analysts who doubt the strength of an MFO know they will get more jobs and bigger rewards if they predict success. The challenge for the analyst is to defend a forecast of future improvement when current performance is weak and when few MFOs have performed well or improved much.

Those who stand to gain from more funds for microfinance are loath to hire analysts who defend the poor from bad projects. In the past, this conflict between the rewards for the analyst and the rewards for the poor led to claims of strong financial projects in the midst of weak financial markets (Adams, 1988). This conflict does not fix itself since bad gambles on MFOs do not sting the bettors (Kane, 1984; Von Pischke, 1980).

At least in the long term, however, the truth wins. An example is the now-debunked paradigm of supply-leading targeted credit with low interest rates from DFIs in the 1950s-70s. By the 1980s, their waste strained budgets so much that analysts could carve out a niche with the truth. Adams (1971) threw the first stone. Other prophets were Gonzalez-Vega (1976), Von Pischke and Adams (1980), Adams, Graham, and Von Pischke (1984), Yaron (1994), and Schmidt and Zeitinger (1996).

But, in the short term, a lot of funds were wasted. Likewise, donors now are staking a lot of funds on microfinance. This time, they should not wait too long to check if it is a mistake (Adams and Von Pischke, 1992). If microfinance is a good bet, then donors might wager more.

The incentives of donors and of analysts should be aligned with the goal of helping the poor in the best way. I suggest ten ways to do this.

First, reward the truth. Few analysts will bear bad news unless they know they will not be blamed. Donors need the foresight to make rules that force them to kill weak projects no matter how much they would be tempted to renege later. This would strengthen the market for critics and for strong projects. MFOs need tough love.

I.	Reward the truth.
II.	Lengthen the time frame.
III.	Reward progress toward long-term goals.
IV.	Measure costs.
V.	Demand plans that meet goals.
VI.	Compare progress to benchmarks and to peers.
VII.	Compare past performance to past support.
VIII.	Look at trends.
IX.	Judge levels and trends together.
X.	Be precise, but don't overdo it.

Table 2: The ten suggestions for donors

Second, lengthen the time frame. The people who work for donors want to help the poor, but they must show results in the short term to climb the career ladder. This push for results in the short term can harm goals in the long term. To be freed to build strong projects, the people who work for donors need long-term contracts with time-bound benchmarks for progress.

Third, reward progress toward long-term goals. Donors should attach their employees to one or two projects and then link at least part of their rewards to measurable goals in 5-7 years. This makes the rewards of the employees of donors depend on the performance of the MFO.

Fourth, measure costs. It is cheap. Donors often reward not low costs, nor high gains, nor good investments, but disbursements. This is due in part to the fact that disbursements are cheap to measure.

Fifth, demand plans in which performance meets goals. The plan is a time-bound check on improvement. An MFO has no chance to meet goals if it cannot even plan to meet them with made-up numbers. Donors must demand support for the changes predicted in performance and then judge whether the assumptions in the plan make sense. A young or weak MFO should not plan to do better than the best MFOs did at the same stage. The plan should show that the MFO is willing and able to change along a margin that it controls. For example, loan officers will not likely scramble to work more cases if their pay does not grow to match their workload. Likewise, an MFO cannot plan to push interest rates past a usury cap set by law.

Sixth, compare progress through time with benchmarks, peers, and best practice (Christen, 1997; Richardson, 1994; Koch, 1992; Barltrop and McNaughton, 1992). If few MFOs meet their goals, then their progress matters as much as their state. In fact, no one knows yet whether MFOs can meet their goals at all. The target may be set too high. But at least benchmarks through time help to judge the speed of progress. If MFOs are to get public funds and if no MFOs meet their goals, then support should go to the MFOs that advance the fastest.

Seventh, compare past performance to past support. Progress now may be due to a lack of progress and/or a lot of help in the past. An analyst can often guess the health of an MFO by

whether it can supply data for each month or quarter since birth. Donors with scarce funds need to do triage. They should skip MFOs who cannot provide the data needed for diagnostic tests.

Eighth, look at trends. *Trends* are patterns of change in performance through time. Trends matter if levels of performance are still too low. An MFO should support plans to improve with a track record of fast improvement, given its age, market, and past support.

Ninth, judge levels and trends together. Improvement matters since it means an MFO gets closer to absolute goals. For example, two MFOs may perform at the same level, but one may be stronger since it reached this stage faster and with less support. Or two MFOs may improve at the same rate, but one may be stronger since it is big and builds on a strong record while the other is small and builds on a weak record.

Tenth, be precise, but truncate numbers at their significant digits. Some frameworks downplay details and focus just on trends and magnitudes. Such broad brushstrokes do help to defuse quibbles that could sidetrack the talk from how to improve performance. If an MFO is grossly wasteful, then the analysis can overlook some details and still reach the same result. But some MFOs are now close to some of the goals of some of the groups of stakeholders. A lot rides on the judgements of their success. For example, much of the fervor for microfinance sprung from the reported success of just three banks: BancoSol, Grameen, and *unit desa* system of Bank Rakyat Indonesia (BRI) (Christen *et al*., 1995; Benjamin, 1994). Precision matters as MFOs inch closer to the target and as the stakes grow. Analysts must spend time to talk about details.

G. How measurement boosts performance

Measurement sparks strong performance, casts light on weak performance, and rewards good stewards in at least seven ways.

First, measurement forces MFOs and donors to discuss their goals. Vague goals wither under attempts at measurement. Buzzwords lose punch unless grounded in the nuts-and-bolts problems of sticking numbers to them (IADB, 1994).

Second, measurement changes goals. MFOs who start to measure costs also start to worry about costs (Von Pischke, 1996a).

Third, measurement highlights goals. An MFO willing to measure costs signals a willingness to work to reduce costs (Richardson, Lennon, and Branch, 1993). MFOs that do not care about costs do not measure them. Success is more than just disbursing money. If donors measure only disbursements, then MFOs will learn to disburse at any cost (Von Pischke, 1996).

Fourth, measurement helps meet goals. Technical feedback helps managers detect trends, set targets, benchmark progress, and compare to peers.

Fifth, measurement proves what MFOs can do. Donors want to demand better performance. But without measurement, donors are pestered by the fear that they ask for too much too fast. Unsure donors expect less, so they get less (Schmidt and Zeitinger, 1997).

Sixth, to improve social welfare is virtue; to harm it is sin. Cooperation improves social welfare, but it is a prisoner's dilemma. If all people do it, then all are better off. But if all work as one, then it is better for one not to work at all. Religion and civic pride are two ways to commit to cooperation, to reward selflessness, and to punish shirkers. A third way is measurement. Private and social rewards are aligned better when the analyses of MFOs measure performance with tools meant to check the welfare of the poor.

Seventh, donors cannot reward fitness unless they measure it first. Donors are like genetic engineers who want to quicken the evolution of robust MFOs. Most strong MFOs make more small loans and deposits for the poor faster than most weak MFOs. Society tinkers with MFOs

since it thinks growth by trial-and-error in a *laissez-faire* market would take too long. One of the few roles for donors is as a source of funds. But more funds may not prod an MFO to work more unless donors link the funds to measures of progress. Experiments to strengthen MFOs are risky. Progress follows mistakes, if it comes at all. MFOs may mutate into financial Frankensteins, well-meaning monsters whose blunders do more harm than good. Donors work outside the market, but to smooth wrinkles and to weed out MFOs headed for dead ends, they must mimic market forces. Donors husband strong strains of MFOs when they grease entry and exit and when they measure strength (Von Pischke, 1991). Feedback makes markets work. It selects strong firms and strikes down weak ones. Funds from donors should help an MFO to outgrow funds from donors (Otero and Rhyne, 1994). Donors can shelter an infant MFO from market forces for a time. But an MFO must fend for itself when donors leave. If donors want a fledgling MFO to survive the move to the wild, then donors must base rewards on measures of gains and costs just like the market does.

Chapter 3: Subsidies and Subsidized Funds

"A poor widow threw in two mites." Mark 12:42

This chapter has four parts. In the first part, I discuss the opportunity cost of the public funds used by an MFO from the point of view of the poor, workers, and investors. In the second part, I give a rule to identify subsidized funds. Past work on this topic lacks such a rule. In the third part, I define and link the concepts of *subsidies* and of *subsidized funds*. I describe six forms of subsidized funds.

A. The cost of public funds entrusted to an MFO

Public funds are funds taken from taxpayers and then used by a public entity such as a government or donor. Public funds entrusted to an MFO include soft debt, grants, and discounts. *Soft debt* comes from loans from a public entity to an MFO. *Grants* are gifts from a public entity to an MFO. *Discounts* are when a public entity absorbs the difference between the price paid by an MFO and the market price.

The cost of public funds entrusted to an MFO is the return the funds could bring their owners in their best other use. This return is the *opportunity cost*. It is also known as the *efficiency price* or the *shadow price*. All costs are opportunity costs. The consequence of spending a dollar on one thing is not to spend it on something else.

In a perfect market, all funds are in their best uses, and the opportunity cost of all entities in the economy is the market price. The market price is also the marginal value product. But most markets are not perfect, so most market prices do not match opportunity costs (Gittinger, 1982).

The prices faced by MFOs are even more distorted since they are most often set not by market feedback but by administrative fiat. For example, the price of soft debt does not depend on the default risk of the MFO nor on the return the funds could earn elsewhere. Instead, the price depends on political, social, and other non-market factors. Likewise, grants and discounts are free. The market has no free lunch, so free funds are not priced at their opportunity cost.

Prices set outside the market mean that common measures such as accounting profit and ROE do not reflect the true financial performance of an MFO (Schreiner and Yaron, 1998). It does not make sense to measure costs as the expenses recorded in the accounts of an MFO if some of these expenses depend not on the market but on the whims of donors.

I suggest valuing public funds at their opportunity costs. If the gain caused by the use of funds by an MFO exceeds their opportunity cost from some point of view, then the MFO creates value. If not, then the MFO destroys value.

1. The point of view of an investor

For an investor, the opportunity cost of funds entrusted to an MFO is the risk-adjusted price of like funds on the market. For example, the opportunity cost of equity r is the return the MFO would need to attract and to keep investors in the long term. Likewise, the opportunity cost of soft debt m is what an MFO would pay for like debt on the market. If an MFO can take deposits, then it might replace soft debt with deposits instead of with market debt. The market may not be perfect, but the investor takes it as given. If an MFO replaced its public funds, then it would pay the market price, warts and all.

Yaron (1992b, pp. 8, 9, 18) said that the opportunity cost of an investor is the risk-adjusted rate an MFO would pay to replace public funds with market funds. In practice, Yaron used the interest rate paid on deposits plus a small mark-up for the extra administrative costs

needed to take more deposits. This rule of thumb gives a lower bound on the true opportunity cost of an investor. In fact, most MFOs would not replace the public funds in their equity with deposits, nor could most MFOs replace all their soft debt with deposits. The rule of thumb was used to keep talks from being sidetracked by fights over opportunity costs.

Most users of the SDI followed this rule of thumb. Some other frameworks go still lower. They take the opportunity cost of an investor r as the inflation rate π (RC&H, 1997; Holtmann and Mommartz, 1996; Christen *et al*., 1995; SEEP, 1995; IADB, 1994). Such a nominal rate is too low since it implies a real rate of zero.

If an MFO can take deposits, then the opportunity cost of soft debt in some cases might be the interest rate paid on deposits plus a mark-up. But few MFOs take deposits. In fact, most MFOs, by law, cannot take deposits at all. Even if an MFO could take deposits, it could not replace soft debt with deposits and still pay the same rate it pays now. Furthermore, public funds in equity would be replaced by private equity capital. At least in the short term, most MFOs are too risky to swap equity capital for debt. This suggests the use of a higher, more realistic opportunity cost than the rule of thumb used by Yaron.

Equity is riskier than debt, so the opportunity cost of equity r exceeds that of soft debt m (Von Pischke, 1991). I use a framework from Benjamin (1994) to estimate m and r (Appendix 3 on page 105). Yaron's lower bound on opportunity costs is simple. The opportunity costs in Appendix 3 are higher lower bounds, are still simple, and have a better theoretical base.

These higher opportunity costs will increase the measured cost of most MFOs. Their performance will be worse than was thought. But the measures will be closer to the truth and so closer to the goal to check whether an MFO is the best way to help the poor.

The literature on not-for-profit hospitals has established that these firms should earn a return on the public funds in their equity just as high as that of for-profit firms of like risk (Jennings, 1993; Silvers and Kauer, 1986; Conrad, 1986 and 1984). If not, then society would be better off if it took the public funds from the not-for-profit hospital and invested them in a for-profit hospital and then used the return to buy what the not-for-profit would have produced.

Yaron (1992b) notes that government-owned DFIs would pay the same price for both debt and equity. Creditors of the DFI do not consider equity riskier than debt since the government will bail out a bankrupt DFI. But this implicit guarantee is itself a subsidy worth just as much as the risk premia it wipes out. Unlike the government, the DFI in the market on its own could not replace its public funds at a cost near the rate paid for deposits.

Not all MFOs will have the same opportunity costs at all times for at least four reasons. First, leverage differs among MFOs. Second, some MFOs are riskier, regardless of leverage. Third, each MFO would replace public funds with funds from its own local or national market. Fourth, the opportunity cost of an investor changes through time.

2. The point of view of workers

Public funds do not have the same opportunity cost for investors as for the workers of an MFO. Workers ask their own question: Could an MFO survive without more help from donors? Just as for investors, the opportunity cost of soft debt m for workers is the market price of like debt. In contrast, the opportunity cost of equity r for workers is not the market price of equity of like risk but rather the rate of inflation π.

In practice, donors do not take back public funds once they are lodged in the net worth of an MFO. Thus an MFO that lost support from donors would not replace public funds in equity with private funds. Such an MFO could survive as long as it could replace public debt with market debt and earn enough profit to maintain the real value of public funds trapped in equity.

3. The point of view of the poor and of donors

For the poor and for donors, the opportunity cost of public funds in the net worth of an MFO is the return lost from not funding the best other project to help the poor. No one knows the opportunity cost for the poor ρ. But it does not matter much. Unless they have a better guess, most governments use a rule of thumb of 10 percent per year in real terms (Belli, 1996a; Katz and Welch, 1993; Gittinger, 1982).

This is a high rate, and it may unjustly skew analyses in favor of projects with quick gestations. In practice, the point is moot. MFOs compete for public funds now against all other development projects. To compare these projects, donors must use the same opportunity cost for all of them. This opportunity cost should be just high enough to exhaust all the funds in the budget. The analyst bears the burden of proof for some other opportunity cost (Gittinger, 1982).

For example, "financial rates of interest, such as government borrowing rates or the prime lending rate, are generally too low to justify their use in economic analysis of projects. Indeed, when inflation is high, these rates may even be negative in real terms" (Gittinger, 1982, p. 315).

The opportunity cost of soft debt for donors and for the poor is the same as the opportunity cost of soft debt for an investor *m*. Ignoring administrative costs, this is the price that would let donors break even if they borrowed from the market to onlend to the MFO and still covered their risk. Given a budget for development in which each dollar has an opportunity cost ρ, donors could borrow on the market and lend to an MFO at a rate of $c = m$ without using any of their budget. In this case, the loan has no opportunity cost. At a rate $c < m$, the loan would use some of the development budget since the donor pays *m* but collects just *c* from the MFO. In this case, the loan does have an opportunity cost for donors and for the poor.

4. The link between opportunity costs

The opportunity cost of equity for donors and for the poor is ρ, the return on the marginal development project. The opportunity cost of equity for investors is *r*, the return on an investment of like risk. The opportunity cost of equity for workers is π, the rate of inflation. In general, none of these three opportunity costs has a set relation to the other.

Each point of view has its own opportunity cost since each asks its own question. Donors and the poor could fund something else, so they ask whether an MFO is the best use of scarce funds. Workers know donors and the poor could fund something else, so they ask whether the MFO could survive without more public funds. Likewise, investors could fund something else, so they ask whether the MFO could earn a market return.

For example, a donor might lend a dollar to an MFO for a year at no charge. The dollar might have caused 10 cents worth of benefits a project for health care or for grade school for girls. In contrast, the MFO would have to pay a private lender an interest rate of 50 percent since the lender could get that much elsewhere for a loan of like risk. At the same time, the rate of inflation might have been 5 percent. In this case the opportunity cost for an investor *r* is 50 cents, the opportunity cost for the poor and for donors ρ is 10 cents, and the opportunity cost for workers π is 5 cents.

B. Subsidies versus subsidized funds

Subsidized funds are public funds lodged in the equity of an MFO. All grants and all discounts are subsidized funds. Subsidized funds increase net worth one-for-one, either directly or through their effects on profit.

Subsidies are the opportunity costs of the use of subsidized funds. Like all costs, subsidies are sunk and gone. In contrast, subsidized funds in net worth would, in principle, revert to the

budget meant for the poor if the MFO closed. Losses gnaw at net worth and thus reduce what donors could collect from an MFO. Thus losses convert subsidized funds to subsidies.

This framework supposes that donors could reclaim the grants and discounts in the net worth of an MFO for use in some other development project. I justify this fiction in three ways. First, it follows the practice of standard measures like CBA. Second, donors could inject all funds as paid-in capital instead of as grants and discounts. This would give donors a legal claim on the net worth of an MFO, but it would not change anything else. Third, someone will collect the net worth of a closed MFO. If no one else has legal rights to this net worth and if the net worth came from the budget earmarked for the poor in the first place, then it should revert to that same budget.

This means the cost to the poor of the use of a dollar for a year by an MFO is less than a full dollar. Unless losses wipe out net worth, the dollar is not lost to the poor. The loss to the poor is the return they could have had from the dollar in some other project. As long as the dollar stays in the net worth of the MFO, the poor could get it back and use it elsewhere. The cost is the return lost since the poor have to wait to get the dollar back.

1. What funds are subsidized?

All public funds in equity are subsidized. Taxpayers, the source of the public funds in the budget earmarked for the poor, did not choose to fund the MFO. Donors set the price of the funds, not the market. If public funds were not subsidized, then the MFO would skip the hassle of donors and use market funds. In contrast, most private funds are not subsidized. People know the best way to use their own funds for their own good.

In some cases that matter for MFOs, private funds can be subsidized. This happens when people give their own funds to an entity and then yield control. This does not happen with for-profit firms nor with households, but it could happen with churches and with other firms set up for the common good. The case is like when taxpayers yield control over their funds to donors.

In general, subsidized funds come either from unwilling taxpayers through the government and donors or from firms whose funders gave their own funds but then yielded control. Unsubsidized funds come either from willing people or from the firms owned and controlled by private people (Figure 2 on page 22). Past frameworks lack such a rule.

2. The need for a rule to identify subsidized funds

The framework of the SDI did not need a rule to identify subsidized funds since all funds put in a DFI are subsidized (Yaron, 1992a and 1992b). But MFOs are not so simple. Most MFOs are not government-owned development banks but not-for-profit NGOs. They mix funds from government and donors, people, churches, other NGOs, investors, and customers.

RC&H (1997) do suggest one rule in a footnote. They say funds are subsidized if the funders intend to help others rather than themselves. This rule works in most cases, but it fails for gifts made by people from their own funds. For example, private gifts fund churches, the United Way, the Salvation Army, and not-for-profit hospitals. These firms, the gifts, and their sources are permanent. Private donors do demand returns, just not cash ones (Pauly, 1986). They still do a secret CBA to check that the gift costs them less than what they get back in “in-kind profit”, “social products”, or “community dividends” (Silvers and Kauer, 1986). The gift is the price of the thrill the private donor gets. It does not make sense to impute a subsidy to gifts that people think are worthwhile. I ignore the subsidies an MFO gets when private gifts are tax-deductible.

Trades between MFOs and people or their firms are not subsidized. Each side chooses to trade its own funds in the market. If not, then it is theft. Barring externalities, each side pays the

costs and gets the gains from the choice to trade. Each side does its own secret CBA, and no one needs to take care of anyone else.

Likewise, market trades between MFOs and non-private entities whose funders wield control are not subsidized. Examples are family trusts and small churches. Society has no grounds to worry when people choose to give funds through firms they control. The funders can yank the funds from the MFOs if they stray.

In contrast, a donor doles out funds wrenched from reluctant taxpayers by government. This is not theft but taxes. The government and donors do not spend their own money, and they do not bear all the costs and get all the gains of their choice to trade. The people who work for donors might not balance their own welfare against that of the poor. The same holds for non-private entities whose funders relinquish control.

3. Example uses of the rule

a. Forced deposits

Some MFOs force borrowers to make deposits at below-market rates. The rule says forced deposits are not subsidized funds. Borrowers agree to make the deposit as part of the price of the loan in the same way that they agree to pay interest and installments. Borrowers must expect the gain from the loan to swamp the opportunity cost of the forced deposits (IADB, 1994).

b. Gifts from big churches

People sometimes give to MFOs through churches. The rule says these gifts are subsidized if the people yield control to the church. Except for fund drives earmarked for MFOs, the flock trusts the pastor to do the best thing. As long as the leaders are selfless and wise, this does the most good. But some church leaders do not report the use of gifts from members to fund MFOs, and no one checks whether the leaders are indeed selfless and wise. For example, Roman Catholics cannot fire a priest who wastes the mites of widows. I do not want to condemn churches nor their funds for MFOs. Some churches care more than some governments and donors about the poor. I do want to highlight the fact that the lack of feedback between the leaders of big churches and their members can lead to the waste of funds meant for the poor.

c. Gifts from small churches

If people wield control over their gifts, then the rule says the gifts are not subsidized. This could be the case with small Protestant splinter sects that adopt MFOs. The members track their funds, and they can fire their pastor. Repeated gifts show whether they like their rewards.

d. Cheap debt from private banks

Some MFOs get loans from banks at rates lower than what a firm of like risk would pay. If the bank does this of its own free will and bears all the risk and gets just the price the MFO pays, then the rule says the debt is not soft. If the bank cuts the price since donors guarantee the debt for the MFO and thus cut its risk, then the rule says the debt is soft.

e. Shares bought by members

Credit unions, village banks, and some MFOs such as Grameen force new members to buy shares. Often the members cannot sell these shares, even if they quit the MFO. The rule says these shares are not subsidized. Like forced deposits, they are the price of access to the MFO.

f. Shares bought by non-members

Sometimes rich people choose to buy shares in MFOs with their own funds. Few MFOs have paid dividends or earned capital gains for shareholders. But stockholders must get some kicks for their costs or else they would sell their stake. The rule says this stock is not subsidized. Investors in BancoSol buy shares since they like to help the poor and to gain goodwill.

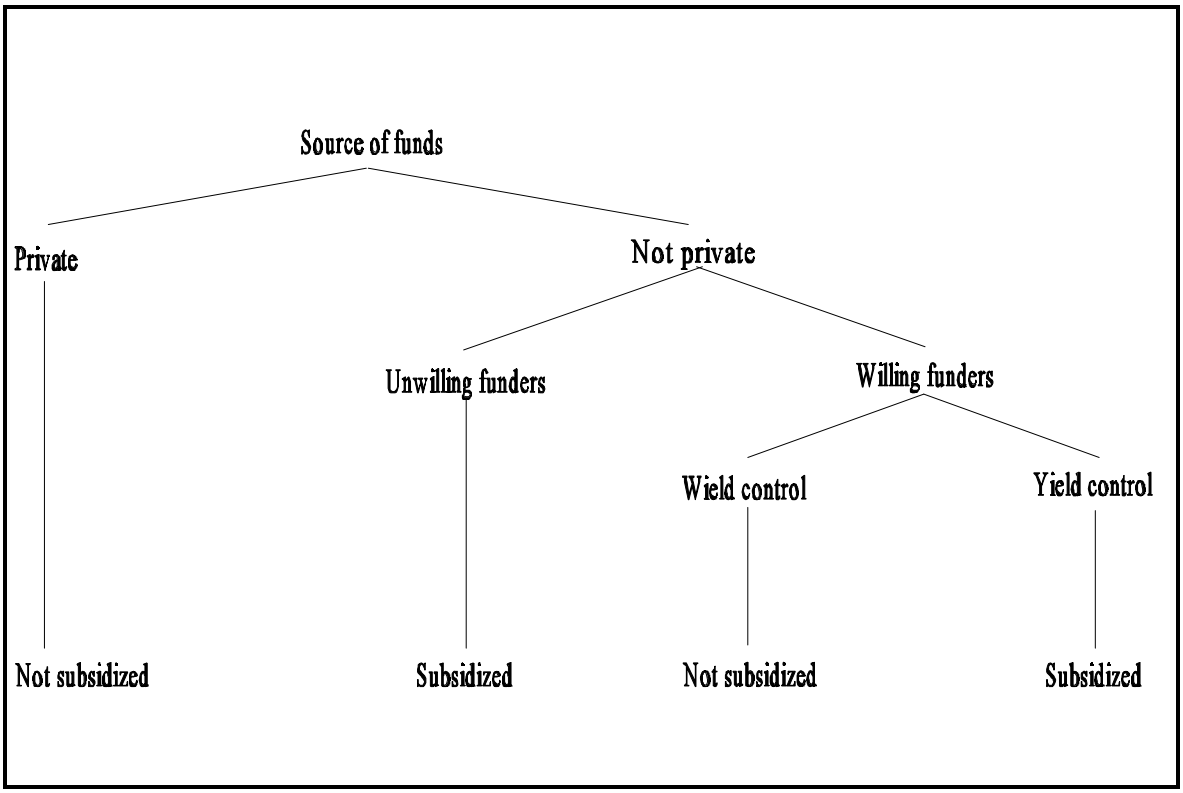

Figure 2: Decision tree to identify subsidized funds

g. Funds from NGOs

Some MFOs such as BancoSol have big loans from other firms who get public funds. The rule says that a loan from a subsidized firm is just soft debt in drag unless it has a market price.

4. The relationship between subsidy and sustainability

Subsidy also matters for sustainability. *Sustainable* means repeatable. Most unsubsidized trades are sustainable; subsidized trades are not. The price in a voluntary trade obeys only the laws of supply and demand. Voluntary trades are repeatable and thus sustainable since they are self-interested acts. The owners of the funds traded choose to trade. If traders think a trade looks good now, then they will not likely change their minds in the future. Unlike donors, private traders cannot shift their tastes through time without cost to themselves.

Feedback makes markets work. But donors block the feedback loop between projects and the poor. Trades between donors and MFOs are not self-interested acts. Thus they are not repeatable, and thus they are not sustainable.

Donors are fickle. They can afford mood swings since they do not play with their own funds. Donors will stop trades with an MFO when they lose their wisdom or their selflessness. This will happen long before private traders lose their self-interest.

Trades with donors are not repeatable. Such non-private trades have below-market prices and so are subsidized. Private entities can take care of themselves, but public entities cannot take care of everyone else.

Type of subsidized funds	Notation	Type of grant	Cash/non-cash
1. Direct grant	DG	Equity grant, EG	Cash
2. Public paid-in capital	PC_{pub}		
3. Revenue grant	RG	Profit grant, PG	
4. Discount on soft debt	$D\cdot(m-c)$		Non-cash
5. Discount on expenses	DX		
6. True profit	TP	Equity grant, EG	

Table 3: Types of subsidized funds

C. Types of subsidized funds

Subsidized funds come in six forms (Table 3 on page 23). Three forms are equity grants. Equity grants increase net worth but do not change accounting profit. The other three forms are profit grants. Profit grants increase net worth through their effect on accounting profit. Profit grants inflate revenues and/or deflate expenses.

1. Equity grants

The first two forms of subsidized funds are equity grants *EG*. These cash gifts increase net worth but do not change accounting profit. Equity grants are the sum of direct grants *DG* and two kinds of paid-in capital, public PC_{pub} and private PC_{pri}:

$$\begin{aligned} \text{Equity grants} &= \text{Direct grants} + \text{Public paid-in capital} + \text{Private paid-in capital}, \\ EG &= DG + PC_{pub} + PC_{pri}. \end{aligned} \tag{1}$$

a. Direct grants

Direct grants *DG* are cash gifts not exchanged for shares. Direct grants increase net worth, but they do not pass through the income statement, and so they do not inflate accounting profit. Direct grants include not just gifts in cash but also gifts in kind such as computers or trucks that get marked down as assets on the balance sheet.

b. Public paid-in capital

Public paid-in capital PC_{pub} comes from sales of shares to donors. Private paid-in capital PC_{pri} comes from sales of shares to investors. Total paid-in capital *PC* is the sum of public and private paid-in capital:

$$PC = PC_{pub} + PC_{pri}. \tag{2}$$

A sale of stock to a donor is like a direct grant since donors do not act like owners and since donors buy shares with public funds. Unlike private owners, donors will not sell their shares if they do not get dividends or increased net worth. Most donors do not wield control but rather yield it to the workers in the MFO.

Donors, as stewards of the budget of the poor, have a legal claim on a proportion β of the net worth of an MFO. This equals the ratio of public paid-in capital to total paid-capital:

$$\beta = \frac{PC_{pub}}{PC_{pub} + PC_{pri}}. \qquad (3)$$

In an MFO with private shareholders, the proportion β of shares owned by donors will most often be less than the proportion of net worth injected by donors. This loss to the budget of the poor is a windfall for investors. MFOs that do not sell shares have β = 1. All their net worth comes from the budget for the poor even though donors may have no legal claim.

Unlike DFIs, some MFOs have both public and private shareholders. For example, private entities owned about 17 percent of BancoSol at the end of 1996. Donors and PRODEM, an NGO without owners, hold the rest, so $\beta \doteq 1 - 0.17 = 0.83$ (line e of Table 17 on page 83). Members owned 92 percent of Grameen at the end of 1994, so $\beta \doteq 1 - 0.92 = 0.08$ (line e of Table 20 on page 87). Yet donors injected most of the net worth of BancoSol and Grameen through grants and discounts.

2. Profit grants

Profit grants are the third through fifth forms of subsidized funds (Table 3 on page 23). All forms of profit grants *PG* increase net worth through their effect on accounting profit. All profit grants, like all equity grants, wind up in net worth.

Profit grants distort accounting profit *AP* and thus ROE since they depend not on business performance but on arbitrary choices by administrators and accountants (Schreiner and Yaron, 1998). Donors can use profit grants to lard accounting profit and ROE. Shifting equity grants to profit grants changes accounting profit and ROE but not business performance.

Profit grants are the sum of revenue grants *RG*, discounts on soft debt $D \cdot (m - c)$, and discounts on expenses *DX*:

$$\begin{aligned} \text{Profit grants} &= \text{Rev. grants} + \text{Discount soft debt} + \text{Discount on expenses}, \\ PG &= RG + D \cdot (m - c) + DX. \end{aligned} \qquad (4)$$

Profit grants poison accounting profit, ROE, and other common measures. Donors can use profit grants to nudge these measures high or low as they like. In contrast, the measures in this framework do not change when a dollar shifts from equity grants to profit grants.

a. Revenue grants

Revenue grants *RG* are cash gifts. They are just like equity grants except for the accounting choice of how to record them. Revenue grants increase net worth. They pass through the income statement and so inflate accounting profit. But grants are not revenue since they do not come from the business of the MFO. To count them as revenue misleads the user of financial statements.

b. Discounts

Discounts are the fourth and fifth forms of subsidized funds. Discounts are costs absorbed by donors and not recorded as expenses by the MFO. Discounts are non-cash gifts. Discounts increase the cash of the MFO since they save the MFO from the need to spend cash.

i. Discount on soft debt

The discount on soft debt is $D \cdot (m - c)$, where D is average soft debt, m is the opportunity cost of soft debt for the market, and c is the rate the MFO paid for soft debt:

$$\begin{aligned} \text{Discount soft debt} &= \text{Ave. soft debt} \cdot (\text{Opp. cost soft debt} - \text{Rate paid}), \\ &= D \cdot (m - c). \end{aligned} \tag{5}$$

Like all discounts, discounts on soft debt are subsidized funds. They inflate profit and boost net worth since they cut expenses. In contrast, the soft debt itself is not subsidized. For an MFO, soft debt is not equity but liability. Soft debt is like market debt linked to a grant of $D \cdot (m - c)$ (IADB, 1994). Unlike discounts on soft debt, soft debt itself does not wind up in net worth. If a donor pays m to borrow D on the market and relends it to an MFO at a rate of c, then the budget earmarked for the poor loses not D but $D \cdot (m - c)$.

The rate paid on soft debt c is the ratio of the expense for interest on soft debt to the average soft debt D:

$$c = \frac{\text{Expense for interest for soft debt}}{\text{Ave. soft debt}}. \tag{6}$$

The best way to estimate average soft debt D is to track the dates and the amounts of each inflow and outflow and then to find the average daily balance. But most MFOs balk at releasing such detailed data. Still, most MFOs will give data on the stock of the loan portfolio each month. As a second-best guess, the analyst might assume that the stock of soft debt changes in step with the stock of the loan portfolio. This means average soft debt D is a multiple α of half the sum of start soft debt D_0 and end soft debt D_1:

$$D = \alpha \cdot (D_0 + D_1)/2. \tag{7}$$

The conversion factor α is the ratio of the average loan portfolio with frequent data to the average loan portfolio with just year-end data (Appendix 5 on page 112). If the analyst has just year-end data or if the rate of growth of the loan portfolio was constant, then $\alpha = 1$.

ii. Discounts on expenses

Discounts on expenses DX are costs absorbed by donors that the MFO does not record as expenses. Classic examples are technical help, exemptions from reserve requirements, free deposit insurance, coverage of organization costs or feasibility studies, debt guarantees, fees for consultants, classes for loan officers, and travel for workers. Exemption from taxes is treated separately. In-kind grants of assets recorded in the accounts, such as gifts of computers or trucks, must be linked to direct grants, not to discounts on expenses.

Much of the work is to track discounts on expenses. The discounts are common and take a plethora of forms. Most leave no trace in the financial statements. The analyst must ask for a list of discounts on expenses, and most donors and MFOs are loath to confess to them.

3. True profit

True profit TP, a non-cash equity grant, is the sixth form of subsidized funds (Table 3 on page 23). The poor own true profit, but they let the MFO keep it instead of withdrawing it to use

elsewhere. True profit is accounting profit *AP* less profit grants (equation 4 on page 24):

$$\begin{aligned} \text{True profit} &= \text{Accounting profit} - \text{Profit grants}, \\ TP &= AP - [RG + D \cdot (m - c) + DX]. \end{aligned} \tag{8}$$

True profit is what an MFO without profit grants would earn for owners. The poor, through donors, own a portion β of true profit. If donors choose not to withdraw this claim, then true profit is a like a grant injected in net worth. Positive true profit is a benefit. It increases net worth and thus increases the claim of the poor on an MFO. Negative true profit (true loss) is a cost. It decreases net worth and thus decreases the claim of the poor on an MFO.

4. How the form of subsidized funds matters

In the short term, the form of subsidized funds does not matter for measures of cost. If it did, then donors or accountants could change costs without changing business performance. All else constant, the measures of cost in this framework do not change if, for example, a donor shifts a dollar of support from a discount on soft debt to public paid-in capital. The suggested measures are invariant to the form of subsidized funds.

Net worth increases by one dollar when a donor injects one dollar of subsidized funds in any form. All six forms have the same cost since they all wind up in net worth. Their cost is the opportunity cost of equity, the return the funds could earn for their owners in their best other use.

All six forms of subsidized funds increase net worth. Direct grants and public paid-in capital go straight to equity. Revenue grants also increase equity, but they pass through accounting profit first. For all grants, the subsidy is not the subsidized funds in the grant itself but rather the opportunity cost of the extra net worth caused by the grant.

Like revenue grants, discounts on soft debt and discounts on expenses increase net worth. The discounts deflate expenses and thus inflate profit and equity. As with grants, the subsidy is not the discount but rather the opportunity cost of the extra net worth.

The form of subsidized funds does not change the effect of the funds on net worth and thus does not change measures of cost. For example, net worth changes the same whether an MFO gets a grant of $D \cdot (m - c)$ and then pays m on D of market debt or whether it gets D of soft debt linked to a discount on soft debt of $D \cdot (m - c)$. Likewise, net worth changes the same whether an MFO pays DX for an analyst and then gets a grant worth DX or whether a donor pays for the analyst in the first place.

True profit and exemption from taxes on true profit are like equity grants. They increase net worth but do not change revenues or expenses. True profit adds to the funds earmarked to help the poor. True losses subtract from these funds. True profit (loss) is like a transfer from an MFO to the poor matched with an equal transfer from the poor back to the MFO. Exemption on taxes on true profit works the same way, except the MFO gets no tax break unless true profit exceeds zero.

In the long term, the form of subsidized funds matters for business performance since some forms may buy long-lived assets. Donors can use this fact to pick the forms that strengthen an MFO the most. As a rule, technical help is the best way to use subsidies to cut the need for subsidies. If donors must give cash, then they should buy shares (Schreiner, 1997). These are the best bets since they give donors the most control over an MFO, should they choose to wield it. A big part of control is the power to measure.

Chapter 4: Sustainability

"The poor you will have always with you." Mark 14:7

Performance is meeting goals. *Sustainability* is meeting goals now and in the long term. Sustainability looks to the future. It matters since the poor we will have always with us. Sustainability is not an end in itself. It is just a means to the end of improving the lot of the poor.

A. Why does sustainability matter?

Sustainability can be a buzzword, but permanency matters. An MFO might help the poor now, but it cannot help the poor in the future if it is gone. An unsustainable MFO can backfire to harm the poor now and in the future (Krahnen and Schmidt, 1994; Adams, Graham, and Von Pischke, 1984).

An MFO might be unsustainable yet still be the best use of funds meant to help the poor. But I think a sustainable MFO would most likely help the poor even more. A sustainable MFO helps a lot of poor people through a long time frame. In contrast, an unsustainable MFO helps just a few poor people through a short time frame. I submit that unless the discount rate is quite high, the NPW of the help for the poor from a sustainable MFO will likely exceed that of an unsustainable MFO. This framework can test the truth of this hypothesis.

Sustainability requires profits. Profits protect permanency. A sustainable MFO has so much profit that when donors leave it will not shrink in real terms nor will it reduce the size or scope of its service to the poor. Permanency matters since access to support waxes and wanes with the whims of donors and since subsidized funds fade as fads fizzle. An MFO without profits and without donors will shrink and die.

Repayment also hinges on the sustainability and permanence of the MFO. Poor customers take losses or low profits as proof of a weak, sick MFO. Dishonest debtors will not repay an ill MFO. As the expected life of an MFO shrinks and as the chance of future loans falls, the NPW of default is more likely to exceed the NPW of repayment for a debtor. Too much default weakens the MFO unto death. Dead MFOs do not help poor people.

Sustainability takes more than just profit. Just as one year of marriage does not mean happily ever after, one year of high profits and of strong performance does not mean an MFO is sustainable. Long-term financial self-sustainability requires a structure of rules and incentives and a system of organization that prompts stakeholders to adapt the rules to fit changes in the market (Figure 3 on page 28). Such permanence requires *meta-rules*—rules for making rules (Schreiner, 1995). Good meta-rules help an MFO to perform well over time without uncommon labor, luck, or leadership. MFOs live in a market environment that changes with time, and so MFOs must change too if they are to do well in the long term.

All of this means sustainability is difficult to measure. No single number cranked out of a machine can do it—not even the SDI. Only humans can forecast sustainability. Their forecasts must build on an understanding of the past and of the present and on a comprehensive knowledge of the organization, of its rules, and of what MFOs in general can do. This is why I do not suggest a direct measure of sustainability in this framework.

B. Sustainability versus self-sustainability

Sustainability is not the same as *self-sustainability*. *Sustainability* is meeting goals now and in the long term. *Self-sustainability* is meeting goals now and in the long term with

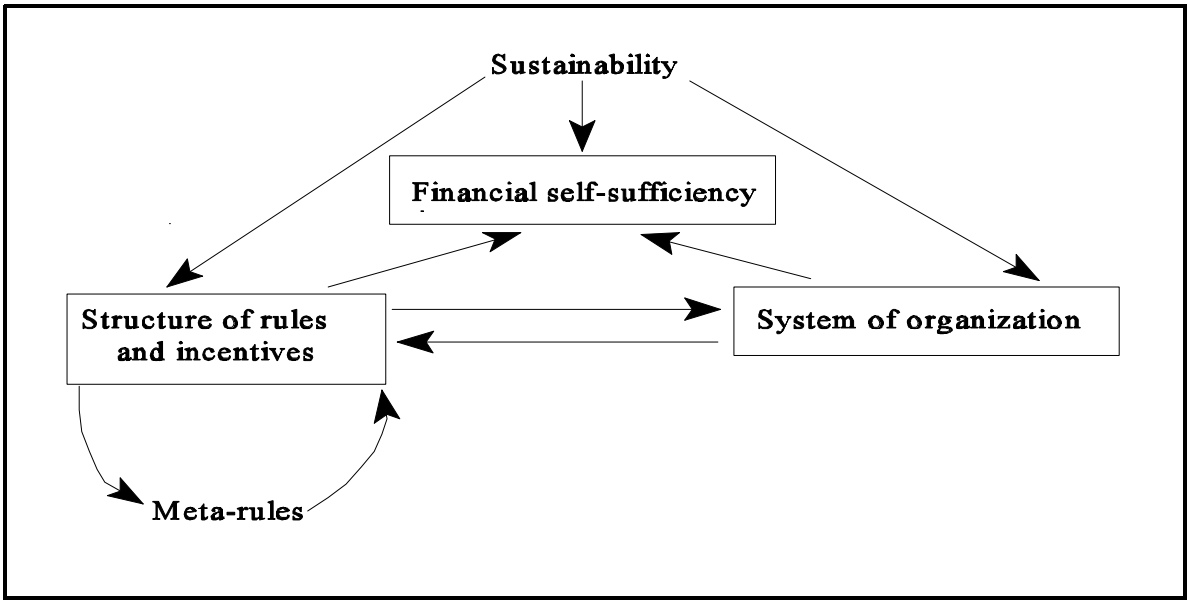

Figure 3: Three necessary conditions for sustainability

subsidized funds replaced with market funds. For example, Grameen may not be self-sustainable even though it is probably sustainable since donors will not abandon it.

Sustainability is not the same as *subsidy independence* in the framework of the SDI (Yaron, 1992b). An MFO with a weak organization and rigid rules could perform well for a time without being able to make such stellar performance last.

Sustainability requires at least financial self-sufficiency from the point of view of workers. To maintain the size and scope of its service to the poor, an MFO must maintain the real value of the subsidized funds in its equity and pay market rates for the rest of its funds.

A financially self-sufficient MFO could be sustainable while not being self-sustainable. Financial self-sufficiency does not mean that the MFO could replace all its subsidized funds with market funds. A financially self-sufficient MFO is permanent, but it might not attract investors, and so it may miss some chances to help the poor.

C. Time frames for sustainability

Self-sustainability from birth onward means an MFO could have got all its funds in the market from its first day and still have performed well. Investors would want to start this kind of MFO from scratch.

Self-sustainability from now onward means an MFO could get all its funds in the market from today forward and still perform well. Investors would want to buy into this kind of MFO.

D. Sustainability in a market niche

Microfinance sustainability means an MFO is sustainable and keeps its mission of service to the poor. The distinction matters since an MFO might gain sustainability at the cost of its mission. *Microfinance self-sustainability* means an MFO is self-sustainable and keeps its mission (Gonzalez-Vega *et al.*, 1997b).

Chapter 5: Repeated Use by Poor Customers

"Say 'yes' when you mean 'yes', and 'no' when you mean 'no'." Matthew 5:37

In this chapter, I suggest some cheap measures of repeated use by poor customers. Repeated use matters since it answers the question of whether the gains for poor customers exceed their costs. More expensive measures than those suggested here are useful only if they tell not only whether gains exceed costs but also by how much gains exceed costs. Furthermore, if poor customers repeatedly use an MFO whose discounted true profit exceeds the opportunity cost for the poor of its subsidized funds, then CBA from the point of view of the poor is moot since benefits exceed costs for both the poor as a whole and for poor customers.

A. Why measure repeated use?

Poor customers will use an MFO just as long as their gains exceed their costs. Customers could make a mistake and use an MFO once but then find out that the gain was less than the cost. But customers would not make the same mistake twice. Thus repeated use means that gains exceed costs for poor customers.

Measures of repeated use tell whether gains exceed costs for customers but it does not tell by how much. The measures are useful since they are cheap. Those suggested here require data on the stock number of loans outstanding *Out*, the flow number of new borrowers *New*, and the flow number of all loans disbursed. An MFO that cannot or will not provide these data may not be worth an analysis.

1. Loans per borrower since birth

The number of loans per borrower since birth uses T years of the flow number of all loans disbursed and of the flow number of new borrowers:

$$\text{Loans per borrower since birth}_T = \frac{\sum_{t=1}^{T} \text{Num. loans disbursed}_t}{\sum_{t=1}^{T} \text{Num. new borrowers}_t}. \qquad (9)$$

To imply repeated use, the ratio must be at least 1.5. Like all measures, this measure must be used with care. It comes with seven caveats.

First, the analyst must judge what the estimate means. For example, a ratio of 1.5 might mean that half the borrowers got two loans and half got one loan. Or perhaps one third of the borrowers got three loans and two-thirds got one loan. The analyst must judge whether the gains to repeaters outweigh the losses to one-timers.

Second, borrowers might benefit from their first loan but still not repeat. Not all people want constant debt. Some might switch to their own savings or to some other source of funds such as soon as they can.

Third, the estimate is too low. The numerator does not count loans after time T made to borrowers whose new loans are already counted in the denominator.

Fourth, the measure can fail to answer the question it was meant for. For example, borrowers may not have had time yet to get more than one loan from a young MFO. Also, quick growth by a young MFO may make the number of borrowers close to the number of loans

disbursed even if all borrowers repeat. When loans are long compared with the time frame, the measure does not tell much since it will be close to one.

Fifth, the measure can mislead if the time frame does not span the whole life of the MFO. Unless the measure starts at birth, some of the borrowers with loans counted in the numerator will not count as new borrowers in the denominator.

Sixth, the measure mixes loans and borrowers from all years. Thus, it does not measure recent repeated use well. Recent performance might matter more than lifetime performance.

Seventh, the measure does not tell why borrowers quit. They might just rest or they might get kicked out due to default. Likewise, drop-outs who do not want more loans are not the same as drop-outs who switch lenders.

Most of these drawbacks can be fixed if the MFO gives the analyst panel data of each loan to each borrower made by the MFO since birth (Schreiner, 1997). A good panel database also has the amount disbursed, the date disbursed, the length of the loan, the number of installments, the interest rate, the branch, the loan officer, and basic borrower traits such as wealth, income, sex, race, and sector.

2. The drop-out rate

The drop-out rate tells what part of those who could drop out did in fact drop out. Its time frame does not need to start at the birth of the MFO. I assume clients have just one loan at a time. The drop-out rate uses the stock number of loans at the start and end of the time frame Out_0 and Out_T and the flow number of new loans disbursed to new borrowers New_T in the time frame:

$$\text{Drop-out rate} = \frac{\text{Num. of drop-outs}}{\text{Num. who could drop out}} = \frac{New_T - (Out_T - Out_0)}{Out_0 + New_T}. \qquad (10)$$

As for all measures, people decide what is high or low (McCloskey, 1983). The drop-out rate can grow as an MFO ages without signaling worse performance since the rate of borrowers who drop out for reasons unrelated to the worth of the loan service may exceed the rate of replacement.

The drop-out rate shares the caveats of the first measure. Youth, quick growth, or long loans distort both measures since old borrowers are swamped by new ones who have not yet had the chance to drop out or to repeat. Neither measure tells whether a drop-out rested, defaulted, or just quit. Neither measure tells the reason for a drop-out.

RC&H (1997) propose a measure of the drop-out rate that replaces $Out_0 + New_T$ in the denominator equation 10 on page 30 with just Out_0:

$$\text{Drop-out rate}_{\text{RC\&H}} = \frac{New_T - (Out_T - Out_0)}{Out_0}.$$

The RC&H formula has two problems. First, Out_0 is zero at the birth of the MFO. This sends the drop-out rate since birth to math limbo. Second, the RC&H formula overstates the drop-out rate, all else constant, since the numerator counts all drop-outs but the denominator does not count all possible drop-outs since it omits new borrowers in the time frame.

3. Repayment

Repayment alone does not signal the worth of an MFO for its poor customers. They repay for one of two reasons, and one does not depend on the MFO. First, customers might repay since

the NPW of the expected stream of future loans exceeds the NPW of default. Second, honest customers, heedless of their own gain or cost, might repay to keep their word. High repayment with repeated use, however, does signal the worth of an MFO for poor customers.

4. Examples

Schreiner (1997) uses the measures suggested here to look at repeated use of loans by poor customers of Grameen and BancoSol. Both banks get repeated use, and this sends the same message as costlier and more complex studies: customers get more benefits than costs.

B. Repeated use of deposits

Measures of repeated use of time deposits are like those of repeated use of loans. It is more difficult, however, to measure the repeated use of passbook deposits. Unlike loans and time deposits, passbook deposits do not have a fixed term. They lack a point in time where the customer renews the contract or drops out. A passbook deposit held for one year does not mean repeated use in the same way that two six-month time deposits mean repeated use. Nor do frequent deposits and withdrawals signal worth.

A measure like the drop-out rate makes some sense. A measure like the number of loans per borrower makes less sense since depositors may keep an account open for any length of time and make any number or size of deposits and withdrawals without closing the account and reopening it.

The analyst needs panel data even more for deposits than for loans. Panel data can reveal whether small depositors keep a pittance in an account for years while big depositors come and go. It can tell whether depositors who leave tend to come back.

Chapter 6: Private Profitability for Investors

"Why didn't you put my money in a bank so I could have it back now with interest?" Luke 19:23

In this chapter, I review the framework of the standard Subsidy Dependence Index (Yaron, 1992a and 1992b) as a measure of private profitability for an investor. The standard SDI is a ratio. The numerator is the unpaid opportunity cost of equity for an investor less true profit. The denominator is revenue from lending. The SDI answers the question: Could an MFO replace all its public funds with market funds and still break even? Such an MFO is privately profitable.

I adjust the standard SDI to account for taxes. The SDI works just in short time frames. For long time frames, I suggest a new twist on an old measure of private profitability: the net present cost for an investor of flows of funds between an investor and an MFO (NPC_I). The NPC_I has the same content as NPW. Like the SDI, the NPC_I does not measure sustainability nor social costs. Unlike the SDI, the NPC_I discounts flows and so works in any time frame. I suggest a way to compare the NPC_I with revenue from lending in any time frame.

Like NPW, the NPC_I tells an investor whether an MFO is a good investment. With a time frame started at birth, the NPC_I can tell whether an investor would want to start a new MFO like the MFO analyzed. In one-year time frames, the NPC_I measures private profitability better than the SDI.

This chapter has two parts. In the first part, I review the logic and the strengths of the standard SDI for an investor. Adjusted for taxes, the SDI is negative if and only if the subsidy-adjusted ROE (SAROE) exceeds the opportunity cost of equity for an investor. In the second part, I derive the NPC_I and compare it with the SDI.

Grameen and BancoSol have never been privately profitable as measured by the one-year NPC_I, although BancoSol was close by 1996. The NPC_I since birth suggests that Grameen and BancoSol will not spawn private clones. Investors might buy BancoSol now, but they will not start MFOs like BancoSol or Grameen from scratch.

A. The standard Subsidy Dependence Index

The framework of the standard SDI is the most common way to judge an MFO (*e.g.*, Gonzalez-Vega, *et al*., 1997a; Chaves and Gonzalez-Vega, 1996; Alfaro, 1996; Khandker, 1996; Christen, *et al*., 1995; Benjamin, 1994; Yaron, 1994). The standard SDI measures whether an MFO could compensate for subsidies. For an investor, this means to replace public funds with market funds and still break even. An MFO that can compensate for subsidies is privately profitable.

Common financial ratios like accounting profit and ROE can disguise the performance of a subsidized MFO since profit often reflects revenues and expenses set not by the market but by administrators (Schreiner and Yaron, 1998). The standard SDI strips grants and discounts from profit. It then assigns an opportunity cost to public funds, subtracts true profit, and compares the result with revenue from lending, the main source of revenue of the MFO.

The heart of the framework of the standard SDI is the measurement of subsidy. For an investor, subsidies are the unpaid opportunity costs of the equity of an MFO less what an MFO could pay for the use of equity without help from profit grants.

The main strength of the SDI is that, after adjustment for taxes, it has the same content as an SAROE. An MFO will have an SDI less than zero if and only if its SAROE would exceed the hurdle rate, the opportunity cost of equity for an investor.

The concept of measuring performance as the opportunity cost of equity less what a firm could pay is not unique to MFOs nor to not-for-profit firms. For-profit firms long "lost in ever darker muddles of accounting" have adopted measures based on opportunity costs (Tully, 1993; Appendix 2 on page 104). Shareholders need measures like the SDI since accounting profit and ROE do not tell whether an MFO creates or destroys wealth.

The standard SDI is a ratio. The numerator is subsidy in a year. The denominator is revenue from lending in a year. The full ratio is the percentage change in the yield on lending that, all else constant, would let an MFO replace subsidized funds with market funds (Yaron, 1992b). The SDI adjusted for taxes answers a key question: Would an MFO shrink if it replaced subsidized funds with market funds? If the SDI is zero or less, then the MFO would not shrink. Such an MFO is privately profitable. Investors would want to buy into such an MFO now.

The SDI tells how far an MFO is from being able to pay market prices for all its funds. The SDI is a positive measure. It does not prescribe raising interest rates to wipe out subsidy. A request to step on a scale is not a command to eat less. The SDI does not say that an MFO should be able to compensate for all of its subsidies with true profit.

1. The received formula of the standard SDI

Yaron (1992a) defines the standard SDI as subsidy *S* divided by revenue from lending $LP \cdot i$, where *LP* is the average loan portfolio and *i* is the yield on lending:

$$\begin{aligned} \text{Standard SDI} &= \frac{\text{Subsidy}}{\text{Revenue from lending}}, \\ &= \frac{S}{LP \cdot i}. \end{aligned} \tag{11}$$

The standard SDI is meant to be the percentage change in revenue from lending that would drive subsidy to zero (Yaron, 1992b). For example, a standard SDI of 1.00 should mean that, all else constant, a change in $LP \cdot i$ of 100 percent would wipe out subsidy. A standard SDI of zero or less means that an MFO could pay market prices for all its funds and still break even. The SAROE of such an MFO would exceed the opportunity cost of equity for an investor.

a. Subsidy, the numerator of the standard SDI

Yaron (1992a) defines the numerator of the standard SDI as subsidy *S*:

$$S = r \cdot E + D \cdot (m - c) + K - AP, \tag{12}$$

where

S = Subsidy received by an MFO,
r = Opportunity cost of equity for an investor,
E = Average equity,
D = Average soft debt,
m = Opportunity cost of soft debt for an investor,
c = Rate paid for soft debt,
K = Sum of revenue grants and discounts on expenses, and
AP = Accounting profit.

The standard SDI ignores tax. Subsidy is the sum of the opportunity cost of the equity of an MFO and of the three types of profit grants (equation 4 on page 24) less the accounting profit the MFO could use to pay for opportunity costs and still break even. Average equity includes

public and private equity since an MFO splits its return among all shareholders. *K* is "the sum of all other annual subsidies received by the DFI (such as partial or complete coverage of the DFI's operational costs by the state) . . . [it includes] all other miscellaneous subsidies that a DFI might receive. These include subsidization of training costs, free use of government facilities and vehicles, free computer facilities, full or partial exemption from the deposit reserve requirement, and full or partial guarantee by the state of loan repayment by subborrowers in default" (Yaron, 1992b, pp. 6, 12). *K* includes both revenue grants *RG* and discounts on expenses *DX*:

$$K = RG + DX. \tag{13}$$

If *K* does not include revenue grants *RG*, then subsidy *S* will depend on the form of subsidized funds. Some frameworks that change the standard SDI botch *K* since they forget it should include revenue grants *RG* (Sacay, 1996; KK&K, 1995). This makes measured subsidy *S* too low. In fact, donors could make the SDI of an MFO as low as they liked with enough revenue grants. Any SDI that has omitted revenue grants from *K* has been too low.

With *K* in hand, I rewrite subsidy *S* to show its economic logic. Subsidy from the point of view of an investor is the opportunity cost of equity less what an MFO without profit grants could pay. The opportunity cost of equity is the product of average equity *E* and the opportunity cost for an investor *r*. An MFO without profit grants could use its true profit *TP* to pay for its use of net worth. A simple formula for subsidy *S* combines the received formula of subsidy in the standard SDI (equation 12 on page 33), the formula for *K* (equation 13 on page 34), and the formula for true profit (equation 8 on page 26):

$$\begin{aligned} S &= r \cdot E + D \cdot (m - c) + K - AP, \\ &= r \cdot E + D \cdot (m - c) + RG + DX - [\,TP + D \cdot (m - c) + RG + DX\,], \\ &= r \cdot E - TP. \end{aligned} \tag{14}$$

This simple formula shows that subsidy is the opportunity cost of equity for an investor less true profit. This is the opportunity cost of the equity used by an MFO less what an MFO stripped of profit grants could pay for that equity.

b. How subsidized funds affect the SDI

The simple formula of subsidy (equation 14 on page 34) does not show how profit grants and equity grants affect the SDI. Subsidized funds enter through average equity *E*. This is the product of α (Appendix 5 on page 112) and half the sum of start and end equity:

$$\text{Ave. equity} = \alpha \cdot (E_0 + E_1)/2. \tag{15}$$

The factor α uses a stock measured more than twice a year to estimate an average stock measured just at the start and end of a year. Almost all analysts up to now have used just year-end stocks. In this case, $\alpha = 1$.

The change in equity in the year ΔE is end equity E_1 less start equity E_0:

$$\Delta E = E_1 - E_0. \tag{16}$$

I assume that dividends are paid at the end of the year and so do not affect average equity. The change in equity ΔE is the sum of private paid-in capital and the six forms of subsidized funds

injected in the year:

$$\begin{aligned}\Delta E &= E_1 - E_0, \\ &= DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX + TP.\end{aligned} \tag{17}$$

Now I can show how all six forms of subsidized funds matter for subsidy through average equity *E*. Put the formula for the change in equity in a year (equation 17 on page 35) into the general formula for average equity from year-end stocks (equation 15 on page 34). Then put the result into the simple formula for subsidy in the standard SDI (equation 14 on page 34):

$$\begin{aligned}S &= r\cdot E - TP, \\ &= r\cdot\alpha\cdot(E_0 + E_1)/2 - TP, \\ &= r\cdot\alpha\cdot(E_0 + E_0 + \Delta E)/2 - TP, \\ &= r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot[DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX + TP] - TP.\end{aligned} \tag{18}$$

This formula breaks down the logic of the subsidy in the standard SDI in three terms. The first term, $r\cdot\alpha\cdot E_0$, is the opportunity cost of the subsidized funds used through the whole year. The second term, $r\cdot\alpha/2\cdot[DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX + TP]$, is the opportunity cost of the fresh funds injected in the MFO in the course of the year. The average equity from these new funds was $\alpha/2$ of the change in stock of equity. The third term, *TP*, is the true profit that the MFO could use to pay for the opportunity costs in the first two terms. In the SDI, subsidy is unpaid cost less ability to pay cost.

The new formula of the logic of the subsidy in the standard SDI (equation 18 on page 35) has five strengths compared with the received formula (equation 12 on page 33). First, the new formula shows that an MFO compensates for the cost of its net worth not with accounting profit but with true profit. The received formula hides this since *K* hides revenue grants *RG* and discounts on expenses *DX* and since accounting profit *AP* hides *RG*, *DX*, and the discount on soft debt $D\cdot(m-c)$. In fact, the *K* and the $D\cdot(m-c)$ that are explicit in the received formula cancel with the profit grants hidden in accounting profit. This leaves true profit to pay for the opportunity cost of net worth.

Second, the new formula shows that subsidies are the opportunity cost of the use of funds in the net worth of the MFO. In the received formula, the discount on soft debt $D\cdot(m-c)$, revenue grants *RG*, and discounts on expenses *DX* seem like subsidies, not subsidized funds. If these funds were subsidies, then they would be consumed and gone in the year they were injected in the MFO. In fact, the MFO does not consume these funds unless true profit is less than zero. In principle, the owners of these funds could take them back and lose just the return they missed in the time while the MFO used the funds.

Third, the new formula shows that all six forms of subsidized funds affect subsidy in the same way. This means the SDI is invariant to the form of subsidized funds. All forms injected in past years are in starting equity E_0 and get multiplied by $r\cdot\alpha$. All forms injected in the current year are in the change in equity and get multiplied by $r\cdot\alpha/2$.

Fourth, the new formula shows that the subsidy from soft debt held in a year is not the discount on soft debt $D\cdot(m-c)$ itself but rather the opportunity cost of the use of the discount, $r\cdot\alpha/2\cdot D\cdot(m-c)$. In the received formula, soft debt looks like a subsidy.

Fifth, the new formula shows that true profit boosts equity and thus has a subsidy in the year it is earned. All revenues and expenses affect the SDI through true profit. Sacay (1996) missed this hidden effect. He damned the SDI for what he saw as its invariance to the rate paid on soft debt *c*, a factor in the expense for interest paid on soft debt. Yaron (1996) and Belli (1996b) defended the supposed invariance of the SDI to *c* and went so far as to call it a strength. In fact, the SDI does depend on the rate paid on soft debt *c*. If not, then subsidy would not change as market debt replaced soft debt. The new formula shows that a unit change in *c* changes subsidy by $-r\cdot\alpha/2\cdot D$.

The new formula exposes the guts of the subsidy in the SDI. The received formula is like the tip of an iceberg. A lot lurks hidden to wreck the analyst. Unlike the new formula, the received formula does not show that profit grants affect accounting profit and that all forms of subsidized funds affect equity and thus subsidy the same.

c. The denominator of the standard SDI

Yaron (1992a) defined the denominator of the standard SDI as revenue from lending, the product of the average loan portfolio *LP* and the yield on the loan portfolio *i*:

$$\begin{aligned}\text{Revenue lending} &= \text{Ave. loan portfolio}\cdot\text{Yield on loan portfolio},\\ &= LP\cdot i.\end{aligned} \tag{19}$$

The yield on the loan portfolio *i* is the ratio of interest and fee revenue from lending over the average loan portfolio:

$$i = \frac{\text{Interest and fees from lending}}{\text{Ave. loan portfolio}}. \tag{20}$$

The standard SDI is the ratio of subsidy (equation 12 on page 33) to revenue from lending:

$$\text{Standard SDI} = \frac{r\cdot E + D\cdot(m-c) + K - AP}{LP\cdot i} = \frac{S}{LP\cdot i}. \tag{21}$$

d. The standard SDI uses the wrong denominator

Yaron says "The SDI is a ratio that measures the percentage increase in the average on-lending interest rate required to compensate a DFI for the elimination of subsidies in a given year" (1992b, p. 5). As confessed in a footnote (p. 11), this is not quite right. The problem is that the standard SDI ignores that more revenue from lending means more true profit and thus more opportunity cost of equity. All else constant, an MFO that increased revenue from lending by the amount of the standard SDI would not drive subsidy to zero. The culprit is the denominator.

I will derive an SDI without this problem. First, write the formula of the logic of the subsidy of the standard SDI (equation 18 on page 35) so that revenue from lending appears as its own term. To do this, let *FF* be the fresh funds injected in an MFO in a year (equation 17 on page

35) less true profits *TP*:

$$\begin{aligned} FF &= [DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX + TP] - TP, \\ &= DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX. \end{aligned} \tag{22}$$

Let true expenses *TE* be the sum of expenses in the income statement, the discount on soft debt, and the discount on expenses, less revenues in the income statement except for revenue from lending and from revenue grants:

$$TE = [\text{Exp. income stmt} + D\cdot(m-c) + DX] - (\text{Rev. income stmt} - RG - LP\cdot i). \tag{23}$$

Now true profit *TP* is revenue from lending $LP\cdot i$ less true expenses *TE*:

$$\begin{aligned} LP\cdot i - TE &= LP\cdot i - \{[\text{Exp. income stmt} + D\cdot(m-c) + DX] \\ &\qquad - (\text{Rev. income stmt} - RG - LP\cdot i)\}, \\ &= (\text{Rev. income stmt} - RG) - [\text{Exp. income stmt} + D\cdot(m-c) + DX], \\ &= \text{Rev. without profit grants} - \text{Exp. without profit grants}, \\ &= TP. \end{aligned} \tag{24}$$

To isolate revenue from lending in the formula of the logic of the subsidy of the standard SDI (equation 18 on page 35), use the formula for fresh funds except for true profit *FF* (equation 22 on page 37) and the formula for true profit in terms of revenue from lending $LP\cdot i$ and true expenses *TE* (equation 24 on page 37):

$$\begin{aligned} S &= r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot[DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX + TP] - TP, \\ &= r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot(FF + LP\cdot i - TE) - (LP\cdot i - TE), \\ &= r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF - (1 - r\cdot\alpha/2)\cdot(LP\cdot i - TE). \end{aligned} \tag{25}$$

Subsidy is the sum of the opportunity cost of net worth at the start of the year and the opportunity cost of fresh funds added in the year, less true profit after using some true profit to compensate for the opportunity cost of the net worth added by true profit itself in the year.

The SDI is the percentage increase in revenue from lending that makes *S* zero. Multiply revenue from lending in equation 25 on page 37 by (1+SDI), set *S* to zero, and solve for the SDI:

$$\begin{aligned} 0 &= r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF - (1 - r\cdot\alpha/2)\cdot[LP\cdot i\cdot(1 + \text{SDI}) - TE], \\ \text{SDI} &= \frac{r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF - (1 - r\cdot\alpha/2)\cdot(LP\cdot i - TE)}{LP\cdot i\cdot(1 - r\cdot\alpha/2)}, \\ \text{SDI} &= \frac{S}{LP\cdot i\cdot(1 - r\cdot\alpha/2)}. \end{aligned} \tag{26}$$

Yaron took the denominator of the SDI as $LP\cdot i$ (equation 11 on page 33). The new denominator (equation 26 on page 37) is smaller by a factor of $(1 - r\cdot\alpha/2)$. Since $r > 0$ and $\alpha > 0$, the factor $(1 - r\cdot\alpha/2)$ is less than 1. The mended SDI (equation 26 on page 37) has the same

numerator but a smaller denominator than the standard SDI (equation 11 on page 33). Thus the standard SDI is too low to wipe out subsidy. The standard SDI assumes that all of the increase in true profit caused by an increase in revenue from lending can go to pay for the cost of equity injected in the past E_0 and in the course of the year except true profit *FF*. But true profit itself has an opportunity cost of $r \cdot \alpha/2 \cdot TP$, so just a portion $(1 - r \cdot \alpha/2)$ can compensate for the other opportunity costs. An MFO that changes revenue from lending in accord with the standard SDI will still have a subsidy, but an MFO that uses the mended SDI will not (Schreiner, 1997).

e. The standard SDI leaves out taxes

An analysis of an MFO from the point of view of society could omit taxes since taxes are transfer payments between two parts of society (Gittinger, 1982). The SDI, however, takes the point of view of an investor. As certain as death, an MFO owned by private investors would not be tax-exempt. When investors contemplate ownership of an MFO, they will not forget that taxes come with profits.

The standard SDI omits taxes, not since they cancel out from the point of view of society but since "tax exemption rarely has a major impact on DFI financial performance" (Yaron, 1992b, p. 5, 9). It is true that a subsidized MFO, or an unsubsidized MFO with losses, would not pay taxes. But the SDI asks how far an MFO is from survival in a world without public help. It tells the change in revenue from lending that, all else constant, would make profit as big as the unpaid opportunity cost of market funds. This requires positive profits and thus taxes. If the SDI omits taxes, then the increase in revenue from lending will not be enough to wipe out subsidies since some of the increase will go to pay for increased taxes.

Yaron says that "using before-tax data to assess DFIs would engender simplicity and uniformity" (1992b, p. 5). This is true. The SDI is a bit more complex with taxes added. But wise investors consider taxes since taxes can cut returns a lot. It is also true that the use of before-tax data is uniform—just as uniform as the use of after-tax data.

An MFO on its own in the market would not last long without profit. If such an MFO made a profit, then it would pay taxes. Most governments would not let a profitable MFO owned by investors keep its tax-exempt, not-for-profit status.

For an MFO without public help, accounting profit is the same as true profit. If true profit in such an MFO were more than zero, then the MFO would pay a portion τ as tax. If true profit were less than zero (true losses), then the MFO would not pay tax. Tax for a for-profit MFO is:

$$Tax = \tau \cdot \max(0,\ TP), \tag{27}$$

where

$$\max(0,\ TP) = \begin{cases} 0 & \text{if } 0 \geq TP, \\ TP & \text{if } TP > 0. \end{cases}$$

The tax paid *Tax* is not the same as the tax rate τ. The tax paid *Tax* depends on true profit. It could zero or more than zero. The tax rate τ does not depend on true profit. It is a constant, $1 > \tau > 0$. With positive true profit, true profit net of tax is $TP \cdot (1 - \tau)$. With negative true profit, true profit net of tax is just *TP*, not $TP \cdot (1 - \tau)$.

Subsidy with tax subtracts the tax paid *Tax* from true profit in the formula with revenue from lending as its own term (equation 25 on page 37):

$$S = r \cdot \alpha \cdot E_0 + r \cdot \alpha/2 \cdot FF - (1 - r \cdot \alpha/2) \cdot (LP \cdot i - TE - Tax). \tag{28}$$

The SDI is the percentage change in revenue from lending that would wipe out subsidies even though the MFO pays tax as soon as profits exceed zero. This SDI is derived just like the standard SDI (equation 26 on page 37). If subsidy is zero, then true profit must be positive since the opportunity cost of equity is positive. If true profit is positive, then $Tax = TP \cdot \tau$. In turn, $TP - Tax = TP - TP \cdot \tau = TP \cdot (1 - \tau)$. Since $TP = LP \cdot i - TE$ (equation 24 on page 37), $TP - Tax = (LP \cdot i - TE) \cdot (1 - \tau)$. Set subsidy S (equation 28 on page 38) to zero, multiply revenue from lending by (1+SDI), and solve for the SDI:

$$0 = r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot FF - (1 - r \cdot \alpha / 2) \cdot [LP \cdot i \cdot (1 + \text{SDI}) - TE] \cdot (1 - \tau),$$

$$\text{SDI} = \frac{r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot FF - (1 - r \cdot \alpha / 2) \cdot TP \cdot (1 - \tau)}{LP \cdot i \cdot (1 - r \cdot \alpha / 2) \cdot (1 - \tau)}. \quad (29)$$

From now on, the term *SDI* will refer to equation 29. The term *standard SDI* will refer to the SDI of Yaron (1992a and 1992b). The new measure of subsidy and the SDI (equation 28 on page 38 and equation 29 on page 39) are mildly more complex than the standard measures (equation 14 on page 34 and equation 21 on page 36). The new measures are better since they are much closer to what a private investor would want to use.

To check that the SDI (equation 29 on page 39) drives subsidy to zero, put it into the measure of subsidy S (equation 28 on page 38), noting that Tax is $\tau \cdot (LP \cdot i - TE)$ since $TP > 0$ from the constructed increase in revenue from lending:

$$\begin{aligned}
S &= r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot FF - (1 - r \cdot \alpha / 2) \cdot \{ LP \cdot i \cdot (1 + \text{SDI}) - TE - \tau \cdot [LP \cdot i \cdot (1 + \text{SDI}) - TE] \}, \\
&= r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot FF - (1 - r \cdot \alpha / 2) \cdot (1 - \tau) \cdot [LP \cdot i \cdot (1 + \text{SDI}) - TE], \\
&= r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot FF - (1 - r \cdot \alpha / 2) \cdot (1 - \tau) \\
&\qquad \cdot \left(LP \cdot i \cdot \left[1 + \frac{r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot FF - (1 - r \cdot \alpha / 2) \cdot (LP \cdot i - TE) \cdot (1 - \tau)}{LP \cdot i \cdot (1 - r \cdot \alpha / 2) \cdot (1 - \tau)} \right] - TE \right), \\
&= r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot FF - (1 - r \cdot \alpha / 2) \cdot (1 - \tau) \cdot (LP \cdot i - TE) \\
&\qquad - r \cdot \alpha \cdot E_0 - r \cdot \alpha / 2 \cdot FF + (1 - r \cdot \alpha / 2) \cdot (1 - \tau) \cdot (LP \cdot i - TE), \\
&= 0.
\end{aligned}$$

The logic behind the SDI is that true profits compensate not only for the opportunity cost of E_0, of FF, and of true profit itself, but also for taxes. If true profits are less than zero (Figure 4 on page 40), then a unit increase in revenue increases true profit by one unit but decreases subsidy by just $(1 - r \cdot \alpha / 2)$. Subsidy does not decrease one-for-one since the increased revenue increases equity and its opportunity cost. The MFO must increase revenue by $-TP$ just to get true profit up to zero. Once true profit is more than zero, a unit increase in revenue still increases true profit by one unit, but now it decreases subsidy by just $(1 - r \cdot \alpha / 2) \cdot (1 - \tau)$ since part of profit now goes to pay for increased taxes as well as for the increased opportunity cost of equity. Figure 5 on page 41 shows the case with $TP > 0$.

Most analysts forget that the SDI is a relative measure. It relates the subsidy-free yield to the current yield. The current yield changes between years and between MFOs. Thus, the SDI alone is not a good way to compare MFOs, even if they are peers.

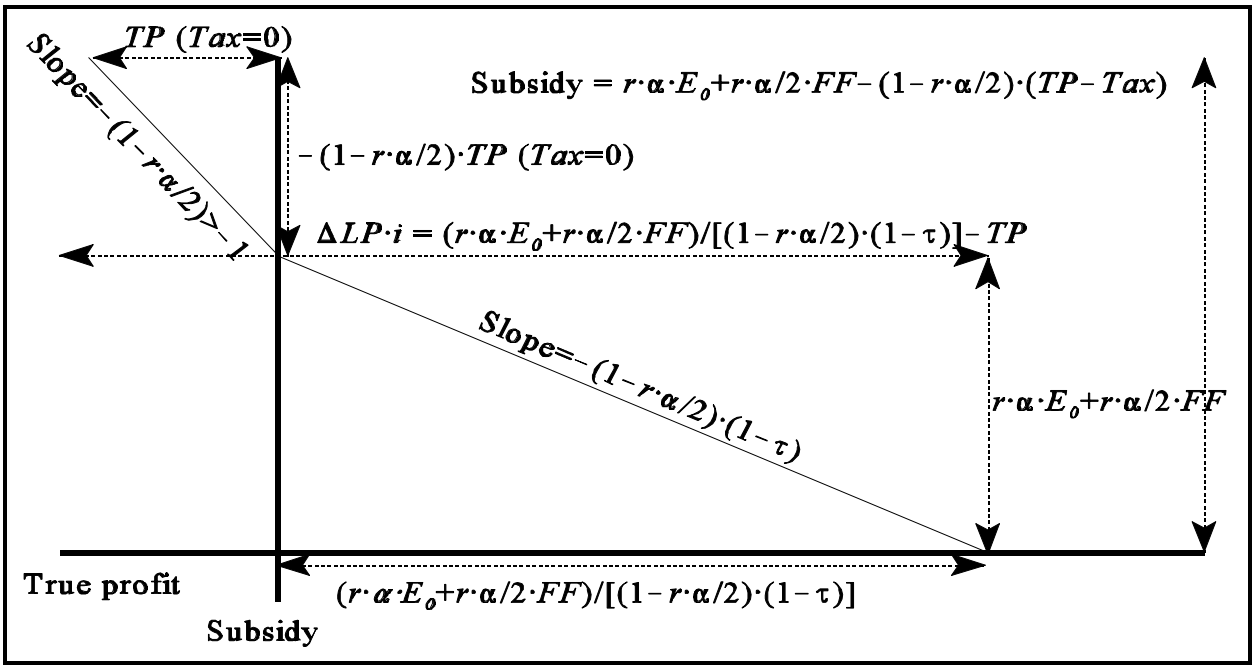

Figure 4: Subsidy and change in revenue from lending with true profit less than zero

Sometimes the combined use of the current yield, the change in the current yield, and the subsidy-free yield can hint how an MFO might improve or how an MFO used its subsidy. For example, a low subsidy-free yield combined with a low current yield and a high change in the current yield suggest that prices are too low. In contrast, a high current yield and a low change in the current yield suggest that an MFO might need to cut costs to improve. A high current yield and a high change in the current yield suggest a weak MFO unless it is young and can improve fast. An MFO that has reduced its subsidy-free yield in each year for a long time likely used a lot of its subsidy to strengthen itself rather than to reduce the price paid by customers.

i. Why does the SDI compare subsidy to revenue from lending?

The heart of the framework of the SDI is the measurement of subsidy. The comparison of subsidy to revenue from lending matters, but it matters less than the measurement of subsidy itself. Subsidy depends on many factors, and the analyst could compare subsidy with any or all of them. While Yaron (1992a and 1992b) focused on revenue from lending, he also highlighted loan repayment, deposit mobilization, and administrative costs.

The choice to focus on revenue from lending makes sense for three reasons. First, an MFO must cover the cost of market funds with revenue from lending in the long term. Otherwise, it will collapse when donors withdraw.

Second, revenue from lending is by far the biggest revenue or expense. In practice, the best way to cut subsidies in the short term may be to charge more for loans. For example, expenses cannot fall by more than 100 percent. Also, the MFO is a price-taker in its investments and so cannot increase those revenues much without a drastic increase in risk.

Third, an MFO sets fees and interest rates by decree. An MFO can change them when it wants with just a stroke of the pen. In principle, higher fees and interest rates can dampen demand and prompt loan losses (Morduch, 1997; Stiglitz and Weiss, 1981). In practice, few MFOs have doused demand or spawned a rash of defaults with price hikes (Rosenberg, 1996).

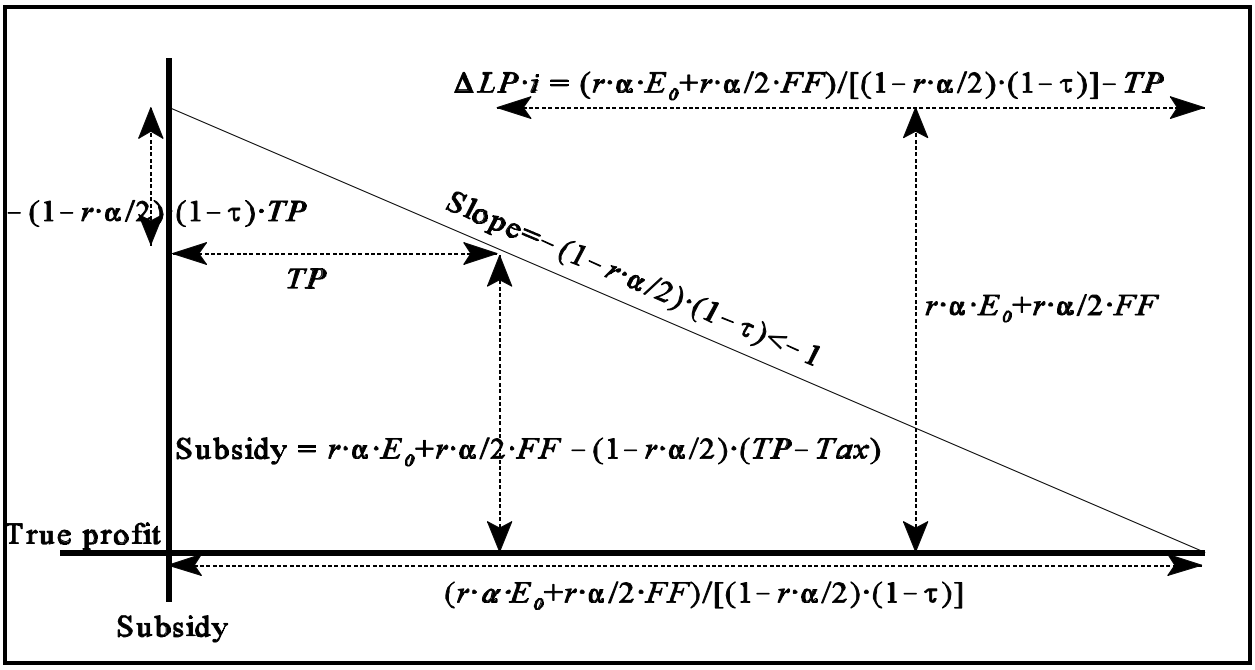

Figure 5: Subsidy and change in revenue from lending with true profit more than zero

For example, high rates did not seem to affect demand or default at BancoSol nor at Grameen (Schreiner, 1997).

ii. Other items to compare with subsidy

Subsidy can be compared with anything in units of dollars per unit of time. For example, it is useful to compare true profit less tax with average equity or with average assets to make a subsidy-adjusted ROE (SAROE) or a subsidy-adjusted ROA (SAROA). If subsidy is less than zero, then the SAROE will be higher than its hurdle rate, the opportunity cost of an investor.

There are many ways for an MFO to respond to the loss of subsidy or to increase its private profitability (Alfaro, 1996; Yaron, 1992b). For example, it could slash administrative costs, dun borrowers more, grow the loan portfolio, or boost the physical productivity.

All comparisons require care. Subsidy cannot be compared with outputs unless the time frame begins at the birth of the MFO. Otherwise, some outputs in the time frame were caused by past subsidies, and some subsidies in the time frame will cause future outputs. For example, an MFO might grow without subsidies and then get a small soft debt in its tenth year. The ratio of subsidy to output is low in that year, so the subsidy seems highly productive. In fact, the subsidy did not cause all the output.

In any case, it does not make sense to compare costs as seen by investors with outputs. Society might compare costs with outputs in cost-effectiveness analysis, but subsidy for society is not the same as subsidy for an investor.

2. Weaknesses of the standard SDI

The standard SDI has four weaknesses as a measure of private profitability for an investor. First, it uses the wrong denominator and omits taxes. I patched this above. Second, the standard SDI claims to take the point of view of society, not of investors. Third, the SDI does not measure self-sustainability. A negative SDI is needed for self-sustainability, but it is not enough. Fourth, like all accounting measures, the standard SDI does not discount flows and so cannot measure

performance in long time frames. Below, I suggest a measure that does discount flows.

a. The point of view of the standard SDI

Yaron (1992a and 1992b) designed the standard SDI as a simple tool to check the financial performance of a DFI in one year. The SDI combines accounting data with shadow prices. The opportunity cost and the treatment of taxes determine whether the SDI takes the point of view of society or of investors.

Yaron wanted the standard SDI to measure social costs (1992b, pp. title, iii, v, 1, 4, 8, 22; YB&P, 1997, pp. 7, 45, 87, 92, 139, 140). He called it "a public-interest analysis" that takes "full account of the overall social costs." It measures "the social cost of a DFI" as needed to check "the social justification of [its] existence" (1992b, p. 4). In line with the point of view of society, Yaron says that "assigning a cost to equity accounts for the opportunity cost of the government" (p. 8). This opportunity cost is the return both in cash and in welfare gains that society could get in the best use of its funds. Also like a social measure, the standard SDI omits taxes.

Yet parts of the framework seem to take the point of view of an investor. Yaron says self-sustainability "assumes a profit-maximizer's approach" (p. 5). Society wants both cash and improved welfare, but investors want just profit, and improved welfare for the poor need not help to make an MFO self-sustainable. One suggested opportunity cost is "the cost the DFI would have to pay for its funds if access to concessional funds were eliminated," adjusted for risk, term, and other factors (pp. 7, 18). This is what a DFI would pay to replace public funds with market funds. It is the opportunity cost of an investor.

In practice, Yaron (1994, 1992a, 1992b) uses the opportunity cost of an investor. But this is a poor proxy for the opportunity cost of society. For example, market failures cause market prices to diverge from the opportunity cost of society (Markandya and Pearce, 1991).

The standard SDI takes the point of view of society but uses the point of view of an investor. I want to make a clean break between the two points of view. I want to use the SDI to answer the question of private profitability for an investor. Social CBA is much more complex.

b. The standard SDI and self-sustainability

The standard SDI is part of a two-pronged framework for the measurement of the performance of MFOs (Yaron, 1992a). The first prong is *outreach*—the depth, breadth, quality, and cost of the output of an MFO as seen by poor customers. The framework of the standard SDI does not suggest a formal way such as CEA to compare costs with outreach.

The second prong is self-sustainability. Yaron says that a standard SDI of zero implies full self-sustainability (1992b, pp. 5, 7). I submit that an SDI less than zero just means the MFO could replace public funds with market funds and still break even. Such an MFO has been privately profitable, but it may or may not be self-sustainable in the future.

Self-sustainability requires much more than private profitability. It also requires a strong organization and a flexible structure of incentives to prod stakeholders to maintain good performance as the market environment changes (Figure 3 on page 28; Schreiner, 1997b). Thus an SDI less than zero is needed for self-sustainability, but it is not enough. An MFO could have a negative SDI for a short time thanks to uncommon luck, labor, or leaders. But the MFO might not perform as well when luck ends, workers tire, or leaders die.

Private profitability is not enough for self-sustainability since an MFO may reach it but yet shrink in size, switch its market niche, charge more, or make a worse product. A negative SDI may imply financial self-sustainability, but not overall self-sustainability. To buy an MFO, an investor would want to know much more than just the SDI. A negative SDI implies subsidy

independence, but since self-sustainability involves non-quantifiable, non-financial concepts, simple financial ratios such as the SDI cannot measure self-sustainability.

c. The SDI does not discount flows

But for its use of shadow prices, the SDI is an accounting measure. Like all accounting measures, the SDI does not discount flows of funds by when they take place. Thus the SDI works just in time frames so short that the analyst can ignore the time value of money. ROE for private firms has this same weakness.

The SDI is still a good way to check private profitability in short time frames. But a discounted measure such as NPW is better no matter how short the time frame. In any case, investors look at the long term when they buy or start an MFO. Investors who plan to sell their stock soon still care for the long term since the price of the stock at the end of their time frame depends on the expected performance of the MFO after that point. Investors trade an outflow of cash now for a stream of cash inflows in the future. A dollar now is worth more than a dollar later, so investors would discount flows to put them in a common unit. Compared with discounted measures such as NPW, undiscounted measures such as the SDI can lead to bad choices (Appendix 1 on page 102).

Newborn MFOs, just like all new firms, lose money until time and growth spread start-up costs and sharpen technology. Both investors and society judge MFOs not only in the last year but also in longer time frames. The SDI cannot help them to do this.

3. Strengths of the SDI

a. The SDI as a subsidy-adjusted ROE

A negative SDI implies a subsidy-adjusted ROE (SAROE) above the opportunity cost of equity for an investor. This is its biggest strength. It tells whether an MFO could pay market prices for its subsidized funds. An SAROE compares true profit after tax with the opportunity cost of equity. ROE uses profit after tax, so the standard SDI cannot be seen as an SAROE.

ROE is the single most-common accounting measure of private profitability (Stickney and Weil, 1994; Brigham and Gapenski, 1993; Koch, 1992). A measure like ROE for subsidized MFOs would be useful since most users of financial analysis know and understand ROE better than the SDI (Christen, 1997). ROE compares accounting profit less tax with average equity:

$$\text{ROE} = \frac{\text{Net income}}{\text{Average Equity}} = \frac{AP - Tax}{E}. \qquad (30)$$

ROE is not a good measure of the financial performance of a subsidized MFO since it depends on the form accountants and donors give to subsidized funds (Schreiner and Yaron, 1998). The SAROE solves this problem. A privately profitable MFO would have an SAROE higher than its hurdle rate, the opportunity cost of its equity for the market r.

Investors can use SAROE to compare subsidized MFOs with unsubsidized peers. This is the standard way to benchmark the performance of banks (Christen, 1997; Barltrop and McNaughton, 1992; Koch, 1992). The SDI is less useful for peer comparisons since it measures subsidy relative to revenue from lending, and this is not an input used by the MFO.

Yaron hints once that the SDI is equivalent to an SAROE, saying that subsidy is less than zero when "the return on equity, net of any subsidy received, equals or exceeds the opportunity cost of funds" (1992b, p. 5). To see this, set the formula for subsidy S to zero or less (equation 28 on page 38). Note that $\alpha \cdot E_0 + \alpha/2 \cdot FF + \alpha/2 \cdot (TP - Tax) = E$ (equation 17 on page 35 and equation

22 on page 37), and solve for *r*:

$$\begin{aligned} 0 &\geq r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF - (1 - r\cdot\alpha/2)\cdot(LP\cdot i - TE - Tax), \\ &\geq r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF + r\cdot\alpha/2\cdot(TP - Tax) - (TP - Tax), \\ &\geq r\cdot E - (TP - Tax), \\ \frac{TP - Tax}{E} &\geq r. \end{aligned} \tag{31}$$

The left-hand side is ROE since, without profit grants, accounting profit is true profit. For an unsubsidized MFO, the ROE compares true profit with the opportunity cost of equity for an investor. For a subsidized MFO, the SAROE does this. Subsidy in the SDI is a difference comparison of costs and ability to pay for costs; SAROE is a ratio comparison. Subsidy is to SAROE as cost-benefit analysis is to cost/benefit analysis.

The framework of the SDI is not the only way to get an SAROE for a subsidized MFO. Christen (1997) suggests an elegant approach that adjusts the financial statements themselves so that standard measures like ROE answer the questions they purport to answer. This is nice since it uses a framework that analysts already know and understand.

For peer comparisons, a subsidy-adjusted return on assets (SAROA) is better than an SAROE since an SAROA removes the effects of financial leverage. An SAROA has average assets in the denominator instead of average equity (Schreiner and Yaron, 1998).

b. Other strengths of the standard SDI

The standard SDI has other strengths (Schreiner and Yaron, 1998). First, it shifts the paradigm from accounting prices to opportunity costs. Second, it highlights taking deposits and covering costs with revenue from lending. Third, it measures costs, which is cheap, and eschews measuring benefits, which is expensive. Fourth, it is simple and well-known.

4. Examples of the standard SDI, the SDI, and SAROE

a. BancoSol

i. The standard SDI

The standard SDI of BancoSol fell each year since birth and stood at 5 percent in 1996 (line s of Table 4 on page 47). A change of 5 percent in the current nominal yield of 40 percent (line t) would be two percentage points (line u, 0.40·0.05 ≐ 0.02), and the nominal subsidy-free yield would be 42 percent (line v, 0.40+0.02 ≐ 0.42). The real subsidy-free yield would be 32 percent (line x). I do not want to dwell on the standard SDI. It is too low since it ignores taxes and uses the wrong denominator. A yield of 42 percent in 1996 would not have made subsidy zero for BancoSol.

Do not compare the standard SDI of BancoSol here with the standard SDI in Hulme and Mosley (1996), Agafonoff (1994), or Benjamin (1994). Hulme and Mosley (1996) report an average standard SDI in 1988-92 of 135 percent. This average does not make sense since the average of ratios is not the ratio of the average numerator to the average denominator. Agafonoff (1994) ignores all subsidies on equity and uses the wrong opportunity costs to find an SDI of -5 percent. Benjamin (1994) does not compute the SDI but rather finds the opportunity cost for an investor that would make the SDI zero.

ii. The SDI

The SDI in 1996 was 12 percent (line w of Table 5 on page 48). All else constant, this means that an increase of 12 percent in the yield from lending would push the SAROE past the opportunity cost of equity for an investor. The standard SDI of 5 percent and the SDI of 12 percent differ due to taxes and due to the opportunity cost of the true profit built up in the year.

The current nominal yield in 1996 was 40 percent (line x), so the change to reach the subsidy-free yield was $0.40 \cdot 0.12 \doteq 0.05$ (line y). The nominal subsidy-free yield was thus $0.40+0.05 \doteq 0.45$ (line z). The real subsidy-free yield was 34 percent (line bb).

For most MFOs, an SDI of 12 percent and a real subsidy-free yield of 34 percent are low. With all else constant and with the SDI of an MFO held at zero, the poor gain more the lower the real subsidy-free yield. But neither a low SDI nor a low subsidy-free yield mean that BancoSol was the best way to help the poor. They mean that investors who do not care about the poor may take a close look at BancoSol as a way to get rich.

The SDI does not prescribe that BancoSol should increase its nominal yield on lending. Indeed, the SDI has fallen since 1992 in spite of a fall in the nominal yield from 63 percent in 1992 to 40 percent in 1996 (line x of Table 5 on page 48). I do not claim BancoSol should use its profits to court investors. But if BancoSol did want to attract investors, then five more percentage points in its nominal yield might do the trick. BancoSol could also increase profits in some other way. Still, as long as the competition allows it, BancoSol could earn a real yield of 34 percent per year. For example, demand did not flag and default did not soar in 1991-93 as the customers of BancoSol paid real rates of 37, 49, and 42 percent (Schreiner, 1997).

The SDI has fallen in each year since birth. From more than 700 percent in 1987, it fell to 55 percent in 1992. It was near 17 percent in 1994 and 1995 (line w of Table 5 on page 48). The amount of subsidy per year peaked at about $2.1 million in 1993 (line v). Since then, it has fallen each year. In 1996, the subsidy was about $1.1 million.

BancoSol may or may not get an SDI of zero in the next years. It must compete more and more with other MFOs, and it must deal with diminishing returns to new branches. My goal here is not to analyze BancoSol but to give an example of the use of the framework. Gonzalez-Vega *et al*. (1997a and 1997b) analyze BancoSol.

iii. The subsidy-adjusted ROE

Since BancoSol got profit grants in all years, SAROE is less than ROE in all years except 1993 (lines k and l of Table 6 on page 49). Since the SDI was positive in all years, the SAROE was less than the hurdle rate in all years (lines l and m).

In most years of the PRODEM era from 1987-91 (Appendix 8 on page 119), the SAROE was negative even though revenue grants and discounts on soft debt made accounting profit and thus ROE positive (lines k and l). True profit after tax (line h), however, was negative until 1993. In each the first three years, SAROE was so negative that BancoSol would have consumed all its net worth without help from donors (line l).

In the mixed and BancoSol eras from 1992-96, ROE approached SAROE. Profit grants accrued on just a small amount of soft debt. By 1996, ROE and SAROE were 17 and 16 percent (lines k and l). Still, this SAROE was half the hurdle rate of 33 percent (line m). BancoSol had a true profit after tax in 1996 of about $1.1 million, and it had a subsidy of about $1.1 million (lines u and v of Table 5 on page 48). Thus BancoSol would have to double true profit after tax to wipe out subsidy. This would double the SAROE and make it match the hurdle rate.

In sum, a one-year investment in BancoSol would not yet earn a market return without help from donors. If private investors had bought BancoSol at the start of 1996 and sold it at the

end of 1996, they would have earned about $1.1 million less than in an investment of like risk. This assumes no returns from the capitalization in stock prices of expected improvements in performance in the future.

Given the estimated hurdle rate, BancoSol is far from attracting investors driven by greed. This may matter in the next few years since some of the shares owned by public entities will eclipse sunset clauses and must be sold to private entities.

In the terms of Yaron (1992b), BancoSol was almost subsidy-independent by 1996. This places it in the top rung of all MFOs in the world. In the terms of an investor, BancoSol had an SAROE below the hurdle rate.

This does not address whether BancoSol was worthwhile for the poor. Nor does it address self-sustainability. The SDI does not answer those questions. Nor does the SDI tell whether the low SDIs in recent years resulted from high SDIs in the first years. I will suggest a long-term SDI to address this question.

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Opp. cost equity, r	Data	0.46	0.38	0.43	0.34	0.27	0.25	0.27	0.29	0.32	0.33
b.	Alpha	Data	0.60	1.00	0.81	0.86	0.79	0.68	0.71	0.93	0.83	0.86
c.	Start equity, E0	Data	0	125	220	361	1,960	3,246	10,030	11,282	7,164	7,306
d.	End equity, E1	Data	125	220	361	1,960	3,246	10,030	11,282	7,164	7,306	8,220
e.	**Average equity, E**	b*(c+d)/2	37	172	236	1,003	2,049	4,488	7,591	8,613	5,975	6,646
f.	Exp. int. soft debt	Data	9	27	53	69	70	63	203	119	78	41
g.	Ave. soft debt, D	Data	102	344	603	893	1,091	973	1,145	1,530	715	470
h.	**Rate paid soft debt, c**	f/g	0.08	0.08	0.09	0.08	0.06	0.06	0.18	0.08	0.11	0.09
i.	m, Opp. cost, soft debt for debt	Data	0.33	0.28	0.30	0.27	0.22	0.21	0.21	0.19	0.19	0.20
j.	**Disc. soft debt, D*(m-c)**	g*(i-h)	25	70	129	172	168	143	36	170	59	52
k.	Rev. grants, RG	Data	109	157	135	226	243	0	0	0	0	0
l.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	4	0	0
m.	**K**	k+l	109	157	135	226	243	0	0	4	0	0
n.	Accounting profit, AP	Data	21	69	(54)	103	185	(131)	46	1,471	880	1,512
o.	**Standard subsidy, S**	i*e+j+k-n	130	223	421	634	779	1,418	2,053	1,168	1,100	757
p.	Rev. lending, LP*i	Data	23	128	274	863	1,864	3,761	8,522	13,237	12,494	14,633
q.	End loan portfolio, LP	Data	213	488	1,151	2,911	5,188	12,472	30,964	35,856	37,436	47,159
r.	Ave. loan portfolio, LP	b*[q(t-1)+q]/2	63	351	668	1,757	3,189	5,970	15,471	31,201	30,265	36,212
s.	**Standard SDI**	o/p	5.63	1.75	1.54	0.73	0.42	0.38	0.24	0.09	0.09	0.05
t.	Nom. yield lending in year, i	p/r	0.36	0.36	0.41	0.49	0.58	0.63	0.55	0.42	0.41	0.40
u.	Change in yield	s*t	2.05	0.64	0.63	0.36	0.24	0.24	0.13	0.04	0.04	0.02
v.	**Subsidy-free nom. yield in year**	t+u	2.41	1.00	1.04	0.85	0.83	0.87	0.68	0.46	0.45	0.42
w.	Bolivia Infl. (port. wgt. ave.)	Data	0.09	0.23	0.20	0.23	0.15	0.10	0.09	0.09	0.13	0.08
x.	**Subsidy-free real yield in year**	(v-w)/(1+w)	2.13	0.63	0.70	0.51	0.58	0.70	0.54	0.34	0.28	0.32

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 4: BancoSol standard subsidy dependence index, 1987-96

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	r*Alpha	Data	0.27	0.38	0.35	0.29	0.21	0.17	0.19	0.27	0.27	0.29
b.	r*Alpha/2	a/2	0.14	0.19	0.18	0.15	0.11	0.09	0.10	0.13	0.13	0.14
c.	1-r*Alpha/2	1-b	0.86	0.81	0.82	0.85	0.89	0.91	0.90	0.87	0.87	0.86
d.	Tax rate, Tau	Data	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
e.	Start equity, E0	Data	0	125	220	361	1,960	3,246	10,030	11,282	7,164	7,306
f.	Rev. lending, LP*i	Data	23	128	274	863	1,864	3,761	8,522	13,237	12,494	14,633
g.	Direct grants, DG	Data	90	41	192	1,488	1,226	1,601	2,274	(5,449)	(4)	0
h.	Paid-in cap. public, PCpub	Data	0	0	0	0	0	4,287	(94)	651	405	317
i.	Paid-in cap. private, PCpri	Data	0	0	0	0	0	1,072	(23)	422	(194)	(72)
j.	Change Reserve and adjust.	Data	13	(15)	3	8	(126)	5	(860)	(881)	(725)	(465)
k.	Disc. soft debt, D*(m-c)	Data	25	70	129	172	168	143	36	170	59	52
l.	Rev. grants, RG	Data	109	157	135	226	243	0	0	0	0	0
m.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	4	0	0
n.	**Fresh funds less (TP-Tax), FF**	g+h+i+j+k+l+m	238	252	459	1,894	1,512	7,107	1,333	(5,083)	(459)	(168)
o.	Accounting profit	Data	21	69	(54)	103	185	(131)	46	1,471	880	1,512
p.	Disc. soft debt, D*(m-c)	k	25	70	129	172	168	143	36	170	59	52
q.	Rev. grants, RG	l	109	157	135	226	243	0	0	0	0	0
r.	Disc. op. exp, DX	m	0	0	0	0	0	0	0	4	0	0
s.	**True profit, TP**	o-(p+q+r)	(113)	(157)	(318)	(295)	(226)	(274)	9	1,297	820	1,460
t.	Tax	d*Max(0, s)	0	0	0	0	0	0	2	324	205	365
u.	**True profit less tax, TP-Tax**	s-t	(113)	(157)	(318)	(295)	(226)	(274)	7	973	615	1,095
v.	**Subsidy, S**	a*e+b*n-c*u	130	223	421	634	779	1,422	2,064	1,493	1,308	1,124
w.	**SDI**	v/[f*c*(1-d)]	8.69	2.88	2.49	1.15	0.62	0.55	0.36	0.17	0.16	0.12
x.	Nom. yield lending in year, i	Data	0.36	0.36	0.41	0.49	0.58	0.63	0.55	0.42	0.41	0.40
y.	Change in yield	w*x	3.16	1.05	1.02	0.56	0.36	0.35	0.20	0.07	0.07	0.05
z.	**Subsidy-free nom. yield in year**	x+y	3.53	1.41	1.43	1.05	0.95	0.98	0.75	0.50	0.48	0.45
aa.	Bolivia Infl. (port. wgt. ave.)	Data	0.09	0.23	0.20	0.23	0.15	0.10	0.09	0.09	0.13	0.08
bb.	**Subsidy-free real yield in year**	(z-aa)/(1+aa)	3.16	0.96	1.02	0.67	0.69	0.80	0.60	0.38	0.31	0.34

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 5: BancoSol subsidy dependence index, 1987-96

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Opp. cost equity, r	Data	0.46	0.38	0.43	0.34	0.27	0.25	0.27	0.29	0.32	0.33
b.	Alpha	Data	0.60	1.00	0.81	0.86	0.79	0.68	0.71	0.93	0.83	0.86
c.	End equity, E1	Data	125	220	361	1,960	3,246	10,030	11,282	7,164	7,306	8,220
d.	Fresh funds less (TP-Tax), FF	Data	238	252	459	1,894	1,512	7,107	1,333	(5,083)	(459)	(168)
e.	Accounting profit, AP	Data	21	69	(54)	103	185	(131)	46	1,471	880	1,512
f.	Actual tax	Data	0	0	0	0	0	49	91	331	220	378
g.	**Accounting profit less tax**	e-f	21	69	(54)	103	185	(180)	(45)	1,139	660	1,134
h.	True profit less tax, TP-Tax	Data	(113)	(157)	(318)	(295)	(226)	(274)	7	973	615	1,095
i.	Average equity w/subsidies, E	b*[(c(t-1)+c]/2	37	172	236	1,003	2,049	4,488	7,591	8,613	5,975	6,646
j.	Average equity w/o subsidies, E	b*c(t-1)+b/2*(d+h)	37	172	236	1,003	2,049	4,504	7,622	8,617	5,981	6,652
k.	**ROE**	g/i	0.57	0.40	(0.23)	0.10	0.09	(0.04)	(0.01)	0.13	0.11	0.17
l.	**SAROE**	h/j	(3.04)	(0.91)	(1.35)	(0.29)	(0.11)	(0.06)	0.00	0.11	0.10	0.16
m.	**Hurdle rate, r**	Data	0.46	0.38	0.43	0.34	0.27	0.25	0.27	0.29	0.32	0.33

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 6: BancoSol ROE and subsidy-adjusted ROE, 1987-96

b. Grameen

i. The standard SDI

The standard SDI for Grameen in 1994 was 88 percent (line s of Table 7 on page 52). Do not compare this with the standard SDIs of 20-60 percent in Morduch (1997), YB&P (1997), or KK&K (1995). I use a higher opportunity cost (Benjamin, 1994; Appendix 3 on page 105). Hulme and Mosley (1996) report an average SDI for 1988-92 of 142 percent. An average SDI does not make sense. For 1986-92, the standard SDIs here are near those in Benjamin (1994).

ii. The SDI

The SDI of Grameen in 1994 was 115 percent (line w of Table 8 on page 53). The nominal current yield was 17 percent (line x). Thus the change in the current yield was $0.17 \cdot 1.15 \doteq 0.19$ (line y), and the nominal subsidy-free yield was $0.17+0.19 = 0.36$ (line z). With inflation at 5 percent, the real subsidy-free yield was 29 percent (line bb).

I do not say whether Grameen should or should not try to decrease its SDI. Investors want to make money, so they want a lower SDI and thus a higher SAROE. In contrast, the poor want Grameen to make the best use of scarce development funds. In practice, low SDIs are often linked to MFOs that help the poor a lot, but a low SDI is neither necessary nor sufficient for an MFO to be the best way to help the poor.

The SDI of 115 percent in 1994 means that Grameen would have needed to more than double its yield to pay a market return on its equity without help from donors. My guess is that Grameen could do this if it wanted. I do not say whether Grameen should or should not do this. An increase in the price paid by customers would reduce their surplus, but it might increase sustainability. Sustainability might help the poor in two ways. First, it might attract private investors and release funds for use in other development projects. Second, it might lengthen the time frame in which poor customers get surplus from Grameen. In turn, this might boost the NPW of Grameen for the poor.

The SDI of 115 percent seems high, as do the subsidies of $20-37 million in 1992-94 (line v of Table 8 on page 53). But the SDI itself is a relative measure, and investors care not only about the SDI but also about the change in the current yield and about the subsidy-free yield. These two measures are low. The change in the current yield is 19 percentage points (line y), and the real subsidy-free yield is 29 percent (line bb).

My guess is that Grameen chooses to charge a low interest rate and thus to have a high SDI. Grameen is not wasteful or lazy, nor does it lack demand, scale, or experience (Jain, 1996). Perhaps the customers of Grameen could pay a real rate of 29 percent per year without a rash of default. They already paid a real rate of 14 percent in 1992 (Schreiner, 1997). There is some evidence that they could pay twice what they pay now (Pitt and Khandker, 1996 and 1995).

The SDI of 115 percent in 1994 was the lowest for Grameen in a decade (line w of Table 8 on page 53). The SDI fell each year since 1990. The real subsidy-free rate of 29 percent was also the lowest since 1989-90 (line bb).

In the long term, however, I think the performance of Grameen as seen by investors has not changed much. Gains from growth and improvement must have been passed to customers or to workers rather than sunk in profit. Changes in the nominal yield on lending explain just a small part of the movements of the SDI and of the real subsidy-free rate. Movements of the nominal opportunity cost of equity for an investor r seem to matter more. In turn, the biggest factors for r are changes in inflation and in leverage (Table 26 on page 108).

iii. The subsidy-adjusted ROE

Profit grants make a wide gap between the ROE and SAROE of Grameen (lines k and l of Table 9 on page 54). ROE was 0-2 percent in each year since 1985 (line k). While revenues ranged from $2 million to $53 million in 1984-94 (Table 34 on page 129), accounting profit stayed between -$150,000 and $600,000 (line g of Table 9 on page 54). To me, this hints that Grameen wants to report a profit but not a high profit. Grameen looks profitable but does not seem not to need donors nor to gouge customers.

Stripped of revenue grants and discounts, however, profit is always negative (line h of Table 9 on page 54). In 1994, true profit was -$17 million. The SAROE for Grameen was near -100 percent in 1985-89. With all else constant except with the loss of help from donors, Grameen would have consumed all its net worth in each of those years.

In each year from 1990-94, a private Grameen would have consumed 16-48 percent of its net worth. The SAROE of Grameen never exceeded zero (line l), let alone the hurdle rate of the opportunity cost of equity for an investor (line m).

All this suggests that Grameen would have been a bad investment for an investor. This does not mean Grameen was a bad investment for the poor. Nor does it mean that Grameen was not sustainable.

I do not analyze Grameen. I just use Grameen to show the use of the framework. Nor do I compare Grameen with BancoSol. The comparison would be false since all else is not constant. For example, Grameen makes smaller loans to customers who are poorer, more rural and more likely to be women. Grameen deposits are part of membership, but BancoSol deposits are voluntary. Bangladesh is not Bolivia. Analysts could compare Grameen with BancoSol if they keep all else constant. As for me, I punt.

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Opp. cost equity, r	Data	0.30	0.28	0.37	0.42	0.48	0.32	0.26	0.26	0.25	0.24	0.23	0.24
b.	Alpha	Data	1.04	1.00	1.00	1.01	1.02	1.01	0.99	1.01	1.00	0.97	1.00	1.01
c.	Start equity, E0	Data	0	851	1,406	1,413	1,745	1,765	7,036	12,049	27,195	38,459	69,081	78,724
d.	End equity, E1	Data	851	1,406	1,413	1,745	1,765	7,036	12,049	27,195	38,459	69,081	78,724	89,140
e.	**Average equity, E**	b*(c+d)/2	442	1,126	1,408	1,588	1,794	4,456	9,447	19,827	32,754	52,346	74,243	84,664
f.	Exp. int. soft debt	Data	65	754	1,212	988	846	974	1,240	1,425	1,391	2,356	6,234	13,365
g.	Ave. soft debt, D	Data	2,517	10,534	17,696	24,022	32,168	38,548	47,326	53,829	52,019	49,784	96,950	174,682
h.	**Rate paid soft debt, c**	f/g	0.03	0.07	0.07	0.04	0.03	0.03	0.03	0.03	0.03	0.05	0.06	0.08
i.	m, Opp. cost, soft debt for debt	Data	0.17	0.13	0.15	0.15	0.14	0.14	0.14	0.17	0.18	0.18	0.17	0.17
j.	**Disc. soft debt, D*(m-c)**	g*(i-h)	363	615	1,384	2,495	3,786	4,552	5,520	7,645	8,060	6,723	10,424	15,554
k.	Rev. grants, RG	Data	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
l.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	0	0	0	0	0
m.	**K**	k+l	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
n.	Accounting profit, AP	Data	(189)	273	29	15	17	41	98	303	357	(150)	246	556
o.	**Standard subsidy, S**	i*e+j+k-n	687	661	1,883	3,149	4,747	7,141	9,783	14,648	17,891	20,903	29,596	36,981
p.	Rev. lending, LP*i	Data	12	1,251	1,668	1,843	2,481	3,957	5,188	6,557	9,307	13,820	27,943	42,110
q.	End loan portfolio, LP	Data	4,217	9,275	10,846	13,211	22,764	37,159	49,809	59,231	70,027	119,608	227,869	274,625
r.	Ave. loan portfolio, LP	b*[q(t-1)+q]/2	2,190	6,732	10,052	12,098	18,394	30,337	43,046	55,089	64,485	92,306	174,539	253,437
s.	**Standard SDI**	o/p	58.20	0.53	1.13	1.71	1.91	1.80	1.89	2.23	1.92	1.51	1.06	0.88
t.	Nom. yield lending in year, i	p/r	0.01	0.19	0.17	0.15	0.13	0.13	0.12	0.12	0.14	0.15	0.16	0.17
u.	Change in yield	s*t	0.31	0.10	0.19	0.26	0.26	0.24	0.23	0.27	0.28	0.23	0.17	0.15
v.	**Subsidy-free nom. yield in year**	t+u	0.32	0.28	0.35	0.41	0.39	0.37	0.35	0.38	0.42	0.38	0.33	0.31
w.	Bangladesh Infl. (port. wgt. ave.)	Data	0.12	0.08	0.22	0.12	0.14	0.09	0.09	0.13	0.02	0.01	0.04	0.05
x.	**Subsidy-free real yield in year**	(v-w)/(1+w)	0.18	0.19	0.11	0.26	0.22	0.26	0.23	0.22	0.39	0.37	0.28	0.25

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 7: Grameen standard subsidy dependence index, 1983-94

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	r*Alpha	Data	0.32	0.28	0.37	0.42	0.49	0.33	0.26	0.26	0.25	0.23	0.23	0.24
b.	r*Alpha/2	a/2	0.16	0.14	0.19	0.21	0.25	0.16	0.13	0.13	0.12	0.12	0.12	0.12
c.	1-r*Alpha/2	1-b	0.84	0.86	0.81	0.79	0.75	0.84	0.87	0.87	0.88	0.88	0.88	0.88
d.	Tax rate, Tau	Data	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
e.	Start equity, E0	Data	0	851	1,406	1,413	1,745	1,765	7,036	12,049	27,195	38,459	69,081	78,724
f.	Rev. lending, LP*i	Data	12	1,251	1,668	1,843	2,481	3,957	5,188	6,557	9,307	13,820	27,943	42,110
g.	Direct grants, DG	Data	6	(73)	(31)	202	(74)	4,793	4,935	16,046	10,258	30,040	11,310	11,383
h.	Paid-in cap. public, PCpub	Data	1,022	0	0	0	0	0	0	0	0	0	0	0
i.	Paid-in cap. private, PCpri	Data	0	376	212	218	238	503	471	1	1,162	949	14	1,653
j.	Change Reserve and adjust.	Data	13	(22)	(203)	(103)	(162)	(65)	(491)	(1,204)	(513)	(217)	(1,928)	(3,177)
k.	Disc. soft debt, D*(m-c)	Data	363	615	1,384	2,495	3,786	4,552	5,520	7,645	8,060	6,723	10,424	15,554
l.	Rev. grants, RG	Data	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
m.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	0	0	0	0	0
n.	**Fresh funds less (TP-Tax), FF**	g+h+i+j+k+l+m	1,403	897	1,362	2,812	3,905	10,970	12,344	24,735	20,995	39,146	22,121	27,366
o.	Accounting profit	Data	(189)	273	29	15	17	41	98	303	357	(150)	246	556
p.	Disc. soft debt, D*(m-c)	k	363	615	1,384	2,495	3,786	4,552	5,520	7,645	8,060	6,723	10,424	15,554
q.	Rev. grants, RG	l	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
r.	Disc. op. exp, DX	m	0	0	0	0	0	0	0	0	0	0	0	0
s.	**True profit, TP**	o-(p+q+r)	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
t.	Tax	d*Max(0, s)	0	0	0	0	0	0	0	0	0	0	0	0
u.	**True profit less tax, TP-Tax**	s-t	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
v.	**Subsidy, S**	a*e+b*n-c*u	687	661	1,883	3,149	4,747	7,141	9,783	14,648	17,891	20,903	29,596	36,981
w.	**SDI**	[a*e+b*n-c*s*(1-d)] /[f*c*(1-d)]	74.74	0.70	1.53	2.37	2.78	2.34	2.35	2.84	2.48	1.98	1.39	1.15
x.	Nom. yield lending in year, i	Data	0.01	0.19	0.17	0.15	0.13	0.13	0.12	0.12	0.14	0.15	0.16	0.17
y.	Change in yield	w*x	0.40	0.13	0.25	0.36	0.37	0.31	0.28	0.34	0.36	0.30	0.22	0.19
z.	**Subsidy-free nom. yield in year**	x+y	0.41	0.32	0.42	0.51	0.51	0.44	0.40	0.46	0.50	0.45	0.38	0.36
aa.	Bangladesh Infl. (port. wgt. ave.)	Data	0.12	0.08	0.22	0.12	0.14	0.09	0.09	0.13	0.02	0.01	0.04	0.05
bb.	**Subsidy-free real yield in year**	(z-aa)/(1+aa)	0.26	0.22	0.17	0.35	0.32	0.32	0.28	0.28	0.47	0.43	0.33	0.29

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 8: Grameen subsidy dependence index, 1983-94

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Opp. cost equity, r	Data	0.30	0.28	0.37	0.42	0.48	0.32	0.26	0.26	0.25	0.24	0.23	0.24
b.	Alpha	Data	1.04	1.00	1.00	1.01	1.02	1.01	0.99	1.01	1.00	0.97	1.00	1.01
c.	End equity, E1	Data	851	1,406	1,413	1,745	1,765	7,036	12,049	27,195	38,459	69,081	78,724	89,140
d.	Fresh funds -(TP-Tax), FF	Data	1,403	897	1,362	2,812	3,905	10,970	12,344	24,735	20,995	39,146	22,121	27,366
e.	Accounting profit, AP	Data	(189)	273	29	15	17	41	98	303	357	(150)	246	556
f.	Actual tax	Data	0	0	0	0	0	0	0	0	0	0	0	0
g.	**Accounting profit - tax**	e-f	(189)	273	29	15	17	41	98	303	357	(150)	246	556
h.	True profit less tax, TP-Tax	Data	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
i.	Ave. equity w/ subsidies, E	b*[(c(t-1)+c]/2	442	1,126	1,408	1,588	1,794	4,456	9,447	19,827	32,754	52,346	74,243	84,664
j.	Ave. equity w/o subsidies, E	b*c(t-1)+[b/2**(d+h)]	442	1,126	1,408	1,588	1,794	4,456	9,447	19,827	32,754	52,346	74,243	84,664
k.	**ROE**	g/i	(0.43)	0.24	0.02	0.01	0.01	0.01	0.01	0.02	0.01	(0.00)	0.00	0.01
l.	**SAROE**	h/j	(1.25)	(0.30)	(0.96)	(1.56)	(2.17)	(1.28)	(0.78)	(0.48)	(0.30)	(0.16)	(0.17)	(0.20)
m.	**Hurdle rate, r**	Data	0.30	0.28	0.37	0.42	0.48	0.32	0.26	0.26	0.25	0.24	0.23	0.24

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 9: Grameen ROE and subsidy-adjusted ROE, 1983-94

B. Net present cost of flows: a better measure of private profitability

The framework of the SDI cannot measure performance in long time frames since it does not discount flows of funds. This might not matter much in a short time frame, but it matters a lot in a long time frame. Most investors do not bother to discount short-term investments. If they did, then ROE would fall from grace.

As a time frame lengthens, however, investors do bother to discount. A dollar one year from now is not the same as a dollar ten years from now. I suggest that investors would measure performance in the long term with one of the most basic yardsticks in finance and economics: the net present worth (NPW) of flows of funds. To match the practice of the SDI, I reverse the sign of the NPW and call it the net present cost for an investor (NPC_I). The NPC_I has the same information content as NPW:

$$NPC_I = - NPW. \tag{32}$$

The NPC_I assumes all flows come from investors. It adds the discounted stream of outflows and subtracts the discounted stream of inflows. The NPC_I answers the same questions as NPW. A negative NPC_I means a positive NPW. An investor would want to buy into an MFO with a negative NPC_I from now onward. A negative NPC_I from birth onward would prompt investors to start like MFOs from scratch.

1. The SDI versus the NPC_I

Unlike the SDI, the NPC_I discounts flows, so it can stretch to fit long time frames. Like the SDI, the NPC_I can measure performance in a single year. Investors would make more money judging investments in MFOs with the NPC_I than with the SDI (Appendix 1 on page 102).

Both the NPC_I and the SDI merge the economic concept of opportunity cost with accounting data. The key contrast is that the NPC_I discounts but the SDI does not. Thus the NPC_I is not just the sum of the subsidies from the SDI in a span of years. Since the NPC_I can stretch into the past all the way back to birth, it matters less than for the SDI that some current results were caused by past subsidies.

Since the NPC_I discounts and the SDI does not, the two measures do not answer the same question. Investors might ask: What would the ROE of the MFO be without profit grants? The answer is the subsidy of the SDI as seen through an SAROE. Or investors might ask: Would the MFO have had a positive NPW in a one-year time frame? The answer is the one-year NPC_I. Investors might also ask: Would the MFO have had a positive NPW since birth? The answer is the NPC_I since birth. All three questions and answers matter. Both the SDI and the NPC_I are the right tools for their distinct questions and time frames.

The SDI and the NPC_I are simple tools to measure costs. Both are only as good as their data and assumptions (Schreiner and Yaron, 1998). Like other yardsticks, the analyst can use them to carve benchmarks, to chart trends, and to compare an MFO with peers.

2. How the NPC_I discounts flows

The NPC_I discounts flows by when they take place. The discount rate is the price of gains and costs later in terms of gains and costs now. The discount rate for investors δ_{I1} for a flow that takes place one year past the start of the time frame is one divided by one plus the opportunity cost of equity for an investor in the first year, r_1 (Gittinger, 1982):

$$\text{Discount rate of investors} = \delta_{I1} = \frac{1}{1 + \text{Opp. cost equity for investor}} = \frac{1}{1 + r_1}. \tag{33}$$

Given a stream of opportunity costs r in years 1 through T, the discount rate δ_{It}^{t-n} for a flow at time $t-n$ with $0 \le n < 1$, is:

$$\delta_{It}^{t-n} = \left(\frac{1}{1+r_t} \right)^{1-n} \cdot \prod_{j=1}^{t-1} \left(\frac{1}{1+r_j} \right). \quad (34)$$

For example, from the point of view of the start of a time frame, a flow of one dollar is worth δ_{I0}^{0} at the start, $\delta_{I1}^{0.5}$ six months from the start, and δ_{I1}^{1} one year from the start. A flow one year and nine months from the start is worth $\delta_{I2}^{0.75} \cdot \delta_{I1}$.

In the best case, the analyst would discount each flow by when it took place. In practice, the analyst may not have more than year-end financial statements and thus no knowledge of the pattern of flows in the year. With just year-end data, it makes sense to assume flows are constant. For example, a constant flow from the start to the end of year t is worth about $\delta^{t-0.5}$ (Appendix 6 on page 114).

Often the analyst can get measures of the stock of the loan portfolio for each month or for each quarter. If the analyst can assume that flows of fresh funds measured twice a year move in step with the changes in the stock of the loan portfolio, then there is a factor γ_{It} such that γ_{It} multiplied by the accumulated flow is the sum of the discounted component flows (Appendix 6 on page 114). With just year-end data, γ_{It} is $\delta_{It}^{t-0.5}$.

3. The formula for the NPC_I

For an investor, outflows of funds from the investor to an MFO are costs. Inflows of funds back to the investor from an MFO are gains. The NPC_I adds discounted outflows and subtracts discounted inflows. Like all discounted measures, the NPC_I ignores flows before the start of the time frame. They are sunk and cannot be undone. The NPC_I prices all net worth as if it came from private sources. All else constant, this lets the NPC_I measure financial performance as if market funds replaced subsidized funds.

The stock of equity at the start of the time frame E_0 is not a sunk flow. At time 0, investors choose to keep this equity in the MFO instead of using it elsewhere. Investors see this as an outflow needed to stake a claim to the future net worth of the MFO:

$$\text{Outflow start net worth} = \delta_{I0}^{0} \cdot E_0 = E_0. \quad (35)$$

After the start of the time frame, the MFO builds net worth from flows of grants, paid-in capital, and discounts. The NPC_I pretends that private paid-in capital replaces all these forms of funds. The discount factor for the flow of fresh funds in year t is γ_{It} (Appendix 6 on page 114). Given fresh funds except true profit less tax (equation 22 on page 37), the outflow from investors to the MFO in the whole time frame is:

$$\text{Outflow fresh funds} = \sum_{t=1}^{T} \gamma_{It} \cdot [DG_t + PC_{pub_t} + PC_{pri_t} + RG_t + D_t \cdot (m_t - c_t) + DX_t] = \sum_{t=1}^{T} \gamma_{It} \cdot FF_t. \quad (36)$$

True profit accrues through each year. The owner of an MFO could withdraw true profit as it accrues, but instead the owner lets the MFO keep it. Hence true profit is like an inflow back-to-back with an outflow. The two flows cancel out of the NPC_I.

For investors, tax is neither an inflow nor an outflow. Taxes just reduce the net worth that investors can take from an MFO at the end of the time frame.

An investor could withdraw some net worth as dividends. I assume this inflow back to the investor from the MFO takes place at the end of a year:

$$\text{Inflow dividends} = \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t . \tag{37}$$

Investors pocket the net worth of an MFO at the end of the time frame. This is an inflow back to investors from the MFO. It includes all outflows from investors to the MFO up to time *T* plus true profit less taxes and dividends. I assume that the market worth of the MFO at the end of the time frame matches the net worth in its accounts. The discount used is δ_{IT}^{T}:

$$\text{Inflow end net worth} = \delta_{IT}^{T} \cdot (E_0 + \sum_{t=1}^{T} FF_t + TP_t - Div_t - Tax_t) . \tag{38}$$

The NPC_I adds discounted outflows (equation 35 on page 56 and equation 36 on page 56) and subtracts discounted inflows (equation 37 on page 57 and equation 38 on page 57):

$$\begin{aligned} NPC_I &= \text{Discounted outflows} - \text{Discounted inflows}, \\ &= E_0 + \sum_{t=1}^{T} \gamma_{It} \cdot FF_t - \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t - \delta_{IT}^{T} \cdot \left[E_0 + \sum_{t=1}^{T} (FF_t + TP_t - Div_t - Tax_t) \right], \\ &= (1 - \delta_{IT}^{T}) \cdot E_0 + \sum_{t=1}^{T} (\gamma_{It} - \delta_{IT}^{T}) \cdot FF_t - \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t - \delta_{IT}^{T} \cdot \sum_{t=1}^{T} (TP_t - Div_t - Tax_t) . \end{aligned} \tag{39}$$

The net present cost of the flows of funds between an investor and an MFO from time 0 to time *T* has four terms (equation 39 on page 57). The first term is the cost of funds put in at the start. For an investor at time 0, starting equity E_0 is worth E_0 when the investor entrusts it to the MFO at time 0 but just $\delta_{IT}^{T} \cdot E_0$ when the investor gets it back at time *T*. The cost is the worth of funds when they leave less their worth when they come back.

The second term of the NPC_I is the cost of fresh funds injected after the start of the time frame. Seen from time 0, these funds are worth γ_{It} when the investor entrusts them to the MFO but just δ_{IT}^{T} when the MFO gives them back. The cost is the difference.

The third term is the worth of dividends paid to the investor by the MFO. Each dollar of dividends at the end of year *t* is worth δ_{It}^{t} at time 0.

The fourth term is the cost or the gain of the true profit less taxes less dividends accrued by the MFO. The investor does not get this inflow until the end of the time frame, so the discount factor is δ_{IT}^{T}. A negative true profit (true loss) in any year decreases the inflow for the investor. For most MFOs, the sum of true profit since birth is negative. This means investors get back fewer dollars than what they put in.

4. The use of the NPC_I

The NPC_I is less than zero if the worth of the inflows to the investor exceeds the worth of the outflows. Thus the NPC_I mirrors NPW. A negative NPC_I tells an investor at time 0 that an MFO would be a good investment since its return exceeds that of the best other investment of like risk. This requires true profits so large that, even when discounted from the end of the time frame back to the start, they swamp the cost of the funds used by the MFO in the time frame.

An investor might want to check the worth of an MFO built from scratch patterned on a subsidized MFO. In this case, the investor would use the NPC_I with a time frame started at the birth of the subsidized MFO. If the investor does not want to project performance in the future, the time frame could end with the current year. Otherwise, the investor can forecast future performance and choose when to truncate the horizon.

An investor might want to buy into a subsidized MFO. In this case, the investor might use the NPC_I with data forecast for some time frame started now. Or the investor might just use the NPC_I to measure performance in the past year.

a. A long-term SDI with the NPC_I

A long-term SDI tells the percentage increase in revenue from lending that would wipe out subsidy in a long time frame. One important time frame starts at birth. Although an MFO cannot increase revenue from lending in the past, a long-term SDI can show how far an MFO was from having had sparked new MFOs funded from scratch by investors.

The long-term SDI with the NPC_I is the percentage increase in revenue from lending $LP \cdot i$ that drives the NPC_I (equation 39 on page 57) to zero. To express this, I break true profit TP into revenue from lending less true expenses $LP_t \cdot i_t - TE_t$ (equation 24 on page 37) and use the formula for tax (equation 27 on page 38):

$$\begin{aligned} 0 = {} & (1-\delta_{IT}^{T}) \cdot E_0 + \sum_{t=1}^{T} (\gamma_{It} - \delta_{IT}^{T}) \cdot FF_t - \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t \\ & - \delta_{IT}^{T} \cdot \sum_{t=1}^{T} \{ [LP_t \cdot i_t \cdot (1+\mathrm{SDI}) - TE_t] - Div_t - \tau \cdot \max[0,\ LP_t \cdot i_t \cdot (1+\mathrm{SDI}) - TE_t] \}. \end{aligned} \tag{40}$$

I cannot solve this for the long-term SDI with the NPC_I in the same way as for the SDI (equation 29 on page 39). For subsidy to be zero in a one-year measure like the SDI, true profit in the year must be positive to offset the unpaid opportunity costs of equity. Thus tax is also positive. With more than one year, however, tax in some years might be zero. The increase in revenue might not make true profits positive in all years even though the discounted sum of true profits by the end of the time frame is positive enough to balance costs. Thus the maximum function in *Tax* may not vanish, and simple algebra does not yield an answer.

All is not lost. The analyst can use a numeric search to solve for the long-term SDI with the NPC_I, plugging in guesses for the SDI until the NPC_I falls to zero. A good spreadsheet can automate this search.

The long-term SDI with the NPC_I is useful since an MFO with a positive NPC_I might have been able to increase prices enough to be a good investment. An investor who contemplates a new MFO from scratch would want to check the price increase needed.

b. The SDI with the one-year NPC_I

An investor who uses the SAROE from the SDI would do better to use a one-year NPC_I since the NPC_I discounts flows. In fact, the SAROE can top the hurdle rate even though NPW is negative (Appendix 1 on page 102). I derive the SDI with the one-year NPC_I in four steps. First, I get the one-year case of the NPC_I by setting $T = 1$ in the T-year case (equation 39 on page 57),

dropping the investor subscripts from γ and δ:

$$\begin{aligned}\mathrm{NPC_I}^{T=1} &= (1-\delta_{IT}^{T})\cdot E_0 + \sum_{t=1}^{T}(\gamma_{It}-\delta_{IT}^{T})\cdot FF_t - \sum_{t=1}^{T}\delta_{It}^{t}\cdot Div_t - \delta_{IT}^{T}\cdot\sum_{t=1}^{T}(TP_t - Div_t - Tax_t),\\ &= (1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot Div - \delta\cdot(TP - Div - Tax).\end{aligned}$$

Second, I cancel dividends to get the $\mathrm{NPC_I}$ analog to the subsidy in the SDI:

$$\mathrm{NPC_I}^{T=1} = (1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot(TP - Tax). \tag{41}$$

Third, net profit in the year must be positive to offset positive costs. This means taxes are $\tau\cdot TP$ (equation 27 on page 38):

$$\mathrm{NPC_I}^{T=1} = (1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot(1-\tau)\cdot TP.$$

Fourth, I write true profits TP as $LP\cdot i - TE$ (equation 24 on page 37), multiply revenue from lending $LP\cdot i$ by (1+SDI), set the $\mathrm{NPC_I}$ to zero, and solve for the SDI of the one-year $\mathrm{NPC_I}$:

$$\begin{aligned}0 &= (1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot(1-\tau)\cdot[LP\cdot i\cdot(1+\mathrm{SDI}^{T=1}) - TE],\\ \mathrm{SDI}^{T=1} &= \frac{(1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot(1-\tau)\cdot TP}{\delta\cdot(1-\tau)\cdot LP\cdot i}.\end{aligned} \tag{42}$$

The SDI with the one-year $\mathrm{NPC_I}$ can be used in all the ways the SDI can. The SDI with the one-year $\mathrm{NPC_I}$ discounts flows, so it is better than the SDI.

i. Is subsidy in the SDI just the one-year case of $\mathrm{NPC_I}$?

Subsidy in the SDI (equation 28 on page 38) is not just the one-year $\mathrm{NPC_I}$ (equation 41 on page 59). Unlike the SDI, the $\mathrm{NPC_I}$ discounts flows. If true profit is positive, then subsidy in the SDI is less than the one-year $\mathrm{NPC_I}$. If true profit is negative, then subsidy in the SDI is more than the one-year $\mathrm{NPC_I}$.

To compare the one-year $\mathrm{NPC_I}$ (equation 41 on page 59) with subsidy in the SDI (equation 28 on page 38), the discount rate δ and the discount factor for fresh funds γ must be in terms of r, the opportunity cost of equity for an investor. For r near zero, $\delta \doteq 1 - r$ (Schreiner, 1997). For example, $r = 0.10$ leads to $\delta = 1/1.1 \doteq 0.9091 \doteq 0.90 = 1\text{-}0.10 = 1 - r$.

With just year-end data, the factor $\gamma \doteq \delta^{0.5} = \delta^{1-0.5}$ (Appendix 6 on page 114). For r near zero, $\delta^{1-n} \doteq 1 - r\cdot(1-n)$ (Schreiner, 1997). For example, if $r = 0.1$ and $n = 0.5$, then $\delta^{1-0.5} \doteq 0.9091^{0.5} \doteq 0.9535 \doteq 0.95 = 1-0.05 = 1-(0.1\cdot 0.5) = 1-0.1\cdot(1-0.5) = 1 - r\cdot(1-n)$.

With just year-end data or with constant flows, $\alpha = 1$ (Appendix 5 on page 112). Subsidy in the SDI (equation 28 on page 38) is then:

$$\begin{aligned}S &= r\cdot 1\cdot E_0 + r\cdot 1/2\cdot FF - (1 - r\cdot 1/2)\cdot(TP - Tax),\\ &= r\cdot E_0 + r/2\cdot FF - (1 - r/2)\cdot(TP - Tax).\end{aligned} \tag{43}$$

Given $\delta = 1 - r$ and $\gamma = 1 - r\cdot(1-n)$, the one-year NPC_I (equation 41 on page 59) is:

$$\begin{aligned} NPC_I^{T=1} &= E_0 \cdot [1-(1-r)] + [(1-r/2)-(1-r)] \cdot FF - (1-r)\cdot(TP-Tax), \\ &= r \cdot E_0 + r/2 \cdot FF - (1-r)\cdot(TP-Tax). \end{aligned} \quad (44)$$

The one-year NPC_I (equation 44 on page 60) and the subsidy of the SDI (equation 43 on page 59) differ by $r/2\cdot(TP-Tax)$. The NPC_I discounts the true profit net of tax returned to the investor from the MFO as if it came at the end of the year. In contrast, the SDI acts as if it came in the middle of the year.

If true profit is negative (true loss), then both the subsidy of the SDI and the one-year NPC_I are positive. The SDI acts as if the investor gets the flow of the true loss in the year as it accrues, or on average halfway through the year. In fact, the investor gets the net worth and the embedded true loss at the end of the year. A loss in a year is worth less than a loss in six months, so the SDI is more than the NPC_I for an MFO with true losses.

If true profit is positive, then the subsidy of the SDI is less than the one-year NPC_I. The SDI pretends the investor got the true profit net of tax too soon. When true profit is more than zero, the SDI could be negative while the NPC_I could be positive. This means an investor who judges with the SAROE from the SDI could pick an investment with a negative NPW (Appendix 1 on page 102).

The NPC_I ratchets the performance benchmark for MFOs up a notch. The SDI helps to check if the SAROE of an MFO could attract investors. In contrast, the NPC_I helps to check if the NPW of an MFO could attract investors.

ii. The worth of the SDI

The NPC_I discounts and so it measures private profitability better than the SDI in all time frames, short or long. All else constant, investors would make more money if they used the NPC_I and not the SDI to judge MFOs. Still, the SDI has worth for at least three reasons. First, the SDI is a bit simpler than the one-year case of the NPC_I. Second, the extra accuracy of the one-year case of the NPC_I may be swamped by the inaccuracies of the basic data and assumptions used by both the SDI and the NPC_I. Third and most important, people understand ROE, so the SDI is useful in its guise as a subsidy-adjusted ROE.

5. Examples of the one-year NPC_I and the NPC_I since birth

a. BancoSol

i. SDI with the one-year NPC_I

The one-year NPC_I is the negative of the NPW of an MFO without help from donors bought at the start of a year and sold at the end of the year. In 1996, the one-year NPC_I for BancoSol was about $1 million (line k of Table 10 on page 62). This is near the subsidy of the SDI of about $1.1 million (line v of Table 5 on page 48). The difference is that the SDI pretends an investor pockets the net worth from true profit earlier than the NPC_I does.

As predicted, subsidy for the SDI exceeded the one-year NPC_I when true profit was negative in 1987-92. This reversed when true profit was positive in 1993-95. This did not hold in 1996 due to the approximate nature of equation 44 on page 60 and due to the odd path of changes in stocks at BancoSol in that year. Thus SAROE could pass the hurdle rate before NPW turns positive (Appendix 1 on page 102).

For BancoSol in 1996, the SDI with the one-year NPC_I was 12 percent (line l of Table 10 on page 62). This matches the SDI to two digits (line w of Table 5 on page 48). Thus the comments for the SDI hold for the one-year NPC_I. BancoSol is close to private profitability.

With performance projected past 1996, the NPC_I could measure whether investors would like to buy into BancoSol now and hold its shares for years. I do not try to answer this question since I do not want to project performance. I could make BancoSol look as good or as bad as I wanted, and quibbles with the predicted numbers would distract talk from the main points.

ii. SDI with the NPC_I since birth

The NPC_I since birth is the negative of NPW had investors started BancoSol from scratch without help from donors and liquidated it at the end of the time frame. By 1996, the NPC_I since birth was about $2 million and growing (line w of Table 11 of page 63).

Seen from birth, BancoSol through 1996 would not have looked good to an investor. I doubt it ever will. Even if profits grow in the next years as in 1994-96, they get discounted so much when seen from 1987 that they may never outweigh the losses in the first years.

The SDI since birth tells the percentage increase in the average yield on lending since birth that would make an MFO look good to an investor at birth. For BancoSol, the SDI since birth fell in each year until 1994-96 when it flattened at about 83 percent (line x of Table 11 on page 63). The nominal yield on lending since birth peaked at 58 percent in 1992 and fell to 45 percent by 1996 (line bb). An increase of 83 percent in the nominal yield of 45 percent is $0.45 \cdot 0.83 \doteq 0.37$ (line cc). Thus the subsidy-free nominal yield since birth is about $0.45+0.37 \doteq 0.81$ percent (line dd). All else constant, an increase of 37 percentage points in the average yield on lending through 1987-96 would have made BancoSol attractive to a venture capitalist in 1987.

Could BancoSol have done this? The most its customers have paid was 63 percent in 1992 (Schreiner, 1997). Not only is 81 percent almost twice the average yield of 45 percent, but the average yield is already high. Still, an investor who started a new BancoSol in 1997 would not clone the performance of the old BancoSol in its first 10 years. On the one hand, the investor could use the lessons of BancoSol to grow faster, to cut costs, to improve output, and to shave the yield required for a negative NPC_I. On the other hand, stiffer competition might limit the yield a new BancoSol could earn.

The example of BancoSol shows the foolishness of comparisons of the one-year NPC_I or of the SDI between two MFOs or between one MFO through time. Without the subsidies that made the SDI with the one-year NPC_I range from 656 to 53 percent in 1987-91, BancoSol could not have grown and improved to record lower SDIs in the 1990s (line l of Table 10 on page 62). Likewise, two MFOs could have the same NPC_I in a year without having had the same path to that point. The NPC_I since birth helps to control for past subsidies and to compare MFOs at the same age.

For BancoSol, both the SDI with the NPC_I since birth and the nominal yield on lending have fallen since 1992 (lines x and bb of Table 11 on page 63). At the same time, BancoSol has improved its outreach (Gonzalez-Vega *et al*., 1997a and 1997b). Thus BancoSol has helped the poor more and more each year even as it has grown more and more attractive to investors.

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Opp. cost equity, r	Data	0.46	0.38	0.43	0.34	0.27	0.25	0.27	0.29	0.32	0.33
b.	Discount rate, Delta	Data	0.69	0.72	0.70	0.75	0.79	0.80	0.79	0.78	0.76	0.75
c.	Gamma, investor one year	Data	0.77	0.86	0.77	0.83	0.81	0.81	0.82	0.80	0.29	0.71
d.	Tax rate, Tau	Data	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
e.	Start equity, E0	Data	0	125	220	361	1,960	3,246	10,030	11,282	7,164	7,306
f.	Fresh sub funds less (TP-Tax), FF	Data	238	252	459	1,894	1,512	7,107	1,333	(5,083)	(459)	(168)
g.	Rev. lending, LP*i	Data	23	128	274	863	1,864	3,761	8,522	13,237	12,494	14,633
h.	True profit less tax, TP-Tax	Data	(113)	(157)	(318)	(295)	(226)	(274)	7	973	615	1,095
i.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0
j.	**True profit less tax less dividends**	h-i	(113)	(157)	(318)	(295)	(226)	(274)	7	973	615	1,095
k.	**NPC Investor, one year**	(1-b)*e+(c-b)*f-b*j	97	182	322	464	631	1,004	2,179	1,638	1,492	1,013
l.	**SDI with NPC Investor, one year**	k/[b*(1-d)*g]	8.19	2.62	2.25	0.96	0.57	0.45	0.43	0.21	0.21	0.12
m.	Nom. yield lending in year, i	Data	0.36	0.36	0.41	0.49	0.58	0.63	0.55	0.42	0.41	0.40
n.	Change in yield	l*m	2.98	0.95	0.92	0.47	0.33	0.28	0.24	0.09	0.09	0.05
o.	**Subsidy-free nom. yield in year**	m+n	3.34	1.32	1.33	0.96	0.92	0.91	0.79	0.51	0.50	0.45
p.	Bolivia Infl. (port. wgt. ave.)	Data	0.09	0.23	0.20	0.23	0.15	0.10	0.09	0.09	0.13	0.08
q.	**Subsidy-free real yield in year**	(o-p)/(1+p)	2.99	0.88	0.94	0.60	0.66	0.74	0.64	0.39	0.32	0.34

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 10: BancoSol NPC_I with one-year time frame, 1987-96

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Opp. cost equity, r	Data	0.46	0.38	0.43	0.34	0.27	0.25	0.27	0.29	0.32	0.33
b.	Delta at end of year t	[b(t-1)^0]*[1/(1+a)]	0.69	0.50	0.35	0.26	0.20	0.16	0.13	0.10	0.08	0.06
c.	Gamma, investor since birth	Data	0.77	0.62	0.39	0.31	0.24	0.19	0.15	0.12	0.03	0.06
d.	Tax rate, Tau	Data	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
e.	Start equity, E0	Data	0	0	0	0	0	0	0	0	0	0
f.	Fresh sub funds less (TP-Tax), FF	Data	238	252	459	1,894	1,512	7,107	1,333	(5,083)	(459)	(168)
g.	Accumulated FF	g(t-1)+f	238	490	949	2,843	4,355	11,462	12,795	7,712	7,254	7,086
h.	Accum. discounted FF	h(t-1)+c*f	183	339	517	1,109	1,474	2,844	3,047	2,459	2,444	2,434
i.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0
j.	Accumulated dividends	j(t-1)+i	0	0	0	0	0	0	0	0	0	0
k.	Accum. discounted dividends	k(t-1)+b*i	0	0	0	0	0	0	0	0	0	0
l.	Expense income stmt	Data	131	264	486	1,018	1,980	4,343	8,745	15,440	15,209	16,618
m.	Disc. soft debt, D*(m-c)	Data	25	70	129	172	168	143	36	170	59	52
n.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	4	0	0
o.	Revenue income stmt	Data	152	333	432	1,121	2,166	4,212	8,790	16,911	16,088	18,130
p.	Rev. grants, RG	Data	109	157	135	226	243	0	0	0	0	0
q.	Rev. lending, LP*i	Data	23	128	274	863	1,864	3,761	8,522	13,237	12,494	14,633
r.	**True expense, TE**	(l+m+n)-[o-(p+q)]	136	285	592	1,158	2,091	4,035	8,513	11,940	11,674	13,173
s.	True profit	q-r	(113)	(157)	(318)	(295)	(226)	(274)	9	1,297	820	1,460
t.	Accumulated true profit	t(t-1)+s	(113)	(270)	(589)	(884)	(1,110)	(1,384)	(1,374)	(77)	743	2,203
u.	Tax	Data	0	0	0	0	0	0	2	324	205	365
v.	Accumulated tax	v(t-1)+u	0	0	0	0	0	0	2	327	532	897
w.	**NPC Investor since birth**	(1-b)*e+h-b*g-k-b*(t-j-v)	97	230	393	602	813	1,208	1,589	1,733	1,883	1,962
x.	**SDI with NPC Investor, since birth**	See text	6.56	3.57	3.13	2.20	1.58	0.00	1.37	1.05	0.80	0.83
y.	Accum. rev. lending	y(t-1)+q	23	151	425	1,288	3,152	6,913	15,436	28,672	41,166	55,799
z.	Ave. loan portfolio, LP	Data	63	351	668	1,757	3,189	5,970	15,471	31,201	30,265	36,212
aa.	Accum. ave. loan port.	aa(t-1)+z	63	415	1,082	2,839	6,028	11,998	27,468	58,670	88,935	125,147
bb.	**Nominal yield since birth**	y/aa	0.36	0.36	0.39	0.45	0.52	0.58	0.56	0.49	0.46	0.45
cc.	Change in yield	w*bb	2.39	1.30	1.23	1.00	0.82	0.00	0.77	0.51	0.37	0.37
dd.	**Sub.-free nom. yield since birth**	bb+cc	2.75	1.66	1.62	1.45	1.35	0.58	1.33	1.00	0.83	0.81

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 11: BancoSol NPC_I since birth in 1987 through 1996

b. Grameen

i. SDI with the one-year NPC_I

In 1994, the one-year NPC_I for Grameen was $31.2 million (line k of Table 12 on page 66). This was about $6 million less than the subsidy of the SDI (line v of Table 8 on page 53). Since true profit was negative in all years, the one-year NPC_I is less than the subsidy of the SDI.

The SDI with the one-year NPC_I was about 105 percent in 1994 (line l of Table 12 on page 66). In contrast, the SDI was 115 percent (line w of Table 8 on page 53).

As in the discussion of the SDI, I think Grameen could double its yield on lending and so attract investors. Members already own more than 90 percent of the shares of Grameen. But poor, rural women are not like private investors. They buy shares not to get returns to ownership as dividends and capital gains but rather to get returns from membership.

I do not say Grameen should double its yield or try to attract private investors. I do not expect it to chase private funds. Grameen might continue to nudge the real yield up, but, as the flagship of all MFOs in the world, it can count on donors for funds. Grameen is sustainable, but it might not be self-sustainable. Grameen does not need to prepare to cope with the loss of donor help. Donors will let Grameen help poor customers both now and in the future. This does not mean, however, that Grameen is the best way to help the poor.

ii. SDI with the NPC_I since birth

The NPC_I since birth tells whether Grameen would have created wealth for investors had they started it from scratch without help from donors. By 1994, the NPC_I since birth was about $14.4 million and growing (line w of Table 13 on page 67). If stockholders had funded Grameen since birth in 1983 and sold it in 1994, then they would have earned about $14.4 million less than in investments of like risk. This does not mean Grameen was not the best use of funds for the poor. It means Grameen was not the best use of funds for an investor.

All else constant, Grameen from 1983-94 could have had an NPC_I since birth of zero with an increase in the average yield of about 350 percent (line x of Table 13 on page 67). An increase of 350 percent in the average nominal yield of 15 percent (line bb) means a subsidy-free yield since birth of 69 percent (line dd). Such an increase may or may not have affected demand and default (Schreiner, 1997).

The one-year NPC_I and the NPC_I since birth have always been high for Grameen. Changes in inflation and in leverage drove changes in the opportunity cost of equity for an investor *r* (Appendix 3 on page 105). In turn, changes in *r* drove the SDI with the one-year NPC_I and the NPC_I since birth to rise from 1984-91 and then to fall from 1992-94. Financial performance has not changed much since 1983. Grameen seems to use growth not to increase profit but to give more surplus to more poor customers.

Seen from 1983, I doubt Grameen will ever look like a good investment. Even if the NPC_I since birth started to fall after 1994, the low weight of discounted results in the late 1990s seen from 1983 suggests the NPC_I would never reach zero.

Investors likely would not want to clone Grameen from scratch nor to buy it now. While this matters to investors, it does not tell whether Grameen was the best use of funds for the poor. I will address that question below.

iii. Discussion

Both BancoSol and Grameen have a wide gap between their one-year NPC_I and their NPC_I since birth. I draw three points from this. First, performance in the short term may not be the same as performance in the long term. Second, investors would not have started BancoSol nor Grameen from scratch. Since BancoSol and Grameen are two of the three top MFOs in the world,

I doubt investors would have wanted to start many other MFOs from scratch. Investors may want to start MFOs from scratch now that BancoSol and Grameen and some other good MFOs have done the research and development of microfinance, but I do not address this question here. Third, both BancoSol and Grameen could adjust to attract investors now. Thus investors might buy into MFOs now since they can avoid the start-up costs.

I repeat the warning not to compare MFOs with just the NPC_I. Such a comparison would falsely assume all else is constant. For example, I do not compare Grameen or BancoSol since they do not have the same size, products, or customers. The analyst must compare MFOs, and the NPC_I helps, but it does not give the whole picture.

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Opp. cost equity, r	Data	0.30	0.28	0.37	0.42	0.48	0.32	0.26	0.26	0.25	0.24	0.23	0.24
b.	Discount rate, Delta	Data	0.77	0.78	0.73	0.70	0.68	0.76	0.79	0.80	0.80	0.81	0.81	0.81
c.	Gamma, investor one year	Data	0.88	0.88	0.85	0.84	0.82	0.87	0.89	0.89	0.89	0.90	0.90	0.90
d.	Tax rate, Tau	Data	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
e.	Start equity, E0	Data	0	851	1,406	1,413	1,745	1,765	7,036	12,049	27,195	38,459	69,081	78,724
f.	Fresh funds less (TP-Tax), FF	Data	1,403	897	1,362	2,812	3,905	10,970	12,344	24,735	20,995	39,146	22,121	27,366
g.	Rev. lending, LP*i	Data	12	1,251	1,668	1,843	2,481	3,957	5,188	6,557	9,307	13,820	27,943	42,110
h.	True profit, TP	Data	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
i.	Actual tax	Data	0	0	0	0	0	0	0	0	0	0	0	0
j.	**True profit less tax**	h-(i+j)	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
k.	**NPC Investor, one year**	(1-b)*e+(c-b)*f-b*j	576	547	1,540	2,544	3,762	5,984	8,469	12,460	15,192	17,794	25,049	31,248
l.	**SDI w/ NPC Investor, one year**	[(1-b)*e+(c-b)*f-b*h*(1-d)]/[b*(1-d)*g]	67.93	0.63	1.38	2.12	2.41	2.14	2.22	2.62	2.29	1.84	1.27	1.05
m.	Nom. yield lending in year, i	Data	0.01	0.19	0.17	0.15	0.13	0.13	0.12	0.12	0.14	0.15	0.16	0.17
n.	Change in yield	l*m	0.37	0.12	0.23	0.32	0.33	0.28	0.27	0.31	0.33	0.27	0.20	0.17
o.	**Subsidy-free nom. yield in year**	m+n	0.37	0.30	0.40	0.47	0.46	0.41	0.39	0.43	0.47	0.42	0.36	0.34
p.	Bangladesh Infl. (port. wgt. ave.)	Data	0.12	0.08	0.22	0.12	0.14	0.09	0.09	0.13	0.02	0.01	0.04	0.05
q.	**Subsidy-free real yield in year**	(o-p)/(1+p)	0.22	0.21	0.15	0.32	0.28	0.30	0.27	0.26	0.44	0.41	0.31	0.28

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 12: Grameen NPC_I with one-year time frame, 1983-94

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Opp. cost equity, r	Data	0.30	0.28	0.37	0.42	0.48	0.32	0.26	0.26	0.25	0.24	0.23	0.24
b.	Delta at end of year t	b(t-1)*[1/(1+a)]	0.77	0.60	0.43	0.31	0.21	0.16	0.12	0.10	0.08	0.06	0.05	0.04
c.	Gamma, investor since birth	Data	0.88	0.68	0.51	0.36	0.25	0.18	0.14	0.11	0.09	0.07	0.06	0.05
d.	Tax rate, Tau	Data	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
e.	Start equity, E0	Data	0	0	0	0	0	0	0	0	0	0	0	0
f.	Fresh funds less (TP-Tax), FF	Data	1,403	897	1,362	2,812	3,905	10,970	12,344	24,735	20,995	39,146	22,121	27,366
g.	Accumulated FF	g(t-1)+f	1,403	2,300	3,662	6,475	10,379	21,350	33,694	58,428	79,424	118,570	140,691	168,057
h.	Accum. discounted FF	h(t-1)+c*f	1,228	1,836	2,530	3,556	4,538	6,508	8,226	10,962	12,817	15,600	16,875	18,154
i.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0	0	0
j.	Accumulated dividends	j(t-1)+i	0	0	0	0	0	0	0	0	0	0	0	0
k.	Accum. discounted dividends	k(t-1)+b*i	0	0	0	0	0	0	0	0	0	0	0	0
l.	Expense income stmt	Data	254	1,658	3,098	3,771	4,891	6,968	9,480	11,987	14,920	20,593	34,834	51,075
m.	Disc. soft debt, D*(m-c)	Data	363	615	1,384	2,495	3,786	4,552	5,520	7,645	8,060	6,723	10,424	15,554
n.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	0	0	0	0	0
o.	Revenue income stmt	Data	65	1,930	3,126	3,787	4,908	7,008	9,578	12,291	15,276	20,443	35,081	51,631
p.	Rev. grants, RG	Data	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
q.	Rev. lending, LP*i	Data	12	1,251	1,668	1,843	2,481	3,957	5,188	6,557	9,307	13,820	27,943	42,110
r.	**True expense, TE**	(l+m+n)-[o-(p+q)]	564	1,594	3,023	4,322	6,366	9,655	12,519	16,146	19,038	22,344	40,421	59,061
s.	True profit	q-r	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
t.	Accumulated true profit	t(t-1)+s	(552)	(895)	(2,250)	(4,730)	(8,615)	(14,313)	(21,645)	(31,233)	(40,964)	(49,488)	(61,967)	(78,917)
u.	Tax	Data	0	0	0	0	0	0	0	0	0	0	0	0
v.	Accumulated tax	v(t-1)+u	0	0	0	0	0	0	0	0	0	0	0	0
w.	**NPC Investor since birth**	(1-b)*e+h-b*g-k-b*(t-j-v)	576	995	1,916	3,022	4,173	5,410	6,732	8,277	9,777	11,184	12,785	14,409
x.	**SDI w/ NPC Investor, since birth**	See text	67.93	1.58	1.73	2.37	3.20	3.56	3.82	4.23	4.48	4.48	3.96	3.52
y.	Accum. rev. lending	y(t-1)+q	12	1,263	2,931	4,773	7,254	11,211	16,399	22,957	32,263	46,083	74,026	116,136
z.	Ave. loan portfolio, LP	Data	2,190	6,732	10,052	12,098	18,394	30,337	43,046	55,089	64,485	92,306	174,539	253,437
aa.	Accum. ave. loan port.	aa(t-1)+z	2,190	8,922	18,974	31,073	49,467	79,804	122,849	177,939	242,423	334,729	509,268	762,705
bb.	**Nominal yield since birth**	y/aa	0.01	0.14	0.15	0.15	0.15	0.14	0.13	0.13	0.13	0.14	0.15	0.15
cc.	Change in yield	x*bb	0.37	0.22	0.27	0.36	0.47	0.50	0.51	0.55	0.60	0.62	0.58	0.54
dd.	**Sub.-free nom. yield since birth**	bb+cc	0.37	0.36	0.42	0.52	0.62	0.64	0.64	0.67	0.73	0.75	0.72	0.69

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 13: Grameen NPC_I since birth in 1983 through 1994

Chapter 7: Financial Self-sufficiency for Workers

"You did well with a little, so now I will trust you with more." Matthew 25:21

Financial self-sufficiency answers the question of the workers in an MFO. Workers ask whether they can keep their jobs and keep helping the poor when donors leave. A financially self-sufficient MFO can maintain the real worth of the subsidized funds in its equity and pay market rates for the rest of its funds without public help.

Financial self-sufficiency is not as strict a benchmark as self-sustainability. Financial self-sufficiency is just one part of self-sustainability. Furthermore, financial self-sufficiency for workers is less strict than private profitability for investors. Investors want an SAROE at least as high as that of firms of like risk. Workers want an SAROE at least as high as inflation.

Thus the framework predicts a key conflict: workers have few incentives to attract investors. This may constrain how an MFO can help the poor. BancoSol is financially self-sufficient but not yet privately profitable. Grameen is not financially self-sufficient.

A. The point of view of workers

Workers use the funds entrusted to an MFO by owners. *Workers* include board members, managers, and line employees. Workers care for financial self-sufficiency and sustainability not only since they care for the poor but also since they care for their own jobs. Workers in an MFO often get high pay and the perk of helping the poor. Low-income countries have few jobs so good. If the MFO shrinks and dies when donors withdraw, then workers will lose their good jobs.

MFOs allow workers the slack to pursue their own goals. One important perk is the quiet life—the chance to relax and not to work to compete to cut costs and to improve service (Berger and Hannan, 1994). When workers pursue their own goals, the goals of the other stakeholders suffer (Schreiner, 1997).

B. Subsidized funds lodged in net worth

Workers are lucky to have donors instead of owners. When donors leave, they will not withdraw the subsidized funds lodged in the net worth of the MFO. The MFO will not lose any public funds except soft debt. For workers, the cost to replace soft debt with market debt is the opportunity cost of soft debt for an investor m.

The MFO does not need to replace subsidized funds in net worth with market funds. If workers can maintain the real value of the subsidized funds trapped in net worth and pay a market return for debt and equity from private sources, then they can maintain the size and scope of the MFO and thus keep their jobs while they help the poor. For workers, the opportunity cost of equity is the rate of inflation π. This is less than the return needed to attract investors r.

Thus workers ask whether an MFO without more public funds could replace soft debt with market debt, chink the cracks in net worth caused by inflation, pay for any private equity it might have, and still turn a profit. If an MFO can do this, then it is financially self-sufficient.

Financial self-sufficiency is good, but it is not the best. The gist of the problem is that improvement may stop there. Progress may cease once workers feel content and free from the threat of the loss of their jobs. Workers will have few selfish reasons to improve. Owners help spur workers to improve, but improvement may stop before an MFO can attract owners. The result may be an MFO that serves fewer poor people with worse products.

Level of performance	Measure
1. Accounting profitability	= Accounting profit, $AP > 0$
	– Revenue grants, RG
	– Discount on soft debt, $D \cdot (m - c)$
	– Discount on expenses, DX
2. Operational profitability	= True profit, $TP > 0$
	– Taxes on true profit, Tax
	– Dividends, Div
	– Inflation effect on equity, $\pi \cdot E$
	– Risk premium private equity, $(1-\beta) \cdot (r - \pi - Div/E) \cdot E$
3. Financial self-sufficiency	= Financial self-sufficiency > 0
	– Risk premium public equity, $\beta \cdot (r - \pi - Div/E) \cdot E$
4. Private profitability	= –(Subsidy S in the SDI) > 0

Table 14: Sequence of levels of performance from the point of view of workers

C. Levels of performance for workers

The performance of an MFO can be seen as a sequence of four steps (Table 14 on page 69). Each step is necessary but not sufficient for the next step. The measures look just at the past year since workers do not ask questions about the worth of a new MFO.

This sequence contrasts with others for MFOs (Morduch, 1997; Von Pischke, 1996; SEEP, 1995; Christen, *et al*., 1995; KK&K, 1995; IADB, 1994; Rosenberg, 1994; Otero and Rhyne, 1994). It is based on the goals of workers and on the unique traits of a subsidized MFO once donors withdraw. The levels of performance have simple links (Table 14 on page 69).

1. Accounting profitability

Accounting profitability is the lowest level of performance for workers. It requires positive accounting profit. It means the MFO paid its bills and kept the nominal value of its net worth.

Most MFOs trumpet accounting profitability. This makes sense since not all MFOs reach this common milestone. But accounting profitability is meaningless when an MFO gets profit grants (Schreiner and Yaron, 1998). Accounting profitability does not comfort workers. It ignores profit grants and the effect of inflation on subsidized funds in net worth.

Without accounting profitability, an MFO is dying fast despite help from donors. It is shrinking in real and nominal terms. With accounting profitability, an MFO is not shrinking in nominal terms, at least as long as donors stay. In real terms, it might already be shrinking.

2. Operational profitability

Operational profitability is the second level of performance for workers. It implies positive true profit before taxes and dividends. An operationally profitable MFO could have paid its bills and kept its nominal size without donors. But it might still shrink in real terms.

3. Financial self-sufficiency

Financial self-sufficiency is the third level of performance for workers. An MFO is financially self-sufficient when true profit after taxes, dividends, and the return required by private owners is enough to maintain the real value of subsidized funds in net worth against inflation. Even without more help from donors, such an MFO could have paid its bills and not have shrunk in real terms.

Financial self-sufficiency is necessary but not sufficient for sustainability. Financial self-sufficiency means workers are content with financial performance. Workers may still want to protect their jobs by strengthening the other parts of sustainability (Figure 3 on page 28). But they have few selfish reasons to improve financial performance.

In the long term, financial self-sufficiency matters for all stakeholders. MFOs secure repayment less by collateral, monitoring, and enforcement than by the NPW to customers of their good credit (Gonzalez-Vega, *et al*., 1997b). Lack of sustainability shortens the time frame, cuts the NPW to customers of good credit, and increases the reward to default. Depositors run once they suspect an MFO is unsustainable. All this thwarts profit and thus harms financial self-sufficiency more and more.

4. Private profitability

Private profitability is the fourth and last level of performance for workers. A privately profitable MFO has enough true profit to replace subsidized funds with market funds without shrinking in real terms. Private profitability is the same for workers and for investors. Subsidy in the SDI measures it in short time frames.

Investors check private profitability with the NPC_I or with the SDI. Workers, once they reach financial self-sufficiency, might not check private profitability at all. In fact, workers may not want to reach private profitability. Without owners, workers control the MFO. Owners might demand more effort or cut perks.

Financial self-sufficiency is a low hurdle. It supposes that an MFO would not use private funds to replace subsidized funds left behind by donors in net worth. The opportunity cost of subsidized funds for workers is just the rate of inflation π. In contrast, private profitability is a high hurdle. It supposes that an MFO would replace subsidized funds with market funds. Thus it uses the opportunity cost of equity for an investor r.

D. Examples of financial self-sufficiency

1. BancoSol

Workers at BancoSol secured their jobs with financial self-sufficiency in 1994-96 (line o of Table 15 on page 72). In these years, BancoSol had more than enough true profit to replace soft debt with market debt, to pay private investors a market return, and to maintain the real value of subsidized funds in net worth.

Financial self-sufficiency is no mean feat. It is needed for self-sustainability, though it is not sufficient. At its highest level of financial self-sufficiency in 1996, BancoSol still fell short of private profitability (line q of Table 15 on page 72). BancoSol needed to double true profit after tax to reach private profitability. The shortfall is the subsidy of the SDI (line v of Table 5 on page 48). The shortfall may reflect the conflict between the goals of workers and investors.

2. Grameen

In spite of a small accounting profit in most years, Grameen was not once operationally profitable, financially self-sufficient, nor privately profitable (lines f, j, o, and q of Table 16 on page 73). For example, without revenue grants or discounts, accounting profit in 1994 fell from about $600,000 to -$17 million (lines f and j). Furthermore, if Grameen had maintained the real worth of equity and paid its members a market return on their shares, then net worth would have eroded by almost $35.4 million (line o). A risk premium on subsidized funds in equity would have cost Grameen $1.6 million more (line p). The $37 million shortfall from private profitability (line q) is the subsidy of the SDI (line v of Table 8 on page 53).

Grameen enjoys a unique place as the anointed one of microfinance. Its workers can keep their jobs despite a lack of financial self-sufficiency since donors will not cut their support. Workers manage revenues and expenses so the bottom line shows a profit, but not a big profit. Donors do not seem to care that their grants and discounts lard the reported profit. The conflict between the goals of workers and of investors does not bite yet since donors have not pressed workers for operational profitability, let alone for financial self-sufficiency.

I still think Grameen could reach financial self-sufficiency. I am not saying that this would help the poor more. I am just saying it could be done. In spite of the lack of financial self-sufficiency, Grameen is sustainable since its support from donors will not end. Grameen is financially self-sufficient as long as it could make the changes needed if donors left.

Please do not compare the financial self-sufficiency of Grameen and BancoSol. Too much is not held constant. I do not analyze these MFOs. They are just examples of the framework. A real analysis could compare Grameen and BancoSol, but it would need to use much more than just the summary measures suggested here.

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Opp. cost equity, r	Data	0.46	0.38	0.43	0.34	0.27	0.25	0.27	0.29	0.32	0.33
b.	Inflation given IAS 29 practice	Data	0.02	0.04	0.04	0.06	0.03	0.03	0.02	0.03	0.02	0.03
c.	Ave. equity	Data	37	172	236	1,003	2,049	4,488	7,591	8,613	5,975	6,646
d.	Average Beta in year	Data	1.00	1.00	1.00	1.00	1.00	0.90	0.80	0.78	0.79	0.82
e.	Accounting profit, AP	Data	21	69	(54)	103	185	(131)	46	1,471	880	1,512
f.	**Accounting profitability**	e	21	69	(54)	103	185	(131)	46	1,471	880	1,512
g.	Rev. grants, RG	Data	109	157	135	226	243	0	0	0	0	0
h.	Disc. soft debt, D*(m-c)	Data	25	70	129	172	168	143	36	170	59	52
i.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	4	0	0
j.	**Operational profitability**	e-(g+h+i)	(113)	(157)	(318)	(295)	(226)	(274)	9	1,297	820	1,460
k.	Actual tax	Data	0	0	0	0	0	49	91	331	220	378
l.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0
m.	Inflation premium all equity	b*c	1	8	10	56	62	117	181	228	148	214
n.	Risk premium private equity	(1-d)*(a-b-l/c)*c	0	0	0	0	0	103	376	490	379	356
o.	**Financial self-sufficiency**	j-(k+l+m+n)	(114)	(165)	(328)	(351)	(288)	(542)	(639)	248	73	512
p.	Risk premium public equity	d*(a-b-l/c)*c	16	58	93	283	490	925	1,505	1,747	1,394	1,647
q.	**Private profitability**	o-p	(130)	(223)	(421)	(634)	(779)	(1,467)	(2,144)	(1,499)	(1,320)	(1,135)

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 15: BancoSol financial self-sufficiency for workers, 1987-96

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Opp. cost equity, r	Data	0.30	0.28	0.37	0.42	0.48	0.32	0.26	0.26	0.25	0.24	0.23	0.24
b.	Inflation given IAS 29 practice	Data	0.12	0.08	0.22	0.12	0.14	0.09	0.09	0.13	0.02	0.01	0.04	0.05
c.	Ave. equity w/o subsidies, E	Data	442	1,126	1,408	1,588	1,794	4,456	9,447	19,827	32,754	52,346	74,243	84,664
d.	Average Beta in year	Data	1.00	0.86	0.66	0.55	0.47	0.37	0.28	0.25	0.20	0.14	0.12	0.10
e.	Accounting profit, AP	Data	(189)	273	29	15	17	41	98	303	357	(150)	246	556
f.	**Accounting profitability**	e	(189)	273	29	15	17	41	98	303	357	(150)	246	556
g.	Rev. grants, RG	Data	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
h.	Disc. soft debt, D*(m-c)	Data	363	615	1,384	2,495	3,786	4,552	5,520	7,645	8,060	6,723	10,424	15,554
i.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	0	0	0	0	0
j.	**Operational profitability**	e-(g+h+i)	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
k.	Tax	Data	0	0	0	0	0	0	0	0	0	0	0	0
l.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0	0	0
m.	Inflation effect on equity	b*c	53	90	307	192	259	393	896	2,658	705	424	3,181	4,261
n.	Risk premium private equity	(1-d)*(a-b-l/c)*c	0	33	75	213	321	659	1,115	1,801	5,937	10,294	12,261	14,168
o.	**Financial self-sufficiency**	j-(k+l+m+n)	(605)	(465)	(1,738)	(2,885)	(4,465)	(6,751)	(9,342)	(14,048)	(16,373)	(19,242)	(27,921)	(35,380)
p.	Risk premium public equity	d*(a-b-l/c)*c	82	195	145	264	282	390	440	600	1,518	1,661	1,675	1,602
q.	**Private profitability**	o-p	(687)	(661)	(1,883)	(3,149)	(4,747)	(7,141)	(9,783)	(14,648)	(17,891)	(20,903)	(29,596)	(36,981)

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 16: Grameen financial self-sufficiency for workers, 1983-94

Chapter 8: Cost-effectiveness for the Poor

"No one is told any story but their own." Lewis (1954, p. 194)

In this chapter, I suggest cost-effectiveness analysis (CEA) as a measure of the worthwhileness of a subsidized MFO for the poor. The poor ask the question: Is a subsidized MFO the best way to get help? Thus the opportunity cost of subsidized funds in equity for the poor is the return those funds could earn in the best unfunded or underfunded development project of like risk. The return could be increased welfare, cash left in the MFO, or cash used to help the poor in some other way.

It costs a lot to measure what the poor gain from an MFO. In contrast, it costs much less to measure what the poor lose. This loss is just the net present cost of the stream of flows between the budget of the poor (from now on "the poor") and an MFO (NPC_P). The NPC_P is the negative of the NPW from the point of view of the poor.

Instead of cost-benefit analysis, I suggest cost-effectiveness analysis. CEA compares cost for the poor to output in a test of bang-for-the-buck. CEA can count outputs both from deposits and from loans. The cost to the poor per unit of output is the surplus required per unit of output to make the gains to the poor offset their costs and thus to make the MFO worthwhile.

In most cases, the gains got by the poor are unknown. Still, the gains required to offset costs may be so high or so low that people can use the information to allot funds (Detsky, 1994). People judge whether surplus is likely high enough to offset costs through reasoned talk based on measurement, logic, and theory. Regardless of whether analysts agree on the likely worth of an MFO, just the act of the measurement of cost and its comparison to outputs used by the poor will push an MFO to help the poor more.

A. The cost to the poor of a subsidized MFO

The cost to the poor of a subsidized MFO is the welfare lost since the funds in the MFO were not used in the best other development project. This is measured as the net present cost (NPC_P) of the flows of funds between the poor and an MFO.

The NPC_P resembles the NPC_I in most ways. Both are discounted measures of flows of funds between their source and an MFO from the start to the end of a time frame. Both form their discount rate with their opportunity cost of equity.

The NPC_P and the NPC_I differ in three ways. First, the NPC_P uses not the opportunity cost of equity for an investor r but rather the opportunity cost of equity for the poor ρ. Second, the NPC_I can assume that all funds come from investors and that all funds revert to investors. In contrast, the NPC_P cannot assume that all the net worth put in an MFO from the budget of the poor would revert to that budget at the end of the time frame unless the MFO does not have any private shareholders. Private shareholders have a legal right to a part of net worth equal to their portion of shares even though the poor may have injected some net worth without buying shares. Third, a negative NPC_I is both necessary and sufficient for private profitability for investors. In contrast, a negative NPC_P is sufficient but not necessary for worthwhileness for the poor.

1. The opportunity cost of equity for the poor

No one knows the opportunity cost of equity for the poor ρ since no one knows the marginal return to funds earmarked to help the poor. In practice, governments and donors that fund MFOs can use the estimated rate of return on their best unfunded or underfunded development project of like risk. For example, the department of health might lack the budget for

a vaccine campaign with an estimated risk-adjusted return of 20 percent per year in real terms. Most governments and donors such as the World Bank use a base opportunity cost of society unadjusted for risk of 10 percent per year in real terms (Katz and Welch, 1993; Gittinger, 1982; U.S. Office of Management and Budget, 1972). The true ρ could be higher or lower, but 10 percent seems like a good rule of thumb. Financial rates of interest, such as the rate paid for deposits, are too low (Gittinger, 1982).

I suggest that all measures of NPC_P use a real rate of 10 percent per year as the opportunity cost of equity for the poor unadjusted for risk. "A discount rate lower than 10 percent might be difficult to justify" (Belli, 1996a, p. 148). The burden of proof for some other opportunity cost is on the analyst (Gittinger, 1982).

In practice, the exact number used as ρ matters less than that the same number be used across all analyses. This matters since the analyst measures costs in order to compare them with other costs, outputs, and benefits. This view takes the opportunity cost as a way to allocate scarce funds from a budget rather than as a true opportunity cost (Belli, 1996a).

The only other treatment of something like the NPC_P for an MFO is a few pages in Holtmann and Mommartz (1996). They took the opportunity cost of equity for the poor ρ as the rate of inflation π. This is too low since this implies a real opportunity cost of zero.

The base opportunity cost for the poor of 10 percent does not account for risk. In principle, the analyst should not use the opportunity cost to adjust CBA or CEA for risk (Belli, 1996a; Norgaard and Howarth, 1992; Markandya and Pearce, 1991). Instead, the analyst should assign weights to possible outcomes and then find an expected NPC_P (Little and Mirrlees, 1974; Dasgupta, Sen, and Marglin, 1972). In practice, this requires a lot more data than the analyst can get. Thus I suggest that the analyst add 10 more percentage points to get a real risk-adjusted opportunity cost for the poor ρ of 20 percent for funds entrusted to an MFO.

The analyst must adjust for risk. For BancoSol and Grameen, I set ρ to 20 percent. Perhaps Grameen and BancoSol were just the two MFOs with the most luck. Good performance *ex post* does not change *ex ante* risk. I check whether the NPC_P is robust to the choice of ρ.

2. The time frame of the NPC_P

Like the NPC_I, the NPC_P stretches to fit any time frame. The two biggest questions of the poor correspond to two time frames. In the first time frame, the poor forecast performance from now onward and ask the question: Will more subsidies cause more benefits than costs? The answer from CEA can help allot funds now, both among MFOs and among MFOs and other development projects. It can help to force an MFO to plan to meet concrete goals. Forecasts are uncertain since the future is unknown, but I doubt the poor would want to fund an MFO that cannot even plan to be worthwhile.

In the second time frame, the poor look at performance from birth onward. They ask the question: Are subsidies now to a new MFO that performs the same as an old MFO the best way to help the poor? The answer will also tell whether the old MFO was worthwhile up to now. Past costs are sunk, but the answer may still inform the choice to put more subsidized funds in an old MFO now. All else constant, MFOs that used funds well in the past are more likely to do so in the future. The NPC_P may also help judge microfinance as a whole. If most MFOs would not have been judged as worthwhile at the time of their birth had its future performance been known, then the poor might want to check whether MFOs are still the best way to use their budget. Supporters of MFOs must make a case that MFOs will improve enough to reverse this soon.

Like investors, the poor look at projects in the long term. Like the NPC_I, the NPC_P measures performance in the long term. Like a newborn private firm, a newborn MFO will not

perform well at first. Investors in private firms expect this, but they bet that profit in the last years will more than compensate for costs in the first years. Losses in the short term are fine as long as they are balanced by gains in the long term. When the poor subsidize an MFO, they want to check whether gains exceed costs in the long term.

An MFO is a long-term project. The analyst needs short-term measures to track progress and long-term measures to check success. A dam is not worthwhile just because benefits exceeded costs in the tenth year but not in the first nine years. One-year measures are not enough.

3. The formula of the NPC_P

The NPC_P is constructed in the same way as the NPC_I. They differ in two ways. First, the opportunity cost of the poor is not r but ρ. Second, not all of the net worth of an MFO with private shareholders will revert to the poor at the end of the time frame.

The discount rate for the poor δ_{P1} for a flow one year past the start of the time frame is one divided by one plus the opportunity cost of equity for the poor in the first year, ρ_1:

$$\text{Discount rate for poor} = \delta_{P1} = \frac{1}{1 + \text{Opp. cost equity for the poor}} = \frac{1}{1 + \rho_1}. \tag{45}$$

Given a stream of opportunity costs in years 1 through T, the discount rate δ_{Pt}^{t-n} for a flow at time $t-n$ with $0 \leq n < 1$, is:

$$\delta_{Pt}^{t-n} = \left(\frac{1}{1+\rho_t}\right)^{1-n} \cdot \prod_{j=1}^{t-1}\left(\frac{1}{1+\rho_j}\right). \tag{46}$$

As with the NPC_I, I use a factor γ_P to discount a flow that accrues through a year (Appendix 6 on page 114).

For the poor, outflows of funds from their budget to an MFO are costs. Inflows of funds back to their budget from an MFO are gains. Like the SDI and the NPC_I, the NPC_P adds discounted outflows and subtracts discounted inflows. The NPC_P ignores costs sunk before the start of the time frame.

The share of the stock of equity that belongs to the poor at the start of the time frame $\beta_0 \cdot E_0$ is not a sunk flow. The poor could have withdrawn it from the MFO for use in some other development project. Instead, they let the MFO keep it. Thus the poor count their share β_0 of equity at the start of the time frame as an outflow:

$$\text{Outflow start net worth} = \beta_0 \cdot \delta_{P0}^{0} \cdot E_0 = \beta_0 \cdot E_0. \tag{47}$$

After the start of the time frame, the poor inject net worth in the MFO with grants, public paid-in capital, and discounts. The MFO also gets private paid-in capital, but this is not an outflow for the poor. The discount factor on these accumulated flows is γ_{Pt} (Appendix 6 on page 114). Given the definition of fresh funds (equation 22 on page 37), the discounted cost of these

outflows from the poor to the MFO in the time frame is:

$$\begin{aligned}\text{Outflow fresh funds} &= \sum_{t=1}^{T} \gamma_{Pt} \cdot [DG_t + PC_{pub_t} + RG_t + D_t \cdot (m_t - c_t) + DX_t], \\ &= \sum_{t=1}^{T} \gamma_{Pt} \cdot (FF_t - PC_{pri_t}).\end{aligned} \tag{48}$$

True profit accrues through each year. The poor could withdraw true profit as it accrues, but instead they let the MFO keep it. Hence true profit in each year is like an inflow back-to-back with an outflow. The two flows cancel from the NPC_P.

Tax is not an inflow nor an outflow. Tax does reduce the net worth that the poor can take from an MFO at the end of the time frame.

The poor could withdraw some net worth as their share β_t of dividends. I assume this inflow back to the poor from the MFO takes place at the end of a year:

$$\text{Inflow dividends} = \sum_{t=1}^{T} \beta_t \cdot \delta_{Pt}^{t} \cdot Div_t. \tag{49}$$

The NPC_P assumes the poor get a share β_T of the net worth of an MFO at the end of the time frame. End net worth includes funds invested at the start of the time frame as well as paid-in capital, grants, discounts, and true profit. Negative true profit (true losses), dividends, and taxes reduce final net worth. Taxes are the actual taxes paid, not the taxes that would be paid on true profit. The poor discount their last inflows by δ_{PT}^{T}:

$$\text{Inflow end net worth} = \beta_T \cdot \delta_{PT}^{T} \cdot [E_0 + \sum_{t=1}^{T} (FF_t + TP_t - Div_t - Tax_t)]. \tag{50}$$

The NPC_P adds discounted outflows (equation 47 on page 76 and equation 48 on page 77) and subtracts discounted inflows (equation 49 on page 77 and equation 50 on page 77):

$$\begin{aligned}NPC_P &= \text{Discounted outflows} - \text{Discounted inflows}, \\ &= \beta_0 \cdot E_0 + \sum_{t=1}^{T} \gamma_{Pt} \cdot (FF_t - PC_{pri_t}) - \sum_{t=1}^{T} \beta_t \cdot \delta_{Pt}^{t} \cdot Div_t \\ &\quad - \beta_T \cdot \delta_{PT}^{T} \cdot [E_0 + \sum_{t=1}^{T} (FF_t + TP_t - Div_t - Tax_t)], \\ &= (\beta_0 - \beta_T \cdot \delta_{PT}^{T}) \cdot E_0 + \sum_{t=1}^{T} (\gamma_{Pt} - \beta_T \cdot \delta_{PT}^{T}) \cdot FF_t - \sum_{t=1}^{T} \gamma_{Pt} \cdot PC_{pri_t} \\ &\quad - \sum_{t=1}^{T} (\beta_t \cdot \delta_{Pt}^{t} - \beta_T \cdot \delta_{PT}^{T}) \cdot Div_t - \beta_T \cdot \delta_{PT}^{T} \cdot \sum_{t=1}^{T} (TP_t - Tax_t).\end{aligned} \tag{51}$$

The NPC_P has five terms (equation 51 on page 77). The first is the cost of funds put in net worth at the start. For the poor at time 0, the worth of $\beta_0 \cdot E_0$ falls to $\beta_T \cdot \delta_{PT}^{T} \cdot E_0$ from time 0 to time *T*. The cost is the change in the worth of funds through time.

The second term is the cost of funds put in net worth by the poor after the start of the time frame. From the point of view of time 0, these funds are worth γ_{Pt} when they go in but just $\beta_T \cdot \delta_{PT}^{T}$

when they come back. The cost is the difference.

The third term is private paid-in capital. The second term counted private paid-in capital as if it came from the poor, so this term takes it out.

The fourth term is the gain the poor get since dividends come at the end of year *t* instead of at the end of the time frame. This is worth $\beta_t \cdot \delta_{Pt} - \beta_T \cdot \delta_{PT}$.

The fifth term is the present worth of the accumulated true profit net of tax that belongs to the poor. This is a benefit that, along with the third and fourth terms, may offset some or all of the costs in the first two terms. As with the NPC_I, I assume that the economic worth of the MFO matches its accounting worth.

If the NPC_P is negative, then the poor got the MFO free. If customers got some gain as shown by repeated use, then a negative NPC_P means the MFO was worthwhile. In contrast, if the NPC_P is positive, then the MFO can be worthwhile only if gains to customers exceed the NPC_P.

B. The comparison of the NPC_P to measures of benefits

The analyst can compare the NPC_P with measures of the welfare of customers with and without a subsidized MFO. The with-versus-without comparison is straightforward for the NPC_P from birth onward. Without subsidies, the MFO would not have been born. Thus all benefits from birth onward were caused by all subsidies from birth onward. Subsidies to microfinance before the birth of the MFO may have allowed it to improve faster than it could have otherwise. But the subsidies got by the MFO broke a binding constraint and so caused the output of an MFO. Furthermore, subsidies before the birth of the MFO were sunk before its time frame started.

The with-versus-without comparison from now onward requires forecasts of benefits with and without subsidies. Still, making a plan where benefits exceed costs from now on can only improve future performance.

The poor can get two kinds of benefits from an MFO. The first kind is a negative NPC_P. A negative net cost is a benefit. It is the value of the net worth the MFO returns to the poor for use in other development projects in excess of the value of the funds put in by the poor. A negative NPC_P means the MFO increased the funds in the budget of the poor.

The second kind of benefit is the extra surplus of customers with the MFO versus without it. The comparison is not before-and-after but with-and-without. Before-and-after does not control for changes in welfare that did not depend on the MFO (Gittinger, 1982).

There are two problems with the measurement of benefits. First, while a negative NPC_P since birth implies worthwhileness for the poor, no one has documented such an MFO. Thus measures of worth to the poor require measures of customer surplus with and without the MFO.

Second, no one knows what customers would have done without the MFO since no one is told any story but their own. The missing link is a control group. This is a group of people who, through no fault of their own, cannot use the MFO but who are just like the people who do use it.

It is well-known that it is difficult to find a good control group and then to measure the impact of an MFO as the change in welfare between customers and the control group (Adams, 1988; David and Meyer, 1983; Von Pischke and Adams, 1980). The analyst cannot assume a loan caused the project stated in the loan contract. Borrowers can substitute fungible loan proceeds for other funds that would have been used for the same purpose. Borrowers can also divert loan proceeds to other uses. If customers use an MFO more than once, then they gain from the MFO, but perhaps not as stated in the loan contract and perhaps not from the access to the loan itself but rather from its low cost. Furthermore, borrowers are not the same as non-borrowers unless lenders disburse loans at random or unless non-borrowers cannot get loans due to some external

constraint. Without a control group, these problems prevent the measurement of the impact of an MFO.

Once analysts understood these problems, disciplined work to measure the impact of MFOs went dormant. Rather than work to solve the problems, some analysts said it was better not to try to measure impact at all since it was so difficult to do it right. In truth, it may cost a lot to measure impact, but that does not mean no one should try to make good measurements with the right tools. It only means that good measurements take a lot of time, effort, skill, and budget.

The measurement of the benefits of an MFO is just program evaluation with non-experimental data. Mainstream econometricians have grappled with this problem for at least 20 years (Moffitt, 1991). They figured out how to do it right. The analyst must control for the fact that customers and non-customers are likely to differ systematically. Examples with MFOs are Smith and Jain (1998), Pitt and Khandker (1996 and 1995), Hulme and Mosley (1996), Sial and Carter (1996), Carter and Olinto (1996), Lapar *et al*. (1995), Feder *et al*. (1990), Bolnick and Nelson (1990), and Carter (1989).

The problem of measuring benefits is to find a valid control group. It is not the fungibility of money, in contrast to Von Pischke and Adams (1980). Control groups control for fungibility.

A good control group is hard to find. Those who choose to use the MFO are not the same as those who choose not to use the MFO. The users are more likely to do well regardless of the MFO. For example, they may work more or take more risks. In contrast, the non-users likely would not do so well regardless of the MFO. Thus simple comparisons of users to non-users overestimate impact. Furthermore, while a study may estimate the impact of one MFO on one outcome, no study can estimate the sum of all impacts on all outcomes nor for all MFOs. I doubt analysts will ever plumb the full depths of the impact of an MFO on the welfare of its customers.

Analysts can measure the impact of an MFO. But the measures are incomplete and take a long time, a lot of skill, and a big budget. It costs too much to measure the impact of all subsidized MFOs (YB&P, 1997). The measure of one lender in one year does not transfer to other lenders or even to the same lender in other years. Still, this does not preclude the measurement of some impacts for some MFOs.

These problems highlight the worth of the premise of CEA. Unlike benefits, costs and outputs are cheap to measure. Whereas CBA compares costs with benefits, CEA compares costs with outputs (Garber and Phelps, 1997; Weinstein and Stason, 1977).

For most MFOs, a CBA of CBA versus CEA would find that measuring costs but not benefits with CEA beats measuring both costs and benefits with CBA. Whether analysts use CBA or CEA, they still must measure costs. The measurement of costs can help judge an MFO whether or not benefits are measured.

CEA is not as useful as full-blown CBA since CEA does not measure benefits. CEA cannot rank projects that do not have the same size or that do not make the same outputs for the same customers. Also, CEA does not pin a dollar value on benefits nor tell whether benefits exceed costs. But CEA is cheaper than CBA.

Measures of the cost of subsidized MFOs are useful since subsidies could be used elsewhere. It is not bad to entrust public funds to an MFO unless the funds could help the poor more elsewhere. The measurement of costs is the first step in the wise use of public funds.

C. Cost-effectiveness analysis

Cost-benefit analysis (CBA) is the standard way to compare the costs and benefits of a public project. Let *B* stand for the total flow of benefits caused by public funds in an MFO in a

year. Subsidizing the MFO helps the poor more than the best other project as long as the discounted stream of costs (the NPC_P) is less than the discounted stream of benefits:

$$\begin{aligned} 0 &\geq \text{Discounted stream of costs} - \text{Discounted stream of benefits}, \\ &\geq \text{NPC}_\text{P} - \sum_{t=1}^{T} \gamma_{Pt} \cdot B_t . \end{aligned} \tag{52}$$

If CBA were free, then analysts would use it for each transfer of funds to an MFO. But it is expensive to measure benefits. In contrast, it is cheap to measure costs with NPC_P.

Cost-effectiveness analysis (CEA) has a role when full-blown CBA costs too much. In practice, this is the most common case. CEA takes advantage of two facts. First, measures of costs and of outputs are cheap. Second, the extra welfare caused by an MFO is, on average, a multiple of its outputs (Schreiner, 1997; Gittinger, 1982).

CEA measures the cost to the poor per unit of output. Less cost per unit of output means that the poor require less consumer surplus per unit of output to offset costs and to make an MFO worthwhile. All else constant, the lower the cost to the poor per unit of output, the more likely it is that the surplus per unit of output is enough to make an MFO pass a CBA. Examples of CEA in subsidized finance are Binswanger and Khandker (1995) and Gale (1991).

The output of a typical MFO could be measured as the average amount of dollars outstanding (dollar-years of debt), the average number of loans outstanding (loan-years of loans), the amount of dollars disbursed, and/or the number of loans disbursed (Schreiner, 1997). In the case of an MFO like Grameen that produces both financial and non-financial outputs, output might be measured as years of membership. With output and market niche held constant and without secondary benefits and costs, the cheaper an MFO produces a unit of output, the better.

CEA is the standard tool when the analyst can measure costs but not benefits (Brent, 1996; Gittinger, 1982). CEA is common in health care since analysts do not like to put a price on human life (Warner and Luce, 1982). CEA traces its roots back to a cadre of economists under Winston Churchill in World War II (Stockfisch, 1987). Churchill wanted someone with disciplined judgement on behalf of the common good to balance the entrenched forces of groups in government whose pursuit of their own goals led to waste. This framework has the same goal, but it has no war to increase the cost of waste and thus to increase the worth of the use of CEA.

People must discuss whether unknown surplus is high enough to offset costs. People judge how big is big with talk (McCloskey, 1983). Human talk is not groundless opinion. It is reasoned persuasion based on measurement, logic, and theory. Even though no one knows the worth of the output of an MFO, the poor should know at least how much they pay for output. The NPC_P and CEA do not say that subsidized MFOs are bad. Subsidized MFOs may be the best way to help the poor. But the stewards of the budget of the poor should know how much an MFO costs. They should not buy microfinance sight-unseen and without a price tag.

D. The measurement of the cost to the poor per unit of output

CEA measures the cost to the poor per unit of output. This is the ratio of discounted flows of costs to discounted flows of outputs. A lower cost means more bang-for-the-buck:

$$\text{Ave. cost to poor} = \frac{\text{Discounted stream of costs to poor}}{\text{Discounted stream of outputs}} . \tag{53}$$

The NPC_P measures cost for the poor. Output should be measured as flows. Some outputs

are natural to measure in flows. Two examples are the number of loans disbursed or the amount of dollars disbursed. Outputs that are natural flows are discounted by $\delta_{Pt}^{t-\omega}$, where I define ω in Appendix 6 on page 114. With constant flows or with just year-end measures of flows, ω is 0.5. The analyst must convert outputs measured as stocks to flows. For example, the average stock of dollars outstanding in a year can be seen as a flow of dollar-years of debt produced in the year. Likewise, the average stock of the number of loans outstanding in a year can be seen as a flow of loan-years produced in a year. These are flow measures since they are in units per year. The discounted flow from an average stock S_t in year t uses the factor ϵ (Appendix 7 on page 116) and the factor α (Appendix 5 on page 112):

$$\text{Discounted flow from a stock} = \epsilon_t \cdot \alpha_t \cdot (S_{t-1} + S_t)/2. \tag{54}$$

For example, the cost to the poor per dollar-year of debt in a time frame would be:

$$\text{Cost to poor per dollar-year of debt} = \frac{\text{NPC}_\text{P}}{\sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (LP_{t-1} + LP_t)/2}. \tag{55}$$

1. Surplus required to offset costs

The surplus per unit of output σ required to make discounted benefits less costs positive for the poor is just the cost to the poor per unit of output. The derivation of σ uses the fact that benefits *B* in the cost-benefit formula (equation 52 on page 80) are the surplus per unit of output σ multiplied by the flow of output:

$$B_t = \sigma \cdot \text{Output}_\text{t}. \tag{56}$$

Setting the cost-benefit formula (equation 52 on page 80) less than zero gives:

$$\begin{aligned} 0 &\geq \text{Discounted stream of costs} - \text{Discounted stream of benefits}, \\ &\geq \text{NPC}_\text{P} - \sum_{t=1}^{T} \text{Discount factor}_\text{t} \cdot B_t, \\ &\geq \text{NPC}_\text{P} - \sum_{t=1}^{T} \text{Discount factor}_\text{t} \cdot \sigma \cdot \text{Output}_\text{t}, \\ \sigma &\geq \frac{\text{NPC}_\text{P}}{\sum_{t=1}^{T} \text{Discount factor}_\text{t} \cdot \text{Output}_\text{t}}. \end{aligned} \tag{57}$$

2. Benefits from deposits

An MFO views deposits as inputs with costs, but the poor view deposits as outputs with benefits. The analyst can adjust the formula for required surplus σ to count the benefits of deposits by assuming a surplus per dollar-year of deposits *d*, discounting this stream, and then subtracting it from the cost to the poor:

$$\sigma \geq \frac{\text{NPC}_\text{P} - \text{Discounted surplus from deposits}}{\text{Discounted output}}. \tag{58}$$

The analyst can make the simple concept of required surplus more accurate at the cost of making it more complex. For example, the analyst might want to weight costs and outputs by whom they go to (Ray, 1984; Little and Mirrlees, 1974; Dasgupta, Sen, and Marglin, 1972). Or the analyst could measure output better.

In sum, CEA measures the cost to the poor per unit of output. This puts a price tag on the improved welfare bought from MFOs. Whether analysts measure benefits or not, they must measure costs to check whether the funds used by an MFO are wasted or worthwhile.

E. Examples of CEA

1. BancoSol from the point of view of the poor in 1987

The CEA of BancoSol takes the real, risk-adjusted opportunity cost to the poor ρ as 20 percent per year and then adjusts for inflation (lines a, b, and c of Table 17 on page 83). The time frame starts in 1987 and ends with net worth reverting to owners.

The NPC_P was about $2.1 million in 1996 (line bb of Table 17 on page 83). The NPC_P was still growing in 1996, but the growth had slowed and may have peaked.

CEA compares the cost with the poor as measured by the NPC_P to discounted output. Output for BancoSol can be seen as dollar-years of debt, loan-years of loans, dollars disbursed, loans disbursed, or dollar-years of deposits outstanding (lines b, c, d, e, and o of Table 18 of page 84). Discounted output grew each year (lines k, l, m, n, and p).

Output measured as disbursements is not too useful since the length of time a dollar or a loan disbursed stayed outstanding changed in 1987-96 (Schreiner, 1997). I assume a surplus *d* of 2 cents per dollar-year of deposits (line q of Table 18 of page 84). Although the NPC_P since birth was $2.1 million and growing in 1996, the NPC_P since birth net of surplus for the poor from deposits peaked at $1.9 million for 1983-93 and fell to $1.7 million for 1983-96 (line s).

The required surplus per unit of loan output that would offset the NPC_P since birth net of surplus to depositors fell through time. For example, the cost to the poor per dollar-year of debt fell from 76 cents for the two-year time frame 1987-88 to 6 cents for the 10-year time frame 1987-96 (line t of Table 18 on page 84). Thus BancoSol was worthwhile for the poor as long as the average borrower in 1987-96 got a surplus per dollar-year of debt of at least 6 cents.

I highlight two points. First, BancoSol makes both loans and deposits. Surplus from deposits cut the required surplus from loans by about 20 percent. Second, CEA does not measure benefit per output. The analyst must judge whether poor customers gained enough to make an MFO worthwhile. For BancoSol, my guess is that the willingness-to-pay of the average borrower did exceed their costs by at least 6 cents per dollar-year of debt. The highest real interest rate paid by customers was 49 percent (Schreiner, 1997). With this as a lower bound on willingness-to-pay and with other costs constant, I expect that customers did get more than 6 cents of surplus.

I assume a surplus on deposits *d* of 0.02 per year and a real, risk-adjusted opportunity cost to the poor ρ of 0.20 per year. The required surplus did not change much as ρ ranged from 2 to 30 percent and as *d* ranged from 0 to 15 percent (Table 19 on page 85). In the most conservative case (d=0, ρ=0.30) the required surplus is 11 cents (bottom left corner).

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Real opp. cost equity for poor, rho	Data	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
b.	Inflation given IAS 29 practice	Data	0.02	0.04	0.04	0.06	0.03	0.03	0.02	0.03	0.02	0.03
c.	**Nom. opp. cost equity for poor, rho**	a+b+a*b	0.23	0.25	0.25	0.27	0.24	0.23	0.23	0.23	0.23	0.24
d.	Beta 0	Data	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
e.	Beta t	Data	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.76	0.81	0.83
f.	Delta for poor at end of year	f(t-1)*[1/(1+a)]	0.81	0.65	0.52	0.41	0.33	0.27	0.22	0.18	0.14	0.12
g.	Gamma for the poor, since birth	Data	0.87	0.72	0.54	0.43	0.34	0.27	0.23	0.18	0.00	0.11
h.	Beta t*Delta	e*f	0.81	0.65	0.52	0.41	0.33	0.22	0.18	0.14	0.12	0.10
i.	Start equity, E0	Data	0	0	0	0	0	0	0	0	0	0
j.	Fresh sub funds less (TP-Tax), FF	Data	238	252	459	1,894	1,512	7,107	1,333	(5,083)	(459)	(168)
k.	Accumulated FF	k(t-1)+j	238	490	949	2,843	4,355	11,462	12,795	7,712	7,254	7,086
l.	Accum. discounted FF	l(t-1)+g*j	206	386	635	1,454	1,965	3,914	4,217	3,293	3,292	3,273
m.	Private paid-in capital	Data	0	0	0	0	0	1,072	(23)	422	(194)	(72)
n.	Accum. private paid-in cap.	n(t-1)+m	0	0	0	0	0	1,072	1,048	1,470	1,276	1,204
o.	Accum. disc. private paid-in cap.	o(t-1)+g*m	0	0	0	0	0	294	289	365	365	357
p.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0
q.	Accumulated dividends	q(t-1)+p	0	0	0	0	0	0	0	0	0	0
r.	Accum. discounted dividends	r(t-1)+f*p	0	0	0	0	0	0	0	0	0	0
s.	True profit	Data	(113)	(157)	(318)	(295)	(226)	(274)	9	1,297	820	1,460
t.	Actual tax	Data	0	0	0	0	0	0	2	324	205	365
u.	**True profit less actual tax**	s-t	(113)	(157)	(318)	(295)	(226)	(274)	7	973	615	1,095
v.	Accum. TP-Tax	v(t-1)+u	(113)	(270)	(589)	(884)	(1,110)	(1,384)	(1,376)	(404)	211	1,307
w.	Term 1	(d-h)*i	0	0	0	0	0	0	0	0	0	0
x.	Term 2	l-f*k	12	68	142	288	521	828	1,412	1,920	2,242	2,445
y.	Term 3	o	0	0	0	0	0	294	289	365	365	357
z.	Term 4	r-f*q	0	0	0	0	0	0	0	0	0	0
aa.	Term 5	f*v	(92)	(176)	(306)	(362)	(368)	(298)	(241)	(55)	25	127
bb.	**NPC of Poor since birth**	w+x-(y+z+aa)	104	244	448	650	889	832	1,365	1,610	1,853	1,961

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 17: BancoSol NPC_p since birth in 1987 through 1996

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	**NPC of Poor since birth**	Data	104	244	448	650	889	832	1,365	1,610	1,853	1,961
b.	Ave. loan portfolio, LP	Data	63	351	668	1,757	3,189	5,970	15,471	31,201	30,265	36,212
c.	Ave. number of loans out.	Data	508	2,525	5,119	11,047	18,389	25,416	41,470	57,187	60,808	67,162
d.	Val. disbursed	Data	589	1,962	3,717	9,632	17,114	34,342	70,820	90,900	88,930	107,177
e.	# loans disb.	Data	3,758	9,496	15,276	34,093	52,626	88,879	126,647	151,957	138,233	154,276
f.	Eta	Data	0.86	0.75	0.63	0.52	0.44	0.36	0.30	0.25	0.21	0.18
g.	Omega	Data	0.24	0.47	0.41	0.39	0.41	0.37	0.38	0.45	0.42	0.43
h.	Nom. opp. cost equity for poor, rho	Data	0.23	0.25	0.25	0.27	0.24	0.23	0.23	0.23	0.23	0.24
i.	Delta at end of year	i(t-1)*[1/(1+h)]	0.81	0.65	0.52	0.41	0.33	0.27	0.22	0.18	0.14	0.12
j.	Delta^(t-Omega)	i(t-1)*[1/(1+h)]^(1-g)	0.85	0.72	0.57	0.45	0.36	0.29	0.24	0.20	0.16	0.13
k.	Accum. disc. dollar-years of debt	k(t-1)+b*f	55	319	737	1,652	3,048	5,217	9,878	17,824	24,264	30,658
l.	Accum. disc. loan-years of loans	l(t-1)+c*f	439	2,342	5,545	11,298	19,345	28,579	41,074	55,639	68,576	80,436
m.	Accum. disc. dollars disbursed	m(t-1)+d*j	503	1,921	4,036	8,371	14,567	24,556	41,345	59,129	73,164	86,899
n.	Accum. disc. loans disbursed	n(t-1)+e*j	3,211	10,070	18,763	34,106	53,158	79,012	109,035	138,764	160,580	180,352
o.	Ave. annual deposit libs.	Data	0	45	138	395	756	1,221	7,274	23,818	26,515	30,424
p.	Accum. disc. ave. dep. libs.	p(t-1)+o*f	0	34	120	326	657	1,101	3,292	9,358	15,000	20,372
q.	Surplus/dollar-year deposits	Data	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
r.	Social value of dep. libs.	p*q	0	1	2	7	13	22	66	187	300	407
s.	**NPC of Poor since birth w/dep. libs**	a-r	104	243	446	644	876	810	1,299	1,423	1,553	1,554
t.	Cost to poor/dollar-years of debt	s/k	1.90	0.76	0.60	0.39	0.29	0.16	0.13	0.08	0.06	0.05
u.	Cost to poor/loan-years of loans	s/l	238	104	80	57	45	28	32	26	23	19
v.	Cost to poor/dollars disbursed	s/m	0.21	0.13	0.11	0.08	0.06	0.03	0.03	0.02	0.02	0.02
w.	Cost to poor/loans disbursed	s/n	33	24	24	19	16	10	12	10	10	9

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 18: BancoSol cost to the poor per unit of output, 1987-96

	Surplus per dollar-year of deposits, d															
Rho	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
2	1	(0)	(1)	(1)	(2)	(3)	(4)	(4)	(5)	(6)	(6)	(7)	(8)	(9)	(9)	(10)
4	1	1	(0)	(1)	(2)	(2)	(3)	(4)	(4)	(5)	(6)	(6)	(7)	(8)	(9)	(9)
6	2	1	1	(0)	(1)	(2)	(2)	(3)	(4)	(4)	(5)	(6)	(6)	(7)	(8)	(9)
8	3	2	1	1	(0)	(1)	(2)	(2)	(3)	(4)	(4)	(5)	(6)	(6)	(7)	(8)
10	3	3	2	1	1	(0)	(1)	(2)	(2)	(3)	(4)	(4)	(5)	(6)	(6)	(7)
12	4	3	3	2	1	1	(0)	(1)	(2)	(2)	(3)	(4)	(4)	(5)	(6)	(6)
14	5	4	3	3	2	1	1	(0)	(1)	(1)	(2)	(3)	(4)	(4)	(5)	(6)
16	5	5	4	3	3	2	1	1	(0)	(1)	(1)	(2)	(3)	(3)	(4)	(5)
18	6	5	5	4	3	3	2	1	1	0	(1)	(1)	(2)	(3)	(3)	(4)
20	7	6	6	5	4	4	3	2	2	1	0	(0)	(1)	(2)	(2)	(3)
22	8	7	6	6	5	4	4	3	2	2	1	0	(0)	(1)	(2)	(2)
24	8	8	7	6	6	5	4	4	3	2	2	1	0	(0)	(1)	(1)
26	9	8	8	7	6	6	5	5	4	3	3	2	1	1	0	(1)
28	10	9	9	8	7	7	6	5	5	4	3	3	2	2	1	0
30	11	10	9	9	8	7	7	6	6	5	4	4	3	2	2	1

Source: Author's calculations.
Figures in units of constant Dec. 1996 cents.
The opportunity cost of equity for society, Rho, changes with rows.
The surplus per dollar-year of deposits changes with columns.

Table 19: BancoSol sensitivity of cost to the poor per unit of output of dollar-years of debt to the assumed opportunity cost of the poor and to the assumed surplus per dollar-year of deposits, time frame from 1987 to 1996

2. Grameen from the point of view of the poor of 1983

The CEA of Grameen takes the real, risk-adjusted opportunity cost for the poor ρ as 20 percent per year and then adjusts for inflation (lines a, b, and c of Table 20 on page 87). The time frame starts in 1983 and ends with the net worth of Grameen reverting to its owners. Grameen was born in 1976, not 1983. The CEA acts as if the poor bought Grameen from someone in 1983.

The NPC_P of Grameen grew as the time frame lengthened. For 1983-94, the NPC_P was about $16.4 million (line bb of Table 20 on page 87). Discounted output grew each year (lines k, l, m, n, and p of Table 21 on page 88). The NPC_P net of surplus to depositors also grew each year. It reached $15.5 million for the time frame 1983-94 (line s).

I compare costs to the poor with two discounted measures of output. The first is dollar-years of debt since the main financial outputs of Grameen are loans. The second is years of membership since the non-financial outputs of Grameen help members regardless of how much they borrow (KK&K, 1995; Hossain, 1988).

The cost to the poor per dollar-year of debt was 12-14 cents for all the time frames started in 1983 and ended in 1984-93 (line t of Table 21 on page 88). This cost fell to 10 cents for the time frame 1983-94. The cost to the poor per year of membership was $8-$10 and was at $8 for the time frame 1983-94 (line u).

Thus Grameen helped the poor as long as the average borrower from 1983-94 got surplus for each dollar-year of debt of at least 10 cents or $8 per year of membership. Several studies suggest that members got at least this much surplus (Schuler, Hashemi, and Riley, 1997; Morduch, 1997; Pitt and Khandker, 1996 and 1995; Hashemi, Schuler, and Riley, 1996).

I think most analysts would agree that the average poor customer gets at least $8 of surplus from a year of membership. My guess is that customers get so much surplus that Grameen could double or triple prices without much less demand or much more default. I think Grameen could raise prices. I think they should raise prices if it would help the poor more.

c. The constancy of Grameen

Improvement from 1983-94 came from helping more poor customers the same rather than from helping the same poor customers more. This follows since outputs grew in each year but the surplus required to offset costs was more or less constant. For example, the average loan portfolio grew from $2 million to $253 million (line b of Table 21 on page 88). The average number of members per year grew from about 30,000 to almost 2 million (line c). In contrast, the required surplus per year of membership stayed between $8-10 (line u). If Grameen was a good way to help the poor, then its performance improved over time since it helped more and more poor customers.

As for BancoSol, the CEA for Grameen assumes a surplus per dollar-year of deposits *d* of 2 percent and a real, risk-adjusted opportunity cost to the poor ρ of 20 percent. The cost to the poor per year of membership is robust as ρ ranges from 2-30 percent and as *d* ranges from 0-15 percent (Table 22 on page 89). With $\rho = 0.30$ and $d = 0.00$, the cost to the poor per year of membership was $9 (bottom left corner). Grameen was likely a good use of development funds.

d. Discussion

I judge both BancoSol and Grameen as worthwhile for the poor even though they are not privately profitable for investors. The SDI and the NPC_I answer the question of investors, not the question of the poor. Do not use the CEA here to compare BancoSol with Grameen. Each MFO produces its own output for its own customers. A valid comparison would hold these and a host of other factors constant. I do not do that.

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Real opp. cost equity for poor	Data	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
b.	Inflation given IAS 29 practice	Data	0.12	0.08	0.22	0.12	0.14	0.09	0.09	0.13	0.02	0.01	0.04	0.05
c.	**Nom. opp. cost equity for poor, rho**	a+b+a*b	0.34	0.30	0.46	0.35	0.37	0.31	0.31	0.36	0.23	0.21	0.25	0.26
d.	Beta 0	Data	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
e.	Beta t	Data	1.00	0.71	0.60	0.51	0.43	0.32	0.25	0.25	0.16	0.12	0.12	0.08
f.	Delta for poor at end of year	f(t-1)*[1/(1+a)]	0.74	0.57	0.39	0.29	0.21	0.16	0.12	0.09	0.07	0.06	0.05	0.04
g.	Gamma for the poor, since birth	Data	0.86	0.65	0.47	0.34	0.25	0.19	0.14	0.11	0.08	0.07	0.05	0.04
h.	Beta t*Delta	e*f	0.74	0.41	0.24	0.15	0.09	0.05	0.03	0.02	0.01	0.01	0.01	0.00
i.	Start equity, E0	Data	0	0	0	0	0	0	0	0	0	0	0	0
j.	Fresh funds less (TP-Tax), FF	Data	1,403	897	1,362	2,812	3,905	10,970	12,344	24,735	20,995	39,146	22,121	27,366
k.	Accumulated FF	k(t-1)+j	1,403	2,300	3,662	6,475	10,379	21,350	33,694	58,428	79,424	118,570	140,691	168,057
l.	Accum. discounted FF	l(t-1)+g*j	1,210	1,797	2,444	3,396	4,369	6,410	8,164	10,792	12,519	15,164	16,378	17,574
m.	Private paid-in capital	Data	0	376	212	218	238	503	471	1	1,162	949	14	1,653
n.	Accum. private paid-in cap.	n(t-1)+m	0	376	588	806	1,045	1,548	2,019	2,020	3,182	4,131	4,145	5,797
o.	Accum. disc. private paid-in cap.	o(t-1)+g*m	0	246	347	421	480	573	640	640	736	800	801	873
p.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0	0	0
q.	Accumulated dividends	q(t-1)+p	0	0	0	0	0	0	0	0	0	0	0	0
r.	Accum. discounted dividends	r(t-1)+f*p	0	0	0	0	0	0	0	0	0	0	0	0
s.	True profit	Data	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
t.	Actual tax	Data	0	0	0	0	0	0	0	0	0	0	0	0
u.	**True profit less actual tax**	s-t	(552)	(343)	(1,355)	(2,480)	(3,885)	(5,699)	(7,331)	(9,589)	(9,731)	(8,524)	(12,478)	(16,950)
v.	Accum. TP-Tax	v(t-1)+u	(552)	(895)	(2,250)	(4,730)	(8,615)	(14,313)	(21,645)	(31,233)	(40,964)	(49,488)	(61,967)	(78,917)
w.	Term 1	(d-h)*i	0	0	0	0	0	0	0	0	0	0	0	0
x.	Term 2	l-h*k	166	853	1,580	2,437	3,425	5,311	7,120	9,462	11,591	14,287	15,550	17,030
y.	Term 3	o	0	246	347	421	480	573	640	640	736	800	801	873
z.	Term 4	r-h*q	0	0	0	0	0	0	0	0	0	0	0	0
aa.	Term 5	h*v	(411)	(367)	(530)	(701)	(783)	(737)	(671)	(711)	(479)	(366)	(365)	(255)
bb.	**NPC of Poor since birth**	w+x-(y+z+aa)	577	974	1,764	2,717	3,729	5,475	7,150	9,533	11,333	13,852	15,114	16,413

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 20: Grameen NPC_p since birth in 1983 through 1994

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	**NPC of Poor since birth**	Data	577	974	1,764	2,717	3,729	5,475	7,150	9,533	11,333	13,852	15,114	16,413
b.	Ave. loan portfolio, LP	Data	2,190	6,732	10,052	12,098	18,394	30,337	43,046	55,089	64,485	92,306	174,539	253,437
c.	Ave. number of members	Data	29,160	89,685	146,337	202,983	286,750	414,759	576,313	765,900	967,982	1,245,411	1,619,656	1,914,023
d.	Val. disbursed	Data	NA	NA	NA	NA	351,017	522,570	692,246	850,752	1,068,690	1,634,041	3,067,408	4,286,618
e.	# loans disb.	Data	46,955	106,943	152,463	209,467	328,557	272,430	648,467	852,522	1,041,630	1,385,324	1,682,914	1,860,674
f.	Eta	Data	0.89	0.75	0.63	0.53	0.44	0.36	0.30	0.25	0.21	0.18	0.15	0.12
g.	Omega	Data	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
h.	Nom. opp. cost equity for poor, rho	Data	0.34	0.30	0.46	0.35	0.37	0.31	0.31	0.36	0.23	0.21	0.25	0.26
i.	Delta at end of year	i(t-1)*[1/(1+h)]	0.74	0.57	0.39	0.29	0.21	0.16	0.12	0.09	0.07	0.06	0.05	0.04
j.	Delta^(t-Omega)	i(t-1)*[1/(1+h)]^(1-g)	0.86	0.65	0.47	0.34	0.25	0.19	0.14	0.11	0.08	0.07	0.05	0.04
k.	Accum. disc. dollar-years of debt	k(t-1)+b*f	1,944	7,014	13,382	19,767	27,817	38,886	52,014	66,037	79,715	95,941	121,466	152,563
l.	Accum. disc. member-years	l(t-1)+c*f	25,877	93,434	186,129	293,264	418,747	570,089	745,845	940,799	1,146,132	1,365,047	1,601,912	1,836,767
m.	Accum. disc. dollars disbursed	m(t-1)+d*j	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n.	Accum. disc. loans disbursed	n(t-1)+e*j	40,503	110,405	182,814	253,750	335,618	386,315	478,445	569,024	654,708	748,288	840,684	922,023
o.	Ave. annual deposit libs.	Data	545	1,522	2,760	4,234	6,555	9,514	13,067	17,839	22,613	29,989	48,920	71,412
p.	Accum. disc. ave. dep. libs.	p(t-1)+o*f	484	1,631	3,379	5,614	8,482	11,954	15,939	20,479	25,276	30,547	37,702	46,464
q.	Surplus/dollar-year deposits	Data	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
r.	Social value of dep. libs.	p*q	10	33	68	112	170	239	319	410	506	611	754	929
s.	**NPC of Poor since birth w/dep. libs**	a-r	567	942	1,697	2,605	3,559	5,236	6,832	9,123	10,828	13,242	14,360	15,483
t.	Cost to poor/dollar-years of debt	s/k	0.29	0.13	0.13	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.12	0.10
u.	Cost to poor/member-years	s/l	22	10	9	9	8	9	9	10	9	10	9	8
v.	Cost to poor/dollars disbursed	s/m	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
w.	Cost to poor/loans disbursed	s/n	14	9	9	10	11	14	14	16	17	18	17	17

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 21: Grameen cost to the poor per unit of output, 1983-94

	Surplus per dollar-year of deposits, d															
Rho	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
2	8	8	8	7	7	7	7	6	6	6	5	5	5	5	4	4
4	8	8	8	8	7	7	7	6	6	6	6	5	5	5	4	4
6	8	8	8	8	7	7	7	6	6	6	6	5	5	5	5	4
8	8	8	8	8	7	7	7	7	6	6	6	5	5	5	5	4
10	9	8	8	8	7	7	7	7	6	6	6	6	5	5	5	4
12	9	8	8	8	8	7	7	7	6	6	6	6	5	5	5	5
14	9	8	8	8	8	7	7	7	7	6	6	6	6	5	5	5
16	9	9	8	8	8	7	7	7	7	6	6	6	6	5	5	5
18	9	9	8	8	8	8	7	7	7	7	6	6	6	5	5	5
20	9	9	8	8	8	8	7	7	7	7	6	6	6	6	5	5
22	9	9	9	8	8	8	7	7	7	7	6	6	6	6	5	5
24	9	9	9	8	8	8	8	7	7	7	7	6	6	6	6	5
26	9	9	9	8	8	8	8	7	7	7	7	6	6	6	6	5
28	9	9	9	9	8	8	8	8	7	7	7	7	6	6	6	6
30	9	9	9	9	8	8	8	8	7	7	7	7	6	6	6	6

Source: Author's calculations.
Figures in units of constant Dec. 1996 dollars.
The opportunity cost of equity for society, Rho, changes with rows.
The surplus per dollar-year of deposits changes with columns.

Table 22: Grameen sensitivity of cost to the poor per unit of output of member-years of membership to the assumed opportunity cost of the poor and to the assumed surplus per dollar-year of deposits, time frame from 1983 to 1994

Chapter 9: Market Leverage for Donors

"All ate their fill, and the crumbs and scraps filled twelve baskets." Mark 6:43

Like the poor, donors want to know whether a subsidized MFO is the best development project. CEA answers this question. Yet donors often ask a second question. Given a budget earmarked for microfinance, donors sometimes think the best way to help the poor is to squeeze as much output from MFOs as they can. Donors may proxy the quest to get the most welfare for the poor with the quest to get the most microfinance.

If poor customers gain from MFOs, then donors might opt for a plan meant to stretch the scarce funds meant for MFOs. In this case, donors would measure performance as *market leverage*, the amount of output caused by public funds. Market leverage increases as an MFO funds itself more with market funds. Market funds include equity from investors, debt from private lenders, and deposits from private entities.

This goal for donors was the brainchild of Rosenberg (1994), a USAID microfinance expert now with a microfinance group housed in the World Bank. This goal may or may not match the goal of the poor. In practice, this goal may be too kind to donors since it ignores that the true goal of some of the employees of donors may be to climb the career ladder and to enjoy perks. Donors may also like market leverage since they like to be linked to big MFOs.

I suggest a measure of market leverage without some of the weaknesses of the measures used so far. The measure is the ratio of the discounted flow of output of an MFO used by the poor to the discounted flow of the public funds used by an MFO.

Grameen has low market leverage. It matches each discounted dollar from donors with less than a discounted dollar lent to the poor. This has not changed much with time. BancoSol matches each discounted dollar from donors with about two discounted dollars lent to the poor. This has increased with time.

A. The Nirvana of market leverage

For Rosenberg (1994), a focus on market leverage solves a dilemma. Assuming that microfinance helps the poor, he notes that the amount of microfinance is limited by the public purse. For example, Rosenberg says donors have just one-twelfth of the $300 million needed to saturate Bolivia with microfinance. He calls for "an analysis of microfinance that goes beyond self-sufficiency. If [donors] have the technical tools to bring efficient finance to massive numbers of the poor, and [if] we don't have the funds to saturate that market, then leverage has to be the linchpin of [donor] strategy" (p. 2).

Rosenberg wants donors to structure their support in ways that strengthen an MFO as a magnet for market funds. Given a budget, Rosenberg thinks donors should try to buy as much microfinance as they can. One way to do this is to get someone else to pay part of the price. The matching funds would come from private equity, private debt, and private deposits.

Rosenberg prescribes two ways for donors to help. First, donors should bolster net worth in ways that create owners. This fattens the buffer of net worth and helps an MFO to qualify for regulation. Second, donors should give technical help to bridge the gap between an MFO as a social NGO and an MFO as a regulated financial intermediary.

The language of Rosenberg (1994) hints that "the magic of full licensed leverage" (p. 11) is like a miracle, a free lunch, something for nothing. He says, "There seems to be a kind of law of the loaves and of the fishes at work in development finance" (p. 8). For example, at the highest

level of market leverage, "the donor's original dollar would catalyze an indefinitely large amount of resources . . . this level . . . is Nirvana" (p. 4). Like an alchemist (Drake and Otero, 1992), a licensed MFO can change $100 from a donor into "eleven hundred more for the same purpose, at no cost to the donor" (Rosenberg, 1994, p. 12).

Is this too good to be true? From the point of view of donors, more microfinance caused by market funds is indeed free. From the point of view of society, however, all funds have an opportunity cost. Economics is the opposite of magic (McCloskey, 1989). Even if private entities shift their funds to MFOs of their own free will, society as a whole gains only if the gains from the shift outweigh the costs of the subsidies that caused the shift in the first place.

Even the poor might lose from more market leverage. To preen for the market, an MFO might increase costs borne by its customers. In the pursuit of profit to build net worth and to attract private funds, an MFO might increase prices, decrease quality, or shift its niche. In some cases, subsidies might attract investors and prompt donors to exit long before subsidies for MFOs exhaust the gains from resolving market failures. More market leverage could help the poor less than more subsidies.

1. Is more market leverage good?

Some donors seem to be converts of the message of Rosenberg that "donors no longer have an excuse to set their sights any lower than a *saturation of the microfinance market* [italics original] in their countries" (p. 5). For example, Christen (1997) says, "Profitability is a means for achieving the programs' ultimate social objective: delivering efficient financial services to as many poor clients as possible" (p. 25).

In fact, the goal of donors is not to drench the poor with microfinance but to improve their welfare. Suppose an MFO increases the welfare of the poor more than the marginal development project. Then market leverage helps the poor just as long as the poor get more surplus with market leverage than without it. Market leverage might not be good for society since subsidies could reward private investment in an MFO in spite of higher social returns elsewhere.

2. Market leverage is good

In most cases, MFOs help the poor more when they aim to increase market leverage. The push for market leverage need not reduce the surplus per customer. It may increase prices, but it may also increase quality. Even if market leverage does reduce the surplus per customer, it increases the number of customers who get surplus or the time frame in which one customer gets surplus. With a low enough discount rate, this will increase the welfare of the poor.

Market leverage promotes sustainability since private sources of funds will watch the performance of the MFO. Unlike public funds, market funds are permanent. Sustainability also increases the number of poor people who gain from the use of an MFO. An investor would scrutinize an MFO more than most donors.

For example, private equity brings owners, and private debt brings quasi-owners. Like shareholders and lenders, depositors want to monitor an MFO so that it does not go bankrupt (Poyo, Gonzalez-Vega, and Aguilera, 1993). Deposits also help the poor. Taking deposits requires prudential regulation and supervision (Chaves and Gonzalez-Vega, 1994). Regulators require shareholders and a thick buffer of net worth. Shareholders help regulators protect depositors since they have a selfish reason to check that the MFO does not go bankrupt.

B. The measurement of market leverage

Donors do not get most of the gains or costs of their choices. Most feedback they might get is deflected. No one has an incentive to be a gadfly or a whistleblower. The measurement of

market leverage is one way to goad donors to do good.

Rosenberg proposes that donors measure market leverage with the answer to a bottom-line question: "If donors put one dollar into a program today, how much in microfinance assets will that dollar have generated after, say, five years?" (1994, p. 2). In practice, this concept has been measured as the ratio of a flow of output in the most recent year to a flow of the use of public funds in the most recent year:

$$\text{Market leverage} = \frac{\text{Flow of output}}{\text{Flow of use of public funds}}. \tag{59}$$

The first measurement of market leverage took the flow of output as the average loan portfolio and took the flow of the use of public funds as the average subsidized funds in net worth plus the average soft debt (Schreiner and Gonzalez-Vega, 1995). RC&H (1997) kept this same measure for the flow of public funds but measured the flow of output as average assets.

1. Problems with this measure

This measure of market leverage of RC&H (1997) has at least six weaknesses. First, it has the same weaknesses as all measures of impact. Market leverage is just the impact of public funds on the output of an MFO. The measure must distinguish between output with-and-without public funds. The link between cause and effect is hidden since no one knows what would have happened without public funds. The best the analyst can hope to do is to measure market leverage since birth or to prove that public funds relaxed a constraint that blocked market funds.

Second, the measure does not discount flows. A loan used by the poor now is worth more now than the same loan ten years from now. This also goes for the flow of the use of public funds. The discount rate should use the opportunity cost of the poor ρ since the public funds could have been used in some other development project.

Third, the measure should work in any time frame since donors care about performance not just in the most recent year but also in the past and in the future. Past performance matters as a signal of future performance. Also, the use of public funds in the past affects the capacity to produce output now and in the future. Donors expect more from MFOs that got more in the past. Future performance matters because donors want the best results from their choices now.

Fourth, the measure should compare the flow of the use of public funds to the flow not of assets but of outputs. Not all assets are outputs used by the poor. For example, Grameen in some years held a lot of its funds not as loans to the poor but as deposits in banks. Donors want public funds to produce outputs for the poor.

Fifth, the measure assumes that no net worth belongs to private shareholders. This is a severe weakness since the advent of private shareholders increases market funds, exactly what market leverage purports to measure.

Sixth, the measure weights all soft debt the same as subsidized funds in equity. For an MFO, subsidized funds in equity are free. In contrast, soft debt has an accounting expense. For example, soft debt could be almost free or it could cost almost as much as market debt. The measure of market leverage should not treat soft debt with an expense of 1 cent a year the same as soft debt with an expense of 20 cents a year nor the same as subsidized funds in net worth with no expense at all. If an MFO has an average soft debt of D and pays a rate c less than the market rate m, then it is as if the MFO borrowed $D\cdot(1-c/m)$ at an interest rate of zero and $D\cdot c/m$ at the market rate. I submit that the measure of market leverage should count the interest-free part of soft debt $D\cdot(1-c/m)$ the same as the subsidized funds in equity.

2. A new measure of market leverage

I suggest a new measure of market leverage, the ratio of discounted flows of output over discounted flows of the use of public funds in a time frame started at birth:

$$\text{Market leverage} = \frac{\text{Discounted flow of output}}{\text{Discounted flow of use of public funds}}. \tag{60}$$

Flow outputs include the number of loans disbursed or the amount of dollars disbursed. Stock outputs are converted to flows as average stocks. For example, the number of loans outstanding is a stock, but the average number of loans outstanding in a year is a flow.

For flow outputs, the measure discounts the flow accumulated at the end of each year by $\delta_{Pt}^{\,t-\omega}$ (Appendix 6 on page 114). For example, with output as the number of loans disbursed:

$$\text{Discounted flow of output} = \sum_{t=1}^{T} \delta_{Pt}^{t-\omega} \cdot \text{Number of loans disbursed}_t. \tag{61}$$

For stock outputs, the formula discounts the average stock in each year by a factor ϵ (Appendix 7 on page 116). Given the factor α (Appendix 5 on page 112) and output as the flow of dollar-years of debt per year in the loan portfolio *LP*:

$$\text{Discounted flow of output} = \sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (LP_{t-1} + LP_t)/2. \tag{62}$$

The flow of the use of public funds by the MFO is measured as the sum of the discounted average stocks of public funds *PF* in each year. This excludes net worth put in by private shareholders and includes interest-free soft debt $D \cdot (1 - c/m)$:

$$\text{Discounted flow of use of public funds} = \sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (PF_{t-1} + PF_t)/2, \tag{63}$$

where

$$PF_t = PF_{t-1} + DG_t + PC_{pub_t} + RG_t + D_t \cdot (m_t - c_t) + DX_t + D_t \cdot (1 - c_t/m_t) - D_{t-1} \cdot (1 - c_{t-1}/m_{t-1}).$$

True profit less tax and dividends is not in public funds *PF* since donors do not count funds that do not come from their budget. Market leverage of public funds by an MFO in terms of the output of dollar-years of debt is:

$$\text{Market leverage} = \frac{\sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (LP_{t-1} + LP_t)/2}{\sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (PF_{t-1} + PF_t)/2}. \tag{64}$$

3. The use of the measure of market leverage

The analyst should compute the measure of market leverage for more than one view of the flow of output of an MFO. As always, the analyst must discuss the meaning of the number computed. In general, cause-and-effect is difficult to trace. The measure is best used to compare

one MFO through time since birth or two MFOs at the same age. This comparison will always require judgements not based on the measure itself since not all else will be constant.

Market leverage measures a point along a continuum. With output viewed as dollar-years of debt, the least market leverage is zero, and the most is twelve, the inverse of the capital-adequacy ratio (Rosenberg, 1994). More is better, but, given a view of output, I cannot draw a line with market leverage on one side but not on the other. Discounting can compound the problem of the lack of an easy meaning. The analysis must discount, however, since some level of market leverage one year after birth is not worth the same as an equal level of market leverage 10 years after birth.

C. Market leverage for BancoSol

For the time frame 1987-96, market leverage for BancoSol as discounted dollar-years of debt per discounted dollar-years of public funds was about 2.2 (line u of Table 23 on page 96). Market leverage was less than 1.0 for the time frames from 1987-92. Once BancoSol started to take a lot of deposits, market leverage climbed.

In 1996, BancoSol used an average of about $8 million in public funds (line o of Table 23 on page 96). The average portfolio in 1996 was about $36 million (line r of Table 4 on page 47). Thus the ratio of average portfolio to average public funds in 1996 was about 4.5. This was not, however, the market leverage of BancoSol in 1996. The $8 million of public funds used in 1996 did not cause the average portfolio of $36 million. Instead, the portfolio in 1996 was caused by the use of all the public funds in 1996 and in all past years. Some unknown part of the output in 1996 was indeed caused by some unknown part of the public funds used in 1996. But all of the public funds used did not cause all of the output. I measure market leverage since birth since all output since birth was caused by all the public funds since birth.

A discounted measure of market leverage requires more judgement than a neat system. The problem is not the measure but the lack of benchmarks. The measure must come first.

For now, the market leverage of 2.2 of BancoSol from 1987-96 may be high or low. It depends on what the analyst can expect and defend. In any case, analysts can use the measure to track the progress of an MFO through time. With all else constant, they can also compare market leverage between two MFOs. I do not do this for BancoSol and Grameen since I cannot hold all else constant. But I can say that BancoSol has had more market leverage through time.

D. Market leverage for Grameen

Market leverage for Grameen as discounted dollar-years of debt per discounted dollar-years of public funds through the time frames started in 1983 and ended from 1987-94 was about 0.8 (line u of Table 24 on page 97). At the same time, Grameen made about one discounted year of membership per 1/0.009 = 111 discounted dollar-years of public funds (line v).

The flat market leverage through time results from at least three factors. First, Grameen was born in 1976, not 1983. For an MFO, it was already big and mature by 1983. Thus Grameen may not have had much room for improvement left.

Second, most of the funds of Grameen are public although Grameen does take some small deposits from members. Likewise, Grameen did not borrow from private lenders or have private shareholders other than members. Until 1993, more than half its funds were public.

Third, the loan portfolio was a small portion of total assets. The portfolio was about 71 percent of assets in 1993 and 1994, between 53-64 percent of assets from 1988-92, and less than 50 percent of assets from 1984-87 (Table 35 on page 130). In essence, the portion of assets

Grameen has lent to poor customers has been a bit more than the portion of funds Grameen has used from public sources. Grameen may have been awash in liquidity since it wanted to keep a buffer in case of typhoons and mass arrears. Or donors may have flooded Grameen with more money than it could wisely lend.

I think the market leverage of Grameen is low. For more than a decade, most of its funds came from the budget earmarked for the poor. This does not mean that Grameen wastes funds meant to help the poor. Donors have been more than willing to fund the growth of Grameen. But without more market leverage, the size of the public purse could limit the number of poor customers helped by Grameen. More market leverage may help Grameen reach more poor customers, but it may or may not improve the welfare of the poor.

In any case, Grameen has not grown to depend more on the market with time. I expect Grameen could leverage its public funds more if it needed to do so. More market leverage would reduce the surplus of each poor customer now and may or may not increase the welfare of the poor in the long term.

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Alpha	Data	0.60	1.00	0.81	0.86	0.79	0.68	0.71	0.93	0.83	0.86
b.	Eta	Data	0.86	0.75	0.63	0.52	0.44	0.36	0.30	0.25	0.21	0.18
c.	Ave. soft debt, D	Data	102	344	603	893	1,091	973	1,145	1,530	715	470
d.	Rate paid soft debt, c	Data	0.08	0.08	0.09	0.08	0.06	0.06	0.18	0.08	0.11	0.09
e.	m, Opp. cost, soft debt for debt	Data	0.33	0.28	0.30	0.27	0.22	0.21	0.21	0.19	0.19	0.20
f.	**Free soft debt, D*(1-c/m)**	c*(1-d/e)	76	249	428	638	770	675	174	899	309	262
g.	Start public funds	n(t-1)	0	300	816	1,699	4,223	6,631	13,336	15,726	12,000	12,770
h.	Direct grants, DG	Data	90	41	192	1,488	1,226	1,601	2,274	(5,449)	(4)	0
i.	Paid-in cap. public, PCpub	Data	0	0	0	0	0	4,287	(94)	651	405	317
j.	Rev. grants, RG	Data	109	157	135	226	243	0	0	0	0	0
k.	Disc. soft debt, D*(m-c)	Data	25	70	129	172	168	143	36	170	59	52
l.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	4	0	0
m.	Change in free soft debt	f-f(t-1)	76	248	427	637	770	675	174	899	309	262
n.	**End public funds, PF**	g+h+i+j+k+l+m	300	816	1,699	4,223	6,631	13,336	15,726	12,000	12,770	13,400
o.	Ave. public funds	a*(g+n)/2	89	559	1,024	2,561	4,273	6,750	10,351	12,946	10,229	11,202
p.	**Accum. disc. public funds**	p(t-1)+b*o	77	498	1,139	2,472	4,342	6,795	9,913	13,211	15,387	17,365
q.	Accum. disc. dollar-years of debt	Data	55	319	737	1,652	3,048	5,217	9,878	17,824	24,264	30,658
r.	Accum. disc. loan-years of loans	Data	439	2,342	5,545	11,298	19,345	28,579	41,074	55,639	68,576	80,436
s.	Accum. disc. dollars disbursed	Data	503	1,921	4,036	8,371	14,567	24,556	41,345	59,129	73,164	86,899
t.	Accum. disc. loans disbursed	Data	3,211	10,070	18,763	34,106	53,158	79,012	109,035	138,764	160,580	180,352
u.	Market leverage dollar-years of debt	q/p	0.7	0.6	0.6	0.7	0.7	0.8	1.0	1.3	1.6	1.8
v.	Market leverage loan-years of loans	r/p	0.006	0.005	0.005	0.005	0.004	0.004	0.004	0.004	0.004	0.005
w.	Market leverage dollars disbursed	s/p	6.5	3.9	3.5	3.4	3.4	3.6	4.2	4.5	4.8	5.0
x.	Market leverage loans disbursed	t/p	0.042	0.020	0.016	0.014	0.012	0.012	0.011	0.011	0.010	0.010

Source: Author's calculations based on financial statements of BancoSol. Monetary figures in thousands of Dec. 1996 dollars.

Table 23: BancoSol market leverage for donors, since birth in 1987 through 1996

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Alpha	Data	1.04	1.00	1.00	1.01	1.02	1.01	0.99	1.01	1.00	0.97	1.00	1.01
b.	Eta	Data	0.89	0.75	0.63	0.53	0.44	0.36	0.30	0.25	0.21	0.18	0.15	0.12
c.	Ave. soft debt, D	Data	2,517	10,534	17,696	24,022	32,168	38,548	47,326	53,829	52,019	49,784	96,950	174,682
d.	Rate paid soft debt, c	Data	0.03	0.07	0.07	0.04	0.03	0.03	0.03	0.03	0.03	0.05	0.06	0.08
e.	Opp. cost, soft debt for debt, m	Data	0.17	0.13	0.15	0.15	0.14	0.14	0.14	0.17	0.18	0.18	0.17	0.17
f.	**Free soft debt, D*(1-c/m)**	c*(1-d/e)	2,136	4,734	9,435	17,207	26,295	31,755	38,642	45,370	44,364	36,864	60,668	93,951
g.	Start public funds	n(t-1)	0	3,526	6,667	12,721	23,190	36,106	52,098	71,350	104,016	123,356	154,270	202,109
h.	Direct grants, DG	Data	6	(73)	(31)	202	(74)	4,793	4,935	16,046	10,258	30,040	11,310	11,383
i.	Paid-in cap. public, PCpub	Data	1,022	0	0	0	0	0	0	0	0	0	0	0
j.	Rev. grants, RG	Data	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
k.	Disc. soft debt, D*(m-c)	Data	363	615	1,384	2,495	3,786	4,552	5,520	7,645	8,060	6,723	10,424	15,554
l.	Disc. op. exp, DX	Data	0	0	0	0	0	0	0	0	0	0	0	0
m.	Change in free soft debt	f-f(t-1)	2,136	2,599	4,701	7,772	9,088	5,460	6,888	6,728	(1,006)	(7,500)	23,804	33,283
n.	**End public funds, PF**	g+h+i+j+k+l+m	3,526	6,667	12,721	23,190	36,106	52,098	71,350	104,016	123,356	154,270	202,109	264,282
o.	Ave. public funds	a*(g+n)/2	1,831	5,086	9,686	18,060	30,318	44,654	61,103	88,598	113,432	135,135	179,010	235,228
p.	**Accum. disc. public funds**	p(t-1)+b*o	1,625	5,456	11,591	21,123	34,391	50,684	69,319	91,871	115,932	139,686	165,865	194,728
q.	Accum. disc. dollar-years of debt	Data	1,944	7,014	13,382	19,767	27,817	38,886	52,014	66,037	79,715	95,941	121,466	152,563
r.	Accum. disc. member-years	Data	25,877	93,434	186,129	293,264	418,747	570,089	745,845	940,799	1,146,132	1,365,047	1,601,912	1,836,767
s.	Accum. disc. dollars disbursed	Data	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
t.	Accum. disc. loans disbursed	Data	40,503	110,405	182,814	253,750	335,618	386,315	478,445	569,024	654,708	748,288	840,684	922,023
u.	Market leverage dollar-years of debt	q/p	1.2	1.3	1.2	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.8
v.	Market leverage member-years	r/p	0.016	0.017	0.016	0.014	0.012	0.011	0.011	0.010	0.010	0.010	0.010	0.009
w.	Market leverage dollars disbursed	s/p	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
x.	Market leverage loans disbursed	t/p	0.025	0.020	0.016	0.012	0.010	0.008	0.007	0.006	0.006	0.005	0.005	0.005

Source: Author's calculations based on KK&K (1995) and Hashemi (1997). Monetary figures in thousands of Dec. 1996 dollars.

Table 24: Grameen market leverage for donors, since birth in 1983 through 1994

Chapter 10: Links Between Views of Performance

"We could have sold the perfume and given the money to the poor." Mark 14:5

In this chapter, I highlight the links among the answers to the questions asked by the five groups of stakeholders in the last five chapters. I also describe how these five measures of performance relate to sustainability.

This serves two purposes. First, it shows the cases in which good performance from one point of view implies good performance from another point of view. Second, it shows the need for all of the measures. In some important cases, nothing implies good performance from one point of view except the measure designed for that point of view.

The links are shown in Figure 6 on page 99. The boxes enclose the levels of performance from a given point of view. The arrows mark sufficiency but not necessity. The level of performance at the start of the arrow implies the level of performance at the end of the arrow, but not vice versa.

The framework reveals five key issues for performance and its measurement. First, customers can gain from an MFO even though no other group of stakeholders do. This means an MFO can help poor customers without being the best way to help the poor.

Second, market leverage may not meet the goals of any stakeholders except donors and customers. The other groups see market leverage not as an end in itself but as a means to an end.

Third, financial self-sufficiency does not imply private profitability. Workers will stop the push to improve long before an MFO attracts investors. To get private owners for MFOs, donors must act like private owners.

Fourth, no single measure of performance from any point of view is sufficient for self-sustainability. The analyst will always have to judge self-sustainability with measurements, theory, logic, and talk.

Fifth, an MFO that gets repeated use from its customers can be worthwhile for the poor as a whole even though it may not perform well from the point of view of donors, investors, and workers. Thus the analyst must measure performance with CEA or CBA.

Some analysts claim that an MFO fulfills the goal of the poor through self-sustainability, private profitability, financial self-sufficiency, or market leverage. None of these, however, is necessary for worthwhileness for the poor. Yet in practice, good performance from all points of view strengthens sustainability, and in most cases, this means more welfare for the poor. Thus good performance from all points of view helps an MFO to reach worthwhileness for the poor.

A. Repeated use for customers

Repeated use by poor customer shows that customers gain from an MFO. But it does not imply any other level of performance from any other point of view (Figure 6 on page 99).

Repeated use does not mean that an MFO is worthwhile for the poor as a whole. Poor customers could get a small slice of surplus from an MFO even though some other development project could have used the funds used by the MFO to make more benefits for the poor as a whole and perhaps even more benefits for the poor customers themselves.

Repeated use does not imply worthwhileness, but worthwhileness implies repeated use. An MFO cannot help the poor as a whole unless it helps its poor customers.

An MFO can get repeated use without market leverage, self-sustainability, private profitability, or financial self-sufficiency. Yet all these levels of performance imply repeated use.

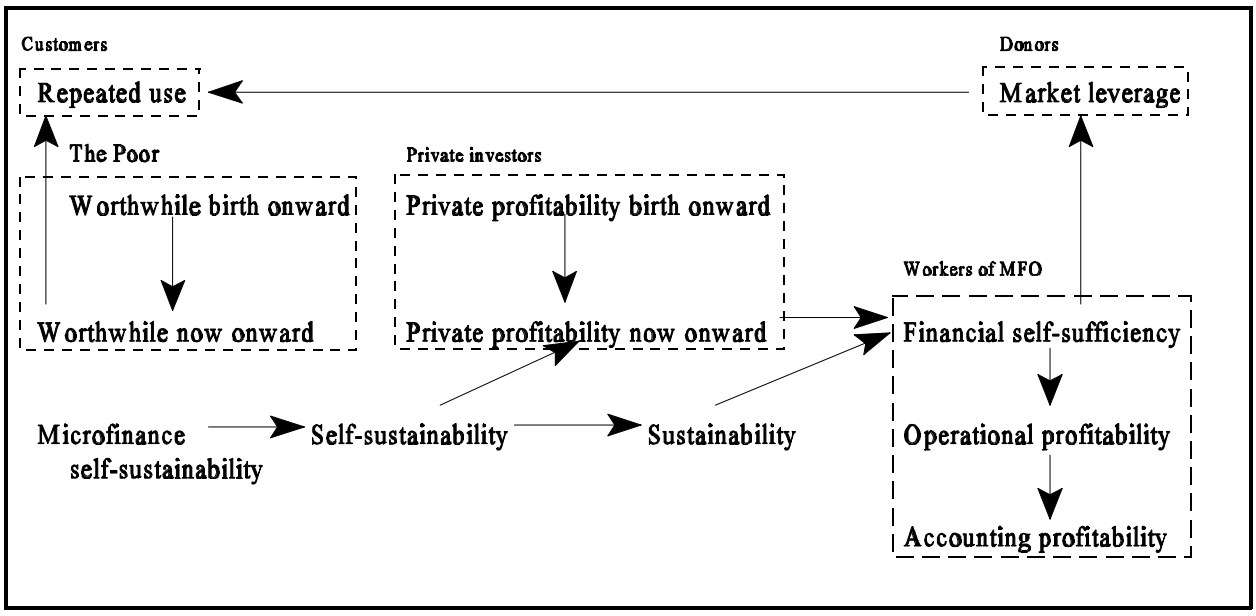

Figure 6: Links between measures of performance and of sustainability

Repeated use does not imply profit, but all the other levels of performance do imply profit, and profit implies repeated use.

For example, an MFO may not earn a true profit, but it may have enough subsidy that customers do not expect it to collapse soon. Borrowers would not default and depositors would not run, but other stakeholders would not like how the MFO performs.

In contrast, profit requires repeated use. Most MFOs do not recoup their costs when they lend to a new borrower. Profit depends on repeat borrowers since, once an MFO knows a borrower, it can lend more, screen less, and thus cut costs. Likewise, an MFO cannot make a profit when many borrowers default since they do not plan to repeat.

B. Market leverage for donors

Market leverage implies only repeated use (Figure 6 on page 99). An MFO could not attract market funds without profit, and it could not get profit without repeated use. In contrast, workers and investors require some market leverage but just as a by-product of their own goals of self-sufficiency and private profitability. Private profitability can increase market leverage since it means an MFO could pay for market funds. But an MFO could be privately profitable yet not replace subsidized funds with market funds. Likewise, an MFO could be financially self-sufficient yet not replace soft debt with market debt. The ability to replace subsidized funds with market funds does not mean an MFO did in fact make the replacement.

Market leverage does not imply worthwhileness for the poor. A subsidized MFO could make a profit and attract market funds even though it is not the best way to help the poor. More market leverage may mean more welfare for the poor, but the increased welfare may still not be enough to make an MFO worthwhile. For the poor, market leverage is not an end in itself nor even a means to their end.

C. Financial self-sufficiency for workers

Financial self-sufficiency implies some market leverage and some repeated use since it requires some profit (Figure 6 on page 99). It is necessary but not sufficient for sustainability. Sustainability also takes a strong structure of incentives and a flexible organization.

Financial self-sufficiency for workers does not imply private profitability for investors. Workers just want to maintain the real value of net worth against inflation, but investors want to match the real return they could get elsewhere. But workers may not push for private profitability once they reach financial self-sufficiency.

If donors want MFOs to be privately profitable, then they need to craft incentives for workers to aim not just for financial self-sufficiency but also for private profitability. The best way to do this is to buy shares and then to act like owners. If donors do not own shares, they cannot threaten to close the MFO or to fire workers. Donors could also create other owners.

Financial self-sufficiency does not imply worthwhileness for the poor. An MFO could maintain the real value of its net worth and pay its bills but yet leave such a thin sliver of surplus for customers that some other project could have helped the poor more.

Financial self-sufficiency implies operating profitability. In turn, operating profitability implies accounting profitability. These last two levels of performance do not imply any other level, and they do not fulfill any goal from any point of view. They just let workers or donors claim that an MFO has reached some level of performance.

D. Private profitability for investors

If an MFO has enough profit for private profitability, then it also has enough profit for financial self-sufficiency, market leverage, and repeated use (Figure 6 on page 99). Private profitability does not imply self-sustainability since current profit could be due to uncommon labor, luck, or leaders that may not last in the long term.

Private profitability does not imply worthwhileness for the poor. The NPC_I measures private profitability and answers the question of an investor, not the question of the poor. An MFO may or may not be the best way to help the poor, whether or not it can attract investors. A negative SDI or NPC_I does not imply that an MFO is the best way to help the poor.

Private profitability since birth will often be linked to private profitability from now onward. But an MFO could be privately profitable from now onward without having been privately profitable since birth. This means that while investors might not want to start MFOs from scratch, they might want to buy MFOs once start-up costs are sunk.

E. Self-sustainability

A self-sustainable MFO could meet its goals now and in the long term without the use of public funds. A sustainable MFO could meet its goals now and in the long term without the use of more public funds than it has now. Thus self-sustainability implies sustainability, but not vice versa (Figure 6 on page 99). Microfinance self-sustainability means an MFO meets it goals now and in the long term without public funds and without creep from its market niche of the poor.

Financial self-sufficiency is necessary but not sufficient for sustainability (Figure 6 on page 99). Likewise, self-sustainability implies private profitability but not vice versa.

An unsustainable MFO might be the best way to help the poor even though the lack of sustainability truncates the horizon, breeds perverse incentives, and increases costs and decreases gains for the poor. Thus sustainability has no simple relation to worthwhileness for the poor.

F. Worthwhileness for the poor

An MFO can be worthwhile for the poor without good performance as seen by any other group except poor customers (Figure 6 on page 99). This is a problem since measures of worthwhileness with CBA cost a lot. Even with CEA, people can plead without evidence that the customers of a wasteful MFO get the surplus required to make benefits exceed costs.

The problem is that quantitative measures cannot sift the wheat from the chaff. To discern whether customers get the required surplus requires judgement and talk. No one can be sure of the right choice. This harms the poor since it leaves room not only for honest mistakes but also for rent-seeking.

G. Why bother with any measure except CEA?

The poor want to use the funds meant for them as well as they can. CEA from the point of view of the poor is the best way to check this. Other measures of performance from other points of view do not tell whether an MFO fulfills the goal of the poor.

Self-sustainability, private profitability, financial self-sufficiency, market leverage, and repeated use still matter for the goals of the poor. A lack of necessity does not mean a lack of importance.

In practice, the profit needed to fulfill the goals of other stakeholders might decrease the surplus of current poor customers. In most cases, however, self-sustainability will increase the NPW of the surplus of customers since it lengthens the life of the MFO. Compared with an MFO that is not self-sustainable, a self-sustainable MFO serves more customers longer, and this will likely outweigh the losses in surplus per customer.

Appendix 1: The Parable of the Subsidized Servant

The measurement of the performance of a subsidized MFO is like a rich man who left to go on a long trip. He took most of his wealth with him, but he left E_0 shekels with a servant. "Use these funds," the rich man said, "and give me the profit when I come back." The servant took the funds and squandered all but ϵ on a reckless life, $E_0 > \epsilon > 0$.

While on his trip, the rich man was told that if he entrusted E_0 to a normal servant in the market, he would get back at the end of the year both the E_0 and the profit the servant made after tax. Such a servant would have a subsidy-adjusted return on equity (SAROE) of r. With constant flows, $\alpha = 1$ (Appendix 5 on page 112), and an SAROE of r would mean true profit of (equation 31 on page 44, equation 27 on page 38, equation 17 on page 35, and equation 22 on page 37):

$$\begin{aligned} \text{SAROE} &= r, \\ (TP - Tax)/E &= r, \\ 0 &= r \cdot E - (1-\tau) \cdot TP, \\ 0 &= r \cdot \alpha \cdot E_0 + r \cdot \alpha/2 \cdot \Delta E - (1-\tau) \cdot TP, \\ 0 &= r \cdot E_0 + r/2 \cdot FF - (1 - r/2) \cdot (1-\tau) \cdot TP, \\ TP &= \frac{r \cdot E_0}{(1 - r/2) \cdot (1-\tau)}. \end{aligned} \tag{65}$$

A year passed, and the rich man went back to his home. He planned to take a trip again soon, so he called the servant to reckon the accounts. "You gave me E_0 shekels, sir," said the servant. "Look! Here is the profit ϵ. I used your funds well!"

The rich man thought, "I could have got back $E_0 + (r \cdot E_0)/[(1-r/2) \cdot (1-\tau)] > \epsilon$ if I had left my funds with a servant with an SAROE of zero." But the rich man was fair, and he knew he had asked the servant just for some profit. "Well done, good and faithful servant," said the rich man. "You did what I asked, so I will leave you E_0 one more time. But next year when I come back, I want to get at least $E_0 + (r \cdot E_0)/[(1-r/2) \cdot (1-\tau)]$. A good servant could get me at least that much."

The rich man left, and the servant took the funds and bought bricks to build a bin to store grain. It took some time to build, but once it was done, the servant rented it out. The servant sold the bin at the end of the year.

While on his second trip, the rich man learned that the SAROE acted as if the servant gave him the profit in the middle of the year. In fact, the rich man got it at the end of the year. He heard of second yardstick called the net present cost for investors (NPC_I). The normal servant in the market would have an NPC_I of zero. Such a servant would give the rich man a profit at the end of the year of (equation 44 on page 60):

$$\begin{aligned} 0 = \text{NPC}_\text{I}^{1 \text{ year}} &= r \cdot E_0 + r/2 \cdot FF - (1-r) \cdot (1-\tau) \cdot TP, \\ TP &= \frac{r \cdot E_0}{(1-r) \cdot (1-\tau)}. \end{aligned} \tag{66}$$

A year passed, and the rich man came back to his home. He called the servant to reckon the accounts. The servant came in and said, “Sir, I know you are a hard man. I was scared when you gave me E_0 shekels, so I worked hard to use them well. Look! Here are the E_0 shekels and a profit of $(r \cdot E_0)/[(1-r/2)\cdot(1-\tau)]$. My SAROE was zero!”

The rich man got mad. “Wicked and slothful servant!” he said. “You knew, did you, that I was a hard man? Well, then, you should have known that an SAROE of zero did not mean an NPC_I of zero. I could have gotten more than what you offer from a servant with an NPC_I of zero (equation 65 on page 102 and equation 66 on page 102):

$$E_0 + (r \cdot E_0)/[(1-r)\cdot(1-\tau)] > E_0 + (r \cdot E_0)/[(1-r/2)\cdot(1-\tau)],$$

$$1 - r/2 > 1 - r,$$

$$r > r/2.$$

“Guards,” the rich man said, “Sell this worthless servant as a slave, along with his wife, cattle, and other property, to pay for the return I could have had.” The servant grew sore afraid, and he knelt and started to wail and to gnash his teeth. “Go slow with me,” he begged, “and I will pay you all I owe. I did not know about the NPC_I.” The rich man took pity on him. “You may try once more, but I want to get at least $E_0+(r \cdot E_0)/[(1-r)\cdot(1-\tau)]$.”

Once more the rich man left. The servant bought more bricks and built a better bin than before. When it was done, he rented it out, and he sold the bin at the end of the year.

When the rich man came home a third time, the servant saw him a long way off and ran out to meet him. “You gave me E_0 shekels, sir,” the servant said. “Voilà! Here they are with $(r \cdot E_0)/[(1-r)\cdot(1-\tau)]$ more.” “Well done, good and faithful servant!” said the rich man. “Come and celebrate my return with me!”

Appendix 2: EVA, an SDI for For-Profit Firms

Subsidy in the SDI measures the private profitability of an MFO as the opportunity cost of its capital less what business operations could pay for that capital. This is the same idea as Economic Value Added, a new measure used by for-profit firms (*The Economist*, 1997b; Tully, 1994 and 1993.) EVA is what a firm could pay for the use of its capital less the opportunity cost of that capital. If EVA is positive, then the firm created value for its shareholders.

Stockholders like EVA since it answers their biggest question better than accounting-based measures. "Stock prices track EVA far more closely than they track such popular measures as earnings per share or operating margins or ROE. That because EVA shows what investors really care about—the net cash return on their capital—rather than some other type of performance viewed through the often distorting lens of accounting rules" (Tully, 1993).

Boiled down, EVA is accounting profit less the opportunity cost of capital. This is just the negative of subsidy in the framework of the SDI.

Invented by the consulting firm Stern Stewart, EVA is used at firms such as Wal-Mart, Coca-Cola, AT&T, and Proctor & Gamble. Just like the SDI, EVA "takes into account a factor no conventional measure includes: the total cost of capital" (Tully, 1993). According to one analyst, "Capital looks free to a lot of managers. It doesn't look free to investors who hand them the money" (Tully, 1993). And if the managers of a for-profit firm can forget the opportunity cost of capital, then so can an MFO and its donors.

Like the SDI, a strength of EVA is its ease of use. Some new measures—for example, Total Shareholder Return and Cash Flow Return on Investment—answer the question asked by owners better than EVA since they resemble NPW more. But they are more complex and harder to teach to managers.

Like the SDI, EVA boosts performance by measuring it. Firms have broken down business units in their internal accounts so as to reward managers based on EVA. One CEO said, "EVA makes managers act like shareholders" (Tully, 1993).

Like the SDI, EVA ratchets the performance benchmark up a notch. The CFO of AT&T said, "The effect is staggering. 'Good' is no longer positive operating earnings. It's only when you beat the cost of capital" (Tully, 1993).

Like the SDI, EVA "is powerful and widely applicable because in the end it doesn't prescribe doing anything. . . . Instead, it is a method of seeing and understanding what is really happening" (Tully, 1993).

Appendix 3: Opportunity Costs for an Investor

In this appendix, I present a framework based on Benjamin (1994) to find the opportunity costs of debt and equity for an investor. Schreiner and Yaron (1998) give numerical examples. Gonzalez-Vega *et al.* (1997b) and Schreiner and Gonzalez-Vega (1995) use the framework.

A. The price of market debt *m*

1. When deposits will replace soft debt

If an MFO takes deposits, then it might replace soft debt with deposits. If the analyst can make a case for this, then the opportunity cost of soft debt for an investor *m* is the rate the MFO pays on deposits plus a mark-up for the extra costs to handle more deposits. Three percentage points is a good rule of thumb (Yaron, 1992b).

2. When market debt will replace soft debt

For most MFOs, the source of funds on the margin is market debt or even market equity. In these cases, the opportunity cost of soft debt for an investor *m* is the local prime rate plus a risk premium. Most MFOs are far riskier than the blue-chip borrowers who get the prime rate.

a. Age affects the price of market debt

Younger MFOs pay more for market debt. All else constant, a young MFO is riskier than an old MFO since lenders do not know it as well and since a young MFO is more apt to collapse. Benjamin (1994) suggests an age premium of $2/100/Y$, where Y is the age of the MFO.

b. Profit affects the price of market debt

Profitable MFOs pay less for market debt since they are less risky. Benjamin (1994) captures this with a rule: If the MFO has an ROE of less than zero, then add 0.03. If ROE is more than zero but less than the prime rate, then add 0.02. If ROE is more than the prime rate but less than twice the prime rate, then add 0.01. Otherwise, add nothing.

The estimated opportunity cost of soft debt for an investor *m* is thus the sum of the prime rate, the adjustment for age, and the adjustment for profit. The result is a higher lower bound on *m* than the lower bound suggested by Yaron (1992b).

B. The price of market equity *r*

Equity costs more than debt since it is riskier. Benjamin (1994) takes the opportunity cost of equity for an investor *r* as the opportunity cost of soft debt *m* plus a risk premium. Even for DFIs owned by a government, $r > m$.

Leverage L is the ratio of average liabilities to average equity:

$$\text{Leverage} = \frac{\text{Average liabilities}}{\text{Average equity}}. \tag{67}$$

Investors require a higher ROE as a firm gets more leverage (Modigliani and Miller, 1958). Unlike equity, liabilities spawn fixed charges. More fixed charges mean more chances to go bankrupt if revenue falls short. A bankrupt firm pays creditors before shareholders, so more leverage increases the risk borne by shareholders.

Benjamin (1994) uses data on leverage and on ROE from the United States to relate the opportunity cost of equity *r* to market leverage L and to the opportunity cost of soft debt *m*:

$$r = m \cdot (1.1 + 0.1 \cdot L). \tag{68}$$

Without debt, $L = 0$, and thus the cost of private equity would be $m \cdot 1.1$. With nine times as much debt as equity, $L = 9$, and thus the cost of private equity would be $m \cdot 2$.

C. Example opportunity costs for the market

1. BancoSol

In 1993-96, the opportunity cost of soft debt replaced with deposits was 16-20 percent (line e of Table 25 on page 107). The peak of 38 percent came in 1992 as the new bank started to take voluntary deposits.

Deposits, however, are not the source of funds for BancoSol at the margin. To replace soft debt, BancoSol would, at least in the short term, borrow from other banks. The rate for such debt fell from 27-33 percent in 1987-90 to 19-22 percent in 1991-96 (line k).

The opportunity cost of equity *r* was 27-33 percent in 1991-96 (line o). By 1996, the prime rate in Bolivia flattened out near 18 percent (line f). The opportunity cost of equity *r* rose in 1992-96 since more leverage meant more risk even as financial performance improved.

BancoSol applies IAS 29 (Appendix 4 on page 109) not with inflation in Bolivia but with the change in the exchange rate between the boliviano and the dollar. This mixes the effects of inflation in Bolivia, inflation in the United States, and any pure devaluation or revaluation. BancoSol split its funds between dollars and bolivianos, so I do not know whether a real *r* would adjust the nominal *r* for the rate of inflation in the United States, for the rate of inflation in Bolivia, or for the rate of change in the exchange rate. I used the inflation rate in Bolivia.

2. Grameen

In 1984-1994, Grameen paid 6-10 percent for deposits (line c of Table 26 on page 108). The opportunity cost of soft debt *m* replaced with deposits was near 10-13 percent (line e). The peak of 13 percent came in 1994.

Grameen would replace soft debt not with deposits but with private debt, so the opportunity cost of soft debt *m* is the Bangladesh prime rate (line f) with premia for age and profit (lines h and j). In 1984-89, *m* was 13-15 percent (line k). In 1990-94, *m* was 17-18 percent.

For Grameen, *r* rose from 30 percent in 1983 to 48 percent in 1987 (line o). By 1994, it had fallen to 24 percent. The prime rate in Bangladesh was 12-16 percent though the whole stretch (line f). Thus the rise and fall of *r* depended on the changes in leverage. At the peak in 1987, Grameen had leverage of more than 22 (line n). By 1994, leverage had fallen to about 3. In the 1990s, the fall in leverage decreased risk and more than offset the increase in the prime rate.

3. Discussion

The opportunity costs here are much higher than those in other analyses of BancoSol and Grameen except for those of Benjamin (1994). For BancoSol, Agafonoff (1994) uses a rate of 11 percent for 1993. Mosley (1996) does not report the rate he uses. For Grameen, KK&K (1995) use the deposit rate in Bangladesh. This dove from about 14 percent in 1987-93 to 6 percent in 1994. This rate is too low (Morduch, 1997). He uses a rate of 14-16 percent for 1987-94. Yaron (1992a) used a rate of about 15 percent for 1987-89. Like Yaron (1992a and 1992b), all these authors use the same rate for both *m* and *r*.

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Exp. int. deposit libs.	Data	0	10	7	41	134	422	1,215	3,438	3,386	4,072
b.	Ave. annual deposit libs.	Data	0	45	138	395	756	1,221	7,274	23,818	26,515	30,424
c.	**Rate paid on deposit libs.**	a/b	NA	0.22	0.05	0.10	0.18	0.35	0.17	0.14	0.13	0.13
d.	Adjustment admin. costs	Data	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
e.	**m, Opp. cost, soft debt for dep.**	c+d	NA	0.25	0.08	0.13	0.21	0.38	0.20	0.17	0.16	0.16
f.	Bolivia prime (port. wgt. ave.)	Data	0.30	0.26	0.27	0.24	0.19	0.18	0.18	0.17	0.17	0.18
g.	Age of MFO in years	Data	1	2	3	4	5	6	7	8	9	10
h.	**Premium for age**	2/100/g	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
i.	Standard ROE	Data	0.57	0.40	(0.23)	0.10	0.09	(0.04)	(0.01)	0.13	0.11	0.17
j.	**Premium for profitability**	See text	0.01	0.01	0.03	0.02	0.02	0.03	0.03	0.02	0.02	0.02
k.	**m, Opp. cost, soft debt for debt**	f+h+j	0.33	0.28	0.30	0.27	0.22	0.21	0.21	0.19	0.19	0.20
l.	Ave. liabilities	Data	106	446	790	1,522	2,754	4,728	15,185	35,832	34,117	38,685
m.	Ave. equity	Data	37	172	236	1,003	2,049	4,488	7,591	8,613	5,975	6,646
n.	**L, leverage**	l/m	2.9	2.6	3.3	1.5	1.3	1.1	2.0	4.2	5.7	5.8
o.	**Nom. opp. cost equity investor, r**	k*(1.1+0.1*n)	0.46	0.38	0.43	0.34	0.27	0.25	0.27	0.29	0.32	0.33

Source: Author's calculations based on Benjamin (1994). Monetary figures in thousands of Dec. 1996 dollars.

Table 25: BancoSol opportunity costs for investors, 1987-96

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Exp. int. deposit libs.	Data	18	96	195	313	478	732	1,050	1,620	1,900	2,697	4,020	6,891
b.	Ave. annual deposit libs.	Data	545	1,522	2,760	4,234	6,555	9,514	13,067	17,839	22,613	29,989	48,920	71,412
c.	**Rate paid on deposit libs.**	a/b	0.03	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.08	0.09	0.08	0.10
d.	Adjustment admin. costs	Data	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
e.	**m, Opp. cost, soft debt for dep.**	c+d	0.06	0.09	0.10	0.10	0.10	0.11	0.11	0.12	0.11	0.12	0.11	0.13
f.	Bangladesh prime (port. wgt. ave.)	Data	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.15	0.16	0.15	0.15	0.14
g.	Age of MFO in years	Data	1	2	3	4	5	6	7	8	9	10	11	12
h.	**Premium for age**	2/100/g	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
i.	Standard ROE	Data	(0.43)	0.24	0.02	0.01	0.01	0.01	0.01	0.02	0.01	(0.00)	0.00	0.01
j.	**Premium for profitability**	See text	0.03	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02
k.	**m, Opp. cost, soft debt for debt**	f+h+j	0.17	0.13	0.15	0.15	0.14	0.14	0.14	0.17	0.18	0.18	0.17	0.17
l.	Ave. liabilities	Data	3,063	12,062	20,467	28,654	40,132	51,654	67,699	82,161	88,856	102,929	179,584	278,639
m.	Ave. equity	Data	442	1,126	1,408	1,588	1,794	4,456	9,447	19,827	32,754	52,346	74,243	84,664
n.	**L, leverage**	l/m	6.9	10.7	14.5	18.0	22.4	11.6	7.2	4.1	2.7	2.0	2.4	3.3
o.	**Nom. opp. cost equity investor, r**	k*(1.1+0.1*n)	0.30	0.28	0.37	0.42	0.48	0.32	0.26	0.26	0.25	0.24	0.23	0.24

Source: Author's calculations based on Benjamin (1994). Monetary figures in thousands of Dec. 1996 dollars.

Table 26: Grameen opportunity costs for investors, 1983-94

Appendix 4: From Nominal Units of Local Currency to Constant Dollars

"Who would give their children a stone when they ask for bread,
or a snake when they ask for a fish,
or a scorpion when they ask for an egg?" Matthew 7:9

In this appendix, I suggest ways to convert stocks and flows in nominal units of a local currency to constant dollars. If the purchasing power of a unit of currency changes with time, then a stock at one time cannot be added to a stock at another time since they have different units. Worse, accumulated flows add a continuum of units through time. It does not make sense to compare numbers unless they have the same units. As Boulding (1962, p. 54) says, "A hundred feet plus ten centimeters is certainly not a hundred and ten of anything."

I suggest to put data in units of constant dollars as of a point in the time frame close to the present. The use of a single unit makes comparisons valid. The use of recent dollars helps the analyst to compare numbers across countries. Also, most people have a better gut feel for the worth of a dollar now than for a dollar 10 years ago or for a unit of local currency now. The analyst should do the conversions suggested here before the use of the adjustment factors α, γ, ω, and ϵ (Appendix 5 on page 112, Appendix 6 on page 114, and Appendix 7 on page 116).

A. Inflation and financial statements

Financial statements are the weak link in this framework (Schreiner and Yaron, 1998). They use accounting rules for tax purposes. Tax logic is seldom economic logic. Accounting data were not meant as present-worth measures.

The analyst should adjust financial statements in two ways. The first corrects for the assumption that monetary figures keep a constant value (Goldschmidt, Shashua, and Hillman, 1986). Without the adjustment, the data do not measure what they claim to measure. It is beyond my scope to tell how to do this. IAS 29 tells how to adjust for the effects of inflation on equity, the net monetary position, and the worth of fixed assets. Goldschmidt (1992) discusses IAS 29, and Goldschmidt and Yaron (1991) outline some shortcut methods. Christen (1997) steps through an example for an MFO. Shadow prices applied to IAS 29-adjusted data should be in real terms. The use of nominal shadow prices with adjusted data would count costs twice (Yaron, 1992b). If data is not adjusted as in IAS 29, then shadow prices should be in nominal terms.

The second adjustment puts data in constant units. IAS 29 does not do this. An MFO may follow IAS 29, but the analyst will still need to put the data in constant units. The rest of this appendix suggests how to do this.

B. How to convert stocks

The analyst converts stocks in nominal units of a local currency to stocks in constant dollars in two steps (Christen, 1997). First, the analyst inflates or deflates stocks in the local currency throughout the time frame to stocks in the local currency at a single point in time, usually the end of the time frame. Given time T as the constant point and given the local consumer price index (CPI) at times t and T, a unit of the local currency at time t has the same purchasing power as CPI_T/CPI_t units of local currency at time T.

Second, the analyst changes stocks in constant units of the local currency at a single point in time to dollars. This means multiplying the stock in constant units of the local currency as of

time T by the exchange rate between dollars and the local currency at T, EX_T. The two steps give:

$$\text{Stock}_t \text{ in constant dollars} = \theta_t \cdot \text{Stock}_t \text{ in nominal units of local currency}, \quad (69)$$

where

$$\theta_t = EX_t \cdot (CPI_T / CPI_t).$$

For BancoSol, the stock conversion factor θ is in line a of Table 27 on page 111. For Grameen, the factor θ is in line a of Table 28 on page 111.

C. How to convert flows

Flows accrue through time, but the MFO reports accumulated flows at just a few points in time. The analyst can make two assumptions about the unseen pace of flows (Appendix 6 on page 114). First, the pace might be constant. Second, the pace might be a share of a stock measured more often than accumulated flows.

1. Flows at a constant pace

If the analyst assumes flows accrue at a constant pace between measurements, then the flow of constant dollars is the product of the accumulated flow in nominal units of the local currency F_t and the flow conversion factor λ_t:

$$\text{Flow}_t \text{ in units of constant dollars} = \lambda_t \cdot \text{Flow}_t \text{ in nominal units of local currency}, \quad (70)$$

where

$$\lambda_t = (\theta_t + \theta_{t-1})/2.$$

The flow conversion factor λ_t is the average of the stock conversion factors θ since the flow accrues at a constant pace and since θ changes at a constant pace (Schreiner, 1997).

2. Flows in step with an average stock

In some cases, the analyst measures an accumulated flow just at the end of the year but yet measures a stock such as the loan portfolio at N intervals in a year. One way to use the information in the frequent measurements is to assume that the flow is proportional to the real average stock. For example, the real flow of revenue from lending might be a constant share of the real average loan portfolio.

Here, λ is the average of the flow conversion factors in the N intervals weighted by the share of the real average stock in each interval to the annual real average stock:

$$\lambda = \sum_{n=1}^{N} \left(\frac{\theta_n + \theta_{n-1}}{2} \right) \cdot \left[\frac{(\theta_n \cdot S_n + \theta_{n-1} \cdot S_{n-1})/(2 \cdot N)}{\sum_{j=1}^{N} (\theta_j \cdot S_j + \theta_{j-1} \cdot S_{j-1})/(2 \cdot N)} \right]. \quad (71)$$

For BancoSol, the flow conversion factor λ is in line b of Table 27 on page 111. I assumed that flows kept in step with the average loan portfolio. For Grameen, the factor γ is in line b of Table 28 on page 111. I had just year-end data for Grameen.

Line	Year ending Dec. 31	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Stock conv. factor, Theta	0.588	0.484	0.415	0.352	0.307	0.278	0.255	0.235	0.208	0.193
b.	Annual flow conv. factor, Lambda	0.598	0.523	0.453	0.387	0.321	0.286	0.263	0.245	0.223	0.198
c.	Alpha	0.595	1.001	0.814	0.865	0.787	0.676	0.712	0.934	0.826	0.856
d.	Gamma, investor one year	0.769	0.856	0.770	0.828	0.812	0.815	0.817	0.800	0.289	0.710
e.	Gamma, investor since birth	0.769	0.619	0.388	0.312	0.241	0.193	0.152	0.116	0.032	0.058
f.	Gamma for the poor, since birth	0.866	0.715	0.542	0.432	0.339	0.274	0.227	0.182	0.002	0.112
g.	Omega for the poor	0.237	0.471	0.408	0.394	0.414	0.371	0.381	0.455	0.420	0.433
h.	Eta	0.865	0.753	0.626	0.521	0.438	0.363	0.301	0.255	0.213	0.177

Source: Author's calculations.

Table 27: BancoSol conversion factors, 1987-96

Line	Year ending Dec. 31	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Stock conv. factor, Theta	0.057	0.052	0.044	0.040	0.036	0.034	0.031	0.028	0.027	0.027	0.026	0.025
b.	Annual flow conv. factor, Lambd	0.059	0.053	0.048	0.042	0.038	0.035	0.032	0.030	0.028	0.026	0.026	0.026
c.	Alpha	1.039	0.998	0.999	1.006	1.023	1.013	0.990	1.010	0.998	0.974	1.005	1.009
d.	Gamma, investor one year	0.875	0.883	0.853	0.839	0.822	0.869	0.891	0.893	0.895	0.899	0.901	0.899
e.	Gamma, investor since birth	0.875	0.677	0.510	0.365	0.251	0.180	0.139	0.111	0.088	0.071	0.058	0.047
f.	Gamma for the poor, since birth	0.863	0.654	0.475	0.339	0.249	0.186	0.142	0.106	0.082	0.068	0.055	0.044
g.	Omega for the poor	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
h.	Eta	0.887	0.753	0.633	0.528	0.438	0.365	0.305	0.255	0.212	0.176	0.146	0.123

Source: Author's calculations.

Table 28: Grameen conversion factors, 1983-94

Appendix 5: How to Estimate Average Stocks

Financial ratios need estimates of average stocks to compare flows with stocks. For example, ROE compares profit with the equity used to make profit. Like profit, the measure of equity must have units of dollars per unit of time. Average equity has these units.

I suggest a way to estimate average stocks with two or more snapshots of the stock at equal intervals. The more snapshots, the better the estimate. I also suggest a way to estimate an average stock with year-end measures of one stock but frequent measures of some other stock. I assume that the stocks are already in constant dollars (Appendix 4 on page 109).

A. Estimated average stocks

Analysts cannot measure stocks each day. Most MFOs would not give such data, and the effort would not be worth the extra accuracy. Instead, analysts measure stocks at a few points and then assume a path for the unseen change between points. The most common assumption is a constant pace of growth.

Some stocks grow in spurts and jerks. For example, an MFO gets and repays tranches of soft debt not as constant trickles but as discrete lumps. Paid-in capital and other grants come in all at once. The stock of loans may surge near holidays, planting, and harvest.

B. Constant growth

Suppose an analyst has N+1 snapshots S_n at the points in time on the borders of N equal intervals. For example, N = 12 gives N+1 = 13 monthly snapshots. Without time subscripts, the average stock S with constant growth between measurements is:

$$S = \sum_{n=1}^{N} \left[(S_n + S_{n-1})/(2 \cdot N) \right]. \tag{72}$$

In contrast to RC&H (1997), the average stock S with constant growth is not:

$$S = \sum_{n=0}^{N} \left[S_n/(N+1) \right].$$

Most frameworks assume analysts have just year-end data. In this case, N = 1, and the average stock S (equation 72 on a page 112) is half the sum of the start and end stocks:

$$S = (S_1 + S_0)/2.$$

If a stock changed at a constant pace, then it would follow a straight growth path (Figure 7 on page 113). In this case, the two-point average is not in error. The area under the line of constant growth equals the area under the line (S_0+S_1)/2.

But most stocks in most MFOs do not grow at a constant pace. An example is the exponential growth path in Figure 7 on page 113. Here the two-point average is far off the mark. The area under the line of (S_0+S_1)/2 is not close to the area under the line of true growth.

If the simple average with year-end data is too far off, then quarterly or monthly data can help. Even semi-annual data can cut error a lot (Figure 7 on page 113).

C. Estimates with frequent measurements of some stock

Most MFOs will provide monthly data on the loan portfolio. An analyst might make a

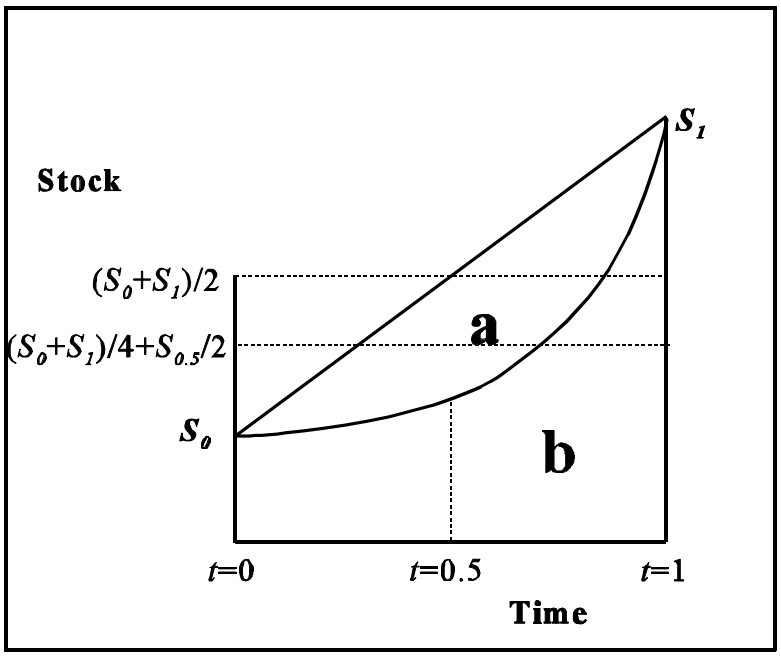

Figure 7: Average stocks with year-end data and with semi-annual data

case that stocks known just at the end of the year changed in step with a stock such as the loan portfolio known throughout the year.

In this case, I suggest to estimate the average stock S as the simple average stock with year-end measures—$(S_0+S_N)/2$—adjusted for the difference between the average portfolio with N measures and the average portfolio with just year-end measures:

$$S = \alpha \cdot (S_0 + S_N)/2. \tag{73}$$

where

$$\alpha = \left[\sum_{n=1}^{N} (LP_n + LP_{n-1})/(2 \cdot N) \right] / \left[(LP_N + LP_0)/2 \right].$$

The factor α is the ratio of the average portfolio with N snapshots to the average portfolio with just two snapshots. This is $b/(a+b)$ in Figure 7 on page 113.

Year-end data correspond to $N = 1$. With constant change, $\alpha = 1$, and the formula for an average stock S (equation 72 on a page 112) is $(S_0+S_N)/2$. With faster growth at the end of the year, $\alpha < 1$. With slower growth at the end of the year, $\alpha > 1$.

For BancoSol, α is in line c of Table 27 on page 111. With monthly data, α ranged from 0.6 to 1.0. For example, in 1996 $\alpha = 0.86$. The average stock of $36.2 million with monthly data (line r of Table 4 on page 47) was 86 percent of the average stock of $42 million with year-end data (Table 31 on page 124).

For Grameen, α is in line c of Table 28 on page 111. I had just year-end data for Grameen. The factor is not exactly 1.00 in all years since I used the year-end data and the assumption of constant growth to interpolate monthly stocks before I converted to constant dollars (Appendix 4 on page 109). I used monthly data for inflation and the exchange rate, and these did not change at a constant pace.

Appendix 6: How to Estimate Discounted Accumulated Flows

Discounted measures such as NPC_I and NPC_P need to know the amount and the time of each flow. The problem is that the stocks and the accumulated flows in year-end financial statements do not tell this.

In this appendix, I suggest a way to discount flows that does not assume that they all took place at the start, end, or middle of the year and that does not require a list of all the flows in a year. The method works for accumulated flows in the income statement and for changes in stocks between two balance sheets. I assume the data are in constant dollars (Appendix 4 on page 109).

A. How to discount flows with a constant pace

The analyst must assume how unseen flows accumulate between two points in time. The simplest and most common assumption is a constant pace. Other assumptions are that all the flows took place on the start, end, or middle of a year.

Suppose an MFO gets a flow at a constant rate of f dollars per day for N days between time t-1 and time t. At time t, the income statement reports an accumulated flow of $N \cdot f$ dollars. Given an opportunity cost r from some point of view, the discount rate is $\delta = 1/(1+r) < 1$. Seen from the start of the time frame, the whole flow on the first day has a present worth $N \cdot f \cdot \delta^0 = N \cdot f$. If the whole flow took place on the last day, then the present worth is $N \cdot f \cdot \delta^1 < N \cdot f$. If the whole flow took place halfway through the time frame, then the present worth is $N \cdot f \cdot \delta^{(1-0.5)}$.

Given this constant flow f per day for N days:

$$\text{Present worth of flow} = \sum_{n=1}^{N} \delta^{(t-n/N)} \cdot f, \doteq N \cdot f \cdot \int_{t-1}^{t} \delta^x dx = N \cdot f \cdot \left(\frac{\delta^t - \delta^{t-1}}{\ln \delta} \right). \qquad (74)$$

Multiplying $(\delta^t - \delta^{t-1})/(\ln \delta)$ by the accumulated flow $N \cdot f$ gives the same result as discounting each flow each day. Furthermore, for r near zero or for large t, $(\delta^t - \delta^{t-1})/(\ln \delta) \doteq \delta^{t-0.5}$ (Schreiner, 1997).

B. How to discount non-constant flows

An analyst might know flows in N intervals in a year. For example, this happens with the flow of output measured as amount of dollars disbursed or as the number of loans disbursed. Most MFOs will provide these numbers for each month.

An analyst might also assume that changes in one stock mimic the changes in a stock such as the loan portfolio that is measured each month or each quarter. I use this assumption to discount the fresh funds injected in net worth.

1. How to estimate discounted non-constant flows

I assume that the analyst has data on flows for each month or for each quarter and that flows are constant within each month or quarter. Schreiner (1997) gives a numerical example with semi-annual data. Given N intervals, f_n is the flow accumulated at a constant pace in interval n. The total flow accumulated in the year is $F_N = (f_1 + f_2 + \ldots + f_N)$.

I want a single factor ω to apply to the total flow in the year F_N such that $F_N \cdot \delta_t^{t-\omega}$ gives the same result as discounting each of the N flows. The factor ω is the average of the discount rates at the midpoints of the N intervals weighted by the share of the flow in the interval in the total flow

in the year:

$$\text{Discounted flow} = F_N \cdot \delta_t^{t-\omega}. \tag{75}$$

where

$$\omega = 1 - \sum_{n=1}^{N} [(2 \cdot n - 1)/(2 \cdot N) \cdot (f_n / \sum_{j=1}^{N} f_j)].$$

With just year-end data, $N = 1$ and so $\omega = 0.5$. This framework uses the factor ω to discount flows of output in the analysis of market leverage. The discount rate δ there takes the point of view of the poor.

2. How to estimate discounted non-constant change in stocks

Most MFOs will report the monthly stock of the loan portfolio even though they do not report each change in the stock of net worth. I use this fact to find a factor γ to discount the fresh funds injected in net worth in a year. There is one factor for the poor with long time frames, a second factor for investors with one-year time frames, and a third factor for investors with long time frames.

The factor γ is the sum of the discounted change in the stock of the portfolio in each interval normalized by the total change in the portfolio in the year:

$$\gamma_t = \sum_{n=1}^{N} \delta_t^{t-[1-(2 \cdot n-1)/(2 \cdot N)]} \cdot (LP_n - LP_{n-1})/(LP_N - LP_0). \tag{76}$$

The assumptions that support the use of the factor γ do not always hold. For example, in 1995 the loan portfolio of BancoSol grew from $36.5 million to $37.9 million (Table 31 on page 124). The stock through the course of the year, however, was much lower. For example, it was $28-29 million from March through October. The surge of $9 million in the last two months was not enough to make the present worth of all the changes in the year positive. This meant γ was negative. Also in 1995, the flow of fresh funds injected in net worth for BancoSol was negative. The analyst should not use γ when the change in the loan portfolio does not have the same sign as the change of the other stock and when the factor γ is negative. When both these conditions hold, the analyst can hardly assume that a stock changed in step with the loan portfolio. In these cases, I suggest the use of the absolute value of γ. This keeps the same shape of the path of the accumulated stock but it does not flip its sign. I did this for BancoSol in 1995.

The three factors γ for BancoSol are in lines d, e, and f of Table 27 on page 111. The three factors γ for Grameen are in lines d, e, and f of Table 28 on page 111. For Grameen, I had just year-end measures of stocks and flows. The pace of the real flows and of the changes in stocks was not exactly constant for the same reasons that α was not exactly 1.00 (Appendix 5 on page 112).

Appendix 7: How to Estimate Discounted Average Stocks

Measures of discounted flows such as NPC_P can be compared with outputs measured as discounted flows. In some cases, however, outputs are stocks. Average stocks can be discounted like flows since they are measured per unit of time.

In this appendix, I suggest a way to find discounted average stocks (DAS) to compare with discounted flows. The method assumes that a stock measured twice a year mimics the changes in a stock measured more than twice a year. I assume the data are in constant dollars (Appendix 4 on page 109).

A. Stocks that change at a constant pace

The simplest and most common assumption is a constant pace of change between two measurements. The analyst has N+1 snapshots S_n on the borders of N equal intervals in a year. The length of each interval in years is $m = 1/N$. For example, with just year-end stocks, $N = 1$ and $m = 1/N = 1$. With monthly stocks, $N = 12$ and $m = 1/12 \doteq 0.083$. Let $q = t-1+m\cdot n$. With a discount rate of δ, the DAS of S_t from 0 to T is:

$$\text{DAS} = \sum_{t=1}^{T} \sum_{n=1}^{N} \left\{ \int_{q-m}^{q} \delta^x \cdot [S_{q-m} + (S_q - S_{q-m}) \cdot (x - q + m)/m] \; dx \right\}. \qquad (77)$$

The sum over t adds the DAS in each of the T years. In each year, the sum over n adds the DAS in each of the N intervals. In each interval, the integral is the DAS. It is the product of the discount factor δ^x and the stock at each instant. The stock in each instant is the sum of the start stock S_{q-m} and the change in the stock $S_q - S_{q-m}$ after a portion $(x-q+m)/m$ of the interval has passed (Figure 8 on page 117).

The interval n in year t starts with a stock measured at time $q-m = t-1+m\cdot n-m$. It ends with a stock measured at time $q = t-1+m\cdot n$. For example, with semi-annual data, $N = 2$ and $m = 1/N = 1/2 = 0.5$. In the first interval, $n = 1$. It starts at $q-m = t-1+m\cdot n-m = t-1+0.5\cdot 1-0.5 = t-1$ and lasts until $q = t-1+m\cdot n = t-1+0.5\cdot 1 = t-0.5$. In the second interval, $n = 2$. It starts at $q-m = t-1+m\cdot n-m = t-1+0.5\cdot 2-0.5 = t-0.5$ and lasts until $q = t-1+m\cdot n = t-1+0.5\cdot 2 = t$.

The integral is with respect to time x. The stock at each moment is discounted by δ^x. With a constant pace of change between snapshots, the stock at time x is the sum of the stock at the start of the interval S_{q-m} and the change in the stock $S_q - S_{q-m}$ after a portion $(x-q+m)/m$ of the interval has passed. At the start of the interval, $x = q-m$, so $(x-q+m)/m = 0$. The stock at time $q-m$ is just the start stock S_{q-m}. At the end of the interval, $x = q$, so $(x-q+m)/m = 1$. The stock at time q is the end stock, the sum of the stock at the start and the full change in the stock in the interval, $S_{q-m}+S_q-S_{q-m} = S_q$. Halfway through, $x = q-m/2$, so $(x-q+m)/m = 0.5$. This is the sum of the start stock plus half the change in the stock in the interval.

To compute the DAS (equation 77 on page 116), I first rewrite it as:

$$\text{DAS} = \sum_{t=1}^{T} \sum_{n=1}^{N} \left[\int_{q-m}^{q} \delta^x \cdot S_{q-m} + \delta^x \cdot x \cdot (S_q - S_{q-m})/m + \delta^x \cdot (S_q - S_{q-m}) \cdot (m-q)/m \; dx \right].$$

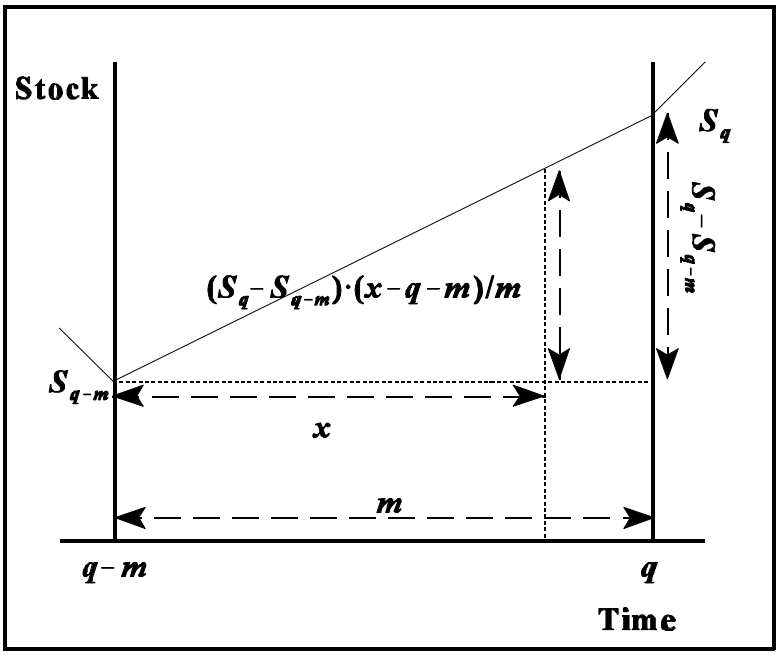

Figure 8: Notation and logic of discounted average stock in an interval

To compute the integral, I use the facts:

$$\int_{q-m}^{q} \delta^x \, dx = \frac{\delta^q - \delta^{q-m}}{\ln \delta},$$

and

$$\int_{q-m}^{q} x\cdot\delta^x \, dx = \frac{\delta^q\cdot(q\cdot\ln\delta - 1) - \delta^{q-m}\cdot[(q-m)\cdot\ln\delta - 1]}{(\ln\delta)^2}.$$

The formula for a discounted average stock is then:

$$\begin{aligned} \text{DAS} = \sum_{t=1}^{T}\sum_{n=1}^{N}\Bigg[& \left(\frac{\delta^q - \delta^{q-m}}{\ln \delta}\right)\cdot S_{q-m} \\ & + \left(\frac{\delta^q\cdot(q\cdot\ln\delta - 1) - \delta^{q-m}\cdot[(q-m)\cdot\ln\delta - 1]}{(\ln\delta)^2}\right)\cdot(S_q - S_{q-m})/m \\ & + \left(\frac{\delta^q - \delta^{q-m}}{\ln \delta}\right)\cdot(S_q - S_{q-m})\cdot(m-q)/m\Bigg]. \end{aligned} \tag{78}$$

B. Extrapolated estimates of discounted average stocks

Often the analyst can get monthly data for the loan portfolio but just year-end measurements of all other stocks. In this case, the analyst might assume that the stocks measured just twice mimicked the changes in the loan portfolio. Then the analyst can use the DAS of the loan portfolio to estimate the DAS of other stocks.

The factor ϵ uses S_{tn}, the $N \geq 2$ snapshots of S in year t, to convert an undiscounted average stock (equation 73 on page 113) to a discounted average stock:

$$\text{DAS of S} = \sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (S_t + S_{t-1})/2. \tag{79}$$

where

$$\epsilon_t = \frac{\text{Discounted average stock}}{\text{Undiscounted average stock}} = \frac{\text{DAS of loan portfolio}}{\sum_{n=1}^{N} \left(\frac{LP_{tn} + LP_{tn-1}}{2 \cdot N} \right)}. \tag{80}$$

For BancoSol, ϵ is in line h of Table 27 on page 111. For Grameen, ϵ is in line h of Table 28 on page 111.

APPENDIX 8: BancoSol of Bolivia

In this appendix, I record notes on the data used in the example of the framework with BancoSol of Bolivia. I have two goals. The first is to let analysts check the results and to debug their own spreadsheets. The second is to publish the first set of financial statements that make a clean break between BancoSol and PRODEM, its NGO parent.

I visited BancoSol in 1995. Since then, its staff has updated my data and answered my questions. I am more sure of the data and results for BancoSol. As a bank, BancoSol has followed the strict reporting standards required of banks subject to prudential regulation and supervision in Bolivia. Even PRODEM had transparent accounts by NGO standards.

I picked BancoSol as an example since, behind Grameen and BRI of Indonesia, it is the third most-famous MFO in the world. BancoSol was the first NGO to become a bank. Like Grameen, the example of BancoSol has spawned many other MFOs (Gonzalez-Vega, *et al.*, 1997a, 1997b, 1996).

A. The morph from PRODEM to BancoSol

Now this is how the birth of BancoSol came about. PRODEM, an NGO MFO, started in Feb. 1987. In Feb. 1992, PRODEM split off one of its branches to spawn BancoSol. I will not retell how BancoSol got a charter as a bank and sold shares (Katsuma, 1997; Mosley, 1996; Agafonoff, 1994; Glosser, 1994). I will delve into the details of the slow shift of branches from PRODEM to BancoSol and of their transfer prices. The transfer prices hid a subsidy from PRODEM to BancoSol. The transfer itself also hid subsidies since a branch while with PRODEM used more subsidized funds than that same branch while with BancoSol.

BancoSol paid PRODEM cash or shares of stock equal to the book value of the assets net of liabilities transferred. This transfer price was too low since it was based on accounting net worth instead of economic NPW. It does not give full value to the start-up costs borne by PRODEM nor to the intangible assets embodied in a bank branch, a proven technology, and base of customers (Gonzalez-Vega, Prado Guachalla, and Miller Sanabria, 1997; Agafonoff, 1994). BancoSol also got workers without paying for their training and experience with PRODEM.

I do not estimate a transfer price. Instead, I treat branches transferred from PRODEM to BancoSol as if BancoSol had them all along. The story has three parts: the PRODEM era, the mixed era, and the BancoSol era.

The PRODEM era lasted from the birth of PRODEM in Feb. 1987 until the budding of BancoSol in Feb. 1992. All the branches in PRODEM in this era were later transferred to BancoSol. Thus PRODEM in this era was BancoSol in all but name.

The mixed era lasted from the budding of BancoSol in Feb. 1992 until the last branch transfer in Oct. 1994. In the mixed era, PRODEM and BancoSol both had their own financial statements and records of output. Some of the branches in PRODEM in the mixed era, however, later became part of BancoSol. Thus part of the financial results and output of PRODEM in the mixed era counts for BancoSol.

With output data by branch and by month for both PRODEM and BancoSol, I unmixed the output of the branches that PRODEM transferred to BancoSol from the output of the branches that PRODEM kept. I did not have financial statements by branch and by month, so I made two assumptions. First, I assumed that revenues and costs in each branch with PRODEM were proportionate to the share of the branch in the average loan portfolio for PRODEM as a whole in the year. I grafted this portion of the revenues and expenses of PRODEM to the income

statement of BancoSol. The portion shifted was 99 percent in 1992, 80 percent in 1993, and 36 percent in 1994.

Second, I assumed that the stocks in the balance sheet used by each branch in PRODEM were proportional to the share of each branch in the stock of the loan portfolio for PRODEM as a whole at the end of the year. I then spliced this portion of the balance sheet of PRODEM into the balance sheet of BancoSol. The proportion shifted was 95 percent in 1992 and 67 percent in 1993. I did not shift any stocks at the end of 1994 since by then PRODEM had stopped transferring branches.

The BancoSol era started in Oct. 1994. Since then, PRODEM has not transferred any branches to BancoSol. The financial statements and the outputs for 1995-96 are just those reported by BancoSol.

B. Macroeconomic indicators

The analysis uses three basic macroeconomic indicators: the exchange rate between bolivianos and dollars, the consumer price index (CPI) in Bolivia, and the prime rate in Bolivia (Table 29 on page 122). The exchange rate at the end of each month comes from *International Financial Statistics* (IMF).

I use the CPI of Bolivia in each month to find the rate of inflation. I use the rate of inflation to adjust nominal bolivianos to constant bolivianos (Appendix 4 on page 109) and to convert between nominal and real rates. I present two measures of the rate of inflation in Bolivia and in the United States (Table 29 on page 122). The simple average is the percentage change in the CPI from the start of the year to the end of the year. The portfolio-weighted average weights the percentage changes in the month-to-month CPI by the contribution of the loan portfolio in the month to the nominal average portfolio in the year.

I use the prime rate in Bolivia to find the opportunity cost of investors (Appendix 3 on page 105). For comparison, I also report the prime rate, the rate of inflation, and the rate paid on Treasury bills in the United States (Table 29 on page 122). I also present population and GNP per capita data for Bolivia (World Bank). In 1995, Bolivia had about 7.4 million people and a GNP per capita of about $870.

C. Financial statements of BancoSol, 1987-96

The financial statements of BancoSol have units of thousands of dollars as of Dec. 1996 (Table 30 on page 123, Table 31 on page 124, and Table 32 on page 125). The stocks in the balance sheet were converted with the factor θ, and the flows in the income statement were converted with the factor λ (Appendix 4 on page 109).

Most frameworks for the analysis of the performance of MFOs strip accrued interest from revenue. The danger is that an MFO could accrue interest it will not collect and so taint profit. For BancoSol, I have counted accrued interest as revenue (Table 30 on page 123). BancoSol has collected 99 percent of its loans and writes off the rest. It does not accrue interest on loans in arrears. Accrued interest does not distort measures of the performance of BancoSol.

I adjusted the equity accounts (Table 32 on page 125). For example, BancoSol added retained earnings each year to paid-in capital. I have undone this. I also set public and private paid-in capital to zero at the start of 1992. PRODEM had recorded some equity as paid-in capital even though it had no shareholders. Also, PRODEM funded its branches in part with direct grants, but these grants stayed with PRODEM when the branches shifted to BancoSol. Thus direct grants grew in 1992 and 1993 as branches that would later be part of BancoSol grew with

direct grants under PRODEM. The direct grants left BancoSol when PRODEM transferred the branches but kept the grants.

Shareholders own BancoSol, but most shareholders are public entities. BancoSol did not pay dividends through 1996, although it did in 1997 (*Wall Street Journal*, 1997b). Public entities own about 80 percent of the shares (line e in Table 17 on page 83).

D. Other assumptions

BancoSol is not exempt from reserve requirements nor from taxes on profit. I assume the tax rate τ on profit in Bolivia was 25 percent from 1987-96. In fact, Bolivia did not have a tax on profit before 1994. Instead, it charged 3 percent on the stock of equity at the end of the year. The tax paid in the mixed era of 1992-94 was not 25 percent of accounting profit since it included losses from PRODEM (Table 30 on page 123).

I ignore the subsidy in the analyses done for BancoSol by donors. I ignore the help PRODEM got with its plans to spawn a bank and in the maneuvers to get a bank charter.

BancoSol takes big deposits from other subsidized NGOs and MFOs in Bolivia. I assume that these deposits carry a market rate. I assume just two cents of surplus for the poor per dollar-year of deposits d since so many deposits are not held by the poor. I assume that BancoSol would not replace soft debt or subsidized funds in equity with deposits but rather with market debt or with private equity. BancoSol placed some bonds in the market backed by donor guarantees. I ignore this subsidy. These bonds are small and carry a near-market rate.

Year ending Dec. 31	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Bolivia										
Exchange rate (Bs/$)	2.18	2.47	2.98	3.40	3.75	4.10	4.46	4.70	4.93	5.18
Bolivia inflation, annual	9.4	21.5	16.6	18.0	14.5	10.5	9.3	8.5	12.6	7.9
Bolivia Infl. (port. wgt. ave.)	8.9	22.9	20.2	22.9	15.4	9.7	9.0	8.7	13.2	8.2
Bolivia prime (simple ave.)	30.1	26.2	26.6	24.6	19.7	17.9	17.5	16.6	17.0	17.7
Bolivia prime (port. wgt. ave.)	30.1	26.1	26.6	24.5	19.4	17.8	17.6	16.6	17.0	17.6
Population (millions)	6.7	6.9	7.1	7.2	7.3	7.5	7.1	7.2	7.4	NA
GNP/capita (1996 $)	797	784	852	830	818	806	874	860	870	NA
USA										
U.S. Inflation, annual	4.3	4.5	4.6	6.1	3.1	2.9	2.7	2.7	2.5	3.3
U.S. Inflation (port. wgt. ave.)	2.4	4.4	4.2	5.6	3.0	2.6	2.4	2.7	2.5	3.2
U.S. prime (simple ave.)	8.2	9.2	10.9	10.0	8.6	6.3	6.0	7.0	8.8	8.3
U.S. prime (port. wgt. ave.)	8.7	9.5	10.8	10.0	8.3	6.2	6.0	7.2	8.8	8.3
T-bill rate (simple ave.)	5.8	6.6	8.1	7.5	5.5	3.5	3.0	4.2	5.5	5.0
T-bill rate (ave. port. weighted ave.)	6.0	6.9	8.0	7.4	5.3	3.4	3.0	4.3	5.5	5.0

Sources: IMF and World Bank, various issues.

Table 29: Macroeconomic indicators for Bolivia and the United States, 1987-96

Year ending Dec. 31	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Rev. lending, LP*i	23	128	274	863	1,864	3,761	8,522	13,237	12,494	14,633
Rev. investments	7	7	19	15	23	317	470	1,298	771	357
Rev. adj. inflation	11	0	0	0	0	0	0	2,295	2,763	3,010
Exp. adj. inflation	29	32	165	250	294	310	233	2,442	2,894	3,153
Exp. int. deposit libs.	0	10	7	41	134	422	1,215	3,438	3,386	4,072
Exp. int. market debt	0	0	0	20	28	141	1,434	1,521	1,007	1,080
Exp. int. soft debt	9	27	53	69	70	63	203	119	78	41
Financial margin	3	66	68	499	1,362	3,142	5,907	9,309	8,664	9,653
Rev. other op.	3	41	5	17	36	134	114	86	70	104
Exp. other op.	5	3	26	35	204	98	80	58	28	22
Exp. prov. reserve for loan loss	0	6	3	17	58	114	275	1,041	116	246
Exp. extraordinary write-offs (net)	0	0	0	0	0	0	17	(190)	(241)	(44)
Exp. personnel	57	121	155	315	695	2,032	3,515	4,662	5,291	5,466
Exp. administration	24	54	70	247	446	1,042	1,525	1,948	2,176	1,920
Exp. depreciation	7	11	8	26	51	120	248	400	473	661
Operating margin	(88)	(88)	(189)	(123)	(58)	(131)	362	1,475	890	1,485
Rev. extraordinary (net)	(0)	0	0	0	0	0	(316)	(4)	(10)	27
Rev. grants, RG	109	157	135	226	243	0	0	0	0	0
Acct. profit, AP	21	69	(54)	103	185	(131)	46	1,471	880	1,512
Tax	0	0	0	0	0	49	91	331	220	378
Dividends declared, Div	0	0	0	0	0	0	0	0	0	0
Change retained earnings	21	69	(54)	103	185	(180)	(45)	1,139	660	1,134

Source: Financial statements of BancoSol. All figures in thousands of 1996 dollars.

Table 30: BancoSol adjusted income statement, 1987-96

Year ending Dec. 31	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Cash and short-term invest.	145	120	362	786	900	1,953	7,981	9,932	4,707	6,701
Portfolio performing	213	493	1,154	2,924	5,225	12,245	30,435	35,069	37,146	46,809
Portfolio contaminated arrears	0	1	0	1	18	336	865	1,877	1,163	1,211
Portfolio (gross)	213	493	1,154	2,924	5,243	12,581	31,300	36,946	38,309	48,019
Reserve for loan losses	(0)	(5)	(3)	(13)	(55)	(109)	(337)	(1,090)	(873)	(860)
Portfolio (net)	213	488	1,151	2,911	5,188	12,472	30,964	35,856	37,436	47,159
Deprec. fixed assets (net)	101	125	205	239	702	1,409	2,640	2,819	2,667	3,705
Non-deprec. fixed assets	0	0	17	76	370	1,053	1,019	1,005	987	884
Total fixed assets (net)	101	125	222	315	1,071	2,462	3,659	3,824	3,654	4,588
Long-term invest.	3	4	8	14	435	1,707	1,729	230	407	92
Other assets	18	17	23	46	533	540	476	532	512	642
Total assets	481	754	1,766	4,072	8,127	19,135	44,810	50,373	46,716	59,183
Deposit libs.	0	89	251	662	1,259	2,354	18,070	32,937	31,274	39,801
Market debt	0	0	0	299	1,576	4,952	12,451	8,148	6,299	9,181
Soft debt	343	345	1,136	930	1,840	1,038	2,177	1,100	633	466
Other libs.	13	101	19	222	206	761	830	1,025	1,205	1,514
Total liabilities	356	534	1,406	2,113	4,882	9,105	33,528	43,209	39,410	50,962

Source: Financial statements of BancoSol. All figures in thousands of 1996 dollars.

Table 31: BancoSol adjusted assets and liabilities from the balance sheet, 1987-96

Year ending Dec. 31	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Open retained earnings	0	21	91	36	139	325	145	100	1,239	1,899
Change retained earnings	21	69	(54)	103	185	(180)	(45)	1,139	660	1,134
Close retained earnings	21	91	36	139	325	145	100	1,239	1,899	3,033
Open reserve and adj.	0	13	(2)	1	9	(117)	(112)	(971)	(1,852)	(2,577)
Change reserve and adj.	13	(15)	3	8	(126)	5	(860)	(881)	(725)	(465)
Close reserve and adj.	13	(2)	1	9	(117)	(112)	(971)	(1,852)	(2,577)	(3,041)
Open direct grants	0	90	131	323	1,811	3,038	4,639	6,912	1,464	1,459
Change direct grants	90	41	192	1,488	1,226	1,601	2,274	(5,449)	(4)	0
Close direct grants	90	131	323	1,811	3,038	4,639	6,912	1,464	1,459	1,459
Open paid-in cap. public	0	0	0	0	0	0	4,287	4,193	4,843	5,249
Change paid-in cap. public	0	0	0	0	0	4,287	(94)	651	405	317
Close paid-in cap. public	0	0	0	0	0	4,287	4,193	4,843	5,249	5,565
Open paid-in cap. private	0	0	0	0	0	0	1,072	1,048	1,470	1,276
Change paid-in cap. private	0	0	0	0	0	1,072	(23)	422	(194)	(72)
Close paid-in cap. private	0	0	0	0	0	1,072	1,048	1,470	1,276	1,204
Total equity	125	220	361	1,960	3,246	10,030	11,282	7,164	7,306	8,220

Source: Financial statements of BancoSol. All figures in thousands of 1996 dollars.

Table 32: BancoSol adjusted equity from the balance sheet, 1987-96

APPENDIX 9: Grameen Bank of Bangladesh

In this appendix, I make some notes on the data used in the example of the Grameen Bank of Bangladesh. The goal is to allow analysts to check the results and to provide a way for them to debug their own spreadsheets.

I did not visit Grameen, nor did I ask its staff questions about data. In general, I am less sure of its exact data and results. I believe, however, that the main points hold.

I picked Grameen as an example since it is the most famous MFO in the world. Its success with poor, rural women spawned much of the zeal for microfinance. In fact, the young PRODEM was patterned on Grameen. Other big MFOs in Bangladesh have cloned its group-lending technology with success (Montgomery, Bhattacharya, and Hulme, 1996; Khandker and Khalily, 1996; Khandker, Khan, and Khalily, 1995).

A. Macroeconomic indicators

I use three basic macroeconomic indicators: the exchange rate between taka and dollars, the consumer price index (CPI) in Bangladesh, and the prime rate in Bangladesh (Table 33 on page 128). The exchange rate at the end of each month comes from the IMF. For Dec. 1992 to May 1984, I assumed the exchange was 25.2 taka per dollar, the rate at the end of June 1984.

I use the CPI of Bangladesh in each month from 1983-94 to find the rate of inflation. I use the rate of inflation to adjust nominal taka to constant taka (Appendix 4 on page 109) and to convert between nominal and real rates of interest. I assume Grameen did not follow IAS 29. With just year-end data, the simple average of inflation in Bangladesh was almost the same as the portfolio-weighted average (Table 33 on page 128). I imputed a monthly CPI series from Dec. 1982 through June 1985 based on the inflation rate of 12 percent reported by the Asian Development Bank (1997).

I use the prime rate in Bangladesh to find the opportunity cost of investors (Appendix 3 on page 105). With year-end data, the simple average of the prime rate is almost the same as the portfolio-weighted average. I took the prime rate as the "lending rate" reported by the IMF. For some months, no lending rate is listed. In each case, a single rate bounded the empty stretch, so I filled in the gaps with this rate. In some years, the lending rate is less than inflation or barely more than inflation. I doubt Grameen could have replaced soft debt with market debt at such a low rate. I still used the lending rate in the IMF even though I suspect a private lender would have charged more.

I report the prime rate, the rate of inflation, and the rate paid on Treasury bills in the United States (Table 33 on page 128). I also present data on population and GNP per capita in Bangladesh. With about 115 million people and a GNP per capita of about $234 in 1994, Bangladesh was one of the poorest and most crowded countries in the world (World Bank).

B. Financial statements of Grameen, 1983-94

The financial data for Grameen come from Hashemi (1997) and from KK&K (1995). The adjusted statements are in thousands of dollars as of Dec. 1996 (Table 34 on page 129, Table 35 on page 130, and Table 36 on page 131). The adjustments use the stock conversion factor θ and the flow conversion factor λ (Appendix 4 on page 109).

I pretend Grameen started in 1983 with no net worth. In fact, Grameen was born in 1976. When it was chartered as a bank in 1983, the portfolio was about $4 million. I could not dredge up data on Grameen for 1976-82.

Accounting profit in the income statement was near zero in all years (Table 34 on page 129). Without revenue grants, Grameen would have had accounting losses in all years except 1984-86. Grameen has not paid dividends nor taxes on profits. I have no evidence of discounts on expenses for Grameen, and I assumed they were zero.

The empty cells in the balance sheet (Table 35 on page 130) are due to the aggregate data in Hashemi (1997) and KK&K (1995). I took average soft debt *D* as half the sum of the soft debt at the start and the end of a year. This does not always match the average in KK&K (1995). I assumed all debt in 1983-86 was soft. This is close to the truth (Hossain, 1988).

I count all grants as equity. KK&K (1995) treat some grants earmarked for the loan fund as liabilities. I assume direct grants caused all changes in net worth not due to changes in retained earnings or in paid-in capital. This leads to some small negative direct grants in 1984-87.

I recognize the fact that the members of Grameen own most of its shares. I assume that the government bought all the shares in 1983 but that members bought all shares 1984-94. The distributions that result match those in Hashemi (1997) and YB&P (1997).

C. Other assumptions

Given year-end data, I assume that stocks grew at a constant pace. I have output data for 1983-94 just for deposits, the amount of dollars outstanding, and the number of loans disbursed. Whether members borrow or not, they gain from non-financial outputs. Thus, the best measure of output for Grameen is likely the years of membership.

I assume a surplus for the poor *d* of 2 cents per dollar-year of deposits since most deposits with Grameen are forced. Members chose to make deposits as part of the price of membership, but I am reluctant to assume that these deposits benefit the poor a lot. I did not remove forced deposits from the measure of the loan portfolio.

I ignore the subsidy Grameen gets since it is exempt from reserve requirements on deposits. I also ignore the subsidy from the scores of analyses and reports done on Grameen. Grameen was tax-exempt until Sept. 1996 (YB&P, 1997). I assume a tax rate τ of 20 percent.

Year ending Dec. 31	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh												
Exchange rate (Tk/$)	25.2	26.0	31.0	30.8	31.2	32.3	32.3	35.8	38.6	39.0	39.9	40.3
Bangladesh inflation, annual	12.0	8.6	18.4	10.6	11.1	5.9	8.6	11.8	1.9	1.5	4.0	4.7
Bangladesh Infl. (port. wgt. ave.)	12.0	8.0	21.8	12.1	14.4	8.8	9.5	13.4	2.2	0.8	4.3	5.0
Bangladesh prime (simple ave.)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	14.3	16.0	15.1	15.0	14.5
Bangladesh prime (port. wgt. ave.)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	14.6	15.9	15.0	15.0	14.4
Population (millions)	94	96	97	99	101	103	105	107	109	111	113	115
GNP/capita (1996 $)	185	201	188	192	197	204	203	199	218	230	228	234
USA												
U.S. Inflation, annual	NA	NA	NA	NA	4.3	4.5	4.6	6.1	3.1	2.9	2.7	2.7
U.S. Inflation (port. wgt. ave.)	NA	NA	NA	NA	4.1	4.5	4.5	6.0	3.1	2.8	2.6	2.7
U.S. prime (simple ave.)	NA	NA	NA	NA	8.2	9.2	10.9	10.0	8.6	6.3	6.0	7.0
U.S. prime (port. weighted ave.)	NA	NA	NA	NA	8.3	9.4	10.9	10.0	8.4	6.2	6.0	7.2
T-bill rate (simple ave.)	NA	NA	NA	NA	5.8	6.6	8.1	7.5	5.5	3.5	3.0	4.2
T-bill rate (ave. port. weighted ave.)	NA	NA	NA	NA	5.9	6.8	8.1	7.5	5.4	3.4	3.0	4.3

Sources: IMF, Asian Development Bank, and World Bank, various issues.

Table 33: Macroeconomic indicators for Bangladesh and the United States, 1983-94

Year ending Dec. 31	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Rev. lending, LP*i	12	1,251	1,668	1,843	2,481	3,957	5,188	6,557	9,307	13,820	27,943	42,110
Rev. investments	41	642	1,454	1,917	2,295	1,839	2,404	3,401	3,735	4,722	4,482	6,817
Rev. adj. inflation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exp. adj. inflation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exp. int. deposit libs.	18	96	195	313	478	732	1,050	1,620	1,900	2,697	4,020	6,891
Exp. int. market debt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exp. int. soft debt	65	754	1,212	988	846	974	1,240	1,425	1,391	2,356	6,234	13,365
Financial margin	(29)	1,043	1,715	2,458	3,452	4,090	5,302	6,912	9,752	13,489	22,172	28,671
Rev. other op.	12	37	5	27	17	25	77	85	207	250	355	751
Exp. other op.	94	305	480	530	704	1,111	1,282	1,512	2,539	4,059	7,966	14,604
Exp. prov. reserve for loan loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exp. extra. write-offs (net)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Exp. personnel	77	503	1,212	1,822	2,493	2,847	3,881	5,073	7,421	10,301	15,348	15,033
Exp. administration	0	0	0	118	371	1,303	2,027	2,357	1,670	1,180	1,267	1,182
Exp. depreciation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Operating margin	(189)	273	29	15	(98)	(1,147)	(1,811)	(1,944)	(1,671)	(1,801)	(2,054)	(1,397)
Rev. extraordinary (net)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rev. grants, RG	0	0	0	0	115	1,188	1,909	2,247	2,027	1,651	2,301	1,953
Acct. profit, AP	(189)	273	29	15	17	41	98	303	357	(150)	246	556
Taxes on profits, Tax	0	0	0	0	0	0	0	0	0	0	0	0
Dividends declared, Div	0	0	0	0	0	0	0	0	0	0	0	0
Change retained earnings	(189)	273	29	15	17	41	98	303	357	(150)	246	556

Source: Based on data in KK&K (1995) and Hashemi (1997). All figures in thousands of 1996 dollars.

Table 34: Grameen adjusted income statement, 1983-94

Year ending Dec. 31	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Cash and short-term invest.	2,231	8,701	10,488	17,384	14,678	13,561	20,085	30,149	39,824	35,182	45,370	79,552
Portfolio performing	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portfolio contaminated arrears	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portfolio (gross)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Reserve for loan losses	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portfolio (net)	4,217	9,275	10,846	13,211	22,764	37,159	49,809	59,231	70,027	119,608	227,869	274,625
Deprec. fixed assets (net)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-deprec. fixed assets	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total fixed assets (net)	79	251	428	1,280	2,381	3,914	5,057	7,392	9,443	11,384	12,924	13,689
Long-term invest.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other assets	221	1,458	2,340	4,159	6,142	10,233	16,043	14,103	13,595	19,938	33,050	33,248
Total assets	6,749	19,685	24,102	36,034	45,965	64,866	90,994	110,875	132,888	186,112	319,213	401,114
Deposit libs.	1,050	2,001	3,523	4,897	7,924	10,868	15,531	19,778	25,549	36,060	61,332	80,258
Market debt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Soft debt	4,847	16,267	19,153	28,614	34,300	41,842	53,772	52,773	51,497	50,781	142,229	204,117
Other libs.	0	10	13	778	1,976	5,120	9,641	11,129	17,383	30,190	36,928	27,599
Total liabilities	5,898	18,279	22,689	34,289	44,201	57,830	78,945	83,680	94,429	117,031	240,489	311,974

Source: Based on data in KK&K (1995) and Hashemi (1997). All figures in thousands of 1996 dollars.

Table 35: Grameen adjusted assets and liabilities from the balance sheet, 1983-94

Year ending Dec. 31	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Open retained earnings	0	(189)	84	113	128	144	185	283	587	943	793	1,040
Change retained earnings	(189)	273	29	15	17	41	98	303	357	(150)	246	556
Close retained earnings	(189)	84	113	128	144	185	283	587	943	793	1,040	1,596
Open reserve and adj.	0	13	(9)	(211)	(315)	(476)	(541)	(1,033)	(2,237)	(2,749)	(2,966)	(4,894)
Change reserve and adj.	13	(22)	(203)	(103)	(162)	(65)	(491)	(1,204)	(513)	(217)	(1,928)	(3,177)
Close reserve and adj.	13	(9)	(211)	(315)	(476)	(541)	(1,033)	(2,237)	(2,749)	(2,966)	(4,894)	(8,071)
Open direct grants	0	6	(67)	(98)	104	30	4,823	9,758	25,804	36,062	66,102	77,412
Change direct grants	6	(73)	(31)	202	(74)	4,793	4,935	16,046	10,258	30,040	11,310	11,383
Close direct grants	6	(67)	(98)	104	30	4,823	9,758	25,804	36,062	66,102	77,412	88,796
Open paid-in cap. public	0	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022
Change paid-in cap. public	1,022	0	0	0	0	0	0	0	0	0	0	0
Close paid-in cap. public	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022	1,022
Open paid-in cap. private	0	0	376	588	806	1,045	1,548	2,019	2,020	3,182	4,131	4,145
Change paid-in cap. private	0	376	212	218	238	503	471	1	1,162	949	14	1,653
Close paid-in cap. private	0	376	588	806	1,045	1,548	2,019	2,020	3,182	4,131	4,145	5,797
Total equity	851	1,406	1,413	1,745	1,765	7,036	12,049	27,195	38,459	69,081	78,724	89,140

Source: Based on data in KK&K (1995) and Hashemi (1997). All figures in thousands of 1996 dollars.

Table 36: Grameen adjusted equity from the balance sheet, 1983-94

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