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

DISSERTATION

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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 best other unfunded or underfunded development project. Their customers repeat, and their workers have good jobs. BancoSol attracts market funds, and Grameen does not. 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.

For Mariangeli, Mom, and Dad

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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 so 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 microfinance organizations. The work is not done, and I thank you for comments sent to *schreiner.10@osu.edu*.

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FIELDS OF STUDY

Major Field: Agricultural Economics and Rural Sociology

Other Fields: Development Finance

Applied Economics and Econometrics

Microeconomics

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LIST OF ACRONYMS

BancoSol	Banco Solidario, S.A.
BCA	Benefit-Cost Analysis
BRI	Bank Rakyat Indonesia
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
IBM	International Business Machines
IMF	International Monetary Fund
KK&K	Khandker, Khalily, and Khan
MFO	Microfinance Organization
NGO	Non-Government Organization
NPC_I	Net Present Cost of flows of funds for Investors
NPC_P	Net Present Cost of flows of funds 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

LIST OF NOTATION

α	Conversion factor, start and end stocks to average stock
AP	Accounting profit
β	Proportion of equity owned by public entities for 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
Dep	Average deposits
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
j	Index of summation
λ	Conversion factor for nominal to real annual flows
L	Leverage
LP	Average loan portfolio
$LP\cdot i$	Revenue from lending
m	Opportunity cost of soft debt for the market
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 for 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 the market, or real rate of interest
R	Nominal rate of interest
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, 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

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 to help the household and its neighbors to drink more milk and to spark microbusinesses that sold sweets made with milk.

Gant (1992) judged the project based on a brief survey. She did not measure benefits or costs, and she was silent on repayment. She did report that all of 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 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. Given a budget earmarked for projects to help the poor, 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.

Benefit-cost analysis (BCA) compares benefits with costs. In contrast, cost-effectiveness analysis (CEA) compares outputs with costs. 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 best unfunded or underfunded development project.

The term *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 who use an MFO. The choice also affects all of the poor since the 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. Just the act of asking questions and looking 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 19). 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 BCA, 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 the benefits of finance than to measure its costs. I suggest to measure 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 of stakeholders. 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 BCA is beyond my scope. Much of the social benefits and costs of subsidized MFOs are external to the MFO itself and so cannot be measured cheaply.

The poor customers of an MFO ask whether a loan or a deposit has more benefits than costs for them. If poor customers borrow, repay as promised, and borrow again, then their benefits must have exceeded their costs. This also holds for poor customers who make deposits and keep them. Economists trust people to 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 often ask another question. They 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 channels 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. This is a sanguine view of donors. They may also try to maximize their own welfare heedless of the effect on the poor. I do not discuss this case. In fact, the mismatch between the goals of the poor and of donors does constrain the help the poor can get from 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 meet its obligations 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. Thus 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*, maintaining 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 increases the help an MFO can offer to 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 its funds were shifted to some other project. Third, financial self-sufficiency for workers is less stringent than private profitability for investors. Workers lose most selfish reasons to work for private profitability once an MFO is financially self-sufficient.

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, the principal (base of arrows in Figure 1 on page 7) 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 get more help to the poor.

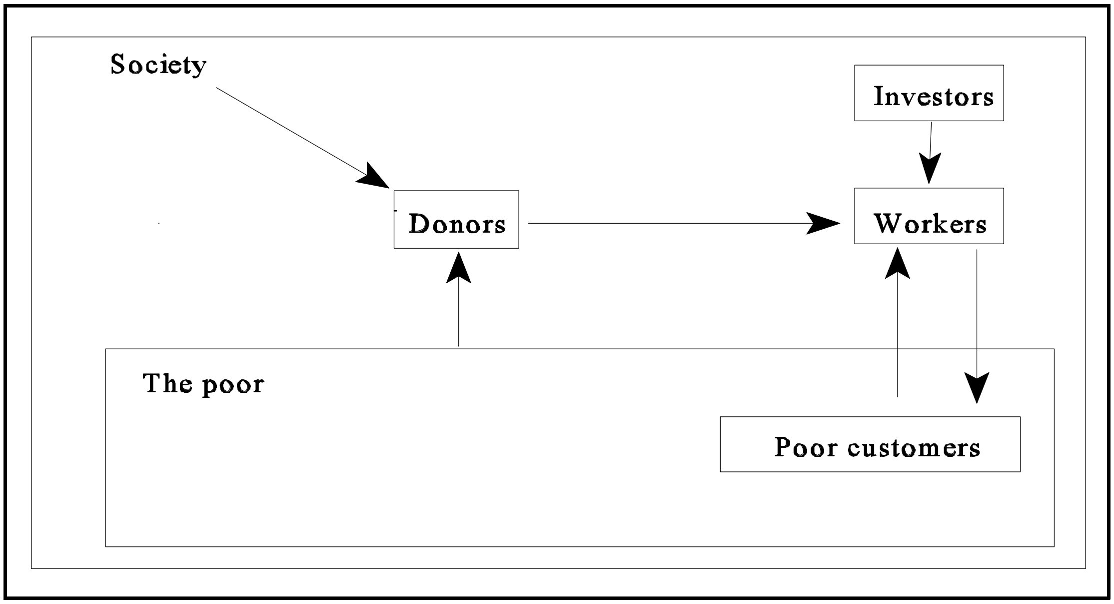

Figure 1: Agency relations among the six groups of stakeholders in an MFO

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. Comparing costs with outputs with CEA is a first step in the wise use of public funds. BCA 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 them to do their own BCA to make sure that they gain from the deal.

In contrast, most MFOs do not have owners who own shares. Subsidized MFOs get funds when governments, like Robin Hood, tax the rich in high-income countries and then, through donors, fund MFOs that sell loans and deposits to 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 its performance from the point of view of the poor. This same principal-agent problem plagues all public projects.

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 rest of the poor bear the costs since they 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. Each poor person gets too few benefits or costs to make it worthwhile for them to check whether an MFO is the best development project. The gain or the cost of an MFO that trickles down to any one person is just too small to be worth the fuss.

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.

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, a rural development bank in Morocco 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 way to spend scarce development funds.

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, 1996a).

In the next decade, more than $20 billion will 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. Rather than spend $20 billion to take microfinance to 100 million households, society could just give each household $100 cash, assuming it cost $100 to find the households.

Many people count the blessings of MFOs for poor customers. Few count the costs of MFOs for the poor or for poor customers. With no true owners, market feedback cannot discipline the use of public funds in MFOs. The people who work in microfinance—workers, politicians, donors, scholars, and consultants—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 them 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 BCA? Yet no one has done it. Some have looked at the costs of an MFO. A few have done this well. Even more have looked at the benefits of an MFO. 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 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.

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 for each year of membership. Seen another way, Grameen would have been worthwhile as long as the average borrower got more than 10 cents of surplus on the average dollar-year of debt. Given the documented impact of Grameen, this seems likely to me.

For 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 through time. MFOs could fool customers once, but not twice. In fact, few customers drop out of BancoSol or Grameen. This repeated use means BancoSol and Grameen improved the welfare of their poor customers.

For donors, good performance means market leverage. This squeezes the most bang-for-the-buck 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 the workers of an MFO, good performance means financial self-sufficiency through maintaining the real size of the MFO. This saves their jobs and helps the poor. I do not think BancoSol would shrink if it lost its small amount of donor support. If Grameen did lose 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 default. In any case, donors will not abandon Grameen.

For investors, good performance means an MFO earns them a higher return than they could get from 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 could make more money somewhere else.

The examples of the framework with BancoSol and Grameen lead to four important 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 best other development project. Third, the lack of financial self-sufficiency of Grameen means that even the best MFOs may need to increase profit to last long without more support from donors. BancoSol shows that financial self-sufficiency is possible. 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. The amount of the microfinance is still tied to the purse strings of donors.

I am not saying donors should wedge more funds into MFOs until they have squeezed out the last drop of gain for the poor. I am saying MFOs could help more poor people and use fewer dollars earmarked for development if they attracted more funds from the market. The poor are plenty, but the development dollars are few. 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 are most likely 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. At least in some cases, 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. I also do not measure performance as seen by society. I answer a smaller question: Without external effects, is an MFO the best use of public funds earmarked to help the poor? This is a first step to answer the bigger question.

D. New worth added by the framework

This framework is a disciplined way to measure how well an MFO converts public funds into improved welfare for 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 BCA. The framework is less complex than the real world, so it does not replace logic, theory, and reasoned talk. But it offers 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, BCA/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 gives less information than BCA, but CEA costs much less than BCA. For most MFOs, I think that a BCA of BCA versus CEA would favor CEA. In some cases, CEA makes BCA moot.

This framework is a child of the standard frameworks for the analysis of public projects (Brent, 1996; Sloan, 1995; Gittinger, 1982; Weinstein and Stason, 1977; 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 the performance and sustainability of not-for-profit hospitals (Jennings, 1993; Wheeler and Clement, 1990; Pauly, 1986; Silvers and Kauer, 1986; Conrad, 1986 and 1984). Like BCA or CEA, this framework could be used with other public projects. I discuss how to make the most of the sparse data 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 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). The standard SDI was meant to measure social costs. I show the logic of the standard SDI and that while it does not measure self-sustainability, 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 their birth as seen by the poor. I do this for two of the most famous MFOs in the world, BancoSol of Bolivia and Grameen Bank of Bangladesh. Neither MFO has attracted private investors. At the same time, both have been worthwhile from the point of view of the poor.

E. Guide to the next chapters

The next step is the framework itself. I target donors and the analysts who work for them. They are the people 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 the analysis of MFOs. Measurement is just half of analysis. People must use the numbers cranked out by machines to explain and to predict performance, to suggest ways to improve performance, and to guide future analyses.

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 the public funds lodged in the net worth of an MFO. *Subsidies* are the opportunity costs of subsidized funds. I list six forms of subsidized funds and tell how the form affects cost and performance.

In Chapter 4, I discuss sustainability. *Sustainability* is meeting a goal now and in the long run. *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 better 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 BCA. 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 shows that gains exceed costs for customers. Both BancoSol and Grameen get repeated use.

In Chapter 6, I review the framework of the Subsidy Dependence Index (Yaron, 1992a and 1992b). 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 grants and discounts. The SDI does not discount flows. I suggest measuring private profitability as the net present cost of the flows of funds between an investor and an MFO (NPC_I). The NPC_I answers the question of an investor both in the short term and in the long term.

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 benefit-cost analysis, I suggest cost-effectiveness analysis. CEA compares costs with outputs in a test of bang-for-the-buck. 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 measure performance as market leverage. 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 Chapter 11, I discuss some of the weaknesses of the framework.

In the 14 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	Benefit-cost 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-effect. 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-suff.
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 point 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 is a quantitative input to 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 by suggesting questions about performance, by highlighting the links among these questions, and by looking at old and new answers to these questions. My goal is to improve the welfare of the poor by measuring the performance of MFOs better.

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 only from now onward; some also look at performance from birth onward (Table 1 on page 19).

B. The analysis of MFOs is qualitative

This framework suggests quantitative measures of performance from the point of view of 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 the question and to the subject. Qualitative measures do depend on the person who is the analyst. Qualitative analysis uses the 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 and to handle quantitative data. 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 (1992a and 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, 1997).

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 not numbers but people must forecast future performance and suggest ways to improve it.

Suppose subsidizing one MFO cost the poor $100 per loan disbursed in terms of gains lost from some other development project. Subsidizing a second MFO cost 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 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. Teasing knowledge from data requires human skill. The work is holistic, synthetic, and idiosyncratic. Numbers, computers, and financial ratios cannot do the work of guessing the future. They cannot replace human judgement and smarts.

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. Examples of MFOs are NGOs, credit unions, and village banks.

Development finance institutions are para-statals chartered as banks. A government lends soft debt 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. NGOs sprouted in part as 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 still lack real owners and still do not face market forces.

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

MFOs and DFIs look the same to measures of costs 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 sometimes own part of MFOs as with Grameen, credit unions or village banks. Fourth, compared with DFIs, MFOs tend to get more of their subsidized funds in ways that inflate accounting profit (Appendix E on page 226). 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. The worth of a subsidized MFO needs to be checked just as for most other public projects.

MFOs are unusually tempting public projects. MFOs hold a unique promise since they work with pure funds, and lack of funds often constrains development. The poor are poor since they lack assets, and MFOs transfer control of assets. MFOs can reach the poorest of the poor with deposits if not with loans.

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 shun MFOs.

Most MFOs are not government organizations. Unlike BancoSol and Grameen, most DFIs cannot brag about private owners or member 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, the MFO will recycle funds 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.

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 instead of some other project. The choice is not whether to help the poor with an MFO or not to help the poor at all. The choice is whether to help the poor with an MFO or to help the poor in some other way.

E. Traits of MFOs

MFOs are odd firms. In a private firm, the goals of workers constrain the goals of investors. In contrast, an MFO serves the goals of its owners, the poor. But workers and donors do not discipline the MFO like private owners since they do not stand to gain or to lose as much as private owners. Nor do donors ignore their own goals in a selfless pursuit of the good of the poor. Thus, workers and donors in an MFO constrain the goal of the poor even more than workers in a private firm constrain the goal of investors.

Measures of performance such as accounting profit and ROE do not answer the question asked by the poor nor the questions asked by other stakeholders. These widespread, standard measures ignore opportunity costs. They use accounting data that depend not on market feedback but on administrative fiat.

Subsidies may buy assets such as trained workers or knowledge of customers that last through time and so affect performance long after the subsidy is gone. Thus past subsidies affect current performance, and current subsidies affect future performance. To control for this, CEA compares performance with and without public support. The time frame could be just one year, from birth onward, or from now onward.

MFOs draw funds from the development budget, so the poor own MFOs. Yet the poor wield no control. MFOs lack owners who could discipline their service to the poor.

Not-for-profit MFOs are also strange firms since they need profit to survive. Just like all new firms, all new MFOs lose money. All new firms need time and growth to spread start-up costs and to hone technology. But unlike most old firms, most old MFOs keep losing money. Investors still shun MFOs in spite of the hopes of donors.

Donors and MFOs can be like parents and teens. Donors start MFOs since entry into lending is cheap—all it takes is money. Donors often trust MFOs to staff without a background in banks. Donors feed MFOs subsidies, but they want to wean them. Both donors and MFOs know the market will strengthen the MFO, but both donors and MFOs hang back. MFOs work for some revenue from sales and wheedle the rest as grants from donors. MFOs trumpet their freedom from donors even as they mooch off them.

F. Analysis should predict and improve future performance

Good analysis uses theory with knowledge of past and present performance to suggest how to improve future performance (IADB, 1994). Analysis should measure, explain, and predict performance. The goal of analysis is to suggest the technological, financial, and organizational changes needed to meet a goal.

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 down to study an MFO do a bad job unless they leave workers with the knowledge and the tools for quantitative analysis. This lets workers track progress on their own. No plan will work unless workers can detect mistakes and then change course.

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 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.

G. 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 predict 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.

Those who stand to gain from more funds for microfinance do not 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).

But, at least in the long term, 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), Cuevas (1984), 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 the funds earmarked for the poor on microfinance. This time, we should not wait too long to check if it is all another mistake (Adams and Von Pischke, 1992). If microfinance is a good bet, then perhaps donors should 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 (Table 2 on page 32).

First, reward the truth. Few analysts will bear bad news unless they know they will not be blamed. Donors, in a fit of foresight, need 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.

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 those who work for them to one or two projects and then link at least part of their rewards to measurable goals in 5-7 years. This makes those who work for donors like owners whose rewards and punishments 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 compared with costs or gains.

Fifth, demand plans in which performance meets goals. The plan provides 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 and that has room for change. For example, loan officers will not likely scramble to handle 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 move the fastest toward those goals.

Seventh, compare past performance to past support. Much 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 basic tools needed for diagnostic tests.

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

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 getting closer to absolute goals. For example, two MFOs may perform at the same level, but one may be stronger since reached this stage faster and with less support. Or two MFOs may be improving 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.

H. How measurement boosts performance

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

First, measurement forces MFOs and their sponsors 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 measure costs worry about costs (Von Pischke, 1996a).

Third, measurement highlights goals. An MFO willing to measure costs signals a willingness to work to reduce costs. Success is more than just disbursing money. If donors measure only disbursements, then MFOs will learn to disburse at any cost (Von Pischke, 1994).

Fourth, measurement helps meet goals. Technical feedback helps managers detect trends, set targets, benchmark progress, and compare to peers (Richardson, 1994; Koch, 1992; Barltrop and McNaughton, 1992).

Fifth, measurement shows the MFO cares to meet its goals (Richardson, Lennon, and Branch, 1993). If it did not care, then it would not measure.

Sixth, measurement proves what MFOs can do. Donors want to demand better performance from MFOs. 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).

Seventh, 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 analyses of MFOs are judged by their use of tools meant to check the welfare of the poor.

Eighth, 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 evolution by trial-and-error in a *laissez-faire* market would take too long (Appendix N on page 275). 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 market and from the point of view of the poor. 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 then describe the six forms of subsidized funds. In the fourth part, I tell how the form of subsidized funds affects the performance of an MFO.

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 price cuts where 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*, 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 market price is the opportunity cost of all entities in the economy. This 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 standard, widespread measures such as accounting profit and ROE do not reflect the true financial performance of an MFO. 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.

The opportunity cost of public funds entrusted to an MFO depends on the point of view. From the point of view of an investor, the opportunity cost is the price the MFO would pay to replace funds from public entities with like funds from private entities. This is just the market price. From the point of view of the workers of an MFO, the opportunity cost of public funds locked in equity is the rate of inflation, and the opportunity cost of public funds in soft debt is the market price of like debt. From the point of view of donors and of the poor, the opportunity cost of public funds used by an MFO is the return to those funds in the best project aimed at the poor.

1. The point of view of an investor

For an investor, the opportunity cost of funds from public entities is the price of like funds from private entities. 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. The opportunity cost of equity for the market r is the return needed to attract and to keep private investments in the long term. This return is just what investors can get from other firms of like risk.

The opportunity cost of soft debt for the market m is the price needed to replace soft debt with market debt. If the MFO takes deposits, then it might replace soft debt with private deposits. In this case, the opportunity cost of soft debt would be the cost of attracting more deposits. Otherwise, the MFO would replace soft debt with market debt.

Most estimates of the opportunity cost of subsidized funds from the point of view of an investor follow Yaron (1992a and 1992b) (*e.g.*, Sacay, Randhawa, and Agabin, 1996; Khandker, Khalily, and Khan [KK&K], 1995; Yaron, 1994). This takes the opportunity cost for the market of all public funds—soft debt, grants, and discounts—as the interest rate paid on deposits plus a small mark-up for administrative costs. Other frameworks for measuring subsidy go still lower (RC&H, 1997; Holtmann and Mommartz, 1996; Christen *et al*., 1995; SEEP, 1995; IADB, 1994). They take the nominal opportunity cost of public funds as the rate of inflation. This would mean a real opportunity cost of zero, and that is too low (Appendix F on page 228).

If an MFO takes deposits, then the opportunity cost of soft debt for the market might be the interest rate paid on deposits plus a mark-up for administrative costs as suggested by Yaron (1992a and 1992b). In fact, few MFOs take deposits. Most MFOs cannot take deposits. They lack the legal blessing of prudential regulation and supervision. Even if an MFO could take deposits, it could not replace soft debt with deposits and still pay the same rate it pays now. I submit that most MFOs would replace at least some soft debt, if not all, not with deposits but with market debt.

Furthermore, I submit that an MFO would replace public funds lodged in equity not with private deposits, nor with market debt, but with private equity. At least in the short term, most MFOs are too risky to swap equity capital for debt. In the long term, private ownership might change performance compared with the case without private ownership and so let an MFO replace a small part of equity with market debt.

An investor asks the question: Could an MFO earn a market return without help from donors? To do this, an MFO must earn a market return on all its shares, replace soft debt with market debt, and pay all taxes just like any private firm. Thus, from the point of view of an investor, the opportunity cost of soft debt *m* is the price of market debt. The opportunity cost of equity *r* is the market return on an investment of like risk.

Equity is riskier than debt, so equity has a higher opportunity cost than debt (Von Pischke, 1991; Mehra and Prescott, 1985; Modigliani and Miller, 1958). I tell how to find an estimate *m* and *r*, the opportunity costs of debt and equity for the market, with the method of Benjamin (1994; Appendix D on page 218).

For DFIs, Yaron (1992b) argues that the opportunity cost of debt and of equity for the market are the same. The government will bail out a bankrupt DFI, so its equity and debt have the same risk. This implicit guarantee, however, spawns a subsidy worth as much as the risk premium it wipes out. The risk premium is more for equity than for debt.

I submit that the opportunity cost from the point of view of an investor used by Yaron (1992a and 1994) is too low. Unlike DFIs, most MFOs do not enjoy government guarantees. Even if they did, the analysis should count the subsidy from the guarantee just like any other subsidy. This leads to higher measures of cost from the point of view of an investor. This is bad if the goal is to make MFOs look stronger than they are. But this is good if the goal is to check whether an MFO can attract private investment.

Opportunity costs for the market are not the same for all MFOs for two reasons. First, some MFOs have more risk. Second, each draws private funds from its own market.

2. The point of view of workers

Public funds do not have the same opportunity cost for the workers of an MFO as for investors. 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 lodged in the net worth of an MFO unless they own shares and liquidate the MFO. No donor asks an MFO to give back public funds in net worth when the donor stops adding fresh public funds. Thus an MFO that lost support from donors would not need to 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. This is why, from the point of view of the workers of an MFO, the opportunity cost of soft debt is the price of market debt m and the opportunity cost of public funds in equity is the rate of inflation π.

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

From the point of view of the poor and of 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 just what is the opportunity cost for the poor ρ. But that does not matter much. Unless they have a better estimate, most governments use a rule of thumb of 10 or 12 percent per year in real terms (Gittinger, 1982).

If this rate is too high, then it unjustly values people now and in the near future more than people in the distant future. In practice, the point is moot. MFOs compete for public funds now against all other projects funded by the budget earmarked to help the poor. To compare these projects, donors must use the same opportunity cost for all of them. This opportunity cost should be just high enough so the projects that pass a benefit-cost test exhaust all the funds earmarked to help the poor. The burden of proof for some other opportunity cost rests on the analyst (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 market price of debt 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 best unfunded or underfunded development project. The opportunity cost of equity for the market 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 bears 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 benefits worth 10 cents in constant terms in a project for health care or for grade schools for girls. In contrast, the MFO might have needed to pay 50 cents to borrow a dollar from a private source since the lender could have got 50 cents for a loan of like risk. At the same time, the rate of inflation might have been 5 percent.

I distinguish between the opportunity cost for the market and the opportunity cost for donors and for the poor just as standard frameworks for project analysis distinguish between economic and financial analysis. Economic analysis takes the point of view of society. It values funds at their shadow prices since some entity in society absorbs the difference between the shadow and market prices. In contrast, financial analysis takes the point of view of a household or firm so small that some funds flow across its borders. It uses market prices since households and firms pay market prices (Gittinger, 1982).

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 earmarked for the poor if the MFO closed. Losses gnaw at net worth and thus reduce what donors could collect if the MFO shut down. Thus losses convert subsidized funds to subsidies.

This framework measures subsidies. Measurement precedes the standard analysis of the gains and losses caused by subsidies, their distribution, and their effects on behavior. The framework compares subsidies to output and so helps the analyst to judge whether the subsidies are worthwhile.

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 of performance like ROE and BCA. 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 the opportunity cost of the funds for donors or for the poor. 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 not 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 by using the dollar in some other development project. As long as the dollar stays in the net worth of the MFO, the poor could get it back and put it to use elsewhere. The cost is the return lost since the poor have to wait to use the dollar in some other project.

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. Economists assume 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 not unlike 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 48). Past frameworks lack such a rule to identify subsidized funds.

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 (Schreiner and Yaron, 1997).

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 BCA 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 BCA, 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. The donor does not spend its own money. This is not theft but taxes. The two sides 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 they agree to pay interest and installments. Borrowers would refuse to do it unless they 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 to improve social welfare. 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 earmarked for the poor.

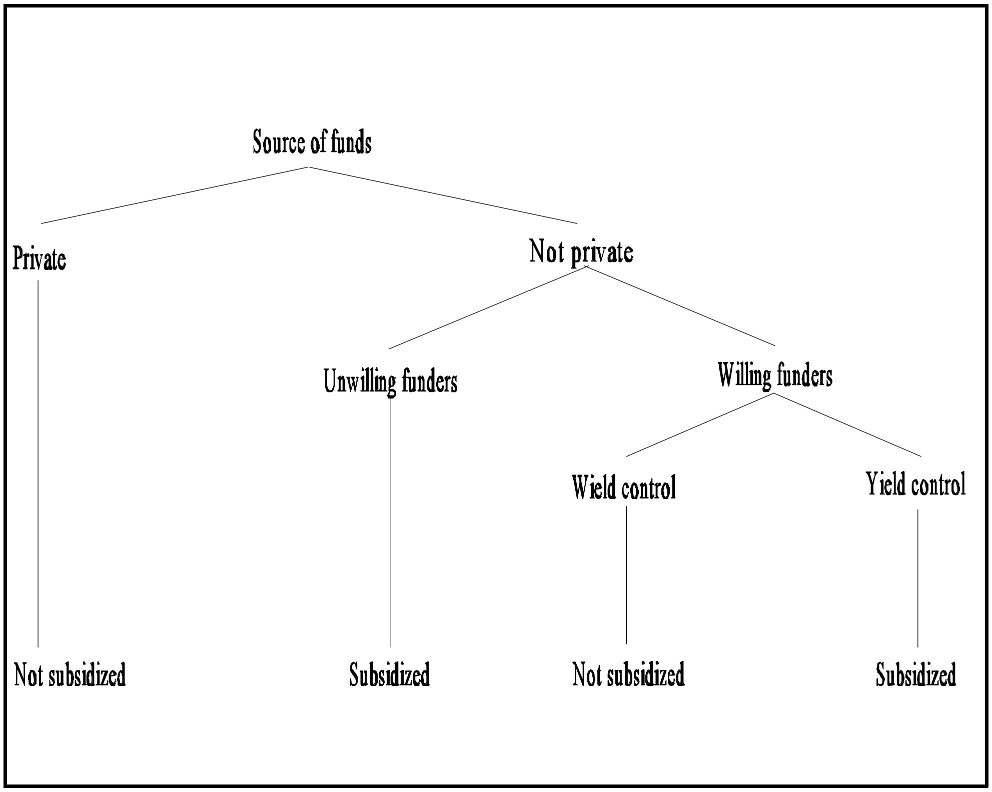

Figure 2: Decision tree to identify subsidized funds

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 the use of their funds, and they can fire their pastor. Repeated gifts show that people like the rewards they get.

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 and that it does not have a discount. If the bank cuts the price since donors guarantee the debt for the MFO and thus cut the risk faced by the bank, then the rule says the debt is soft and does have a discount.

e. Shares bought by members

Credit unions, village banks, and some other MFOs such as Grameen force new members to buy shares. Often the members cannot sell these shares or get their money back, even if they quit the MFO. The rule says these shares are not subsidized. Like forced deposits, they are part of the price of access to the MFO. Members of Grameen buy its shares of their own free will.

f. Shares bought by non-members

Some rich people sometimes 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 since they want to gain goodwill.

g. Deposits 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 the analyst can prove it has a market price. Schreiner and Yaron (1997) discuss this case.

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 is not set by fiat nor by any law except 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. In contrast to the tastes of private traders, the tastes of donors can shift through time without cost to the donors.

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. Society can trust private entities to care for themselves, but it cannot trust public entities to care for everyone else.

C. Types of subsidized funds

Subsidized funds come in six forms (Table 3 on page 51). 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 depress expenses.

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

Table 3: Types of subsidized funds

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 private entities. 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 equity of an MFO. This equals the proportion of public paid-in capital in total paid-capital:

$$\beta = \frac{PC_{pub}}{PC_{pub} + PC_{pri}}. \tag{3}$$

Donors have a legal claim on a portion β of dividends and net worth. 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 $\beta = 1$. All their net worth comes from the budget for the poor even though donors 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 18 on page 176). Members owned 92 percent of Grameen at the end of 1994, so $\beta \doteq 1-0.92 = 0.08$ (line e of Table 21 on page 183). 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 51). 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 (Appendix E on page 226). Profit grants are window-dressing that donors can use to lard accounting profit and ROE. Shifting equity grants to profit grants does not change their opportunity cost, but it can change accounting profit and ROE.

Many MFOs count grants as revenue. They claim that grants are the price donors pay them for the sale of small loans and deposits to the poor. Or they claim that grants are tied to expenses prompted by donors. These arguments are *non sequiturs*. Counting grants as revenue inflates profit and so misleads users of financial statements.

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

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

Profit grants poison accounting profit, ROE, and other standard financial measures. With enough profit grants, donors can nudge these measures as high or as low as they like. In contrast, the measures suggested in this framework do not change if a dollar shifts between equity grants and 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. Since they pass through the income statement, they also inflate accounting profit. But grants are not revenue since they are not the product of the business of the MFO. To count them as revenue lards profit and ROE and so misleads the user of financial statements.

b. Discounts

Discounts are the fourth and fifth forms of subsidized funds. Discounts are costs the MFO does not record as expenses since donors absorb them. 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 the opportunity cost of soft debt less what the MFO paid. This is $D\cdot(m-c)$, where D is average soft debt, c is the rate the MFO paid for soft debt, and m is the opportunity cost of soft debt for the market:

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

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 on soft debt. Still, most MFOs will give data on the stock of the loan portfolio each month. As 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 the soft debt at the start of the year D_0 and the soft debt at the end of the year 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 H on page 237). If the analyst just has year-end data or if the rate of growth of the loan portfolio was constant, then $\alpha = 1$.

ii. Discount 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 not a discount in the framework of the standard SDI (Yaron, 1992b). Grants in kind 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 of the analyst 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 from the donor and/or from the MFO itself. 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 51). 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 53):

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

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 increases net worth and thus increases the claim of the poor on an MFO. Negative true profit (true loss) decreases net worth and thus decreases the claim of the poor on an MFO.

D. 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.

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.

1. Opportunity costs

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. A good measure of the cost of a subsidized MFO will not depend on the form of subsidized funds since all the forms have the same opportunity cost and the same effect on net worth.

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 caused by the discount. 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 direct grants and public paid-in capital. All four increase net worth but do not change revenues or expenses. True profit adds to the funds earmarked to help the poor. True loss subtracts 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.

2. Business performance

The form of subsidized funds does not matter for the opportunity cost, but it does matter for business performance. I suggest that the best way to tinker with an MFO is technical help. If donors want to give cash, then they should buy shares. 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.

a. Technical help

Donors give technical help linked to discounts on expenses. Examples are travel for workers, classes for loan officers, studies of demand, or help to install a new computer system. Technical help has at least two strengths.

The first is to let donors fine-tune the production technology. If it works, then average costs fall. Technical help is unique since it targets cogs in the present and future productive capacity of the MFO. For example, a dollar spent on classes meant to make an MFO more flexible might not have the same effect as a dollar without strings attached.

An MFO could use a direct grant to buy technical help on its own, but donors might sometimes know better than the MFO what it needs in the long term. Donors have more chances than an MFO to learn from the past mistakes of other MFOs. For example, an MFO might not use a stringless cash gift to train its loan officers in a more efficient lending technology. But a donor might know from experience that such training helps the MFO make the best use of its funds. Thus the donor might force the training on the MFO by buying it rather than by injecting a grant with the same worth (Schreiner, 1997b). Also, an MFO might spend grants with less care than its own earnings (Thaler, 1990).

The second strength of technical help is to bestow assets that last a long time. This can improve business performance if it improves the technology or the organization. For example, an MFO keeps its know-how even if losses wipe out some of its net worth.

Technical help stands in contrast to financial help. Technical help equips the MFO with tools, skills, and structures of rewards. It aims to solve the problems that keep the MFO from solving its own problems.

A dollar of support may not funge well between technical help and financial help. For example, a dollar as a discount on soft debt may lead to a low price on loans and thus losses of net worth since it seems unjust to charge a high rate for funds the MFO got cheap. In contrast, a dollar as classes for loan officers does not seem to have to do with the price of loans. And the know-how from the classes lasts for years. Thus technical help may force an MFO to use subsidized funds in a way that helps poor customers both now and in the future. In contrast, financial help may be easier to pass on to current customers.

The effect of financial help depends on its use in a given technology and organization. Financial help *per se* is not bad. It can help an MFO grow. Growth lets the MFO reach more poor people, and it may trim average costs. But donor funds are scarce, so all MFOs cannot reach all their goals with economies of scale from subsidized funds.

Financial help can also be the bait that lures an MFO into a program that otherwise stresses technical help. While financial help may be the syrup that helps an MFO to swallow technical help, donors and MFOs must guard against addiction. More cash helps as long as bigger is better. Stronger and cheaper are also better.

Technical help has at least four weaknesses. First, an MFO might know its needs better than donors. Second, good technical help is hard to find (Rosenberg, 1994). Third, the results of technical help come later and defy measurement more than the results of financial help even if technical help packs more bang-for-the-buck. Fourth, discounts on expenses for technical help are less transparent than cash grants.

b. Shares

As a rule, financial help can strengthen an MFO more when traded for shares than when given as a direct grant. Both direct grants and paid-in capital increase the net worth of an MFO. But only paid-in capital bestows legal ownership and seats on the board. Thus a shift from cash gifts to share purchases may let donors wield more control over an MFO. Even if most donors choose not to act like owners, other forms of subsidized funds do not offer the choice to wield control or not. For example, the clout a donor gets from a direct grant fades fast unless the donor dangles more grants.

Having owners, even nominal ones, may also help an MFO to qualify for prudential regulation and supervision. This adds more incentives to measure performance.

Share purchases are the best way for donors to give cash to an MFO. A donor can still lend to an MFO and give it technical help. But the MFO should pay market prices and record the expenses in its accounts, and the cash gift should go straight to net worth and should not taint revenues.

If a donor must give cash and cannot buy shares, then it should give a direct grant rather than a revenue grant, a discount on soft debt, or a discount on expenses. Unlike profit grants, direct grants do not inflate profit. This might matter for business performance since accounting losses might prompt more worry and thus more work for improvement. Donors tend to harp less on performance when an MFO shows an accounting profit even when the profit results not from strong performance but from profit grants. This might explain why Grameen recorded a small accounting profit in almost each year (Table 38 on page 272).

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 there are poor now as well as in the future. 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 since the poor we will have always with us. An MFO might help the poor now, but it cannot help the poor in the future if it is gone. An unsustainable MFOs can even 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 present worth of the help for the poor from a sustainable MFO will likely exceed that of an unsustainable MFO. An analyst could use this framework to test the truth of this hypothesis.

Sustainability requires profits. Profits protect permanency. A financially self-sufficient 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 stop repayment to ill MFOs. As the expected life of an MFO shrinks and as the chance of future loans drops, the net present worth of default is more likely to exceed the net present worth of repayment from the point of view of a debtor. Too much default weakens the MFO unto death. Dead MFOs do not help poor people.

Sustainability requires more than just financial self-sufficiency from profit. Just as one year of marriage does not mean happily ever after, one year of high profit and of strong performance does not mean an MFO is sustainable. Financial self-sufficiency can last in the long term only if the structure of rules and incentives and the system of organization prompt stakeholders to adapt the rules to fit changes in the market (Figure 3 on page 65). Such permanence requires *meta-rules*—rules for making rules (Schreiner, 1995). Good meta-rules help an MFO to perform well over time without extraordinary

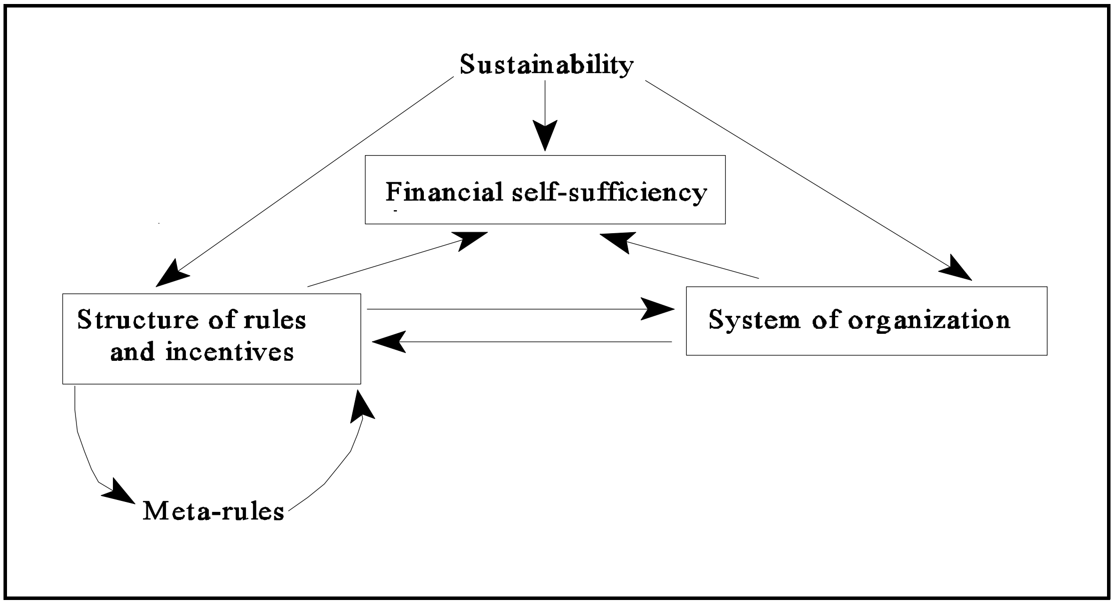

Figure 3: Three necessary conditions for sustainability

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 (Yaron, 1992a and 1992b). Only humans can forecast sustainability. Their forecasts must build on an understanding of the past and of the present and on comprehensive knowledge of the organization, of its rules, and of what MFOs can do. Measures in this framework do not address the question of sustainability directly.

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 subsidized funds replaced with market funds. For example, Grameen likely is sustainable even though it may not be self-sustainable. But in fact the point is moot. Donors will not abandon Grameen, so Grameen will not reduce its size or scope.

Sustainability is not the same as *subsidy independence* in the framework of the SDI (Yaron, 1992a and 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. If subsidy independence implied sustainability, then no private firm would go bankrupt.

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 lodged in its equity while paying 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 from 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 (Schreiner, 1997a; 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 got by the poor customers of an MFO exceed their costs. The analyst does not need to use a more costly measure unless it tells 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 BCA from the point of view of the poor is moot.

A. Why measure repeated use?

A poor customer will use an MFO just as long as the gains to the customer exceed the costs to the customer. A customer could make a mistake and borrow or make a deposit with an MFO once but then find out that the gain was less than the cost. But economists assume customers would not make the same mistake twice. Thus repeated use means that gains exceed costs from the point of view of the poor customer.

Repeated use tells whether gains exceed costs for customers but it does not tell by how much. Measures of repeated use are still useful since they are cheap. The measures 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. If an MFO cannot or will not provide these data, then the analyst likely can judge the MFO as weak.

1. Loans per borrower since birth

One measure of repeated use is the number of loans per borrower since birth. The measure uses *T* years of data on the flow number of all loans disbursed and on the flow number of new borrowers:

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

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 means the number of repeat loans was the same as the number of new loans. The analyst must judge whether the gains to repeaters likely 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 like to switch to their own savings or to some other source of funds such as normal banks as soon as they can.

Third, the estimate is too low. The numerator omits loans to the borrowers in the denominator after time *T*.

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 since they got their first loan before the start of the time frame.

Sixth, the measure mixes loans and borrowers from all years. Thus, it does not measure recent repeated use well. It just tells how the MFO has done in its lifetime.

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

2. The drop-out rate

A second measure of repeated use is the drop-out rate. It 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 no client has more than one loan at a time. The drop-out rate uses the stock number of loans at the start and at the 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 and what is 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 regardless of how well the MFO performs.

The drop-out rate shares the caveats of the number of loans per borrower since birth. 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 borrow twice. Neither measure distinguishes between someone who rests, someone who defaults, and someone who drops out. Neither measure tells why a borrower dropped out.

RC&H (1997) propose a measure of the drop-out rate that matches equation 10 on page 71 except that it replaces $Out_0 + New_T$ in the denominator 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 not found in the formula suggested here (equation 10 on page 71). 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.

3. Repayment

Repayment alone does not signal the worth of an MFO for its poor customers. Customers repay for one of two reasons, and one does not depend on the worth of the loan. First, customers might repay since the net present worth of the expected stream of future loans exceeds the gain from default. Second, honest customers, heedless of their own gain or cost, might repay to keep their word. High repayment coupled with repeated use, however, does signal the worth of an MFO for poor customers.

B. Better measures of repeated use from panel data

The number of loans per borrower since birth and the drop-out rate are not the best measures of repeated use. Their usefulness stems from the fact that they use data the analyst can get from the MFO.

Better measures require panel data of each loan to each borrower made by the MFO since birth. 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, and sector.

The MFO itself can use good analyses of drop-outs with panel data. New borrowers cost more and earn less for an MFO than repeat borrowers. Thus MFOs who worry about costs can use studies of drop-outs to reduce them.

In practice, few MFOs are able or willing to let an outside analyst see panel data. The few MFOs with panel databases may want to keep them secret. Most MFOs do not have electronic records of past loans and borrowers. Their loan officers can use a paper file to learn from the past of a single borrower, but their front offices cannot learn from the past of the whole portfolio.

Panel data could help to tell the MFO who drops out. The loss of an old customer who got big, long loans hurts more than the loss of a new customer who got small, short loans. Panel data might also yield clues as to why borrowers drop out. It could link drop-outs with borrower traits, loan terms, and past loans. It could let the analyst hazard a guess at how many seeming drop-outs are in fact just at rest.

Panel data permit survival analysis (Greene, 1993). This technique links factors to the time-to-drop-out and could help the MFO target effort at likely drop-outs.

Perhaps most important, panel data help to screen out the noise of past performance to look at recent performance. The analyst can take out all loans to all borrowers who dropped out before this year to see the number and traits of recent drop outs. An MFO could check for changes between recent drop-outs and past drop-outs.

The weakness of panel data is that it is censored. Some borrowers with a loan now will drop out in the future. Other borrowers with no loan now will borrow in the future.

C. Repeated use of deposits

Measures of repeated use of time deposits are like those of repeated use of loans. It is more difficult 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 ever 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.

D. Repeated use by poor customers of BancoSol and Grameen

I do not have panel data on loans or deposits for BancoSol nor for Grameen. All I know for Grameen is that 4 percent of its members dropped out between 1986 and 1994 (KK&K, 1995). This is a low drop-out rate even though not all members borrowed. It sends the same message as more complex and more costly studies: customers get more benefits than costs from Grameen (Schuler, Hashemi, and Riley, 1997; Hashemi, Schuler, and Riley, 1996; Pitt and Khandker, 1996 and 1995). Grameen requires all members to hold deposits. Thus their repeated use does not signal their worth to customers.

For BancoSol, I did have the data needed to estimate the drop-out rate and the number of loans per borrower. By 1996, the number of loans per borrower since birth was almost five (line h of Table 4 on page 76). The yearly drop-out rate climbed from 11 percent in 1993 to 31 percent in 1994. It then slid to 24 and 21 percent in 1995 and 1996 (line f). The drop-out rate since birth was 55 percent in 1996 (line g). Bad data from

BancoSol caused the negative drop-out rates in 1988 and 1989. They do not affect the later figures much since the portfolio was so small in 1988 and 1989.

A real analysis would recognize that these measures do not tell the whole story of the repeated use of loans from BancoSol. For example, many drop-outs of BancoSol switched to rival MFOs (Gonzalez-Vega *et al*., 1996). These borrowers might value loans from BancoSol even though they value loans from other lenders more. Perhaps customers can switch just since membership in BancoSol signals creditworthiness to other MFOs.

Rapid growth also reduces the information in these measures. For example, BancoSol tripled the number of loans in its portfolio from 1991 to 1996 and added more than 100,000 new borrowers (lines b and e of Table 4 on page 76). The measures do not tell whether these new borrowers dropped out already, will drop out soon, or will stay with BancoSol a long time.

The measures do not tell who drops out. My guess is that most of the drop-outs of BancoSol leave after one, two or three loans. Most borrowers that stick with BancoSol get more than five loans. This fits the fact that BancoSol does not screen new borrowers much. Instead, new borrowers screen themselves. BancoSol then screens repeat borrowers based on repayment. I would expect this to lead to a high drop-out rate for new borrowers, especially as BancoSol reaches deeper into the market as it grows and fights its rivals. BancoSol welcomes new borrowers who want loans since they have seen old borrowers prosper. But decreasing returns means new borrowers get less benefit than the first borrowers of BancoSol. The new borrowers expect their gains to exceed their costs, but they often find out they are mistaken and then drop out.

Line	Year ending Dec. 31	Source	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	# new loans in year	Data	1,737	1,827	3,539	8,645	10,475	21,946	29,023	32,510	21,354	28,333
b.	# new loans since birth	b(t-1)+a	1,737	3,564	7,103	15,748	26,223	48,169	77,192	109,702	131,056	159,389
c.	# repeat loans in year	Data	2,021	7,669	11,737	25,448	42,151	66,933	97,624	119,447	116,879	125,943
d.	# repeat loans since birth	d(t-1)+c	2,021	9,690	21,427	46,875	89,026	155,959	253,583	373,030	489,909	615,852
e.	# loans out. at year end	Data	1,170	3,351	7,395	15,735	22,743	34,233	56,297	61,255	63,038	71,749
f.	**Drop-out rate in year**	{a-[e-e(t-1)]}/ [a+e(t-1)]	0.33	(0.12)	(0.07)	0.02	0.13	0.23	0.11	0.31	0.24	0.21
g.	**Drop-out rate since birth**	(b-e)/b	0.33	0.06	(0.04)	0.00	0.13	0.29	0.27	0.44	0.52	0.55
h.	**Loans/borrower since birth**	(b+d)/b	2.2	3.7	4.0	4.0	4.4	4.2	4.3	4.4	4.7	4.9

Source: Data from BancoSol.

Table 4: BancoSol repeated use of loans by customers, 1987-96

CHAPTER 6

PRIVATE PROFITABILITY FOR INVESTORS

"Why didn't you put my money in the 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 from the point of view of an investor. The standard SDI is a ratio. The numerator is the unpaid opportunity cost of equity for the market 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 keep the same size and scope of service to its market niche? An MFO that can do this is privately profitable.

I submit that the standard SDI does not measure sustainability. It ignores taxes on profit, so it also does not measure private profitability from the point of view of an investor. The SDI does not discount flows, so it does not work in long time frames.

I adjust the standard SDI to account for taxes. 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 does not measure sustainability nor social costs, but it discounts flows and so works in any time frame. The NPC_I has the same content as net present worth (NPW). 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 an MFO like the MFO analyzed. With a time frame from the start to the end of one year, 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 the standard SDI from the point of view of investors. Adjusted for taxes, the SDI is negative if and only if the subsidy-adjusted ROE (SAROE) exceeds the opportunity cost of equity for the market. In the second part, I derive the NPC_I and compare it with the SDI.

By the one-year NPC_I, Grameen in 1983-94 and BancoSol in 1987-96 were not privately profitable, 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; 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 without reducing net worth or the size and scope of service to the market niche. An MFO that can compensate for subsidies is privately profitable.

Standard, 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 (Appendix E on page 226). 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 to 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 from profit without grants and discounts.

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 of investors, the opportunity cost of equity for the market.

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" are adopting measures based on opportunity costs (Tully, 1993; Appendix B on page 213). 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 tax 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. Investors would want to start MFOs from scratch like an MFO that was privately profitable since birth.

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 a change in $LP \cdot i$ of 100 percent would wipe out subsidy, all else constant. A standard SDI of zero or less means that an MFO could pay market rates for all its funds and resources and still break even. The SAROE of such an MFO would exceed the opportunity cost of equity for the market.

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

$$\begin{aligned} S &= \text{Subsidy received by an MFO}, \\ r &= \text{Opportunity cost of equity for the market}, \\ E &= \text{Average equity}, \\ D &= \text{Average soft debt}, \\ m &= \text{Opportunity cost of soft debt for the market}, \\ c &= \text{Rate paid for soft debt}, \\ K &= \text{Sum of revenue grants and discounts on other expenses, and} \\ AP &= \text{Accounting profit}. \end{aligned}$$

The standard SDI ignores tax. It takes subsidy as the sum of the opportunity cost of the equity of an MFO and of the three types of profit grants (equation 4 on page 53) less the accounting profit the MFO could use to pay for opportunity costs. Average equity includes public and private equity since an MFO splits its return among all shareholders.

The term *K* must encompass both revenue grants and discounts on expenses:

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

If not, then subsidy *S* will depend on the form of subsidized funds. Yaron (1992b, pp. 6, 12) says *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 does not say that *K* should include revenue grants, although he does say that *K* should include all other miscellaneous subsidies. I want an explicit definition since some frameworks that change the standard SDI botch *K* (Sacay, 1996; Khandker and Khalily, 1996; KK&K, 1995; and Khandker, Khan, and Khalily, 1995). This is a mistake (Schreiner and Yaron, 1997). Without revenue grants in *K*, the SDI would depend on the form of subsidized funds. Worse, subsidy in the SDI would be 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 the market *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 81), the formula for *K* (equation 13 on page 81), and the formula for true profit (equation 8 on page 56):

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

This simple formula shows that subsidy is the opportunity cost of equity for the market 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 does not show how profit grants and equity grants affect the SDI (equation 14 on page 82). Subsidized funds enter through their effect on average equity E. This is the product of α (Appendix H on page 237) and half the sum of equity at the start and at the end of the year:

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

The factor α uses a stock measured more than twice a year to estimate an average stock measured just at the start and at the 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 their effect on average equity *E*. Put the formula for the change in equity in a year (equation 17 on page 83) into the general formula for average equity from year-end stocks (equation 15 on page 83). Then put the result into the simple formula for subsidy in the standard SDI (equation 14 on page 82):

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

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 received before the start of the year and thus 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 the year-end 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 84) has five strengths compared with the received formula (equation 12 on page 81). First, the new formula shows that an MFO compensates for the cost of its net worth not with accounting profit but with true profit (Schreiner, 1997c). 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 $D \cdot (m - c)$ 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 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 $r \cdot \alpha / 2$. The measure of subsidy does not change regardless of the label put on subsidized funds.

Fourth, the new formula shows that the subsidy from soft debt 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 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 $-r \cdot \alpha / 2 \cdot D$. True profit does not depend on *c* since discounts on soft debt are stripped from true profit. As an MFO pays more of the cost of its soft debt, *c* increases and thus subsidy decreases.

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) wanted the standard SDI to tell the percentage change in the yield on lending that, all else constant, would drive subsidy to zero. Thus he 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 outstanding:

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

The standard SDI is the ratio of subsidy (equation 12 on page 81) 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 Yaron confesses 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. An MFO that increased revenue from lending by the amount of the standard SDI would not, all else constant, drive subsidy to zero. The culprit is the denominator of the standard SDI.

Yaron did not show how he derived the standard SDI. I will do so now. First, write the formula of the logic of the subsidy of the standard SDI (equation 18 on page 84) so that revenue from lending appears alone as its own term. To do this, let *FF* be the fresh funds injected in an MFO in a year (equation 17 on page 83) except for 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:

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

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

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

To isolate revenue from lending in the formula of the logic of the subsidy of the standard SDI (equation 18 on page 84), use the formula for fresh funds except for true profit *FF* (equation 22 on page 87) and the formula for true profit in terms of revenue from lending $LP \cdot i$ and true expenses *TE* (equation 24 on page 88):

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

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 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 subsidy *S* zero. Multiply revenue from lending in equation 25 on page 88 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 80). The new denominator (equation 26 on page 89) 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 SDI (equation 26 on page 89) has the same numerator but a smaller denominator than the standard SDI (equation 11 on page 80). 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 profits FF. But true profit itself has an opportunity cost of $r\cdot\alpha/2\cdot TP$, so just a portion $(1-r\cdot\alpha/2)$ of true profit 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 (Appendix C on page 215).

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). I want an SDI not from the point of view of society but from 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 at all. Thus 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, $\tau > 0$. 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 88):

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

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 89). For subsidy to be zero, 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 88), $TP - Tax = (LP \cdot i - TE) \cdot (1 - \tau)$. Set subsidy *S* (equation 28 on page 91) to zero, multiply revenue from lending by (1+SDI), and solve for the SDI:

$$0 = r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF - (1 - r\cdot\alpha/2)\cdot[LP\cdot i\cdot(1+\mathrm{SDI}) - TE]\cdot(1-\tau),$$
$$\mathrm{SDI} = \frac{r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF - (1 - r\cdot\alpha/2)\cdot TP\cdot(1-\tau)}{LP\cdot i\cdot(1 - r\cdot\alpha/2)\cdot(1-\tau)}. \tag{29}$$

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 measure of subsidy and the SDI (equation 28 on page 91 and equation 29 on page 92) are mildly more complex than the standard measure of subsidy and the standard SDI (equation 14 on page 82 and equation 21 on page 87). The new measures are better since they are much closer to what a private investor would use to judge an MFO in a one-year time frame.

To check that the SDI (equation 29 on page 92) drives subsidy to zero, put it into the measure of subsidy S (equation 28 on page 91), noting that *Tax* is $\tau\cdot(LP\cdot i - TE)$ since $TP > 0$ from the constructed increase in revenue from lending:

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

The logic behind the SDI is that true profits compensate not only for the opportunity cost of E_0, FF, and true profit itself, but also for taxes. If true profits are less

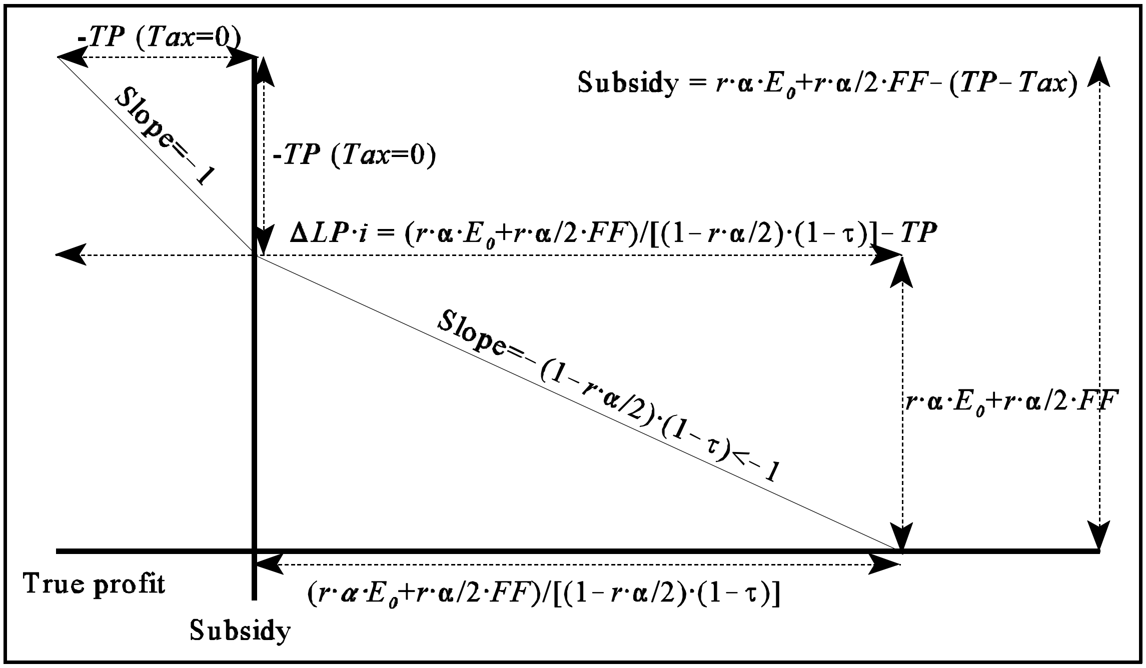

Figure 4: Subsidy and change in revenue from lending with true profit less than zero

than zero, then increased revenue decreases subsidy one-for-one. Once true profits are more than zero, however, increased revenue decreases subsidy less than one-for-one since part goes to pay for increased taxes as well as for increased opportunity costs.

If true profits are less than zero, then the MFO must increase revenue by $-TP$ just to get true profit up to zero (upper left corner of Figure 4 on page 93). Tax is zero since true profit is still negative, and increases in revenue decrease subsidy one-for-one.

Once positive, true profit starts to compensate for the opportunity cost of the use in the year of the funds in the net worth of the MFO, $r \cdot \alpha \cdot E_0 + r \cdot \alpha/2 \cdot FF$. But now true profit must also compensate for two other costs. The first cost is tax on true profit, $\tau \cdot TP$. The second is the opportunity cost of the net worth spawned in the year by accrued true

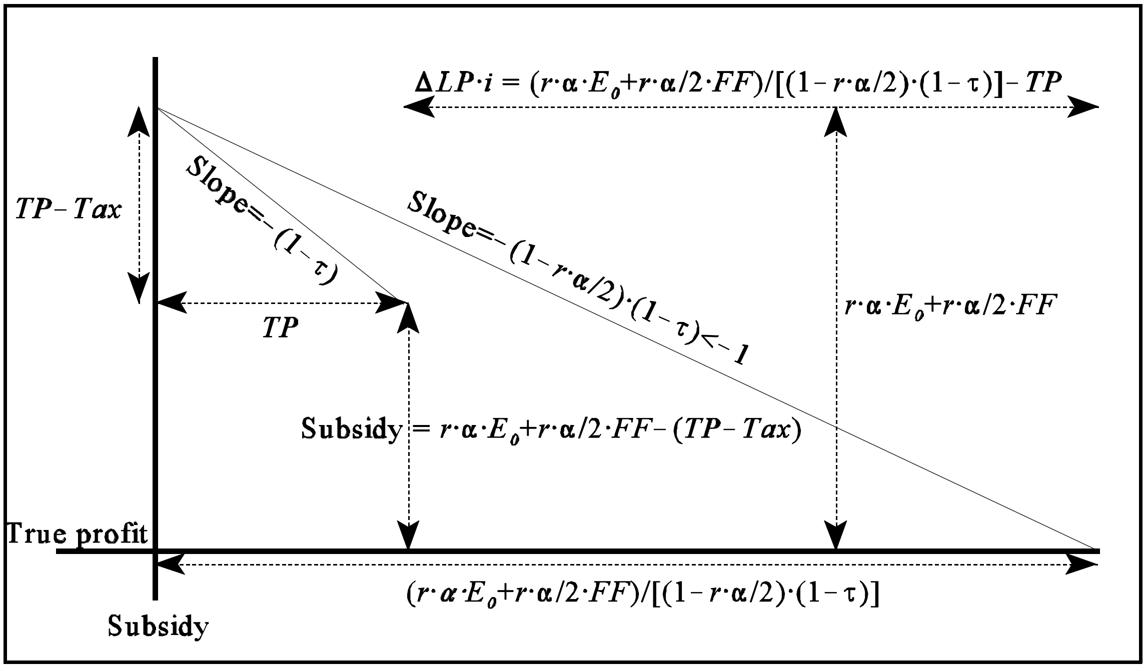

Figure 5: Subsidy and change in revenue from lending with true profit more than zero

profit itself, $r\cdot\alpha/2\cdot TP$. Thus a dollar increase in true profit decreases subsidy by just $(1-\tau)\cdot(1-r\cdot\alpha/2)$. The amount of true profit needed to offset the unpaid opportunity cost of equity is not $r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF$ but rather $(r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF)/[(1-\tau)\cdot(1-r\cdot\alpha/2)]$.

The logic is almost the same when true profits are more than zero (Figure 5 on page 94). Now the first increase in revenue does not decrease subsidy one-for-one since the MFO already pays taxes and compensates for the opportunity cost of true profit.

Subsidy S uses the term *Tax* (equation 28 on page 91). If true profit is negative, then this term is zero (equation 27 on page 91). If true profit is positive, then this term is positive. In contrast, the SDI (equation 29 on page 92) uses τ. This term is constant for all levels of true profits. The SDI can use τ since it constructs the change in revenue needed to make true profits more than zero, so taxes will not be zero. This allows the use of just one formula for the SDI even though taxes are a kinked function of true profits.

f. The interpretation of the SDI

Now the SDI is the percentage change in the yield on lending that would permit an MFO to replace subsidized funds with market funds. The *subsidy-free yield* is the yield that would bring the SDI to zero:

$$\text{Subsidy}-\text{free yield} = \text{Current yield} \cdot (1 + \text{SDI}). \tag{30}$$

The *change in the current yield* is the subsidy-free yield less the current yield. This is also a product of the current yield and the SDI:

$$\text{Change in current yield} = \text{Current yield} \cdot \text{SDI}. \tag{31}$$

To use the SDI to the fullest, the analyst must look not only at the SDI but also at the current yield, the change in the current yield, and the subsidy-free yield. These three numbers have a simple relation (equation 30 on page 95 and equation 31 on page 95):

$$\begin{aligned} \text{Subsidy}-\text{free yield} &= \text{Current yield} \cdot (1 + \text{SDI}) \\ &= \text{Current yield} + \text{Change in current yield}. \end{aligned} \tag{32}$$

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 tool for comparisons even between peers.

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 invested a lot of its subsidy in its own development instead of giving more to customers through lower prices.

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 how subsidy depends on loan repayment, deposit mobilization, and administrative costs.

The choice to focus on the comparison of subsidy to 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. It does not help much to know that an MFO would be privately profitable with an increase in revenue from investment of 400 percent or with a decrease in wages of 200 percent. Often the only way to cut subsidies in the short term in practice is to charge more for loans.

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, 1997a; Stiglitz and Weiss, 1981). In practice, few MFOs have doused demand or spawned a rash of defaults with price hikes (Rosenberg, 1996). For example, high rates did not seem to affect demand or default at BancoSol nor at Grameen (Appendix F on page 228).

ii. Other items to compare with subsidy

An MFO might respond to the loss of subsidized funds or increase its ability to compensate for subsidy in many ways (Alfaro, 1996; Yaron, 1992b). For example, it could slash administrative costs, dun more, lend more, or boost physical productivity.

Comparisons of subsidy to revenues or to expenses are straightforward. In contrast, comparisons to output require care. For example, a bigger portfolio of loans might increase private profitability. But a bigger portfolio is more likely than a higher price to change not only revenue but also assets, liabilities, expenses, and workload. The link between the size of the portfolio and the SDI does not boil down to a single number.

The analyst cannot compare output in a year with subsidy in a year. Unless the MFO is brand new, this falsely implies cause-and-effect. The right comparison is output with subsidy versus output without subsidy. Such a with-and-without comparison is difficult since the analyst does not know what would have happened without the subsidy. Subsidy in past years caused some of the outputs this year. Likewise, some of the outputs caused by current subsidies will not come until the next years.

For example, suppose a credit union is born and grows without subsidies. In its tenth year, it gets a small soft loan with an even smaller discount on soft debt attached.

The ratio of the output to the subsidy is high, but the subsidy did not cause all the output (Schreiner and Gonzalez-Vega, 1995).

A comparison of subsidy to outputs or to benefits has two requirements. First, it must estimate benefits or outputs with and without subsidy. Second, it must discount streams of costs and of outputs or benefits through time. The SDI does not do this.

2. Weaknesses of the standard SDI

The standard SDI has four weaknesses as a measure of private profitability from the point of view of an investor. First, the standard SDI uses the wrong denominator and omits taxes. I fixed this above. Second, the framework of the standard SDI takes the point of view of society. I want to take the point of view of investors. Third, the SDI does not measure self-sustainability. A negative SDI is needed, but it is not enough. Fourth, like all accounting measures, the standard SDI does not discount flows and so cannot measure performance in the long term. I suggest a measure that does discount flows below.

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. Like accounting profit or ROE, the SDI is an accounting measure but for its use of shadow prices. The opportunity cost and the treatment of taxes tell whether the SDI takes the point of view of society or of investors.

Yaron intended the standard SDI as a measure social costs (1992b, pp. title, iii, v, 1, 4, 8, 22). He calls the standard SDI “a public-interest analysis” that takes “full account of the overall social costs.” He says that a measure of “the social cost of a DFI” is needed to check “the social justification of [its] existence” (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. In line with the point of view of society, the standard SDI omits taxes.

Yet parts of the framework of the standard SDI 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. 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 opportunity cost is what a DFI would pay to replace public funds with market funds.

In practice, Yaron (1994, 1992a, 1992b) uses the opportunity cost for the market. Thus the framework of the standard SDI proxies the opportunity cost of society—the return on the best use of its funds—with the price a DFI would have to pay for market funds. Market prices can be higher or lower than the opportunity cost of society (Markandya and Pearce, 1991). For example, external gains and costs of private choices to fund a DFI or an MFO could put a wedge between market and social prices.

The design of the standard SDI takes the point of view of society but uses elements of 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 not of society but of investors. Social BCA is much more complex than private profitability for an investor.

b. The standard SDI and self-sustainability

The standard SDI is part of a two-pronged framework for measuring the performance of MFOs (Yaron, 1992a). The first prong is *outreach*—the depth, breadth, and quality of the output of an MFO from the point of view of customers. The framework 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 is privately profitable, but it may or may not be self-sustainable.

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 65; Schreiner, 1997a). Thus a negative SDI is necessary but not sufficient for self-sustainability. An MFO could have a negative SDI for a short time thanks to uncommon labor, luck, or leaders. But the MFO might not perform as well when luck ends, workers tire, or leaders die. An SDI of less than zero is needed for self-sustainability, but it is not enough.

c. The SDI does not discount flows

The SDI is an accounting measure that uses shadow prices. 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.

In the one-year case, the failure of the SDI to discount flows is not fatal, though a discounted measure such as NPW is better no matter how short the time frame. Investors look at the long term when they buy into an MFO or start an MFO from scratch. The investor trades an outflow of cash now for a stream of cash flows in the future. A dollar now is worth more than a dollar later, so an investor 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 A on page 210).

Investors buy into an MFO or start a new MFO from scratch when they expect that future returns will exceed their opportunity costs. Before investors buy into an MFO, they use predicted results to check for positive expected NPW. Before investors start an MFO from scratch, they could use data from an existing MFO to check whether its NPW since birth would have been positive.

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

The SDI is equivalent to a subsidy-adjusted ROE (SAROE). This is its biggest strength. ROE uses profit after tax, so the standard SDI cannot be seen as an SAROE.

a. The SDI as a subsidy-adjusted ROE

A negative SDI implies an SAROE higher than the opportunity cost of equity for the market. Thus the SDI tells whether an MFO could pay market prices for its subsidized funds. It compares true profit after tax with the opportunity cost of the equity in an MFO.

ROE is the single most-common accounting measure of the financial performance of a private firm from the point of view of investors (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:

$$ROE = \frac{\text{Net income}}{\text{Average Equity}} = \frac{AP - Tax}{E}. \qquad (33)$$

Barltrop and McNaughton (1992) and Mould (1987) tell how to use ROE in the analysis of DFIs. 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 (Appendix E on page 226). The SDI solves this problem since it means the same as a subsidy-adjusted ROE (SAROE). 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 compare subsidized MFOs with unsubsidized peers with the SAROE. 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.

Yaron never shows that the SDI is equivalent to an SAROE. He hints at it once, 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 show this, set the formula for subsidy *S* to zero or less (equation 28 on page 91). Note that $\alpha \cdot E_0 + \alpha/2 \cdot FF + \alpha/2 \cdot (TP - Tax) = E$ (equation 17 on page 83 and equation 22 on page 87), and solve for r:

$$\begin{aligned} 0 &\geq r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF - (1 - r\cdot\alpha/2)\cdot(LP\cdot i - TE - Tax), \\ &\geq r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot FF + r\cdot\alpha/2\cdot(TP - Tax) - (TP - Tax), \\ &\geq r\cdot E - (TP - Tax), \\ \frac{TP - Tax}{E} &\geq r. \end{aligned} \tag{34}$$

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

The biggest strength of the SDI is that it answers the same question as an SAROE. It tells whether an MFO could pay a market return on its equity. 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 frameworks analysts already know and understand.

b. Other strengths of the standard SDI

The standard SDI has four other strengths. 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 5 on page 108). A change of 5 percent in the current nominal yield of 40 percent (line t) should drive subsidy to zero. The change would be two percentage points (line u, $0.40 \cdot 0.05 \doteq 0.02$), and the nominal subsidy-free yield would be 42 percent (line v, $0.40+0.02 \doteq 0.42$). 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 the opportunity cost of positive true profit. 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 the market needed to make the SDI zero.

ii. The SDI

In contrast, the SDI in 1996 was 12 percent (line w of Table 6 on page 109). This means that with all else held constant, an increase of 12 percent in the yield from lending would push the SAROE past the hurdle rate of the opportunity cost of equity for the market. The difference between the standard SDI of 5 percent and the SDI of 12 percent is taxes and the opportunity cost of net worth from the accrual of true profit 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). With inflation at 8 percent, 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 an investment.

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 6 on page 109). I do not claim BancoSol should use its profits to court investors. But if BancoSol did want to attract investors, then 5 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 (line e of Table 28 on page 230 in Appendix F).

The SDI has fallen in each year since birth. From more than 700 percent in 1987, it fell to 53 percent in 1992. It was near 17 percent in 1994 and 1995 (line w of Table 6 on page 109). 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 (lines k and l of Table 7 on page 110). 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 L on page 256), 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 (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 6 on page 109). 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.

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 address whether BancoSol was worthwhile from the point of view of 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 5: 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**	[a*e+b*n-c*s*(1-d)] /[f*c*(1-d)]	7.06	2.47	2.10	1.03	0.58	0.53	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	2.57	0.90	0.86	0.51	0.34	0.33	0.20	0.07	0.07	0.05
z.	**Subsidy-free nom. yield in year**	x+y	2.93	1.26	1.27	1.00	0.93	0.96	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)	2.61	0.84	0.89	0.63	0.67	0.79	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 6: 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 7: 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 8 on page 115). Do not compare this standard SDI with those of Morduch (1997a), YB&P (1997), or KK&K (1995). I use a higher opportunity cost since I use the framework of Benjamin (1994; Appendix D on page 218). Their standard SDIs for Grameen in 1993-94 range from 20 to 60 percent. Hulme and Mosley (1996) report an average SDI for Grameen in 1988-92 of 142 percent. Such 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 9 on page 116). 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 am not saying that 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 not necessary or sufficient for an MFO to be the best way to help the poor.

The SDI of 115 percent in 1994 means 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 am not saying that 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 net present worth 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 9 on page 116). 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). I also guess that 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 (line e of Table 29 on page 230). There is some evidence that the customers of Grameen 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 9 on page 116). 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 run, however, I think the performance of Grameen from the point of view of 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 in the market *r* seem to matter more. In turn, the biggest factors for *r* are changes in inflation and in leverage (Table 27 on page 225).

iii. The subsidy-adjusted ROE

Profit grants make a wide gap between the ROE and SAROE of Grameen (lines k and l of Table 10 on page 117). 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 38 on page 272), accounting profit stayed between -$150,000 and $600,000 (line g of Table 10 on page 117). 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 or to gouge customers.

Stripped of revenue grants and discounts, however, profit is always negative (line h of Table 10 on page 117). 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 these 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 the market (line m).

All this suggests that Grameen would have been a bad investment for a capitalist. 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 than BancoSol 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 8: 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 9: 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 10: 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 the long term 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 flows. A dollar received after one year is not the same as a dollar received after ten years. 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 of flows of funds for an investor (NPC_I):

$$NPC_I = -NPW. \tag{35}$$

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 the 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. An investor would make more money judging investments in MFOs with the NPC_I than with the SDI (Appendix A on page 210).

Both the NPC_I and the SDI force the economic concept of opportunity cost onto accounting data. The SDI is an accounting measure equivalent to SAROE. In contrast, the NPC_I is an economic measure equivalent to NPW. The SDI strips profit grants from profit just as dictated by standard rules of accounting. The NPC_I is a simple use of the standard way to measure the costs of a project from a point of view that does not encompass all of society (Gittinger, 1982).

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.

Discounting follows an economic logic: from the point of view of a person now, a dollar now is worth more than a dollar one year from now. At the least, a dollar put in an MFO for a year could have been put in a bank and returned after one year with interest. Discounting puts streams of flows through time in a common unit.

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 SDI seen as 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 own questions and time frames.

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 the market in the first year, r_1 (Gittinger, 1982):

$$\begin{aligned} \text{Discount rate of investors} &= \frac{1}{1+\text{Opp. cost equity for market}}, \\ \delta_{I1} &= \frac{1}{1+r_1}. \end{aligned} \tag{36}$$

Given a stream of opportunity costs for the market 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:

$$\delta_{It}^{t-n} = \left(\frac{1}{1+r_t}\right)^{1-n} \cdot \prod_{j=1}^{t-1}\left(\frac{1}{1+r_j}\right). \tag{37}$$

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, $\delta_{I1}^{1-0.5}$ 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 $\delta_{I1} \cdot \delta_{I2}^{1-(1-0.75)}$.

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 $\delta^{t-(1-0.5)} = \delta^{t-0.5}$ (Appendix I on page 242).

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 I on page 242). With just year-end data, γ_{It} is $\delta_{It}^{t-0.5}$.

3. The formula for the $\mathrm{NPC_I}$

From the point of view of 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 $\mathrm{NPC_I}$ adds discounted outflows and subtracts discounted inflows. Like all discounted measures, the $\mathrm{NPC_I}$ ignores flows before the start of the time frame. They are sunk and cannot be undone. Both before and after the start of the time frame, the $\mathrm{NPC_I}$ replaces the flow of injected net worth from grants, public paid-in capital, and discounts with flows of private paid-in capital. All else constant, this lets the $\mathrm{NPC_I}$ 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 count this as an outflow needed to stake a claim to the future net worth of the MFO:

$$\mathrm{NPC_I}\ \text{start net worth} = \delta_{I0}^{0} \cdot E_0 = E_0. \qquad (38)$$

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. Since private capital replaces profit grants, accounting profit is true profit. The discount factor for the flow of fresh funds in year t is γ_{It} (Appendix I on page 242). Given fresh funds except true profit less tax (equation 22 on page 87), the discounted cost of these outflows from investors to the MFO in the whole time frame is:

$$\begin{aligned} \text{NPC}_\text{I} \text{ fresh funds} &= \sum_{t=1}^{T} \gamma_{It} \cdot [DG_t + PC_{pub_t} + PC_{pri_t} + RG_t + D_t \cdot (m_t - c_t) + DX_t], \\ &= \sum_{t=1}^{T} \gamma_{It} \cdot FF_t. \end{aligned} \tag{39}$$

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 affect investors by reducing the net worth that they 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:

$$\text{NPC}_\text{I} \text{ dividends} = \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t. \tag{40}$$

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 tax and dividends. The discount used is δ_{IT}^{T}:

$$\mathrm{NPC_I}\ \text{end net worth} = \delta_{IT}^{T} \cdot \left(E_0 + \sum_{t=1}^{T} FF_t + TP_t - Div_t - Tax_t\right). \tag{41}$$

The $\mathrm{NPC_I}$ adds the discounted outflows (equation 38 on page 121 and equation 39 on page 122) and subtracts the discounted inflows (equation 40 on page 122 and equation 41 on page 123):

$$\begin{aligned}\mathrm{NPC_I} &= \text{Discounted outflows} - \text{Discounted inflows},\\ &= E_0 + \sum_{t=1}^{T} \gamma_{It} \cdot FF_t - \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t - \delta_{IT}^{T} \cdot \left[E_0 + \sum_{t=1}^{T} (FF_t + TP_t - Div_t - Tax_t)\right],\\ &= (1 - \delta_{IT}^{T}) \cdot E_0 + \sum_{t=1}^{T} (\gamma_{It} - \delta_{IT}^{T}) \cdot FF_t - \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t - \delta_{IT}^{T} \cdot \sum_{t=1}^{T} (TP_t - Div_t - Tax_t).\end{aligned} \tag{42}$$

The net present cost of the flows of funds between an investor and an MFO from the point of view of the investor from time 0 to time T has four terms (equation 42 on page 123). 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 only $\delta_{IT}^{T} \cdot E_0$ when the investor gets it back from the MFO at time T. The cost is the difference between the worth of funds when they leave and when they come back.

The second term of the $\mathrm{NPC_I}$ 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.

I assume that the market worth of the MFO at the end of the time frame matches the net worth in its accounts. This means that owners cannot salvage any off-balance sheet assets. In practice, an MFO might have a lot of intangible assets, but it may not be able to salvage them (Gonzalez-Vega and Graham, 1995).

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 for a time frame longer than one year. In most cases, the most 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 42 on page 123) 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 88) and use the formula for tax (equation 27 on page 91):

$$\begin{aligned} 0 = {} & (1-\delta_{IT}^{T}) \cdot E_0 + \sum_{t=1}^{T} (\gamma_{It} - \delta_{IT}^{T}) \cdot FF_t - \sum_{t=1}^{T} \delta_{It}^{t} \cdot Div_t \\ & - \delta_{IT}^{T} \cdot \sum_{t=1}^{T} \{ [LP_t \cdot i_t \cdot (1+\text{SDI}) - TE_t] - Div_t - \tau \cdot \max[0,\ LP_t \cdot i_t \cdot (1+\text{SDI}) - TE_t] \} . \end{aligned} \tag{43}$$

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 92). 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 algebra does not yield a simple 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 percentage change in revenue until the NPC_I falls to zero (Judd, 1991). 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 $\mathbf{NPC_I}$

An investor who contemplates a one-year investment in an MFO could use the SAROE from the SDI or a one-year NPC_I. The NPC_I is better since the SAROE does not discount flows. In fact, the SAROE can exceed the hurdle rate even though the NPW of an investment is negative (Appendix A on page 210).

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 42 on page 123), dropping the investor subscripts from γ and δ:

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

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

$$\mathrm{NPC_I}^{\mathrm{T}=1} = (1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot(TP - Tax)\,. \tag{44}$$

Third, net profit in the year must be positive to offset positive costs. This means taxes are $\tau\cdot TP$ (equation 27 on page 91):

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

Fourth, I write true profits TP as $LP\cdot i - TE$ (equation 24 on page 88), multiply revenue from lending $LP\cdot i$ by (1+SDI), set the $\mathrm{NPC_I}$ to zero, and solve for the SDI with the one-year $\mathrm{NPC_I}$:

$$0 = (1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot(1-\tau)\cdot[LP\cdot i\cdot(1+\mathrm{SDI}^{\mathrm{T}=1}) - TE]\,,$$

$$\mathrm{SDI}^{\mathrm{T}=1} = \frac{(1-\delta)\cdot E_0 + (\gamma-\delta)\cdot FF - \delta\cdot(1-\tau)\cdot TP}{\delta\cdot(1-\tau)\cdot LP\cdot i}\,. \tag{45}$$

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 91) is not just the one-year $\mathrm{NPC_I}$ (equation 44 on page 127). Unlike the $\mathrm{NPC_I}$, the SDI does not discount flows. If true profit is positive, then subsidy in the SDI understates the cost of replacing public funds with market funds. If true profit is negative, then subsidy in the SDI overstates the cost.

To compare the one-year $\mathrm{NPC_I}$ (equation 44 on page 127) with subsidy in the SDI (equation 28 on page 91), the discount rate δ and the discount factor for fresh funds γ must be in terms of r, the opportunity cost of equity for the market. For r near zero,

$\delta \doteq 1-r$ (Figure 6 on page 129). For example, $r = 0.10$ leads to $\delta = 1/1.1 \doteq 0.9091 \doteq 0.91 \doteq 0.90 = 1\text{-}0.10 = 1\text{-}r$.

With just year-end data, the factor $\gamma \doteq \delta^{0.5} = \delta^{1-0.5}$ (Appendix I on page 242). For r near zero, $\delta^{1-n} \doteq 1-r\cdot(1-n)$ (Figure 7 on page 130). For example, if $r = 0.1$ and $n = 0.5$, then $\delta^{1-0.5} \doteq 0.9091^{0.5} \doteq 0.9535 \doteq 0.95 = 1-0.05 = 1-(0.1\cdot0.5) = 1-0.1\cdot(1-0.5)$.

With just year-end data or with constant flows, $\alpha = 1$ (Appendix H on page 237). Subsidy in the SDI (equation 28 on page 91) is then:

$$\begin{aligned} S &= r\cdot 1\cdot E_0 + r\cdot 1/2\cdot FF - (1 - r\cdot 1/2)\cdot(TP - Tax), \\ &= r\cdot E_0 + r/2\cdot FF - (1 - r/2)\cdot(TP - Tax). \end{aligned} \tag{46}$$

Given $\delta = 1-r$ and $\gamma = 1-r\cdot(1-n)$, the one-year NPC_I (equation 44 on page 127) is:

$$\begin{aligned} \text{NPC}_\text{I}^{\text{T}=1} &= E_0\cdot[1-(1-r)] + [(1-r/2)-(1-r)]\cdot FF - (1-r)\cdot(TP - Tax), \\ &= r\cdot E_0 + r/2\cdot FF - (1-r)\cdot(TP - Tax). \end{aligned} \tag{47}$$

The difference between the one-year NPC_I (equation 47 on page 128) and the subsidy of the SDI (equation 46 on page 128) is $r/2\cdot(TP-Tax)$. Thus the one-year NPC_I and subsidy of the SDI are not the same. 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 the investor got true profit net of tax 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

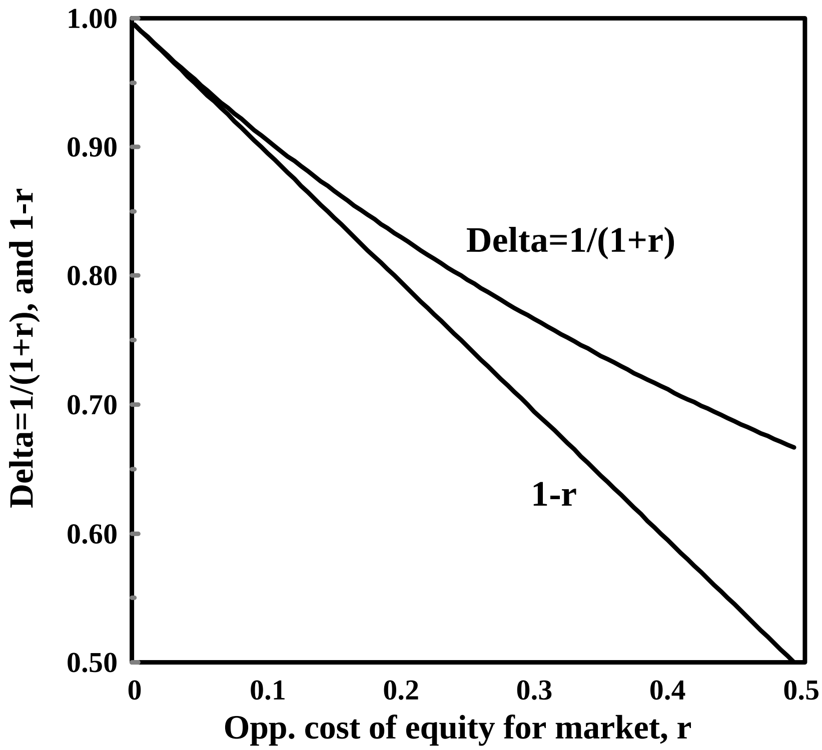

Figure 6: The approximation of the discount rate $\delta = 1/(1+r)$ by $1-r$

net worth and the embedded true loss at the end of the year. A loss in a year is less than a loss in six months, so the SDI overstates subsidy when an MFO has true losses.

If true profit is positive, then the subsidy of the SDI is less than the one-year NPC_I. In this case, the subsidy of the SDI understates subsidy. It pretends the investor got the true profit net of tax too soon, after 6 months instead of after a year.

When true profit is more than zero, the SDI could be negative at the same time that the NPC_I is positive. This means an investor who judges with the SAROE from the SDI could pick an investment with a negative NPW (Appendix A on page 210).

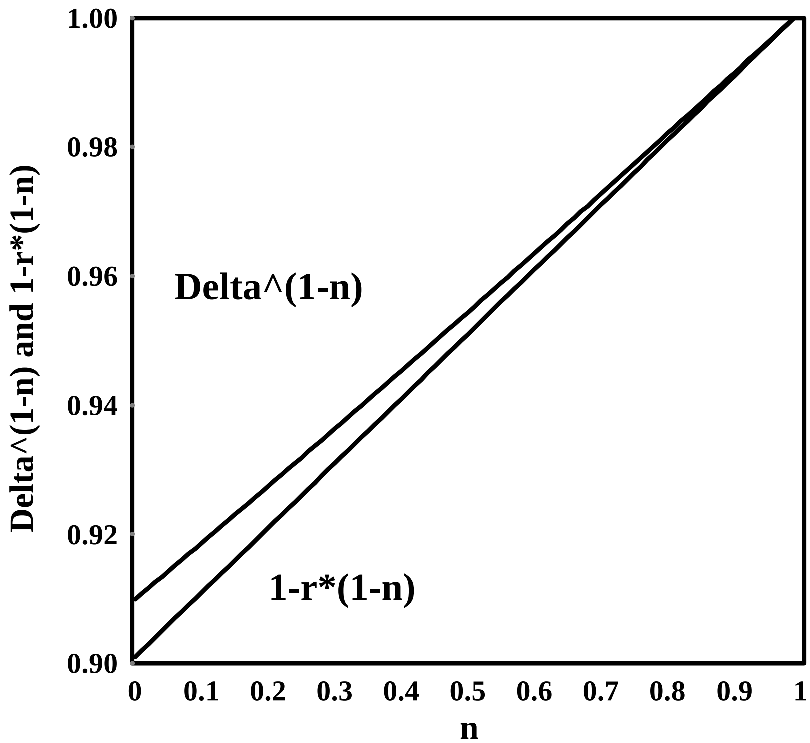

Figure 7: Approximations of δ^{1-n} by $1-r\cdot(1-n)$, given $r = 0.1$

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

ii. The worth of the SDI

The SDI is not worthless. Many investors measure performance by ROE, and the SDI adjusts ROE to make sense for a subsidized MFO. The SDI is a good tool to check whether an MFO without public help would get an accounting return above a hurdle rate.

Still, NPW is known as the best tool to judge projects (Brigham and Gapenski, 1993; Wheeler and Clement, 1990). The NPC_I has the same information content as NPW. Investors could make mistakes if they judge with ROE or SAROE since these widespread measures do not discount like the NPC_I or NPW.

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, 1997). Like other yardsticks, the analyst can use them to carve benchmarks, to chart trends, and to compare an MFO with peers.

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 tells whether an MFO without help from donors bought at the start of a year and sold at the end of the year would earn a market rate of return. The NPC_I discounts flows, so it answers this question better than the SDI and SAROE.

In 1996, the one-year NPC_I for BancoSol was about $1 million (line k of Table 11 on page 135). This is near the measure of subsidy of the SDI of about $1.1 million (line v of Table 6 on page 109). 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 1993-96. Thus SAROE will pass the hurdle rate before NPW turns positive (Appendix A on page 210).

For BancoSol in 1996, the SDI with the one-year NPC_I was 12 percent (line l of Table 11 on page 135). This matches the SDI to two digits (line w of Table 6 on page

109). Thus the comments for the SDI hold for the one-year NPC_I. BancoSol has yet to attract private investors with a one-year horizon, but it is close.

Given 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 am loath to project performance. I could make BancoSol look as good or as bad as I wanted, and quibbles with the predicted numbers would sidetrack talk from the main points of the framework.

ii. SDI with the NPC_I since birth

The NPC_I since birth tells whether investors would have made more than their opportunity cost had they 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 12 of page 136). This means the NPW of BancoSol for private stockholders at the start of 1987 was about -$2 million.

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 12 on page 136). 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 (line t of Table 5 on page 108). Not only is 81 percent almost twice as much as the average yield of 45 percent, but the average yield was 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 and so keep its NPW negative.

The example of BancoSol shows the foolishness of comparisons of the one-year NPC_I or 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 an SDI with the one-year NPC_I of 42 percent in 1991, 21 percent in 1994-95, or 12 percent in 1996 (line l of Table 11 on page 135). 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 the analyst conquer the challenge 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 12 on page 136). At the same time, BancoSol has improved its outreach as seen by the depth of poverty of customers, the cost of output to customers, the number of customers, and the scope and quality of output (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 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, TP	Data	(113)	(157)	(318)	(295)	(226)	(274)	9	1,297	820	1,460
i.	Actual tax	Data	0	0	0	0	0	49	91	331	220	378
j.	**True profit less tax**	h-(i+j)	(113)	(157)	(318)	(295)	(226)	(323)	(81)	965	600	1,082
k.	**NPC Investor, one year**	(1-b)*e+(c-b)*f-b*j	97	182	322	464	631	1,043	2,248	1,644	1,503	1,023
l.	**SDI with NPC Investor, one year**	[(1-b)*e+(c-b)*f-b*h*(1-d)]	6.56	2.21	1.86	0.85	0.53	0.42	0.43	0.21	0.21	0.12
		/[b*(1-d)*g]										
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	2.39	0.80	0.76	0.42	0.31	0.27	0.24	0.09	0.09	0.05
o.	**Subsidy-free nom. yield in year**	m+n	2.75	1.17	1.17	0.91	0.90	0.90	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)	2.44	0.76	0.81	0.55	0.64	0.73	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 11: BancoSol net present cost to investor 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)*[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 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	1.37	1.05	0.80	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	x*bb	2.39	1.30	1.23	1.00	0.82	0.79	0.59	0.39	0.37	0.37
dd.	**Sub.-free nom. yield since birth**	bb+cc	2.75	1.66	1.62	1.45	1.35	1.37	1.15	0.88	0.83	0.81

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

Table 12: BancoSol net present cost to investor 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 13 on page 140). This was about $6 million less than the subsidy of the SDI (line v of Table 9 on page 116). Since true profit was negative in all years, the one-year NPC_I is always 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 13 on page 140). In contrast, the SDI was 115 percent (line w of Table 9 on page 116).

As I concluded 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 dividends and capital gains but rather to get membership. They demand a return from Grameen as benefits not to ownership but to membership.

I am not saying Grameen should double its yield or try to attract private investors. I do not expect it to chase private funds. Grameen might continue to increment the real yield, but, as the flagship of all MFOs in the world, it can count on donors for funds. Grameen may be sustainable, but it might not be self-sustainable. Grameen does not need to prepare to cope with the loss of donor help. Grameen does not need to choose between help for poor customers now or in the future. Donors will let it do both. 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 14 on page 141). 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. I am not saying Grameen was not the best use of funds earmarked to help the poor. I am just saying Grameen was not the best use of funds from the point of view of 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 14 on page 141). 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.

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 the market *r* (Appendix D on page 218). 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 profits 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 it 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 earmarked to help 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 or 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 make adjustments to attract investors now. Thus investors might buy into MFOs now since the poor absorbed the start-up costs in the past.

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 13: Grameen net present cost to investor 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 14: Grameen net present cost to investor 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 a return on equity at least as high as they could get from a firm of like risk. Workers want a return on equity at least as high as inflation.

Thus the framework predicts a key conflict: workers have few incentives to work to attract investors. This may constrain the gain the poor can get from an MFO. 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 the MFO by owners. *Workers* include board members, managers, and line employees. Workers care about financial self-sufficiency and sustainability not only because they care about the poor but also because they care about 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.

1. The quiet life

MFOs allow workers the slack to pursue their own goals. One important perk is the quiet life—the chance to relax and not to spend effort 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.

MFOs carry four traits that breed ease and waste. First, most MFOs are owned by members or by no one at all. Such disperse ownership is linked to excess expense and lax effort (Akella and Greenbaum, 1988; Verbrugge and Jahera, 1981; Hannan and Mavinga, 1980). Likewise, most MFOs lack depositors or creditors to act as monitors (Poyo, Gonzalez-Vega, and Alfred, 1993). Donors do not spend their own money, so they do not act like owners. This framework may cut the cost of tracking the efforts of workers, but it cannot give MFOs owners in the first place.

Second, MFOs have some market power as a source of formal loans and deposits for the poor. This can protect workers from the market forces that select against those who spend too much and sweat too little (Gropper and Oswald, 1996).

Third, the markets for funds and for workers are not perfect. Donors do not entrust their own funds to MFOs, nor do they know the workers they hire. Donors cannot swoop down on an MFO once a year and snoop enough to know whether bad results come from waste or from factors workers cannot control. Donors fund MFOs and hire workers on behalf of the poor without knowing the price they pay nor the product they buy.

Fourth, workers may scavenge from an MFO once it shows signs of collapse. Like workers at bankrupt banks (Gropper and Beard, 1995), workers at weak MFOs tend to gobble perks while they still have the chance. This weakens the MFO more and more.

Some workers at some MFOs are not lazy. The high operating costs that mark most MFOs may come not from waste but from the cost of good service to a new, difficult market niche (Basch, 1987). The desire to help a target group could constrain the urge to shirk (Keating and Keating, 1992). Market power and/or disperse ownership is not always linked to waste (Krinsky and Thomas, 1995; Blair and Placone, 1988). The issue is that no group of stakeholders in an MFO has the power and the incentives to control workers, and workers have few selfish reasons to do their best.

2. 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 the market *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, the opportunity cost of equity for the market *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 workers stop improving before they can attract owners. The result may be an MFO that serves fewer poor people with worse products.

B. Levels of performance for workers

The performance of an MFO can be seen as a sequence of four steps (Table 15 on page 146). 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, 1997a; 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 15 on page 146).

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, $(1-\overline{\beta}) \cdot (r-\pi-Div/E) \cdot E$
3. Financial self-sufficiency	= Financial self-sufficiency > 0
	− Risk premium public equity, $\overline{\beta} \cdot (r-\pi-Div/E) \cdot E$
4. Private profitability	= −(Subsidy S in the SDI) > 0

Table 15: Sequence of levels of performance from the point of view of workers

1. Accounting profitability

Accounting profitability is the lowest level of performance from the point of view of workers. It requires positive accounting profit. It means the MFO met the obligations of its liabilities and maintained the nominal value of its net worth.

Most MFOs trumpet accounting profitability. This makes sense since not all MFOs reach this common milestone. The crux of the problem is that accounting profitability is misleading or meaningless when an MFO gets profit grants (Appendix E on page 226). 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 in spite of help from donors. It is shrinking in real terms and in 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 from the point of view of workers. It implies positive true profit before taxes and dividends. An operationally profitable MFO could have met its obligations and kept its nominal size without donors. But such an MFO might still shrink in real terms.

3. Financial self-sufficiency

Financial self-sufficiency is the third level of performance from the point of view of 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 met its obligations without shrinking 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 work to strengthen the other parts of sustainability (Figure 3 on page 65). 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 from the point of view of workers. A privately profitable MFO has enough true profit to replace subsidized funds with market funds without shrinking in real terms. Private profitability for workers is the same as private profitability for investors. It mirrors subsidy in the SDI.

Investors check private profitability with the NPC_I or with the SDI. Workers might not check private profitability at all once they reach financial self-sufficiency. 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 the market r. The opportunity cost of equity r exceeds inflation π since investors want a positive real return.

C. Examples of financial self-sufficiency

1. BancoSol

Workers at BancoSol secured their jobs with financial self-sufficiency in 1994-96 (line o of Table 16 on page 151). 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 16 on page 151). BancoSol needed to double true profit after tax to reach private profitability. The shortfall is the subsidy of the SDI (line v of Table 6 on page 109). The shortfall may reflect the conflict between the goals of workers and investors. The framework predicts that workers have few selfish reasons to push past financial self-sufficiency to private profitability.

2. Grameen

In spite of small accounting profits in most years, Grameen was not once operationally profitable, financially self-sufficient, or privately profitable (lines f, j, o, and q of Table 17 on page 152). 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 replaced equity lost to inflation 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 9 on page 116).

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 are not likely to stop 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 relieved workers of the need to push for even operational profitability, let alone for financial self-sufficiency.

I still think Grameen could reach financial self-sufficiency. I am not saying 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 self-sustainable as long as it could make the changes needed for financial self-sufficiency 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 information 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.	Average equity w/o subsidies	Data	37	172	236	1,003	2,049	4,504	7,622	8,617	5,981	6,652
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.	Tax	Data	0	0	0	0	0	0	2	324	205	365
l.	Dividends, Div	Data	0	0	0	0	0	0	0	0	0	0
m.	Inflation effect on equity	b*c	1	8	10	56	62	117	182	228	148	214
n.	Risk premium private equity	(1-d)*(a-b-l/c)*c	0	0	0	0	0	103	378	490	379	356
o.	**Financial self-sufficiency**	j-(k+l+m+n)	(114)	(165)	(328)	(351)	(288)	(494)	(553)	254	88	525
p.	Risk premium public equity	d*(a-b-l/c)*c	16	58	93	283	490	928	1,511	1,747	1,395	1,648
q.	**Private profitability**	o-p	(130)	(223)	(421)	(634)	(779)	(1,422)	(2,064)	(1,493)	(1,308)	(1,124)

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

Table 16: 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 17: Grameen financial self-sufficiency for workers, 1983-94

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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 from the point of view of 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 project of like risk meant to help the poor. 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 NPW from the point of view of the poor.

Instead of benefit-cost analysis, I suggest cost-effectiveness analysis. CEA compares cost with the poor to output in a test of bang-for-the-buck. CEA can count outputs both from deposits and from loans. The test of bang-for-the-buck tells the gains the poor require to offset their costs. If benefits exceed costs, then the MFO is 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 measurement of cost and its comparison to outputs used by the poor will push an MFO to help the poor more.

The poor want to measure worthwhileness in the long run. The two most important time frames are from now onward and from birth onward. The first time frame from now onward tells whether the extra gain to the poor caused by more subsidized funds now exceeds the cost of the funds. CEA from now onward can help allot funds among MFOs or to force an MFO slotted to get funds to plan to meet concrete goals.

The second time frame from birth onward tells whether a new MFO whose life matched an existing MFO would likely be worthwhile. CEA from birth onward can also help allot funds between MFOs and other ways to help the poor. For example, if most MFOs would not have been judged as worthwhile as seen from the time of their birth, then the poor might want to shift funds out of MFOs unless they can make a strong case that MFOs will improve enough to reverse this soon.

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 differs from the NPC_I in three ways. First, the NPC_P uses not the opportunity cost of equity for the market *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 injected into 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 portion 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, donors or governments 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 vaccination 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 or 12 percent per year in real terms (Katz and Welch, 1993; Gittinger, 1982; U.S. Office of Management and Budget, 1972). The opportunity cost of the poor 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. If all analyses use the same opportunity cost, then analysts can compare costs across MFOs. “A discount rate lower than 10 percent might be difficult to justify” (Belli, 1996b, p. 148). The burden of proof for some other opportunity cost is on the analyst (Gittinger, 1982).

In practice, the exact number used as the opportunity cost of the poor 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. The chosen rate should also be high enough that the projects that pass the test exhaust all earmarked funds (Gittinger, 1982). This view takes the opportunity cost as a way to allocate scarce funds from a budget rather than as a true opportunity cost (Belli, 1996b; Russell, 1986).

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 as the rate of inflation. This is too low since this implies a real opportunity cost of zero

(Appendix F on page 228). This would mean the marginal development project does not help nor harm the poor at all.

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 BCA or CEA for risk (Belli, 1996b; Norgaard and Howarth, 1992; Markandya and Pearce, 1991). Instead, the analyst should assign weights to the outcomes that could happen or that could have happened and then find an expected NPC_P (Little and Mirrlees, 1974; Dasgupta, Sen, and Marglin, 1972). This requires a lot more information than the typical 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.

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

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: Given all goes as planned, will more subsidies cause more benefits than costs? The answer can help allot funds now, both among MFOs and among MFOs and other development projects. 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 answer may also help judge microfinance as a whole. If an average MFO would not have been seen as worthwhile at the time of its 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.

Like investors, the poor look at projects in the long term. Both the NPC_I and the NPC_P measure 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 later years will more than compensate for costs in the first few 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. No one would call a dam 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 formula of the NPC_P is constructed in the same way as the NPC_I. The formulae differ in two ways. First, the poor do not use the opportunity cost of equity for the market r but rather the opportunity cost of equity for the poor ρ. Second, if an MFO has some private shareholders, then not all of the net worth in an MFO at the end of the time frame will revert to the budget of the poor.

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:

$$\text{Discount rate for the poor} = \frac{1}{1 + \text{Opp. cost equity for the poor}},$$
$$\delta_{P1} = \frac{1}{1+\rho_1}. \tag{48}$$

Given a stream of opportunity costs for the poor 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:

$$\delta_{Pt}^{t-n} = \left(\frac{1}{1+\rho_t}\right)^{1-n} \cdot \prod_{j=1}^{t-1} \left(\frac{1}{1+\rho_j}\right). \tag{49}$$

As with the NPC_I, I use a factor γ_P to discount a flow that accrues through a year (Appendix I on page 242).

From the point of view of the poor, outflows of funds from their budget to an MFO are costs. Inflows of funds back to their budget from an MFO are benefits. 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:

$$\text{NPC}_\text{P} \text{ start net worth} = \beta_0 \cdot \delta^0_{P0} \cdot E_0 = \beta_0 \cdot E_0. \tag{50}$$

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 I on page 242). Given the definition of fresh funds (equation 22 on page 87), the discounted cost of these outflows from the poor to the MFO during the time frame is:

$$\begin{aligned} \text{NPC}_\text{P} \text{ new injections} &= \sum_{t=1}^{T} \gamma_{Pt} \cdot [DG_t + PC_{pub_t} + RG_t + D_t \cdot (m_t - c_t) + DX_t], \\ &= \sum_{t=1}^{T} \gamma_{Pt} \cdot (FF_t - PC_{pri_t}). \end{aligned} \tag{51}$$

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:

$$\text{NPC}_\text{P}\ \text{dividends} = \sum_{t=1}^{T} \beta_t \cdot \delta_{Pt}^{t} \cdot Div_t. \tag{52}$$

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. Final 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 $\delta_{PT}{}^{T}$:

$$\text{NPC}_\text{P}\ \text{end net worth} = \beta_T \cdot \delta_{PT}^{T} \cdot [E_0 + \sum_{t=1}^{T} (FF_t + TP_t - Div_t - Tax_t)]. \tag{53}$$

The NPC_P adds discounted outflows (equation 50 on page 160 and equation 51 on page 160) and subtracts discounted inflows (equation 52 on page 161 and equation 53 on page 161):

$$\begin{aligned}
\text{NPC}_\text{P} &= \text{Discounted outflows} - \text{Discounted inflows}, \\
&= \beta_0 \cdot E_0 + \sum_{t=1}^{T} \gamma_{Pt} \cdot (FF_t - PC_{pri_t}) - \sum_{t=1}^{T} \beta_t \cdot \delta_{Pt}^{t} \cdot Div_t \\
&\qquad - \beta_T \cdot \delta_{PT}^{T} \cdot [E_0 + \sum_{t=1}^{T} (FF_t + TP_t - Div_t - Tax_t)], \\
&= (\beta_0 - \beta_T \cdot \delta_{PT}^{T}) \cdot E_0 + \sum_{t=1}^{T} (\gamma_{Pt} - \beta_T \cdot \delta_{PT}^{T}) \cdot FF_t - \sum_{t=1}^{T} \gamma_{Pt} \cdot PC_{pri_t} \\
&\qquad - \sum_{t=1}^{T} (\beta_t \cdot \delta_{Pt}^{t} - \beta_T \cdot \delta_{PT}^{T}) \cdot Div_t - \beta_T \cdot \delta_{PT}^{T} \cdot \sum_{t=1}^{T} (TP_t - Tax_t).
\end{aligned} \tag{54}$$

The NPC_P has five terms (equation 54 on page 161). 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 of the NPC_P 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 of the NPC_P is private paid-in capital from investors. The second term counted private paid-in capital as if it came from the poor, so this term takes it out.

The fourth term of the NPC_P 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 worth of the inflow of dividends at the end of the time frame is in the next term.

The fifth term of the NPC_P 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 benefit 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 benefits to customers exceed the NPC_P.

B. Comparing NPC_P to measures of benefits

The analyst can compare the NPC_P with measures of the welfare of customers with and without subsidies. 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 its output. Furthermore, subsidies before the birth of the MFO were sunk before its time frame started.

The with-versus-without comparison is less straightforward from now onward since it 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 the poor put in. 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).

The problem of measuring benefits is twofold. First, a negative NPC_P since birth is sufficient for worthwhileness from the point of view of the poor. But no one has documented an MFO with a negative NPC_P since birth. Thus measures of worth to the poor require measures of the surplus of customers with the MFO versus without it.

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 constrained from using the MFO but just like the people who do use it.

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. The high costs and the hard knocks are well-known (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 loan proceeds themselves but rather from their lower cost to the customer. Furthermore, borrowers do not have the same traits as non-borrowers unless lenders disburse loans at random or unless non-borrowers cannot get loans due to some external constraint. This means the analyst must match the traits of the control group to the traits of the customers. Without such a control group, the analyst cannot measure the change in customer welfare caused by an MFO.

Once analysts understood these problems, disciplined work to measure the impact of MFOs went dormant. Instead of working to solve the problems, some analysts claimed it was better not to try to measure impact at all since it was so difficult to do 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.

Measuring 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 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 finding a valid control group. The problem is not the fungibility of money, in contrast to Adams and Von Pischke (1992) and Von Pischke and Adams (1980). Control groups control for fungibility.

It is difficult to find a valid control group since those who choose to use an MFO differ from those who choose not to use it. Those who prosper with an MFO are exactly those most likely to prosper without an MFO. For example, users may work more, risk more, or seek rent more than non-users. In the same way, those who choose not to use an MFO likely would not do so well with or without an MFO. A comparison of users to non-users overstates the impact of the MFO. It assumes the MFO causes all the differences between users and non-users. In fact, users and non-users already differ.

This is the classic sample-selection problem in program evaluation (Morduch, 1997b; Moffitt, 1991). The problem is to distinguish between the results caused by the

MFO and the results caused by the unique innate traits of its customers. To make matters worse, most of these traits are difficult to measure.

The analyst must model the sample-selection process or use a control group to control for observed and unobserved traits. Panel data might let the customers in the past control for the unobserved traits of the customers now.

The impact studies listed above estimate the effect of specific MFOs on specific outcomes. But a measure of the effect of an MFO on one outcome is not the same as a measure of all of the effects of an MFO on the welfare of customers. I doubt analysts will ever plumb the full depths of the impact of an MFO on 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, these caveats do not preclude measuring some impacts for some MFOs. The job is difficult, but not as difficult as once thought. But it is still too difficult to use to allot funds to most MFOs.

These problems highlight the worth of CEA. Unlike measuring benefits, measuring costs is cheap. Measuring outputs is also cheap. In most cases, a BCA of BCA versus CEA would find that measuring costs but not benefits with CEA is better than measuring both costs and benefits with BCA. This is the premise behind the suggested use of measures of CEA as cost to the poor per unit of output. Whether analysts use BCA or CEA, they still must measure costs.

CEA leaves out half the story since it measures costs but not benefits. 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. Measuring costs is the first step in the wise use of public funds.

C. Cost-effectiveness analysis

Benefit-cost analysis is the standard way to check whether the benefits of a public project exceed the costs. Let *B* stand for the total flow of benefits of an MFO in a year. Subsidizing the MFO helps the poor more than the best other project as long as the discounted stream of benefits caused by the subsidies exceeds the NPC_P, the discounted stream of costs due to subsidies (equation 54 on page 161):

$$\begin{aligned} 0 &\leq \text{Discounted stream of benefits} - \text{Discounted stream of costs}, \\ &\leq \sum_{t=1}^{T} \gamma_{Pt} \cdot B_t - \text{NPC}_\text{P}. \end{aligned} \tag{55}$$

If BCA were free, then analysts would use it to check each contemplated transfer of funds to an MFO. But measuring benefits costs a lot. In contrast, measuring costs with the NPC_P is cheap.

Cost-effectiveness analysis (CEA) has a role when full-blown BCA 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 (Appendix K on page 253; Gittinger, 1982).

CEA measures the cost to the poor per unit of output in a test of bang-for-the-buck. 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 an MFO would pass a benefit-cost test.

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 (Appendix K on page 253). In the case of an MFO like Grameen that produces both financial and non-financial outputs, output might be measured as years of membership. Holding constant the output and the customers of an MFO and ignoring secondary benefits and costs, the cheaper an MFO produces a unit of output, the better.

CEA is the standard way to measure worth when the analyst can measure costs but not benefits (Brent, 1996; Levin, 1983; 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 (Goldman, 1967). 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 (Stockfisch, 1987). 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.

CEA measures cost to the poor per unit of output. The test of bang-for-the-buck compares this with the gain to the poor per unit of output expected by the analyst. The test of bang-for-the-buck answers the question asked by the poor: How much benefit per output would offset costs? Examples of tests of bang-for-the-buck in development finance are Binswanger and Khandker (1995) and Gale (1991).

CEA is not as useful as full-blown BCA. 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. But CEA costs less than BCA.

People must discuss whether unknown average surplus is high enough for an MFO to pass a test of bang-for-the-buck. People judge how big is big with talk (McCloskey, 1983). But human talk is not groundless opinion. It is reasoned persuasion based on measurement, logic, and theory.

1. A lower bound on average surplus

With CEA, the analyst does not measure average surplus. I suggest a lower bound on average surplus of zero as long as an MFO gets repeated use from customers. People may get fooled once, but, at least in the long term, they know what they like.

Zero is not a trivial bound. It means repeated use by customers answers the question: Does an MFO help customers? The answer does not require a measure of impact but rather of repeated use. Analysts should measure benefits only when they want to know their level. When they want to know their sign, they can measure repeated use.

This lower bound leads to another important result. If the NPC_P from birth is less than zero and if an MFO gets repeated use from customers, then the benefits of the MFO to the poor must exceed its costs to the poor. A negative NPC_P means the MFO does not consume the budget meant for the poor, and repeated use means poor customers benefit.

2. A higher lower bound on average surplus

In some cases, the analyst can place a better lower bound on surplus. Customers would not use an MFO unless it gave them more surplus than an alternative. Thus a lower bound on the extra surplus caused by an MFO is the cost savings between the MFO and an alternate source such as an informal lender as long as the cost of the alternate source is less than the willingness-to-pay of the customer. If customers have no alternative, then the lower bound reverts to zero. This is useful since measuring the costs of customers with the MFO and with their alternatives is cheaper than measuring benefits.

3. An upper bound on average surplus

In some cases, costs are so high that the analyst can judge that benefits are unlikely to exceed costs. For example, I doubt that an MFO is the best way to help the poor if it costs a dollar to lend a dollar. Even with the costs to find the poor and to give them a gift, the poor would likely gain more at less cost if donors just scrapped grossly wasteful MFOs and shifted their subsidies to direct grants for the poor.

No one knows how much surplus customers get from MFOs. But all else constant, lower costs to the poor per unit of output are better. Even though no one knows the worth of the output of an MFO, the poor should know 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. Measuring 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:

$$\text{Ave. cost to poor} = \frac{\text{Discounted stream of costs to poor}}{\text{Discounted stream of outputs}}. \qquad (56)$$

The NPC_P measures cost to 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 I on page 242. 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 the number 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 the number 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 J on page 248) and the factor α (Appendix H on page 237):

$$\text{Discounted flow from a stock} = \epsilon_t \cdot \alpha_t \cdot (S_{t-1} + S_t)/2. \qquad (57)$$

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

$$\text{Cost to poor per dollar-year of debt} = \frac{\text{NPC}_\text{P}}{\sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (LP_{t-1} + LP_t)/2}. \qquad (58)$$

1. A test of bang-for-the-buck

The test of bang-for-the-buck measures the surplus per unit of output σ required to make the discounted stream of benefits for the poor exceed the discounted stream of costs for the poor. This is just the cost to the poor per unit of output. The derivation of required surplus uses the fact that benefits *B* in the benefit-cost formula (equation 55 on page 167) are the surplus per unit of output σ multiplied by the number of outputs:

$$B_t = \sigma \cdot \text{Output}_\text{t}. \qquad (59)$$

Setting the benefit-cost formula (equation 55 on page 167) greater than zero gives:

$$\begin{aligned} 0 &\leq \text{Discounted stream of benefits} - \text{Discounted stream of costs}, \\ &\leq \sum_{t=1}^{T} \text{Discount factor}_\text{t} \cdot B_t - \text{NPC}_\text{P}, \\ &\leq \sum_{t=1}^{T} \text{Discount factor}_\text{t} \cdot \sigma \cdot \text{Output}_\text{t} - \text{NPC}_\text{P}, \\ \sigma &\geq \frac{\text{NPC}_\text{P}}{\sum_{t=1}^{T} \text{Discount factor}_\text{t} \cdot \text{Output}_\text{t}}. \end{aligned} \qquad (60)$$

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. The required surplus is then:

$$\sigma \geq \frac{\text{NPC}_\text{P} - \text{Discounted surplus from deposits}}{\text{Discounted output}}. \quad (61)$$

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 benefits 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 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 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 18 on page 176). The time frame starts in 1987 and ends with net worth reverting to its owners.

The net present cost to the poor of the use of funds in BancoSol was about $2.1 million in 1996 (line bb of Table 18 on page 176). The NPC_P was still growing in 1996, but the growth has slowed and may have peaked.

CEA compares the cost to 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 19 of page 177). 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. At BancoSol the average term lengthened from 1.6 months in 1987 to 5.2 months in 1996. The amount disbursed per loan changed from $157 to $695, and the average dollar-years of debt per loan grew from $16 to $237. The units of dollar-years of debt and loan-years of loans control best for these changes in the loan terms. A dollar-year of debt from BancoSol in 1987 is closer to a dollar-year of debt in 1996 than is a dollar disbursed in 1987 to a dollar disbursed in 1996.

The outputs of BancoSol used by the poor include both loans and deposits. I assume a surplus *d* of 2 cents per dollar-year of deposits (line q of Table 19 of page 177). Although the NPC_P 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 bang-for-the-buck from loan output that would offset the NPC_P since birth net of surplus to depositors fell through time. The most important example is the cost to the poor per dollar-year of debt. This cost fell from 76 cents for the two-year time frame of 1987-88 to 6 cents for the 10-year time frame of 1987-96 (line t of Table 19 on page 177). This means that 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 the poor. For BancoSol, my guess is that the willingness-to-pay of the average borrower did exceed interest, fees, and other costs by at least 6 cents per dollar-year of debt. The highest real interest rate paid by customers was 49 percent (line e of Table 28 on page 230). 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 per dollar-year of debt.

I assume a surplus on deposits d of 2 percent per year and a real, risk-adjusted opportunity cost to the poor ρ of 20 percent per year. The surplus needed to offset costs to the poor did not change much as ρ ranged from 2 to 30 percent and as d ranged from 0 to 15 percent (Table 20 on page 178). In the most conservative case with no surplus for depositors and ρ at 30 percent, the required surplus is 11 cents (bottom left corner of Table 20 on page 178). It seems to me that with reasonable levels of d and ρ, BancoSol was likely a good use of scarce development funds.

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
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
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 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-h*k	12	68	142	288	521	1,445	1,973	2,247	2,441	2,583
y.	Term 3	o	0	0	0	0	0	294	289	365	365	357
z.	Term 4	r-h*q	0	0	0	0	0	0	0	0	0	0
aa.	Term 5	h*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	1,449	1,926	1,936	2,052	2,098

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

Table 18: BancoSol net present cost to the poor 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	1,449	1,926	1,936	2,052	2,098
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 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, d	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 Poor since birth w/dep. libs**	a-r	104	243	446	644	876	1,427	1,860	1,749	1,752	1,691
t.	Cost to poor/dollar-years of debt	s/k	1.90	0.76	0.60	0.39	0.29	0.27	0.19	0.10	0.07	0.06
u.	Cost to poor/loan-years of loans	s/l	238	104	80	57	45	50	45	31	26	21
v.	Cost to poor/dollars disbursed	s/m	0.21	0.13	0.11	0.08	0.06	0.06	0.04	0.03	0.02	0.02
w.	Cost to poor/loans disbursed	s/n	33	24	24	19	16	18	17	13	11	9

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

Table 19: 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 20: 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 21 on page 183). 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 pretends that the poor decided to use their budget to buy Grameen from some other owner 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 21 on page 183). The discounted output of Grameen also grew each year (lines k, l, m, n, and p of Table 22 on page 184). The NPC_P of Grameen 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 22 on page 184). This cost fell to 10 cents for the time frame 1983-94. The cost to the poor per year of membership was $9-$10 until it fell to $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. I expect that the poor members of Grameen did get this much surplus.

a. Estimates of the impact of Grameen

The best study of the impact of an MFO was done for Grameen (Pitt and Khandker, 1996 and 1995). It controlled for the sample-selection problems that plague measures of impact. It found that annual household expenditure in 1991-92 increased $17 with each $100 borrowed since 1986 (Morduch, 1997a). Non-land assets increased $27 with each $100 borrowed, and the children of members went to school more. The effects were more pronounced for women than for men. Khandker (1997 and 1996) presents other measures of the impact of Grameen.

As proxies for willingness-to-pay for output from Grameen, these numbers require extreme care for six reasons. First, the effects cannot be added. For example, the effect on expenditure is a flow, and the effect on assets is a stock.

Second, they do not include all of the gains poor customers get from Grameen. For example, Grameen helps to empower women and to decrease births (Schuler, Hashemi, and Riley, 1997; Hashemi, Schuler, and Riley, 1996). No one has put a dollar value on these effects, and I doubt anyone can. No single number sums up all of the effects of Grameen.

Third, the measures are functions of random variables. Pitt and Khandker, however, do not report their standard errors.

Fourth, the effects are average, not marginal, in contrast to Khandker (1996). No one knows how Grameen affects annual household expenditure through the life of a member. No one knows whether the effects grow or shrink with time. The households sampled did not all join Grameen at the same time, so Pitt and Khandker mix the effects at different stages. The interaction of finance, wealth, and income changes at the levels of each change through time.

Fifth, a lower bound on the interest rate a household would be willing to pay is not $17 for each $100, in contrast to Morduch (1997a). Since most loans last one year, $17 per $100 disbursed translates to $34 per 100 dollar-years of debt. Borrowers pay Grameen interest on dollars outstanding, not on dollars disbursed.

Sixth and most important, the effects were measured as outcomes in 1991-92 compared with disbursements since 1986. All else constant, I doubt that $100 disbursed in 1992 to a new borrower has the same effect as for a borrower with loans since 1986 or before. The effect of the loan depends on its size and on the experience, wealth, and income of the borrower. These all change each other through time. Since the effect of loans on outcomes are not constant through the life of a member, the analyst cannot compare the effects measured by Pitt and Khandker to measures of cost.

Still, I think the evidence would convince most analysts 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.

b. 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 from

1983-94. For example, the average loan portfolio grew from \$2 million to \$253 million (line b of Table 22 on page 184). 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 does not change much as ρ ranges from 2-30 percent and as *d* ranges from 0-15 percent (Table 23 on page 185). This shows again the constancy of the performance of Grameen. With ρ at 30 percent and *d* at 0 percent, the cost to the poor per year of membership was \$9 (bottom left corner of Table 23). Given what has been documented of the impact of Grameen, this suggests to me that Grameen was likely a good use of development funds.

c. Discussion

I judge both BancoSol and Grameen as worthwhile from the point of view of the poor even though they are not privately profitable from the point of view of investors. The SDI and the NPC_I do not tell whether an MFO was the best way to help the poor. They answer the question of investors, not the question of the poor.

Do not use the estimates of cost to the poor per unit of output 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, rh**	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 21: Grameen net present cost to the poor 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 22: 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	$\boxed{8}$	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 23: 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 on the margin. 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 maximizing the welfare of the poor with maximizing 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 a USAID microfinance expert now on secondment to a microfinance group housed in the World Bank (Rosenberg, 1994). This goal is not at odds with the goal of the poor, but it does not match it exactly either. In practice, this goal may be too kind to donors since some of their workers may want to climb the career ladder and to enjoy perks more than they want to help the poor. 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 use of public funds 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 is improving 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. An MFO gets these matching funds 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 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” (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. Furthermore, donors may inflate their impact if they measure it as before-and-after rather than as with-and-without. 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 (Appendix N on page 275).

Even the poor might lose from more microfinance 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 (Appendix N on page 275). 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 in the best way. Suppose an MFO increases the welfare of the poor more than the best unfunded or underfunded development project. Then market leverage helps the poor just as long as they 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 or scope. Even if market leverage does reduce the surplus per customer, it increases the number of customers who get 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. Most private entities scrutinize their investments more than most donors and thus their seal of approval signals strong performance.

For example, private equity brings owners, and private debt brings quasi-owners. Both groups stand to lose if an MFO goes bankrupt. Like shareholders and creditors, depositors can help to monitor an MFO (Poyo, Gonzalez-Vega, and Aguilera, 1993). Private deposits also can help the poor. Taking deposits requires prudential supervision and regulation (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. Measuring 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. Measuring market leverage is a 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:

$$\text{Market leverage} = \frac{\text{Flow of output}}{\text{Flow of use of public funds}}. \qquad (62)$$

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 denominator but measured the flow of output as average assets.

1. Problems with this measure

This measure of market leverage has at least six weaknesses. First, it suffers from 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 in a time frame that starts at 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 come from the opportunity cost of the poor ρ since the public funds could have been used in some other development project.

Third, the measure should stretch to fit 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. Furthermore, donors expect more now from MFOs that got more in the past. Future performance matters because donors want the biggest bang from the bucks they disburse now. The horizon does not fall off the edge of the world after one year or even after five years.

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 do not want an MFO to use public funds to invest in a private firm, to make deposits, or to support excess fixed assets. They 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 combine the interest-free part of soft debt $D\cdot(1-c/m)$ with the subsidized funds in equity with no accounting expense.

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:

$$\text{Market leverage} = \frac{\text{Discounted flow of output}}{\text{Discounted flow of use of public funds}}. \tag{63}$$

Flow outputs include the number of loans disbursed or the amount of dollars disbursed. Stock outputs are converted to flows as average stocks in a year. 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 new measure discounts the flow accumulated at the end of each year by $\delta_{Pt}^{t-\omega}$ (Appendix I on page 242). For example, with output as the number of loans disbursed in a year:

$$\text{Discounted flow of output} = \sum_{t=1}^{T} \delta_{Pt}^{t-\omega} \cdot \text{Number of loans disbursed}_t. \tag{64}$$

For stock outputs, the formula discounts the average stock in each year by a factor ϵ (Appendix J on page 248). Given the factor α (Appendix H on page 237) and output as the flow of dollar-years of debt per year in the loan portfolio LP:

$$\text{Discounted flow of output} = \sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (LP_{t-1} + LP_t)/2. \tag{65}$$

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 $D{\cdot}(1-c/m)$:

$$\text{Discounted flow of use of public funds} = \sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (PF_{t-1} + PF_t)/2, \tag{66}$$

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 per year is:

$$\text{Market leverage} = \frac{\sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (LP_{t-1} + LP_t)/2}{\sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (PF_{t-1} + PF_t)/2}. \tag{67}$$

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 are 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 between an MFO at two ages or two MFOs at the same age.

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 use of public funds was about 2.2 (line u of Table 24 on page 198). 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 24 on page 198). The average portfolio in 1996 was about $36 million (line r of Table 5 on page 108). 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 used since birth.

A discounted measure of market leverage requires more judgement than a neat system such as the Rosenberg Scale (Von Pischke, 1996; Rosenberg, 1994). The problem is not the measure but the lack of established benchmarks. The measure must come first.

For now, the market leverage of 2.2 of BancoSol from 1987-96 may be high or low (line u of Table 24 on page 198). 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 and 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 use of public funds through the time frames started in 1983 and ended from 1987-94 was about 0.8 (line u of Table 25 on page 199). In the same stretch, Grameen produced about one discounted year of membership per 1/0.009 = 111 discounted dollar-years of public funds used (line v).

The flat market leverage through time result 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. Grameen takes deposits, but they are mostly small amounts from members. Likewise, Grameen does not borrow from private lenders or have private shareholders other than members. Until 1993, more than half its funds had a public source.

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 39 on page 273). 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 the funds of Grameen 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. Without more market leverage, the size of the public purse at some point 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 more output from its public funds if it had to. More market leverage would reduce the surplus of each poor customer now and may or may not increase the welfare of the poor from the output of Grameen in the long run.

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.	Opp. cost, soft debt for debt, m	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	741	1,376	3,472	5,242	11,177	12,892	8,993	8,864
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	173	179	210	133	(95)	(501)	725	(590)	(47)
n.	**End public funds, PF**	g+h+i+j+k+l+m	300	741	1,376	3,472	5,242	11,177	12,892	8,993	8,864	9,186
o.	Ave. public funds	a*(g+n)/2	89	521	862	2,097	3,431	5,551	8,573	10,220	7,374	7,726
p.	**Accum. disc. public funds**	p(t-1)+b*o	77	470	1,009	2,101	3,602	5,619	8,202	10,805	12,374	13,738
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	0.7	0.7	0.8	0.8	0.9	1.2	1.6	2.0	2.2
v.	Market leverage loan-years of loans	r/p	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	0.006
w.	Market leverage dollars disbursed	s/p	6.5	4.1	4.0	4.0	4.0	4.4	5.0	5.5	5.9	6.3
x.	Market leverage loans disbursed	t/p	0.042	0.021	0.019	0.016	0.015	0.014	0.013	0.013	0.013	0.013

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

Table 24: 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 25: 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 the concepts of sustainability in Chapter 4.

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 8 on page 203. 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. For example, an MFO that is privately profitable from now onward for investors is also financially self-sufficient for workers, but an MFO could be financially self-sufficient without being privately profitable.

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 fulfill the goals of any stakeholders except donors and customers. Investors, workers, and the poor 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 BCA.

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, stronger sustainability means more welfare for the poor. Thus good performance from all points of view helps an MFO to reach worthwhileness from the point of view of the poor.

A. Repeated use for customers

Repeated use shows that customers gain from an MFO. But it does not imply any other level of performance from any other point of view (Figure 8 on page 203).

Repeated use by poor customers does not mean that an MFO is worthwhile from the point of view of the poor. 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. While donors see poor customers, they do not see the mass of the poor who bear the cost of funds used by an MFO. This makes donors loath to withdraw support from an MFO even when it is not the best way to help the poor.

Repeated use does not imply worthwhileness, but worthwhileness implies repeated use. An MFO cannot make gains for the poor as a whole unless it first makes gains for its poor customers.

An MFO can get repeated use without having market leverage and without being self-sustainable, privately profitable, or financially self-sufficient. Yet all these levels of performance imply repeated use. 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

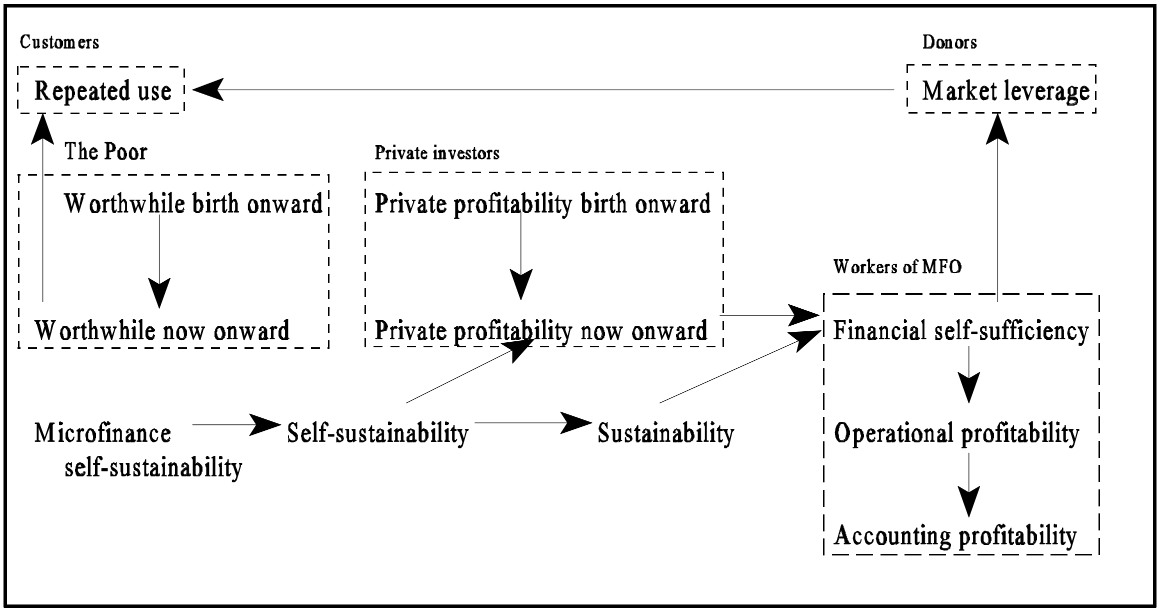

Figure 8: Links between measures of performance and of sustainability

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 8 on page 203). An MFO could not attract market funds without profits, and it could not get profits 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 allows an MFO to sell shares to investors, to borrow from private sources, and/or to take deposits. 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.

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. All else constant, more market leverage does mean more welfare for the poor, but the increased welfare may still not be enough to make an MFO worthwhile. Market leverage is not an end in itself nor necessarily a means to an end.

C. Financial self-sufficiency for workers

Financial self-sufficiency implies some market leverage and some repeated use since it requires some true profit (Figure 8 on page 203). It is necessary but not sufficient for sustainability. Sustainability also requires 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 for private profitability. The best way to do this is to buy shares in an MFO and then to act like owners. If donors do not own shares, they cannot threaten to close the MFO or to fire workers who do not aim for private profitability. Donors could also create owners in some other way.

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 of performance, and they do not fulfill any goal from any point of view. They just let workers or donors claim an MFO 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 8 on page 203). 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. If private profitability implied self-sustainability, then no private firms would go bankrupt.

Private profitability does not imply worthwhileness for the poor. The NPC_I measures the net present cost to investors of flows between them and an MFO. It does not measure benefits or costs to the poor due to subsidies for an MFO. 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 imply 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 may 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 8 on page 203).

Microfinance self-sustainability means an MFO meets it goals now and in the long term without public funds and without creep away from its market niche of the poor. All three views of self-sustainability start the time frame now.

Financial self-sufficiency is necessary but not sufficient for sustainability (Figure 3 on page 65, Figure 8 on page 203). Likewise, self-sustainability implies private profitability but not vice versa.

An unsustainable MFO might be the best way to help the poor. The lack of sustainability truncates the horizon and breeds perverse incentives, and this increases costs and decreases benefits for the poor, but an unsustainable MFO may still beat the best other project. Thus sustainability does not imply worthwhileness for the poor.

F. Worthwhileness for the poor

An MFO can be worthwhile for the poor without good performance from any other group except customers (Figure 8 on page 203). This is a problem since measures of worthwhileness with BCA cost a lot. Even with CEA, people can plead without evidence that a wasteful MFO makes the required surplus.

The problem is that quantitative measures cannot sift the wheat from the chaff. To discern whether an MFO makes the required surplus per unit of output 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, and market leverage still matter for worthwhileness from the point of view of the poor. A lack of necessity does not imply 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. A self-sustainable MFO serves more customers longer, and this will likely outweigh the losses in surplus per customer compared with an unsustainable MFO. Self-sustainability also helps to increase the number, quality, and scope of outputs.

CHAPTER 11

WEAKNESSES OF THE FRAMEWORK

"Forgive us our debts as we forgive our debtors" Matt 6:12

In this chapter, I list a few of the weaknesses of my work.

I skip the point of view of society. Society does not take the budget for development as given. Society earmarks funds for development since improved welfare for the poor meets some social goal. Subsidized MFOs may or may not be the best way to meet this goal. A good MFO resolves a market failure in a way that increases social welfare more than other ways. I do not see any practical way to check this quantitatively.

I punt the question of how to measure gains for the poor. The short answer is to use a control group. In practice, good control groups are rare, so the analyst must try to patch the gaps in the data with fancy econometrics.

The measures suggested here depend on the data fed to them (Schreiner and Yaron, 1997). Garbage in gets garbage out. Accounting data is seldom good, but I do not discuss how to repair it. Few MFOs follow GAAP. Even if they did, GAAP is not based on an economic logic of present worth. The analyst still must check and adjust the data.

I dump most of the work square on the analyst. The suggested quantitative measures can help, but the analyst must still make assumptions, check data, and decide what it all means. I cannot tell how to do qualitative analysis. Knowledge comes from human judgement and reasoned persuasion. Some questions that need answers do not have objective answers. Talk is to the search for truth what competition is to the search for social welfare. It keeps us honest.

I do not discuss how to know whether an MFO has kept its niche with the poor. I cannot say whether more welfare for the near-poor offsets less welfare for the hard-core poor. I do not talk about who the poor are. Decades of talk have yet to resolve this.

I do not count all the subsidies an MFO gets. For example, a lot of the funds earmarked to help the poor pay for the overhead of the donor. I overlook this and focus just on the funds injected in the net worth of the MFO.

I ignore externalities, the secondary costs and benefits of subsidized MFOs. For example, an MFO may take business from informal lenders. These lenders might be poor themselves, but whatever their wealth, the subsidized MFO decreases their welfare. I also ignore positive externalities. For example, I do not count benefits to non-customers.

I do not tell how to measure the depth, breadth, and quality of outreach.

I do not compare BancoSol and Grameen. I do not try to analyze the reasons for their performance as measured here since it would quadruple the work. The suggested measures assume all else is constant. To compare MFOs, the analyst must control for the fact that all else is not constant. The framework offers standardized measures, but the analyst must judge what they mean.

APPENDIX A

THE PARABLE OF THE SUBSIDIZED SERVANT

Measuring 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. It was said that such a servant would have a subsidy-adjusted return on equity (SAROE) of r. With constant flows, $\alpha = 1$ (Appendix H on page 237), and an SAROE of r would mean true profit of (equation 34 on page 103, equation 27 on page 91, equation 17 on page 83, and equation 22 on page 87):

$$\begin{aligned}
\text{SAROE} &= r, \\
(TP - Tax)/E &= r, \\
0 &= r \cdot E - (1-\tau) \cdot TP, \\
0 &= r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot \Delta E - (1-\tau) \cdot TP, \\
0 &= r \cdot E_0 + r/2 \cdot FF - (1 - r/2) \cdot (1-\tau) \cdot TP, \\
TP &= \frac{r \cdot E_0}{(1-r/2) \cdot (1-\tau)}.
\end{aligned} \tag{68}$$

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 instead of with this servant.” But the rich man was fair, and he knew he had asked the servant just for some profit. “Well done, good and faithful servant,” sighed 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 halfway through the year. In fact, the rich man got it at the end of the year. He heard of second yardstick called the present cost for investors of flows of funds ($\mathrm{NPC_I}$). The normal servant in the market would have an $\mathrm{NPC_I}$ of zero. Such a servant would give the rich man $E_0 + (r{\cdot}E_0)/[(1-r){\cdot}(1-\tau)]$ at the end of the year in exchange for the use of E_0 through the course of the year (equation 47 on page 128):

$$\begin{aligned} 0 &= \mathrm{NPC}_{\mathrm{I}}^{1\ \text{year}}, \\ 0 &= r \cdot E_0 + r/2 \cdot FF - (1-r)\cdot(1-\tau)\cdot TP, \\ TP &= \frac{r \cdot E_0}{(1-r)\cdot(1-\tau)}. \end{aligned} \tag{69}$$

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 a NPC_I of zero. I could have gotten more than what you offer from a servant with an NPC_I of zero (equation 68 on page 210 and equation 69 on page 211):

$$E_0 + (r \cdot E_0)/[(1-r) \cdot (1-\tau)] > E_0 + (r \cdot E_0)/[(1-r/2) \cdot (1-\tau)],$$
$$1-r/2 > 1-r,$$
$$r > r/2.$$

“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 B

EVA, AN SDI FOR FOR-PROFIT FIRMS

The SDI measures the financial performance of an MFO as the opportunity cost of its capital less the profit that could pay for that capital. This is the same concept as Economic Value Added (EVA), a new measure used by for-profit firms (*The Economist*, 1997b; Tully, 1994 and 1993).

Like the SDI, EVA uses shadow prices with accounting data to measure performance in the short-term. EVA does not discount cash flows.

Boiled down, EVA computes the capital used by a firm as its net worth plus the expenses that are investments in intangible assets that bear fruit in the long term. Examples are goodwill or research and development. EVA subtracts the opportunity cost of this capital from accounting profit. The result is the economic value added, the wealth created or destroyed by the use of capital in the firm instead of elsewhere.

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 is 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).

Invented by the consulting firm Stern Stewart, EVA guides managers at firms such as Wal-Mart, Coca-Cola, AT&T, and Proctor & Gamble. Like the SDI, EVA "takes into account a factor no conventional measure includes: the total cost of capital" (Tully, 1993). One analyst said, "Capital looks free to a lot of managers. It doesn't look free to the investors who hand them the money" (Tully, 1993). If the managers of a for-profit firm can forget the opportunity cost of capital, then so can donors or workers in an MFO.

Like the SDI, EVA is simple. Some new measures—for example, Total Shareholder Return and Cash Flow Return on Investment—answer the question asked by shareholders better than EVA. Like the NPC_I, these measures discount flows. They tweak the accounts more than EVA and so are more difficult to teach to managers.

Like the SDI, EVA boosts performance by measuring it. Firms have leapt ahead by linking rewards for managers to EVA. One CEO said, "EVA makes managers act like shareholders" (Tully, 1993). Likewise, if donors wanted an MFO to attract private owners, then they could reward workers based on the SDI or the NPC_I.

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 C

THE DENOMINATOR OF THE STANDARD SUBSIDY DEPENDENCE INDEX

The standard SDI (Yaron, 1992a and 1992b) is not the percentage change in revenue from lending that would drive subsidy to zero. To have this meaning, the denominator of the standard SDI should be not $LP \cdot i$ but rather $LP \cdot i \cdot (1 - r \cdot \alpha/2)$. In this appendix, I show this with an example based on Schreiner and Yaron (1997).

Suppose the opportunity cost of the equity for the market r is 0.1, start equity E_0 is 0, direct grants DG are 1,400, public paid-in capital PC_{pub} is 200, revenue grants RG are 400, discounts on soft debt $D \cdot (m - c)$ are 10, discounts on expenses DX are 100, accounting profit AP is 200, and revenue from lending $LP \cdot i$ is 400. Private paid-in capital is zero. With just year-end financial statements, $\alpha = 1$ (Appendix H on page 237). True profit TP (equation 8 on page 56) is:

$$
\begin{aligned}
TP &= AP - [RG + D \cdot (m - c) + DX], \\
&= 200 - (400 + 10 + 100), \\
&= -310.
\end{aligned}
$$

The measure of subsidy *S* is:

$$
\begin{aligned}
S &= r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot[DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX + TP] - TP,\\
&= 0.1\cdot 1\cdot 0 + 0.1\cdot 1/2\cdot[1{,}400 + 200 + 0 + 400 + 10 + 100 + (-310)] - (-310),\\
&= 0.05\cdot 1{,}800 + 310,\\
&= 400.
\end{aligned}
$$

Given *S*, the standard SDI is (equation 11 on page 80):

$$\text{Standard SDI} = \frac{S}{LP\cdot i} = \frac{400}{400} = 1.00.$$

The SDI (equation 26 on page 89) is higher than the standard SDI:

$$\text{SDI} = \frac{S}{LP\cdot i\cdot(1 - r\cdot\alpha/2)} = \frac{400}{400\cdot(1-0.1\cdot 1/2)} = \frac{400}{400\cdot 0.95} = 1.05.$$

The SDI should be the percentage increase in revenue from lending that would wipe out subsidy. Suppose the MFO did increase revenue from lending by 100 percent, the value of the standard SDI. All else constant, revenue from lending would increase to 400·(1+1.00) = 800 (equation 30 on page 95). The increase in revenue would increase true profit from -310 to -310+400 = 90. Yet subsidy is not zero:

$$
\begin{aligned}
S &= r\cdot\alpha\cdot E_0 + r\cdot\alpha/2\cdot[DG + PC_{pub} + PC_{pri} + RG + D\cdot(m-c) + DX + TP] - TP,\\
&= 0.1\cdot 1\cdot 0 + 0.1\cdot 1/2\cdot[1{,}400 + 200 + 0 + 400 + 10 + 100 + 90] - 90,\\
&= 0.05\cdot 2{,}200 - 90,\\
&= 20.
\end{aligned}
$$

The standard SDI after doubling revenue from lending is:

$$\text{Standard SDI} = \frac{S}{LP \cdot i} = \frac{20}{800} \doteq 0.03.$$

Suppose the MFO increased revenue from lending by 105 percent. Revenue from lending would change from 400 to 400·(1+1.05) = 820 (equation 30 on page 95), and true profit would change from -310 to -310+420 = 110. Within rounding error, subsidy is zero:

$$\begin{aligned} S &= r \cdot \alpha \cdot E_0 + r \cdot \alpha / 2 \cdot [DG + PC_{pub} + PC_{pri} + RG + D \cdot (m - c) + DX + TP] - TP, \\ &= 0.1 \cdot 1 \cdot 0 + 0.1 \cdot 1/2 \cdot [1{,}400 + 200 + 0 + 400 + 10 + 100 + 110] - 110, \\ &= 0.05 \cdot 2{,}220 - 110, \\ &= 1. \end{aligned}$$

Within rounding error, the amended SDI is also zero:

$$\text{Amended SDI} = \frac{S}{LP \cdot i \cdot (1 - r \cdot \alpha / 2)} = \frac{1}{820 \cdot (1 - 0.1 \cdot 1/2)} = \frac{1}{820 \cdot 0.95} \doteq 0.00.$$

APPENDIX D

OPPORTUNITY COSTS FOR THE MARKET

In this appendix, I present a framework based on Benjamin (1994) to find the opportunity costs of debt and equity for the market. Schreiner and Yaron (1997) and Benjamin (1994) discuss the framework and give numerical examples. Gonzalez-Vega *et al.* (1997b) and Schreiner and Gonzalez-Vega (1995) use the framework.

MFOs that can take deposits might replace soft debt with deposits. If the analyst can make a case for this, then the opportunity cost of soft debt for the market m is the rate paid on deposits now plus a mark-up for the cost to handle more deposits (Yaron, 1992b).

In practice, most MFOs will replace soft debt with private debt. This holds even for those MFOs that can take deposits by law. In this case, I take the opportunity cost of private debt m as the prime rate in the local market plus a premium for risk.

I assume private equity would replace all subsidized funds in equity. In line with Benjamin (1994), I take the opportunity cost of equity for the market r as the opportunity cost of private debt m plus a premium for risk. In principle, an MFO might scrimp to replace some subsidized funds with private debt. In practice, however, this is rare. Even with equity propped up with subsidized funds, most MFOs are too weak to borrow on the market. Furthermore, lenders would prefer not to lend at all than to adjust interest rates more than a few percentage points to compensate for extra risk.

1. The price of market debt *m*

a. When deposits will replace soft debt

An MFO that can take deposits might replace soft debt with deposits. If the analyst can make a case for deposits as the source of funds at the margin for an unsubsidized MFO, then the opportunity cost of soft debt for the market 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). In practice, an MFO could not take more deposits than it takes now unless it paid more than it pays now.

b. 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 the market m is the local prime rate plus a premium for risk. Most MFOs are far riskier than the blue-chip borrowers who can get the prime rate.

i. Age affects the price of market debt

Younger MFOs pay more for market debt. All else constant, young MFOs are riskier than old MFOs since lenders do not know them as well and since young MFOs are more apt to collapse. Benjamin (1994) suggests a premium for age of $2/Y$ percentage points, where Y is the age of the MFO in years.

ii. Profit affects the price of market debt

MFOs with profit pay less for market debt since more profit means less risk of default. Benjamin (1994) captures this fact with a rule: If the MFO has an ROE of less than zero, then add three percentage points. If ROE is more than zero but less than the prime rate, then add two percentage points. If ROE is more than the prime rate but less than twice the prime rate, then add one percentage point. Otherwise, add nothing.

The estimated opportunity cost of soft debt for the market *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). After all, most MFOs could not borrow at the prime rate, nor could they attract equity at the rate of return of the average firm traded in a stock exchange in the United States.

2. The price of market equity *r*

Equity costs more than debt since it is riskier. Benjamin (1994) takes the opportunity cost of equity for the market *r* as the opportunity cost of soft debt for the market *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:

$$\text{Leverage} = \frac{\text{Average liabilities}}{\text{Average equity}}. \tag{70}$$

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 for bankruptcy 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 derive a formula that relates the opportunity cost of equity for the market r to market leverage L and to the opportunity cost of soft debt for the market m:

$$r = m \cdot (1.1 + 0.1 \cdot L). \tag{71}$$

For an MFO without debt, $L = 0$, and thus the cost of private equity would be $m \cdot 1.1$. For an MFO with nine times as much debt as equity, $L = 9$, and thus the cost of private equity would be $m \cdot 2$.

3. Example opportunity costs for the market

a. BancoSol

In 1993-96, the opportunity cost of soft debt replaced with deposits was 16-20 percent (line e of Table 26 on page 224). 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. This rate fell from 27-33 percent in 1987-90 to 19-22 percent in 1991-96 (line k).

The opportunity cost of equity for the market r was 27-33 percent in 1990-96 (line o). At the end of this stretch, the prime rate in Bolivia flattened out near 18 percent. The opportunity cost of equity for the market *r* of BancoSol rose in 1992-96 since more leverage meant more risk even as financial performance improved.

BancoSol applies IAS 29 (Appendix G on page 231) not with inflation in Bolivia but with the change in the exchange rate between the boliviano and the dollar. This change reflects not only inflation in Bolivia and in the United States but also pure devaluation or revaluation. BancoSol splits its funds between dollars and bolivianos, so it is not clear whether the nominal opportunity cost *r* should be adjusted 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 have not adjusted the nominal opportunity cost of equity *r*.

b. Grameen

For most of 1984-1994, Grameen paid 6-10 percent for deposits (line c of Table 27 on page 225). The opportunity cost of soft debt for the market *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 for the market *m* is the Bangladesh prime rate (line f) with premia added 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.

The opportunity cost of equity for the market *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 more than 22 dollars of liabilities for each dollar of equity (line n). By 1994, leverage had fallen to about

3. In the 1990s, the fall in leverage decreased the risk of Grameen. This more than offset the increase in the prime rate.

c. Discussion

The opportunity costs here are much higher than those in other analyses of BancoSol and Grameen. In the case of BancoSol, Agafonoff (1994) uses a rate of 11 percent for 1993. Mosley (1996) does not report his assumed opportunity cost.

In the case of Grameen, KK&K (1995) use the deposit rate in Bangladesh. This was about 14 percent from 1987-93 until it dove to 6 percent in 1994. Morduch (1997a) explains why this rate is too low. He uses a rate of 14-16 percent for 1987-94. Yaron (1992a) used a rate of about 15 percent for 1987-89. All these authors follow Yaron (1992a and 1992b) in that they use the same rate for both *m* and *r*. The opportunity costs for Grameen here are close to those in Benjamin (1994).

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 26: 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 27: Grameen opportunity costs for investors, 1983-94

APPENDIX E

HOW PROFIT GRANTS CHANGE PROFIT AND ROE

Donors can put subsidized funds in an MFO through equity grants (equation 1 on page 51) or through profit grants (equation 4 on page 53). The choice does not affect costs nor the amount of funds in the net worth of the MFO. Unlike equity grants, however, profit grants boost accounting profit and thus ROE. A dollar as a profit grant increases accounting profit and ROE; a dollar as an equity grant does not. The arbitrary distinction depends not on market forces but on accountants and administrators. This means donors and MFOs can use profit grants to inflate accounting profit and ROE as high as they want. Accounting profit and ROE depend on the form of subsidized funds, so they are not good measures of the financial performance of an MFO.

For example, suppose that an MFO starts with equity of $100 and that a donor injects $100 in an MFO at a smooth pace in a year. In the first case, the donor calls all $100 equity grants. Equity grants do not affect revenues or expenses, and the MFO posts an accounting loss of $50. Ending equity is the sum of starting equity, equity grants, and accounting profit. Average equity is [(100)+(100+100−50)]/2 = 125. ROE is

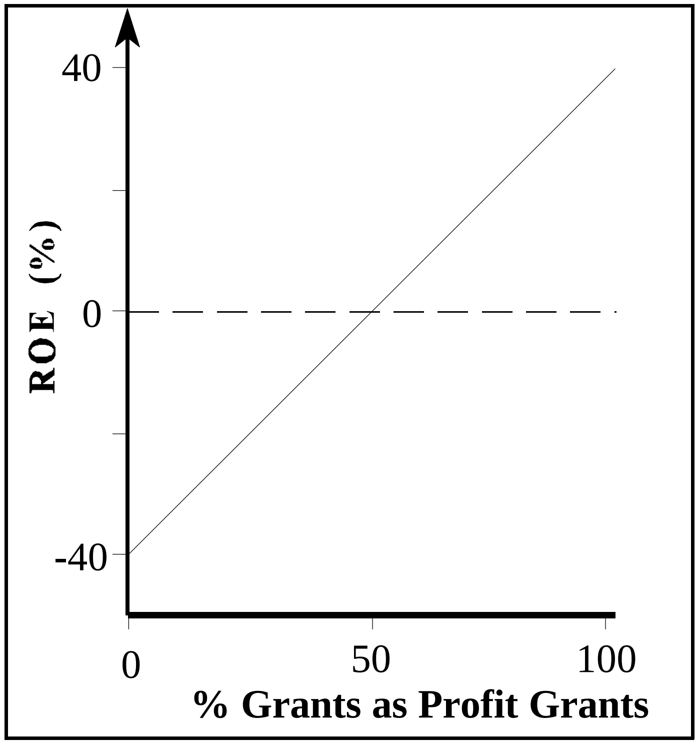

Figure 9: Example ROE as equity grants switch to profit grants

-50/125 = -0.40 (Figure 9 on page 227). In this first case, ROE is right to say that the MFO lost 40 cents for each dollar-year of equity used.

Now suppose the donor calls all $100 profit grants. Business performance does not change, but revenues increase and/or expenses decrease. The new accounting profit is $50. Average equity is still 125, but new ROE is 50/125 = 0.40 (Figure 9 on page 227). In this second case, ROE is wrong to say the MFO created 40 cents for each dollar-year of equity used.

APPENDIX F

HOW TO CONVERT BETWEEN REAL AND NOMINAL RATES

In this appendix, I give the formula to convert between real and nominal rates. I also show that the real yield on lending at BancoSol and Grameen changed much more than the nominal yield since the nominal yield did not change in step with inflation. These changes in the real yields did not seem to affect demand or default.

1. How to convert between real and nominal rates

A nominal rate R depends on a real rate r and on inflation π (IADB, 1994):

$$R = r + \pi + r \cdot \pi . \tag{72}$$

A real rate r can also be written as a function of a nominal rate R and inflation π:

$$\begin{aligned} R &= r + \pi + r \cdot \pi , \\ R - \pi &= r \cdot (1 + \pi) , \\ \frac{R - \pi}{1 + \pi} &= r . \end{aligned} \tag{73}$$

2. Demand, default, and real yields on lending

Inflation changes with time. If an MFO does not adjust its nominal yield on lending, then its real yield will change. Grameen and BancoSol are both examples.

a. Grameen

From 1984-94, Grameen had a nominal yield on lending of 12-19 percent (line c of Table 29 on page 230). Inflation ranged from 1-22 percent (line d), and thus the real yield ranged from -4 to 14 percent (line e). Yet repayment rates stayed above 90 percent, and the loan portfolio grew more than sevenfold (KK&K, 1995). Grameen changed the real yield since it did not change the nominal yield in step with inflation. Big changes in the real yield did not seem to affect demand and default.

b. BancoSol

The real yield at BancoSol changed through a wide range. It almost quintupled from a low of 11 percent in 1988 to a high of 49 percent in 1992 before it fell to 30 percent in 1996 (line e of Table 28 on page 230). Yet repayment and demand stayed high (lines a and b).

Line	Year ending Dec. 31		1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
a.	Est. recovery/year	Data	1.00	0.99	1.00	1.00	0.99	0.99	0.99	0.97	1.01	1.00
b.	Portfolio (net)	Data	0.2	0.5	1.2	3	5	12	31	36	37	47
c.	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
d.	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
e.	**Real yield on lending in year**	(c-d)/(1+d)	0.25	0.11	0.17	0.21	0.37	0.49	0.42	0.31	0.25	0.30

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

Table 28: BancoSol nominal and real yields on lending, 1987-96

Line	Year ending Dec. 31		1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
a.	Est. recovery/year	Data	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
b.	Portfolio (net)	Data	4	9	11	13	23	37	50	59	70	120	228	275
c.	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
d.	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
e.	**Real yield on lending in year**	(c-d)/(1+d)	(0.10)	0.10	(0.04)	0.03	(0.01)	0.04	0.02	(0.01)	0.12	0.14	0.11	0.11

Source: Based on KK&K (1995) and Hashemi (1997)
Monetary figures in millions of Dec. 1996 dollars.

Table 29: Grameen nominal and real yields on lending, 1983-94

APPENDIX G

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 a local 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 nominal 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 dollars at a point in time close to the present helps the analyst to compare numbers across countries. It also helps people to understand what the numbers mean. 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 H on page 237, Appendix I on page 242, and Appendix J on page 248).

1. Inflation and financial statements

Financial statements are the weak link in this framework (Schreiner and Yaron, 1997). They use accounting rules for tax purposes. Tax logic is seldom economic logic. Accounting data were not meant to measure costs in terms of net present worth.

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 describe how to do this. International Accounting Standard (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 shortcuts. Christen (1997) steps through an example for an MFO. Shadow prices applied to data adjusted as in IAS should be in real terms (equation 72 on page 228). The use of nominal shadow prices with data adjusted for IAS 29 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.

2. 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. This constant point in time should be near the present. Most often it will be the start or 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, the conversion factor is $\text{CPI}_T/\text{CPI}_t$. A unit of the local currency at time t has the same purchasing power as $\text{CPI}_T/\text{CPI}_t$ 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 of dollars per unit of the local currency at time T, EX_T. These two steps give:

$$\text{Stock}_\text{t} \text{ in constant dollars} = \theta_t \cdot \text{Stock}_\text{t} \text{ in nominal units of local currency}, \qquad (74)$$

where

$$\theta_t = EX_t \cdot (CPI_T / CPI_t).$$

For example, suppose that CPI_T is 400 and that CPI_t is 200. Inflation between t and T is 100 percent, and $\text{CPI}_T/\text{CPI}_t = 2$. Suppose that the exchange rate of dollars per unit of local currency at time T EX_T is 0.25. Thus one unit of local currency buys 0.25 dollars. Then θ_t is $EX_T \cdot (\text{CPI}_T/\text{CPI}_t) = 0.25 \cdot 2 = 0.5$. This means that one nominal unit of local currency at time t buys as much as 50 cents as of time T.

For BancoSol, the stock conversion factor θ is in line a of Table 30 on page 236. For Grameen, the factor θ is in line a of Table 31 on page 236.

3. 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 I on page 242). First, the pace might be constant. Second, the pace might be a share of a stock measured more often than accumulated flows.

a. 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:

$$\text{Flow}_\text{t} \text{ in units of constant dollars} = \lambda_t \cdot \text{Flow}_\text{t} \text{ in nominal units of local currency}, \quad (75)$$

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 analyst assumes that the flow accrues at a constant pace and that θ changes at a constant pace. Suppose that the time between t and $t-1$ were broken into $N\rightarrow\infty$ pieces and that a constant flow accrued to one unit by time t. One-nth of the flow would take place while the stock conversion factor θ was one-nth of the way from θ_{t-1} to θ_t. Likewise, one-nth would happen while θ was two-$n$ths of the way from θ_{t-1} to θ_t, and so on. The sum of these converted flows is the average of start and end stock conversion factors:

$$\lambda_t = \int_{t-1}^{t} [\theta_t + (\theta_t - \theta_{t-1}) \cdot (x - t + 1)]\, dx,$$
$$= (\theta_t - \theta_{t-1})/2.$$

b. 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 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:

$$\lambda = \sum_{n=1}^{N} \left(\frac{\theta_n + \theta_{n-1}}{2} \right) \cdot \left[\frac{(\theta_n \cdot S_n + \theta_{n-1} \cdot S_{n-1})/(2 \cdot N)}{\sum_{j=1}^{N} (\theta_j \cdot S_j + \theta_{j-1} \cdot S_{j-1})/(2 \cdot N)} \right]. \qquad (76)$$

For BancoSol, the flow conversion factor λ is in line b of Table 30 on page 236. I assumed that flows kept in step with the average loan portfolio. For Grameen, the factor γ is in line b of Table 31 on page 236. I had just year-end data for Grameen. For both BancoSol and Grameen, the λ for a year is between the start and end stock factors θ.

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 30: 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, Lambda	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 31: Grameen conversion factors, 1983-94

APPENDIX H

HOW TO ESTIMATE AVERAGE STOCKS

Financial ratios need estimates of average stocks to compare like with like. For example, ROE compares profit with the equity used to make profit. Like profit, the measure of equity must have units of dollars per year. Average annual equity has these units. Likewise, the discount on soft debt multiplies interest rates by average soft debt. Both interest rates and average soft debt have units of dollars per year.

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 when the analyst just has year-end measures of the stock but yet has frequent measures of some other stock such as the loan portfolio. I assume the stocks are already converted to constant dollars (Appendix G on page 231).

1. Estimated average stocks

Analysts cannot measure stocks each day. In any case, most MFOs balk at providing 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 of the stock between measurements. The most common assumption is a constant pace of growth. Exponential growth is also a good choice, but I do not discuss it here.

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 are not spread through the course of the year but rather come in all at once. The stock of loans may surge near holidays, planting, and harvest.

2. 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:

$$S = \sum_{n=1}^{N} \left(\frac{S_n + S_{n-1}}{2 \cdot N} \right). \tag{77}$$

In contrast to RC&H (1997), the average stock S with constant growth is not:

$$S = \sum_{n=0}^{N} \left(\frac{S_n}{N+1} \right).$$

Often analysts have just year-end data. In fact, most frameworks assume this. In this case, N = 1, and the average stock S boils down to half the sum of the start and end stocks (equation 77 on a page 238):

$$S = (S_1 + S_0)/2.$$

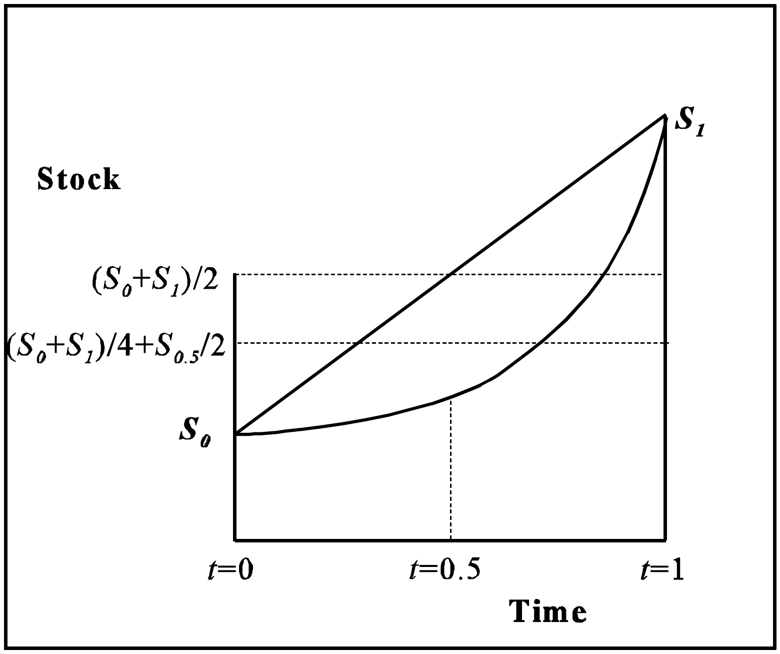

Figure 10: Average stocks with year-end data and with semi-annual data

If a stock changed at a constant pace, then it would follow a straight growth path (Figure 10 on page 239). 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 $(S_0+S_1)/2$.

Most stocks in most MFOs, however, do not grow at a constant pace. An example is the exponential growth path in Figure 10 on page 239. In this case, 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 exponential growth.

If the simple average with year-end is too far off, then quarterly or monthly data can help. Even semi-annual data can cut error a lot (Figure 10 on page 239).

3. Estimates with frequent measurements of some stock

Most MFOs will provide data at least on the monthly loan portfolio. An analyst might make a 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:

$$S = \alpha \cdot (S_0 + S_N)/2\,. \tag{78}$$

where

$$\alpha = \frac{\sum_{n=1}^{N} (LP_n + LP_{n-1})/(2 \cdot N)}{(LP_N + LP_0)/2}\,.$$

The factor α is the ratio of the average portfolio with N snapshots to the average portfolio with just two snapshots. This is $a/(a+b)$ in Figure 11 on page 241.

Year-end data correspond to $N = 1$. In this case, $\alpha = 1$, and the formula for an average stock S (equation 77 on a page 238) boils down to $(S_0+S_N)/2$.

With constant change, $\alpha = 1$. A more common case is faster growth at the end of the year, in which case $\alpha < 1$. Slower growth at the end of the year leads to $\alpha > 1$.

For BancoSol, the factor α is in line c of Table 30 on page 236. With monthly data, α ranged from 0.6 to 1.0. For example, in 1996 $\alpha = 0.86$. The average stock of $36.2

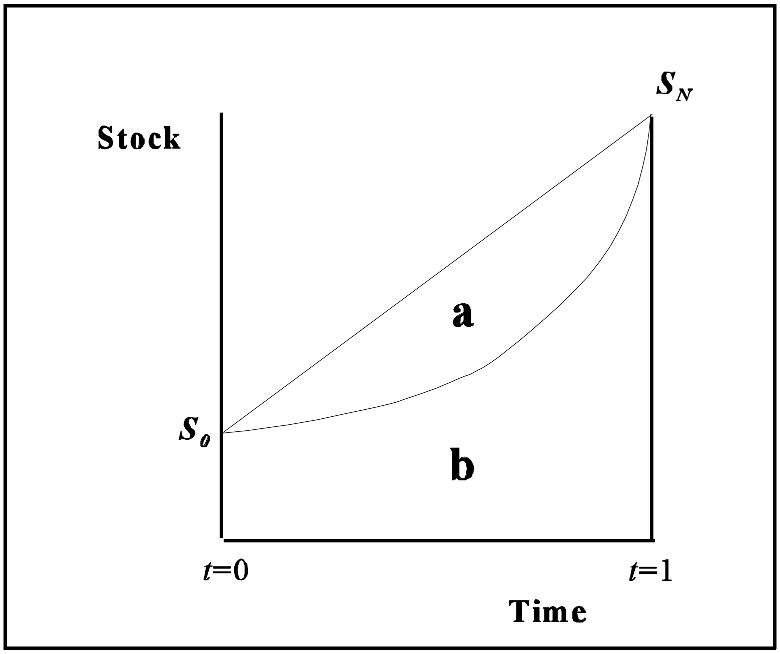

Figure 11: Growth path of a stock with N measures and with two measures

million with monthly data (line r of Table 5 on page 108) was 86 percent of the average stock of $42 million with year-end data (Table 35 on page 265).

For Grameen, the factor α is in line c of Table 31 on page 236. 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 G on page 231). I used monthly data for inflation and the exchange rate, and these did not change at a constant pace.

APPENDIX I

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 the amounts and the times of the flows of revenues and expenses and of the changes in stocks in the course of the year.

In this appendix, I suggest a way to discount flows that does not assume that they all took place at the start, the end, or the middle of the year and that does not require a list of all the flows in a year. The method works both 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 G on page 231).

1. 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 the time frame.

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:

$$\begin{aligned} \text{Present worth of flow} &= \sum_{n=1}^{N} \delta^{(t-n/N)} \cdot f, \\ &\doteq N \cdot f \cdot \int_{t-1}^{t} \delta^x \, dx, \\ &= N \cdot f \cdot \left(\frac{\delta^t - \delta^{t-1}}{\ln \delta} \right). \end{aligned} \tag{79}$$

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, $(\delta^t - \delta^{t-1})/(\ln \delta) \doteq \delta^{t-0.5}$ (Table 32 on page 244).

2. How to discount non-constant flows

An analyst might know flows in N intervals in a year. In the examples here, 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.

Parameters			Discount Factors		
t	r	δ	$(\delta^t-\delta^{t-1})/(\ln\delta)$	$\delta^{t-0.5}$	Difference
1	0.1	0.9091	0.9538	0.9535	0.0003
10	0.1	0.9091	0.4045	0.4044	0.0001
1	0.5	0.6667	0.8221	0.8165	0.0428
10	0.5	0.6667	0.0214	0.0212	0.0002

Table 32: The equivalence of two discount factors for flows

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 in this framework for the fresh funds injected in net worth.

a. 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. I use an example with semi-annual data (Figure 12 on page 246). The flow in the first six months f_1 accumulated to 1 at a constant pace. The flow in the second six months f_2 accumulated to 3 at a constant pace.

I discount each flow as if it took place in the middle of its interval. Thus the discount factor for the flow of 1 in the first half of the year is $\delta^{0.25}$, and the discount factor for the flow of 3 in the second half of the year is $\delta^{0.75}$ (Figure 12 on page 246). Given an opportunity cost $r = 0.1$ so that $\delta \doteq 0.9091 \doteq 1/(1+0.1)$, the present worth of the flows as seen from the start of the year is $1 \cdot 0.9091^{0.25} + 3 \cdot 0.9091^{0.75} \doteq 3.77$.

In practice, I want a single factor ω to apply to the total flow in the year $F_N = (f_1 + f_2 + \ . \ . \ . \ + f_N)$ 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 midpoints of the N intervals weighted by the share of the flow in the interval in the total flow in the year:

$$\text{Discounted flow} = F_N \cdot \delta_t^{t-\omega}. \tag{80}$$

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 ω = 0.5. In the example (Figure 12 on page 246), $N = 2$, $f_1 = 1$, and $f_2 = 3$:

$$\begin{aligned}\omega &= 1 - \left(\frac{2 \cdot 1 - 1}{2 \cdot 2}\right)\left(\frac{1}{2+2}\right) - \left(\frac{2 \cdot 2 - 1}{2 \cdot 2}\right)\left(\frac{3}{2+2}\right),\\ &= 1 - 0.25 \cdot 0.25 - 0.75 \cdot 0.75,\\ &= 0.375.\end{aligned}$$

Since $t = 1$ and $\delta \doteq 0.9091$, the discounted flow in terms of the accumulated flow F_N is (equation 80 on page 245):

$$\text{Discounted flow} = F_N \cdot \delta^{(t-\omega)} = (1+3) \cdot 0.9091^{(1-0.375)} \doteq 3.77.$$

This matches the result that discounted each six-month flow at its midpoint. This framework uses the factor ω to discount flows of output in the analysis of market leverage. The discount rate δ takes the point of view of the poor.

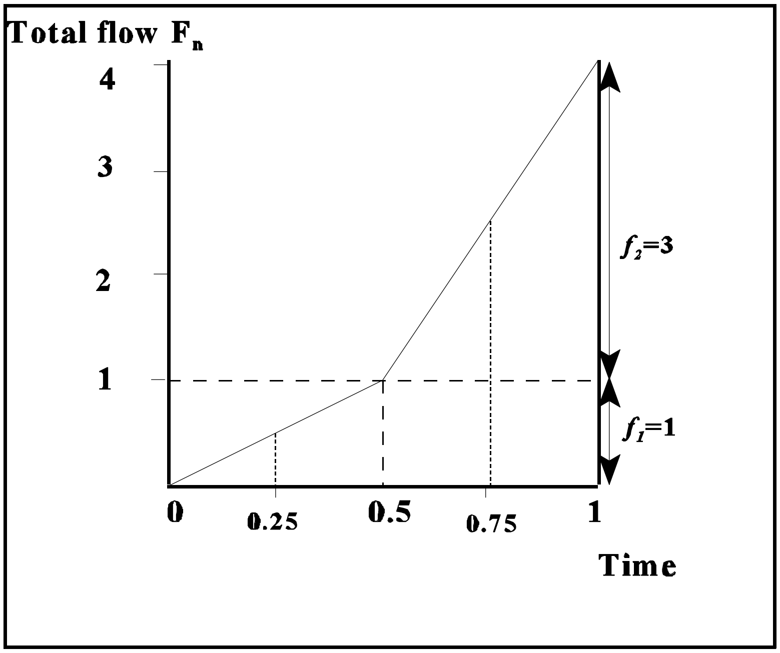

Figure 12: Example of accumulated flows with semi-annual data

b. 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 for the time frame started at the birth of the MFO, a second factor for investors for the time frame started in the last year, and a third factor for investors for the time frame started at the birth of the MFO. Each point of view uses its own discount factor δ.

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:

$$\gamma_t = \sum_{n=1}^{N} \delta_t^{t-[1-(2 \cdot n - 1)/(2 \cdot N)]} \cdot (LP_n - LP_{n-1})/(LP_N - LP_0). \tag{81}$$

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 35 on page 265). 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 discounted flow of all the changes in the year negative. This meant γ was also 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 (equation 81 on page 247). 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 30 on page 236. The three factors γ for Grameen are in lines d, e, and f of Table 31 on page 236. 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 H on page 237).

APPENDIX J

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.

For example, an MFO with one dollar in the portfolio in each day of the year made a dollar-year of debt in the year. Likewise, an MFO with 365 dollars in the portfolio for one day and nothing in the rest of the days made a dollar-year of debt in the year.

In this appendix, I suggest a way to find discounted average stocks (DAS) to compare with discounted flows. The method works when the analyst can assume 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 G on page 231).

1. 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:

$$\text{DAS} = \sum_{t=1}^{T} \sum_{n=1}^{N} \left\{ \int_{q-m}^{q} \delta^x \cdot [S_{q-m} + (S_q - S_{q-m}) \cdot (x - q + m)/m] \; dx \right\}. \tag{82}$$

I will walk through this formula for DAS step by step. The summation over t accumulates the DAS in each of the T years. In each year, the summation over n accumulates 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 an instant is the sum of the starting 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 13 on page 250).

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 just year-end stocks, $N = 1$ and $m = 1/N = 1$. The interval is the whole year since it starts at $q-m = t-1+m \cdot n-m = t-1+1 \cdot 1-1 = t-1$ and lasts until $q = t-1+m \cdot n = t-1+1 \cdot 1 = t$.

With semi-annual data, $N = 2$ and $m = 1/N = 1/2 = 0.5$. In the first interval, $n = 1$. The first interval 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, $n = 2$. The second interval 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 $S_q - S_{q-m}$ that happens

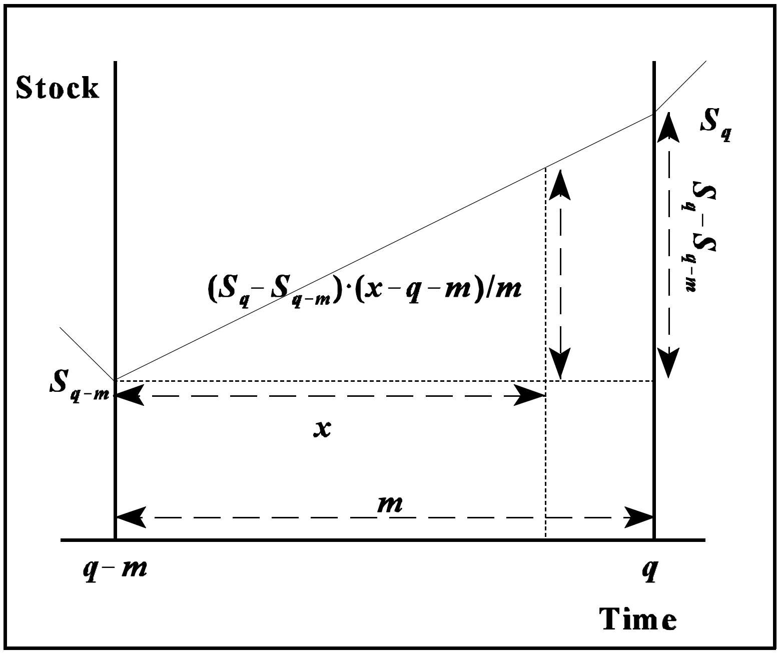

Figure 13: Notation and logic of discounted average stock in an interval

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 starting 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 ending 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 the interval, $x = q-m/2$, so $(x-q+m)/m = 0.5$. This is the sum of the starting stock plus half the change in the stock in the whole interval.

To compute the DAS (equation 82 on page 249), I first rewrite it as:

$$\mathrm{DAS} = \sum_{t=1}^{T} \sum_{n=1}^{N} \left[\int_{q-m}^{q} \delta^x \cdot S_{q-m} + \delta^x \cdot x \cdot (S_q - S_{q-m})/m + \delta^x \cdot (S_q - S_{q-m}) \cdot (m-q)/m \; dx \right].$$

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:

$$\begin{aligned} \text{DAS} = \sum_{t=1}^{T} \sum_{n=1}^{N} \Bigg[& \left(\frac{\delta^{q} - \delta^{q-m}}{\ln \delta} \right) \cdot S_{q-m} \\ & + \left(\frac{\delta^{q} \cdot (q \cdot \ln \delta - 1) - \delta^{q-m} \cdot [(q-m) \cdot \ln \delta - 1]}{(\ln \delta)^{2}} \right) \cdot (S_{q} - S_{q-m})/m \\ & + \left(\frac{\delta^{q} - \delta^{q-m}}{\ln \delta} \right) \cdot (S_{q} - S_{q-m}) \cdot (m-q)/m \Bigg]. \end{aligned} \tag{83}$$

2. 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 78 on page 240) to a discounted average stock:

$$\text{DAS of S} = \sum_{t=1}^{T} \epsilon_t \cdot \alpha_t \cdot (S_t + S_{t-1})/2. \tag{84}$$

where

$$\begin{aligned} \epsilon_t &= \frac{\text{Discounted average stock}}{\text{Undiscounted average stock}}, \\ &= \frac{\text{DAS of loan portfolio}}{\sum_{n=1}^{N} \left(\frac{LP_{tn} + LP_{tn-1}}{2 \cdot N} \right)}. \end{aligned} \tag{85}$$

For BancoSol, the factor ϵ is in line h of Table 30 on page 236. For Grameen, the factor ϵ is in line h of Table 31 on page 236.

APPENDIX K

BENEFITS AS A MULTIPLE OF OUTPUT

Benefits are a multiple of the output of an MFO regardless of whether the analyst can measure benefits. It does not matter that borrowers do not get the same loans nor that borrowers with the same loans do not get the same surplus. Nor does it matter that a single borrower does not get the same surplus from each dollar of a single loan.

Consumer surplus is the area between the demand curve and the average cost per unit to the consumer. The demand curve stands for the willingness to pay of the consumer for another unit. The consumer surplus per unit is the area between demand and the cost to the consumer divided by the quantity bought. This average surplus exists regardless of the shape of the demand curve and of the quantity bought.

For example, consider the average surplus per dollar-year of debt for an MFO with two borrowers. Each borrower gets a year-long balloon loan of $100. Each pays an interest rate of 10 percent, and each bears non-price costs worth $10 more. The MFO does not collect non-price costs.

The willingness-to-pay for an extra dollar-year of debt traces out the demand curve of the first customer (left side of Figure 14 on page 254). The first borrower gets

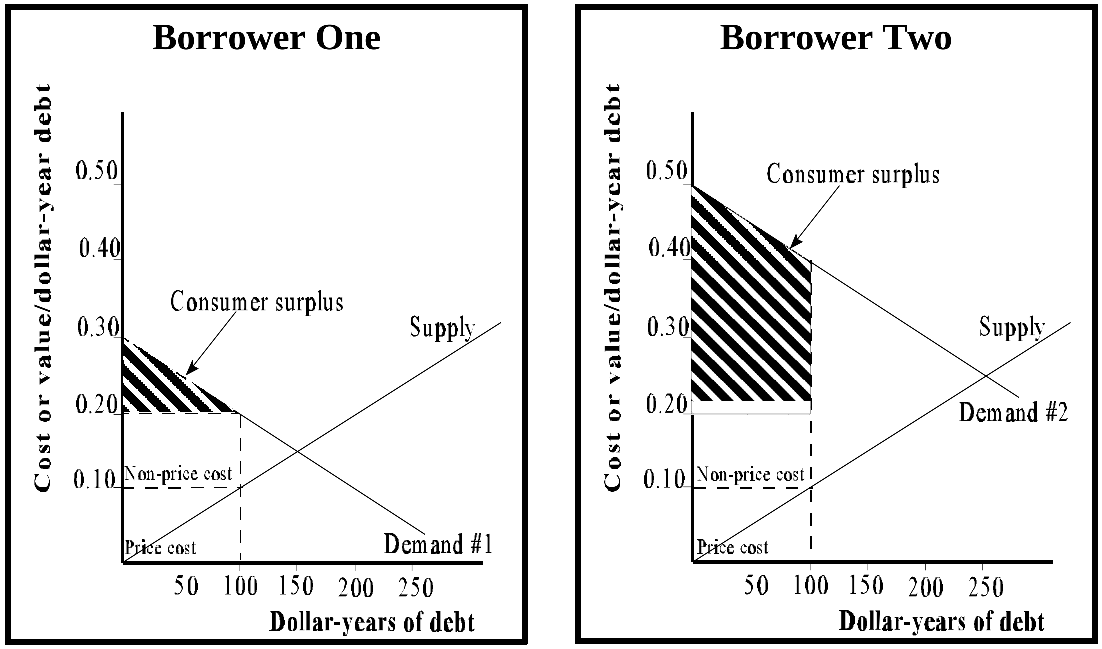

Figure 14: Two cases of consumer surplus for borrowers

surplus from the first dollar-year of debt of (0.30−0.20) = 0.10. She gets no surplus at all from the hundredth dollar. Total consumer surplus is the area between demand and the cost to the borrower of 20 percent per dollar-year of debt. This area is (0.30−0.20)·100/2 = 5. The first borrower gets 5/100 = 0.05 dollars of surplus per dollar-year of debt.

Debt is worth more to the second customer than to the first (right side of Figure 14 on page 254). The first dollar-year is worth 50 cents, and the hundredth dollar-year is worth 40 cents. Still, the loan is just 100 dollars, so the second borrower is rationed—he cannot get an extra dollar-year of debt even though he values it more than its cost. The first dollar-year of debt gives the second borrower a surplus of (0.50−0.20) = 0.30. The last gives a surplus of (0.40−0.20) = 0.20. Total surplus is [(0.50−0.40)·100/2 + (0.40−0.20)]·100 = 5+20 = 25. The second borrower gets 25/100 = 0.25 dollars of surplus per dollar-year of debt.

Together, the two borrowers get surplus of 5+25 = 30 on 100+100 = 200 dollar-years of debt. The average surplus for the customers of the MFO is 30/200=0.15. This is not the same as the average surplus of either borrower. In fact, it is more than the surplus of the first dollar for the first customer and less than the surplus of the last dollar for the second customer.

This example assumes customers have no source without the MFO and thus benefit is willingness-to-pay less the cost borne by the customer. In some cases, an MFO replaces sources that cost customers more. In these cases, the extra benefit with-versus-without the MFO is the cost savings to the customer.

APPENDIX L

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, their 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 and 1997b). Some of them compete with BancoSol in Bolivia and often convince its borrowers to jump ship (Gonzalez-Vega *et al.*, 1996).

1. 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 from PRODEM without paying for their training and experience while 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 chapters: 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 part of 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.

2. 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 33 on page 263). The exchange rate at the end of each month comes from various issues of *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 G on page 231) and to convert between nominal and real rates (Appendix F on page 228). I present two measures of the rate of inflation in Bolivia and in the United States (Table 33 on page 263). 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 D on page 218). The simple average of the prime rate gives the same weight to each month. The portfolio-weighted average weights the prime rate in each month by the contribution of the loan portfolio in the month to the nominal average portfolio.

For comparison, I also report the prime rate, the rate of inflation, and the rate paid on Treasury bills in the United States (Table 33 on page 263). I also present population and GNP per capita data for Bolivia from various issues of the *World Development Report* (World Bank). In 1996, Bolivia had about 8 million people and a GNP per capita of about $800.

3. Financial statements of BancoSol, 1987-96

The financial statements of BancoSol have units of thousands of dollars as of Dec. 1996 (Table 34 on page 264, Table 35 on page 265, and Table 36 on page 266). 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 G on page 231).

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 34 on page 264). 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 did remove the offsetting revenues and expenses for funds lent and borrowed between the central office and the branches.

To skip the problem of the transfer price of branches, I treat all branches now part of BancoSol as if they were always part of BancoSol. The numbers for 1987-91 reflect the results reported by PRODEM since all of its branches until the start of 1992 later switched to BancoSol. The numbers for 1992-94 mix the results reported by PRODEM and BancoSol since BancoSol had its own branches and PRODEM had some branches it would later transfer to BancoSol. The numbers for 1995-96 come straight from BancoSol.

I adjusted the equity accounts (Table 36 on page 266). 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). The proportion of shares held by public entities is near 80 percent (line e in Table 18 on page 176). Past analyses of subsidy for BancoSol ignore that the equity owned by public entities is subsidized (Benjamin, 1994; Agafonoff, 1994).

4. 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 34 on page 264).

I ignore subsidy from analyses done for BancoSol by donors and their consultants. 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 33: 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. extraord. 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 34: 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 35: 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 36: BancoSol adjusted equity from the balance sheet, 1987-96

APPENDIX M

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).

I gleaned most of the data for Grameen from Hashemi (1997) and from KK&K (1995). I also used Hossain (1988) and the assumptions listed here.

1. 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 37 on page 271). The exchange rate at the end of each month comes from *International Financial Statistics* (IMF). I could not get the exchange rate from Dec. 1992 to May 1984, so I assumed it 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 G on page 231) and to convert between nominal and real rates of interest (Appendix F on page 228). 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 37 on page 271). 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.

I use the prime rate in Bangladesh to find the opportunity cost of investors (Appendix D on page 218). 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. In most cases with a zero or negative real lending rate, debt is rationed. I 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 37 on page 271). 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.

2. 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 38 on page 272, Table 39 on page 273, and Table 40 on page 274). The adjustments use the stock conversion factor θ and the flow conversion factor λ (Appendix G on page 231).

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 38 on page 272). 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 39 on page 273) 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 not as liabilities but 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).

3. 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 forced 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 (Schreiner and Yaron, 1997). I also ignore the subsidy from the scores of analyses and reports done on Grameen through the years. 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 37: 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 38: 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 39: 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 40: Grameen adjusted equity from the balance sheet, 1983-94

APPENDIX N

WHY SOCIETY SUBSIDIZES MFOS

"If you lend to the poor, do not make them pay interest" Exodus 22:25

Society subsidizes MFOs because it wants to improve social welfare. From the point of view of society, the benefit is the extra welfare caused by the extra subsidy. If society takes funds earmarked for development as given, then the cost of a subsidized MFO is the benefits lost since funds did not go to some other project to help the poor. If, however, society does not take funds earmarked for development finance as given but rather wants the most weighted welfare for all the people in the world, then the costs of subsidizing an MFO are the benefits lost since the funds did not go to their best other use.

In this framework, I take dollars earmarked for some project to help the poor as given. I do not ask if the whole world would do better to shift development funds to projects not targeted to the poor or even back to the pockets of taxpayers. I address a smaller question. All I ask is if an MFO is the best choice to help the poor given that society has chosen to try to help the poor. The other question is bigger and perhaps more important, but it is beyond my scope. Its answer would require social BCA.

1. When subsidizing an MFO can make sense

A subsidized MFO can make sense if it solves a market failure with more benefits less costs than any other intervention whose benefits exceed its costs. A market failure is when a competitive market fails to bring about a constrained-Pareto efficient outcome (Besley, 1994). Some causes of market failure are market power, custom, non-exclusive goods, externalities, costly information, or fixed costs. A subsidized MFO might also make sense if it is the cheapest way to reach a social goal (YB&P, 1997).

a. MFOs and market failure

Some forms of market failures happen when budging from the status quo would improve social welfare but no private entity can capture enough of the gains to recoup their costs. The market fails since the private optimum is not also a social optimum. In principle, someone could gain and no one would have to lose.

Society can mitigate some market failures since its point of view encompasses all the costs and benefits of an intervention. Society can use taxes and subsidies to induce a bigger market for a good for which the gain in the sum of consumer and producer surplus is more than the loss caused by the tax and subsidy. If this is the case, then society as a whole is better off even though taxpayers are worse off.

The market does not reconcile the price of small loans and deposits with their high average cost. This is the basic problem of microfinance. Whether this is a market failure or not depends on the cause behind the mismatch.

If private financial intermediaries are unwilling or unable to learn how to make small loans and deposits at a low cost even though the social benefits would exceed the social costs, then there is a market failure. If private financial entities are constrained or unwilling to charge a price that covers costs even though the social benefits would exceed the social costs, then there is also a market failure. Without market failure, the social benefits of a tax and subsequent subsidy cannot exceed social costs.

Unlike the rich, the poor transact small amounts. They also want frequent transactions, putting in a mite today and taking it out tomorrow. But a big part of the cost of loans and deposits are fixed. This hikes the per-dollar cost of their sale in small, frequent chunks. For example, a lender uses almost the same time and paperwork for a $10,000 loan as for a $100 loan. Likewise, an MFO with a given flow and/or stock of deposits needs more tellers and branches to handle many small deposits and withdrawals from the poor than it would to handle a few big deposits and withdrawals from the rich.

Private banks spurn deposits from the poor because it costs too much to handle such small amounts or because custom keeps them from charging to take deposits. Private banks have the same problems with loans to the poor. The poor cannot offer the inputs used by the standard low-average-cost technology (Sanchez-Schwarz, 1996; Fleisig and de la Peña, 1995). This raises risks and thus costs (Gonzalez-Vega, Prado Guachalla, and Miller Sanabria, 1997). Poor people eschew banks because the ways banks cut costs lead to services no longer useful to the poor, or because the rich use all the services for sale, or because law or custom keeps interest rates too low to cover costs.

An MFO could improve social welfare by mitigating at least six market failures. The first is a failure of financial markets to be competitive. Banks may just be content with their profit. In low-income countries, the lack of a good way to share data makes reputation an asset with a sunk cost that cannot be transferred between lenders and thus ties a borrower to one lender. Informal financial markets are small, fragmented, and do not intermediate much since they rely on trust and informal contracts (Christensen, 1993).

The second is a failure in the market for financial technology. Private banks might not bother to tinker with financial technology since it is a non-exclusive good. They cannot hide their discoveries and thus cannot capture enough of the gain from them to recoup their costs. Society can bypass this problem through an MFO since society encompasses all gains and costs.

The third is a failure in the market for new habits. A private bank that made microloans at a price that covered costs would run the risk of being scolded for usury. Likewise, no private bank has the guts to pay a negative nominal rate of interest and to face public scorn. In contrast, MFOs have nothing to lose, and their customers are glad to pay high prices and/or to get low returns as long as it beats their best alternatives. In time, MFOs could change custom and weaken the punishment for a private bank that sticks its neck out. Mores meant to protect the poor from the rich can prevent the rich from helping the poor (Akerlof, 1984). Finance is an odd market since people do not think of money as a resource with an opportunity cost. Thus, the price of a loan has a moral tinge absent from the prices of, say, clothes or roads.

Fourth, an MFO might relax constraints from rationing. Excess demand at market prices is common in developing financial markets due to built-in asymmetric information. Lending to the poor only makes the problems worse (Kochar, 1996; Zeller, 1994; Carter, 1988; Gonzalez-Vega, 1984b). In spite of the supposed goal of maximum profit, some private firms still shun taboo groups (Munnell *et al*., 1996; Schreiner *et al*., 1996). An MFO could improve social welfare if rationing is random or based on non-economic criteria such as race or gender and if the customers who lose access value it less than the customers who gain access.

Fifth, an MFO can venture where bankers fear to tread (World Bank, 1989). Untested new products or new customers have an unknown risk, but a pioneer cannot hide what it learns when it explores a new niche (Besley, 1994). An MFO can break the deadlock since society internalizes all the costs and benefits. Society might also know more about the risk of a group than do private lenders. In this unlikely case, the MFO could show that a clientele is profitable.

Sixth, MFOs can target support to key sectors such as microenterprises. The strength of this sector in the long term may boost social welfare even though private firms will not strengthen it in the short term.

b. MFOs and social goals

Society can also use an MFO for goals other than to resolve a market failure. For example, MFOs might be a cost-effective way to reduce poverty in some cases (YB&P, 1997). Also, MFOs may support equity goals since microenterprises employ poor people.

The framework here suggests a way to check if an MFO is the best way to spend dollars earmarked to help the poor. MFOs alone cannot make the poor rich. As Ravaillon writes in YB&P (1997): “Chronic poverty does not appear to be due mainly to ‘market failure’ in credit or other markets, but rather to low factor productivity and low endowments-per-person of non-labor factors” (p. 44).

2. The record of MFOs

In practice, market failures plague financial markets. But market failure, though necessary to justify public intervention, is not sufficient. In the end, an MFO wastes public funds unless it cures the market failure better than any other act whose benefits exceed its costs (Gonzalez-Vega, 1994 and 1993). The costs of meddling with markets often swamp the benefits.

A few MFOs have tweaked technology to reach new niches, mostly by through low-cost ways to lend to groups without collateral and to individuals without traditional collateral (Gonzalez-Vega *et al*., 1997b; Chaves and Gonzalez-Vega, 1996). Likewise, some MFOs might have decreased rationing (Barham, Boucher, and Carter, 1996).

Many reports dissect successful MFOs (*e.g.*, Gonzalez-Vega, *et al*., 1997a; Khandker, 1996; Christen *et al*., 1995; Benjamin, 1994; Yaron, 1994; Hossain, 1988). Gittinger (1982) cites a review of World Bank lending that rated credit projects as the best type of project of those reviewed, with the highest average rate of return, the lowest cost overruns, lower-than-average time overruns, and an ability to reach small farmers.

But at least for DFIs, the horror stories outnumber the happy endings. The jury is still out on MFOs. DFIs had to ration their loans after subsidies spawned a feeding frenzy (Ladman, 1984). Loans to a group can backfire if 30 default instead of just one (Paxton, 1996b). DFIs also failed to ignite key target sectors. They did not spur growth in GNP, and they may have harmed those they wanted to help (YB&P, 1997; Krahnen and Schmidt, 1994; Adams, Graham, and Von Pischke, 1984).

MFOs may also be twisted to ends they were not meant for. For example, planners have used cheap credit to coax farmers into development projects (Gittinger, 1982). Politicians have co-opted MFOs to sprinkle patronage (Ladman and Tinnermeier, 1981).

MFOs are not good tools to transfer funds to the poor. Society can give cash to the poor if it wants, but it should not disguise gifts as loans. No one is fooled, and the rich elbow out the poor like a big girl who clutches for the bouquet thrown by the bride (Gonzalez-Vega, 1984a). MFOs do not reach the poorest of the poor (Hulme and Mosley, 1996; Navajas *et al*., 1996). Donors have not judged risk better than private firms.

The theory behind MFOs is straightforward: if there is a market failure, then an MFO might have scope to improve social welfare (Besley, 1994; Stiglitz, 1993; Greenwald and Stiglitz, 1986). But this is all blackboard economics (McCloskey, 1996). Regardless of the castles in the theoretical sandbox of externalities and technological and informational asymmetries, society in the end needs to ask whether the benefits of a subsidized MFO exceed the costs. Market failure is needed for an intervention, but it is not enough since the intervention itself has costs and can disrupt a market (Gonzalez-Vega 1994 and 1993).

All of this is not to say that a subsidized MFO is a waste or that it cannot mitigate a market failure. But it is to say that MFOs might waste scarce funds or make market failures worse. Government failure may wreck attempts to fix market failure. An MFO might not be the best way to improve social welfare. Society does not yet know whether the social benefits of microfinance exceed the social costs. It needs to measure them.

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