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"FUNGIBILITY AND THE DESIGN AND  
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## Notes

# Fungibility and the Design and Evaluation of Agricultural Credit Projects

J. D. Von Pischke and Dale W Adams

Agricultural credit is an important element in development efforts in most low income countries. Some countries such as India, Brazil, and Thailand assign credit a leading role in rural development. The World Bank, the Inter-American Development Bank, and the Agency for International Development have aggressively promoted agricultural credit, committing in excess of \$5 billion through hundreds of projects. The popularity of credit is due in part to the notions that loans are necessary to accelerate technological change in farming and that formal credit is required to release peasants from dependence on moneylenders. In certain situations the relative ease with which credit projects can be initiated adds to their appeal.

Most credit projects are aimed at stimulating the production of commodities such as rice or dairy products, augmenting the use of an input like fertilizer or improved breeding stock, encouraging investment in machinery and irrigation, or providing more financial services to target groups such as the rural poor, cooperative members, or corn producers. Agricultural banks, cooperative banks, credit unions, and supervised credit agencies have been created under some of these projects. Other projects have augmented loanable funds flowing through existing parts of rural financial markets (RFMs).

A number of these projects have been evaluated formally.<sup>1</sup> Major measures of performance emphasized by donor agencies are disbursement of project funds and recovery rates on loans to farmers. Most evaluations also attempt to measure the impact of loans on farm activities. Impact is usually expressed in terms of increases in crop area or

yields financed by the project and by the quantity of animals, fertilizer, or tractors bought with loans. Numbers, amounts, and kinds of loans made, and farm income and net worth are also used as performance measures. These evaluations typically include little analysis in depth of the credit institutions handling project funds.

While project evaluations may show slow loan disbursement or loan repayment problems, they often indicate that production, input use, investment, and target group participation goals were generally met, and that projects achieve many of their objectives. Despite this, a number of observers are increasingly concerned about the quality and quantity of services provided in low income countries by rural credit institutions and by the RFMs of which they are a part. Critics charge that although donor funding for agricultural credit has increased substantially, the real value of total agricultural loans has decreased in many countries, that concessionary loans often end up in the hands of the well-to-do, that loans for agricultural purposes are diverted to nonagricultural uses, that policies in many RFMs encourage consumption and discourage savings, that the term structure of agricultural loans often contracts or fails to expand, and that RFMs are adopting few cost-decreasing technologies in the provision of financial services. It is disconcerting that rural financial markets could perform poorly while projects within these markets are judged to be doing well. An attempt is made in the following discussion to resolve this paradox by showing how design and evaluation procedures which ignore fungibility lead to faulty conclusions about agricultural credit project results.<sup>2</sup>

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<sup>1</sup> Only a few of these evaluations are available in published form (e.g., Adams, Giles, Pena; Daines). Some overview publications, however, do give a flavor of project results (Agency for International Development, Donald, Food and Agriculture Organization, Kratoska, Reserve Bank of India, Shaw, World Bank, 1975, 1975-79).

### Fungibility, Additionality, Substitution, and Diversion

Fungibility is a prime characteristic of modern currency. Standardization, or interchangeability, enables money to serve as a *numéraire* and medium of exchange, and makes monetized transactions more efficient than barter. Fungibility underlies the role of money in efficient resource allocation in classical economic models and in increasing monopoly ac-

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<sup>2</sup> Fungible: "of such a kind or nature that one specimen or part may be used in place of another specimen or equal part. . . ; interchangeable." (*Webster's New Collegiate Dictionary*, Springfield, Mass., 1973.)

cumulation in Marxist models. This important quality of finance may cause difficulties when it is not understood, when efforts are made to limit exchange by the imposition of controls, and when channels through which funds are directed prove too small to accommodate the desired flow. Agricultural credit project design and evaluation often encounter these problems.

Fungibility makes credit activities hard to evaluate. Its effects appear at the national level, the credit agency level, and the farm level. Reasons given to justify a loan at any of these levels may or may not be related to the activities stimulated at the margin by the additional liquidity a loan provides. At the farm level, for example, many credit projects treat loans as if they were production inputs, ignoring the fact that a unit of borrowed money is identical to other units of money held by the borrower. Even if a loan is given in kind, such as bags of fertilizer, the goods provided can often be sold and converted into cash if the borrower desires (Scobie and Franklin). For all practical purposes, loans in cash or kind can be used to buy any good or service available to the borrower in the market.

Additionality, substitution, and diversion are terms that clarify the problems fungibility poses for credit projects. Additionality is jargon for the changes created by a project: it is the difference between the with and without project situations. It is generally assumed, for example, that a donor-funded credit project should induce the borrowing country to increase loans to farmers by an amount at least equal to the donor's loan. At the RFM level, credit for target purposes should expand by an amount at least equal to the project funds provided. Likewise, it is expected that farmers will increase their input purchases and investments by amounts comparable to the loans they receive and augment production of goods promoted by the project.

Measuring additionality is difficult because it is impossible to know exactly what governments, lenders, and farmer borrowers would have done in the absence of a credit project. To what extent would the government have allocated more funds to agricultural credit without project assistance? Would credit institutions have channelled funds away from other activities to serve project objectives in the absence of a project? Would borrowers have used cash from their own reserves or informal credit sources, or reduced their consumption, to fund an activity without a project? In other words, to what degree do project funds simply substitute for other resources which would have been used, in any event, for project purposes?

Diversion is a more extreme form of substitution. Diversion occurs, for example, when a farmer obtains a cattle loan but does not buy any cattle and uses the funds for a purpose not authorized by the loan contract. It is usually difficult for lenders, governments, and project personnel to divert credit project funds unless donors are lax in supervising

projects, or unless the administration and accounting systems used by project agencies are faulty. Close supervision of thousands of rural borrowers, however, can be a costly task, and diversion occurs even in well-administered programs.

Changes in the purchasing power of money further complicate analysis of additionality. While nominal amounts of loans and farmer expenditures may expand in the desired direction, the real value of loans may remain constant or decline as inflation erodes the purchasing power of financial instruments.

The three synthetic case studies that follow illustrate the difficulties of measuring the impact of credit projects. The case studies illustrate analytical problems arising at the three different levels from fungibility, additionality, substitution, and diversion. Following the case studies, some suggestions are presented for improving the design and evaluation of credit projects.

#### A Farm Household in Africa

Mrs. Kariuki is an African farmer who recently received a loan for the purchase of three milk cows and other materials needed to establish a dairy operation. The amount of the loan was \$1,200, divided as follows on the loan contract: three milk cows, \$800; fencing, \$200; a water tank, \$100; and a milking shed, \$100.<sup>3</sup> She went into debt because of the easy terms offered (80% financing, five years to repay, 10% interest) and the range of attractive investment opportunities available in her locality. Many of her neighbors are expanding their dairy and tea enterprises, and several have entered the transport business. Land prices are increasing, and many families are improving their homes.

Mrs. Kariuki is an attractive credit risk because her family's farm is productive and well-maintained. In addition to the 10-acre farm owned by her husband, she owns an urban lot which she used as loan collateral. She has \$600 in her Post Office savings account, which, in conformity with local traditions, was not disclosed on her loan application.

Mrs. Kariuki used the funds borrowed to obtain the goods specified in her loan agreement. Her loan was disbursed by the lender, out of funds supplied by a donor agency, against invoices submitted directly by the suppliers from whom Mrs. Kariuki obtained the improved dairy cows and materials. But, the \$100 worth of iron sheets and lumber for the milking shed were not used to build a shed, which in the local community would be considered ostentatious. Rather, they were used to extend and reroof the family's house. In addition to the loan proceeds, Mrs. Kariuki invested \$300 of her funds

<sup>3</sup> For consistency, all values in the three cases are expressed in a common currency.

in the dairy project to help purchase the cattle and other investment goods, to pay for labor to install the fencing and water tank, and to transport loan-financed items to the farm.

Mrs. Kariuki's first investment priority was to establish a dairy enterprise because of its expected profitability and steady labor demands and the family's preference for fresh milk. Just before the loan was approved, she sold her entire herd of five inferior dairy animals for \$800 in cash. She obtained credit for the purchase of new stock and materials even though she could have financed most of the project out of the sale of the five cows and the \$600 in her savings account.

Her other priorities include planting more tea, which requires hired labor; acquisition of more land; and joining her husband and some friends in purchasing a taxi so that their community would be linked more dependably with a market town 12 miles away. Reflecting these priorities, Mrs. Kariuki spent \$250 for tea planting and \$300 to purchase a half acre from an elderly neighbor after receiving the dairy loan. In addition, Mrs. Kariuki's family decided to increase consumption expenditures by \$100. Part of this went to buy a new coat for her husband and two new school uniforms for her children, while the remainder financed a visit to relatives. Of her \$1,400 in cash and in the post office savings bank, \$450 remained after these expenditures. Since she wanted to keep \$200 on hand for a rainy day, this left \$250 for investment in a share of a taxi.

The conventional project interpretation assumes that Mrs. Kariuki's loan financed a dairy enterprise establishment. Therefore, the impact of the loan is assumed equal to changes in Mrs. Kariuki's dairy enterprise. This approach ignores changes in consumption and adjustments in all other uses and sources of household liquidity associated with the loan. It overlooks the fact that Mrs. Kariuki substituted fungible loan funds for a part of the investment in dairying, which she would have undertaken in any event because dairying was her highest priority. It also fails to take into account that Mrs. Kariuki diverted iron sheets and timber to house improvement rather than using these materials for a milking shed.

In contrast to the conventional project evaluation approach, a financial view of Mrs. Kariuki's activities would take a broader perspective that the loan gave her liquidity—an increase in her general command over resources. Because of fungibility, a financial view does not attempt to relate the loan to just one use of liquidity. The impact of the loan can be found only in the marginal changes in all sources and uses of household funds which resulted from the additional liquidity provided by the loan. Obviously, the type of information needed to document these liquidity flows for a representative sample of farm households is very time-consuming and costly to collect.

### A Credit Agency in Asia

The effects of fungibility also are found at the level of agencies lending to farmers. The institutions involved in the following hypothetical example from an Asian country are a diversified local lender called the Farmers Small Enterprise Bank (FSEB), a central rediscounting agency (CRA) which uses donor and government funds to make loans to lenders like FSEB, and a donor agency which helped design the project. The main objective of the project is to increase the volume of loans to small farmers.

The mechanics of the credit project are as follows: the target group consists of farmers with less than two hectares of land. CRA advances \$0.80 for every \$1.00 lenders extend to the target group. The interest rate on CRA loans to lenders is 4%, while the lenders charge farmer borrowers 10% per annum. CRA, in turn, claims from the donor agency 75% of its advances under the project, and obtains the other 25% from the national treasury. The project supports an important national credit priority, which is also reflected in Central Bank regulations, favoring agriculture. One of these is that at least 20% of the outstanding loans of each bank must consist of agricultural loans, while banks like FSEB which are located in farming communities must devote 40% of their loan portfolios to agricultural activities.

The effect of the project on lender behavior is illustrated by FSEB's plans and actions before and after the project. Before the project in 1978, FSEB directors developed a sources-and-uses-of-funds budget for 1979. As shown in table 1, the major source in the original 1979 budget was loan repayments received from borrowers. The allocation of new loans was budgeted to ensure compliance with the requirement that 40% of total loan balances on the books are farm loans, and FSEB directors expected that new loans of \$750,000 to these borrowers would meet this target. The directors also expected an increase in deposits at their bank because of a recent increase in interest rates paid on savings from 5% to 6% per annum. The directors allocated a portion of the expected deposit increase to non-interest-bearing reserves held with the Central Bank, and to liquidity reserves in the form of government bonds and cash required to support the expanded level of deposits.

Shortly after FSEB directors approved the 1979 budget, the general manager was visited by representatives of the donor agency and CRA, who informed him that the FSEB could participate in the small farmer credit project. The general manager later presented to his board a revised budget assuming FSEB participation in the project (table 1). In presenting the revised budget, the manager noted that about \$300,000 of the \$750,000 in loans to farmers in the original budget met the credit project's lending criteria. FSEB could discount with

**Table 1. Projected Sources and Uses of Funds by the Farmers Small Enterprise Bank (FSEB) in 1979**

Sources of Funds		Uses of Funds	
Original budget	(\$ thousand)		(\$ thousand)
Loan repayment from borrowers	1,500	Increase in statutory reserves (25% of increase in deposits)	75
Increase in deposit liabilities	300	Increase in cash and government securities held	25
Net profit	50	New loans made:	
		Farmers	750
		Others	1,000
Total	1,850	Total	1,850
Revised budget			
Loan repayment from borrowers	1,500	Increase in statutory reserves (25% of increase in deposits)	50
CRA rediscount of project loans	240	Increase in cash and government securities held	40
Increase in deposit liabilities	200	New loans made:	
Net profit	55	Farmers	755
		Others	1,150
Total	1,995	Total	1,995

CRA 80% of the \$300,000 and gain \$240,000 in loanable funds. The manager proposed to his board that \$15,000 of these additional funds be used to buy more high-yielding government securities (9% per annum), and that \$150,000 be used in loans to landlords and businessmen in the area who could offer substantial collateral. He recommended that FSEB roll back its interest rates paid on savings from 6% to 5%, in order to reduce projected increases in deposit liabilities from \$300,000 to \$200,000 in 1979. The addition of project resources to the previous deposit target would cause FSEB to fall below the minimum capital-to-assets ratio required by the Central Bank. Because the revised budget would increase FSEB net profits by 10%, it was approved by the board. Late in 1979 the manager reported to the board that budget targets were substantially achieved.

The net result of FSEB participation in the new loan program was a decrease in local deposit mobilization, lower rates of return to all depositors, an increase in government securities held by the bank, and an increase in the amount of money loaned to borrowers other than the project's target group. The project resulted in only a small amount of additional lending to the target group. Substitution washed out almost all of the intended effects of the project in this particular lender's activities.

#### A Latin American Country

From 1960 to 1978, a Latin American country received \$80 million in ten loans or grants from donor agencies for agricultural credit projects. These credit projects had four objectives. First, four proj-

ects established institutions to serve rural areas: a supervised credit program, an agricultural cooperative bank, rediscount facilities for agricultural loans at the Central Bank, and private finance agencies to provide risk capital for agricultural enterprises. Second, all ten projects provided funds to expand agricultural credit supply. Third, seven of the projects aimed at expanding the amount and number of loans to the rural poor. Fourth, three projects sought to provide more medium- and long-term loans to farmers.

All ten projects have been evaluated. Several had loan recovery problems which undermined at least one of the new institutions. Analysis of loan applications and interviews with loan officers and borrowers indicate that objectives regarding type of borrower, enterprise, inputs, and loan term structure were largely met. Overall, these evaluations suggest the projects did a surprisingly good job of achieving their goals. One donor was sufficiently satisfied with its projects to give the country an additional loan of \$15 million to expand medium- and long-term lending to small farmers. During 1979, the loan was disbursed for the purposes intended. An evaluation gave a glowing report of the results.

Despite these projects, farmers, and especially small farmers, continued to complain about the shortage of loans. As a result, one of the donors engaged consultants to prepare another sizable agricultural credit loan proposal. A financial analyst on the consulting team was asked to assess the performance of the country's financial markets. He did not take a conventional project focus in his analysis, but examined imports, the government budget, and overall RFM performance. He rea-

soned that changes in activities associated with the most recent loan would be the best indicator of what might be expected from the next loan.

The analyst collected information on imports, as presented in table 2. Agricultural investment goods imported increased by \$15 million in 1979. Because of inflation in world prices, however, the real value of these imports in 1978 prices declined from \$200 million in 1978 to \$195 million in 1979. At the same time the real value of imports of nonagricultural investment goods and government and defense goods increased. Military hardware and supplies to furnish new tourist hotels accounted for most of the real increases in imports. From these figures the analyst concluded that the 1979 agricultural loan relaxed the country's foreign exchange constraint and that arms for the military and bathtubs and toilets for new hotels were the main result.

The analyst then reviewed the 1979 government budget. What he found is also shown in table 2. The government increased the nominal amount allocated for agricultural programs from \$250 million in 1978 to \$265 million in 1979. The government met the conditions of the agricultural loan agreement by adding to the Agricultural Bank's loan portfolio the \$15 million generated by sales of goods imported under the loan. But because of domestic inflation the real amount in 1978 prices allocated to agriculture decreased from \$250 million in 1978 to \$241 million in 1979, despite the donor's loan. Real increases in the 1979 budget for defense, nonagricultural development, and general expenses reflected government priorities. From these data the analyst concluded that the government budget was not influenced in the desired direction by the agricultural credit project.

The analyst next looked at activities in formal rural financial markets in the country, and collected the data presented in table 3. The nominal amount of new agricultural loans made each year increased from \$50 to \$144 million between 1960 and 1980. In real terms, however, the amount of purchasing power represented by the formal agricultural loan portfolio peaked in 1975 and declined by about 5% through 1980. The \$94 million increase in the nominal amount of new agricultural loans made annually from 1960 to 1980 can be explained largely by the \$95 million in foreign grants and loans for agricultural credit, given the average term structure of approximately one year. The analyst concluded that foreign funds substituted for at least some local funds which would have been allocated to agricultural credit in the absence of external assistance.

The analyst was disappointed to see that ratios of agricultural credit to total credit and agricultural credit to GNP from agriculture declined after 1970. In spite of heavy emphasis by donors on expanding agricultural credit during the 1970s in the country, it appears they were unable to effect structural changes in credit allocation in favor of agriculture. Furthermore, the decline in the deposit to loan ratio after 1970 shows that some portions of RFMs were becoming more, rather than less, dependent on outside resources.

Table 3 shows no increase after 1970 in the proportion of farmers who received credit; over the twenty-year period, levels of access were not significantly altered. Most of the increase in agricultural credit apparently went into large loans for experienced borrowers. Because agricultural lenders' records did not include details on borrowers' economic characteristics, the analyst could not

**Table 2. Imports and Government Budget Allocation before and after an Agricultural Credit Loan to a Latin American Country**

	1978 (Current Prices)	1979	1979 (In 1978 Prices)*
<b>Imports</b>			
Agricultural investment goods	200	215	195
Nonagricultural investment goods	300	360	327
Intermediate goods	100	110	100
Consumption goods	100	110	100
Government and defense goods	300	350	318
Other	100	110	100
Total	1,100	1,255	1,140
<b>Government Budget Allocation</b>			
Defense	1,000	1,200	1,091
Health, education, welfare	1,000	1,100	1,000
Agricultural development	250	265	241
Nonagricultural development	300	350	318
General government expenses	300	340	309
Other	100	110	100
Total	2,950	3,365	3,059

\* Reflects adjustment for an inflation rate of 10% during calendar year 1979.

**Table 3. Measures of Rural Financial Market Performance in a Latin American Country 1960-80**

Year	Total Value of New Loans Made to Agriculture		Ratio of		Ratio of Deposits to Loans in RFM*	Percentage of Farmers Receiving Formal Loans	Avg. Term Structure of Agr. Loans
	Current Value	In 1960 Prices	Agr. Credit Total Credit	Agr. Credit Agr. GNP			
	----- (\$ thousand) -----						(months)
1960	50	50	.09	.21	.14	15	10
1965	70	69	.10	.24	.16	16	12
1970	90	88	.12	.27	.18	17	15
1975	110	104	.11	.26	.17	15	14
1978	115	100	.10	.24	.17	14	13
1979	130	99	.09	.23	.16	13	12
1980	144	99	.08	.21	.16	12	11

\* Excludes commercial banks

document loan allocation by economic class: small loans do not necessarily go to low income borrowers, and a wealthy borrower may have multiple loans. He did find, however, that those agencies serving mainly the rural poor had modest real increases in their loan portfolios from 1970 to 1980, while agencies lending mainly to high income borrowers expanded substantially.

Finally, the analyst concluded that the credit projects of the 1970s were associated with a trend towards shorter average agricultural loan term structures. While in 1970 the average loan matured in fifteen months, in 1980 the corresponding term was only eleven months. Between 1978 and 1980, this average dropped from thirteen to eleven months, despite the two- to five-year loans under the \$15 million 1979 project. Funds from medium- and long-term loans which matured outside that project were reloaned at shorter maturities.

In his report the financial analyst argued that fungibility and substitution had substantially diluted the intended impact of the eleven credit projects, especially the 1979 project. While the 1979 loan did relax the foreign exchange constraint, it was associated with additional imports of military and tourist hotel hardware. It was not accompanied by a net increase in real imports of agricultural investment goods, and it did not reverse the trend towards shorter average term structures of formal agricultural loans. Because of inflation and concessional interest rates to farmers, the flow of external resources for agricultural credit failed to maintain, let alone increase, the purchasing power of the formal agricultural portfolio. There is little evidence that the rural poor received much additional funding, despite the emphasis in various credit projects on expanding financial services for this target group. It also appeared that donor funds accounted for virtually the entire nominal increase in agricultural credit.

### Recommendations

At the farm level it is very costly, if not impossible, to determine the impact of credit. At the national and lender levels, many countries provide an ideal environment for substitution and diversion to flourish. This environment is created by distorted exchange rates, balance of payments problems, rigid interest rate policies, and substantial inflation coupled with negative real rates of interest. Because of these facts, we feel that it is necessary to alter the traditional design of credit projects and also to modify substantially the way they are evaluated. Several different approaches, used singly or in combination at the project, sector, and national levels, might be taken to diminish the extent to which RFM performance varies from project objectives.

Three points must be recognized in order to understand the approaches and to effect the changes we propose. The first is that loans provide additional liquidity, which tends to flow toward the most attractive use available from the perspective of the loan recipient. The second is that credit project impact, elusive at the farm level, should be viewed in the context of RFM performance. The third is that the major determinants of the financial situations at the farm and RFM level which credit projects seek to ameliorate are not necessarily most effectively tackled on a project basis alone, but rather reflect policies which repress RFM development.

At the project level it is vital to view loans as additional liquidity rather than as farm inputs. This would force project designers to be more sensitive to the alternatives available to those with access to additional liquidity. For example, if a credit project were designed to stimulate cotton production in Northern Colombia, designers ought to be aware of the returns available in the area to production of

marijuana. Likewise, credit for "productive" purposes will be used for consumption if family members are hungry or lack profitable investment alternatives. Only after it can be shown that target activities are among the more profitable or satisfying uses of additional liquidity can it be concluded that a major part of the liquidity provided by the loan will be used as projected.

Farm activities receive primary emphasis in the traditional credit project. The strategy we propose would be centered on the performance of institutions responsible for project implementation, based on the assumption that target groups are most effectively benefited when institutions serving them are efficient, strong, and independent. This perspective is perhaps more consistent with concerns for local participation and control than the traditional project approach, since implementing agencies have to relate to local circumstances in order to be successful. The traditional format finds justification in tons of grain or increases in farm incomes without necessarily having to come to grips with the vitality of RFM intermediaries. Projects which undermine the vitality and financial integrity of a credit agency should not be termed successes.

In addition, specific additionality requirements stated in real terms might be written into a project. Any such targets should apply to the entire RFM. For example, if a project objective is to lend to 5,000 new small borrowers through a supervised credit program, the 4,000 borrowers transferred to the supervised credit agency from the agricultural bank should not count toward this requirement. Progress toward additionality targets can be measured at the national and credit agency levels, although such requirements could raise problems of data reliability and create incentives for evasion if not carefully designed.

Because of fungibility, project design and evaluation should consider rural financial market performance in general. For example, if an agricultural credit project is aimed at supplying more medium- and long-term credit, project design should include an assessment of why the RFM is not adequately providing this type of financial service. Once this deficiency is explained, the designers of the project should show how the project will induce the RFM to offer a service which it is presently unable or unwilling to provide.

At the national level, credit projects usually result in more direct government participation in RFMs. Various rationing schemes are typically part of this involvement. Because of fungibility, finance is difficult to control. Direct attempts to gain control are usually costly, often fail to achieve stated objectives, and generally result in secondary effects that are unexpected—the worst possible development for planners (Kane, McKinnon, Schatz, Shaw). We feel that the best intervention is often indirect. Attempting to tackle problems in RFMs at the project level or through individual institutions

may be less fruitful than use of the price system to encourage priority activities and to discourage less useful ones. Experiences from the application of this strategy suggest that many of the problems associated with RFMs respond favorably to flexible interest rate policies supported by other measures designed to increase competition in finance. This approach accommodates fungibility and encourages resource reallocation by enabling financial markets to function more efficiently.

In sum, we feel that because of fungibility the focus of project design and evaluation should shift away from the traditional emphasis accorded the demand side of farm credit. A better perspective on farm credit would incorporate attention to important variables on the supply side which are reflected in the performance of lenders in RFMs. Less emphasis should be given to evaluating the impact of credit use at the farm level, and more emphasis placed on how intervention in RFMs affects lender behavior, lender vitality, and the overall operation of RFMs. Less time should be spent measuring what is virtually impossible to measure. More attention should be accorded those things which can be documented.

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