Texto para Discussão

Série Economia

Family Farming and Economic Development: The case of Brazil

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Summary

This paper begins with a description of the main characteristics of Brazil's rural credit policies and its program to support family farming. It them examines the cost of this program and its benefits. It suggests the use of a particular equation for measuring subsidies within the credit program and for calculating the subsidy dependence index. The benefits are evaluated by using outreach criteria. It also focuses on the Asian rural financial institutions that are briefly discussed for proposal of comparison with the Brazilian case.

Key words – banking, Brazil, bureaucracy, credit, rural development, small states

1. INTRODUCTION

This paper examines the characteristics of the Brazilian National Program to Strengthen Family Farming (PRONAF). This governmental program was founded in 1995 to stimulate poor agriculture by extending financial services to the sector. The provision of affordable financial services to the poor rural population has been an answer to the politically organised segments of society such as the National Confederation of Agricultural' Workers (CONTAG). These groups for many years had been asking for a program with specific policy for small rural producers in Brazil.

The overriding policy goal of PRONAF is to reduce poverty in rural areas. Although the large majority of Brazilian people lives in urban areas, recent studies of FAO and the Brazilian National Institute of Agrarian Reform (INCRA) showed that 4.3 million agricultural proprieties in Brazil are family-maintained, half of them very poor and without access to commercial credit. The same study revealed the rural family sector importance in creating job opportunities for peasants.

The founding objective of the program was to be a mere cost credit modality, however in 1996 it gained an investment line and one year later an infrastructure financial services toward small cities with less than 25 thousand inhabitants. The PRONAF operates as a state-owner initiative under the supervision of the Ministry of Agriculture until mid-1999 and more recently of the Ministry of Agrarian Development. It not only provides loans for activities related to agriculture, but in fact it is a full range of financial and educational services for development of the rural production. In 1999 the Brazilian agrarian reform program was merged with PRONAF.

This paper does not deal with all the features of PRONAF but focuses on its credit segment. Special emphasis was placed on PRONAF dimension as a credit supply-led approach, called PRONAF-credit from here on. We assume the questionable assessment that PRONAF-credit was not functioning as mere credit disbursement window. We are regarding it

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as a true financial intermediary, which mobilizes deposits to make loans. It is true that the main source of the program funds is not the clientele saves, like traditional banking operations, but special governmental funds, as we will see ahead in this paper. In any case, PRONAF-credit does not have merely channeled government-supplied funds to rural borrowers, but operates mainly via public banks in which operations were driven by commercial financial performance criteria.

The effectiveness of PRONAF-credit in reducing rural poverty by removing policy biases against agriculture and rural development is a broad question that we do not intend to answer completely in the restricted scope of the paper. Notwithstanding we agree with the non-consensual point that directed credit is a potentially useful tool for opening credit access to activities or groups whose access was impeded by inadequate information or other market imperfections. State-owned credit programs are assumed to be a valid option for addressing market failure but a most conspicuous diagnosis calls for a thorough analysis of the underlying problems.

It is a very difficult and probably ineffective task providing a complete overview of all costs and benefits related the program in question considering the problems inherent in measuring the success of rural credit projects. Alternatively this paper subjects the program to a more restrictive burden of proof test and proposes that PRONAF performance in relation to the primary goals of (i) increasing growth by expanding rural incomes and (ii) reducing rural poverty, be measured using the usual criteria applied in the valuation of rural financial institutions. This paper follows the traditional approach and suggests that assessment of a rural financial program should be based primarily on (i) the program's self-sustainability, and (ii) the level of outreach achieved by it. It also identifies some of basic operational details of PRONAF-credit and discusses the performance and operating methods of program according the two previous criteria.

The benefits of PRONAF-credit to its clientele will be obvious according the points to be raised in the paper when we are discussing the issue of outreach, however the overall cost of keeping the program afloat is almost never addressed in researches. Typically, subsidies that benefit such program's borrowers and the related banks are not transparent, so as to allow a public debate on their costs, benefits and social desirability. When a subsidy is granted, the overall subsidy cost in operating a program of rural finance should be made transparent to ensure adequate assessment of the desirability of intervention in the financial market as well as the use of quantified milestones in progress to be made towards borrowers' and banks' independence from subsidy.

This report will show that the maintenance and continued operation of PRONAF-credit has turned into an extremely costly drain on government budgets and donors that support these efforts. The paper presents the aggregate cost to Brazilian society of maintaining continued operations of the program, including the value of the subsidies in the form of access to cheap and subsidized sources of finance, the data for which has not previously been properly disclosed.

To assess the PRONAF-credit performance in a comparative way this study brings up the cases of four Asian rural financial institutions (RFIs) regarding paradigmatic lessons of well building rural finance initiatives. These RFIs are widely viewed as highly successful because they did not make their credit program extremely costly affairs for their sponsoring governments and donors; on the contrary many of them have been profitable enterprises.

The structure of the paper is as follows: the first section describes the historical retrospective of PRONAF discussing the economic, social and institutional factors that are

believed to be very important for locating the particular Brazilian experience with agricultural credit and the context in which arises the family farming credit scheme in Brazil. Next section the paper focuses on PRONAF's operational details. Brief survey of Asian RFIs follows in other section. Two final analytical sections discuss the program performance; the first one addresses issue of outreach and the second one analyzes its self-sustainability. Important conclusions are summarized at the end of paper.

2. THE BRIEF HISTORY OF PRONAF

When in 1937 the Brazilian government thought to create a rural credit banking institution it founded a specialized agricultural credit department within the old and well established Bank of Brazil (BB). It had been a consensual vision among politicians that financial support for the agricultural sector is vital in a country whose main economic activity was agriculture. Instead of creating an independent rural credit bank, the best solution was thought to be the use of the competent staff of BB to guarantee agricultural financing as a specific activity in the bank. The idea of establishing a specialized rural bank was postponed to the uncertain future and never realized. Even today BB is the principal lender to the agricultural sector in Brazil and is currently responsible for more than 75 percent of all rural credit granted annually.

In 1964 the birth of a modern financial system in Brazil happened with the creation of a central bank (BACEN) and other regulatory institutions. The BB continued carrying out many central bank functions, however BACEN started intervening in the rural credit market requiring all the public and private banks to share the function of credit allocation to the rural sector, improving the network of banks that attended to the rural credit demand. Two years after this creation, the co-ordination of the large bank network, including co-operatives, was transferred to the then recently created National System of Rural Credit (SNCR) since that time an indispensable instrument for implementing government policy and the engine of national agriculture.

The problem with the shortage of financial services in agriculture was solved by creating a range of different institutions intended to channel government and donor funds to the sector. Though well intended, some of these initiatives were misdirected and did not address the real problems. Emphasis was not given in offering to the rural residents financial tools to mobilize their own funds among themselves by servicing savings to ensure good remuneration and lending using interest rates that do not become prohibitive. The kernel characteristic of the Brazilian rural credit system until the mid-1980's was reliance on external funds, living on foreign loans, governments bonds and rediscounting facilities, instead of saving mobilization. Between the late 1960's until the mid-1980's the percentile of compulsory reserves channelled as a source of agricultural credit rose from 10 to 55 percents of the clientele's deposits in commercial banks. Additionally, the foreign debt reached a critical level and the growth of the monetary base to finance credit system's deficits impacted inflation a lot.

In the mid-1980's the collapse of this credit system occurred. Serious misconceptions of the real challenges facing rural communities were implicit in this old credit politics. With the end of subsidised credit, the Brazilian government started new rules for agricultural credit. The traditional forms of intervention in the rural credit market that had prevailed caused the bankruptcy of system. Unanimous perceptions about this lead the policymakers to finish the imposed interest rate ceiling. It was the crisis of what Yaron et.al. (1997) call "traditional approach to rural finance" whose main features are high level of government intervention in the form of targeted credit and on-lending to customers at below-market interest rates. The old

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rural credit initiative in Brazil had other undesirable results. It reached only a minority of the farming population (25 percent), while benefits were frequently concentrated among wealthier farmers, large farmers who took out large loans.

Highly negative on-lending interest rates in an inflationary environment generated the equity erosion of the credit programs. Inadequate or complete absence of indexation in a highly inflationary environment caused many borrowers to see the loans like a grant, which resulted in dismal loan collection. Very high arrears have plagued this system. When commercial lending institutions are active in rural areas, they, in most instances, have focused on large-scale farmers while small-scale farmers have been ignored, due to the significant lending cost in processing and servicing unsecured small loans.

In the 1970's the subsidized rural credit was very intense in Brazil. Policymakers believed that the best way to increase agricultural productivity was to encourage the use of modern pesticides, fertilizers, and farm equipment. Directed credit programs were associated with the adoption of modern technology. Credit was provided as part of a package of services, including agricultural extension, inputs (fertilizers, pesticides, and high-yielding plant varieties), and farm equipment (irrigation pumps, tractors, and combines). The Brazilian government had thought that these modernizing agricultural investment projects presented substantial up-front outlays, with returns spread over time. Lack of long-term finance prevents rural firms in Brazil from investing in new technologies, anyway special credit conditions were offered as essential tools to improve efficiency in rural production. In fact, a conspicuous modernization in the Brazilian agriculture happened and these innovations were associated with production gains. However, subsidized below-market rates of interest led to the crowding out of poor farmers because the subsidies were captured by wealthier, better-connected farmers.

A host of problems in rural financial markets was followed by rapid growth in agricultural productivity. It is in this historical context of the evolution of rural credit in Brazil that the Brazilian government started implementing financial policy reforms. By 1984, all interest rates were liberalized and adjusted to reflect market-oriented rates.

When in mid-1980's the government adopted the rule of monetary correction plus a real interest rate of 3 percent per year, many farmers replaced the official credit with their own resources. In the past, the below-market interest rates and leniency on loan collection that characterized the Brazilian credit programs increased incentive for outright diversion of credit to nontargeted, nonproductive uses, mainly investments in financial markets. Now, in the new environments, the substitution of other resources for formal loans maintains and even improves the agricultural production. This improvement is also due to the maturity of past investments in technology and infrastructure, and the good prices in foreign markets.

The answer for the exhaustion of traditional financing sources was initiatives based on private sector and the local governments. In the nineties, new funds for credit appeared, like rural savings, which was important in the first half of the decade, and resources originating from Workers' Support Fund (FAT) among other "Constitutional Funds". The use of Future and Option Markets, the stock exchange and other modern instruments of financing have been increasing in the new Brazilian context.

This overview of the Brazilian evolution of rural credit until mid-1990's allows us to situate the background where the family-based farming program is founded. The PRONAF was created to provide financial and technical assistance to poor agricultural producers, either directly or through banking intermediaries. Brazilian government has intervened in rural financial markets aiming at supplying affordable credit to small-scale farmers and rural

entrepreneurs, who were perceived as a clientele with no alternative access to formal credit markets. This clientele had no access to formal credit markets and was taken advantage by usurious moneylenders. The government realized that it had to do something to address the concerns of rural populations and therefore placate rural voters dependent on the success of its action in rectifying the perceived problems.

PRONAF was established to encourage rural small-scale production by offering short-term credit for small income-generating efforts. The intervention was intended to overcome market failures and spur investments that would not have materialized otherwise. Although PRONAF was originally established in 1995 as an initiative of the Fernando Henrique Cardoso administration it effectively began the operations in 1996 with the authorization by deliberative council of FAT to use 200 million Reais for financing cost and investment in family farming. In 1997 a non-banking infrastructure line was created; and in the banking lines a special modality for very small proprieties was added to offer rotating credit (FAST RURAL) and to finance activities in centre-west portion of Brazil (FCO family farming) using Constitutional Fund resources. In the next year a line (FNE family farming) was created also using funds of the Constitutional Fund to Finance the Northeastern Brazil, as well as a line to finance investments in agribusiness infrastructure and small industries called PRONAF Agregar. More recently in 2000 three news lines were offered with the agrarian reform program merger: two for recent beneficiaries of agrarian reform (*New Family Farmer* and *Microcredit-Northeast*) and one for co-operatives (*Collective Integrated*).

Over the past five years, the original program has changed in accordance with new financial products and facilities offer to cover the same clientele or new ones with the purpose of serving the needs of poor peasants who are the huge majority of Brazilian people living in rural areas and involved in agriculture. Although agriculture today only accounts for a few percent of GDP in Brazil, the family farming sector provides the large majority of total employment in rural areas and it is seen as crucial to retain the rural population and mitigating the problem of migration to urban areas, critical in the Brazilian context.

All of the PRONAF's financing lines have the goal of providing credit to the rural poor for purposes of improving their economic condition. In each line the target clientele is defined through its stated objectives. All lines require that the borrowers work the land, not necessarily like owners. They must reside on the property or in a close small city and the extension of the farms must be less than a standard measure defined according tax proposal (four *módulos fiscais*). Additionally, 80 percent of family income must be gained in activities inside the farm and the family labour must be predominant. The several financial lines make specific requirements in function of a particular goal: some of them serve the very poor, and others serve lower- to middle-income farmers. There is a range of farmer's income specified in each line; it also specified a maximum of workers employed in formal and informal ways; and a distinction is made according the kind of activity.

Because it has realized that credit alone is not enough to promote regional development, PRONAF set up other actions and has even incorporated social programs into its lending activities. Therefore a set of comprehensive activities is integrated with financing to help train the producer to become more self-reliant, and to better compete in the market. The program blends short-term objectives aimed at achieving agricultural production gains and long-term objectives aimed at sustaining rural income expansion. In order to execute all these tasks it has a complicated organizational structure. The Rural Development Council in the scope of Ministry of Agrarian Development makes the policy level decisions. The program can be segmented in: a modality of credit (the subject matter of this paper), that is the huge majority

part of the program in terms of amount of resources allocated; the lines of infrastructure and support services to small cities; and a technical training and educational line.

While the recent model of Brazilian agricultural credit advanced in the direction of competitive markets, administrative allocation of funds was made to particular agricultural activities and rural areas. These are related to family farming segments where the establishment of special program toward regular support for agricultural credit operation and other activities has occurred so as to cover their regular deficits, as we will show in the next section.

3. PROGRAM'S OPERATION

Managed by Councils at three power levels: central government, states and municipalities; PRONAF operates in a very decentralized way. The local councils beside others social agents have the effective role of co-ordination. The program is segmented in areas: credit program, infrastructure and education. The first of these works through qualified financial institutions, which use the program's funds to make loans and provide support to small-scale farmers directly, or through other public banks. The main institutions responsible for credit disbursement of PRONAF funds are BB, Bank of Northeast of Brazil (BNB) and Brazilian Development Bank (BNDES). The infrastructure and education modalities make transfers directly to municipalities or rural extension enterprises.

Table 1 shows the amount of Reais invested by non-banking lines that include infrastructure and education. These segments of PRONAF could be perceived as governmental disbursement window rather than solid financial operations. In 1999 they reached R$192 million in benefits like worker's training, technical support, modern machinery, computer resources and staff training. In this last case they promote production by assisting clients through training and formation of consultation committees. These committees are composed of municipal governments and different community agents. They operate as panels to discuss and decide on strategic issues for the municipalities and provide guidance to local associations and co-operatives. Rural works representatives, rural enterprises and international bodies like PNUD of United Nations also take part. Another special action of PRONAF not yet commented on and that is important to bring up are the indigenous product activity support initiatives with projects specific to improve the typical Indian's cultivation.

Table 2 presents amounts related to PRONAF-credit disbursements between 1997 and 2000. In this case loans were granted to farmers though banks that have to follow government directives when allocating their funds. As these directives frequently include administrative allocation of funds to certain target groups and exclusive lending for agriculture, the financial intermediaries have limited ability to diversify their loan portfolio within the program. However the banks enjoy substantial autonomy in setting their operational and financial policies. Along with the loan, the Banks also provide technical assistance and train the borrower to achieve better results. As the bank assumes almost total risk with repayment problems it needs to use creditworthiness criteria and to implement adequate risk management policy in the grant of credit. As a result a conspicuous part of the available funds of PRONAF-credit stays otiose.[1] In nominal term the resources actually applied rose between 1997 and 98, fell in 99 and rose again in 2000 overtaking 2.5 billion Reais in the last year.

It is important to realize that the share of the three banks' PRONAF values declared in their respective Corporate Reports[2] on total banking credit within this program is less then 100 percent. However, along the time the banks' declared values converge to PRONAF-credit total

official values and in 1997 they represent more then 95 percent of these values (see Table 3). We can presume that the absent part means resources channeled directly to clientele or by other financial institutions, but we are ignoring the differences which matter only in 1997 when the program was still in its initial phases.

The banks focused in the paper are responsible for loans and monitoring of PRONAF-credit funds for finance cost, investment and infrastructure. These institutions receive resources from external funds whose infusion is guaranteed by access on special Treasury and Central Bank's accounts: FAT, Constitutional Funds and rediscounting facilities included reserve's requirements of other banks. The banks have not made a mere transfer of grants from government and donors to a certain clientele but on the contrary they have acted like PRONAF financial agents for loans, collections, control and monitoring of the amounts related to the financing of the rural projects. They capture resources from FAT (Worker's Security Fund) that are deposited in a special remunerated account. The banks must pay interest on these deposits following rules that oblige them to use certain rates called long-run interest rate (TJLP) plus another rate according to a specific legislation for each bank. Other sources we presume do not require interest payments.

The major source of funds for PRONAF is loans and grants from governments and donors. The FAT's source is the largest source of funding, constituting on average more than 80 percent of the total resources granted (see Table 4). The funds allocated for PRONAF are remunerated by banks given rates which are less than the market rates and it's true that if their access to cheap sources of funds had been eliminated the program would be impracticable. The private banks also could take part in operations, however the weak legal system and the ineffective reinforcement arrangements have contributed to the reluctance of commercial banks to engage in lending to the rural population. Related to this issue is the frequent lack of secure land tenure, leading to the absence of collateral or reduced foreclosure capability.

The administrative costs associated with mobilizing and servicing these deposits have been borne by the banks and not by the program. The reluctance of public banks to lend resources with a negative spread leads to a departure from the initial procedure, and PRONAF has increasingly paid an amount to the banks to cover the cost of transaction and the negative spread.

Since 1998 BB has been the main agent of PRONAF-credit with 32.1 percent of total credit granted in 1997, 43 percent in 1998 and 72 percent in 1999. The BNB reached 40.7 percent in 1998 but its participation has fallen since then. The BNDES had an important role in 1997 with 52.7 of total disbursement but fell to 16.3 and 7.2 percent in 1998 and 1999 respectively (see Table 3). Using staff people who are familiar with rural credit, the Bank of Brazil was able to do a highly significant number of loans in the scope of PRONAF, reporting a value of loans larger than 1 billion Reais in 1999.

Each bank uses particular procedures according to its culture to make effective loans to poor rural families. Particularly interesting is the experience of the BNB. In 1997, this bank strengthened the Development Agents Program (an external initiative not directly linked to PRONAF but that also helped PRONAF loans) assuring their presence in the Northeast Region's 1,875 municipalities. The BNB is present locally through 450 trained Agents, who become "banks" with a human face, interactive, each one assisting an average of four municipalities, aiming to mobilize society to help promote and manage sustainable development. These "banks" visited 4,000 towns and districts in 1997. They promoted production by assisting clients through training and the formation of 1,400 consultation committees. The BNB also launched another development effort in 1997: the Mobile Agencies

that provide easier access to credit and facilitate interaction with the client in remote areas. The Mobile Agencies make it possible to do business in municipalities without conventional branches saving the client the burden of traveling long distances. In 1997, these Mobile Agencies traversed 424 municipalities in the Northeast and in northern state of Minas Gerais.

The role of BNDES in PRONAF-credit also is important, however this bank is directly responsible for just a small amount of loans related to rural investment projects (where it is the main agent for PRONAF). The part previously associated with BNDES in this article includes transfer operations to others banks authorized by it. But we're ignoring this fact because the BNDES assumes the risks and must pay interest to the fund used in the loans. The problem of financial layering is not important in the context of our analysis.

The banks which are authorized to operate the lines of PRONAF have a room to maneuver in making a suitable financial contract design. The on-lending interest rates are fixed by credit modality, but each bank is in charge of others features such as the requirements of cosigners and appropriate borrower selection. Despite conspicuous differences in methods used by each banking agent PRONAF forces all banks to follow common rules. It imposes financial incentives for inducing better repayment and collection like rebates, peer pressure and self-help groups; these are very common social pressure techniques. It is worth noting that all banks must require of the farmers a 'declaration of suitability' that proves the condition of family farmer. A public extension firm or rural union makes this declaration. The financial agents must not ask for any kind of reciprocity, and the choice of technical support is free. Only financial agents analyze all financial contracts and the Councils don't care about this.

The PRONAF-credit has applied different procedures tailored to their different clients. It classifies the small-farmer into categories based on income and other criteria and we'll see that it has been successful in terms of its outreach. The delivery mechanism and procedures applied are also prescribed in the PRONAF rules. PRONAF does not have had some of the common problems faced by credit programs with concessional formats. For example, while in concessional programs recipients sometimes viewed "soft" loans as grants that did not have to be repaid in the case of PRONAF the rates of loan collection are satisfactory. The intention of this paper is not to characterize the program as a good or failure experience. It doesn't intend an evaluation of whether or not the objectives of income expansion and poverty reduction were met.

In spite of recent cases of corruption involving PRONAF broadly published in Brazilian newspapers, the program is considered to be organizationally sound and well managed. As this study will show, it has suffered from deficiencies inherent in its design and probably the performance may have fallen short of its stated goals. In any case, it is impossible to ignore that it has had a positive impact on the development of family farming in Brazil. The main argument in this paper is that PRONAF-credit has remained highly subsidy-dependent.

4. THE ASIAN EXAMPLES

According to two traditional criteria used to assess the success of initiatives in rural credit – outreach and financial viability –, four south Asian RFIs are regarded as paradigmatic cases: Thailand's Bank for Agriculture and Agricultural Cooperatives (BAAC); Bangladesh's *Gramem Bank*; the Indonesia non-banking financial institution, Badan Kredit Kecamatan (BKK); and the Indonesia BRI/Unit Desa (BUD), a credit program autonomous within *Rakyat Bank*, a public bank.

These examples do not constitute an exhaustive list of successful RFIs; rather they are salient among the few well-known examples (Yaron, 1992b). A consideration of the factors underlying the success or failure of an RFI is timely because the models of successful rural financial institutions may assist us in better understanding the policies, modes of operations, and incentives that generate significant outreach and financial viability. The potential for successful replication of these institutions or salient components of their designs in different social, economic, financial and institutional environments is unclear since what is valid in one context can be impractical or undesirable in another one.

All these RFIs have made gradual progress towards subsidy independence by using efficient modes of operation that have resulted in financial self-sustainability. These four institutions differ in many ways in their modes of operation, yet they all have progressed significantly in the right direction by (i) applying market oriented onlending and deposit interest rates, (ii) emphasizing saving mobilization, (iii) providing staff and clients with significant incentives and bonus schemes, (iv) applying mobile banking systems, (v) achieving high recovery, and (vi) making use of some sort of social mechanism in efficient, rapid screening and approving of loans.

To different degrees all them have become independent, well-balanced, and increasingly self-sustainable institutions. Some characteristics of these initiatives are also present in PRONAF-credit, however it is not the purpose of this paper to discuss in detail the inner operating mechanism of these programs because they are largely presented in the literature. Like these Asian cases, the PRONAF-credit program has also relied heavily on organizing self-help groups, with routine meetings, to reach their target clientele. Similar the paradigmatic cases the Brazilian program has also dealt successfully with loan collection problems in absence of collateral. Its action is effective in generating a strong degree of solidarity in local communities. PRONAF has also implemented successful assessments of borrower's credit eligibility. In this paper, the comparison among Asian examples and PRONAF will be at a quantitative level. Importing numbers from well know studies we will tailor macro-data on RFIs easily available.

5. MEASUREMENT OF PERFORMANCE AND COMPARISON AMONG PROGRAMS

It is very difficult to evaluate the performance of a rural credit scheme like credit operations in general. The associated costs seem to be easy to measure but actually they are not so clear because in economical analysis it is important not only to consider the accounting costs but also the cost of opportunity not unambiguously defined. The programs' results in terms of productive impact are the most difficult part to address. The income variation, a result of a credit grand, is often hindered by the fungibility of money, substitution and diversion.[3.] In many instances, unless costly supervision is undertaken, borrowers can use funds for purposes preferable to them, regardless of the objectives promoted by credit program.

It is difficult to assess the effects of targeted credit because of several methodological problems. It is not clear how much liquidity a borrower might have had in the absence of a particular loan. That is, in the absence of the loan the borrower might have obtained the funds from other sources. When the credit operations are linked to a very restrictive goal, like the purchase of a certain technological pack, the productive consequence of direct credit is not actually completely impossible to be addressed. The fungibility of farm finance does not

invalidate attempts to relate credit to an incremental physical output and difficulties in measuring the impact of credit do not mean that the credit has no impact.

There are different methods to assess the performance of agricultural credit projects and complex econometric models have been developed to evaluate the financial impact of Bank operations on farming. Quantifying and attributing the benefits of credit projects call for economic evaluation and econometric studies significantly more complex than the methods frequently used in assessing project impact. Researches agree that attributing production gains to access formal credit might be misleading unless inherent measurement difficulties are overcome. Other specialists question whether even the use of rigorous econometric methods can provide conclusive results, given the fungibility of money and the difficulty of establishing an appropriate control group. They believe that the methodological problems of evaluating the impact of credit render such an assessment futile. They realize that in many studies production gains are attributed to formal credit in an exaggerated and unjustifiable manner.

Given these technical difficulties, there is neither a widely accepted nor a widespread definition of successful RFI or rural credit program. One of the traditional quantifiable measures of success is the profit presented in standard financial statements. This data on profitability is of very limited use where self-sustainability is concerned since some financial institution has benefitted from subsidies not captured in conventional accounting reporting.[4]

For many years no agreed-upon criteria existed to evaluate the performance of rural financial institutions. As an alternative approach to the performance measurement problem, a framework was introduced in 1992 for assessing the performance of RFIs. According to this new approach, in order to evaluated the performance of rural credit programs and RFIs, it is essential on to determine first whether they have met their goals of expanding income and reducing poverty, and then to evaluate their opportunity cost. Given the difficulty to address directly the credit program impact in terms of income and poverty changes, the framework proposes two indirect primary criteria, the level of outreach achieved among target clientele and the self-sustainability of the RFI. Outreach is measured by several indicators, such as number of clients, average loan size (as *proxy* for income level), and percentage of female clients. Self-sustainability is assessed by calculating an RFI's subsidy dependence index (SDI).

This performance assessment framework introduced by Yaron in 1992 has since been widely accepted by the academia and practitioners. The two criteria in fact do not provide a full assessment of the economic impact of the operations of an RFI, but they serve as quantifiable *proxies* of the extent to which an RFI has reached its objectives and make transparent the social costs associated with supporting the institution. The indicators of outreach are both qualitative and quantitative and can be used to measure both depth (type of client reached and level of poverty) and breadth of outreach (number of clients served with different kinds of instruments). The self-sustainability is measured by SDI which is developed to assess and quantify the subsidy dependence of the program reviewed. The SDI measures the percentage increase in the RFI average on-lending interest rate required to compensate for the elimination of subsidies. It is a sensitivity test that shows the required change in the average on-lending interest rate *ceteris paribus* necessary for the RFI in order to maintain its operations without a subsidy. The SDI is expressed as a ratio that indicates the percentage increase required in the on-lending rate to completely eliminate all subsidies received in a given year. These subsidies that are in numerator of SDI expression include the major forms of subsidy: concessional borrowing, the opportunity cost of the RFI's equities (considered

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costless by the institutions), and direct reimbursement by the state of some or all operating costs incurred by the RFI (a direct financial transfer).

By applying the imputed cost of subsidized resources extended to RFI, the SDI enables the assessment of the real financial cost of intervention in financial markets and focuses on the real viability and longevity of the institution. It enables governments, donors, and RFI managers to allocate and apply resources more effectively. By making explicit the subsidies received by an RFI, the SDI provides an estimate of the total cost involved in supporting an RFI. It provides a starting point for comparing the costs of alternative public interventions.

It is widely accepted that an RFI's financial performance should be evaluated in the context of the clientele served. SDI couldn't compare very different institutions that have distinct intentions and target clientele. SDI only enables comparison of the financial performance and degree of subsidy dependence of rural financial institutions that provide comparable services to a similar clientele.

If used for comparing the level of subsidy dependence of RFIs providing similar services to a similar clientele, the SDI can be used to monitor progress towards subsidy independence. It serves as a long-term planing and monitoring tool for governments, donors, and managers to track a specific RFI's progress toward self-sustainability over time.

The SDI is obtained by dividing the total amount of subsidies S received by an institution in the context of its activity level by loans portfolio value (annual average loans LP times annual average on-lending interest rate i).

(1) $SDI = S / (LP.i)$

The annual subsidy S received by the RFI can be calculated using the equation:

(2) $S = A*(m - c) + [(E.m) - P] + K$

Where A is the RFI concessional borrowed funds outstanding (annual average), m represents the interest rate the RFI would be assumed to pay for borrowed funds if access to borrowed concessional funds were eliminated. Treasury bill rates cold serve as a reference rate for non-concessional borrowed funds. Reference rates can also be based on bank commercial paper or certificates of deposit. C is the average annual concessional rate of interest actually paid by the RFI on its average annual concessional borrowed funds outstanding. E measures the average annual equity; P the reported annual profit adjusted for loan provisions, and K the sum of all other types of annual subsidies received by the RFI.

An SDI of zero means that an RFI achieved full self-sustainability. Financial self-sustainability of an RFI is achieved when the return on equity, net of any subsidy received, equals or exceeds the opportunity cost of the equity funds. Subsidy Dependence Index measures explicit and implicit subsidies (including the imputed cost of the RFI's net worth) as a percentage of the RFI's loan portfolio times the average on-lending interest rate. The resulting SDI yields the percentage increase required in the RFI average on-lending rate in a given year to compensate for the elimination of subsidies (i.e. to equate the return on equity, net of any subsidy received, with the opportunity cost of funds). However, the index does not mean that adjusting the interest rate as indicated by the index is required or even feasible in all cases. To eliminate subsidy dependence, a program needs to meet at least the following major conditions: (i) it needs to have positive on-lending interest rates that are high enough to cover non-subsidized financial costs as well as administrative costs; and (ii) it needs to contain administrative costs through efficient techniques and procedures in assessing investment plans, screening borrowers, processing loans, collecting repayments, and mobilizing and servicing savings to ensure that lending rates do not become prohibitive. If an RFI is to eliminate subsidy dependence quickly, it needs to have positive on-lending interest rate that

cover costs, adequate deposit interest rates, a high rate of loan collections, and reasonably low administrative costs.

In equation 2 the term $E.m$ uses the concept of opportunity cost of the equity, a very important idea that cannot be ignored. In the subsidy S evaluation, the literature usually considers also the opportunity cost of reserves requirement since when the concessional funds are substituted by deposits a percentile of deposits stays in the Central Bank remunerated on rates below the market interest rate. The reserve increases are calculated following the sequence: (1) Consider the amount of concessional funds plus equity and short run deposits as the base to reserve requirement calculation. (2) Multiply the base by reserve requirement rate r to obtain the reserve volume. (3) Multiply the reserve volume by the differences between the market interest rate and the interest paid by Central Bank for reserves. This is a measure of the reserves opportunity cost. (4) Finally take into account the reserve multiplier $1/(1 - r)$. Therefore, the expression for the reserve effect is:

(3) $[(A + E + D)*r*(m - t)] / (1 - r) = [(A + E + D)/(1 - r) - (A + E + D)]*(m - t)$

Taking into consideration this reserve term we have:

(4) $S = A*(m - c) + [(E.m) - P] + K + [(A + E + D)/(1 - r) - (A + E + D)]*(m - t)$

While the methodology of computing the Subsidy Dependence Index of a rural financial institution is broadly used in many studies as regards to south Asian and African initiatives[5], scarcely any studies could be found that apply the same methodology in programs such PRONAF. Applications of this methodology should be very carefully done due to the specific characteristics of the Brazilian small-farm credit program. Brazil never had a big bank exclusively for the purpose of agriculture credit, or even a specialized bank for micro-credit to small farms. Therefore the Asian tradition of RFIs for small rural business is not very relevant in the Brazilian case. What we have in this continental South American nation are development banks historically important in the evolution of the Brazilian economy, such as BNDES, BB, and regional development banks in which BNB is one of the most active in agriculture loans.

PRONAF is not a specialized financial institution but a development program. Indeed, even known cases when the SDI is ordinarily employed to analyze RFIs also have features of a development program. Gramem Bank is exemplary. The segment of credit of PRONAF (mainly for cost and investment but some for infrastructure) has the traditional characteristic of credit operations. The concerned banks play the classical role of RFIs within PRONAF. They have used concessional funds for building a loans portfolio by selecting the clientele from a pool of borrowers. The banks must pay interest for funds; they make loans collection and enforcement; they assume risks and have demanded some collections guarantees. These banks have had administrative and transitional costs with PRONAF; they allocate staff, use information technology equipment and building as well as other resources that operate in PRONAF modalities. In sum, there is nothing fundamentally different between the BB operations with PRONAF and, for example, the procedures of Thailand's BAAC. Note that we are excluding the non-banking modalities as showing in tables 1 and 2, which in fact are simple transfers.

However a conspicuous difference is seen when the SDI methodology is applied in PRONAF-credit to determine the real cost to society in maintaining it. Measuring its performance should take into account that the PRONAF funds received and lent by banks are only a small segment of their credit operations and that these banks have not been family farming specialized credit agents or even agricultural banks. Data from table 5 enable a comparison between total loans volume and the amounts associated with PRONAF in each

bank. The calculated share percentile of PRONAF in overall credit operations shows that in fact it is a relatively small volume of loans. Each of the three banks considered here work with lots of credit modalities, apart from offering a broad range of other services typical of commercial banks (as the case of BB and BNB), industrial banks (for BNB and BNDES) and development banks. If the PRONAF loans represent less than 3 percent of a bank's annual total loans (except BNB in 1998 when PRONAF was more then 6 percent of loans), then its participation is relatively insignificant. Indeed, the PRONAF credit is only a marginal part of their activities.

The paper's central idea and its most original this is to apply the methodology of SDI to assess the overall financial performance of the PRONAF-credit by using data from the three main banks that operate grants within this credit program. This procedure enables international comparison among PRONAF and the previous Asian cases, and the tracking of progress made by PRONAF in reducing its subsidy dependence over time. The use of SDI clarifies the costs in term of subsidies related to the program.

Not surprisingly, the previous equation 4 must be adapted because it does not apply directly in the PRONAF case in which this program is a small part of bank's loans. For the purposes of this analysis the formula will include an α factor multiplying annual bank's equity, as well as multiplying both profit and opportunity cost of reserves. The rationale behind this change is very sound and based in elementary economics concepts.

If the term $E.m$ in equation 4 indicates the capital opportunity costs, it is evident that in PRONAF's case we must to tailor it, because the banks' equity is in fact related to many credit lines other than PRONAF. We must make a reduction in order to see which part of a Bank's equity should be associated with PRONAF. The constant α is the reduction factor. It is obtained by dividing the PRONAF credits a bank annually grants to borrowers by the total volume of the bank's loans (this proportion is already calculated on table 5). The logic of this procedure follows the economic concept of opportunity cost: all funds that take part in a bank's loans must have the same meaning, per unit, for the bank, because if the money had not been allocated to a PRONAF credit line, it would had been used in other credit operations. For banks, the sources are homogeneous regarding opportunity cost per unit. The method used to calculate α also takes into account that the main bank's source of receipts is loans. It is less important that the funds are borrowed from different sources and loaned to specific target clientele, one of these operations more and the other less subsidized. If incorporated in a bank's total loaning funds, the money must be analyzed as a homogenous amount, since when calculating total subsidy we consider not the account cost but the opportunity cost.

The same α factor applies to gross profit and on the base $A+E+D$ regarding the opportunity cost of reserves. The justification follows the same intuition. It is not important to know the bank profit related to PRONAF operation, because it is impossible to detach it from other credit operations. There is neither a bank agency that just work with PRONAF lines, nor managers that only operate in PRONAF. Neither computers nor other resources exclusives to PRONAF. The bank processes all different lines sharing the same resources. There is again the same argument of opportunity cost which applies also to the case of reserves where we have suggested multiplying it by factor α.

As the paper goal is to calculate the overall PRONAF-credit subsidy, how much each bank gives like subsidy is not relevant but the total program subsidy. So it does not have to worry about certain desegregated data specific for each institution. As within PRONAF there is not a scheme to collect resources from its own clientele, it is convenient to consider null the average

annual deposits D_i in the equation. The equation for the subsidy calculus of PRONAF and other similar rural credit programs are show below.

(5) $S = A*(m - c) + K + \Sigma_i \alpha_i [(E_i.m - P_i) + ((A_i + E_i)/(1 - r) - (A_i + E_i))*(m - t)]$

   i = BB, BNB e BNDES.

6. OUTREACH

Before doing the calculus of PRONAF' SDI and comparing it with the Asian examples (the main proposal of the paper) this section will discuss briefly questions of outreach, the other criterion to evaluate rural credit program according the new approach. Unfortunately we do not have all data that would enable a comprehensive outreach analysis; however, a preliminary assessment is possible using basic data which are easily available.

In the literature on the subject, the outreach of rural credit program has been measured by a number of criteria: (1) the value and number of loans extended, (2) the value and number of saving accounts, (3) the types of financial services offered by the RFI, (4) the number of branches and village posts/units, (5) the percentage of total rural population served, (6) the real annual growth of RFI assets over recent years, and (7) women's participation.

In relation to the four Asian RFIs, there are detailed data about each of these items but in the case of PRONAF, the information is not always available (like data about women's participation), or the criterion is not pertinent (for example, PRONAF does not have a schema to offer saving facilities and depends totally on external sources). In this very restrictive approach we would like to address mainly the former criteria and see, in comparative terms, the average value of PRONAF's loans, the clientele's size, on-leading interest rates, loans collection performance and questions regarding distribution of loans between target borrowers, country regions and agricultural products.

While comparing different initiatives in rural credit it is important to address the degree of similarity among clienteles of different programs. In each case the target clientele is defined through the stated objectives of RFI. For PRONAF the objective has been to finance farm and off-farm income generating activities of the rural poor. In Asian programs the clientele is basically the same with the exception of BAAC which serves also big farmers. The BUD is an autonomous credit program within Rakyat Bank. The BUD supplies small farmers with credit and saving facilities for farm and off-farm activities. It is also known for granting other supports which borrower use to pay for education expenses and pay off lighter debts. The BKK is a much small institution, although older. It is a non-banking RFI that finances mainly off-farm poor activities. It is property of Java's government. BAAC is a state-owned agricultural Bank that does not work with small farmers only. The Grameen Bank is a typical poor man's bank that serves the improvement of the economic condition of low-income segments. A quarter of the bank is state-owned and the remaining part is divided among the borrowers. In all cases the level of outreach achieved must be measured with the targeted population in mind and evaluated in the context of the clientele served. However, in this paper we are not going to discuss explicitly these details; and unless otherwise specified we are comparing PRONAF and Asian RFIs using absolute numbers.

Table 2 shows a significant number of contracts and therefore families supported by PRONAF. The average value of each contract is relatively low and has decreased which reveals that the family farming has been served by the program. In 1999 more them 700

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thousand families were served by PRONAF-credit. According to data from Brazilian newspapers, in 2000 the PRONAF-credit resources have granted money to cover cost and investments, in the amount of 2.62 billion Reais, helping 900 thousand families of farmers. To see what this data means, it is enough to examine the enormous asymmetry in distribution of agricultural credit in the last farming census of Brazilian Institute of Geography and Statistics (IBGE). The census was carried out shortly after PRONAF establishment between the second half of 1995 and first half of the follow year. The census registered 258 thousand properties with access to formal credit which made loan operations, each in the average amount of 14,360 Reais. Only 5.3 percent of properties declared to have borrowed bank credit. In the south of country, this percentile reaches 15.6 percent while in the Northeast only 1.4 percent of farming establishments were benefited from such credit.[6] Therefore, we conclude that 95 percent of the Brazilian rural producers were out of official credit programs.

If before PRONAF's establishment 260 thousand properties were supported by formal credit, the program enabled to include a significant set of beneficiaries of official rural credit. With the PRONAF the percentile of establishment excluded of official credit falls from 95 to 76 percent. The PRONAF, therefore, resulted in positive effects in the capillary of the National System of Rural Credit (SNCR), adding about 700 thousand rural producers in the group of beneficiaries of the SNCR.

While the number of overall clientele served by PRONAF stresses the good performance of the program in terms of outreach, we will examine whether or not the composition of clientele in fact answers the explicit goals of the program. We do not have official data about this but the evidence seems disappointing. Abramovay (1999) points out that the PRONAF was doing favors to prosperous family farmers and even recognized that the participation of farmers within the group with annual income between 1.5−8.0 thousand Reais per year are increasing (a group of poor but not the poorest).

In many cases, farmers are obliged by banks to spend significant amounts of both money and time to obtain loans from PRONAF. In fact, small borrowers' transaction costs are often so high that effective cost of a loan (including transaction cost and interest payments) obtained in the formal market exceeds that of a loan from the informal market. According to confidential information of a director of BNB, transaction costs which borrowers had to incur before they even knew whether their loan would ever be approved amounted to 3 percent or more of the total loan. The high borrower transaction costs for small loans obtained from official lenders explain why small farmers who require modest loans may avoid using the formal market. By attempting to ensure that eligibility criteria have been met and to avoid the diversion of funds, this program has not only incurred high costs but have also imposed high transaction costs on borrowers by forcing them to wait long periods of time for loan disbursement.

Document of Brazilian government Institute of Applied Economics Researches (IPEA) shows that the credits granted from PRONAF have concentrated in some few agricultural products. Particularly they are mainly allocated where the farmers' production is integrated on agribusiness chain. The most detached agriculture products financed by PRONAF are tobacco, corn and soy.[7] Therefore the credits of PRONAF are badly distributed in kinds of product (what weaken the measure of outreach) and the program has often directed credit to the wrong products.

Another feeble feature is related to spatial distribution of PRONAF's loans among different regions of Brazil. The financing of PRONAF has concentrated in the south of country that represents more them 60 percent of the number of contracts and of total values.

It is useful also a comparative assessment of PRONAF taking into consideration the data supplied by Yaron (1992b) about outreach related the Asian RFIs (see Table 6). Although the program has reached a minority of the rural population in Brazil the assessment in terms of outreach are not too bad on comparative approach. For example, based on table 6 the total loans volume of PRONAF in 1999, dollars converted, only do not surpass Thai bank case, which also serve big farmers. Almost 1 billion of dollars as have been grated in PRONAF's loan is a very significant number considering the nature of the program. The average value of loan in PRONAF context seems comparatively high, however we may consider that Brazil is wealthier than Asian countries in question. The average loans in PRONAF reported in table 6 are biased because they do not revel the average loans for very low-income clientele. However, this clientele is minority as groups of income, instead groups of family farming with annual profit above 1.5 thousand Reais is clearly predominant. GB and BKK have had the smallest loans because they serve very poor recipients. Table 6's data indicate a significant level of outreach on PRONAF as measured by supported number of borrowers. It is above BKK and GB's clientele both RFIs in countries with large rural population, Thailand and Bangladesh respectively.

According to international experiences the interest rates of PRONAF are relatively small (the next section is doing a detailed explanation of interest rates of PRONAF). Particularly the bottom floor on PRONAF interest rates range, which is applied to poorest farmers, shows rates smaller than GB rates, which serves similar clientele. The BKK case revels that high interest rates are not a crucial obstacle for effectiveness in micro-credit programs. In fact the rural poor wants a banking service that loans in a simple and non-bureaucratic way, with quick disbursement and low transaction cost. If the internal rate of return of projects is enough he doesn't avoid pay bigger interest rates. Literature about international experiences in rural credit has comprehensively discussed this point.

The differences between interest rates within the rural credit program and market rates partially explain the behavior of subsidies as we will explain in the next section. The GB is the champion of negative spread: 5.9 percent in terms of on-leading rate against 115 percent on market rates, both in 1989. PRONAF has practiced 6.95 percent real average interest rates, against 13.16 percent interest rate on Certificate of Banking Deposits (CDB) that we can use as *proxy* of market rate. Therefore PRONAF rates were in 1999 more close to market rates than GB rates.

PRONAF-credit has achieved a high loan collection rate in 1999 among 96 and 97 percent (Belik, 1999), similar to GB (98.6 percent) that is famous in creating peer groups and other forms of social enforcement for minimizing default. On Brazilian program, the banks which are responsible for loan collection and deal with risks are very careful in selecting clientele. They have developed its own techniques of enforcement but also use monitoring procedures within the program rules.[8]

PRONAF is not as good as Asian cases in terms of clientele served and the variety of financial services offered by the RFIs. For the last criterion it does not have a saving service supplied, for the former it is excessively concentrated in cost modalities. The share of investment credit has been decreasing along time in absolute and relative terms. This is explained by the nature of operation on investment credit where it is required a longer time while happened the project maturation. Therefore, the modality has been more problematic for banks to negotiate with rural clientele.[9]

The main difference between Brazilian family farming program and Asian cases is that PRONAF is a hybrid form with features of rural credit and rural development program. Maybe

for this reason it is scarce in some crucial elements for successful rural finance institution. For instance, there is not within the program a scheme to supply saving facilities to rural poor. However, the international experience shows that poor people is able to save. Sometimes they suffer from absence of credit institution to collect saving and pay interest for it. As a consequence they have saved in physical assets with all inconvenient to do this. All the Asian banks supply instruments to collect saving.

The collateral problem is other key element in rural poor program credit. Because the poor usually has not the title of land it is impossible for them to offer collateral for collection guarantee. The Asian banks have solved this difficult in a creative way offering schemes of joint liability, the use of informal markets, banking mobile and local agents; in sum, there are many solutions in the literature about performance improve of credit rural institutions and it is not our proposal to survey them in the limited scope of this paper. The banks which have operated PRONAF are very effective in create enforcement's mechanism that explain the good loan collection of the program. Also the municipals are helping the borrowers of PRONAF by supplying guarantee or organizing collective guarantees. The central government of Brazil has assumed part of risk for small loans until 500 Reais.

It is not so obvious that PRONAF have often failed to become vehicles to upgrade small farm income and technology. Its outreach performance cannot be ignored, however the question of costs remains that is the issue analyzed in the last section before the conclusion.

7. SUSTAINABILITY

An RFI's audited financial statements should provide the data required to calculate the SDI, even when the accounting systems are not well developed. All cases in Asian RFI and banks that operated PRONAF lines supply reliable accounting statements. For the four Asian institutions we are utilising data from balance sheets and income statements as found in Yaron (1992b). In the PRONAF's banks we consulted directly audited statements. Table 7 shows data about equity and annual profit in Brazil' case. The average annual deposits are reported in the Asian RFIs cases by Yaron but as previously explained it is not relevant to PRONAF's context. Regarding Brazilian banks, shareholders' equity which is in the Balance Sheet is used as *proxy* for equity.[10]

The next step is to collect data related to other variables necessary to obtain total subsidies and a measure of SDI in each case. First, we present the Asian cases and second, the PRONAF additional data that are more complex in treatment. According the calculation of the SDI for Asian RFIs supplied by Yaron (1992b) for selected years the SDIs of BKK were 23.98 percent in 1987 and 19.71 percent in 1989. For the same years they were in percentile respectively 3.00 and –7.21 for BUD, and 180.46 and 129.99 for GB. In 1986 the SDI of BAAC was calculated 27.74 percent and 26.39 percent in 1988.[11] Many conclusions about RFIs' performance can be extracted just by looking at the SDI values. Except GB, all of them had values below 100 percent, which indicates a very good financial performance. In fact even a 100 percent as SDI while it does not show the institution's self-sustainability, because the gross profit does not reach total subsidies, however it represents a comfortable situation since at least the interest receipt reaches subsidies (LP.i = S). Of course, in this case, if government, donors and RFI owners ask for all subsidies as restitution nothing will be left for capitalization. Notwithstanding in the long run this assumption is not plausible and the institution as a matter of fact is sustainable with a SDI of 100 percent. It is for this reason that the RFIs in assessments have had a good performance in terms of this criterion.

We can see that the two Indonesian RFIs have the smallest SDI among all of them. Especially satisfactory is the BUD's financial performance, which in 1998 had attained a complete subsidy independence with negative SDI. This shows that this institution could even reduce the on-lending interest rate and remain self-sustainable. The differences in subsidies are also the consequence of the characteristics of each institution. The high SDI of GB is explained because it deals with low-income clientele. Loan and deposit sizes significantly increase the RFI's administrative cost per dollar lent and dollar saved and thus reduces self-sustainability.

What about the Brazilian family farming program? In this case, we should use equation (5). In order to use this equation we have to find all the information concerning variables in this formula. This is not an easy task because this information cannot be easily gathered given the complex mechanism of PRONAF. However, we said that to calculate the SDI of PRONAF for the comparative approach is the central idea of this paper. Fortunately the SDI provides information on the order of magnitude and trends, therefore precision is not essential.

In equation (5) for total subsidies we already have the α values (see Table 5), and information about E and P (see Table 7). Regarding amount A of concessional funds it is very hard find an exact value. We are using for A the same values in table 2 that represent values lent (LP) and not borrowed fund. In fact, more funds have been available to PRONAF-credit than the amount lent to PRONAF's rural clientele. So there is a difference between available and lent fund, however it is better to ignore it. Why does part of funds remain otiose? Because the borrowers don't fulfill the contracts' requirements imposed by program rules and additionally by banks. The money stays in bank's agencies but only part of it is loaned even with excess demand. We are not sure if these surplus affect cost with subsidies because banks remunerate part of them. The surplus can be allocated for future loans in the same program or be returned to the Treasury. The nature of operation can affect costs but in this paper it is not taken into account.

PRONAF's values for direct subsidy (K), m, c, r and t are present on table 8. The total direct subsidies granted to three banking institutions include risk cover and administration costs of banks as well as equalization of interest rates, since the banks allege that they are forced to work with negative spread which is not ever true. These payments are made monthly by the government to the banks. The category of risk cover and payments for administration represent the majority of expenses: 76.26 percent in 1998 and 54.64 percent in 1999 (Abramovay, 1999).

The calculation of *c* (the average annual concessional rate of interest actually paid by the RFI) is obviously approximate. We explained previously that the sources of PRONAF are FAT, rediscount facilities and Constitutional Funds. Only the resources of FAT are remunerated by banks, although there could be exceptions in the case of the last source but we do not have information regarding it. In this assumption its is enough to know what the share of FAT is (see Table 4) and the interest rates paid in the remunerated account where FAT's money is deposited. In this last case we need the annual average values of the Long Run Interest Rate (TJLP) that the banks utilize to remunerate the borrow fund. Actually FAT gains interest measure by TJLP and sometimes an additional rate determined by each bank's policies. We ignore the other rate since it is not important. TJLP is a good indicator of average remuneration of FAT. During the years TJLP stays above inflation index therefore the funds from FAT have had real correction. We suppose also that all banks pay the same interest rate for FAT's funds, which already had been assumed in equation (5). The TJLP rate times relative weight of FAT give us the relevant rate of interest paid by banks for concessional

funds. Bringing together all these data we can now finally calculate the total subsidy of PRONAF. Table 9 shows these results for subsidy with and without compulsory reserves, as well as the surplus of total subsidy in relation to direct transfer, the relationship between this number and direct subsidies, how much in percentile the surplus represent of the direct transfer and finally the relationship between total subsidy and concessional fund that the program has faced.

Table 9 shows that nominal subsidies arise between 1997 and 1999, particularly in the two former years, after remaining nearly constant. The real series using 1999 as the base year show that real subsidies fell between 1998 and 1999 from 612 million to 572 million.[12] The subsidies related to reserves are greater in 1998; the subsidies that surpass the transfer of direct subsidies grew from 1997 to 1998, but fell significantly in the next year. The subsides' surpass above transfer, as percentile, continuously fell from 338.84 percent to a few more than 100 percent. These data show that the direct subsidies have grown in relative terms, probably as the banks are asking for more grants from the government. The most important data is that total subsidy as percentile of on-lending credit has arisen continuously in the period, from nearly one quarter in 1997 to one third in 1998 and a little more in the next year. The consequence is that the program has a remarkably high total subsidy and increasing along time. Therefore PRONAF's total costs are very expensive.

The last step in this paper is to calculate the PRONAF's SDI. This task is very complex and before we can obtain average on-lending interest rate we should talk about the evolution of finance modality and interest rate in each one. In 1997 the PRONAF worked with three credit lines: regular cost and investment, and special cost. The program charged the fixed annual interest rate of 6.5 percent in normal lines and 9 percent in special lines. In 1998 it had created two new lines (*Special Investment* and *Agregar*). In the normal lines it was charged annual interest rates between 6.5 and 7.0 percent, and half of the monetary correction. This fact happened until July 18, when the government reduced the rate to 5.75 percent, remaining the partial monetary correction of debt. In special cost and other credit lines the rate was 6.5 per year, without monetary correction. In the next year 1999, the debt started to be indexed by TJLP and the interest charged was 6 percent per year in the investment line, and 5.75 percent in cost and special lines. There was a rebate of 50 percent of debt in investment loan.

Since Central Bank's amendment of October 1999, the PRONAF's clientele was segmented into different producer categories. Each one has had a different level of interest rate and also different solutions for arrears. The banks have granted loans for each group according to resources availability for expenses with subsidized interest, operational costs and risks. The groups are: (i) *A group*: the beneficiaries of the extinct Agrarian Reform Program (PROCERA). This clientele has paid even then real interest rate of 6 percent; now the financial responsibilities are only TJLP, with a rebate in debt of 75 percent of TJLP, observing the annual total interest rate of 3.25 percent as the base floor. (ii) *B group*: farmers whose annual farming profit is below 1.5 thousand Reais, not including retirement's gains. They pay interest rate of 1 percent per year without monetary correction, with the debt rebate of 40 percent when paid the debt. (iii) *C group*: farmers who obtain gross annual income from above 1.5 thousand to 8 thousand Reais. They receive cost and investment loan. The financial expenses are equal to 50 percent of the sun TJLP plus real interest rates of 6 percent per year. In this group, there are three kinds of credit within each line: *individual*, when granted to a producer for individual use; *collective*, when granted to group of producers for collective use; and *for group*, when granted to producer group for individual use. Among them, the financing for *collective* or *for group* offer a rebate in the first credit operation, whether it is negotiated

with at least 5 borrowers, whose value is 700 Reais per borrower. (iv) *D group*: different from other groups, the borrower can maintain as many as two permanent employees and eventually a third. The required annual gross income is from above 8 thousand to 27.5 thousand Reais. This modality also has the *collective* and *for group* lines, with the same financial expenses of C group, but without the rebate.

Along year 2000 some conditions are changed. In the new rules the A group pay the nominal annual interest rate of 1.15 percent, plus the partial monetary correction of 25 percent of TJLP (i.e., discount of 75 percent of monetary correction), and a rebate in debt original value of 40 percent, with the base floor of 1.2 thousand and the ceiling of 3 thousand Reais. These rules result in nominal rates (without rebates) near 4 percent per year. On October of the same year the National Monetary Counsel (CMN) reduced the interest rate asking for A group from 4 to 2 percent. B group has been required to pay an interest rate of 4 percent for investment, in annual basis, plus TJLP, which changed since May to 3 percent per year, plus monetary correction by variation of product price (product-equivalence mechanism where the debt value is transformed in number of product sacks).[13] It has remained the rebate for C group.

For the 2001 crop the government finished the product-equivalence. Now there is not any kind of monetary correction. On PRONAF's A line will be charged the interest rate of 1.15 percent per year and granted a discount of 40 percent in initial debt. On B line will be asked interest rate of 1 percent per year, with the same discount. In C line will be charge annual interest rate of 4 percent, with the bonus of 25 percent when the instatement is paid without arrears. For D group the rules are the same. In spite of these new rules had already started in the end of 2000 we are not taking into consideration for this year.

The application of all these volatile rules to calculate PRONAF's average on-lending interest rate is very complex and requires desegregated data of operations not available. However, with the use of certain simplifying hypothesis we can calculate an approximate rate. First of all we have assumed that the group C and D rules (the same rules in terms of interest rate with some differences in rebates) applied to all program's cost and investment operation, except line A whose interest rate will be showed in a different column in table 10. In fact, the B line practically did not start its operation because of technical problems.

According to Abramovay (1999) just the D group obtained 54 percent of PRONAF's loans in 1999, which stresses the realism of our assumption. In the absence of desaggregated data per mouth it is impossible a more rigorous calculation; we also assume uniformity in the loan's flux during the year. Using the rules of PRONAF's interest rates previously presented we can obtain approximated values for overall average rates in each year. The results of these calculations are presented on table 10, and the detailed calculations are presented in notes below this table. Note that in some years the program's rules change during the months. Using this fact we weighted the number associated to each rule regime by the year's fraction in which it has prevailed. Always we have assumed uniformity in loans' flux.

Special lines for the very poor farmers share a small part of the program, exception in 2000 when loans from the old PROCERA were transferred to PRONAF's scope. Unfortunately we do not have detailed data regarding how much of the program have been loaned in each credit line. We will use the heroic supposition that special cost and group A modalities can be ignored. This is made for sake of simplicity and because we in fact do not have the data regarding them. So our calculation of annual average on-lending interest rates on PRONAF is approximately and merely indicative. The numbers seen to overestimate the rates

because we disregarded the rebates, again to simplify the calculation and because we do not have desaggregated data about them.[14]

Note that the average on-lending interest rates i are used on the denominator of equation (1). However in each year we need only one value for i because to calculate one SDI for each credit modality does not make sense. The idea is weighted each line's interest rate by share of modalities cost and investment according table 11 to obtain an unique interest rate in each year.

On table 10 we can see that the interest rate of special group (the poorest) only is bigger than normal lines in 1997, after this year it has been very smaller and the value of rate is conspicuously decreasing. The nominal interest rate for normal lines quickly increase until 1999 and fall in the last year analyzed. We should also take into account the inflationary effect. Using IGP-M as measure of inflation we can obtain real interest rates. Table 12 shows that special lines work with negative real interest in 1999 and 2000, that indicate a high level of dependence on subsidies. The negative value of –7.81 percent in 2000 reveals the large subsidies to agrarian reform's clientele. On traditional lines a strong growth on real interest rates has happened until 1999, but they return to fall in 2000 and today it is close to zero. In fact currently the PRONAF-credit stop to charge real interest in its credit operations.

Table 11, that presents annual average nominal values one for each year, says that these rates have arisen until 1999 and fell after then. The real interest rates are not important for SDI formula because this index a non-dimensional number. But as a matter of curiosity we can see this values converted in real terms using IGP-M. As present on table 12 the behavior of real rate is the same of nominal rate: increasing until 1999 and fallen in 2000. In this last year the real interest rate is a little negative.

Now we can bring together previous data and finally obtain all the numbers of SDI for PRONAF-credit. The results are in table 13. This table shows that PRONAF's index of subsidies dependence is very high but decreasing between 1998 and 1999. Although the financial performance of PRONAF has improved during 1999, even in this year the SDI of 197.34 suggests that the PRONAF on-lending interest rate would have be increased by 297.34 percent to compensate for full subsidy elimination. In 1999 the SDI of PRONAF became similar to GB's SDI in 1987 (180.46 percent) but this even indicate high degree of subsidy dependence. Although we do not have data relate to 2000 all information suggest that the subsidy dependence of this program has become significant and has been rising.

The analysis of SDI indicated that the PRONAF-credit needs continuously infusion of external funds. The necessity of continued subsidization drained budgets and deprived other sectors of the economy of funds. Even agreeing with the assumption that PRONAF has achieved significant outreach in the depth and breadth of their coverage, it is not consensual that the benefits have exceeded cost.

What did happen with PRONAF in 1999? As table 13 revels the total subsidies stay in the same position between 1998 and 1999 (it fallen in real terms). The improvement in SDI is associated with the new rules of PRONAF in this year. This rules separated the clientele in different groups of financing with specific rules and rates. In fact the interest rate fell in A group, however it increased in groups C and D. As the last two groups granted the majority of credit the average on-lending rates grew and this resulted a better number for SDI in this year. The strong fall of PRONAF's interest rates in 2000 (not showed in this paper) conduct us to suspect that the SDI are now worsening.

8. CONCLUSION

Regarding research in rural credit there are two distinct types of approach: looking to the lender or to the borrower. Our analysis was concentrated in the former but we do not ignore the role of an analysis in terms of measuring of credit program economic performance, i.e., the productive impact in efficiency and growth of farmer activity. This paper does not shed light on some items of outreach because this would require far more detailed data. However we have seen that the comparative approach of outreach lead us to conclude that in comparative international setting PRONAF is a relevant initiative that provides some lessons for policy maker and scholar of all places.

However, there is the question of cost and the addresses of cost are made in this paper using the proposal of a program sustainable approach: an adaptation of traditional RFI's sustainability methodology. The key variable in this approach is a measure of the subsidy dependence index. We have had to follow many tables of data to bring together all information to compute this index on the PRONAF's case. Some approximation was inevitable. The approximate market rate the RFI would pay on financial resources in the absence of concessional borrowed funds is difficult to establish. It is possible that the use of the assumption of constant loan's flux misrepresents the actual value of SDI due to important seasonal variations that often occur in agricultural lending. We ignore in the computation of on-leading interest rate of PRONAF interest rate rebates and penalty interest rates on arrears, while in some cases the rebates offered have accounted for a substantial share of the interest charged on loans. For the calculation of PRONAF's SDI the amount of interest is calculated on the original amount of loan, though the loan is repaid in monthly installments for up to one or two years or in some PRONAF's lines as FCO and *Agregar* the collection is in long run over eight years.

Notwithstanding all these difficulties, subsidies to rural financial program institutions should be measured, and the social costs of given interventions should be compared with the cost of alternative interventions. Despite the fact that PRONAF has not developed into a self-sustained rural finance initiative this could not be a problem if contributors and donors have seen the program like a development program and not as a rural banking operation. The non-banking lines of PRONAF are financing public goods (which in fact must be paid by taxes) and are transfers of a fiscal nature. However the banks operation within PRONAF have characteristics of typical commercial credit operation, even the new created infrastructure lines. We believe that a comparison with Asian RFI's SDI is useful and not an erroneous procedure.

The PRONAF uses modern financial technologies in delivery of credit broadly discussed in the literature: it offers an interest rebate (amounting to almost 50 percent in some cases) for timely repayments that have constituted an efficient incentive for prompt repayment. Other financial incentives to encourage prompt repayment are also present. The program has been used arrays of incentives for efficiency on credit application by borrowers. It has features of a bottom-up institutional development program with large participation of popular organizations. The PRONAF offers an educational program with extensive training at all levels that is an essential part of all well designed action on rural credit. The banks that have operated in PRONAF also apply mobile banking techniques that contributed to maintaining administrative costs in check. The BNB presents the most famous example in mobile banking. All these policies became especially effective in the actual macroeconomic environment in

Brazil. The stable economy, wherein inflation was controlled below 13% P.A. has contributed significantly to the program's success.

The PRONAF has had an important role for the improvements in the lives of farmers that have benefited from PRONAF loans. The offer of credit at reasonable rates of interest is not sufficient but helps to ensure growth in rural production, development of the agricultural implement market and an improvement in the quality of life of the families in question. Many of these even abandon plans to move to the cities and strengthen the rural tradition that they inherit from their families. By other side the PRONAF faces some problems typical of rural credit supply lending public institutions. The banks have created lot of difficulties to disburse funds with excess of requirement to grant credit. In function of this they have not been able to disburse funds efficiently and rapidly. Applying simple, clear and efficient methods of loan approval and disbursements are a very important procedure for successful institutions that are not present in the PRONAF.

In focusing on credit, another failure of the program is that it has ignored saving mobilization, the "forgotten half of rural finance" according to Yaron (1992b). Studies indicate that even small farmers have a significant savings potential, and are capable of mobilizing resources when profitable opportunities for investment exist. All seen to indicate that there is a tremendous demand for saving services in the rural areas of Brazil.

Applying adequate accounting, auditing procedures, and managerial information systems are essential for achieving viability. Appropriate staff training and staff and borrowers incentives, emphasis on strict loan collection and its proper measurement are key ingredients of viable institutions. Promoting better deposit and saving facilities is essential for rural development. Strict monitoring and auditing also are important and the Brazilian program has had problems with corruption in the allocation of resources. This problem is only marginal but represents a reason for the increasing concern of the government.

Excepting GB, all Asian institutions depended only marginally on subsidies while the PRONAF is heavily dependent upon subsidies. The Asian banks have applied positive interest rates for ultimate borrowers, however these interest rates have compared favorably to the informal rates. In the Brazilian case there is a myth that only very low interest rates, or negative real rates, are viable in credit to family farming. But the international example shows that it is the access to credit and not the subsidy embodied in the negative interest rates that has been so important for the ultimate borrowers. Agricultural credit projects serving as a catalyst in growth should be accompanied by the removal of distorted policies that inhibit demand for agriculture investments. Brazil still presents some elements on the macroeconomic level that historically have damaged the rural producer.

The managerial information system should make transparent the social cost of state support to the credit institution, to allow public debate on its desirability, as well as tracing changes in the subsidy dependence over time. The scholar's perception is that the subsidies should only assist in temporarily closing the gap between revenues and expense of the programs only in the initial phase. The program never has a guaranteed receipt for prolonged future dependence on donor or state funds and ball-outs and this in long run invariably leads to hampered effectiveness.

Official ceilings on onlending interest rates have frequently forced lending at rates that do not cover transaction and risk costs. However the evidence shows that this is not the case of the PRONAF where the banks have gained direct transfers from government and the value of these transfers seems bigger then their actual expenses. Who does pay the subsidies in PRONAF-credit operations? The contributor (current and future) and the worker do. The

former pays because the Constitution Funds not sufficiently remunerated in grants within PRONAF are resources from the Treasury. The future contributor also pays in function of the use of rediscounts facilities, which leads to growth in public debt. The worker too pays because the resources of FAT in the context of PRONAF are probably remunerated below the alternative opportunities.

From what we know about the causes of poverty, it is hard to maintain that poverty can be solved by targeted credit schemes alone; infrastructure is nevertheless a blunt instrument for intervening directly on behalf of the poor. Subsidized, directed credit does not correct the adverse effects of urban-biased policies. Direct public interventions are justified only if they address identifiable market failures, and then only if the expected benefits of the interventions outweigh the associated costs of the interventions. Intervention should be directed toward overcoming these problems. High rates of loans collection, savings mobilization, and control of administrative costs are together the essential formula for good performance on initiatives for credit to family farming.

Tables

Table 1. *Resources applied in PRONAF non-banking lines (in current Reais)*[a]

Year	Cities Selected	Infrastructure	Education	Others
1997	385	36,628,500.00	4,539,192.00	
1998	915	136,645,000.00	41,579,228.00	5,938,216.00
1999	1,018	151,419,856.00	31,728,698.00*	9,233,671.00*

[a] *Source*: Ministry of Agrarian Development. * Forecast

Table 2. *Resources applied in PRONAF non-credit, credit and total (in current Reais). Also included number of contracts and average value*

Year	1997	1998	1999	2000
Non-credit	41,167,692.00	184,162,444.00	192,382,225.00	*
Banking credit	1,637,440,000.00[a]	1,814,922,000.00[a]	1,644,599,264.64[b]	2,620,000,000.00[c]
Total	1,678,607,692.00	1,999,084,444.00	1,836,981,489.64	2,620,000,000.00
Number of contracts[b]	486,435	644,051	717,619	*
Average values	3,366.21	2,817.98	2,291.74	*

[a] *Source*: Ministry of Agrarian Development
[b] *Source*: Data supplied by BACEN that controls PRONAF cost and part of investments.
[c] *Source*: O Estado de Sao Paulo Newspaper, Suplemento Agricola, January 3, 2001. The data include PRONAF cost and investment.

Table 3. *Resources of the PRONAF-credit applied by three public banks according numbers declared in banks' Corporate Reports. Also include total values of the program and the percentile of bank's participation.*

Year	1997	1998	1999	2000
BB	351,043,000.00[a]	710,265,000.00[a]	1,135,000,000.00[b]	750,000,000.00[c]
% BB	32.1	43	72	*
BNB[d]	166,423,000.00	671,326,100.00	325,167,600.00	158,713,800.00
% BNB	15.2	40.7	20.8	*
BNDES[e]	574,604,084.00	269,123,092.00	114,000,000.00	*
% BNDES	52.7	16.3	7.2	*
Total applied by three banks	1,092,070,084.00	1,650,714,192.00	1,574,167,600.00	*
PRONAF –credit[f]	1,637,440,000.00	1,814,922,000.00	1.644.599.264,00	2.620.000.000,00
Percentile of banks	66.69	90.95	95.72	*

[a] *Source*: BB em Grandes Numeros. Values financed by FAT resources, crop beginning in the second half of the previous years.

[b] *Source*: BB Balanço Social 1999 – Rotating Credit BB and Fast Rural carried out 51.5 percent.

[c] *Source*: News section at BB *home page,* data until October.

[d] *Source*: Balanço Social do BNB 1998, 1999 and first half 2000.

[e] *Source*: Faveret et.al. (2000) The paper offers values in current Reais of 1999: 664 million in 1997, 296 million in 1998. These numbers were deflationated to obtain current values considering the inflation measured by IGP-M, 4.36 percent in 1998 and 10.73 percent in 1999.

[f] See Table 2.

* Data not available.

Table 4. *Sources' participation on PRONAF resources applied (percentile)*

Year / source	FAT	MCR-6.2	FCO/FNE
1997[a]	83.80	11.35	4.85
1998[a]	79.50	12.90	7.60
1999[b]	86.49	10.61	3.89

[a] *Source*: Silva (n.d.),

[b] *Source*: Data from BACEN that controls cost and part of PRONAF-investment.

Table 5. *Total amount of loans of the three main Brazilian banks which work into PRONAF and relative participation of PRONAF-credit*

Bank / Year	1997	1998	1999	2000
BB – Vol. of loans	36,944,000,000.00[a]	40,701,000,000.00[a]	40,300,000,000.00[b]	39,700,000,000.00[b]
BB – PRONAF	351,043,000.00	710,265,000.00	1,135,000,000.00	750,000,000.00
% PRONAF	0.95	1.75	2.82	2.52
BNB–Vol. of loans[c]	8,389,400,000.00	10,900,800,000.00	13,422,300,000.00	14,185,900,000.00*
BNB – PRONAF	166,423,000.00	671,326,100.00	325,167,600.00	158,713,800.00*
% PRONAF	1.98	6.16	2.42	1.12
BNDES–Vol. of loans[d]	42,552,291,000.00	57,071,452,000.00	67,294,505,000.00	-
BNDES – PRONAF	574,604,084.00	269,123,092.00	114,000,000.00	-
% PRONAF	1.35	0.47	0.17	-

[a] *Source*: BB, *Annual Report* 1999 – without provision for doubtful credit.

[b] *Source*: BB: *Administration's Report* 1999 and first semester 2000, without provision for doubtful credit. Partial values in 2000.

[c] *Source*: BNB, *Corporate Report* 1997, 1998, 1999, first half 2000.

[d] *Source*: BNDES: Annual Report 1998, 1999. Balance Sheet on December 31 – sum of short run and long run credit operation. Include financial operations and transfers but not provision for credit risk. Include also doubtful credit and overdue credit operation. Data for 2000 not available.

* Partial data.

Table 6. *Comparison between PRONAF and Asian RFIs*

RFI	PRONAF	BKK	BUD	BAAC	GB
Year	1999	1989	1989	1988	1989
No. of clients	717.619[a]	510.000[b]	1.600.000[b]	2.600.000[b]	660.000[b]
Vol. of loans	913.666.258[c]	17.463.508[d]	642.119.758[d]	1.548.879.966[d]	40.300.403[d]
Average value of loans	1420[e]	35[d]	390[d]	789[d]	107[d]
Real interest (year)	-4,88 a 7,06%[f]	72 a 166%[d]	14,6 a 23,9%[d]	2,6 a 4,0%[d]	5,9%[d]
Prevailing formal interest	13,16%[g]	12,7 a 17,4%[h]	12,7 a 17,4%[h]	15,6 a 47,9%[h]	104,6%[h]
Loans collection	96 e 97%[i]	80%[j]	95%[j]	83%[j]	98,6%[j]

[a] See Table 2. We are supposing one contract per family.

[b] *Source*: Yaron (1992b).

[c] In dollar. Exchange rate R 1,8 = $1,00.

[d] In dollar current in 1999. *Source*: Yaron (1992b) supplies values in current dollars using the exchange rates Rp 1768 =B25=T33=$1,00. In order to become these numbers comparable with PRONAF number we inflationated Asians RFI data using CPI-U supplied by *Department of Labor, Bureau of Labor Statistics, Economic Report of the President*; the calculation takes the average inflation index for 1999.

[e] In dollar. See Table 2 and the previous exchange rate.

[f] According interest rates calculated in table 12 ahead.

[g] *Source*: Relatorio do Banco Central do Brasil, January 2000. Average monthly rate of the Brazilian Certificate of Banking Deposits (CDB), in annualized base.

[h] *Source*: Yaron (1992b) supplies nominal values. If *i* is the rate of nominal interest prevailing at country for formal market and *I* is the inflation rate, the real int current in 1999eresting rate in formal market is given by formula r = (i – I)/(1 +I), where r is the real rate, i is the nominal rate and I means inflation.

[i] Belik (1999).

[j] Source: Yaron (1992b). BKK, GB and BUD's rates are associated with collective loans. For GB the data are for 1987.

Table 7. *Data from Balance Sheet and Income Statement of three Brazilians banks that work in PRONAF-credit (average shareholders' equity and average annual gross profit)*

Institution	BB[a]			
Year	1997[b]	1998[c]	1999[c]	2000[d]
Shareholders'equity	6,003,033,000.00	6,316,453,000.00	6,950,302,000.00	7,528,220,000.00
Gross profit	532,014,000.00	1,194,132,000.00	183,415,000.00	626,257,000.00
Institution	BNB[e]			
Year	1997[b]	1998[c]	1999[c]	2000[d]
Shareholders'equity	735,294,000.00	810,769,500.00	920,989,500.00	975,082,000.00
Gross profit	100,900,000.00	108,229,000.00	69,614,000.00	(-) 53,358,000.00
Institution	BNDES[f]			
Year	1997[b]	1998[c]	1999[c]	2000
Shareholders'equity	10,440,284,000.00	10,378,040,500.00	10,689,887,500.00	-
Gross profit	1,095,813,000.00	717,937,000.00	606,836,000.00	-

[a] *Source*: BB - Balance Sheet and Income Statements in 1998, 1999 and first half 2000. Gross profit before income tax and profit distribution, and adjusted for loan provision.

[b] *Source*: BB - Balance Sheet on December 31, 1997.

[c] *Source*: BB - Balance Sheet. Average amount between two consecutive balances on December 31.

[d] *Source*: BB - Balance Sheet on June 30, 2000.

[e] *Source*: BNB - Balance Sheet and Income Statements in 1998, 1999 e first half 2000. Gross profit before income tax and profit distribution, and adjusted for loan provision.

[f] *Source*: BNDES - Balance Sheet in 1998 and 1999. Gross profit before income tax and profit distribution, and adjusted for lost provision.

Table 8. *Additional data for the three Brazilian banks that work in PRONAF-credit for the total subsidy calculation. K in Reais, others values in percentile*

Year	1997	1998	1999	2000
K	63.300.000,00[a]	171.400.000,00[a]	279.247.100,00[b]	*
m[c]	24,80	29,28	25,78	17,47
c[d]	8,49	9,28	11,43	*
r[e]	38	55	57	43
t[f]	0	0	0	0

[a] *Source*: Silva (n.d.).

[b] *Source*: Abramovay (1999). Amount measured until December 20, 1999.

[c] *Source*: Boletim do Banco Central do Brasil, December 1998, December 1999 and December 2000. Average of annual rates, moth by moth, of *Certificate of Inter-banking Deposites* (CDI). Data not available for include in the *m* administrative costs of operation.

[d] Using the share of FAT that is showed in Tables 4 and values of TJLP (see note in the next table).

[e] *Source*: Boletim do Banco Central do Brasil. December 1998, December 1999 and December 2000. Average of the banking reserves with monthly data.

[f] We supposed that compulsories banking reserves are not remunerates. It would be possible to include monetary correction. * Data not available.

Table 9. *Total of subsidy on PRONAF-credit from 1997 to 1999, regarding data of BB, BNB e BNDES. Values in Reais*[a]

Year	1997	1998	1999
S (without compulsory reserves)	275,415,099.00	533,035,472.00	558,210,767.68
Subsidies related to reserves	2,370,273.96	19,798,087.71	13,693,267.55
Total S	277,785,373.50	552,783,544.28	571,904,035.23
Total S – K	214,485,373.50	381,383,544.28	292,656,935.23
(Total S – K) / K %	338.84	222.51	104.80
(Total S / A) %	25.44	33.49	36.33

[a] The TJLPs used in the calculation of S are in percentile 10.13 in 1997, 11.67 in 1998, and 13.22 in 1999. *Source*: Boletim do Banco Central do Brasil. December 1998, December 2000. Annual Average values supplied to each mouth, fixed per quarter.

Table 10. *Average interest rate on PRONAF. Percentile*

Year	Cost	Investment	Special Cost
1997	6.50[a]	6.50[a]	9.00[b]
1998	8.39[c]	8.39[c]	6.50[b]
1999	18.34[d]	18.55[e]	5.33[f]
2000	12.67[g]	11.95[h]	*3.78[i]

[a] *Source*: *Folha de Sao Paulo* Newspaper, November 11, 1997.

[b] *Source*: Silva (n.d.).

[c] *Source*: *Folha de Sao Paulo* Newspaper, June 18, and December 18, 1998. Taking into account our previous supposition, the average rate was calculated by equation $i_{c98} = 0.46*(6.75+0.5*4,36)+ 0.54*(5.75+0.5*4.36)$. Where 0.46 is the year's proportion until June 18 and 0.54 since this date to ahead; 6.75% is the average among 6.5% and 7.0% of interest charged by regular lines; 0.5 indicates 50% of monetary correction, 4.36% is the inflation rate in 1998 measured by IGP-M (average rate). Finally, 5.75% is the new interest rate which was in force since June 18.

[d] *Source*: Ministry of Agrarian Development and Abramovay (1999). The average interest rate in cost modality was obtained by the formula $i_{c99} = 0.83*(5.75+13.22) + 0.17*(0.5*(13.22+17.37))$. Where 0.83 is the proportion of the year until government's amendment on October that change PRONAF's financing rate, and 0.17 is the weight of remaining days of the year. 5,75% is the rate in cost until then and 13.22% is the TJLP in 1999. Note

that we used the 10.73% average inflation index IGP-M as measuring of the annual inflation in 1999 into the calculation that apply the new rules (where the borrowers have financing responsibilities corresponding 50% of the sum obtained by adding TJLP and real interest rate 6% per year). The nominal rate which are showing in the last term of the previous equation is obtained by the formula $i_n = (0.06*(1+0.1073) + 0.1073)*100 = 17.37$, where we used the supposition of 6% real interest rate per year. We assume that C and D groups' financing roles are applied to all program's lines.

[e] *Source*: Ministry of Agrarian Development. We are using the formula $i_{i99}=0.83*(6+13.22)+ 0.17*(0.5*(13.22+17.37))$, in which the 5.75% cost rate was substituted by the 6% investment charged rate according the stipulation made by the CMN amendment rules.

[f] *Source*: Ministry of Agrarian Development and Ministry of Agriculture: Agricultural Plan, September 1999. As a result of the equation $i_{A99} = 0.83*5.75 + 0.17*0.25*13.22$, which take into consideration the news rules since October's amendment where in A group the rates start to be 25% of TJLP.

[g] *Source*: Ministry of Agrarian Development, Radiobrás (official radio) January 17, 2000 and Abramovay (1999). Data calculated by equation $i_{c00} = 0.41*(5.75+11.98) + 0.59*(3+6.15)$, where 0.41 e 0.59 are proportion of the year before and after May, 11.98% is the average among TJLP for year 1999 and 2000, and 6.15% is the inflation measured by IPR (Producer Received Price Index – *source*: Ministry of Agriculture) in 2000. This index reflect the average behavior of sale's prices in farming sector, and it is a good *proxi* for product price variation used by the new rules that incorporate product-equivalence. We applied only C and D groups' rules of financing.

[h] *Source*: Balanço da Reforma Agrária e da Agricultura Familiar, Ministry of Agrarian Development's *home page*. Some lines charged 6% plus TJLP as interest rate for investment. Also Abramovay (1999). $i_{i00} = 0,41*(4+11,98) + 0,59*(3+6,15)$, formula similar the previous equation, with a difference that the investment interest rate, on former rules, was 4% per year plus TJLP.

[i] *Source*: *O Estado de Sao Paulo* Newspaper, October, 2000. $i_{A00}=0,83*(1,15+(11,98*0,25)) + 0,17*2$, regarding the rules changed on October, 0.83 is the proportion of the year since then and 2 is the new interest rate on A group.

* Data for *A* group

Table 11. *PRONAF-credit annual average interest rate taking into account the proportion between cost and investment loans. Percentile*

Years	Custeio[a]	Investimento[a]	Taxa de juros média[b]
1997	*	*	6.50
1998	54.64	45.36	8.39
1999	65.35	34.65	18.41
2000	70.00	30	12.45

[a] Source: Abramovay (1999). Numbers for the crops beginning on second half of last year.
[b] Weight average interest rated of rates on table 10.
* Data not available, however this is not important for our calculation because the credit's rules are the same in both lines.

Table 12. *Annual average inflation in Brazil measured by IGP-M and annual average real interest rate on PRONAF. Percentile*

Year	Average inflarion[a]	Cost	Investment	Special Cost	Real average interest rate[b]
1997	8.02	-1.41	-1.41	0.91	-1.41
1998	4.36	3.86	3.86	2.05	3.86
1999	10.73	6.87	7.06	-4.88	6.94
2000	12.57	0.09	-0.55	-7.81	-0.11

[a] Source: Boletim do Banco Central, 1998, 1999, and 2000.
[b] Using the equation $r = (i – I)/(1 +I)$, where r is the real rate, i the nominal and I the inflation.

Table 13. *Calculation of PRONAF's SDI*

Year	1997	1998	1999
Total S	277,785,373.50	552,783,544.28	571,904,035.23
LP	1,092,070,084.00	1,650,714,192.00	1,574,167,600.00
i	6.5	8.39	18.41
LP.i	70,984,555.46	138,494,920.71	289,804,255.16
SDI%	391.33	399.14	197.34

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NOTES

1. For example, according Silva (n.d.) and Abramovay (1999) in 1999 3.4 billion Reais were available for PRONAF-credit, but during this year has been actually loaned an amount significantly smaller.

2. Faveret et. al. (2000) is used in the case of BNDES (see Table 3).

3. In the literature of banking, the above three terms are defined in that following way: fungibility is the fact that subloan resources can be pooled with other resources at a client's disposal, and these combined resources can be used for the purposes specified under projects, and it is equally hard to establish the purposes for which loans are applied; substitution is understood to describe the fact that loans may have substituted for these alternatives sources of financing; and diversion happened since farmers who obtain project loans may have been able to mobilize other resources even without the project.

4. For a discussion on the issue of the limitation of the traditional approaches regarding measure of performance in RFI, see Yaron et.al. (1997).

5. For the African case see...

6. Farming census of IBGE. The data are supplied to me by Rubens Nunes.

7. Silva (n.d.)

8. The data about PRONAF's loan collection are biased because they don't consider as arrears non-paid debt that was negotiated. In mid-2000 there were installments in arrears of 170 million Reais corresponding to 60 thousand small farmers. No official data about loans collection of PRONAF is available. We only have an approximate figure based on secondary sources.

9. Abramovay (1999) makes a detailed discussion about composition of PRONAF-credit.

10. We don't use share's value as measurement of equity because the share prices of banks were extremely volatile during the year in question, in line with the behavior of Brazilian equity market as a whole. Particularly volatile were the shares of BB in 1999.

11. Some of these numbers can be different of Yaron's data.

12. The previous years' numbers have gone inflationated using IGP-M (inflation index supplied by Getulio Vargas Foundation – see Table **?**).

13. Sonia C. Silva and Tânia Monteiro in the *O Estado de Sao Paulo* newspaper. May 11, 2000. We have supposed that these changes also apply to special lines.

14. Exception was did in interest rate calculation on A group at the end of 1999 where we applied the rebate of 75% in debt directly on calculus of relevant rate that define interest.