

CHAPTER 2

NON FORMAL CREDIT FOR RURAL AGRICULTURAL AREAS: NEW EVIDENCE FOR AN OLD PROBLEM

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Abstract

The purpose of this paper is to show the complex relationship among different lenders in the agricultural sector. Formal, semi formal and informal lenders coexist, sometimes competing and at others complementing their activities to shape the financial markets for different sectors in the Peruvian economy. There is no difference in the agricultural sector, one the most affected by the lack of access to capital. This paper presents evidence of the activities of both sides, borrowers and lenders, in order to improve credit allocation and increase agricultural activity, and concludes on the need to consider the activities of crucial participants, such as semi formal lenders, in the design of an agricultural policy aimed at improving the development of the credit market relevant to this sector.

The article concludes by presenting evidence suggesting the existence of a complementary relationship between formal and semi formal lenders as well as competition between both types of lenders. This conclusion suggests that in order to develop the credit market for agriculture in Peru we need to consider not only the formal sector but also others, especially the semi formal lenders.

1. Market size: importance of non formal lenders

One of the problems faced by Peru's agricultural sector is the limited access to credit². For a long period of time most credit for agriculture came from a State bank, the Banco Agrario (BA). The BA ended its operations in 1992 and, as part of a program of structural adjustment and financial liberalization, agricultural credit was supposed to come mainly from private formal lenders³. However, as we will discuss later, private financial lenders were not able to provide enough credit, so the problem of lack of credit continued and probably became worse.

A common question about credit market, at least in the case of Peruvian agriculture, continues to be the size of the market. Due to the intrinsic difficulties involved in answering this question, we usually use the total amount of credit allocated to the agricultural sector. However, the existing statistics report only credit allocated by the

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² This problem has been recognized by researchers and policy makers of all political tendencies. See for example Escobal (2000), Gonzales de Olarte (1997), Valdivia and Silva (1997), Trivelli (2000); Alvarado and Ugaz (1998), among others.

³ For a review of the main features of the financial liberalisation of the early 90's see Trivelli, Alvarado and Galarza (2001).

formal sector⁴. With this restriction, and considering only the amount of formal credit, we are clearly underestimating the total amount of agricultural credit. The question is how far is this number from the real value of credit going to the agricultural sector.

As shown in the table below (table 1), in the last decade formal credit to agriculture reached a peak of around US\$ 500 million per year. Nevertheless, the agricultural sector represents a small portion of financial activities for most formal lenders. The total amount of formal loans allocated to agricultural activities represents around 12% of agricultural GDP, showing a reduction compared to the era of the BA (Trivelli, 2001). Estimates made by Valdivia (1995) show that the BA allocated during the 80's around 20% of agricultural GDP in loans to the sector. Similarly, the number of agricultural clients (in the formal sector) in its last years was around 23,000. This figure shows another dimension of the problem when compared to more than 200,000 clients of the now defunct BA.

**Table 1: Formal Credit to the agricultural sector
(US\$ millions)**

Time period	Banks	Financial institutions	CMAC	CRAC	Total formal sector
95.12	256.0	2.9	3.1	10.9	272.9
96.12	354.2	1.7	6.5	23.9	386.3
97.12	438.4	3.4	8.8	32.8	483.5
98.12	441.0	4.8	12.0	36.8	494.6
99.12	374.0	1.0	n.a.	n.a.	n.a.
00.03	375.0	0.9	n.a.	n.a.	n.a.
00.06	389.0	0.9	n.a.	n.a.	n.a.
00.09	393.2	0.9	n.a.	n.a.	n.a.
• N° Institutions	23	6	13	13	
• % Agricultural loans/total loans	3.2%	1.6%	12.8%	63.6%	

Source: Superintendencia de Banca y Seguros
Taken from Trivelli 2001

In this context of limited resources flowing from the formal financial sector to agricultural activities, the obvious question is what about other credit sources?. Non formal lenders are quite important for several reasons and not just in the agricultural sector. However, in the Peruvian agricultural sector, the amount of resources allocated by these non formal lenders using different technologies, having a flexible supply of credit and considering the limited amount of formal credit suggests that there are sufficient arguments in favor of a non formal pool of credit suppliers that serve a significant portion of the agricultural credit market. Non formal agents by definition are difficult to identify, not only as group but also their impact and their

⁴ Formal credit is that provided by formal financial institutions, which are under the supervision of the Superintendencia de Banca y Seguros (SBS). The formal institutions in Peru are: Banks, Cajas Rurales de Ahorro y Crédito (CRAC), Cajas Municipales de Ahorro y Crédito (CMAC), Financial Institutions and Entidades de Desarrollo de la Pequeña y Microempresa (EDPYME). For the meaning of acronyms, see the end of this chapter.

performance. However, their activities are crucial to understanding the agricultural credit market.

Before discussing details of non formal credit, we need to mention the importance of making use of term “non formal” credit instead of “informal” one. We differ from most studies (Hoff et al., 1993, Floro and Yotopoulos, 1991; Bell, 1990; Siamwalla *et al.*, 1990; Steel *et al.*, 1997; McMillan and Woodruff, 1999; among others) as we do not use the common dichotomy between formal and informal credit markets. We recognize the importance of an “in between” type of lender: the semi formal one, with unique characteristics, different from informal as well as from formal lenders. The semi formal lenders together with the traditional informal lenders, are not recognized as financial intermediaries, so in that sense they are part of the “non formal group”. Non formal lenders are also divided into two groups, semi formal and informal sources. The first group is defined as institutional lenders that are not financial intermediaries and the second group consists of individuals⁵.

There are no estimates of the total amount of resources allocated by non-formal agents, but different studies show that these lenders are as important as formal lenders (and in some cases even more important). It is usually assumed that non formal transactions are very common but imply reduced amounts, specific purposes and a short maturity. We will come back to the products and their characteristics in the next section, but it is necessary to discuss two issues: coverage (number of clients) and total amount of resources lent.

As far as coverage of non formal lenders is concerned, and considering the many limitations of measures of credit access, national level surveys (ENNIV⁶) have shown that in rural areas non formal lenders are the most mentioned. Table 2 shows the reduced percentage of households that have had access to credit (from any source) in different regions of the country in the last decade, revealing a lack of access to credit in general, and more dramatically in rural areas.

Table 2. Households with credit: 1994, 1997 and 2000

Region	ENNIV 1994			ENNIV 1997			ENNIV 2000		
	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
With credit (%Households (hh.))	16.6	16.7	16.4	32.0	38.1	22.1	16.5	18.4	13.0
REGIONS									
Coastal (% hh)	13.0	12.0	18.2	36.9	38.7	29.3	16.7	17.0	13.3
Highlands (% hh.)	17.9	22.1	14.9	25.7	36.7	18.3	15.1	20.6	11.9
Jungle (% hh.)	22.2	25.9	18.0	30.2	37.6	22.6	20.2	24.6	16.2

Source: ENNIV 1994, 1997 and 2000
Elaborated: IEP

⁵ In the semi formal lenders we have included the MAG loans (some in kind and some rotating funds) and the Banco de Materiales, which is actually not a bank in formal terms (it lends materials to build houses) but it is referred to in that way.

⁶ Encuestas Nacionales de Niveles de Vida

Table 3 presents the main sources of credit mentioned by households with credit. As can be seen, only Banks, CMAC and Cooperatives are formal lenders, and these represent less than 23% of the sources mentioned in rural areas⁷ for the year 2000. To emphasize the point, although based on general information (at household level), formal lenders work with a reduced percentage of households having loans in rural areas.

**Table 3. Households with loans by source of credit: 1994, 1997 and 2000
(% of households with credit)**

Source of credit	ENNIV 1994			ENNIV 1997			ENNIV 2000		
	Total	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural
Individual	33.1	29.8	38.8	13.6	11.2	19.7	20.0	14.8	33.9
Bank	7.0	10.3	1.4	26.7	33.9	7.2	28.8	33.4	16.5
CMAC	0.0	0.0	0.0	0.0	0.0	0.0	4.7	4.7	4.7
Cooperative	5.2	7.3	1.4	5.0	5.8	2.9	6.0	7.6	1.6
Enterprise	12.5	16.3	5.9	8.5	11.3	1.1	3.1	3.7	1.2
Small store	14.2	20.9	40.2	39.7	29.8	66.9	30.9	29.1	35.7
Others	28.0	15.4	12.3	6.5	8.0	2.2	6.6	6.6	6.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: ENNIV 1994, 1997 and 2000
Elaborated: IEP

Case studies provide additional, and more precise, information about the importance of informal lenders to agricultural producers. Trivelli and Venero (1999) showed, for the case of the Huaral valley, a highly dynamic and integrated region, that 47% of farmers had access to credit. Of these loans 68.9% were obtained from non formal lenders. They also found that from the total number of transactions registered during their field work with a random sample of small farmers, 57% of the transactions involved non formal lenders. Boucher (2001) found that in four valleys of Piura nearly 67% of total loans came from non financial lenders. Alvarado et al (2001), based on random samples of rural households in two different regions (one on the coast and the other one in the highlands), also found that non formal transactions predominated in rural areas; around 87% of all loans in rural areas came from non formal sources.

The importance of non formal lenders in providing access to specific segment of credit client is recognized. Nonetheless, with respect to the amount of resources involved in non formal transactions it is usually assumed that they imply small sum of money (lots of small and micro credits). Based on this hypothesis, the importance

⁷ Nevertheless, it is worth mentioning that formal lenders, mainly commercial banks, have significantly increased their presence in rural areas. Table 3 shows that in 1994 only 1.4% of rural households with loans mentioned banks as their main source of credit, while in 2000 this percentage was 16.5%.

of non formal lenders is limited to their impact in terms of coverage (number of transactions). However, Alvarado et al. (2001) found that this may not be the case for the Peruvian agricultural sector. Their research showed that, in contrast to the other two economic sectors in the study⁸, in the case of rural households, non formal lenders were important in terms of number of transactions as well as in terms of the total amount of resources allocated⁹. Table 4 shows the significance of non formal transactions in a random sample of rural households from two different regions studied by Alvarado's research team¹⁰.

Table 4. Volume of credit transactions in rural households in two regions (US\$)

Credit Source		Lenders	TOTAL CREDIT	Regions	
				Junin	La Libertad
FORMAL		Banks, CRAC, CMAC, EDPYME	114,897	34,064	80,832
NON FORMAL	Semi-formal	MAG, NGOs, Traders, Input stores, etc.	280,018	66,237	213,781
	Informal	Family and friends, individual traders, small retailers, etc.	82,748	12,447	70,302
	TOTAL		362,766	78,684	284,083
TOTAL CREDIT REGISTERED			477,663	112,748	364,915
% Non formal credit in sample			76%	70%	78%

Source: Alvarado et al. (2001)

From the evidence presented it is useful to remind two issues: a) Although the size of the agricultural credit market is not known, if we only consider formal transactions we are clearly underestimating the market's size. b) Non formal lenders are important not only in terms of number of transactions but also in terms of the amount of resources allocated, at least in the case of the Peruvian agricultural sector.

One remaining question is the relationship between formal and non-formal lenders. Are they competing or complementing each other? Do non formal transactions appear when formal lenders do not want to supply credit or when the formal sector is too small? Do non formal transactions constitute a different financial product (compared to the formal ones) so that they do not compete with the formal sector? If one or more of the answers to these questions is affirmative, then we could say that non formal lenders complement the formal sector's activities. However, it is possible that non formal lenders could be replacing formal ones as well, as when they offer similar types of credit to similar clients. In the next section we will discuss these issues to approach an answer to questions about the relationship between formal and non formal lenders in rural areas.

⁸ Wholesale traders and micro-entrepreneurs.

⁹ Trivelli and Venero (1999) and Boucher (2001) do not present information regarding the total amount of resources from each source. Both studies only work at the level of individual credit transactions.

¹⁰ In each of the two regions a random sample of 200 households was examined, with a maximum error of 7%.

2. Formal and non formal lenders in rural areas: evidence and relationships

In order to understand the relationship between formal and non formal lenders, in this section, we will discuss the existence – or not – of common credit types offered by different lenders and whether their lending technologies are similar, based on empirical evidence from two Peruvian agricultural areas. Finally, we present a simple test based on a probit model to explore the type of relationship existing between formal and non formal lenders.

The following analysis is based on evidence collected in two rural areas during 2000 as part of the research presented in Alvarado et al (2001). The data base has 400 cases (rural households) selected at random in two agricultural areas, one in the coastal region and the other in the highlands. Both regions are well integrated with product and input markets. Agriculture is the main economic activity for most cases (94% of the households depend primarily on agriculture). The survey used to collect the information was carefully designed to capture credit transactions, especially the non formal ones.

From the 400 households in the sample, only 107 cases lacked any source of credit in the 12 months prior to the survey. Although this result, 73% of households with credit, shows that credit accessibility is significantly above national levels for rural areas presented in the previous section (based on ENNIV), the results are similar to those obtained by Trivelli and Venero (1999) and by Boucher (2001).

As mentioned before (table 4), non formal sources are the more important ones in terms of total resources involved in credit transactions. In the non formal sector, semi-formal transactions, those coming from enterprises and businesses not specialized in financial activities, are the most significant. In the case of the department of La Libertad this is especially significant due to the importance of rice mills that become important local lenders.

In terms of coverage the figure is quite similar, showing the predominance of non formal transactions. However, as predicted by the theory, informal transactions (credit from individuals) are more frequently reported. A total of 510 transactions was reported by the 293 households with credit, from these, 63 transactions came from the formal sector, 197 from semi formal lenders and 250 from informal sources.

Credit types and lending technologies

As usual, credits allocated in these two rural areas vary widely. Table 5 presents a summary of the characteristics of the reported credits by lender. As shown, formal credits imply significantly larger amounts. The median formal transaction is about US\$ 1,156, compared to a median of US\$ 477 for the semi formal lenders and less than US\$40 for the informal lenders. Clearly, the size of loans varies considerably among lenders.

Table 5. Credit Technology

Description		Formal					Semi formal				Informal				Total	
		Bank	Edpyme/ Coop.	CRAC	CMAC	Total	NGO	Private semi formal	MINAG/ Ban. Mat.	Total	Individual trader small retailer	Informal lender	Family and friends, neighbor	Total		
Credit amount (US\$)	Me*	1499.2	925.4	3112.0	1155.2	1823.8	1450.4	1599.7	834.4	1421.5	33.6	759.1	358.7	331.0	936.6	
	Med*	1300.6	740.2	3000.0	867.1	1156.1	433.5	708.1	433.5	476.9	14.5	173.4	86.7	37.6	231.2	
Maturity (months)	Me*	10.8	5.1	10.2	7.8	8.6	6.9	5.9	70.2	19.4	0.9	4.3	6.1	2.9	10.0	
	Med*	9.0	6.0	10.0	8.0	7.0	6.0	6.0	72.0	6.0	0.5	5.0	6.0	1.0	5.0	
Selec- tion	Collateral (yes)	%	72.7	91.7	100.0	89.5	90.5	76.0	47.3	31.7	47.7		8.2		31.0	
	Need Project (yes)	%	9.1		4.8	5.3	4.8	8.0	3.1	14.6	6.1	2.4	2.4		3.9	
	Year knowing lender (years)	Me*	2.7	2.8	2.8	2.1	2.5	2.2	4.8	3.0	4.1	9.7	11.5	17.3	11.5	7.5
Med*		2.0	2.5	2.0	2.0	2.0	1.0	3.0	2.0	2.0	6.0	6.0	10.0	7.0	3.0	
Moni- toring	Visits	%	27.3	83.3	57.1	42.1	52.4	60.0	44.3	56.1	48.7		16.5		28.0	
Reco- very	Actions taken															
	1	%	33.3	20.0	12.5		20.0	20.0	9.4	88.9	43.8	31.9	22.2	40.0	31.2	35.2
	2	%	16.7	40.0	37.5		30.0	40.0	59.4		32.8	61.7	66.7	60.0	62.3	44.8
	3	%	33.3	40.0	25.0		30.0	40.0	21.9	7.4	17.2					11.7
Default rate (late payments and default)		%	54.6	41.7	38.1	5.3	31.8	20.0	24.4	65.9	32.5	37.3	11.8	12.8	24.8	28.6
Time to obtain credit (days)	Me*	47.5	13.6	48.7	11.8	30.7	22.7	9.4	64.3	22.5	2.1	6.0	6.9	4.2	14.6	
	Med*	44.0	2.5	28.0	5.0	14.0	14.0	2.0	32.0	4.0	2.0	2.0	2.0	2.0	2.0	

* Me: average; Med: median.

¹Actions: 1. Did not do anything, 2. Extend maturity and 3. Increase interest rate.

Source: Alvarado et al. (2001).

Loan maturity seems to be different as well. Although we did not find a significant difference between formal and semi-formal lenders, there is an important difference between these two and the informal loans (see table 5). The median length of a loan from formal lenders is 7 months and for semi-formal lenders is 6¹. These subtle differences could be explained by the characteristics of the sector - fixed agricultural cycle, limited crop diversity in each region, etc. -. However, if one reviews specific lenders in each group important differences are found. Banks and CRAC on one hand had an average loan maturity of 10-11 months, while NGOs and traders had an average maturity of 6-7 months.

Credit offered by different lenders appear to be quite different. Formal lenders, as expected, make larger loans and lend for longer periods than semi formal lenders. Semi formal lenders make larger loans and lend for longer periods than informal lenders. Two additional characteristics of credit's transactions helped us illustrate the differences in the types of credit offered by different lenders². In the first place, formal transactions are 99% in cash, while semi formal are 60% in cash and 40% in kind (inputs, services, etc.)³. Secondly, transaction costs are significantly different among lenders. As shown in table 5, the number of days required to obtain a loan from a formal source varies from 47 days in average for a bank loan to 11 days to obtain a CMAC loan, significantly above the 22 days required in a NGO and the 9 days to obtain a loan from a trader or input store. The extreme case, as expected, is the 4 day average required to obtain an informal credit.

In general terms one can say that there are significant differences in the credit offered by each lender. The extreme cases would be, on one side commercial banks in the formal sector and, on the other side, informal loans from family and friends. However, recognizing these differences, what we actually see is a range of options and types of credit that are not completely different. For example, some formal transactions are related to products offered also by some NGOs or traders; or repeated loans with a semi formal could be similar to a formal loan. We will come back to this issue after reviewing some aspects of the credit technology.

Table 5 includes interesting features about the credit technology used by each type of lender. In first place, it is clear that the selection technology marks important differences among lenders. These differences also imply "filters" for certain types of borrowers as we discussed in a other study⁴. As part of the selection process a formal lender requires collateral in more than 90% of the cases. This requirement, induced by current financial legislation⁵, could represent an important filter for those

¹ Median without considering loans from MAG or Banco de Materiales (Banmat).

² We are leaving the price –interest rate—out of the analyses on purpose because no reliable data was obtained.

³ In the department of La Libertad most semi formal lenders are rice mills that lend in cash and receive rice as payment. Probably in some other agricultural settings the percentage of cash transactions could be even lower.

⁴ See Trivelli (2001).

⁵ Financial law states that although loans can be granted without collateral, when certain types of collateral (houses, bonds, land, etc.) are included as guarantees, the required "provisions" that the lender has to make for that credit are significantly lower.

borrowers with no collateral and/or with interest in small scale loans⁶. Semi formal lenders ask for some type of collateral only in 50% of the transactions and informal lenders in the majority of cases, do not ask for collateral. Therefore, borrowers with no real collateral will probably decide not to go to formal lenders.

A second characteristic of the selection technology that marks a difference is the relation between the borrower and the lender. As expected, in the formal sector we found that borrowers have known the lender for two and a half years, on average; the semi formal clients have known the lender for 4 years approximately and borrower and lender have known each other for 11 years on average in the informal sector. The more informal the transaction, the more time borrower and lender were related.

Monitoring credits is another distinctive part of the credit technology. However, the only significant differences arise when comparing informal transactions with formal and semi formal. We could not conclude that formal and semi formal lenders have different approaches to the monitoring of their credits.

Finally, on the action taken to recover overdue loans, we found interesting evidence of different approaches. Formal lenders usually increased the interest rate or extended the maturity to recover the credits, while semi formals did not take any actions and informals extended the date of payment.

What we have described shows that credit technologies differ among lenders in a similar way to types of credit. However, the differences in technology between formal and semi formal lenders are not as significant as one would expect, leaving open the option for some competition among these lenders for the same type of clients. These results, together with the comparison of the credits allocated by each lender, could suggest that while informal and formal lenders are completely different, seeking to serve different clients, with different types of credit and technology; semi formal lenders could be competing with formal lenders in some segments and complementing formal transactions in some others. If this is the case, the range of formal-semi formal transactions cannot be easily analyzed through the cut of "formality". We will need better instruments and in depth analyses to learn how the competing segment is defined and what marks the beginning of the complementing segment. The argument of the existence of both relationship, competition and complementarity among formal and semi formal lenders is also supported by several cases (18% of the households with credit had credit from more than one source, mainly one formal and one non formal).

The evidence presented shows that the non formal sector is a very heterogeneous one, and that it is more accurate to talk in terms of at least two major groups: semi formal and informal lenders. These two non formal lenders' groups have different type of relationships with the formal lenders. Clearly the informal lenders complement activities of formal lenders, serving clients with different types of credit with a extremely flexible technology. The semi formal lenders are the interesting

⁶ Trivelli and Venero (1999) found that the for the average loan granted to a small farmer (5 hectares in average, loans around US\$1000 per hectare) the cost of using their land as collateral represented a sunk cost near to 4-5% of the total loan received.

case, where credits (the type of credit offered) tend to be similar to the formal ones, but on a smaller scale and credit technology tends to go by the same path but with important differences for specific segments. We could say that semi formal lenders compete with formal lenders when the latter offers cash credits with a maturity of 6 months or more to clients with collateral and a known history. On the other hand, semi formal lenders complement formal activities when they lend to clients with no collateral, for short periods of time, when they sell inputs in advance, etc. One additional comment is that some semi formal lenders work with formal credit themselves, providing another source of complementarity among lenders.

If this is the case, any measure to increase the allocation of credit in the agricultural sector has to consider that formal and semi formal lenders work very closely or consider only the impact on the formal transaction side.

Relationship among lenders: using Probit estimations to understand predominant relation between formal and non formal lenders

Using the described data set we produced a probit model to illustrate which of the two types of possible relationship prevails among formal and non formal lenders: competence or complementarity.

The model is quite simple. We ran a probit function on the probability of having a formal credit over a number of variables, including one on having or not non formal credit. Similarly we ran another probit function to estimate the probability of having credit from a non formal source (with the same explanatory variables and the variable capturing if one has also formal credit). Estimated results include a *rho* coefficient which provides evidence on the type of relationship existing between formal and non formal credit suppliers⁷.

The estimated results show a negative *rho* coefficient, meaning the prevalence of a competing relationship among formal and non formal lenders (see Annex 1). However, theory states that the type of substitution associated with a negative *rho* coefficient is associated with an imperfect substitution. The prevalence of this relationship can be explained by all the evidence presented in the previous section, but also because in the data collected, semi formal transactions were the most important in terms of the total amount of credit and were close to being the most important source of credit in terms of transactions.

In any case, what we find is that semi formal lenders actually compete with formal lenders in a significant portion of the credit market for agriculture, meaning that formal activities, the ones encouraged by the MAG and by financial authorities (SBS, COFIDE, BCRP), are not the ones defining the structure and development of the credit market in this sector. This result shows the need to include new agents in the equation of the credit market for agriculture, agents having cross incentives with traditional agents; participants that could change the result of policy measures.

⁷ For a detailed explanation of the econometric procedure see Greene (2000).

3. Final Remarks

The main conclusions of the article are:

1. No one knows for sure the size of the credit market for the Peruvian agricultural sector. If we base estimates on the formal lenders' activity we are always underestimating the real size of the market.
2. Non formal lenders are quite important. Semi formal and informal lenders are crucial not only in terms of coverage (as most literature agrees), but sometimes they are also significant in terms of the total amount of resources lent to the agricultural sector. We present empirical evidence of one such case. In our case study non formal resources are more important than the ones brokered by formal lenders.
3. Formal and non formal credits in rural areas (mostly agricultural areas as well) have different characteristics. Size, maturity and credit conditions tend to be differentiated according to the lender. Formal lenders tend to provide larger and longer credits with more conditions and higher transactions costs, semi formal lenders tend to be more flexible but provide smaller and shorter credits, and informal lenders are completely flexible, they base their decisions in long term relationship with the borrowers and provide specific credits to serve specific needs.
4. Credit technology varies widely among lenders. The main technological difference appears between formal and informal lenders. Semi formal lenders are in a middle position, sometimes near the formal sector and others near the informal sector.
5. One could say that formal and informal lenders have a complementary relationship. The formal lenders serve one type of need and clients and the informal serve a different demand. The semi formal lenders, however, are in a different position. Some portion of the semi formal lenders is complementing the activities of the formal sector while the other portion is competing with them.
6. Formal and semi formal lenders are crucial to develop the agricultural credit market. However, only formal lenders are considered by the government when financial or sectoral policies are established. We need to learn about semi formal lenders and about their interactions and responses to improve credit access in vulnerable sectors such as agriculture; especially considering that agricultural clients are usually small farmers with low incomes, who make their first contact with credit markets through non formal lenders.
7. Econometric results show that the prevailing relationship among lenders is one of competence and not of complementarity. This result suggest that non formal lenders are responding to public policy as formal lenders.
8. We need to learn how to deal with the complex structure of lenders in our credit market. It is necessary to understand the real dynamics of the sector to improve market activity and improve the performance of state intervention in that market.

9. There is much to do in this sector, but we need to stop considering the problem of lack of credit for agriculture as just a problem of lack of formal access to credit. There is room for all agents in this market. We need to empower their activities in order to promote competitiveness.

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ACRONYMS

CRAC: Caja Rural de Ahorro y Crédito (Rural non-banking entity of savings and loans)

CMAC: Caja Municipal de Ahorro y Crédito (Local non-banking entity of savings and loans)

ENNIV: Encuesta Nacional de Niveles de Vida (National Enquiry of Standards of Life)

EDPYME: Entidades de Desarrollo de las Pequeñas y Microempresas (Organizations for the Development of Small Enterprises)

NGOs: Non-governmental Organizations

SBS: Superintendencia de Banca y Seguros (Bank & Insurance Superintendence)

COFIDE: Corporación Financiera de Desarrollo (Financial Corporation of Development)

BCRP: Banco Central de Reserva del Perú (Peru's Central Bank)

Annex 1: Probit estimations

Estimates to explore the type of relationship between formal and non formal lenders for rural households are based on the following model, known as Seemingly Unrelated Bivariate Probit⁸. Based on the characteristics of the data set, model specification will be as follows:

$$Y_{1i}^* = \beta_1' x_{1i} + \epsilon_{1i} \quad Y_{1i} = \begin{cases} 1 & ; Y_{1i}^* \geq 0 \\ 0 & ; Y_{1i}^* < 0 \end{cases} \quad (1)$$

$$Y_{2i}^* = \beta_2' x_{2i} + \epsilon_{2i} \quad Y_{2i} = \begin{cases} 1 & ; Y_{2i}^* \geq 0 \\ 0 & ; Y_{2i}^* < 0 \end{cases} \quad (2)$$

$$(\epsilon_{1i}, \epsilon_{2i}) \sim \text{NB}(0,0,1,1,\rho)$$

Where:

Y_{1i}^* = Probability of having formal credit

Y_{1i} = Cases with formal credit.

Y_{2i}^* = Probability of having non formal credit

Y_{2i} = Cases with formal credit.

x_{1i} y x_{2i} = Explanatory variables (listed below the estimation report)

β = Estimation parameters

ϵ_{1i} y ϵ_{2i} = Normal bivariate error terms

Estimation results are:

Seemingly unrelated bivariate probit Number of obs = 400

Wald $\chi^2_{(16)} = 44.90$

Log likelihood = -389.79585

Prob > $\chi^2 = 0.0001$

Coef.	Std. Err.	z	P> z		95% Conf. Interval]	
FORMAL						
sexojef	-0.2504372	0.2381109	-1.052	0.293	-0.717126	0.2162516
edadjef	0.0697839	0.0541474	1.289	0.197	-0.0363429	0.1759108
edadsq	-0.0005072	0.0005141	-0.986	0.324	-0.0015148	0.0005005
edujef	0.1217857	0.0465614	2.616	0.009	0.0305269	0.2130444
depen	-0.0064257	0.0054744	-1.174	0.240	-0.0171552	0.0043039
pobres	-0.3701274	0.1727965	-2.142	0.032	-0.7088024	-0.0314525
yprodu_	0.0000246	8.79E-06	2.797	0.005	7.36E-06	0.0000418
dummyjun	-0.1823516	0.1879324	-0.97	0.332	-0.5506924	0.1859891
_cons	-3.406487	1.478981	-2.303	0.021	-6.305236	-0.5077371

⁸ For a detailed analysis of this model, see Greene (2000), pages 849 - 859.

NOFORMAL						
sexojef	0.0646377	0.2011343	0.321	0.748	-0.3295783	0.4588537
edadjef	0.0052699	0.0380623	0.138	0.890	-0.0693309	0.0798707
edadsq	-0.0001414	0.0003602	-0.392	0.695	-0.0008474	0.0005647
edujef	0.0290344	0.0388207	0.748	0.455	-0.0470528	0.1051215
depen	-0.0003774	0.0039065	-0.097	0.923	-0.008034	0.0072792
pobres	0.3310894	0.1433126	2.31	0.021	0.0502019	0.611977
yprodu_	0.0000257	0.0000137	1.872	0.061	-1.20E-06	0.0000525
dummyjun	0.0645942	0.1499276	0.431	0.667	-0.2292584	0.3584468
_cons	0.1089647	1.066037	0.102	0.919	-1.980429	2.198358
/athrho	-0.1137036	0.1095606	-1.038	0.299	-0.3284384	0.1010313
rho	-0.1132161	0.1081563			-0.3171169	0.1006889

Likelihood ratio test of rho=0: $\chi^2_{(1)} = 1.083$ Pr > $\chi^2 = 0.2980$

Seemingly unrelated bivariate probit Number of obs = 400

Wald $\chi^2_{(16)} = 44.90$

Log likelihood = 389.79585 Prob > $\chi^2 = 0.0001$

Coef.	Std. Err.	z	P> z		95% Conf. Interval	
FORMAL						
sexojef	-0.2504372	0.2381109	-1.052	0.293	-0.717126	0.2162516
edadjef	0.0697839	0.0541474	1.289	0.197	-0.0363429	0.1759108
edadsq	-0.0005072	0.0005141	-0.986	0.324	-0.0015148	0.0005005
edujef	0.1217857	0.0465614	2.616	0.009	0.0305269	0.2130444
depen	-0.0064257	0.0054744	-1.174	0.240	-0.0171552	0.0043039
pobres	-0.3701274	0.1727965	-2.142	0.032	-0.7088024	-0.0314525
yprodu_	0.0000246	8.79E-06	2.797	0.005	7.36E-06	0.0000418
dummyjun	-0.1823516	0.1879324	-0.97	0.332	-0.5506924	0.1859891
_cons	-3.406487	1.478981	-2.303	0.021	-6.305236	-0.5077371
NOFORMAL						
sexojef	0.0646377	0.2011343	0.321	0.748	-0.3295783	0.4588537
edadjef	0.0052699	0.0380623	0.138	0.890	-0.0693309	0.0798707
edadsq	-0.0001414	0.0003602	-0.392	0.695	-0.0008474	0.0005647
edujef	0.0290344	0.0388207	0.748	0.455	-0.0470528	0.1051215
depen	-0.0003774	0.0039065	-0.097	0.923	-0.008034	0.0072792
pobres	0.3310894	0.1433126	2.31	0.021	0.0502019	0.611977
yprodu_	0.0000257	0.0000137	1.872	0.061	-1.20E-06	0.0000525
dummyjun	0.0645942	0.1499276	0.431	0.667	-0.2292584	0.3584468
_cons	0.1089647	1.066037	0.102	0.919	-1.980429	2.198358
/athrho	-0.1137036	0.1095606	-1.038	0.299	-0.3284384	0.1010313

rho	-0.1132161	0.1081563	-0.3171169	0.1006889
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Likelihood ratio test of rho=0: $\chi^2_{(1)} = 1.083$ Pr > $\chi^2 = 0.2980$

Where:

sexojef: sex of the head of the household

edadjef: age of the head of the household

edadsq: (edadjef)²

edujef: level of formal education of the head of the household

depen: number of family dependants

pobres: 1 if the household is below the poverty line, 0 if not

yprodu: income derive from agriculture

dummyjun: dummy variable = 1 if household is located in Junin.

Estimation results show a rho < 0, (rho = -0.11) rho that fits in the 95% confidence interval, suggesting an imperfect substitution relationship between formal and non formal lenders.