

IAMA 2007

THE DETERMINANTS OF CAPITAL STRUCTURE CHOICE FOR SOYBEAN PRODUCTION IN BRAZIL

Luciana Florêncio de Almeida

PhD Candidate in the Business School at the University of Sao Paulo

Assistant Professor at ESPM Business School

PENSA researcher – email: luflorencio@usp.br

Contact author and IAMA member

Decio Zylbersztajn

Full Professor in Business Program at the University of São Paulo

Guidance Board President at PENSA – email: dezylber@usp.br

Mail: PENSA (Agribusiness Program)

School of Business, Economics and Accountancy

University of São Paulo, Brazil

Av. Prof. Luciano Gualberto, 908 Sala C-14

CEP 05508-000 - São Paulo, Brazil

Phone/FAX (5511) 3818-

AREA: EFFECTIVE FOOD CHAIN MANAGEMENT

Abstract

Brazilian agrifood sector has experienced substantial, export-led growth since the mid-1990's, with notable contribution from the soy complex. Therefore Brazil still has some relevant limitations for its national agribusiness agenda and according to Chaddad and Jank (2006) the volatility of macroeconomic policies, which includes high interest rates and over evaluation of the real exchange rate, is among the most relevant ones. Through research applied to Brazilian soy producers, Zylberstzjan et al (2005) identified multiple credit contracts forms and also institutional restrictions: a) collateral registration problems, b) a weak market for farm insurance, c) judicial failures in default resolutions and d) high farm debt balance. As a consequence, farmers face critical problems to finance their assets. Due this scenario, some questions emerge: how the soybeans farmers choose to finance their production among the multiple forms of credit contracting? Considering the high interest rates in Brazil, do the farmers would rather prefer use equity than debt? The identification of the capital structure of farms may lead the research on rural credit field to amplify its understanding on credit demand and supply based on farmers decision process and also in agrichain players' credit policies. This study also contributes to enhance the current knowledge about the institutional environment for credit contracting in Brazil making possible to propose institutional modifications that will reduce the obstacles to the transaction being studied.

Key words: rural credit, capital structure, soybean production

1. Introduction

The efficiency of transactions in the rural market results largely from the availability of credit instruments aligned with the agricultural specificities, given price fluctuations and the capital amount necessary for financing farming, investments, stocking and marketing.

A large number of agents, such as banks, credit co-ops, trading companies, production co-ops, processors and agricultural input industries, are involved in the farming credit flow. They form a complex network that engages in a very broad range of contractual agreements and governance structures.

In Brazil, banks and credit co-ops act as pure financial agents, lending money to farmers. The majority of these transactions are based on subsidized credits, trough bearer bonds named agricultural notes. Given transaction costs and the scarcity of low-cost federal funding, phenomenon of lines¹ (Barzel, 1982) emerges as a way to allocate scarce resources. Screeners are applied to farmers, transaction costs arise and a large percentage of farmers are unable to gain access to the subsidized credit. As a result, alternative financing arrangements are developed privately, through the action of agrichain agents, upstream or downstream. They undertake the role of credit agents through a wide range trade credit types, i.e., loans linked to buying or selling agreements.

Zylberstzjan et al (2005) identified the following institution failures regarding agricultural credit: i) incipient agricultural insurance market; ii) abusive collateral requirements imposed by creditors; and iii) concerns about the judicial system's ability

¹ When we examine the Brazilian agricultural credit market, we find that that interest rate that applies to official rural credit is beneath the market rate. According to Barzel (1982), one can expect mechanisms to allocate surplus demand. One such mechanism, i.e., the line phenomenon, can be seen as consisting of costs of access, which in practice could be priced, thus pointing to a higher real interest rate.

to guarantee the creditors' rights. These results indicate that the current institutional environment affects the agreements' performance for crop financing. Consequently, farmers face critical asset-financing problems.

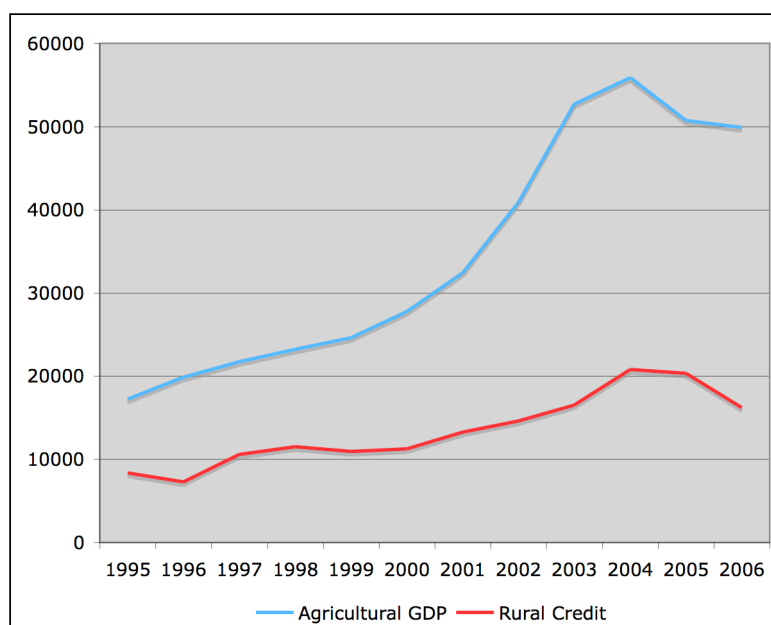
Farmers' financing decisions define a complex relationship of exchange between debtors and creditors. Understanding the determinants underlying this relation helps to understand the capital flow within agro-industrial systems.

Given the problem herein presented, the purpose of this article consists on analyzing the determinants of the capital structure of Brazilian agricultural enterprises, specifically the financing of soybean crops.

2. Agricultural Credit and Soybean Financing in Brazil

In Brazil, subsidies to the costs of farming played a key role in the 60s, through the structuring of the Federal Rural Credit Program (*Sistema Nacional de Crédito Rural – SNCR*) in 1965, but lost their power toward the end of the following decade. In the 80s, government credit offerings plummeted to a level five times lower than that of the previous period (BACEN, 2007). In the last 10 years, although the credit has increased slightly, the Graph 1 shows that the Federal Rural Credit Program does not follow GDB growing offer.

Graph 1. Agricultural GDP versus Federal Rural Credit Program Offer (million US\$)



Source: Data from BNDES (2007) and BACEN (2007)

Since the early years of the decade of 2000, crop and livestock farming has relied largely on funds provided from complementary farmers' activities and resources from companies in the agro-industrial system.

The Federal Government's 2005/2006 Crop and Livestock Farming Plan established an investment of US\$ 18 billion; however, it is estimated that funding the cost of crop and livestock farming alone would require US\$ 48 billion. Ministry of Agriculture experts state that since 2002, the allocation of production cost funding has maintained a stable behavior, with 30% coming from government credit, 30% from

contracts with agricultural industries, trading companies and co-ops and 40% last was financed by the farmers themselves with their own resources (MAPA, 2005).

Many agents such as banks, credit co-ops, trading companies, production co-ops, processing industries and agricultural input industries are involved with the process of providing credit for producers. They form a complex network of relationships that engages in a very broad range of contractual agreements and governance structures, under the rules of the game imposed by the institutional agribusiness environment in Brazil.

Table 1 summarizes the main sources of agricultural production cost funding, the credit providers and the interest rates practiced (when it applies).

Table 1. Agricultural Financing Sources

Source	Agents	Interest Rate
Equity	Farmers	
Federal Rural Credit Program (subsidized funds)	Private and Public Banks	8,75% year
Free market	Private and Public Banks	15,6% to 20, 7%* year
Agricultural Product Note	Private and Public Banks, tradings, processors, supply industry, Cooperatives, Credit Coops	12,8% to 28,3%* year
Trade Credit	Cooperatives, Credit Coops, tradings, processors, supply industry	25% to 30%* year
Agribonds (CDA, WA, LCA, CRA, CDCA)	Private and State banks, elevators, cooperatives, tradings, supply industry, institutional investors	25% to 30%* year

Source: authors

* These values was taken from different sources through information given from the agents to the authors in April, 2007

The Federal Rural Credit Program consist on offering an interest rate lower than the federal fund nominal rate, which currently is at 12,68% year. This program uses a bond called agricultural notes, which are issued by farmers, farmers associations and production cooperatives in order to obtain financing for production. Those bonds can also be used by the banks to finance farmers at free market's rates.

Pursuing the same legal natural, as a bearer bond, the Agricultural Product Note or APN (*Cédula do Produto Rural – CPR*), is legally characterized as a legitimate bond; in other words, once the commercial obligations fail to be performed, the creditor will have his rights covered through prompt foreclosure of collaterals, which are in major cases, the proper crop. It reduces creditors' risk thanks to the speed in recovering the loan value through the collateral foreclosure.

The APN was created through law 8,929 in 1994. Souza & Pimentel (2005) asserts that “the consolidation of the instrument has allowed for the generation of a new, innovative, spin-off financial mechanisms, drawing new agents to the system and increasing liquidity.” From the farmer's point of view, it's a means of obtaining financing in exchange for the delivery of the physical product or giving it as a collateral and the reduction of the risk connected with the volatility of commodity prices.

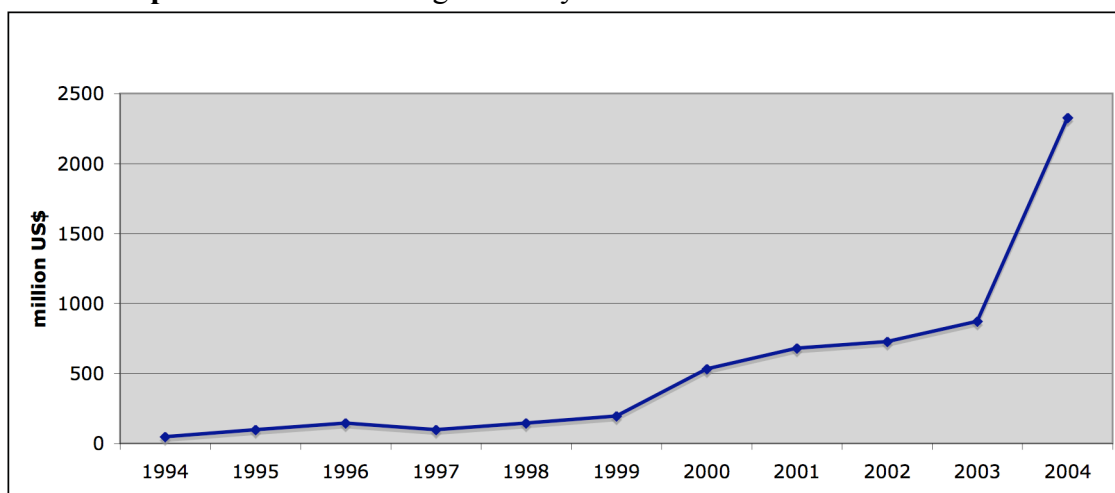
Currently, there are three types of APNs available in the market: i) Physical APN: the farmer receive cash or inputs in the date the bond was issued and has the obligation to deliver an agreed amount of his production at an agreed location and future date, ii) Financial CPR: it doesn't require the physical delivery which it is attractive to financial investors and iii) APN indexed to future markets: in this case the bond relies

on the agreed amount of production multiplied by the agreed reference price which can be based on local or foreigner future markets or other reliable source.

Though APNs were launched in the mid-90s, their use extends back to the early 80s, with greater participation of the chain's agents in the financing of national crop and livestock farming activities. The so-called "drawer APNs" are largely used in transactions between farmers, processors, exporters and suppliers of agricultural inputs. They are called thus because the operation does not involve a financing institution, even though it is registered at a public registry office. In this type of transaction, the APN is widely used in trade credit operations, which can be found in three situations: i) financing of agricultural inputs; ii) crop financing, with advanced release of financial resources; and iii) operations in which agricultural inputs are exchanged for grains.

Thanks to the Bank of Brazil's efforts to reduce the registration costs, financial APNs advanced significantly as from 2000, as graph 2 shows. The Bank of Brazil estimates that in 2005, APNs corresponded to R\$ 20 million. This figure takes into account the APNs that the bank negotiated plus an estimate of the volume generated through "drawer" APNs. The lack of a systematic survey of the traded volumes, other than of those conducted by the Bank of Brazil, turns out difficult to evaluate precisely the current share of these instruments in the total offering of agricultural credit, but many experts point to 30% of the total volume offered.

Graph 2. APN amount negotiated by Bank of Brazil



Source: Banco do Brasil (2005)

What determines the complexity of the agricultural credit transactions is, above all, the diversity of agents that specialize in granting credit, as well as the farmers with different requirements. At the core of these transactions lie the contracts and agreements that seal the many contractual arrangements that exist, which are directly associated with transaction costs.

3. Methodology

In order to reach the research objective the methods used were:

- 1) A literature review on credit, agricultural credit and New Institutional Economics' theoretical framework for providing support to the analyses;
- 2) Qualitative interviews with agents from the agricultural inputs industry, trading companies and banks involved with the soy complex; and
- 3) A quantitative study based on structured questionnaires applied to soy farmers by phone over a two-month period.

115 soy farmers that used agricultural note contracts for financing 2003/04 and 2004/05 crops answered the questionnaire. All of the farmers had entered such a contract in at least one of the stated crops, which shows how widespread this practice has become among soy producers.

The largest portion of information (26%) came from Mato Grosso, Brazil's largest soybean producing state.

The research focused on the transactions that occur within the soy agribusiness system. This agricultural commodity is the most important product of Brazilian agribusiness. In 2006, Brazil was the 2nd ranking producer in the world and the leader in exportation of the soybean complex (grain, bran and oil) accounting to US\$ 9,2 billions (MAPA, 2007).

The analyses of this study's data are based on the propositions taken from studies in the field (Table 2). These propositions reveal the inter-relation between capital structure determinants and the firm's leverage.

Table 2. The determinants of capital structure and its relationship with a firm's leverage

Propositions	Studies
1. The firm's leverage is negatively related to the use of specific assets as safeguards.	Williamson (1988)
2. The firm's leverage is positively related to firm's size.	Titman & Wessels (1998)
3. The firm's leverage should be positively related to the redeployability of its existing assets.	Balakrishnan & Fox (1993) ²
4. The firm's leverage will be positively related to its investment in reputational assets that signal commitment to the product market in which it competes.	Balakrishnan & Fox (1993) ³
5. The firm's leverage is negatively related to the creditors perception of judicial instability.	Arida et al (2004)
6. The firm's leverage is negatively related to the incentives given by the creditors as indirect mechanisms to reduce debt.	Chadad & Lazzarini (2004)

Source: Authors

² Original hypothesis

³ Original hypothesis

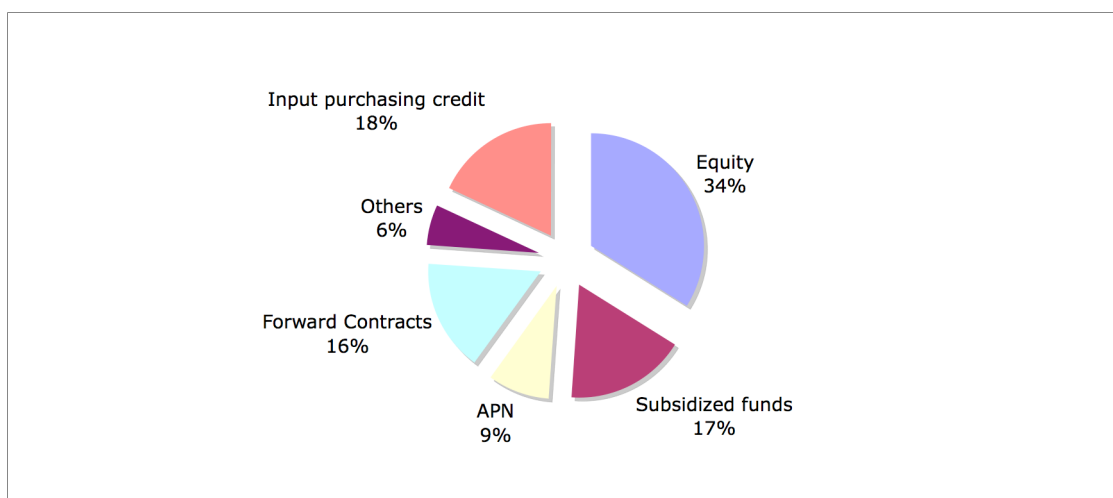
4. Results and Analysis

Financing vs. Equity

Graph 3 shows that most of soy crop financing comes from farmers' own capital (34%). Considering the total amount reported in crop financing expenses, only 17% of the total were financed through subsidized credit. It indicates the need and the real use of other financial alternatives. Trade credit corresponded to 34% (input purchasing credit plus forward contracts) and the Agricultural Product Notes (APNs) represented 9% of the 2004/05 crop financing.

In terms of farm size, the findings indicate that areas smaller than 250 acres had 75% of their financing covered by subsidized credit, illustrating the credit co-ops' participation in transferring the subsidized credit among this audience. However, as property size rises, and given that there is a credit limit for the subsidized credit for each farmer's property (i.e., US\$ 97 th), the leverage through this type of financing decrease. Considering the agrichain agents' credit practices, as forward contracts and input purchasing financing, their share of total farmer expenses rises as the crop area increases. This shows that the relationship between farmers, on one hand, and the agricultural input industries and trading companies, on the other, are stronger among medium-sized and large farmers. Smaller farmers sell their products to the production co-op and also acquire their agricultural inputs through the said co-op.

Graph 3. Soybean production financing - 2004/05



Source: Research data

The research showed that most farmers finance up to 60% of their crop through agricultural notes with subsidized funds. This result indicates that this financial source is preferred due its lower cost; still, despite its high transaction cost due to borrower screening procedures and the bureaucratic process of funds release, this type of credit has been reaching most farmers, contrary to previous estimates according to which subsidized funds benefits only a few.

The research results suggest that a fairly bureaucratic process must be undertaken for a soybean farmer in order to access subsidized credit. Table 3 shows each one of the stages to proceed with a loan at a bank and the percentage of producers who took out loans and had to go through each stage.

Table 3. Steps and required documents to access the subsidized fund at a bank

Update farmer file	95%
Financing Proposal	79%
Plan of the crop production and sale	93%
Land title	96%
Taxes over the land value	97%
Property record at the registry bureau	91%
Safeguard Agreement	82%
Letter of intent related to crop sale	21%
Rural insurance	20%
Bank evaluation of the proposal	77%
Adjustments required by the bank agent	56%
Safeguards records at the registry bureau	75%
Historical credit analysis at federal credit bureau and others private offices	77%
Bank risk rating system	71%
Others	1%

Source: Research data

The existence of two factors explains the rigorous screening process of potential borrowers prior to granting them access to subsidized credit: demand is greater than supply and there is a history of default connected with subsidized government loans, with a significant debt securitization⁴ process undertaken in 1995. In the face of this set of circumstances, the offering banks protect their own interests in advance by reducing informational asymmetry; this reflects a bureaucratic process with high transaction costs for both parties.

Once one production period is over, a new selection process is conducted, with the same documents being required and a new assessment of the farmer's payment capacity being conducted based on the latter's level of debt and the liquidity of the farmer's collateral. For those farmers that keep their debt at an appropriate level, the creditors maintain doing business with them. However, as this debt level increases, the borrower's credit risk rises, and as a result banks reduces access to subsidized credit.

Our research indicated that 53% of the producers took part in the Bank of Brazil's 1995/1996 securitization program, with the average amount of US\$ 65,763 and the maximum of US\$ 1 million. Those figures were calculated on the basis of the 28 producers that reported the securitized value in the interview. Of these, 23% states that securitization reduced the amount financed by the financing agents in subsequent years.

Financing through subsidized agricultural credit

The monetary value of subsidized credit ranged from US\$ 14 th to US\$ 1,357 th, and the average figure was around US\$ 90 th.

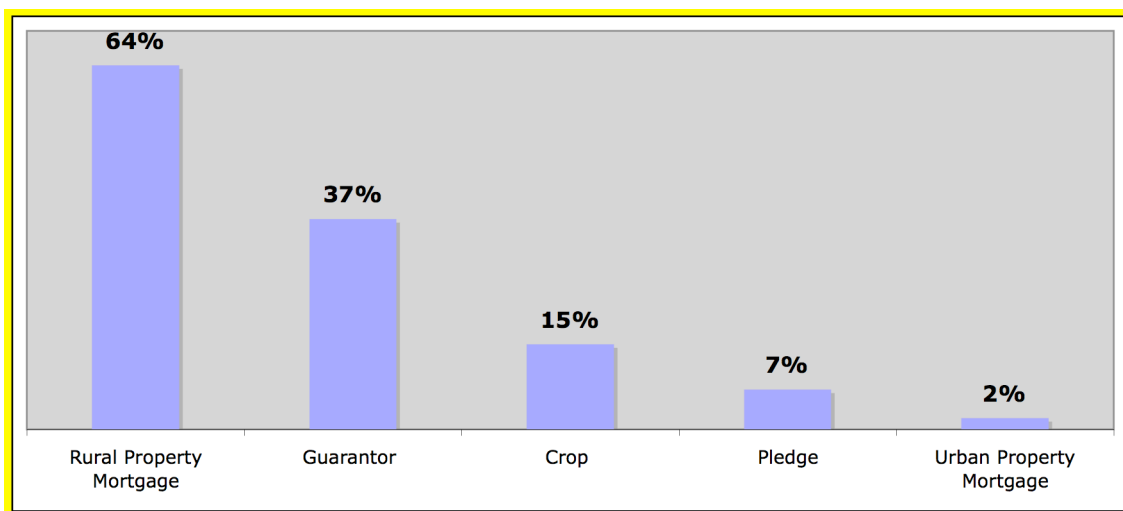
From the total credit provided by Federal Rural Credit Program, 2% is based on freely set interest rates, 61% charges 8.75% and 37% combines freely set interest rates and subsidized rates. The freely set interest rate ranged from 9.5% to 30% per year in the 2004/05 crop. The terms for loan repayment stood, on average, at 8.4 months, ranging from 4 to 12 months.

⁴ The Federal Government conducted the securitization program in order to help producers keep farming after a difficult period of natural disaster combined with low commodity prices at that period of time.

The research shows that among those producers who were obliged to acquire other products and services in order to access the subsidized lending, 80% had to buy insurance (life, car, health and other types), 73% were required to acquire a capitalization plan, 22% had to make investments and 14% had to get a credit card. This information suggests that the bundle practice is widespread among banks associated to the Federal Rural Credit Program. Once the banks have to perform this type of loan, and it is not financial attractive, they conduct the bundle practice as way to turn the farmers as a regular client. The Federal Fund covers the difference between the subsidized rate and the federal fund rate, and also the lending operational expenses. As a way to decrease the operational expenses, the banks in the last 10 years had decided to attend less farmers directly, moving to cooperatives as clients. It reduces the bank's risk, once the cooperative assumes the risk of its members.

Regarding to collaterals, all farmers had to provide some form of guarantee. The research results suggest that in some cases more than one form of collateral was required. Graph 4 illustrates the types of collateral required and the percentage of farmers from whom such guarantees were exacted. 64% of those who took out loans had to mortgage some real property; 37% were obliged to present a guarantor; and in 15% of the cases the loan was tied to a percentage of the future crop. The mortgaging of urban property and pledges were also used on a smaller scale. Farm equipments and tractor are more usually taken as pledges. This indicates that banks prefer traditional types of collateral, i.e., those which they are more familiar with and that they can liquidate more easily, such as mortgages, guarantors and pledges, as opposed to collateral that requires a specific commercial network and know-how for liquidation, such as crops.

Graph 4. Types of required collaterals to access the subsidized fund



Source: Research data

Related to the relationship between the borrower and the financial agent, the research concluded that 60% of the farmers had no relationship with the financial agent, while the other 40% belong to the same social network. Once this transaction is made in a bank environment, it is expected that the relationship between lenders and borrowers might be as impersonal as possible; however, the farmer's social reputation is a key determinant of the credit agreement. Reputation is checked not only through timely repayment of debt, but also through the farmer's relationship with other commercial

agents in town that also use the same branch, enabling the latter to provide references about farmers as to their honesty in commercial relationships.

Trade credit financing

The research showed that trade credit is the financing option that medium-sized and large farmers rely on primarily. In other hand, smaller farmers find using the system of co-ops more advantageous; once they can sell their production and acquire agricultural inputs. Table 4 shows a significant incidence of forward contracts and input purchasing credit among those with an area greater than 5000 acres. Given that forward contract is an operation conducted by trading companies, it's expected that large farmers engage in this type of operation more commonly. It happens based on the larger farmer's ability to offer an attractive volume of grain for the trading companies to export or process, as the case of Cargill and ADM.

Table 4. Trade Credit

Farm Size (acres)	APN	Input Purchasing Credit	Forward Contracts
0 to 250	1%	1%	0%
250 to 1,200	12%	14%	5%
1,200 to 5,000	10%	10%	2%
> 5,000	9%	20%	24%

Source: Research data

Besides the traditional input purchasing credit, commercial exchange operations have been performed evolving three agents: agrichemical industry, trading companies or processors and large farmers. In this kind of operation, the agrichemical industries sell their product to the farmers against delivery of an agreed amount of the production on an agreed date, at a price set in advance. Then the agrichemical company sells the grains at a preset price for future delivery to trading companies or processing industries. In this system, the producer issues a physical APN and undertakes to deliver the product on the bonds' due date at the agreed location. This operation can be advantageous to the three parties, as the farmer transfers to the agrichemical industry the responsibility of selling the product through a price negotiation, guaranteeing ahead of time the sale of his production at a negotiated price, generally based on the future market. For the trading companies, the risk of the operation is shared with the agricultural inputs industry, this being the party that in the event of default will undertake the negotiations or legal proceedings. As for the agrichemical industries, depending on the date of contract closure, they will turn a profit from the spread between the prices negotiated with each party evolved.

In addition to such an operation, it is common for agricultural input industries to sell their products directly to the farmer. In this case, a trade bill is issued. In general, three types of guarantees is possible to be required: a) a bank as guarantor; b) a mortgage; or c) an APN, better know as a "drawer" APN. Given the easiness the "drawer APN" can be issued and the low cost of registration vs. the other alternatives, it has been widely used in these operations. In this kind of transaction, it is required that the APN's collateral should be of first grade. It means that the farmer can give the same collateral to other creditor, but the supply industry has the priority over it.

Resellers, which constitute an important agricultural inputs distribution channel, are more flexible about collateral agreement, a flexibility reflected in their willingness to accept APNs at 2nd or 3rd grade. In these cases, default can lead to severe credit recovery difficulties, as the reseller has no 1st grade rights over the collateral, being obliged to wait for its release by the party that hold such rights. An interviewed reseller mentioned that the company does not engage in systematic risk analysis nor does it have any formal tool for conducting it. An indirect way of performing this consists on analyzing whether the farmer took out a bank loan. If this is the case, it is then assumed that the bank carried out a formal and rigorous screening process and that the farmer will be able to repay the loan. However, as this analysis is very superficial, the reseller can charge an interest rate around 4% per month, depending on the farmer's risk level. This is generally measured by the extent to which the collaterals are already tied up, such as pledges and mortgages.

Contract performance and breach of contract

In order to identify possible breaches of contract among producers, they were asked whether they ever paid agricultural notes past due. 48% of the interviewees said that they did, as follows: 64% failed to pay on time in 2005 and 20% failed to pay on time in 2004; most (85%) obtained agricultural note credit from the Bank of Brazil.

However, when investigating the attitude of the producers that made agricultural note repayments past due, the results show that 64% of them tried to negotiate the matter before the first payment fell due, indicating that they are highly interested in safeguarding their reputation as good borrowers. Moreover, in 71% of the cases, the farmers initiated the negotiation process.

Furthermore, when asked about what would be their payment priority in the hypothetical case of inability to honor the repayment obligations undertaken, most of the farmers (46%) pointed the official banks as the first priority as shown in Table 5.

Table 5. Payment priority

State banks	46%
Input suppliers	18%
No answer	13%
Production coop	10%
Commercial banks	6%
Trading companies	4%
Credit coop	3%

Source: Research data

The agrichain agents informed that the ratio of default involving credit transactions with APNs is close to nil. The core argument lies in the judicial nature of the bond. In general, those who accept them require the future crop as a pledge in addition to another form of collateral, such as a mortgage or a guarantor.

In general, the interviewees considered APNs as an efficient tool for all the agents involved. They also assure that this credit instrument has been an indispensable tool for farmers to gain access to the credit provided by third parties, regardless of the type of APN chosen: financial APN, physical APN or the so-called drawer APN.

Although the financial cost of APNs is high, their volume has risen considerably since they were first introduced in 1994. According to the interviewees, they provide the following core benefits essentially: a) the easiness to recover the debt through a prompt foreclosure of the collaterals, without the need of a execution process that would take months or years considering the slowness of judicial brazilian system; b) APNs can be endorsed and traded on stock markets which turns them attractive to several other agents, including investors. These characteristics provide security to the agents and, according to them, result in a low ratio of default.

Some of the conflict points reported result from three facts:

- a) among banks, the allocation of funds to APNs compete with other sectors of the economy that may generate better yields; given low volume of transactions the APN's market is not yet attractive to investors in comparison with other financial options;
- b) there is no central registry system for all APNs issued and, therefore, agents are unaware of the total amount borrowed by the farmer through APNs, which puts banks and other agents at risk; and
- c) the chronological registration order of the APN's collaterals can weaken the instrument's effect, i.e., the older the chronological registration and the greater the grade, the lower the probability of being able to foreclosure the collateral promptly.

Currently, the following information systems are available for verification of farmers' debts: a) Serasa and SCI: private companies that offer a consultation services on the status of the debtors; and b) Recop: the Federal Bank's system that registers all operations involving government credit (agricultural notes); only banks and credit co-ops have access to this system; and c) SNR: the National Registry System that centralizes all the BNDES (National Bank for Economic and Social Development) on lending and official credit for specific programs. CETIP, the custody and clearing house created by financial institutions in conjunction with the Federal Bank in March 1986, has a record of all the financial and physical APNs held by banks; however, each financial agent only has access to the records pertaining to the APNs with which it is involved, being therefore unaware of farmers' APNs involving other banks. Thus, as APNs are not covered fully by any central system that is already established, they are risky for banks and other agents, which find themselves unable to evaluate the total amount of financing obtained by each farmer via APNs.

This leads to the third problem related to the chronological registration of collateral. Considering the information asymmetry about farmer's total lending volume, the banks demand exclusively and mandatory 1st grade collateral and, in general, tie up an amount of collateral greater than the overall value of the loan.

The farmer commits most of his collateral to banks, trading companies and agricultural input industries. As these agents often do not cover his full financing needs, he then starts to issue APNs with 2nd grade guarantees, which can lead to serious problems for lenders willing to accept these conditions. In reality, in this arrangement, all parties are losers, once pledging most of the collateral available to a single lender causes more limited access to other financing mechanisms. Thus, other agents that might otherwise be able to engage in providing credit cease to be players in the credit market, refuting the risk of accepting collateral of a secondary grade.

This is the critical point mentioned by an interviewee from a major agricultural input industry. This player has the policy of only accepting 1st grade APNs: what has been occurring is that a large number of farmers that are good borrowers are having the total sum of their collateral taken up by banks and trading companies. The banks seem to have preference in this case. Small and medium-sized farmers are the most affected by this practice, once they might commit a great part of their assets to banks in order to

access the subsidized credit, preventing them to candidate for other private funding sources.

5. Conclusion

This study sought to identify and analyze the determinants of the capital structure of agricultural enterprises, specifically of debt incurred to fund crops. Through in-depth interviews with the main lenders involved in providing credit for soy production, such as banks, credit co-ops, agricultural input industries and trading companies, we identified the main types of contracts offered to soy farmers, as well as the post-contract risks faced by creditors. Given the scarcity of subsidized funding, companies in the agro-industrial system acquired a leading role in the transfer of resources, providing an alternative to soy producers, albeit a more expensive one tied to purchase and sale agreements.

On the other side of the transactions stand the farmers, who must make decisions regarding the many financing alternatives available to them and compose their capital structure for financing their plantations, for each crop. As the research showed, the alternative that all farmers prefer, regardless of size, is subsidized credit, at an interest rate of 8.75% per year. However, as this relies on controlled funds of which only limited amounts are made available to each farmers, and as it is managed by banks, access to it is permeated by screeners and financing is granted mainly to those farmers with a good loan-repayment background and a good reputation at the financial institution.

The second alternative consists of gaining access to credit through production co-ops, through the financed purchase of agricultural inputs, or through credit co-ops, which, like banks, manage the lending of subsidized credit. The use of both types is limited to the members of co-ops and therefore access to credit is dependent on fulfilling the formal and statutory rules inherent to co-ops. The research data show that this type is used largely by small soy producers (up to 200 hectares).

The third alternative consists of trade credit, i.e., credit obtained through the purchase of agricultural inputs from the sector's industries or via grain sale transactions with trading companies and processing industries. In both cases, the instrument used is the APN, which has proved to be a helpful tool for speeding up the financing process, given the fact that it provides fast legal foreclosure in the case of default. Although it may be a type of financing with a higher cost for soy producers, it has many advantages, of which the main ones are access to the financing of agricultural inputs and guaranteed production outflow at negotiated prices. From the creditor's point of view, APNs are a safe security that is widely used as the guarantee for purchase and sale agreements.

Despite the three financing possibilities mentioned, farmers make ample use of their own funds: this accounted for 34% of the total sum financed among the sample of interviewed producers for the 2004/05 crop. It is interesting to note that this percentage shows only a small standard deviation between the different sizes of plantations, a greater fluctuation being found only among those with areas of 100 to 200 ha, for which the farmers' own resources accounted for 60% of the funding of crop-related expenses, on average.

The research led us to conclude that the main determinants of the capital structure for funding crop costs are related with the following factors:

- i) Possibility of using specific assets as collateral for loan contracts;

- ii) Size of firm;
- iii) Possibility of re-using the assets;
- iv) The reputation of the borrower;
- v) Creditors' perception of legal insecurity; and
- vi) Degree of incentives provided by the creditors as indirect mechanisms for reducing default.

As for the possibility of using the specified assets as collateral and the possibility of re-using such assets, we found that the results are in line with the propositions of Williamson (1988) and of Balakrishna and Fox (1993). As we are dealing with soy beans, the specificity of the issue is high, given that this asset cannot be used for any transactions other than those that concern the processing of the said asset. Thus, the use of grain as collateral will be greater in transactions conducted with trading companies, processing industries and production co-ops. For banks, credit co-ops and agricultural input industries, grain as collateral can be a problem, in that it requires that they manage the storage, transport and sale of this product to its buyers. Thus, the research showed that these types of creditors demand other kinds of collateral, such as mortgages, pledges, guarantors and financial APNs.

The results of this research do not allow us to establish a positive relation between the level of debt and the size of the soy plantation, as measured by the area of cultivation, as proposed by Titman and Wessels (1998). Both small and medium-sized farmers had a similar ratio of own capital vs. debt, namely, some 35% of own capital vs. 75% of debt. However, we observed some variations in the choice of leverage depending of the size of the plantation. Small producers obtained financing by third parties largely through subsidized credit. What might explain this is the greater participation of production and credit co-ops in the lending of these funds.

On the other hand, larger producers, in addition to subsidized credit, have access to trade credit, being better able to comply with the requirements of the agents of the agro-industrial system. This finding is consistent with the propositions of Chadad and Lazzarini (2004), who showed the negative relation that exists between the level of debt and the offering of incentives by credit agents, as a means of mitigating the risks of default. These mechanisms appear in the form of the need to submit a greater volume of collateral and of better quality; they also reflect greater strictness where breach of contract is concerned, making renegotiation impossible in the case of default. It is reasonable to expect, given these stricter demands for collateral and reputation, that medium-sized and large producers rely on these mechanisms more than the small ones, as the results showed.

The research allowed us to conclude that farmers with a low level of debt had greater access to subsidized credit than securitized farmers, who said that their financing is further reduced at every new crop. This is the case because of the strict credit granting process that banks began using as from the securitization plan, tying new loans to the borrower's payment capacity. This is felt less in the relations with the agents of the agro-industrial system, as the latter lack access to information about the producers' level of debt, this being available only to financial institutions. Given this information limitation, the agents of the agro-industrial system started basing their evaluations about the producers' repayment capacity specifically on the collateral offered by the latter, as well as on their contract performance background history. In both cases, the granting of credit is strongly tied to the borrower's reputation, this measured differently by credit

agents. This result is consistent with the proposition of Balakrishnan and Fox (1993), who indicated that a firm's degree of indebtedness is positively related with the reputation of the borrower, which points to fulfillment of contracts (timely repayment).

There is a latent perception of legal insecurity among credit agents, despite the low level of default indicated by the interviewed agents. However, should default occur, there are two perceived risks indicating insecurity in the judiciary system: i) pro-debtor rulings; and ii) delay in recovering credit. Thus, as proposed by Arida *et al* (2004), access to credit is limited to those borrowers with low risk of default. Therefore, the level of debt is positively related with the real net guarantees extended by the borrower, reducing the possibility of the creditor being obliged to resort to legal mechanisms to solve default.

The institutional environment plays a key role in the outline and the sustainability of the contractual arrangements that emerge from credit transactions. The reduction of contract risks and the expansion of financing through alternatives to subsidized loans are strongly linked to the use of instruments that precede the granting of a loan, such as insurance and screener systems for reducing informational asymmetry. Similarly, it is expected that the role of the judicial system in guaranteeing the rights of creditors be strengthened, whether through improved performance in order to solve default episodes quickly, whether by raising the awareness of judges about the economic impact of their pro-debtor rulings, which send negative signs to creditors and open precedents for opportunistic actions among agricultural credit borrowers.

6. Bibliograph

- ARIDA, P., BACHA, E.L., LARA-RESENDE, A. Credit, Interest, and Jurisdictional Uncertainty: conjectures on the cases of Brazil. *In: Inflation targeting and Debt: the Case of Brazil*. New York: MIT Press, 2004.
- BAKER, GIBBONS, MURPHY. Relational Contracts and the Theory of the Firm, *Quarterly Journal of Economics*, 117 (1), 2002, Pages 39-84.
- BALAKRISHNAN. S., FOX, I. Asset specificity, firm heterogeneity and capital structure. *Strategic Management Journal*, Vol. 14, p. 3-16, 1993.
- BACEN. *Anuário estatístico do Crédito Rural 2004/2005*. Disponível em <http://www.bcb.gov.br>. Acesso em 2007.
- BANCO DO BRASIL. *Sistema de Gerenciamento da CPR*. Relatórios Gerenciais 2004. Brasília, 2004.
- BANCO DO BRASIL. O crédito rural: a alavanca do agronegócio. *In. Revista da Política Agrícola*, no. 4, p.19-20, Brasília, Secretaria de Política Agrícola, 2005.
- BARZEL, Y. Measurement cost and the organization of markets. *Journal of Law and Economics*, 25. April: 27-48, 1982
- CHADDAD, F.R.; LAZZARINI, Sérgio Giovanetti . Relações Contratuais de Crédito Agrícola e o Papel dos Agentes Financeiros Privados: Teoria e Evidências dos EUA. *Revista de Economia e Sociologia Rural*, v. 41, n. 3, p. 29-52, 2003.
- DJANKOV, S., MCLIESH, C., SHLEIFER, A. *Private credit in 129 countries*. Harvard Business Review. 2004.
- DURAND, D. The Cost of Capital, Corporate Finance, and the Theory of Investment: Comment; *The American Economic Review*; Vol. XLIX nº 4 Sept, 1959
- MAPA. *Agronegócio brasileiro*. Disponível em: <http://www.agricultura.gov.br>. Acesso em 2007

- MAPA. **Plano Agropecuário 2005/2006**. 2005. Disponível em <http://www.agricultura.gov.br> Acesso em 2005
- MODIGLIANI, F.; MILLER, M. ***The Cost of Capital, Corporation Finance, and the Theory of Investment***; **American Economic Review**, 1958; Vol. 48, 261-443
- SOUZA, E.L.L, PIMENTEL, F.L. Study on Cédula de Produto Rural (CPR) – farm product bond in Brazil. *In: Rural Finance Innovation Study*. World Bank. Washington, 2005
- TITMAN, S.; WESSELS, R. The Determinant of Capital Structure Choice; **The Journal of Finance**, Vol. 43, No. 1. (Mar., 1988), pp. 1-19.
- WILLIAMSON, O.E . Corporate finance and corporate governance. ***Journal of Finance***. No. 43, p. 567-591, 1988.
- ZYLBERSZTAJN,D,ALMEIDA,L.,LELES,C.,NOGUEIRA,A.C.L.,FACCIOLI,F. **Towards the Improvement of the Business Environment in Brazilian Agriculture. Preliminary report**. Tinker Foundation. University of São Paulo, 2005.