

BARTER OPERATIONS IN THE BRAZILIAN SUGAR CANE INDUSTRY

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Problem Statement

The Brazilian sugar cane industry that produces ethanol, energy through biomass and sugar moves 107.72 billions of dollars through the entire sugar cane chain and it is responsible for 43.36 billion dollars in the Brazilian GDP according to Neves and Trombin (2014).

One of the biggest agents in this industry are the mills. These companies process the sugar cane and obtain sugar, ethanol and/or energy. The sugar cane is obtained by the mills by three different ways according to Neves and Conejero (2010): it can be derived from the mill's own agricultural production in a vertical integration system; it can be originated from contracts between the mills and sugar cane producers; or it can be acquired from the spot market.

Due to the fact that a lot of mills were created through the vertical integration of sugar cane farmers, the prevailing standard of supply is the mill's own production, in the 2013/2014 crop the amount of processed sugarcane that was supplied by the mill's was 61% against 39% that came from independent farmers according to Neves and Trombin (2014) research. To Neves and Conejero (2010) this fact has some reasons like the need of the mills to have a constant flow of sugar cane and the product characteristics as perishable and expensive to transport, what implies in an intimacy relationship between the farm and the mill.

The decision to obtain the sugar cane from these sources depends on several factor and Neves and Conejero (2010) state that one of these factor is the financial capacity of the mill to produce sugar cane and the ability to obtain credit or guarantees in the market.

This important chain also has several companies that need to obtain funds to finance their daily operations and also their investments in permanent assets including the mills. According to Eusébio and Toneto Junior (2012) loans for agribusiness can be addressed to acquire basic inputs, human resources investments, obtaining new technologies, mitigate the impacts of seasonality, among others.

These organizations have only two options to obtain debt-financed resources: the official agricultural credit provided by specialized companies like commercial banks and the Bank of National Economic and Social Development (BNDES); and in the non-official credit market that is obtained with suppliers, tradings and other non-specialized companies as stated by Silva and Lapo (2012).

Despite the subsidized interest rates practices by the Brazilian government in development banks like the BNDES, the requirements for obtaining this financing are very high and often the industry players like the sugar mills are unable to access. Besides that, the credit lines available in the country are often not suitable for agribusiness: several banks still did not learned the peculiarities of the sector and offer financing that does not match the needs of producers in terms of payment's time frame, warranty requirement or interest rates.

Silva (2015) complements saying that the volume of credit lent for agriculture and livestock is insufficient for supplying the sector's demand for funding. He states that in order to decrease this deficit the private companies have key role.

Each year according to Buanain (2014) the capital assets and financial requirements in agriculture can increase to the companies maintain themselves competitive. This can increase even more the risks of the industry.

Already in 2009, when the industry was having good results the high debt rates of sugarcane mills was a major problem for obtaining new loans and market resources because of the risk as showed by Aidar (2009). The scenario is even worse because of the the major drought that Brazil faced on 2014 and the crisis that the sector is going through in the last years. Because of that since 2007, 68 mills were closed. It obligates them to seek for the non-official form of credit frequently with barter operations.

The barter operation for Aguiar, Lima Filho and Torres Junior (2013) is based in this mechanism: the rural producer emits a bill stating that he or she will hand the production to a trading company (as the Farm Product Bond – CPR that is backed by the Bank of Brazil), and then the trading funds the inputs purchase by paying directly to the supplier.

These operations are often used in Brazil as a way of providing credit to rural producers and has become more present and important in the sugar cane cultivation.

According to the International Sugar Organization (ISO) the global consumption increases around 2% each year and the production is expected to grow 50.8 million tons to supply the 2020 global demand. Datagro states that the supply of ethanol that is today around 23 billion liters must increase to around 35 billion liters just to supply the market needs.

It becomes very clear that the sector has a huge growth potential and that funding options like barter, are cornerstones to the sector. Because of that is so important to understand how those operations works and if the barter operations are more interesting than other fundind sources.

Objectives

This paper has the objective to describe how barter operations are realized in the sugar cane industry in Brazil and compare its positive and negative aspects with different forms of funding.

Literature review

After the Second World War, the Brazilian government promoted a great transformation on agriculture. Frederico (2010) states that those changes were called “Green Revolution” and included a lot of technological progress like new seeds and use of crop protection products that enhanced production and yield gains and brought the opportunity to plant in areas that were considered non-arable before it.

This period also was characterized by the public intervention on funding resources for the technological revolution as shown by Santos and Silveira (2001): a great amount of subsidized money was lent to rural producers especially in the considered “new frontier’s area”.

Almeida and Zylbersztajn (2008) quoted that between 1970 and 1979 the volume of agricultural credit increased 415%. The authors say that this occurred mainly because of the fact that in this period the interest rates were negative in the country given the huge inflation rates that took place in Brazil.

Still nowadays the public banks are responsible for a great percentage of rural credit market share being 64% in 2012 as seen on Silva (2015).

This government-financing model started to present problems in the end of the seventy’s decade for Almeida and Zylbersztajn (2008), when the public debt was already high and brought a tax crisis that made the government rethink and reduce the national treasure participation on agricultural funding.

A new reality in the Brazilian economics made the public sector begins a rural financing’s responsibility transfer to private companies. Leaving for the government the function of monitoring and mediate the commercial transactions on the market as stated by Frederico (2010).

It becomes clear when we analyze the results obtained by Defante et al. (1999) that shows the reduction of public financing in agriculture: in 1975 the amount lent was R\$ 9.45 billion; in 1980 R\$ 6.26 billion; in 1985 were R\$ 2.4 billion; and in 1990 it was reduced to only R\$ 875 million.

The reduction in the rural credit was due several actions and movements in the funding policies according to Defante et al. (1999) like raises in interest rates for costing and investment loans in 1979, the establishment of a costing credit limit for the rural producers in 1981 and the subordination of agricultural policies to other government affairs as the engagement in beating the inflation increase. Until this period the authors also state that big producers received more credit from the Brazilian government than the small ones because one of the goals of the policy was the growth of agricultural exports to fight the debt.

Although the policies on this period aimed for the reduction of public involvement in the credit business, there were a few attempts to brake the decline of financing. But in the vision of Almeida and Zylbersztajn (2008) these actions were not effective in reproducing the development of Brazilian agriculture that we saw on the previous phase.

Already in 1994, it was created the CPR (Rural Producer Banknote) that introduced the sale in advance of portion of the production and Almeida and Zylbersztajn (2008) stated that it guaranteed safeguards for the lenders because since the CPR was implemented it became a lot easier to enforce the warranties.

For Frederico (2010) it was created to facilitate the participation of the input industry, processing companies and tradings in the credit offer to rural producers. According to the author it was an important tool for government transfer of costing’s credit responsibility.

The CPR creation allowed several credit operations to be implemented like resource anticipation with banks, tradings, cooperatives and others; input purchase by payment in advance. It also can be backing purchase and selling operations with other players in the industry as pointed by Almeida and Zylbersztajn (2008).

Almeida and Zylbersztajn (2008a) affirms that CPR ensure the creditors because it is callable, however in Brazilian judiciary system the inefficiency can compromise the title execution and consequently increasing the cost of borrowed money.

It is on this moment with lack of resources for the farmers that a transition to a different phase begins. The distribution of funding reversed and the small and medium producers started to took a greater percentage of the credit available to Defante (1999) that defends that the main reason for this was the distinction in the interest rates according to the size of farms.

The shift of focus continued when the PRONAF (Nacional Program for Strengthening Familiar Agriculture) was created in the year of 1996 which the goal was to finance agricultural and livestock production with lower interest rates for the small producers as explained by MAPA (2015).

Because of lack of credit in the market Almeida and Zylbersztajn (2008) say that private agents of the agribusiness chain started to offer financing at the end of nineties. These agents were input dealers, cooperatives and sugar and ethanol mills. Chaddad and Lazzarini (2003) show that the participation of private agents and cooperatives at the American agriculture was very expressive on 2002 with almost 97% of the debt coming from this sources.

New agribusiness bonds were created in the end of 2004 and Almeida and Zylbersztajn (2008) believe that they demonstrate the evolution to contracts that increases the integration between capital markets and agriculture. These bonds are named CDA; CDCA; WA; LCA; and CRA. Frederico (2010) complements saying that it opened the market for foreign investments on Brazilian agriculture.

For Almeida and Zylbersztajn (2008) the CDA and WA aim to boost the operations based on CPRs and the commercialization process because they allow the farmer to be funded for market their production not needing to sell it on the beginning of the harvest to honor the CPRs done before planting. The CDCA, LCA and CRA as quoted by Vian (2005) were created for three reason: lack of resources in the market, credibility insufficiency of the CPR on the capital market and costs.

However according to Frederico (2010) only the LCA had been widely used and represented a significant amount of operations. It could then accomplish its goal of increasing the capital available for the agribusiness agents and consequently offering more money to the farmers.

The agricultural grants are increasing each year since 1999 according to Delgado, Leite and Wesz Junior (2011) and to Banco Central do Brasil (2015), the growth between 2012 and 2014 was almost 59% summing R\$ 239,619,000,000 in the end of 2014.

Even with the advance and improvements in the private sector funding, nowadays Brazil still depends on the public credit in the vision of Delgado, Leite and Wesz Junior (2011) because both Banco do Brasil, Banco do Nordeste and BNDES banks are the main responsible for the money offer.

For Eusébio and Toneto Junior (2012), due to a series of characteristics of the credit sector as the information asymmetry between agents, the agriculture industry can be excluded by not being able to comply with guarantees or that incurs high costs to verify it. In the words of Eusébio and Toneto Junior (2012) the difficulties to acquire information and specificities of the sector are problems for the credit offer because creates bigger risks and allowing just a small portion of farmer to have access to credit.

The research of Eusébio and Toneto Junior (2012) showed that in the São Paulo state small farmers have lower probabilities to obtain credit and that in order to increase probabilities it is important that the farm owner be associated to cooperatives, associations or unions.

Credit Sources

The total volume of agricultural and livestock credit transferred by official forms was 94.1 billion of reais being 64.9 billion of this total directed to agricultural as Silva and Lapo (2012) pointed. They also shown that official credit modes have lower interest rates that non-official ones.

According to the results of Scare and Antolini (2013) farmers consider agility, price and volume as variables influencing their financial services decisions.

Banks

Banks as stated by Chaddad and Lazzarini (2003) have advantages to access capital assets with costs lower than other sources and consequently can provide larger amounts of money. It is even easier for big commercial banks and for the author the market was concentrating at the period of the study in the USA.

At the beginning of 2010 the private banks market share in agricultural and livestock credit sector raised to 41.9% against 58.1% of public banks as shown by Silva and Lapo (2012).

Banks usually are interested in transfer cheaper credit to farmers with low risk profile, these are normally medium and big producers or credit cooperatives that have good history in paying back, according to Almeida and Zylbersztajn (2008a) they do that to eliminate the operational burdens.

There are basically two types of credit lines used for sugarcane production according to Brazilian Central Bank - BACEN (2014):

- Cost – credit directed for the normal expenditures of the crop production cycle like inputs, harvest, processing, among others. The government stimulates the credit by subsidizing the interest rates that were 6.5% a year in 2013/2014 crop with restriction concerning the volume: until 1.1 million by farmer.

- Investment – this type of credit comprehends the funding of goods and services related to agricultural and livestock activities that brings benefits through several production periods like machinery with interest rates varying from 3.5% to 6% by year. For sugarcane farms and mills there special investment lines for cane field extension or renovation for example according to the manual of credit they have 5 years to pay the loan.

As safeguards banks have been using selection process based on profile analysis of lenders as stated by Almeida and Zylbersztajn (2008a) these is relies on public available information or those collected by the manager during the negotiation and transaction. On regular basis it demands a list of documents including a technical project and it is a very bureaucratic process.

The process of selection allied with the demand for guarantees resulted in extremely low rates of default according to Almeida and Zylbersztajn (2008a) in the official credit market that consists in banks and cooperatives but when it happens it is solved through private renegotiation mechanisms.

Credit Cooperatives

The cooperatives have the role of directing the financing especially to small producers that cannot access the PRONAF (National Development Program for Family-own Agriculture) because they do not own the land to use as guarantees or they are not eligible on the bank's selection process in the words of Almeida and Zylbersztajn (2008a).

In July of 1999 the interest rates of credit cooperatives were identified by Bialoskorski Neto and Balieiro (2001) as being 7.58% lower than the rates practiced by commercial banks of São Paulo state located in the Center South of Brazil. Even in more recent studies as presented in Oñate and Lima (2012) that interviewed farmers from a credit cooperative of sugarcane producers, the most quoted reasons for they obtain credit in the cooperative were “lower transaction costs” and “lower interest rates” so the lack of information about the sources and the subsidized rates of 6.75% per year. This is due to cooperatives keeping fewer employees and smaller physical structure.

On the other side the Oñate and Lima (2012) sample also stated that the main issue for them acquiring funding in other institutions was the need for credit lines that did not existed or was not available at the cooperative at the moment.

Oñate and Lima (2012) also found statistical significance indicating that farmer with more sugarcane harvest area have bigger leaning for taking credit in the studied cooperative and that even the cooperative prefers to land for borrowers with bigger land available.

In case of delays or default on cooperative's loans and even on input supplier's loans, they tend to be more flexible in the negotiation due to their better relationship with the clients even in other business issues in the words of Almeida and Zylbersztajn (2008a).

The interest rates of each of the credit sources are presented in table 1 shown in Silva and Lapo (2012):

Table 1 – Brief description of the eight challenges

Group	Funding Model	Interest rates in 2010/11 grain crop (year)
Official Credit	Banks	Subsidized: 6.75% Free rates: until 10.75%
	Credit Cooperatives	Subsidized: 6.75% Free rates: until 10.75%
Non-official Credit	Harvest installment	12% to 20%
	Commercialization in advance	12% to 20%
	Barter Operations	12% to 20%

Source: Silva and Lapo (2012)

Non-financial Agents and Barter

The non-official credit institutions are the market agents that does not have as core business the lending of money so it can include tradings, input producers, input dealers, among others. According to Chaddad and Lazzarini (2003) these agents normally lend short and medium term money that includes machinery and inputs credit because of that, the suppliers uses credit as marketing strategies creating loyalty through this service.

However these agents have several restrictions for obtaining necessary resources for agricultural lending so they need alternative sources to offer credit when the traditional ones do not have these problems in the words of Chaddad and Lazzarini (2003).

Furthermore as the financial aspect is not a core competence of their business these agents work in ways that somehow are endorsed by the financial system as described in Almeida and Zylbersztajn (2008a) like with CPR, commercial papers and triangular operations involving banks.

Noguera (2011) presents briefly the history of barter in primitive moneyless societies: the specialization of labor with citizens producing a single product and exchanging their production with other in order to obtain everything they needed.

After the population reached a bigger size, Noguera (2011) points out that intermediaries are necessary agents for reducing bartering costs because of economies of scale and allowing the development of more structures communities and producers because with intermediaries they have more time available to focus and increase their production.

In risk management strategies, financial instruments have gained importance for price risk mitigation as the derivatives contracts as explained by Buainain et al. (2014) the barter operations are called term's derivatives and are characterized as by their customization for having as counterparts the productive chain's agents like agroindustry and/or tradings.

It is very important to face these financial risks because they concentrate and potentiate all the other types of risks and their negative effects according to Buainain et al. (2014).

Barter in modern agricultural systems consists in the exchange of agricultural inputs to farm production for the commodity delivery in the future as defined by Silva and Lapo (2012), this important operation involves at the same time input suppliers and tradings to offer credit to farmers.

Through the analysis of the sources of grain production funding Silva and Lapo (2012) evidenced that the private resources have an as important role as the official credit in Brazil. Still for grain farms the author state that three major forms of purchasing inputs were identified:

- In cash or short term installments – in this type of transaction the farmer acquires the inputs and pays immediately or in short term installments until 90 days later. They are characterized as short term because the payment occurs before the crop harvest;
- Harvest installment – the payment is done only after the harvest, the supplier sells and delivers the products before the harvest and after it with the revenues obtained with the commercialization they do the payment;
- Barter operations – without money transactions, the input payment is done through the delivery of part of the production to the suppliers.

The barter operations are very common for acquiring inputs for grains production like shown by Silva and Lapo (2012) 14% of the farmers sample stated that uses barter operations when buying seeds, 22% uses for purchasing fertilizers and for acquiring defensives 27% utilizes barter operations in the country.

When considering the Brazilian's productive regions, in Midwest we can notice that in Silva and Lapo (2012) sample it is the region with greatest percentage of utilization of barter operations in all the three types of inputs analyzed. In the paper the authors say that is very common in barter operations to purchase "technological packages" that are a set of inputs necessary to the crop in exchange of a determined amount of grain bags because

Silva and Lapo (2012) presents an interesting number that fertilizers are the most common bartered input due to the fact that some of the companies that sell fertilizers also operates in commodities commercialization and in this way they assure they will sell their fertilizers and have commodity offering.

In general, the input industry is an important supplier of credit to farmers being the bigger lender the defensives suppliers followed by seeds and fertilizers respectively according to Silva and Lapo (2012) research.

Scare and Antolini (2013) did three case studies to better understand the buying behavior of farmers, in those, two of them had some credit restrictions and the difficulties to obtain credit were one of the reasons to perform barter operations as one of the few alternatives they had. Another factor that was pointed by them to realize barter was the reduction of price fluctuation risks.

In their study Scare and Antolini (2013) found that the barter operations can make the farmer more loyal to his or her supplier of inputs because they tend to reduce the information gathering process and consequently raising costs with inputs. On the other side, the farmer that did not realized barter operations affirms that he has greater freedom to choose his inputs and also opportunity to buy cheaper than those who perform barter because he is not compromised with a specific supplier or dealer.

Regarding to safeguards Brazil does not have a unified warranty register system which implies that lenders do not know what the crop compromises to other lenders are. Almeida and Zylbersztajn (2008a) state that for CPRs the asymmetry of information is the same, so as precaution the lenders are demanding the CPR register linked to the property document where the production is held.

This situation brings difficulties to all the agents involved because Almeida and Zylbersztajn (2008a) believe smaller farmers that do not possess land to give as guarantees are excluded and even those that have often give the land as guarantee but still do not acquire the total amount needed to finance their operations, bringing problems and higher risks to subsequent lenders.

For Almeida and Zylbersztajn (2008a) the non-traditional agents reduce the credit asymmetry through social network and for the moral hazard they use the guarantees that could be a problem considering the lack of a unique register system. When talking about trading's financing the author state that they do not use a formal structure to risk analysis, as they usually negotiate with clients with long-term relationships and develop trust.

When facing default problems these agents often use private negotiation trying to maintain the conflict off the judicial system because it takes an average of five years to judge it and there is the risk of borrowers be favored depending on judges' interpretation according to according to Almeida and Zylbersztajn (2008a). Due to this insecurity the money offer may be restricted; the interest rates can reflect these risks; and the adoption of more formal instruments of reputation and risk analysis.

In summary Almeida and Zylbersztajn (2008a) show that the perception of a weak judiciary system coupled with the lack of a centralized information system makes that lenders prevent themselves with safeguards and instruments for borrowers selection.

Procedures

We used a qualitative approach to understand how the barter operations are being used in the sector because these have not been vastly explored in the literature. The objective is to describe how the barter operations are functioning in Brazilian sugarcane market and to compare this source of funding with other options available.

According to Gil (1999) this type of research strategy aims to describe the characteristics of the sample and it allows us to compare these variables and also unravel the relationship between the characteristics and other events.

The research was realized in two phases. First we conducted a bibliographic review of the papers related to funding rural endeavors and barter operations in agribusiness sector. This phase also was used to obtain data and information about rural loans and their characteristics in order to compare the barter operations with other types funding sources.

The second phase was based in secondary data collection in documents owned by the sugar cane mills and non-participative observation. Three mills were selected to participate on the research and to remain anonymous they will be called Mill 1, Mill 2 and Mill 3.

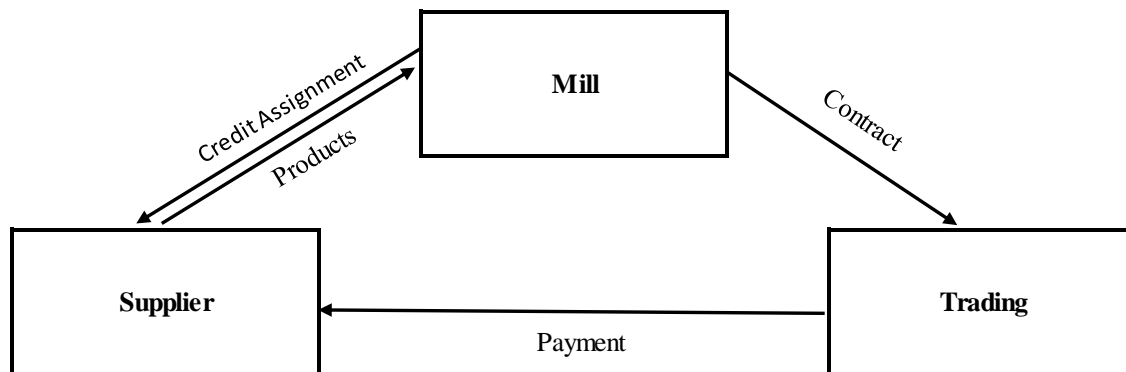
The documental research involved the contracts, CPR and a private instrument of credit assignment of three sugar cane mills chosen by convenience for this study. The geographical location of those mills was based on country's concentration: two of them in the Center-South region that is the biggest producer of sugarcane in Brazil (in 2013/2014 crop the region represented 87% of sugarcane area); and one of them in the Northeast region that is historically very important (corresponds to almost all the rest of Brazilian production in the 2013/2014 crop with more than 12%) in data available at Conab (2015).

Results and Discussion

The barter operations in the sugarcane market involves basically, three agents, the mill, who will produce the commodity – sugar or ethanol, the trading, who is going to buy the commodity, and the input manufacturer, who is going to deliver to the mill the products that they need for producing sugarcane.

First of all the mill signs a sales contract with the trading, declaring the quantity of commodities (sugar or ethanol) then the mill negotiate the inputs with manufacturers and gives a credit assignment to the supplier, which includes the cost of their products and also an interest rate charged by them. It happens because the payment will be realized in 12 to 18 months later.

We can see the general agents and flows in Figure 1 below.



It is not rare that the input producer will also demand a CPR as a guarantee for their products deliver and it can be done through compromising harvest land owned by the mill or sugar and ethanol inventories. As stated by Almeida and Zylbersztajn (2008a) the lenders demand as a precaution that the CPR register is linked to the property document and in many times this operation in realized only because of the long term relationship between mills and trading companies.

The trading being involved in the negotiation is a motive for caution by the mills because in case of default or delays in the payment it can create problems for commercializing the production in the future in terms of conditions and taxes and even in case of major problems the utilization of another trading company.

The biggest reason for bartering operations is that it presents a certain safety for input manufacturers. As the risks were lower, the suppliers offered this type of operation to the mills that did not had its commodity production already sold. To this fact, we noticed that in sugarcane both the findings in Chaddad and Lazzarini (2003) and Scare and Antolini (2013) for grain, do not apply.

Sometimes the credit restrictions situation of the mill was a facilitator of the operation but usually the supplier focused this type of operation on mills that they tended to have future problems in receiving for to guarantying payment.

It is important to note that, unlike barter operations in other crops, the commodity that is traded is not what is harvested such as soybeans, and it needs to be processed before. In addition, there is no fixed price for the commodities, what leads the credit assignment to have a safety margin in the volume of commodities to absorb possible changes in prices.

Although Figure 1 shows the most often form of barter in sugarcane sector there are some differences in the guarantees, taxes, contracts and processes that will be explored in details for each of the three mills studied on this paper.

Case 1

The first mill is a medium size one, located in the state of São Paulo on the Southeast region, and only produces ethanol. With a great history in producing ethanol, this mill choose to finance part of their inputs with barter operations in the crop year of 2013/2014.

The ethanol volume negotiated in the contract was approximately 1.2 million liters with a one-year term and the price of the liter would only be established in the next year when the commodities should be handled to the trading.

The credit assignment was around BRL 1.5 million over the total volume of ethanol, including the products and 8.5% of interest per year. Also, as the contract did not established a price for the ethanol, the assignment had a security margin of 35% over the volume of ethanol in case the commodity was negotiated under the expected price in futures market so the quantity delivered is bigger than 1.2 million liters.

At the sales time if the trading receives more than it was initially established the mill receives back the difference. The problem for the mill is that they cannot maintain the commodities in stock and commercialize it when the prices are attractive.

Even though there was this security margin, in a contract's clause was done ensuring that in case the commodity price did not achieved the price agreed upon, the mill should be responsible for paying the trading the value that would be lost.

Almeida and Zylbersztajn (2008a) showed that the problems with judiciary system in Brazil and the asymmetry of information are responsible for this great amount of safeguards. However, Silva and Lapo (2012) demonstrated that even with all the guarantees, security margins demanded and higher interest rates than the official options would cost the mills, the private sector's resources have still an important role on the production.

The CPR of 1.5 thousand liters of ethanol given as a guarantee was signed between the mill for the input provider so if the mill did not handed the ethanol for the trading, the input supplier will yet receive the payment for the products. The responsible for signing this was one of the mill's owner.

Case 2

The second case was a large mill, located at Minas Gerais state that also included barter operations in it funding sources on 2013/14 crop. Differently of the first case however, it included an intermediary in this case, as an input dealer was responsible for lending the inputs necessary.

The intermediary involved in this case and in case 3 is due storage restrictions. The sugarcane mills have the interest in buying great amount of inputs at once because it can reduce the price paid but they have no physical space and infrastructure to stock all these inputs. Because of that the only solution

available is to buy from an intermediary located nearby so the mill can get an interesting price but also using the dealer's storage capability and taking the products whenever they need.

Another difference was that the contract now includes 6.000 tons of sugar instead of ethanol and the price of the sugar ton also was not established at the time and it could be done by the mill at any time between the contract sign and the beginning of sugar deliveries to the trading. Then the amount of inputs that would be acquired was negotiated with the input dealer. The credit assignment had a total value of US\$ 1.6 million, also including products and an interest rate of 6.5% per year.

It was assigned to the manufacturer directly to ensure it in case of exchange rates variations and to cover for possible judiciary costs in receiving it another concern that Almeida and Zylbersztajn (2008a) raised for the credit market in Brazil. The margin once again was established in 35% of the volume necessary for the payment.

In this case the input supplier also demanded that a CPR in the name of the distributor on these 6.000 tons of sugar was made. In addition they need to have another document with it in this case, a title transfer assignment, that moved from the distributor to the supplier the right to receive the sugar tons even though the dealer was responsible for the sale.

Other important issue are the costs associated with the registering of documents and all the legal procedures concerning signatures that are usually paid by the mills that can be explicit or embedded in the midst of negotiations. In Brazil, this ends up being another reason for high credit costs.

Case 3

The third case was a medium size mill installed at Alagoas state in the northeast of Brazil also during the 2013/2014 crop year. This mills produces ethanol, sugar and it have the capacity to cogenerate energy through biomass like sugarcane bagasse.

The contract signed between the mill and trading involved 4.000 tons of sugar of an exportation type. The responsible for price fixation was once again the mill that could established at any time between the signature and the start of sugar deliveries as it happened in case 2.

The greatest difference of this case from the previous one is that the payment terms. In case 2 they payment was done in Brazil with an onshore contract and in the case 3 the payment was made abroad in an offshore transaction benefiting the mill with lower government taxes.

For this to happen the involvement of another agent in the operation was necessary: a bank based both in Brazil and in USA so that the amount related to the commodity sell would be primary deposited to a bank account in the USA so that it would later be transferred to Brazil. The bank account was in name of the sugarcane mill and they also did a hedge to prevent themselves from exchange variations.

Similarly as the second case, it was used an intermediary between the supplier of inputs and the mill and therefore the products were legally sold by the distributor to the plant, but who holds the

assignment of the contract is the input supplier. Therefore the assignment of the contract whose value was worth 1.3 million dollars represented the inputs purchased and an interest rate of 6.5% a year.

The supplier of inputs in this case also demanded the CPR and as in the previous case, had an endorsement agreement signed by the dealer, which transferred the right to receive the value to the supplier. The CPR had the amount of 4,702 tons of sugar, which also had the same safety margin of 35% and would serve as a collateral if the contract was not fulfilled.

Once again we can see that bureaucracy is an obstacle for the barter operations in Brazil. Besides the costs of obtaining these documents, the time necessary for preparing and collecting documents, signatures and registering it all is too long for an activity that suffers from adverse climate conditions, pests and diseases and demands the right inputs in a short notice.

Then we compared the three barter operations, with details in the chart below, pointing the size of the mill, location, negotiated commodity, volume, credit assignment value, credit currency, interest rates, security margin, presence of an intermediary and if there was guarantee.

Table 2 – Comparison of the 3 cases

	Mill 1	Mill 2	Mill 3
Mill Size	Medium	Large	Medium
Location	São Paulo Southeast	Minas Gerais Southeast	Alagoas Northeast
Commodity	Ethanol	Sugar	Sugar
Volume	1.2 million liters	6,000 tons	4,000 tons
Credit Assignment	1.5 million	1.6 million	1.3 million
Currency	BRL	US\$	US\$
Interest Rate	8.5%	6.5%	6.5%
Security Margin	35%	35%	35%
Intermediary	No	Yes	Yes
Guarantee	CPR	CPR	CPR

The type of barter operations that we found in the sample from sugarcane market differs from other operations in other crops because in this case it is not the farmers who are acquiring inputs through exchange of their commodity production, it is the mill. To that extent the barter operations, the amount of input and commodities being exchanged are usually bigger than in operations in other crops.

Because of that and the prevalent business model in Brazil in which the mills possess land to give as guarantees in these operations, there are fewer cases of mills that are not able for getting funds with barter as can happen in other situations shown by Almeida and Zylbersztajn (2008a).

In all three cases the interest rates are much lower than what Silva and Lapo (2012) found for grain crops. Varying from 6.5% to 8.5% in our sample. The interest rates are that low because of reduced risks in the operation: the security margin of 35% is high and safeguards the supplier allowing the interest rates to be reduced. In terms of comparison, at the time the research was done, vendas a prazo tinham 14% of interest rates per year by having higher risks than barter.

Despite of the differences there are still some similarities between barter operations in sugarcane and grains. Silva and Lapo (2012) shows that for grain crops the farmers often acquire from the supplier or dealer “technological packages” containing all the inputs they need to produce. As we found in all three cases that was also true, we can even conclude that the barter operations takes away the responsibility of commercialization from the mills, making them focused only on their core business showing that it can be a “complete solution”.

The commercialization, as we found, sometimes can be an obstacle for the mill since the prices fluctuation generates risks to them. As Scare and Antolini (2013) stated on their paper, the barter operations reduces this type of risk being a positive aspect in our cases. On the other side the three mills of the sample stated that if they were not doing barter for acquiring the inputs they would have achieved better purchase prices and conditions. Again corresponding to what Scare and Antolini (2013) found for farmers.

As we can see in all the cases and in Almeida and Zylbersztajn (2008a), non-official credit sources seek for endorsement in their operations by the financial system and the chosen way to do that in all three cases was the CPR. Even though they use the CPR to manage risks, a cornerstone on barter operations involving mills and tradings is that they already have established relationships in buying and selling operations. Because of that tradings have knowledge about the paying capacity of mills and this can reduce their apparent risk and lower the interests in these operations as Almeida and Zylbersztajn (2008a) also showed.

As seen on the results there are advantages and disadvantages for the mills in realizing barter operations and they are summarized on table 3.

Table 3 – Pros and cons of barter operations for the sugarcane mills

Pros	Cons
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Relatively easiness in obtaining credit (Not that many safeguards as requested by banks)	Future commercialization problems
Low interest rates	Amount of safeguards
Focus on core business	Costs of documents and legal procedures
Full solution	Time necessary
Price fluctuation risk reduction	Inputs price higher and reduced freedom of choice

Conclusions

The sugarcane market in Brazil has had difficult years since 2009, with the confused politics of ethanol by the government, the increase of costs (both labor and supplies) and the low prices of sugar in the world, which are creating great difficult for financing the activities.

Our research was able to describe, analyze and compare some cases of barter operations in the Brazilian sugarcane industry and to point some positives of using this strategy to finance working capital of the agricultural part of the mills, what can be an alternative for the mills. Furthermore, this paper came to bring light to the barter operation theme, which has yet few studies in Brazil and especially on the last years.

As learning points about this work we found that barter transactions have potential to occupy an increasingly prominent place among the forms of financing agribusiness including in the sugarcane market. It happens because of its relatively lower risks for those who are financing the operations (comparing to other forms of public market financing) because of CPR's warranties and because of risk sharing between the trading agents.

The amount of time for conducting barter operations in the country is an important issued to be considered when the sugarcane market particularities demand the usage of inputs like chemical for example as soon as a disease or pest is identified on the plants and delays on the application can be harmful for the productivity and profitability of rural endeavours.

Another factor that would encourage the growth of barter operations would be the reduction and simplification of registration fees in all documents that end up burdening the operations and makes that lower value operations become unfeasible for farmers and mills.

As any other form of financing, we found that barter has its advantages and disadvantages but in general, it is a valid option for sugarcane mills to obtain inputs for their production. Due of the fact that banks demand an even bigger quantity of safeguards and sometimes do not even accept to borrow money for agricultural endeavours, barter operations in this market have a lot of potencial for growth in a nearby future. With a review of safeguards and security margins, it can be a way of supporting the mills in overcoming the sector crisis more quickly.

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