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## Allocating production risks through credit cum insurance contracts: the design and implementation of a fund for small cotton growers to access market finance

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### RESEARCH ARTICLE

Mauro Alem<sup>a</sup> and Julio Jorge Elias<sup>①b</sup>

<sup>a</sup>*Senior Infrastructure Specialist, Infrastructure and Environment Sector, Inter-American Development Bank, 1300 New York Avenue, N.W. Washington, D.C. 20577, USA*

<sup>b</sup>*Professor, Department of Economics and Business School, Universidad del CEMA, Av. Cordoba 374, Buenos Aires (1054), Argentina*

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### Abstract

Collateral requirements that lenders place on small cotton producers can lead to risk rationing and to farmers' dependence on downstream parties. This paper presents a cotton fund that consists of a set of contracts – credit, insurance, warrant and forward – that enables producers to tackle specific agricultural risks and gain access to market finance. These financial contracts proved to be successful at guaranteeing the fund as issuer of state-contingent debt securities in the capital markets. The fund, as an intermediary, lent to cooperatives to help finance small cotton producers in northern Argentina. The paper explains the experimental design of this innovative fund and presents a potential alternative to government intervention by moving away from *ex post* subsidies for small producers and, instead, facilitating *ex ante* private credit. The paper contributes to the literature on rural financial intermediation by designing a new mechanism to raise funds coming from relatively uninformed investors and creating collateral substitutes through delegated monitoring to overcome asymmetric information and limited commitment.

**Keywords:** cotton, agribusiness, rural development, financial intermediary, credit, insurance, risk sharing  
**JEL code:** O13, Q14, Q13

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<sup>①</sup>Corresponding author: [je49@ucema.edu.ar](mailto:je49@ucema.edu.ar)

## 1. Introduction

Rural economies are characterized by fragmented and incomplete markets, where the ability of small farmers to make long-term investments, take calculated risks and ultimately smooth consumption streams is limited by available financial services. Even though the physical proximity of small, tight-knit groups could facilitate risk pooling, local markets cannot offer sufficient diversification opportunities and the costs of funds can be high. Hence, farmers and cooperatives can ultimately face considerable residual risk. The lack of diversified outside financial intermediaries, such as rural banks and insurance companies, can be attributed to asymmetric information and limited enforcement. These problems reduce the credible promises that a would-be issuer of state-contingent promises can ensure. Making new financial services and contract forms available creates new trading opportunities and allows farmers to specialize in high value income generating activities. This article addresses the design of a fund as a market-based solution to allocate production and distribution risks of small cotton producers and cooperatives. It also presents an experimental implementation of the fund in the province of Chaco, Argentina.

In recent years, despite exceptional natural conditions and a long tradition in cotton production in northern Argentina, small producers and cooperatives have been rationed from private market finance. Government intervention through public banks and subsidies crowded out the development of private markets to insure and finance production. Like Guirkinger and Boucher's (2008) model of private information and the literature on financial intermediation since Stiglitz and Weiss (1981), financial innovation can be understood as efforts to find new mechanisms to create collateral substitutes. One prominent strategy, followed in this paper, is for the lender to use intermediaries or delegated monitors to reduce information asymmetries.

In a prototypical mechanism design moral hazard problem, standard credit contracts can be improved by incorporating contingencies for bankruptcy,<sup>1</sup> and some interim, potentially random monitoring can be predicted. 'The contingencies, though costly to verify, kick in when the borrower most needs them, at very low project realizations' (Townsend, 2003). If small producers lack access to insurance, then collateral has an additional adverse effect on loan demand as producers may not be willing to risk losing their assets. The design of inter-linked contracts introducing new parties to monitor and insure the production risk (surety bond) and the distribution risk (warrant) of cotton fiber is a key contribution of this paper to the literature.

By embedding the proposed contractual arrangement in a cotton trust fund (CTF), a state-contingent contract can be drawn up to transfer risk from the borrower to third parties: insurance and warrant companies. The CTF was designed as a financial fund to issue market debt securities and intermediate finance coming from outside, uninformed investors for small producers in cotton cooperatives. Stiglitz and Weiss (1981) showed that credit rationing may arise as an imperfect mechanism to attenuate problems of asymmetrical information and limited liability. The CTF is a tool that attempts to solve these problems by providing a substitute for collateral and a monitoring mechanism. The paper shows how credit and insurance contracts can be combined to facilitate access to market finance.

Conning and Udry (2007) provide an excellent review of the vast theoretical literature on credit constraints applied to the agricultural sector in developing countries. They highlight the essential role played by intermediaries in the expansion of exchange possibilities for the economy by creating new instruments and contractual forms to overcome the trading gaps and missing markets that information and enforcement problems create. Our paper contributes to the literature of credit rationing and rural financial intermediation by introducing a new mechanism that creates collateral substitutes and monitoring mechanisms to overcome these obstacles to trade.

<sup>1</sup> The theory is generalized to encompass aggregate, observable shocks in Phelan (1994), and to allow interim communication, or unsolicited announcements of unobserved idiosyncratic shocks (Prescott, 2003).

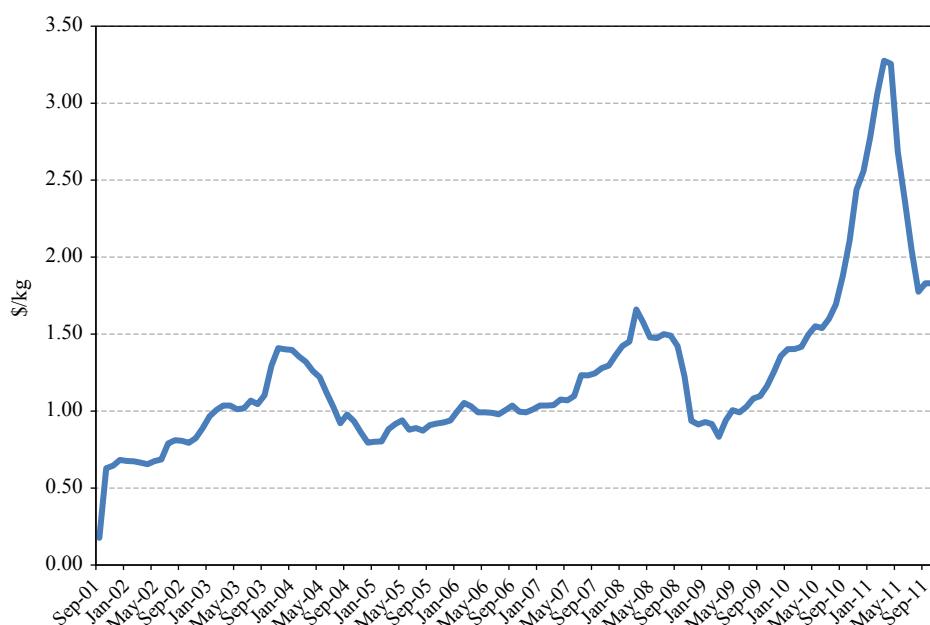
Some related financial tools have been implemented with mixed results in other countries. One example is the development of warehouses in rural areas that enable smallholder farmers to access finance from credit cooperatives by formalizing their crops as collateral (Coulter and Onumah, 2002). Towo and Kimaro (2014) showed that the warehouses have played an important role in facilitating agriculture related activities in Tanzania. Another related system is an inventory based credit system, where groups of farmers place their product in a warehouse and a lending institution uses the inventory as collateral to extend loans to farmers. The group of borrowers has a collective responsibility over the management of the inventory. The main difference to the warehouse is the focus on groups to build trust. This system has been tried in Ghana. It generated major immediate benefits to participating farmers but has not proven economically sustainable because of the small volumes of grain involved (Coulter and Onumah, 2002).

The remainder of the paper proceeds as follows. Section 2 provides some background on Chaco's cotton industry and on the traditional financing scheme of small cotton producers. Section 3 discusses the link between the CTF and the theory of credit rationing and rural financial intermediation. Sections 4 and 5 analyze the critical issues involved in designing and implementing the set of financial contracts embedded in the fund to finance cotton producers. Section 6 discusses market outcomes and Section 7 concludes.

## 2. Background

### 2.1 The cotton industry

Cotton crop production in the province of Chaco represented 69% of the total cotton crops sown in Argentina in 2009-2010 (MAGPN, 2010). Cotton fiber production is the first link in the textile manufacturing process. Figure 1 shows the evolution of the price of cotton for the period 2001-2011, which shows the substantial risk faced by producers. Throughout the years 2002-2005, the series exhibited high volatility with wide fluctuations, a sharp drop in 2009 and a large increase in 2010.



**Figure 1.** Evolution of the price of cotton (cotton free on board price in \$/kg; type D Long 27,0 mm (1 1/16'')), Argentina, September 2001-October 2011 (Ministerio de Agroindustria de Argentina, 2017).

## 2.2 The traditional financing scheme

Small cotton farmers have historically been organized in cooperatives to finance production inputs, to share processing facilities, and to market the cotton fiber. Cooperatives accessed public bank loans to buy seeds and fertilizers that were then distributed to member farmers to produce raw cotton. Chaco counted with 15 active cooperatives in 2010 that were associated with a second-degree cooperative called *Unión de Cooperativas Algodoneras Limited (UCAL)* which was composed of 1,866 small-scale cotton producing members. These cooperatives produced and processed approximately 36% of total raw cotton, a figure that was diminishing. Active members decreased as cooperatives were unable to access credit to finance their crop inputs.

By the end of 2009, cotton cooperatives had accumulated debt with public banks which left them with no choice but to access informal in-kind credit from input suppliers at implicit interest rates reaching 70% in many cases. Input suppliers act as monitoring lenders who must lend primarily out of their own equity and charge exceedingly high interest rates to recover monitoring costs (Aleem, 1990). The opportunity to improve led the government of Chaco, through a specialized agricultural finance unit (UCEF), to work together with two financial intermediaries – a bank and an insurance company – to review the traditional financing scheme and design an innovative fund to provide market finance to cotton cooperatives.

### 3. The link between the cotton trust fund and the theory of credit rationing and rural financial intermediation

Before the CTF was developed, small cotton producers had access to informal in-kind credit and government-assisted loans but not to insurance. In most cases, access to formal private finance was limited as lenders requested land collateral which made it difficult for small producers to demand credit. In their seminal paper on credit rationing, Stiglitz and Weiss (1981) studied the impact of limited liability on feasible equilibrium contracts. By placing an upper bound on an agent's exposure to consequences when a project fails, limited liability may end up encouraging agents to choose excessively risky projects. They showed that this could lead to credit rationing in equilibrium. Banerjee (2003) shows how this could even result in the collapse of the market in some cases.

There are three main but not necessarily exclusive tools that are used in practice to overcome the problem of limited liability: using collateral guarantees, legal enforcement strategies and monitoring (Conning and Udry, 2007). The traditional informal scheme of financing for cotton producers in Chaco by input suppliers via in-kind loans (seed, fertilizers) can be interpreted as a form of monitoring (Burkart and Ellingsen 2004; Watts 1994) since these practices make it difficult for borrowers to divert credit for other private uses.

The CTF consists of a set of contracts – credit, insurance, warrant and forward – which addresses the limited liability problem by combining the three tools. First, it allowed small cotton producers to generate financial collateral at market prices using the only collateral that these producers had: their uncertain future production. To create the collateral, the producer essentially ceded two rights to the fund: their rights to harvested raw cotton under a contract that specifies the date of delivery and price, and their rights to receive insurance indemnities against climate and other agriculture risks. The limited liability problem in this case is solved by a surety issued by an insurance company to guarantee the delivery of the future production at a given location. Second, the surety insurance also operated as a monitoring mechanism since the insurance company visited small producers and cotton cooperatives throughout the production process. Third, the use of the warrant and the trust contract reduced the costs of legal enforcement since in the case of default, the surety indemnized the fund so that outside investors could recover their investment in the trust fund and the insurance company would become a residual claimant to the cooperative.

With the support of this set of contracts, the CTF could obtain a high credit rating from a market rating agency that allowed the CTF to obtain funds from the capital market at competitive market rates. These funds were lent to cooperatives to buy seeds and other crop inputs. Cooperatives paid for the insurance premiums (both climate and surety bond) and on-lend (in-kind) to small cotton producers with a small transaction cost. The private insurer carried out a market due diligence process which was key to avoiding an oversupply of funds that would end up financing projects whose return would be much lower than the market return.

#### **4. Experimental design of the financial product (pilot phase)**

Despite the good conditions of the processing facilities, a review of the financial statements of cotton cooperatives revealed significant losses and negative net worth in recent years, with only two exceptions. These two cooperatives were selected to undertake the experimental design of a new financial contract to cover the production and distribution risks of cotton fiber by a third party – a specialized insurance company acting as delegated monitor – thus making it possible to inter-link credit with a surety contract, as Townsend (2003) suggested. The structured finance scheme allowed a public investment bank, Banco de Inversión y Comercio Exterior (BICE), to lend to these two cooperatives.

In 2010, UCEF, Sancor Seguros (a leading insurance company), and BICE designed an insurance cum credit contract as a new financial product to finance cotton cooperatives to buy raw cotton and pay back with the proceeds of the sale of cotton fiber. An experimental approach was followed to implement the new contract at a pilot scale before launching the financial product to raise market financing.

The new financial product consisted of a surety insurance policy to cover cotton fiber delivery risk linked to a standard credit contract and implied the following contractual arrangement:

- At the time of harvest, the two cooperatives received a short-term loan (90 days) from BICE to buy raw cotton from member producers.
- The cooperatives processed the raw cotton in their ginning equipment and obtained cotton fiber to market at spot prices.
- The loan was guaranteed by a surety insurance policy issued by Sancor Seguros to cover the non-delivery of a warrant of cotton fiber in the quantity stipulated by the loan contract.
- The surety insurance policy was ceded to BICE as a guarantee for the cancellation of the loan until a warrant was constituted.

The surety insurance policy covered all events that could prevent the placement of the warrant of cotton fiber deposited in an authorized storage or warrant company (Control Union).

The credit contractual agreement was then structured on the basis that the warrant is accepted as liquid and preferred collateral by banking regulation. The insurer performed a due diligence analysis (delegated monitoring) of the two cooperatives before issuing the surety. By doing so, it covered the risk that the cooperative might not have the amount of export-quality cotton fiber to constitute a warrant. The surety was ceded to the bank as collateral for the loan repayment.

The surety insurance was also introduced to work as a monitoring mechanism and control activity, a complementary tool that is used in practice to overcome the problem of limited liability (Conning and Udry, 2007). The surety covered the 'proper use' of the money lent to the cooperative and acted as indirect collateral given that the indemnity covered the amount of the bank loan plus interest.

The surety intended to cover the cooperative's management risk and its premium was set at 2% by the insurer, which compared favorably to the standard 6.5% costs of land mortgage contracts. After the disbursement of the loans to the cooperatives, the new financial scheme operated as follows:

- The cooperative bought raw cotton from small-scale producing members, which was then processed to obtain export-quality cotton fiber.
- The cotton fiber was marketed at spot prices and the proceeds were used to buy more raw cotton to process, allowing the cooperative to roll over the proceeds of the sales several times and increase the margin in return.
- Before reaching the 90<sup>th</sup> day of the loan disbursement, the cooperative:
  - i was to pay back the loan plus interest and the surety claim would not come into effect;
  - ii might not pay back the loan but would deliver a warrant (endorsed to the bank) to the amount stipulated in the insurance contract and the surety would not come into effect;
  - iii might not pay back the loan and the surety would come into effect so that the insurance company would pay the bank the indemnity.
- In case of (ii) the bank would liquidate the warrant and recover the amount lent.

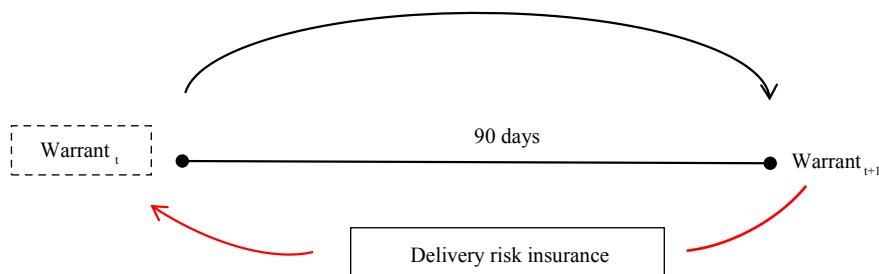
A significant part of real-world financial innovation can be understood as efforts to find ways to relax incentive constraints so as to reduce the size of the limited liability rents that restrict the range of feasible contracting (Conning and Udry, 2007). Delegated monitoring is one strategy used to decrease information asymmetries aimed directly at lowering the agent's return from moral hazard (Tirole, 2006). Sancor Seguros acted as delegated monitor as its experts carried out the due diligence and supervision process to assess the two cooperatives' management and production capabilities to use the proceeds of a loan to buy raw cotton, produce, and sell cotton fiber in the spot markets.

The experts for this independent technical review would set the amount of cotton fiber that each cooperative would be able to produce in a 90-day window during the harvest months (typically between March and July) of the 2009-2010 campaign. The loan amount would be limited to 70% of the dollar value that was to be obtained after multiplying the insured tons of cotton fiber by the spot market price of US\$0.80 per kilogram. At the harvest season in 2010 the bank approved two loans for approximately US\$500,000 to Roque Saénz Peña and San Bernardo cooperatives. The operation was successful and served as an experimental phase before launching an intermediated financial fund to issue short-term debt securities. The fund could now raise finance for crop inputs and sowing, in addition to harvesting and ginning cotton. The fund also included the possibility of incorporating other agricultural products.

#### *4.2 The financial product framework innovation: contract-based collateral*

The financial product consisted initially of two related contracts: a standard credit contract and an insurance contract. The insurance contract guaranteed the bank the constitution of a warrant for a specific amount of cotton fiber by the end of the loan term. The financial product provided incentives for the cooperatives to maximize cotton fiber production and its sale in the market, thus avoiding moral hazard problems. In turn, small cotton producers could sell their raw cotton to the cooperative at market prices as a way to cancel their obligations, obtain a return and be able to repeat the scheme in the next campaign.

Figure 2 shows the key innovation in the financial product. The product consisted of the surety bond issued by a third party (a specialized agricultural insurance company) that covered the management risk of the cooperative by assuring the bank that a minimum amount of export-quality cotton fiber (a commodity with an international price) would be deposited as a warrant in a third-party company. Given that the value of that deposit certificate was considered a liquid asset by banking regulations, the bank did not require additional collateral for the operation.



**Figure 2.** ‘Warrant-Backed’ loan.

#### 4.3 Implementation challenges

The provincial government was a key driver in the implementation. Through UCEF, it acted as a specialized unit transmitting the benefits of the financial contracts (credit cum insurance) to cotton cooperatives as an alternative to the traditional approach of mortgage-backed bank loans. In general, it was important to see the big picture but, as Duflo (2017) points out in ‘The Economist as Plumber’, the details matter a great deal. And because those details matter a great deal, a joint team composed of UCEF, BICE and Sancor Seguros visited the two cooperatives to explain the implications of these contracts and to gain the trust of small producers. A second major obstacle was to assure the efficient functioning of local and export markets for cotton fiber as the financial contract critically depended on the marketing of the fiber to pay off the loan and terminate the surety contract. Any impediment to trade would have a negative effect on the financial contract designed.

### 5. Financial product design: the cotton trust fund

#### 5.1 A design based on market principles

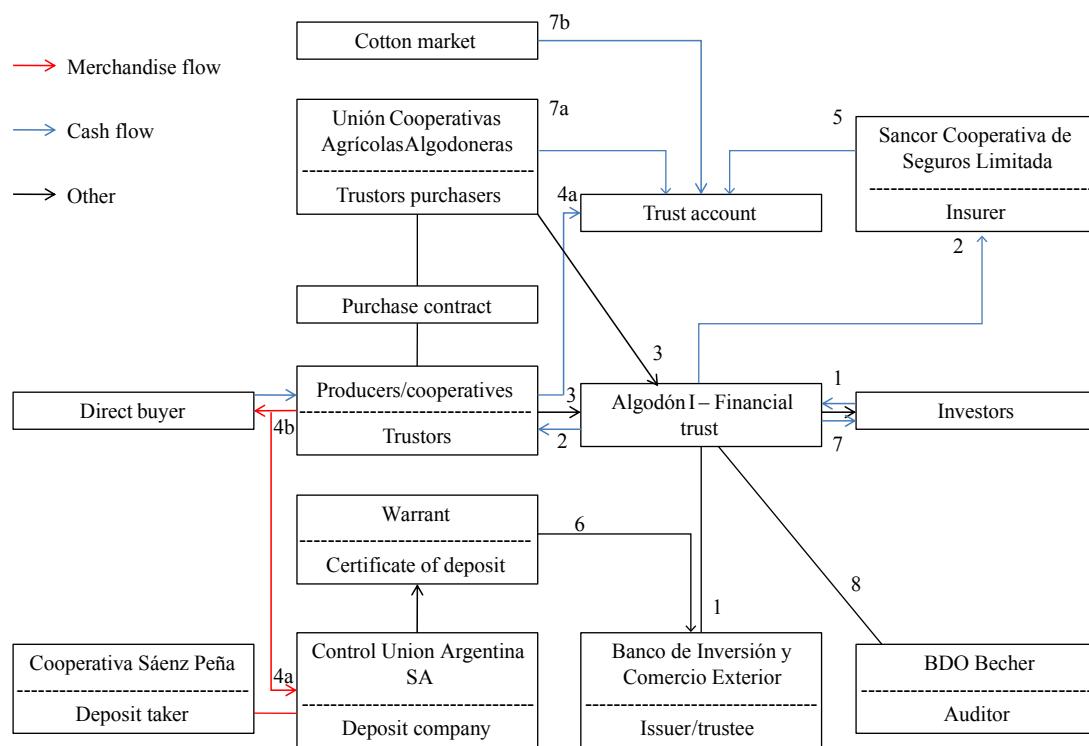
State involvement in banking has been one of the causes of the relatively poorer effective intermediation in developing countries (Adams *et al.*, 1984). The approach to the experimental design was based on the need to recover market principles to allocate production risks to market actors and replace the traditional financing scheme (mortgage-backed bank loans) and *ex post* government intervention in providing production subsidies and debt and tax relief programs to small producers in cotton cooperatives. The role of the government was reduced to facilitate market function so that cooperatives would be able to sell cotton fiber at spot prices in the future.

The financial structure of the trust fund consisted of replicating the two credit operations implemented for the processing and sale of the cotton, but now including the finance of cotton production to small farmers associated with the cooperatives. The fund now extended the term of the loan to cover the entire production cycle (9 months). At this early stage, on-lending to members also included multi-risk insurance to cover climate events. Second-order cooperatives that grouped the commercialization of cotton fiber were constituted as purchaser trustors in the forward sale contract at a specified price.

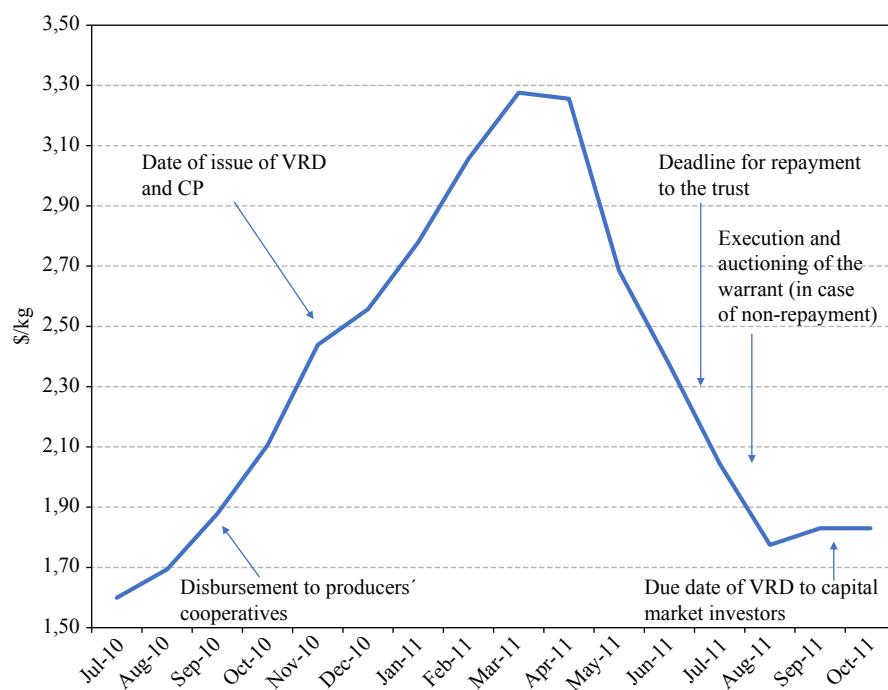
Cooperatives located in the province of Chaco were established as trustor producers who would cede their rights under the forward sale contracts of cotton fiber to the fund’s trustee, BICE. Producer trustors would also cede their rights to the indemnities of climate risk insurance policies granted by Sancor Seguros to the CTF. On the other hand, the federation of cooperatives (UCAL) and a local buyer of cotton fiber (Buyatti) were established as purchaser trustors, who would cede their rights to a surety bond provided by Sancor Seguros that was to cover the cooperatives’ risk of cotton fiber delivery and the constitution of a warrant in the designated depository company. BICE would act as the trustee of the CTF with the mandate of issuing

debt securities in the capital market to obtain resources that would be intermediated to cooperatives and small producers to finance the production of cotton that would be harvested in 2011.

The forward sales contracts regulated the price, the delivery conditions, and the rights of each of the parties. Under these contracts, producers' cooperatives undertook the delivery of a specified quantity of tons of cotton fiber of a specified quality on fixed dates. The purchaser trustor was to be instructed by the trustor producers to pay the price to BICE, as CTF's trustee, as was stipulated in the forward sale contracts. The forward sales contract foresaw that the producer trustor would cancel its obligation of delivery of the cotton fiber by paying a sum of money equivalent to the price agreed in the contract. It was anticipated that if the price of cotton fiber in the market surpassed the price fixed in the forward sales contracts, the producer trustor would be able to use that option and cancel its obligations by making a later cash payment. Figure 3 and 4 show the flows of cotton, cash and contractual arrangements of the CTF and the evolution of the price of cotton during the implementation of the first series (CTF I) with the chronological detail of the operation, respectively.



**Figure 3.** Financial structure of the cotton trust fund.



**Figure 4.** Evolution of the price of cotton during the cotton trust I, with the chronological detail of the operation (cotton free on board price in \$/kg, type D Long 27,0 mm (1 1/16"')), Argentina, July 2010-October 2011. CP = certificate of participation; VRD = Cotton trust fund debt securities (own elaboration using data from Ministerio de Agroindustria de Argentina, 2017).

## 5.2 Separation and mitigation of risks

The CTF transaction was based on the identification of every event affecting production, processing, and sale of cotton fiber in the market and the mechanism designed to mitigate each one independently. The mechanism used market principles to align the participants' incentives:

- Risk of cotton fiber delivery: the risk that the trustor producer cooperative would not deliver the cotton in accordance with the terms of the forward sale contract was mitigated by the surety insurance policy issued by Sancor Seguros (rated B2/A1.ar by Moody's (2010)).
- Multi-risk agricultural insurance policy: in addition to the surety policy, the trustor producer cooperative's production was covered by a multi-risk insurance policy. The insurance company would pay a specific amount to the CTF's trustee (BICE) in case of flood, drought, and specific agricultural diseases.
- Volatility risk of cotton prices: the transaction was open to the price risk of cotton should the following three events concurrently occur: (1) if the market price of the cotton on the date of delivery of the merchandise were to fall below the price fixed in the sale contract of US\$0.97 per kilogram of cotton; (2) if the trustor producer cooperatives were to constitute the warrants and therefore the surety delivered by Sancor Seguros would cease to be relevant; and (3) if the designated trustor purchasers failed to comply with their obligations in the forward sales contract. To eliminate this risk, the historical behavior of cotton prices in the Argentine market was studied and concluded that the transaction supported a reduction in the prevailing cotton price of US\$1.67 up to 42%. The maximum historical negative deviation for the period analyzed was 41%.
- Counterparty risk of the purchase contract: if any of the trustor purchasers defaulted on their obligations under the forward sales contracts, the CTF's trustee would take possession of the merchandise deposited and would have to carry out an extrajudicial auction of the cotton fiber. The costs of this operation were included in the transaction costs and a reserve fund was set up for this purpose.

## 6. Results of the experimental design

The CTF debt securities (VRD) obtained a local A2.ar credit rating of up to US\$64 million and had a Certificate of Participation of 5% of said amount retained by trustors producers. These securities would have a variable yield with a margin of 2% over the market reference rate (BADLAR index) with a maximum nominal interest rate of 18% and a minimum of 13%. BICE issued a first tranche (CTF I) of debt securities for a period of nine months for US\$8.5 million that was successfully placed in the local capital market. The final cost of the funds for producers was 23% (13% of interest rate of the VRD +2% of the surety insurance policy +7% of the multi-risk insurance policy +1% of the cost of the trust).

The resources raised by the trust allowed 11 cooperatives to access finance at prime market rates thanks to the high credit rating of the transaction, which was the same rating as the company Sancor Seguros. Once the trustors (purchasers and producers) had ceded their right to the trust, they became part of contractual arrangements to support the transaction, together with the forward sale contracts. This complex structure of contracts, based on market design principles as in Townsend (2003), was made possible by identifying and separating the risks, as was discussed in Section 5. An important part of these risks was transferred to the private sector, Sancor Seguros, the warrant company and ultimately market investors, with clear comparative advantages to absorb them.

Another key aspect was the lack of government subsidies in this operation. All transactions and contracts involved in the CTF implied fees and prices at market levels. This feature implied a radical change in the government's traditional interventional approach in the sector.

The operation of the CTF faced important challenges during its implementation which calls for further studies to replicate the fund in other contexts. One particular challenge was an external event that significantly affected the functioning of the country's cotton fiber export market. Because of climate events in other cotton-producing regions in the world, the price of fiber in the international market soared to over US\$3.50 per kilogram. Thus, given the potential impact of this situation on local prices, the market expected the government to intervene and close the export market. In this context, cotton cooperatives faced difficulties to close sales contracts that posed high risks on the successful completion of the transaction. Second, the need to attract outside investors demanded that strict timing and procedures in the case of default would have to be included in the contract. The advantage of avoiding lengthy court litigation procedures was balanced by the need to collect loan repayments on time to repay investors. In practice, the actual collection of repayments from cooperatives resulted in the need to restructure a few loans as cooperatives delayed repayments to the fund for a few weeks.

## 7. Conclusions

In environments with the peculiarities of the cotton sector in the province of Chaco, conventional credit mechanisms may be affected by the producers' lack of patrimonial and collateral support, as well as by the high volatility of the price of commodities. This context requires a field research approach to understand and measure diverse risks. The theory of risk allocation and mechanism design provide alternative hedging mechanisms to cope with specific risks that need to be identified before designing contract arrangements. The fund was able to provide Chaco cotton cooperatives and cotton growers – who were unable to access conventional loans – with access to market financing. These actions fostered the formalization of cotton production activities that market actors (insurance and warrant companies, as well as the trustor bank) could monitor.

This paper's main contribution to the literature is the design and implementation of an interlinked loan-insurance contract to overcome information asymmetries and limit liability problems, as Stiglitz and Weiss discuss (1981). The new financial contract presented in Section 4 allowed credit cooperatives to partially overcome limited liability and increase access to market finance by leveraging the credit rating level of the

insurance provider. The innovation in the contract is simple and consisted of issuing a warrant backed by a surety bond. This innovation allowed a bank to lend to cooperatives despite their weak financial situation. The key result is that the bank delegated monitoring to the insurance company, which then invested resources in visiting cooperatives and screening and monitoring their productive cycle throughout the life of the contract, as was predicted in the mechanism design literature (Townsend, 2003). This device worked as substitute collateral which effectively ameliorated credit constraints to rural farmers.

The simple financial contract was later embedded in a financial fund, which consisted of a complex structure of various hedging contractual arrangements to eliminate risks. The fund's implementation faced increased challenges as more cooperatives and new actors (cotton purchasers) were needed to hedge price changes with forward contracts. Despite the challenges, the fund was successfully implemented during a first stage and provided small producers with proper incentives to increase their production. Hence, the most suitable option was to produce and sell in the market.

As more farmers increase production, companies providing insurance will also benefit by being able to better diversify risks as described in the theory of optimal allocation (Townsend, 2003). For the investor, the debt securities issued are relatively safe and offer market levels of profitability. The challenge lies in implementing these types of sophisticated *ex ante* contracts in agricultural environments plagued by informal contractual and financial relationships. The pilot, experimental design approach was successful at introducing small cotton growers to innovative hedging mechanisms employed in modern finance. The support and professional stance of the government unit was also a key factor in the success.

The role of the intermediary institution in the mechanism design for risk allocation deserves further research and experimentation, and this paper attempts to contribute to the research agenda presented by Conning and Udry (2007) on the role of financial intermediaries in rural markets. The key innovation in this paper was the interlinked loan-insurance contract, which was used as the basis to design a financial fund. We believe that the role of the fiduciary agent as a new financial intermediary is a promising attempt to overcome information asymmetries in rural markets, as well as facilitating capital market products at low transaction costs. It is reasonable to consider that other private actors can play the role of the trustee. The case may be that private actors will still wait and see if these types of intervention can be replicated before investing in this new technology.

This experience showed an innovative form of public-private partnership in which each actor contributes know-how. By so doing, it allows market instruments to channel public policy and actors to increase production that is sustainable and reduces poverty. This financial tool also confirms that proper risk management is one of the pillars of agricultural development policies. This product enables agricultural producers to improve both their production and marketing and increase their incomes.

## Disclosure

The ideas and opinions expressed in this article are those of the authors and do not necessarily represent the official position of the Inter-American Development Bank.

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