A Financial Contracting Approach to the Role of Supermarkets in Farmers’ Credit Access

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Abstract

Over the last decade, supermarkets have spread to developing countries and have become major actors in the food marketing system in these countries. Their involvement in farmer’s production is well-known. In this paper, we construct a simple financial contracting model to analyze this activity and especially its impact on farmers’ credit access.

In our framework, the supermarket is modeled as a procurement organization, not only able to advise contracting farmers on their production practices, but also to partly finance their activity; i.e. to substitute for conventional lenders. We show that by bundling advising and moneylending activities the supermarket reduces the agency cost incurred to insure proper incentives in the procurement process. This reduction in agency costs can extend financing to smaller farmers who would otherwise remain credit constrained. We also point out to reasons as to why supermarket sometimes prefer small farmers.

Finally, supermarkets usually set higher food standards. By examining the impact of the introduction of higher food standards, the paper shows that the coexistence of the market for domestic retailers and supermarket products may broaden the credit access of farmers.

Keywords: Financial Contracting, Development, Financial Intermediation, Food Standards, Organization of Production, Supermarket

JEL classification: O17, O33, O50, Q12, Q13

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1 Introduction

In the last two decades, we have witnessed an impressive development of supermarket chains in developing countries. Saturation and intense competition in retail markets of developed countries, together with substantial margins offered by investing in developing markets, have largely contributed to the emergence of supermarket chains.\(^1\) In countries where a substantial portion of the population lives in rural areas, the rise of supermarkets, that arguably affect the livelihood of farmers, is a sensitive issue. Although they represent a source of investment in local economies, their real welfare impacts are hard to assess and remain controversial. On the one hand, many empirical studies have found that supermarkets tend to leave behind or exploit small growers, preferring to concentrate their procurement of fresh agricultural products on larger scale operations (Dolan and Humphrey 2000; Dolan, Humphrey and Harris-Pascal 2001, Trail 2006).\(^2\) On the other hand, although many growers successfully work with supermarkets, it is not clear whether growers who fail to enter a business relationship with them are worse off relative to the period preceding their entry. In addition, other recent case studies have somewhat challenged the view that supermarkets have only a negative impact on small growers. In particular, these studies show that in niche markets small growers perform remarkably well and remain an attractive supply source for supermarket chains (Boselie, Henson and Weatherspoon 2003, Henson, Masakure and Boselie 2005 and Minten, Randrianarison and Swinnen 2007). However, while arguments on both sides are compelling, it is somewhat difficult, in light of these (rather) contradictory observations, to forge a clear understanding of the impact of supermarkets on grower activity. The objective of this paper is to contribute to this debate by providing a theoretical framework to analyze the impact that supermarkets have on growers’ credit access.

There exists an important descriptive literature on supermarkets in developing countries. This literature describes and discusses what these retail chains are trying to accomplish and how they achieve their goals. First, it must be noted that besides the growing (local) demand for fresh food products that they try to meet, supermarkets or their affiliated grocers demand a substantially higher quality in the products they procure. Thus, supermarkets not only need to sell more in local markets, but they need to offer safer and higher quality products, as well. Therefore, the natural response of supermarkets has been to develop their own standards in countries where public food quality standards are often inadequate and lack proper enforcement. However, the quest for higher quality and safer food products cannot be achieved without innovative procurement practices. These practices revolve around the creation of vertical relationships with growers through the

\(^1\) For instance, Carrefour, a French-based supermarket chain, earned on average three times higher margins in its Argentine operations than in those located France (Reardon et al., 2003).

\(^2\) While the local demand for food is globally increasing, supermarket chains established in developing countries also export a substantial portion of their production to developed countries (Dolan and Humphrey 2000). Thus, supermarket production will only exclude a portion of the growers that remain uninvolved with the supermarket.
establishment of tighter procurement contracts. Although the specific form of the contractual relationship between the grower and the supermarket can vary greatly depending on the context, there is arguably a common denominator.

Typically, supermarkets require their growers to make a substantial up-front investment into their operations. This investment ranges from new equipment purchases to the establishment of quality control and coordination systems. The literature analyzing supermarket procurement practices also reports that supermarkets are playing new roles in the production process. These roles essentially consist of a combination of intense production monitoring and advising, sometimes using the support of public partners (Boselie, Henson and Weatherspoon 2003). In practice, the advising is performed on the spot, when supermarket employees visit producers and discuss with them problems encountered during the growing cycle. The typical advice ranges from the proper way to apply fertilizers to the safe handling of pesticides. In addition, supermarkets also take on a monitoring role that essentially protects their investment in the growers’ operations. Indeed, the relationship between farmers and supermarkets features a strong moral hazard component. For instance, to certify that product standards are met, but also that procured quantities are sufficient, supermarkets must make sure growers follow specific procedures and do not cheat or misrepresent their efforts and/or actions.3

Finally, although supermarkets rarely provide cash credit to farmers, they extend loans in the form of input advances that are reimbursed later when the crop is sold.4 These input loans, which range from seeds to fertilizers and pesticides, cover most of the necessary inputs and their amount can be substantial relative to expected crop payments.5 Supermarkets also attempt to absorb some of the growers’ risks related to market conditions. This is usually achieved by committing to input and output prices prior to planting. Such commitments arguably result in lower liquidity needs for growers and are, in that sense, equivalent to additional loans. Overall, supermarkets’ objectives seem to ensure that the financial and production risks faced by their grower base are sustainable and compatible with a long-term dedication to safe and high-quality products (Henson, Masakure and Boselie 2005).

The organization of production by supermarkets, nevertheless, raises several questions. For instance, it is not clear from a theoretical standpoint why supermarkets should provide such a bundle of services. It is conceivable that advising services could be provided independently of input loans. Farmers could finance, possibly using moneylending services, the purchase of the inputs necessary to carry over the production process.6 Supermarkets would then purchase the crop, provided that it met a certain quality threshold.

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3 The most common form of cheating faced by supermarkets is one in which farmers sell part of their crop (for a higher price) to other grocers or local markets and, therefore, do not deliver the quantity that was agreed upon (Gow and Swinnen 2001 and Minten, Randrianarison, and Swinnen 2007).
4 Cash advances are, in fact, widespread in transition countries (Gow and Swinnen 2001).
5 For instance, Boselie, Henson and Weatherspoon (2003) reports that it takes a number of plantings for producers to achieve a net overall profit.
6 In developing countries, credit loans extended by traditional moneylenders use growers’ crops as collateral. To make sure
The mere fact that such organization of production does not prevail in practice suggests that substantial benefits exist in bundling these tasks. In particular, to the extent that supermarkets are keen to have a large grower base, it is possible that this organization of production will allow more farmers to access credit. More generally, we wonder how the emergence of supermarkets will modify credit access for small growers.

In this paper, we analyze the market for growers’ loans using a simple model of financial intermediation. In our framework, growers need to make a financial investment before they can produce for the supermarket. An organization in which supermarkets advise, extend a loan and monitor growers is preferred by the supermarket. In other words, bundling these tasks in the financial contract results in an organization in which motivation costs or agency rents are reduced. Allocating the two tasks to the supermarket implies that, as a monitor, the value of a high quality crop is increased when the probability of success increases as well; thus the supermarket also has an incentive to advise diligently. We show that rent contraction results in more poor growers obtaining loans.

Our definition of the supermarket procurement process is very much similar to that of contract farming. Production finance by contract farming usually involve technical advising and monitoring. As described by Conning (2000), contract farming, apart from the advising part, is not different from traditional money lending. In particular, it possesses all the informal aspects of moneylending. However, this type of lending has become prevalent in many developing countries. For instance, Conning (2000) reports that, during the last 20 years, that production finance has become dominant in Chile. Our multitask approach to this type of contract can explain their relative superiority with respect to banking finance or traditional moneylending.

We also analyze the implications of our model for the grower’s effort. We show that the organization of the production by the supermarket has some motivational consequences for growers. In particular, in our framework, poorer farmers tend to exert higher levels of effort and consequently produce higher quality products. Many recent empirical contributions tend to echo our finding that smaller farmers maybe preferred by supermarkets (Boselie, Henson and Weatherspoon 2003, Henson, Masakure and Boselie 2005 and Minten, Randrianarison and Swinnen 2007).

Finally, we explore the implication of higher standards set by supermarkets on the final market. In this variant of our model, loan access is endogenized and ultimately determined by the competitive outcome on the final market. We show that stronger standards can benefit growers, as they obtain loans more often.

In what follows, we briefly present the existing literature on lending in developing countries that is relevant to our work. We also relate our paper to the corporate finance literature on advising and venture capital.
The model developed in the main section formalizes the basic idea of bundling advising and monitoring tasks in the same financial contract. We then study growers’ incentives in this setup. Finally, we study how standards affect competition in the final market, and thereby influence growers’ access to loans.

2 Relation to the literature

The literature on moneylending in developing countries starts from the premise that borrowers in developing countries usually have weak balance sheets, and therefore have difficulty accessing financing. Most of the contributions in this field describe mechanisms by which borrowers are able to commit to repay their loans.\(^7\)

One of the main mechanisms to facilitate access to financing in the absence of adequate collateral is group lending. In Beasley and Coate (1995), a lender extends a loan to a group of persons jointly responsible for its repayment. Each borrower can be diligent and decide to repay his loan. When he or she is tempted to default, the rest of the group will subject him to intense social pressure, so that shirking incentives are weakened. Thus, this mechanism essentially makes use of the ability of the agents to monitor each other’s actions (Barnerjee, Besley, and Guinnane 1994).

Group lending also uses the fact that members of the group are well-informed agents. Ghatak (1999) shows that a group that is jointly liable can act as a screening device when agents have superior information about each other’s project profitability.\(^8\) As investigated by Aleem (1990) and Hoff and Stiglitz (1998), the informal lending activity in developing countries is usually performed by local agents who can easily monitor borrowers. Hoff and Stiglitz (1998), especially emphasize the fact that the moneylending activity is an informationally intensive activity characterized by monopolistic competition.

Similarly, our work assumes that supermarkets are especially well-informed local agents as, in practice, they employ well-informed local agents to perform the monitoring activity.\(^9\) In addition, the monitoring activity of supermarket employees is very close in nature to that of moneylenders.\(^10\)

\(^7\) A comprehensive review of this literature is out of the scope of this paper and we only allude to key contributions. For a good review of this literature, we refer the reader to Armendáriz de Aghion and Morduch (2005).

\(^8\) Interestingly, without appealing to adverse selection, Armendáriz de Aghion and Gollier (2000) show that group joint liability also has the property of making cross pledging possible and therefore can enhance lending activity. The idea is to mutualize risks in such a way that a person’s loan success can serve to repay another person’s loan failure.

\(^9\) For instance, Minten, Randrianarison and Swinnen (2007) describe the organization of the procurement activity by retail chains in Madagascar. They write (p. 11):

> Every extension agent, the chef de culture, is responsible for about thirty farmers. To supervise these, (s)he coordinates five or six extension assistants (assistant de culture) that live in the village itself. The chef de culture has a permanent salary paid by the firm.

\(^10\) Minten, Randrianarison and Swinnen (2007) also describes the frequency and the purpose of the monitoring (p 12):

During the cultivation period of the vegetables under contract, the contractor is visited on average more than once (1.3 times) a week. This intensive monitoring is to ensure correct production management as well as to avoid ‘side-selling’.
Our work also shares common features with the literature on venture capital. Casamatta (2003) studies under which conditions an entrepreneur (in fact, a borrower) should hire an advisor. This article provides a rationale for the existence of venture capitalists by showing that these advisors have to provide funds as well. In Casamatta (2003), when the venture capitalist advises diligently, the probability of a successful project increases.

Although the investment scale of the project is quite different, the supermarket plays a role that is, arguably, qualitatively identical to that played by venture capitalists. Indeed, supermarket employees do not their activity to growers' monitoring; they continuously advise them on best production practices. Moreover, it is well documented that supermarket agents have substantial knowledge in horticulture and, in that sense, are valuable advisors.\footnote{Again, Minten, Randrianarison and Swinnen (2007) write:}

Overall, allocating these two tasks to a single agent (i.e., the supermarket) helps to reduce the agency rents that would have to be distributed to several agents had the supermarket contracted at arm’s length with the growers. In the spirit of the literature on micro-finance described earlier, our main result is to show that, by combining these two tasks, the supermarket allows poorly collateralized growers to obtain a loan; a loan that they would otherwise not obtain. This result is, to the best of our knowledge, novel.

From a purely theoretical standpoint, our contribution also relates to recent work on the design of contracts involving multitasking agents. Laux (2001) shows how, in a limited-liability contracting environment, wage cost can be reduced by assigning several independent projects to a single agent rather than several agents. By paying the agent only when all projects succeed, the principal can relax the agent’s limited liability constraint by punishing the agent for a given project by taking away payment on another.

More recently, Hueth and Marcoul (2007) model producer cooperatives by assuming that members provide not only work (as input providers) but also monitoring of managerial activity (as directors). The resulting multitasking structure is shown to strictly lower motivation costs.

\section{Supermarket procurement organization}

In developing countries, the supermarket not only behaves as an external consultant (that provides production advice), but also endorses the role of conventional moneylenders. The literature on micro-credit in developing countries has emphasized the role of moneylenders as important actors in farming areas. Tra-
ditionally, growers have relied on moneylenders, as the latter have an informational advantage and excel in curbing farmers’ incentives not to reimburse loans (see, for instance, Armendáriz de Aghion and Morduch, 2005). The purpose of this section is to understand the economic rationale beyond the supermarket procurement system and its implication on credit access by farmers. In particular we seek to understand why the supermarket does not confine its activity to advising farmers on production, but rather, also gets involved in some lending activity.

The contractual relationship between farmers and the supermarket is modeled via a framework similar in spirit to Holmstrom and Tirole (1997).

3.1 Presentation of the model

Consider a project that returns $R$, but requires a fixed investment $I$. Farmers would like to implement this project, but unfortunately are financially constrained; farmers have finance $A$ with $I > A$. We assume that there is a moral hazard component in the farmer’s behavior; he can either choose to be diligent, in that case, he is successful with probability $p_H$ (and fail with probability $1 - p_H$), or he might shirk and, in that case, will always fail. In addition, when unsupervised by a monitor, we assume that the farmer enjoys a private benefit $B$. Based on a survey of Ivory Coast agricultural producers, Biais, Azam, Dia and Maurel (2001) estimate that this opportunity cost of effort is important. Specifically, they report a value for $B$ as large as 40 percent of the investment.

Farmers are assumed to be protected by limited liability, i.e. investors can at most seize the realized outcome. This assumption is in line with Innes (1990) and all the following literature on financial contracting. Finally, shirking is assumed not to be socially optimal (i.e. $B < I$), while the net value of the project under diligence by farmers is strictly positive (i.e., $p_H R - I > 0$).

The external finance necessary to the development of the project can be provided by three distinct investors.

- The local bank can provide $I - A$ to farmers at a gross rate normalized to 1. The bank is a passive but rational investor; it extends a loan as long as it can recoup it in expectation. Banks are passive investors in the sense that they do not supervise borrowing farmers. As a result, banks rely primarily on collateral-based enforcement of their loans.

\[12\] For applications of this framework to developing countries, see, for instance, Straub (2005) that explores informal credit markets and Conning (1999), Conning and Kevane (2003) and Conning and Udry (2006) on micro finance.

\[13\] In practice, shirking farmers may be successful, although at a lower rate. This assumption simplify the analytical results obtained, it does not affect their qualitative nature.
• Moneylenders play are financial intermediary. Their function is to monitor farmers and thereby alleviate the moral hazard problem. In fact, by monitoring, moneylenders reduce the farmers’ opportunity cost of being diligent by reducing the benefit of shirking to \( b \), with \( B > b \). Finally, they lend capital to farmers at a gross rate \( \gamma > 1 \).

• The supermarket, like the moneylenders, plays the role of financial intermediary. Unlike the "conventional" moneylenders, it will not only monitor farmers, but also advise them on production. Advising raises the probability of success of the project to \( p_H + p_A \) with \( p_H + p_A < 1 \). Note that a supermarket whose advice is worthless (i.e. \( p_A = 0 \)) is equivalent to a moneylender.

The proper implementation of the project requires that all agents be provided with adequate incentives. In particular, the contract design problem consists in optimally sharing the project return, \( R \), among the contracting parties. The optimal sharing rule is such that it guarantees the participation of all agents without destroying incentives for diligent behavior.

To understand the rationale behind the bundling of monitoring and advising by the supermarket, two differing organizations of production are considered: an organization where the supermarket acts as an external consultant, restricting its action to advising farmers, and an organization where the supermarket not only advises, but also acts as a moneylender.

It is important to understand that whether the supermarket takes on a monitoring role or not, farmers always have the choice between two sources of financing: direct financing by the bank and indirect financing via a financial intermediary (either the supermarket or a moneylender).

### 3.2 Monitoring and advising as separate tasks

We consider a first organization of production, where the supermarket limits its role to advising and where financing remains in the hands of the moneylender and the bank. In this case, there are four parties involved in the financial contract: the farmer, the moneylender, the bank and the supermarket. Thus, the project return \( R \) is divided up, so that

\[
R = R_f + R_m + R_l + R_s, \tag{1}
\]

where \( R_f \), \( R_m \), \( R_l \) and \( R_s \) denote the success-contingent stakes of the project obtained by the farmer, the moneylender, the bank and the supermarket, respectively.\(^{15}\)

\(^{14}\)This additive specification implies that effort by the farmers and advising by the supermarket are not complementary. Their joint realization is not required to implement the project. Instead, each contributes separately to improve the profitability of the project. This may seem a very strong assumption, but it is done on purpose as assuming synergies would simply reinforce our main results.

\(^{15}\)In case of failure, the project yields no return. This implies, together with limited liability, that each contracting party receives no payment.
3.2.1 Direct financing

In the absence of moneylenders, the project return is only divided between the bank, the farmer and the supermarket (i.e. $R_m = 0$). As previously mentioned, in this financial contract, the share received by each party should be such that it does not destroy each agent’s incentive.

**Farmers.** For a farmer to be diligent, he should receive at least

$$(p_H + p_A) R_f - A \geq p_A R_f + B - A,$$

or equivalently,

$$R_f \geq \frac{B}{p_H} \quad (2)$$

This incentive compatibility constraint requires that the farmer earns at least as much from being diligent as from shirking. Note that as a direct consequence of the substitutability of effort exerted by the supermarket and the farmer, this constraint holds whether the supermarket is properly advising or not.

**The supermarket.** Advising by the supermarket is also subject to moral hazard. The opportunity cost of advising for the supermarket is $c > 0$. To guarantee proper incentives, the supermarket should receive at least as much when being diligent as while shirking. The incentive compatibility constraint of the supermarket is thus written as

$$(p_A + p_H) R_s - c \geq p_H R_s,$$

or equivalently,

$$R_s \geq \frac{c}{p_A} \quad (3)$$

**Bank.** The banking sector is assumed perfectly competitive, and in order to accept a loan application the bank should at least break-even. The break-even condition is expressed as

$$(p_A + p_H) R_l \geq I - A \quad (4)$$

The left-hand side of (4) is referred to as the expected pledgeable income, while the right-hand side is the market value of the fund supplied by the local bank. The pledgeable income is the maximum amount that can be promised to investors without destroying the incentives of the agents involved in the financial contract (here, the farmer and the supermarket). Given that $R_m = 0$ and according to the sharing rule (equation
(1)), it is straightforward that the maximum expected pledgeable income is \((p_A + p_H)(R - R_s - R_f)\). This implies that

\[
(p_A + p_H)(R - R_s - R_f) \geq I - A. \tag{5}
\]

Furthermore, to make the analysis non-trivial, the following assumption is made regarding advising.

**Assumption 1**

\[p_A (R - R_f - R_s) \geq p_H R_s\]

This assumption guarantees that the maximum pledgeable income for farmers is increased with advising by the supermarket. This assumption implies that \(p_A R \geq \frac{p_H + p_A}{p_A} c\), which means that the rise in the net present value of the project is superior to the minimum stake necessary to insure proper incentives from the supermarket. In other words, the net present value of the project is increased by advising from the supermarket. This assumption is necessary in order for farmers to be willing to participate.

### 3.2.2 Indirect financing

Let us now consider the case where farmers borrow from an intermediate moneylender (i.e., \(R_m \geq 0\)). The moneylender is an active investor, in the sense that she visits and monitors farms to guarantee that farmers exert sufficient effort.

**The moneylender.** As in Holmstrom and Tirole (1997), the monitoring activity is subject to moral hazard. The opportunity cost of monitoring for the moneylender is \(m\), and the incentive compatibility constraint of the moneylender requires that

\[
(p_H + p_A) R_m - m \geq p_A R_m,
\]

or equivalently,

\[
R_m \geq \frac{m}{p_H}. \tag{6}
\]

**Farmers.** By monitoring farmers, the moneylender reduces the farmers’ benefits of shirking to \(b\), with \(B > b\). Hence, assuming proper monitoring by the moneylender, the incentive compatibility constraint of the farmer can be rewritten as

\[
R_f \geq \frac{b}{p_H}. \tag{7}
\]
**Bank.** In the presence of intermediation via a moneylender, the break-even condition can be expressed as

\[(p_A + p_H) (R - R_s - R_f - R_m) \geq I - I_m - A.\]  

(8)

Here, \(I_m\) denotes the amount of capital invested by the moneylender in the farm project that she monitors. Finally, we make the following assumption.

**Assumption 2**

\[B - b \geq m\]

This assumption is necessary in order for intermediation by a moneylender to be a viable option. It simply states that the reduction in the private benefit of the farmers, \(B - b\), is greater than the cost of monitoring, \(m\). It is intuitive that under these conditions monitoring is socially desirable, since it increases the number of financed farmers. If this assumption does not hold, then moneylending will not be profitable.

**Proposition 1** In the money lending case, there exists two thresholds of liquid assets given by \(A_a = I - (p_A + p_H) \left[ R - \frac{c}{p_A} - \frac{B}{p_H} \right] \) and \(A_{am} = I - I_m - (p_A + p_H) \left[ R - \frac{c}{p_A} - \frac{b+m}{p_H} \right] \). When the supermarket behaves as an external consultant (i.e. limits its activity to advising), the optimal contract between the farmer, the bank, the moneylender and the supermarket has the following features:

- **when** \(A \geq A_a\), farmers borrow solely from the bank.
- **when** \(A_a \geq A \geq A_{am}\), farmers borrow from banks and the moneylender.
- **when** \(A < A_{am}\), farmers do not have access to credit.

Moreover, as an external consultant, the advising rent of the supermarket is given by

\[\Phi_a = \frac{p_H c}{c_A} \]

**Proof.** Farmers can either be directly financed by the bank or indirectly via a moneylender.

**Direct financing:**

Let us first consider the case where farmers are directly financed. Substituting back (2) and (3) into (5) implies that

\[A \geq A_a = I - (p_A + p_H) \left[ R - \frac{c}{p_A} - \frac{B}{p_H} \right].\]
In other words, to obtain a loan with direct financing, farmers should justify a minimum level of assets, at least equal to $A_a$, to the bank.

*Indirect financing:*

Farmers not directly financed by the bank (i.e., such that $A \leq A_a$) can turn to a moneylender to obtain a loan. By the same reasoning, substituting back (7), (6) and (3) into (8) implies that

$$A \geq A_{am} = I - I_m - (p_A + p_H) \left[ R - \frac{c}{p_A} - \frac{b + m}{p_H} \right].$$

(9)

Verifying that $A_a \geq A_{am}$ for any $I_m \geq 0$, it follows that farmers with finance $A$, such that $A_a \geq A \geq A_{am}$, are financed via a moneylender. Finally, farmers with finance such as $A \leq A_{am}$ do not offer a sufficient guarantee to receive a loan either from the bank or the moneylender. Furthermore, note that to guarantee the participation of the moneylender, it is necessary that $(p_A + p_H) \frac{m}{p_H} \geq m + I_m$; i.e. its expected rent from moneylending is at least as high as its cost. Because a positive share of the project has to be forfeited to a moneylender, when given the choice, farmers will seek to avoid borrowing from a moneylender.

*Supermarket advising rent:*

The rent of the supermarket is given by $\Phi_a = (p_A + p_H) R_s - c = \frac{p_H c}{p_A}$.

It is important to understand that the lower the level of collateral necessary in order to be financed (i.e., the lower $A_{am}$), the greater the number of farmers financed. For the sake of comparison, the financial contract in absence of a supermarket has been reported in the appendix. It is straightforward that given Assumption 2, more farmers get financing when advised by the supermarket (i.e. the level of finance necessary to access credit is reduced when advising is part of the contract).

### 3.3 Bundling monitoring and advising

We now explore the possibility that the supermarket decides to take on two missions; namely, moneylending and advising farmers. In practice, the financing part often takes the form of an input advance on seeds, pesticides or fertilizers.\(^\text{16}\) Unlike the previous case, the multitasking nature of the supermarket now generates several incentive constraints. First, the supermarket must be given reward $R_s$, such that it does not want to shirk on the advising task alone:

$$(p_A + p_H) R_s - m_s - c \geq p_H R_s - m_s,$$

\(^\text{16}\) The fact that the supermarket offers inputs rather than cash has several rationales. First, there are economies of scale in procurement; supermarkets or grossists often serve several thousands of small growers. Second, there is arguably less scope for diversion of physical inputs, although it is still possible that farmers may try to resell them in a secondary market.
or

\[ R_s \geq \frac{c}{p_A}. \]  

(10)

Note that we assume that the supermarket is as efficient as the moneylenders in the monitoring activity, and we let \( m_s = m \). The supermarket must also monitor the farmer. Such monitoring includes, among other things, making sure that the farmer does not divert the inputs, and following the farmer closely at harvest time to make sure he does not resell his harvest to other retailers.\(^{17}\) The incentive constraint is written as

\[ (p_A + p_H) R_s - m - c \geq p_A R_s - c \]

or

\[ R_s \geq \frac{m}{p_H}. \]  

(11)

Finally, the supermarket can decide to shirk on both tasks, in which case the incentive constraint is written as

\[ (p_A + p_H) R_s - m - c \geq 0 \]

or

\[ R_s \geq \frac{m + c}{p_A + p_H}. \]  

(12)

Overall, the supermarket will be diligent in both tasks if constraints (10), (11), and (12) hold true. Thus, the minimum stake consistent with supermarket diligence is

\[ R_s \geq \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\}. \]

(13)

If we denote by \( I_s \) the amount of capital invested by the supermarket in every farm that it monitors, we can state the following result:

**Proposition 2** When the supermarket not only advises, but also acts as a moneylender, there exists a threshold of farmers’ asset, defined by \( A_{am} = I - (p_A + p_H) \left[ R - \frac{b}{p_H} - \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\} \right] - I_s \), such that the optimal contract passed between the farmer, the bank and the supermarket has the following regimes:

- **when** \( A \geq A_a \), farmers borrow solely from the bank.
- **when** \( A_a \geq A \geq A_{am} \), farmers borrow from banks and the supermarket.
- **when** \( A < A_{am} \), farmers do not get funded.

\(^{17}\)More generally, the cost of monitoring the borrower in developing countries can represent up to 39% of the amount lended. See Aleem (1990) for a description of monitoring practices.
Proof. Here, the financial contract involves three parties: the farmer, the bank and the supermarket. Therefore, the return $R$ is shared among them:

$$R = R_f + R_s + R_l.$$  

As in proposition 1, the farmer will not require a loan from the supermarket if $A \geq A_a$ and prefers direct financing with the bank. However, when the farmer has insufficient wealth (i.e., when $A < A_a$), the supermarket substitutes for the moneylender and offers credit and advising. The project is then funded if

$$(p_A + p_H)(R - R_s - R_f) \geq I - A - I_s$$

or

$$A \geq A_{am}^S = I - (p_A + p_H) \left( R - \frac{b}{p_H} - \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\} \right) - I_s. \quad (14)$$

Yet, to understand the behavior of the supermarket, it is critical to derive the rent associated with moneylending for both the moneylender and the supermarket.

3.4 Financial Intermediation

This section examines financial intermediation by the moneylender and the supermarket. In particular, it determines the amount of capital invested, as well as the gross rate charged by these two financial intermediaries.

**Moneylender.** By definition,

$$(p_H + p_A)R_m = \gamma I_m. \quad (15)$$

Here, $\gamma$ denotes the gross rate charged by the moneylender. Together with equation (6), this implies that the amount of capital borrowed via intermediation by the moneylender should be at least

$$I_m = \frac{p_H + p_A}{\gamma p_H} m. \quad (16)$$

In fact, all farms monitored will demand precisely this minimum level of capital. More would be excessively costly and less would be inconsistent with proper incentives from the moneylender. Furthermore, the moneylender rent can be expressed as
\[ \Gamma_{ml} = \left[ \frac{(\gamma - 1) (p_A + p_H)}{\gamma p_H} - 1 \right] m. \]  

(17)

As a result, in its most general form, the gross rate charged by the moneylender can be expressed as

\[ \gamma = \frac{p_A + p_H}{p_A m - p_H \Gamma_{ml}} m. \]  

(18)

This gross rate captures different forms of the moneylending market structure. For instance, Hoff and Stiglitz (1998) argue that there is monopolistic competition in moneylending. This case is captured by \( \Gamma_{ml} = 0 \) and \( \gamma = \frac{p_A + p_H}{p_A} \); price competition between moneylenders is such that the gross rate is set to cover exactly the cost of moneylending (i.e., \( m + I_m \)). However, it can also be argued that due to the scarcity of moneylenders and the high transaction cost that plagues developing countries, moneylenders may enjoy a niche market in financial intermediation. Because it may be too costly for borrowers to seek another moneylender, moneylenders enjoy a positive rent \( \Gamma_{ml} > 0 \). In that case, the gross rate charged is given by equation (18).

**Supermarket gross rate.** Similarly,

\[ (p_H + p_A) R_s = \delta I_s. \]  

(19)

Here, \( \delta \) denotes the gross rate charged by the supermarket. Using logic similar to the moneylender case, the incentive constraint of the supermarket implies that

\[ I_s = \frac{(p_H + p_A)}{\delta} \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\}. \]  

(20)

Therefore, the rent of the supermarket when advising and lending money can be expressed as

\[ \Phi_s = (p_H + p_A) \frac{\delta - 1}{\delta} \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\} - (m + c). \]  

(21)

The next Lemma, which will be needed later, clarifies when the supermarket behaves as a multitask agency.

**Lemma 3**  The supermarket provides both advising and moneylending services if

\[ \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \geq \frac{m + c}{p_A + p_H}. \]

**Proof.** The participation of the supermarket is warranted if \( \Phi_s \geq 0 \). Assuming that \( \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\} = \frac{m}{p_H} \),
According to Lemma 3, when \( \frac{m+c}{p_A+p_H} \geq \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \) the supermarket will limit its activity to advising. On the contrary, when \( \frac{m+c}{p_A+p_H} < \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \) it may engage in moneylending activity. In this case, the gross rate charged by the supermarket is expressed as

\[
\delta = \begin{cases} 
\frac{(p_H+p_A)c}{(p_H+p_A)c-p_A[\Phi_s+(m+c)]} & \text{if } \frac{c}{p_A} \geq \frac{m}{p_H}, \\
\frac{(p_H+p_A)m}{(p_H+p_A)m-p_H[\Phi_s+(m+c)]} & \text{if } \frac{c}{p_A} \leq \frac{m}{p_H},
\end{cases}
\]

(22)

3.5 Bundling tasks to extend supply base

Let us assume that the objective of the supermarket is to extend its supply base. Two arguments can justify the importance to the supermarket of having a large supply base. First, with a large base of farmers the supermarket can achieve economies of scale. Another argument is that a supply base of numerous farmers who are geographically dispersed acts as an effective mechanism to reduce the risk of widespread crop failures due to disease and (to a lesser extent) weather, thus safeguarding the ability to fulfill customer orders (Henson, Masakure and Boselie 2005).

In this section, we show that by bundling advising and monitoring, supermarkets can extend credit access to a larger number of farmers, and thereby increase its supply base. The next Proposition is one of the main results of this paper.

**Proposition 4 (Monitoring and Advising)** Assuming that the supermarket and the moneylender charge the same gross rate (i.e., \( \delta = \gamma \)), and that \( \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \geq \frac{m+c}{p_A+p_H} \), then a procurement organization in which the supermarket bundles advising and monitoring strictly increases the number of farmers who get funded. Thus, a larger number of farmers can supply the supermarket.

If \( \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \leq \frac{m+c}{p_A+p_H} \), then the supermarket only acts as an external consultant and moneylenders provide financial services to farmers.

**Proof.** According to Lemma 3, it is straightforward that to guarantee the participation of the supermarket it should be that \( \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \geq \frac{m+c}{p_A+p_H} \). Under this assumption, the number of farmers funded will strictly increase if and only if \( A_{am}^S < A_{am} \). First, substituting back (16) into (9) implies that

\[
A_{am} = I - (p_A + p_H) \left[ R - \frac{c}{p_A} - \frac{b}{p_H} - \frac{\gamma - 1}{\gamma} \frac{m}{p_H} \right].
\]
Assuming that $\delta = \gamma$, then according to (20), $I_s$ is given by

$$I_s = \left( \frac{p_H + p_A}{\gamma} \right) \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\}.$$

By the same reasoning, we obtain

$$A_{am}^S = I - (p_A + p_H) \left[ R - \frac{b}{p_H} - \frac{\gamma - 1}{\gamma} \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \right].$$

Let us define $\Delta = A_{am} - A_{am}^S$, or equivalently

$$\Delta = (p_A + p_H) \left[ \frac{c}{p_A} + \frac{\gamma - 1}{\gamma} \left( \frac{m}{p_H} - \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \right) \right].$$

By definition, $A_{am}^S < A_{am}$ is equivalent to $\Delta > 0$. Assuming that $\frac{c}{p_A} \geq \frac{m}{p_H}$, then

$$\Delta = \frac{p_A + p_H}{\gamma} \left[ \frac{(\gamma - 1) m}{p_H} + \frac{c}{p_A} \right] > 0.$$

Similarly, assuming that $\frac{c}{p_A} \leq \frac{m}{p_H}$, then

$$\Delta = (p_A + p_H) \frac{c}{p_A} > 0.$$

Therefore, we conclude that $A_{am}^S < A_{am}$. ■

Heuristically, when both tasks are exerted by the same agent, diligence in monitoring also favors diligence in advising and the reverse also holds true.

Formally, bundling both monitoring and advising together results in a contract that reduces the minimum rent necessary to insure proper incentives. To see this, note that the minimum rent necessary to insure proper incentives (i.e., with $\Phi_s = \Gamma_{ml} = 0$) when both advising and monitoring are exerted by separate agents is

$$MS = \frac{p_H + p_A}{p_A} c + m.$$

When both tasks are performed by the same agent, this rent reduces to

$$MB = c + m,$$

which implies that

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3.6 Bundling tasks to raise profits

The previous section made several strong assumptions about the behavior of the supermarket and the moneylender. First, the supermarket and the moneylender were assumed to charge the same gross rate. In reality, this need not be the case, given the obvious discrepancies between a moneylender and a supermarket. Second, in the last section, the goal of the supermarket was to increase its supply base. Although the existing literature makes a strong case for the existence of significant gain associated with scale economy in procurement, one can legitimately argue that keeping a large supply base of producers may be extremely costly for the supermarket. In fact, as is explicit in Lemma 3, the supermarket may sustain losses when \( \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \leq \frac{m+c}{p_A+p_H} \). In addition, as shown in Proposition 1 with a procurement organization only advising farmers, a supermarket will earn a positive rent \( \Phi_a = \frac{p_H}{p_A} c \). Hence, it might be more profitable for the supermarket to delegate monitoring to a moneylender and to restrict its role to advising.

In this section, we generalize our results to the case where the supermarket seeks to maximize its profit and where the gross rate charged by the supermarket and moneylender does not necessary match.

**Proposition 5 (Supermarket Participation)** Assuming that \( \max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \geq \frac{m+c}{p_A+p_H} \), there always exists a range of gross rates that can be charged by the supermarket, under which all farmers seek to borrow from the supermarket and the supermarket prefers a procurement organization that advises and monitors, to a procurement organization that only advises.

**Proof. Farmers’ borrowing preferences**

To understand their preferences, we first need to determine farmers’ expected rent from borrowing either from a moneylender or the supermarket. When farmers borrow from a moneylender, the supermarket still advises them on their production practices. In that case, the expected rent perceived by a farmer corresponds to the expected net return of the project, less not only the share perceived by the moneylender and supermarket to properly monitor and advise, but also their respective opportunity costs. Mathematically, this corresponds to

\[
U_{f|ml} = (p_A + p_H) R - I - \left[ \Gamma_{ml} + m + (p_A + p_H) \frac{c}{p_A} \right],
\]

where, \( U_{f|ml} \) denotes the farmer’s expected rent when borrowing from a moneylender. Similarly, when a farmer borrows from the supermarket, his rent has to be forfeited by the supermarket’s expected net return,
as well as its opportunity costs of monitoring and advising, i.e.,

$$U_{f|s} = (p_A + p_H) R - I - [\Phi_s + m + c], \quad (25)$$

where $U_{f|s}$ denotes the farmer’s expected rent when borrowing from the supermarket. Therefore, a farmer will seek to borrow from a supermarket when $U_{f|s} > U_{f|ml}$. According to (24) and (25), this will be the case as long as

$$\Phi_s \leq \Gamma_{ml} + \frac{p_H}{p_A} c. \quad (26)$$

**Supermarket preference**

To conclude the proof, we need to show that there exists a range of gross rates charged by the supermarket under which equation (26) is verified and the supermarket prefers a procurement organization that advices and monitor.

In a procurement organization that only advises, the rent of the supermarket is $\Phi_a = \frac{p_H}{p_A} c$. Thus, to guarantee the participation of the supermarket and condition (26), it is straightforward that $\Phi_s$ should be such that

$$\frac{p_H}{p_A} c \leq \Phi_s \leq \Gamma_{ml} + \frac{p_H}{p_A} c. \quad (27)$$

It is important to understand that condition (27) is very general and holds true for any combination of gross rate charged by either the moneylender or the supermarket. Furthermore, according to equation (22), a monotonic and continuous relationship between $\delta$ and $\Phi_s$ exists. Therefore, a range of gross rate exists that can be charged by the supermarket that verifies both conditions (27) and (26). Given that $\Phi_a$ is positively correlated with $\delta$, the minimum gross rate that can be charged by the supermarket is obtained by substituting back $\Phi_a$ into equation (22), i.e.,

$$\delta_{\min} = \begin{cases} 
\frac{(p_H + p_A)c}{(p_H + p_A)c - p_A(\Phi_a + (m+c))} & \text{if } \frac{c}{p_A} \geq \frac{m}{p_H}, \\
\frac{(p_H + p_A)m}{(p_H + p_A)m - p_H(\Phi_a + (m+c))} & \text{if } \frac{c}{p_A} \leq \frac{m}{p_H}.
\end{cases}$$

For this gross rate, the supermarket will be indifferent between the two procurement organizations and all farmers will seek to borrow from it rather than a conventional moneylender. By the same reasoning, according to (26), the maximum rent that can be perceived by the supermarket is $\Phi_s^{\max} = \Gamma_{ml} + \frac{p_H}{p_A} c$. In that case, farmers are made indifferent between borrowing from a moneylender and a supermarket. Again,
the maximum gross rate that can be charged is obtained by substituting back $\Phi_{s}^{\max}$ into equation (22), i.e.,

$$
\delta_{\max} = \begin{cases} 
\frac{(p_H+p_A)c}{(p_H+p_A)c-(p_H+\Phi_{s})[\Phi_{s}^{\max}+(m+c)]} & \text{if } \frac{c}{p_A} \geq \frac{m}{p_H}, \\
\frac{(p_H+p_A)m}{(p_H+p_A)m-(p_H+\Phi_{s})[\Phi_{s}^{\max}+(m+c)]} & \text{if } \frac{c}{p_A} \leq \frac{m}{p_H}.
\end{cases}
$$

Note that the range of gross rates that can be charged by the supermarket will depend on the size of the moneylender's rent. In particular, when $\Gamma_{ml} = 0$, then $\delta_{\min} = \delta_{\max}$. Intuitively, by bundling both tasks the supermarket can capture a share of the moneylender rent in addition to its advising rent.

While Proposition 6 shows that supermarkets always have a financial interest in implementing procurement system that bundles advising and monitoring, the impact of such organization on farmers’ credit access remains to be assessed.

**Corollary 6** Assuming $\max \left\{ \frac{c}{p_A}, \frac{m}{p_H} \right\} \leq \frac{m+c}{p_A+p_H}$, then a procurement organization that advises and monitors extends the number of farmers financed, as long as it does not charge its maximum gross rate.

**Proof.** First, note that according to equation (17), $A_{am}$ can be rewritten as

$$
A_{am} = I - (p_A + p_H) \left[ R - \frac{c}{p_A} - \frac{b}{p_H} \right] + \Gamma_{ml} + m.
$$

By the same reasoning, according to (21), $A_{am}^{S}$ can be rewritten as

$$
A_{am}^{S} = I - (p_A + p_H) \left[ R - \frac{b}{p_H} \right] + \Phi_{s} + m + c.
$$

Clearly, in a procurement organization that bundles advising and monitoring, the number of farmers financed will strictly increase (i.e., $A_{am}^{S} > A_{am}$), as long as the supermarket rent is such that $\Phi_{s} < \Gamma_{ml} + \frac{p_H}{p_A}c = \Phi_{s}^{\max}$. ■

The reasoning behind these results is as follows. By bundling both the monitoring and advising, the supermarket can squeeze out the rent of the moneylender. As a result, a lower share of the project has to be forfeited to insure proper incentives. This agency cost reduction provides farmers with a larger share of the project and makes the supermarket financial service more appealing to farmers.

According to corollary 6, the development of the supermarket procurement system is conducive to the extension of credit to smaller farmers (i.e., with lower levels of finance), as long as the supermarket does not capture the entire benefit from the agency cost reduction. Such scenario implicitly puts all the bargaining power in the hands of the supermarket. In reality, farmers always have the option to turn to conventional
moneylenders, making such scenario unlikely. In fact, the observed long waiting list to enter into the supermarket procurement system corroborates strong farmer preference toward supermarket procurement system (on this issue, see Henson, Masakure and Boselie, 2005).

4 Small farmers work harder

So far, our paper has analyzed the supermarket procurement system and its implications, notably on access to credit by farmers. It has been shown that one important feature of the supermarket procurement system is that by bundling monitoring and advising it may broaden access to credit for smaller producers. In particular, smaller farmers (i.e. with lower financial capacity) can, with the supermarket, receive credit in the form of agricultural inputs (such as fertilizer applications).

Although the early empirical literature has found that supermarkets seem to prefer to procure their products from large producers (see, for instance, Dolan, Humphrey and Harris-Pascal 2001; Fernando et al. 2003; Reardon et al. 2003 and Brown and Sander 2007). More recent case studies have contrasted this view and argue instead that, absent substantial economies of scale, supermarkets actually like to procure from small farmers (Boselie, Henson and Weatherspoon (2003)). For instance, Henson, Masakure and Boselie (2005) suggest in a case study that small farmers are indeed competitive. They write, "small producers supplying 'Hortico' have managed to achieve lower rejection rates for certain nontraditional vegetables than large scale farmers." Moreover, they emphasize how fast producers of different scales learn. The authors write that "small producers consistently perform as well as large producers, if not better." Therefore, unless there exists substantial economies of scale in production, small producers seem to put more care and effort into production.

While a compelling explanation for the use of small farmers by supermarkets may be related to their growing concerns for a socially responsible image, in this section, we demonstrate that the reasons for supermarkets to extend market access to smaller farmers can be motivated by the greater willingness of smaller farmers to exert additional effort.

This section develops a variant of our model that focuses on farmers’ efforts. Unlike in the previous section, farmers can now choose among three possible effort levels. In addition, we also assume that, besides liquid assets $A_l$, farmers hold illiquid assets $A_i$. The latter assets are typically made up of land, farm buildings or personal homes. For our purposes, it is important to recognize that a social loss is often incurred whenever these assets change hands.\footnote{Kranton and Swamy (1999) made a similar assumption to analyze moneylending in India. Furthermore, the importance of farm-specific human capital has been empirically shown by Rosenzweig and Wolpin (1985).} For instance, a farmer may have a sentimental attachment to the family farm, but the housing market will not reflect this specific valuation; or he may have developed specific human
capital to operate machines and this knowledge is lost whenever the item is seized. This assumption is made, for instance, by Kranton and Swarmy (1995). Formally, we let $\beta A_i$ denote the market value for the moneylender of an illiquid asset that a farmer values $A_i$. As such, whenever illiquid assets change hands, a social loss of $(1 - \beta) A_i$ occurs.

Farmers can now exert three levels of effort: high, medium and low. The high level of effort requires that the farmer to privately incur an additional cost of $K > 0$. The net monetary surplus of the project is, thus, as follows:

$$
U_f = \begin{cases} 
U_H = p_H R - (I + K) & \text{if high effort is exerted}, \\
U_M = p_M R - I & \text{if medium effort is exerted}, \\
U_L = B - I & \text{if low effort is exerted}.
\end{cases}
$$

Here, $p_H$ and $p_M$ denote the probability of success for high and medium levels of effort, respectively. To make the problem interesting, the following assumption is made.

**Assumption**

$$
\frac{K}{p_H - p_M} > R.
$$

This assumption implies that it is socially optimal to exert the medium level of effort or, in other words, all farmers prefer a medium level of effort.

Yet farmers are financially constrained and must obtain external funding. External funds are borrowed from a lender that can, without loss of generality, be referred to as a bank, a moneylender or a supermarket. However, when farmers do not have enough cash to fund the project, the lender will provide financing only if the farmers collateralize their assets. In the presence of collateralization, the farmers’ utility can be expressed as

$$
U_f = \begin{cases} 
U_H = p_H R - (I + K) - (1 - p_H) (1 - \beta) A_i & \text{if high effort is exerted}, \\
U_M = p_M R - I - (1 - p_M) (1 - \beta) A_i & \text{if medium effort is exerted}.
\end{cases}
$$

(28)

**Lemma 7** Under asset collateralization, a farmer prefers to exert medium effort if and only if

$$
A_i \leq \bar{A}_i = \frac{1}{(1 - \beta)} \left( \frac{K}{p_H - p_M} - R \right).
$$

(29)

**Proof.** The proof is by comparing the two expressions of equation (28).  

Therefore, farmers who have to collateralize a few illiquid assets (i.e., when $A_i < \bar{A}_i$), will choose to exert medium effort, while highly collateralized farmers will choose to exert a high level of effort that decreases the likelihood that their asset will be seized. The next result characterizes the optimal financial contract.\(^{19}\)

\(^{19}\)Our optimal contract, which features contingent collateralization is, in fact, dominated by stochastic financial contracts.
Proposition 8 ("Small farmers work harder") The optimal financial contract between the farmer and the lender has the following features.

- When the farmer has important liquid assets, i.e., when \( A_l \geq \overline{A}_l \) with \( \overline{A}_l = I - p_M \left( R - \frac{B}{p_M - p_L} \right) \), he obtains financing and exerts medium effort.

- When the farmer has intermediate liquid assets, i.e., when \( A_l \leq \overline{A}_l \leq A^*_l \) with \( A^*_l = \overline{A}_l - \left( \frac{\beta}{1-\beta} + p_M \right) \left( \frac{K}{p_H - p_M} - R \right) \), he exerts medium effort and obtains financing by pledging \( 0 \leq A^*_l \leq \overline{A}_l \), where \( A^*_l = \frac{\overline{A}_l - A_l}{p_H + (1-p_H)\beta} \). The contract stipulates that illiquid assets are seized if the project fails, and are otherwise kept.

- When the farmer has weak liquid assets, i.e., when \( A_l < \overline{A}_l \), he exerts high effort and obtains financing by pledging \( A^*_H > \overline{A}_l \) where \( A^*_H = \frac{\overline{A}_l - A_l}{p_H + (1-p_H)\beta} \) and \( \overline{A}_l = I - p_H \left( R - \frac{B+K}{p_H} \right) \). The contract stipulates that the assets are seized if the project fails and are kept otherwise.

**Proof.** With no collateralization, a farmer exerts medium effort if

\[
p_M R_b \geq p_L R_b + B,
\]

or if

\[
R_b \geq R^M_b = \frac{B}{p_M}.
\]

The break-even constraint holds when

\[
p_M \left( R - R^M_b \right) \geq I - A_l,
\]

or if

\[
A_l \geq \overline{A}_l = I - p_M \left( R - \frac{B}{p_M} \right).
\]

When \( A_l \leq \overline{A}_l \), liquid assets are no longer sufficient and collateralization of \( A_l \) transforms (30) into

\[
p_M R_b - (1 - p_M) A_l \geq p_L R_b - (1 - p_L) A_l + B
\]

or

\[
R_b \geq R^M_b = \frac{B}{p_M} - A_l.
\]

This more general class of contract would entail probability of asset seizure in each state of nature. We refrain from making this more general analysis for two reasons. First, the analysis would be more involved without adding any further insight. Second stochastic financial contracts seem less intuitive, as in practice, whoever writes them must commit to these random asset seizures.
Using (31), it is seen that collateralization relaxes the lender’s constraint, as we now have

$$p_M \left( R - \frac{B}{p_M} + A_i \right) + (1 - p_M) \beta A_i \geq I - A_I$$

or

$$A_I \geq A_i(A_i) = \overline{A}_I - [p_M + (1 - p_M) \beta] A_i,$$

which is strictly lower than $\overline{A}_I$ for any $A_i > 0$. To minimize the social loss, the amount of illiquid assets pledged is optimally set to its minimum level. This level must verify the lender’s constraint (32) and we obtain

$$A^{M*}_i = \frac{\overline{A}_I - A_i}{p_M + (1 - p_M) \beta}.$$  \hspace{1cm} (33)

As expected, according to (33), the size of the illiquid collateral is negatively correlated with the size of the farmer’s liquid asset, $A_i$. It is important to note that the relationship between liquid and illiquid assets captured by equation (33) is only valid for farmers exerting a medium level of effort. When farmers have a shallow pocket, i.e. when $A_i$ is smaller, the amount of collateralized assets reaches a level at which, by Lemma 6, they prefer to exert a high level of effort. Using (29) and (32), we obtain

$$A_i = \overline{A}_I - \left( \frac{\beta}{(1 - \beta)} + p_M \right) \left( \frac{K}{p_H - p_M} - R \right).$$

When liquid assets fall further below $\overline{A}_i$, then farmers must pledge more than $\overline{A}_i$, and the break-even constraint is thus written as

$$p_H \left( R - \frac{B + K}{p_H} + A_i \right) + (1 - p_H) \beta A_i \geq I - A_i,$$

with the relationship between liquid and illiquid assets now given by

$$A^{H*}_i = \frac{I - p_H \left(R - (B + K)/\Delta p^H \right) - A_i}{p_H + (1 - p_H) \beta}.$$

The reasoning behind this proposition is as follows. Although every farmer (rich or poor) would strictly prefer to exert medium effort, those who are poor have to rely on illiquid assets to obtain loans. However, reliance on these assets creates a social loss and distorts effort toward higher levels. In essence, small farmers make up for their lack of assets by exerting a higher level of effort. Interestingly, the empirical analysis by Foltz (2004) of Tunisian agriculture estimates that the amount of owned land is a significant determinant
of overall profits. In particular, although credit-rationed farmers have less owned land, it has a significantly greater impact on profit for credit-rationed farmers. These estimates are in line with the idea of small producers exerting a higher level of effort.

If we speculate that supermarkets derive some unmodelled non-monetary benefit from having a better quality more often (i.e., a higher probability of success) then the fact that they tend to repeatedly employ small farmers is not surprising. From that perspective, the policy advertised by many supermarkets to procure agricultural products only from small farmers may appear much less altruistic than it sounds. Many high-end fresh agricultural products require labor-intensive techniques. Proposition 8 shows that the supermarket can exert a greater pressure on smaller farmers by threatening to seize their assets, thereby reinforcing farmers’ incentives to work harder when compared to large scale producers. While it is true that supermarkets stamp their authority on the supply chain by monitoring and auditing production, as argued by (Brown and Sander, 2007), this is in the interest of both the farmers (who have access to more financing) and the supermarkets.

While the latter two sections have focused on the organization of the supermarket procurement system, the next section analyses another prominent feature of supermarkets; namely their capacity to set higher food standards.

5 The supermarket private standard

The spread of supermarkets to developing countries arguably affects the financing of farmers. However, supermarkets have an increasing influence on developing countries, not only through their investments, but also through the imposition of their private standards (Reardon and Farina 2002, Reardon and Berdegué 2002, Berdegué et al. 2003, Fernando et al. 2003 and Weatherspoon and Reardon 2003). To fully understand the impact of the supermarket on farmers in developing countries, the implications of the introduction of higher food standards cannot be ignored.

With a variant of our modeling framework, this section seeks to understand the link between the introduction of more stringent food standards downstream, and access to credit by upstream farmers. Formally, this is achieved by endogenizing the return $R$ of the project.

As before, production requires a fixed investment $I$ and farmers are financially constrained. Their level of finance, denoted by $A$, is assumed to be uniformly distributed between 0 and $\bar{A}$, where $\bar{A} > 0$ denotes the level of finance of the wealthiest farm. Furthermore, for tractability, farmers produce at most one unit of agricultural product.

Unlike in the previous section, farmers now have the choice between two projects:
• The domestic retailer project. The domestic retailer represents local retail shops. The products sold by this domestic retailer follow the country’s food standards, $\alpha_d$, that are set by a public agency. The probability of success of a diligent farmer in meeting the public requirements is $p_H$, while the opportunity cost of effort is increasing with the stringency of the food standard and is given by $\alpha_d B$. The overall return of the domestic retailer project is $R_d$.

• The supermarket project. The supermarket follows its own private standard, $\alpha_s$ which is assumed higher than the public food standard. Hence, the opportunity cost of effort for farmers is increased to $\alpha_s B$, but it is assumed that the probability of success for farmers when exerting effort remains the same. In addition, to comply with supermarket requirements, an upfront investment $C$ in infrastructure is necessary. Indeed, the supermarket usually imposes substantial investments, such as irrigation systems, greenhouses, trucks, cooling sheds and packing technologies, among other things. Finally, the overall return of the supermarket project is $R_s$.

Although the supermarket may finance a fraction of its project, for tractability, it is assumed that both projects are directly financed by the bank. Again, farmers are protected by limited liability and diligence by farmers is socially desirable.

In the downstream market, consumers who are heterogeneous in terms of preferences make their purchasing decisions while observing the price and nature of the products (i.e., public/supermarket private standard). Consumers are modeled in the spirit of Mussa and Rosen (1978) and we denote by $\theta$ the consumer-differentiating attribute. For tractability, this attribute is assumed to be uniformly distributed between $[0, M]$ and each consumer purchases at most one unit of the good. Thus, $M$ also denotes the maximum market size. The utility of consumers with the differentiating attribute $\theta$ is given by

$$U = \begin{cases} 
\theta \alpha_s - R_s & \text{if purchased from the supermarket,} \\
\theta \alpha_d - R_d & \text{if purchased from the domestic retailer,} \\
0 & \text{otherwise.}
\end{cases}$$

(34)

For tractability, the marginal cost of producing one unit of agricultural product is normalized to zero. Thus, the project returns, $R_s$ and $R_d$, also denote the per unit retail price charged by the supermarket and the domestic retailer, respectively. Based on expression (34), the demand for the domestic retailer product is

$$D_d = \begin{cases} 
\frac{R_s - R_d}{\alpha_s - \alpha_d} - \frac{R_d}{\alpha_d} & \text{if } R_s > \frac{\alpha_s}{\alpha_d} R_d, \\
0 & \text{otherwise.}
\end{cases}$$

(35)
On the other hand, the quantity demanded for the supermarket product can be expressed as

\[
D_s = \begin{cases} 
M - \frac{R_s - R_d}{\alpha_s - \alpha_d} & \text{if } R_s > \frac{\alpha_s}{\alpha_d} R_d, \\
M - \frac{R_s}{\alpha_s} & \text{otherwise.}
\end{cases}
\]  

(36)

Note that because the supermarket and domestic retailer products are assumed to be vertically differentiated, to insure the coexistence of both markets it is necessary to have \( R_s > R_d \).

Before concluding this section, it is interesting to note that \( 1/\theta \) can be interpreted as the marginal utility of income (Tirole, 1988). As reported in the literature (see for instance, Reardon et al. 2003 and Trail 2006), with urbanization, the emergence of a wealthier social class is a major determinant of the diffusion of supermarkets in developing countries. The current framework captures the fact that consumers with the lowest marginal utility of income (i.e., the highest \( \theta \)) are more eager to consume the supermarket food products.

5.1 Financing under coexistence

Let us consider the case where there is coexistence of both the domestic retailer and supermarket marketing channels (i.e., \( R_s > \frac{\alpha_s}{\alpha_d} R_d \)). As before, the return of the supermarket project has to be shared, such that

\[
R_s = R_f + R_l + \pi_s.
\]

Here, \( \pi_s \) denotes the rent of the supermarket. Again, to guarantee proper effort by the farmer, he should be provided at least \( p_H R_f \geq \alpha_s B \). The bank’s break-even condition implies that

\[
p_H (R_s - R_f - \pi_s) \geq I + C - A,
\]

or equivalently,

\[
A \geq A_s = I + C + \alpha_s B + p_H \pi_s - p_H R_s.
\]  

(37)

Recall that \( C \) denotes the necessary upfront investment to produce supermarket products. Likewise, to be granted financing for the domestic retailer project, the farmer’s level of finance has to be such that

\[
A \geq A_d = I + \alpha_d B + p_H \pi_d - p_H R_d.
\]  

(38)

Here, \( \pi_d \) denotes the rent of the domestic retailer. The next proposition summarizes our findings.
Proposition 9 (Market Segmentation) Assuming coexistence of both marketing channels – domestic retailer and supermarket – the financial contract between farmers, the bank, the domestic retailer and the supermarket is as follows:

- when $\bar{A} \geq A \geq A_s$, farmers borrow from the bank and supply the supermarket procurement system,
- when $A_s \geq A \geq A_d$, farmers borrow from the bank and supply the domestic retailer procurement system,
- when $A \leq A_d$, farmers have no access to credit and are excluded from the marketing systems.

Furthermore, the expected rent of the supermarket can be expressed as

$$p_H \pi_s = p_H R_s + \frac{R_s - R_d}{\alpha_s - \alpha_d} - (I - \bar{A}) - C - \alpha_s B - M,$$

(39)

while domestic retailer expected rent is given by

$$p_H \pi_d = \left( p_H + \frac{1}{\alpha_d} \right) R_d - \alpha_d B - (I - \bar{A}) - M.$$

(40)

Proof. Given that farmers are uniformly distributed and produce at least one unit, the number of farmers who supply the supermarket also denotes the total quantity supplied by the supermarket. This quantity is given by

$$S_s = \bar{A} - A_s,$$

or using (37),

$$S_s = p_H R_s - (I - \bar{A}) - C - \alpha_s B - p_H \pi_s.$$  

(41)

When $A \leq A_s$ farmers do not receive funding to supply the supermarket marketing channel. However, they can still receive funding to supply the domestic retailer as long as $A \geq A_d$. Thus, with the entry of the supermarket, the total quantity supplied to the domestic retailer becomes

$$S_d = A_s - A_d,$$

or using (38),

$$S_d = p_H R_d - p_H R_s + C + (\alpha_s - \alpha_d) B + p_H \pi_s - p_H \pi d.$$  

(42)

At equilibrium, both the market for the domestic retailer and for the supermarket products clear, such that $D_d = S_d$ and $D_s = S_s$. Substituting back the demand expressions (equations (36) and (35)) into the
respective supply equations (equations (41) and (42)), the expected rent of the supermarket is expressed as

\[ p_H \pi_s = p_H R_s + \frac{R_s - R_d}{\alpha_s - \alpha_d} - (I - A) - C - \alpha_s B - M, \]

while domestic retailer expected rent is given by

\[ p_H \pi_d = \left( p_H + \frac{1}{\alpha_d} \right) R_d - \alpha_d B - (I - A) - M. \]

The empirical literature describing the emergence of supermarkets in developing countries has forcefully argued that supermarkets tend to contract with large, wealthy farmers, while poorer farmers are left behind (see for instance, Dolan and Humphrey 2000 and Dolan, Humphrey and Harris-Pascal 2001). Our model underlies the simple logic behind these observations: supermarkets set up high standards that often require substantial investment on the part of farmers. Thus, only wealthy farmers are able to finance the upfront investment, while poorer ones are credit-rationed and will, as such, turn to the traditional segment.

Furthermore, this literature has also emphasized that the domestic retailing sector is often jeopardized by the entry of supermarkets. The supermarket private standards are in general more stringent than public standards and fierce competition from supermarkets can drive out domestic retailers. For example, following the emergence of supermarkets 64,198 small shops went out of business in Argentina from 1984 to 1993, and 5240 small shops closed their doors in Chile from 1991 to 1995 (Reardon et al., 2003).

**Lemma 10** The minimum price that can be charged by the domestic retailer is given by

\[ \bar{R} = \frac{\alpha_d [\alpha_d B + (I - A)] + M}{\alpha_d p_H + 1}. \]

For any price greater than \( \bar{R} \), the domestic retailer and the supermarket can coexist.

**Proof.** The proof is straightforward from equation (40). ■

According to Lemma 10, the survival of the domestic retailing sector is contingent on the domestic project’s return, which ultimately depends on the equilibrium price. Therefore, to assert the impact of supermarket entry, it is necessary to determine the effects of supermarket entry on retail prices. The next section studies this question.

### 5.2 Market structure and project returns

Assuming coexistence of both marketing channels (i.e., \( R_s > \frac{\alpha_s}{\alpha_d} R_d \)), first note that given equations (35) and (36), the supermarket project’s return can be written as

\[ R_s = \alpha_s M - \alpha_d D_d - \alpha_s D_s. \]
Similarly, for the domestic retailer it corresponds to

\[ R_d = \alpha_d M - \alpha_d D_d - \alpha_d D_s. \] (44)

Thus, the size of the market, as well as consumer preference for each product, determines the returns for each project. Furthermore, while the supermarket is assumed to behave as a monopolist, the domestic retailing sector is composed of symmetric retailing shops. The problem for a retail shop can be written as

\[ \max_{d_d} \{ R_d d_d \}, \]

or equivalently,

\[ \max_{d_d} \{ \alpha_d (M - D_d - D_s) d_d \}. \]

Here, \( d_d \) denotes the quantity sold by a single retail shop. The first order condition implies that

\[ \alpha_d M - \alpha_d (1 + \chi) D_d - \alpha_d D_s = 0, \] (45)

where \( \chi = \frac{\partial D_d}{\partial d_d} \) denotes the conjectural variation elasticity of demand. Assuming that there are \( N \) domestic retailing shops, given that \( D_d = \sum_{i=1}^{N} d_{di} \), \( \frac{\partial D_d}{\partial d_{di}} = 1 + \sum_{j \neq i} \frac{\partial d_{dj}}{\partial d_{di}} \). In theory, \( \frac{\partial d_{dj}}{\partial d_{di}} \) represents the "conjecture" of firm \( i \) regarding how firm \( j \) will react to an increase in quantity by firm \( i \). It can be divided into three classes. Negative values of the conjecture indicate adaptive behavior, a zero value may refer to a Cournotian behavior and positive values denote expectation matching behavior. Assuming that individual firms anticipate other firms’ behaviors, reasonable boundaries for conjecture can be set at \(-1\) and \(1\) (Anderson 1977). For instance, under Cournot conjecture \( \frac{\partial d_{dj}}{\partial d_{di}} = 0 \), while under Bertrand conjecture \( \frac{\partial d_{dj}}{\partial d_{di}} = -\frac{1}{N-1} \). Given that \( d_d \) denotes the market share, the conjectural variation elasticity will take a value between 0 and 1. The parameter \( \chi \) allows an examination of various types of strategic interactions among domestic retailing firms. If, for instance, \( N \) firms compete in quantity (i.e., Cournot-Nash competition), \( \frac{d_d}{D_d} = \frac{1}{N} \) and \( \frac{\partial D_d}{\partial d_d} = 1 \) (given that Cournot conjecture imposes that \( \frac{\partial d_{dj}}{\partial d_{di}} = 0 \)); thereby, \( \chi = \frac{1}{N} \). Similarly, if \( N \) firms are engaged in price competition and have no capacity constraints, \( \chi = 0 \) (given that \( \frac{\partial d_{dj}}{\partial d_{di}} = -\frac{1}{N-1} \), then \( \frac{\partial D_d}{\partial d_d} = 0 \)). Obviously, \( \chi = 0 \) also captures the perfectly competitive outcome. Finally, if the firms collude and act as a monopoly (expectation matching behavior), \( \chi = 1 \).\(^{20}\)

\(^{20}\) Conjecture and conjectural variation elasticities have been the subject of confusion in notation and interpretation. For a good review and discussion, see Lavoie, 2005.

\(^{21}\) While we have assumed that domestic retailing firms are symmetric and hold the same conjecture, more generally, \( \chi = \sum_{i=1}^{N} s_i \kappa_i \), where \( s_i \) denotes the market share of firm \( i \) and \( \kappa_i = \frac{\partial D_d}{\partial d_{di}} \) (see, for instance, Porter 1983).
Given that the supermarket is assumed to behave as a monopolist, its problem is

$$\max_{D_s} (\alpha_s M - \alpha_d D_d - \alpha_s D_s) D_s,$$

and the first order condition is obtained as

$$\alpha_s M - \alpha_d D_d - 2\alpha_s D_s = 0.$$  \hfill (46)

According to equations (45) and (46), the Nash equilibrium quantity of the supermarket product is given by

$$D_s^* = \frac{(1 + \chi) \alpha_s - \alpha_d}{2(1 + \chi) \alpha_s - \alpha_d} M,$$  \hfill (47)

while the Nash equilibrium quantity of the domestic retailer product corresponds to

$$D_d^* = \frac{2\alpha_s - \alpha_d}{2(1 + \chi) \alpha_s - \alpha_d} M.$$  \hfill (48)

Substituting equations (47) and (48) into equations (44) and (43), the return for the supermarket project can be expressed as

$$R_s^* = \frac{(1 + \chi) \alpha_s \alpha_s - 2\alpha_d \alpha_s + \alpha_d \alpha_d}{2(1 + \chi) \alpha_s - \alpha_d} M.$$  \hfill (49)

Similarly the domestic retailer project return is given by

$$R_d^* = \frac{\alpha_d (\chi - 1) \alpha_s + \alpha_d}{2(1 + \chi) \alpha_s - \alpha_d} M.$$  \hfill (50)

It is important to understand that $R_s^*$ and $R_d^*$ represent equilibrium prices of the supermarket and domestic retailer project, respectively. Substituting back equations (47) and (48) into (39) and (40) will provide the expected rent earned by the supermarket and domestic retailer, respectively, under coexistence of both marketing channels.

5.3 Impact of the supermarket private standard

Intuitively, more stringent supermarket standards should raise the return of the project, thereby raising farmers’ credit opportunities. However, as explained in Lemma 10, domestic retailers may be unable to compete with the supermarket and as a result maybe driven out of the market. This, in turn, may strengthen
Based on the previously established results, this section examines the impact of differing stringency in supermarket food standards on the market structure, and its implications for supplying farmers.

**Proposition 11** There exists a standard threshold level defined by
\[
\alpha_s^* = \alpha_d \frac{(\alpha_d p_H + 1)M + \alpha_d B + (I - \bar{A}) + M}{2(1 + \chi)\alpha_d - (\alpha_d p_H + 1)\chi - (I - A) + M}
\]
and such that:

- If \(\alpha_s \leq \alpha_s^*\), then the market for domestic retailer and supermarket products will coexist. In this regime when the stringency of the supermarket standard increases, the number of farmers having access to funding increases, as well. Moreover, the existence of the supermarket always increases the number of farmers funded, in comparison to a situation where there is no supermarket.

- If \(\alpha_s \geq \alpha_s^*\), then with the entry of the supermarket, the market for domestic retailer products vanishes. Here, the number of farmers funded will decrease as long as the supermarket has a greater degree of market power than the domestic retailers.

**Proof.** The domestic retailer will participate in marketing activities as long as its expected rent is positive (i.e., \(p_H\pi_d \geq 0\)) Using expression (40), \(p_H\pi_d \geq 0\) if
\[
\alpha_s \leq \alpha_s^* = \alpha_d \frac{\alpha_d p_H + 1)M + \alpha_d B + (I - \bar{A}) + M}{2(1 + \chi)\alpha_d - (\alpha_d p_H + 1)\chi - (I - A) + M}
\]

Since farmers supply at most one unit, the aggregate equilibrium quantity corresponds to the number of farmers funded. Prior to the entry of the supermarket, the demand for domestic products is given by \(D_d = M - \frac{R_d}{\alpha_d}\). Then, the maximizing behavior by the domestic retailing sector implies that the number of farmers financed can be expressed as
\[
F_b = \frac{M}{1 + \chi}.
\]

Under coexistence, the number of farmers funded corresponds to
\[
F_c = D_s^* + D_d^* = \frac{(3 + \chi)\alpha_s - 2\alpha_d M}{2(1 + \chi)\alpha_s - \alpha_d M},
\]
given that
\[
F_c - F_b = (1 + 2\chi) (\alpha_s - \alpha_d) + \chi^2 \alpha_s > 0.
\]

Thus, under coexistence, the number of farmers funded strictly increases. Finally, if the supermarket is the sole supplier, the demand for its product corresponds to \(D_s = M - \frac{R_d}{\alpha_d}\) and the number of farmers
funded is given by
\[ F_s = \frac{M}{2} \leq F_b. \]

$F_s$ will be lower than $F_b$ as long as $\chi \neq 1$; in other words, as long as the domestic retailer is not a monopolist like the supermarket. ■

The reasoning behind this proposition is as follows. With the entry of the supermarket, to meet its demand, the domestic retailer needs to extend credit to smaller producers. According to equation (38), to do so, the domestic retailer has to diminish its expected rent. As a result, farmers are left with a greater share of the project and more farmers have access to funding. However, as the stringency of the supermarket standard increases, the domestic project’s return decreases (see equation (44)). Therefore, the rent of the domestic retailer decreases to the point where selling domestic products is not a viable option (see Lemma 10).

However, when the supermarket faces no competition, it will maximize its expected rent. To do so, the supermarket will reduce its volume of sale and, as a result, farmers will face fewer financing opportunities.

According to Proposition 11, a regulator seeking to extend farmers’ credit access should impose a maximum standard level on the supermarket food products, such that the entry of the supermarket does not jeopardize the existing domestic retailing sector.

Nevertheless, it is not clear whether the supermarket has an interest in driving out the domestic retailing sector, given that the presence of the lower quality products allows the supermarket to charge a higher price for its food products than in the absence of lower quality products. In a sense, the presence of the domestic retailing sector allows the supermarket to better discriminate among consumers willing to pay for higher food standards. Thus, it may be the case that the supermarket prefers to set a standard level below $\alpha^*_s$. In that case, there is no need to regulate supermarket food standards.

Furthermore, if the regulator cannot control the supermarket food standard, to preserve the domestic retailing sector it may diminish (or raise) the domestic food standard. A change in the stringency of domestic food standards has ambiguous effects on the survival of the domestic retailing sector. On the one hand, its reduction will diminish the opportunity cost of effort for farmers and, thereby, the overall cost of production of the domestic products. This, in turn, will favor the survival of the domestic retailing sector. On the other hand, a reduction in food standards results in a reduction in the demand for domestic food products, which will curtail the market share of the domestic retailing sector. Whether the cost reduction effects dominate the demand effects will determine the best policy for the regulator. In some countries, evidence suggests that the demand effect outweighs the rise in cost of production implied by more stringent food standards (see for instance, Reardon and Farina 2002 and Reardon and Berdegué 2002). For instance, as reported by Reardon
and Berdegué (2002), in South America, in response to the entry of supermarkets, domestic retailers have raised the stringency of their food standards.

6 Conclusion

This paper explores the peculiar relationship between supermarkets and farmers that exists in developing countries. This relationship is modeled as a financial contract, where the farmer provides effort to the supermarket in exchange not only for technical assistance, but also credit and infrastructure support. By doing so, we open the “black box” of the supermarket procurement system.

The motivation of the supermarket to provide not only input credits, but also technical assistance in the framework is as follows. By combining monitoring and farmers advising, supermarkets reduce the agency cost and gain some advantage with respect conventional moneylenders. This agency cost reduction in turn may widen the scope for farmers financing.

Of course, like any business relationship, this is open to abuse and exploitation of the weaker partner. In fact, we show that one motivation for the supermarket to extend credit to smallholders may be that it is able to extract higher effort from farmers especially from smaller ones, who will have more incentives than large scale producers to comply with supermarket requirements. However, this aspect should not be confused with social responsibility as, in this case, it is in the best interest of the supermarket to contract with smaller farmers.

Finally, our analysis inquires about the impact of the introduction of higher food standards on retail markets, a feature that is widely observed in developing countries. From this perspective, while domestic retailers should suffer from the competition with supermarket, increasing competition on the retail market may raise the financing opportunities of smaller farmers.

Unlike a large body of the literature that presents the spread of supermarkets as a threat for smallholders, our conclusions suggest that, overall, farmers can benefit from their entry.

References


7 Appendix

7.1 Prior to the Supermarket Entry

The study of this benchmark case involves three agents: the farmer, the moneylender and the bank. Thus, the optimal sharing rule has to be such that

\[ R = R_f + R_m + R_l \]
7.1.1 Direct financing

Farmers. For a farmer to be diligent he should receive at least

\[ p_H R_f - A \geq B - A, \]

or equivalently,

\[ R_f \geq \frac{B}{p_H}. \]

This incentive compatibility constraint requires that the borrowing farmer earns at least as much from being diligent as from shirking.

Bank. The break-even condition can be expressed as:

\[ p_H [R - R_f] \geq I - A. \] (51)

7.1.2 Indirect financing

The moneylender. The incentive compatibility constraint of the moneylender requires that

\[ p_H R_m - m \geq 0, \]

or equivalently,

\[ R_m \geq \frac{m}{p_H}. \]

Farmers. Hence, assuming proper monitoring by the moneylender, the incentive compatibility constraint of the farmer can be rewritten as

\[ R_f \geq \frac{b}{p_H}. \]

Bank. In the presence of intermediation via a moneylender, the break-even condition can be expressed as

\[ p_H [R - R_m - R_f] \geq I - I_m - A, \]

The next proposition summarizes our result.
Proposition 12 There exists two finance thresholds $A_b = I - p_H\left[R - \frac{R}{p_H}\right]$ and $A_m = I - I_m - p_H\left[R - \frac{b + m}{p_H}\right]$. These thresholds represent the minimum collateral requirements necessary to borrow directly from the bank or indirectly via the moneylender, respectively. In absence of a supermarket, the optimal contract passed between the moneylender, the bank and the farmer has the following features:

- when $A \geq A_b$, farmers are directly financed by the bank,
- when $A_b \geq A \geq A_m$, farmers borrow from the bank and the moneylender,
- when $A < A_m$, farmers do not have access to credit.