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Impact of Supermarket Procurement System on Farmers' Credit Access

Marcoul P.¹ and Veyssiere L.²

¹ Department of Rural Economics, University of Alberta, Edmonton, Canada

² Department of Economics, Iowa State University, Ames, USA

Abstract— In developing countries, modern production contracts offered by supermarkets or agro-export firms entail a loan component under the form of input advances. Like traditional moneylenders, supermarkets want to make sure that this investment is not diverted. However, unlike moneylenders, supermarkets do care about the attributes of the product (form, quality, food safety, etc.). Whether such attributes are present in the harvested product is largely influenced by the advice and the extension services received by the farmer. We built a financial contracting model where we show that supermarkets, choosing to forgo specialization, optimally delegate to a multi-tasking agent both the monitoring and the advisory missions. This contract is shown to potentially enhance credit access for small farmers and sometimes to involve excessive monitoring.

Keywords— Food Standards, Organization of Production, Supermarket.

I. 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. 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.

Since public food quality standards are often inadequate and lack proper enforcement in developing countries. Supermarkets have to develop their own standards. This requires the creation of vertical relationships with growers through the 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 are arguably common denominators.

Typically, supermarkets require their growers to make a substantial up-front investment into their operations. In addition supermarkets are playing new roles in the production process. These roles essentially consist of a combination of intense production monitoring and advising. Finally, supermarkets extend loans in the form of input advances that are reimbursed later when the crop is sold.

Interestingly the analysis of this change in the procurement system has mainly remained descriptive by the relevant literature and their real welfare impacts on growers are still 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 ([1] and [2]). On the other hand, 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 ([3], [4] and [5]).

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 and to rationalize the observed stylized facts associated with the supermarkets entry. In particular we seek to understand why the supermarket not only behaves as a 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. Traditionally, growers have relied on moneylenders,

as the latter have an informational advantage and excel in curbing farmers' incentives not to reimburse loans¹.

In this paper, the relationship between the farmer and the supermarket is modelled through a financial contract. Farmers borrow the capital (e.g. production inputs) necessary to undertake production and later reimburse the lender once harvest is done. The contractual relationship between farmers and the supermarket is modelled via a framework similar in spirit to [9]². However, unlike the conventional financial intermediary of [9], we characterize a contractual framework in which the financial intermediary not only monitors borrowers, but also provides advice that enhances the value of their projects.

In doing so we show that an organization in which supermarkets advise, extend a loan and monitor growers is preferred by the supermarket. In particular, 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 involves technical advising and monitoring. As described by [8], 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, [8] 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.

In what follows, we first present our modeling framework. Then we establish the financial contract passed between the actors involved in the production of an agricultural product when the task of monitoring and advising are exerted by separate agents. Then we repeat our analysis for an organization of the production where the same agent exerts both tasks of advising and monitoring. In the next section the comparison of the optimal contract for each organization of production shows that motivation costs or agency rents are reduced when advising and monitoring are performed by the same agent. The last section concludes the paper.

II. PROCUREMENT ORGANIZATION: A MODEL

Consider a rural economy made up of a population of farmers, a moneylender and an agrifood sector. All the agents of this economy are assumed to be risk neutral. The agrifood sector involves a supermarket/exporter and a procurement agent.

Farmers. Farmers are assumed to be heterogeneous in their level of financial capacity, A . The presence of the supermarket provides farmers with the opportunity to develop a production project whose success is stochastic. More precisely, if the project is undertaken, it yields a verifiable income stream of $R > 0$ in case of success and 0 if it fails. From the farmer's perspective, this project requires two inputs: his effort and a fixed-size investment I . When the farmer works diligently, the probability of crop success is raised by p_H . However, diligence by the farmer is subject to moral hazard, as he may decide to shirk to enjoy a private benefit B . In this case the farmer does not raise at all the likelihood of crop success. To make the problem non trivial, we assume that $I > A$, so that, in order to operate farmers need to borrow $I - A > 0$ from a financial investor.

¹ In developing countries, credit loans extended by traditional moneylenders use growers' crops as collateral. To make sure that the grower repays his loan, the moneylenders closely monitor him during the crop cycle to make sure that he does not secretly side-sell and then default on their loan by pretending to have a bad harvest (See [6] and [7]). Unlike the advising part, the monitoring exerted by the supermarket is very similar to that of traditional moneylending (See [8] and [5] for the case of supermarket monitoring)

² For applications of this framework to developing countries, see, for instance, [10] that explores informal credit markets and [11], [12] and [13] on micro finance.

The moneylender. The moneylender is a member of the rural community, whose function is to monitor farmers. He has an informational advantage and it cannot ascertain whether the monitoring is carried out seriously or not. Therefore, diligent monitoring must be induced through contingent payments. Effective monitoring by the moneylender implies that he privately incurs a cost $m > 0$. Similar to [9], the impact of monitoring is to reduce the farmers' opportunity costs of misbehaving by reducing the benefit of shirking to b , with $B > b$. Farmers hiring a moneylender can then credibly commit to diligence for a lower contingent payment. To make the demand for the moneylender service a viable option, we make the following assumption.

ASSUMPTION 1

$$B - b \geq m.$$

This assumption simply states that the reduction in the private benefit of the farmer, $B - b$, is greater than the private cost of monitoring, m . Under this assumption, it will be shown later that the compensation left to the moneylender to induce proper monitoring is less than the reduction in the farmer's private benefit. It is intuitive that under this assumption monitoring improves the feasibility of the crop project.

The procurement agent. The procurement agent is also a member of the rural community possibly trained by the supermarket in delivering production advice. This advice helps to bring the product in conformity with the supermarket's specific standards. Effective advising from the procurement agent will raise the probability of success of the project by p_A . In other words, when the advisor and the farmer are both diligent, the probability of crop success is $p_A + p_H$. The advising activity is itself subject to moral hazard, as the procurement agent may prefer shirking on his advising mission to avoid a private cost c . To guarantee a positive demand for service from the procurement agent we make the following assumption.

ASSUMPTION 2
$$p_A R \geq \frac{(p_A + p_H)c}{p_A}.$$

This assumption implies that the value of the project is increased by incurring the advising motivation costs of the agent. Thus, whoever makes the production contract offer always find it optimal to hire a procurement agent. The procurement agent could also be trained by the supermarket in monitoring. Like the moneylender, he may decide to shirk to avoid incurring a private cost m .

The supermarket. The agrifood company can provide $I - A$ to farmers. It is a passive but rational investor; it extends a loan as long as it can recoup it in expectation. It is passive in the sense that it does not have the capacity to supervise borrowing farmers. As a result, it relies primarily on collateral-based enforcement of their loans. For simplicity, the opportunity cost of funds is normalized to 1. The supermarket, when accepting farmers' loan applications, cannot observe whether farmers will exert effort or not. In line with Innes [14] and all of the literature on financial contracting, farmers are assumed to be protected by limited liability; i.e. investors can at most seize the realized outcome. Thus, farmers need to make a credible commitment to the supermarket on their supply of effort in order for their loan applications to be accepted. Financing can be eased by using the services of a procurement agent (who advises farmers) and a moneylender (who monitors farmers).

The agrifood company has also to decide the scope of its activity. The company can hire a procurement agent whose task is simply to advise the farmers. In that case, the decision to hire a moneylender is left to the farmer. The company can also choose to integrate these tasks under the same roof by hiring an agent who will both advise and monitor the farmers. In this organizational choice, the monitoring role is assumed by the supermarket agent and the decision to monitor farmers is in the hand of the supermarket.

Finally, we make the following assumption on the parameters:

ASSUMPTION 3

$$\max\{p_H R + c, p_A R - c + B\} - I < 0,$$

$$(p_H + p_A)R - c - m - I > 0.$$

In words, the first condition states that operating the project with a low effort in at least one moral hazard dimension is ruled out. This assumption implies that, in equilibrium, no loan contract that gives one agent incentives to misbehave will be granted. The second condition implies that projects involving monitoring generate a strictly positive surplus.

Summarizing a bit: in the crop production process, diligence in both advising and farming generates a probability $p_H + p_A$ of success, but when shirking on advising and diligence in farming occurs (respectively, diligence in advising and shirking on farming occurs), the probability of success is then p_H (resp. p_A). When shirking occurs on both tasks, crop failure is certain. Lastly, the purpose of monitoring is to lower the farmer's private benefit from B to b .

The interaction between the agents described above is modelled as a four stage sequential game. The timing of events is as follows.

Organizational choice. In the first stage, the supermarket decides between two types of production organization: one in which it hires an agent whose task is solely to advise the farmer on the operation and another in which it hires an agent not only for the advising but also for the monitoring tasks. In the former organization the farmer is free to hire or not a moneylender.

Contracting. The supermarket makes a take-it-or-leave-it offer to all the parties involved in the production cycle. More specifically, the offer is a loan agreement specifying a sharing rule according to which, in case of success, the revenue R is divided among all participants. In case of failure, limited liability implies that all participants receive 0. If the contract is accepted, the game proceeds to investment; otherwise it ends at this point and all participants are free to consume their initial endowment. Immediately after the contract is signed, the farmer invests A while the supermarket delivers $I - A$.

Effort choice. The advisor and the monitor (if one is involved) move first. They simultaneously decide to monitor (or not) and advise (or not) the farmer. The farmer then observes the outcome of the game and, in turn, decides to be diligent or not during the growth cycle.

Production outcome. The production outcome is realized and the return of the project is shared according to the agreement signed at the contracting stage.

The contract design problem consists in optimally sharing the project return, R , without destroying incentives for diligent behaviour by the farmer, the moneylender and the procurement agent.

To understand the rationale behind the supermarket's choice of the production organization, the game is solved by backward induction. In the next sections, the optimal contract is systematically established for each potential organization of production; i.e. an organization where the moneylender monitors and the procurement agent advises and an organization where the procurement agent monitors and advises farmers. The comparison of the (privately) optimal contracts under alternative organization of production will determine the organization preference of the supermarket.

III. MONITORING AND ADVISING BY SEPARATE AGENTS

First consider an organization of production, where the supermarket only trains the procurement agent to advising and where monitoring remains in the hands of the moneylender. While according to Assumption 2 farmers have always an interest in requiring the advises of the procurement agent, it is by no mean guaranteed that farmers will find optimal to hire a moneylender. However, for the sake of exposition we focus on the most general case where the four parties are involved in production. Furthermore in such procurement organization the decision to hire or not a moneylender remains in the hand of the farmers.

While formulating the financial contract, the supermarket shares the project return with the moneylender, the procurement agent and the farmer. This optimal sharing rule can be established by solving the following program:

$$\max_{R_s} \{ \pi = (p_H + p_A)R_s - (I - A) \} \quad (1)$$

$$R = R_f + R_m + R_p + R_s, \quad (2)$$

$$(p_H + p_A)R_f \geq p_A R_f + b \quad (3)$$

$$(p_H + p_A)R_p \geq p_H R_p + c \quad (4)$$

$$(p_H + p_A)R_m \geq p_A R_m + m \quad (5)$$

$$U_f = (p_H + p_A)R_f - A \geq 0 \quad (6)$$

Here, π and U_f denotes the supermarket and farmer's expected net return from the project, respectively, while R_f , R_m , R_p and R_s denote the success-contingent stakes of the project obtained by the farmer, the moneylender, the procurement agent and the supermarket, respectively. Note that each contracting party observes the share of the project received by all contracting parties.

The first constraint (2) simply indicates that the project return R is divided up, among the contracting parties. The next three constraints (3), (4) and (5) denote the incentive constraints of the farmer, the procurement agent and moneylender. Each constraint requires that the agent earns at least as much from being diligent (i.e. produce effort for the farmer, advise for the procurement agent and monitor for the moneylender) than from shirking. Finally the last constraint denotes the farmer participation constraint.

The solution of the above program provides the following proposition³.

PROPOSITION 1: *In the second stage of the game, when monitoring and advising are performed by two separate agents, there exists a unique subgame equilibrium. Let define*

$$A_a = I - (p_A + p_H) \left[R - \frac{c}{p_A} - \frac{B}{p_H} \right] \text{ and}$$

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

equilibrium, the optimal contract passed between the farmer, the procurement agent, the moneylender and the supermarket has the following features:

- $\frac{(p_H + p_A)B}{p_H} \leq A$ the farmer does not hire a moneylender. The procurement agent advises and earns Φ_a . The supermarket captures the entire return of the project i.e. $U_f = 0$ and

$$\pi = (p_H + p_A) \left[R - \frac{c}{p_A} - \frac{m}{p_H} \right] - I.$$

- if $A_a \leq A < \frac{(p_H + p_A)B}{p_H}$ the farmer does not hire a moneylender. The procurement agent advises and earns Φ_a . The farmer's net return of the project is: $U_f = \frac{(p_H + p_A)B}{p_H} - A$ while the supermarket earns $\pi = (p_H + p_A) \left[R - \frac{c}{p_A} - \frac{b+m}{p_H} \right] - (I - A)$.

- if $\frac{(p_H + p_A)b}{p_H} \leq A < A_a$ the farmer hires a moneylender. The procurement agent earns $\Phi_a = \frac{p_H c}{p_A}$ while the moneylender earns $\Gamma_{ml} = \frac{p_A}{p_H} m$. The supermarket captures the entire return of the project i.e. $U_f = 0$ and

$$\pi = (p_H + p_A) \left[R - \frac{c}{p_A} - \frac{m}{p_H} \right] - I.$$

- if $A_{am} \leq A < \frac{(p_H + p_A)b}{p_H}$ the farmer hires a moneylender. The procurement agent earns $\Phi_a = \frac{p_H c}{p_A}$ while the moneylender earns $\Gamma_{ml} = \frac{p_A}{p_H} m$. Finally the farmer receives

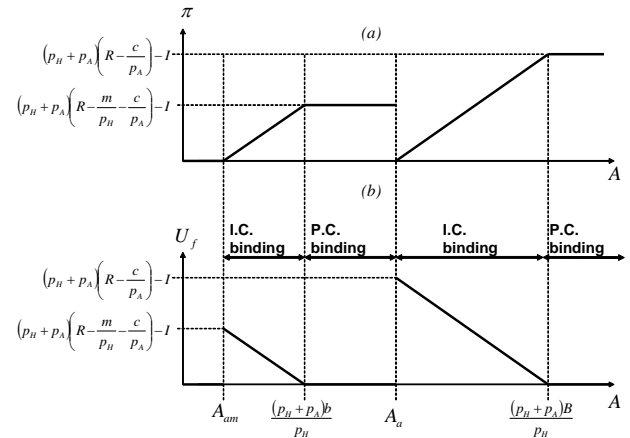
$$U_f = \frac{(p_H + p_A)b}{p_H} - A \text{ and the supermarket}$$

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

- if $A < A_{am}$, farmers do not have access to credit.

Figure 1 illustrates Proposition 1. The equilibrium net returns of the farmer and the supermarket are represented as a function of farmers' wealth A .

Figure 1 (a) Supermarket's expected net return. (b) Farmers' expected net return.



³ A formal proof of this Proposition is available upon request to the authors.

From panel (a), it seems clear that the supermarket has a preference for well-capitalized farmers. However, this preference is clearly non monotonic. The farmer's freedom to hire a not a moneylender explains this non-monotonicity. By not hiring a moneylender the farmer in a sense increases the financial compensation necessary to guarantee its diligence and in turn reduces the expected return of the supermarket.

As illustrated in panel (b) for farmers whose participation constraint is not binding, a payment must be made to guarantee their care. For the other famers, the fear to lose the investment made in the project is sufficient to insure their diligence. As monitoring reduces the private benefits of farmers, under the supervision of a moneylender a lower financial compensation has to be given to guarantee farmers' diligence. Thus when given a choice, farmers will prefer not to hire a moneylender. However, not all farmers are given this choice. Wealthy farmers have an advantage in obtaining loans, as they can bypass the services of the moneylender. In essence, monitoring allows poorer farmer to obtain credit.

Finally, very poor farmers simply cannot access credit, even though according to Assumption 3, these projects are socially worthwhile. The existence of credit rationing in our context is driven by informational frictions. Indeed, moral hazard, together with limited liability, implies that agency rents have to be distributed to implement the project. This creates a wedge between the social value of the project and the total motivation costs that must be incurred to implement it.

IV. MONITORING AND ADVISING BY THE PROCUREMENT AGENT

Let now explore the contractual relationship in an organization of production where the procurement agent not only advises but also monitors. Unlike the previous case, the multitasking nature of the procurement agent now generates several incentive constraints. First, the procurement agent must be given reward R_p , such that it does not want to shirk on the advising task alone:

$$R_p \geq \frac{c}{p_A}. \quad (7)$$

The procurement agent must also monitor the farmer i.e.:

$$R_p \geq \frac{m}{p_H}. \quad (8)$$

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

$$(p_A + p_H)R_p - m - c \geq 0$$

or

$$R_p \geq \frac{m + c}{p_A + p_H}. \quad (9)$$

Overall, the procurement agent will be diligent in both tasks if constraints (7), (8), and (9) hold true. Thus, the minimum stake consistent with the procurement agent diligence is

$$R_p \geq \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\}.$$

Furthermore with the procurement agent performing both monitoring and advising, production will only involve three agents, the procurement agent, the farmer and the supermarket. In this organization of production, the problem of the supermarket can be expressed as:

$$\max_{R_s} \{ \pi = (p_H + p_A)R_s - (I - A) \}$$

$$R = R_f + R_p + R_s$$

$$R_f \geq \max \left\{ \frac{b}{p_H}, \frac{A}{p_A + p_H} \right\}$$

$$R_p \geq \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\}.$$

Before we proceed, it is useful to define

$$R_p^S = \max \left\{ \frac{c}{p_A}, \frac{m}{p_H}, \frac{m + c}{p_A + p_H} \right\} \text{ and}$$

$A_I = (p_H + p_A)(R_p^S - c / p_A - b / p_H)$, that are used in the following result⁴.

⁴Again a formal proof of this Proposition is available upon request to the authors.

PROPOSITION 2 *In the second stage of the game, when monitoring and advising are performed by a same agent, there exists a unique subgame equilibrium. In the second stage of the game, the contract proposed by the supermarket to the farmers and the procurement agent has the following features.*

- if $R_p^S = c / p_A$, the farmer obtains a production contract that stipulates monitoring and advising by the procurement agent. The latter earns expected net return Φ_a^S . If
 - o $A \geq (p_H + p_A)b / p_H$, the supermarket earns $\pi = (p_H + p_A)[R - c / p_A - b / p_H] - I$, while the farmer has no rent, i.e. $U_f = 0$.
 - o $(p_H + p_A)b / p_H > A \geq A_{am}^S$, the farmer's net return is $U_f = (p_H + p_A)b / p_H - A > 0$, while the supermarket's expected profit is $\pi = (p_H + p_A)[R - c / p_A - b / p_H] - (I - A)$.
- if $R_p^S \neq \frac{c}{p_A}$, then the farmer obtains a production contract. If
 - o $A \geq (p_H + p_A)B / p_H$, the farmer's net return is $U_f = 0$ and the contract only stipulates advising by the agent who earns Φ_a while $\pi = (p_H + p_A)[R - c / p_A] - I$.
 - o $(p_H + p_A)B / p_H > A \geq A_I$, the farmer's net return is $U_f = (p_H + p_A)B / p_H - A > 0$. The contract only stipulates advising by the agent who earns Φ_a while $\pi = (p_H + p_A)[R - c / p_A - B / p_H] - (I - A)$.
 - o $A_I > A \geq (p_H + p_A)b / p_H$, the farmer's net return is $U_f = 0$. The contract stipulates monitoring and advising by the agent who earns Φ_a^S . The supermarket's expected profit is $\pi = (p_H + p_A)[R - R_p^S] - I$.
 - o $(p_H + p_A)b / p_H > A \geq A_{am}^S$, the farmer's

net return is $U_f = (p_H + p_A)b / p_H - A > 0$

. The contract stipulates monitoring and advising by the agent who earns Φ_a^S . The supermarket's expected profit is

$$\pi = (p_H + p_A)[R - R_p^S - b / p_H] - (I - A) > 0.$$

- if $A < A_{am}^S$, the farmer does not obtain a production contract, i.e., $U_f = 0$.

Having established Propositions 1 and 2, it seems natural to inquire about the relative merit of both organizational forms in the first stage of the game. The next Proposition is the main result of this paper. The comparison of Proposition 1 and 2 provides the following Proposition⁵.

PROPOSITION 3 *There exists a unique subgame-perfect equilibrium. In the first stage of the game, the supermarket chooses an organization of production in which both tasks of monitoring and advising are left to the procurement agent. In the second stage of the game, the contract proposed by the farmers is the one described in Proposition 2.*

Heuristically, by contracting with the same agent on both tasks the supermarket creates an incentive complementarity between the two tasks. For instance, it is possible that the agent derives a substantial rent by, say, monitoring diligently. Bundling and rewarding the two tasks in a single payment enhances incentives, in the sense that the prospect of losing this rent makes the agent less likely to overlook his advising duties. In other words, in this case, the agent is essentially a free advisor. Conversely, the agent could derive a substantial rent in advising and the fear of losing this (advising) rent would essentially make him a free monitor. Arguably, such a feedback loop does not exist when both tasks are performed by distinct agents. Such reduction in motivation rents allows the supermarket to capture a larger share of the project net return. Therefore it will always favour an organization of production where advising and monitoring are exerted by a same agent.

⁵Again a formal proof of this Proposition is available upon request to the authors.

COROLLARY 1 *A procurement organization where both tasks of advising and monitoring are left to the same agent is conducive to the extension of credit to a larger number of farmers.*

PROOF As $\max\left\{\frac{c}{p_A}, \frac{m}{p_H}, \frac{m+c}{p_A+p_H}\right\} < \frac{c}{p_A} + \frac{m}{p_H}$ it is straightforward that $A_{am}^S > A_{am}$.

In a sense the bundling of monitoring and advising in the hand of the same agent, grants the supermarket with a comparative advantage in lending. As it can reduce by more motivation costs.

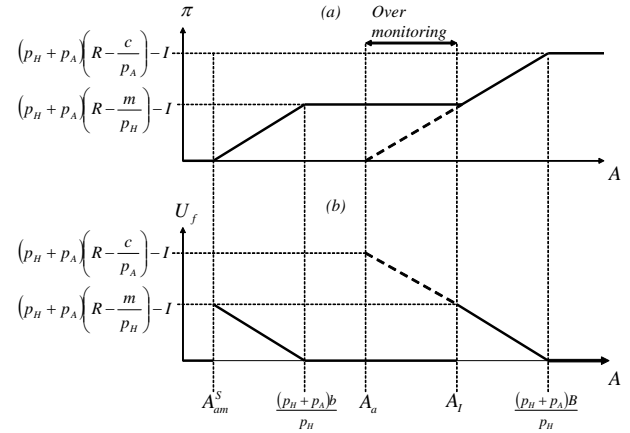
Our result points to a beneficial role of supermarkets for farmers. However, it is important to note that the occurrence of such contracts results in the disappearance of traditional moneylenders in our model. In fact, as already noted by [8] in the Chilean context, the expansion of contract farming by supermarkets or agroindustrial firms has essentially resulted in the removal of traditional moneylending.

COROLLARY 2 *When $R_S \neq \frac{c}{p_A}$ then the supermarket over monitors farmers with a level of finance such that $A_a < A < A_I$. This implies a social loss.*

Such supermarket's behaviour arises because monitoring effectively transfers a rent from the farmer to it and that the supermarket can now impose monitoring to farmers. For a small additional payment, the supermarket assigns the agent an additional monitoring task that ultimately results in (much) smaller incentive payments made to farmers. Here, monitoring is not motivated by feasibility issues, but is just a socially costly rent extraction mechanism. Figure 2 illustrates Proposition 3 in the case where $\max\{c/p_A, m/p_H, (m+c)/(p_A+p_H)\} = m/p_H$.

It features in thick dashes what the returns would be, had the supermarket behaved like a social surplus maximizer.

Figure 2 (a) Supermarket's expected net return. (b) Farmers' expected net return.



In the light of this theoretical finding, several recent puzzling empirical results may, perhaps, find a natural explanation. For instance, [15] who analyses production contracts between supermarkets and farmers, fails to find strong empirical support for monitoring by supermarkets as a means to raise farmer productivity. Such an observation seems consistent with the result stated above.

To summarize the interest by the supermarket in such organization of production is double. Not only by bundling both tasks the supermarket will reduce the motivation costs but also it can endorse monitoring as a rent extraction mechanism.

Finally, this Proposition provides insights on a focal issue in the empirical literature on supermarkets, namely the fate of small farmers in the emergence of these agroindustrial companies.

From panel (a), it seems clear that the supermarket has a preference for well-capitalized farmers. As previously explained, when misbehaving, relatively wealthy farmers lose their initial outlay A and this is sufficient to keep them on their toes and insure their diligence. With lower initial outlays, poorer farmers stand to lose less from shirking, and the supermarket must insure diligence by relying relatively more on incentive payments, which are costly. This result provides argument for the empirical literature describing the emergence of supermarkets in developing countries, which 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).

Panel (b) shows that even though the supermarket designs the contract, some farmers do obtain a positive surplus from their business relationship with the supermarket. For the reasons explained above, this, in fact, benefits less capitalized farmers. Therefore, the existence of strictly positive rents should attract more farmers. In fact, the long waiting list to enter into the supermarket procurement system observed in many developing countries is at least consistent with this result (on this issue, see [4]). If we speculate that a supermarket tries to extend its grower base, then the upper hand of the poorest farmers (i.e., those with level of finance such that $A > A_{am}^S$) should benefit from the implementation of the supermarket arrangement. These findings also seem consistent with recent empirical evidence ([16]).

V. CONCLUDING REMARKS

To conclude the paper, we discuss the robustness of the results with respect to some special assumptions.

Bargaining power in the hand of the farmers.

Thus far we have assumed that the supermarket in the contractual relationship holds all the bargaining power. In the opposite case where the farmers hold all the bargaining power, while the distribution of the project net returns will be different, the same organization of production will be chosen. Access to credit was determined by farmers' pledgeable income, which in turns was determined by the incentive constraint of each agent. Whether the bargaining power is in the hand of the supermarket or the farmers will have not effect on the incentive constraint of each agent. Hence irrespective of who holds the bargaining power an organization of production where the same agent performs the task of monitoring and advising will maximize the number of farmers having access to credit.

Convex motivation costs. Motivation costs are linear in the number of tasks performed -i.e. for the procurement agent the cost of monitoring and advising is simply the sum of his cost for each task ($m + c$). If instead the relationship between the motivation costs and the number of tasks performed was convex, it may still be optimal for the supermarket to charge the

procurement agent with both tasks of advising and monitoring. Of course if the raise in motivation costs outweighs the effect of the rent reduction associated with the bundling of monitoring and advising, then the supermarket may prefer an organization of production which leaves the task of monitoring and advising in the hands of separate agent.

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- Author: Marcoul Philippe
- Institute: University of Alberta
- Street: 515 General Service Building
- City: Edmonton
- Country: Alberta, Canada
- Email: luc@iastate.edu
- Author: Veyssiere Luc
- Institute: Iowa State University
- Street: Heady Hall
- City: Ames
- Country: USA
- Email: luc@iastate.edu