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Endogenous emergence of credit markets: Contracting in response to a new technology in Ghana ☆

Rahul Deb [a,*], Tavneet Suri [b]

[a] Department of Economics, University of Toronto, Canada
[b] Sloan School of Management, MIT, United States

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ABSTRACT

Access to credit is important for the productivity and overall welfare of farmers in developing countries. We present a theoretical framework which shows that a change in the mode of shipping (from air to sea) in the Ghanaian pineapple industry made it profitable for pineapple exporters to provide myopic farmers with both in-kind loans (to improve productivity) and cash loans (for consumption smoothing) despite being unable to monitor farmers or enforce repayment. The innovative theoretical result is that providing farmers with additional cash loans can enforce greater input use without compromising repayment. We provide evidence in the form of a case study documenting the dramatic rise of informal credit (through contract farming) after the switch to sea-freight between 1996 and 2001. Using this anecdote, we argue that credit arrangements can arise spontaneously, absent non-market interventions to meet market needs even in the absence of proper legal protections for creditors.

1. Introduction

There is general agreement among researchers and policymakers that poor agricultural households in developing economies lack adequate access to credit. These poor households do not meet the traditional criteria for borrowing (especially given the long production cycle in agriculture) and hence are often perceived as bad credit risks by private financial institutions. This has a significant impact on these households for whom credit is vital. Loans allow smallholder farmers to invest enough to get productivity gains and it has been shown that alleviating capital constraints can have big effects.[1] In addition, loans may be crucial for poor households to smooth consumption in emergencies and thus can affect nutrition, health and overall household welfare.

In response to this need for credit, policymakers have attempted to intervene in markets. Governments have introduced state-owned development banks and while some have been successful,[2] others have proved to be an inefficient source of credit,[3] have been subject to political capture[4] and have had distortionary effects.[5] Microfinance institutions have been shown to have impacts but the impacts seem to be small on average with bigger benefits for only a small proportion of people.[6] Ultimately, developing economies need a range of financial products and no single type of credit instrument can suffice. For example, microfinance loans are typically paid every week and are hence of limited use for capital investments in the agricultural cycle.

Our contribution in this paper is primarily theoretical. We use anecdotal case study evidence from the pineapple industry in Ghana to document the advent of a new shipping technology and the concurrent

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* Corresponding author. Tel.: +1 416 978 6295.
E-mail addresses: rahul.deb@utoronto.ca (R. Deb), tavneet@mit.edu (T. Suri).

[1] Conning and Udry (2007) and World Bank (2007) provide a good review; also see the studies on the effects of capital grants, such as de Mel et al. (2008), McKenzie and Woodruff (2008), Fafchamps et al. (2011).

[2] For example, in China.

[3] For example, in the Philippines (David, 1984) and India's Integrated Rural Development Program (Meyer, 2002; Pulley, 1989).

[4] Cole (2009).

[5] World Bank (2007) provides a short review.

[6] Banerjee et al. (2010), Karlan and Zinman (2011) and Crépon et al. (2011).

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emergence of an informal credit market via which farmers were able to acquire both loans for inputs and for consumption smoothing from pineapple exporters–credit contracts commonly referred to as contract farming.[7] We then develop a model of informal contracting which explains why a credit market functioned after, but could not function before the technology change. Using this theoretical framework, we show that not only did the credit benefit the smallholder farmer, but the form of the loan additionally allowed the credit provider to better control the farmer's actions. Moreover, our model explains the nature of the offered credit contracts by showing that the provision of credit through multiple channels (cash and in-kind) can facilitate contracting and lead to higher profits for the loan providers. This sort of credit institution is common in developing economies. It is known that the quality of institutions determines economic progress and development.[8] Hence, we feel that our results may be important for policy makers who seek to understand the factors which lead to the emergence of institutions where they are absent.

In particular, we develop a model of informal credit through contract farming aimed at explaining both the reasons behind its emergence in our anecdote from Ghana and the form that the credit contracts took. Present in the model are three of the main issues which could lead to a breakdown of informal contracting. The first is that a farmer who receives credit may default and end up selling her output to a buyer other than the one with whom the farmer is contracting (side selling or extra-contractual marketing). By holding up the buyer, the farmer does not have to repay her loan obligation. The second is the moral hazard problem that stems from the buyer's inability to monitor the farmer's production process. There is no guarantee that the farmer will use the inputs provided on the crop as opposed to using them on a different crop or selling them for cash in the market. Lastly, in spite of the farmer's best efforts, the crop may end up being of poor quality in which case the exporter cannot recover his loan or, in other words, the farmer has limited liability. This implies that providing loans is always risky for the exporter. Since contracting is informal, the exporter must provide dynamic incentives to overcome these hurdles. Providing dynamic incentives is tricky as farmers in developing countries are often myopic.[9]

Firstly, the model uncovers how the difference in observable quality at the time of shipping altered the hold-up problem which affects informal contracting. We argue that this made contracting possible under sea freight when it wasn't under air freight. In the case of air freight, the quality of the fruit was observable to the farmer when she was deciding whether to default on the loan or not. Thus, if the fruit was of high quality, there were large gains to be had by holding-up the exporter and selling the fruit to someone else. By contrast, at the time of shipment by sea, the farmer could not foresee the end quality of the fruit once it arrived at Europe. Therefore, the expected gains from holding-up the exporter were lower and this made the prospect of default less attractive. We argue that for myopic farmers, this easing up of the hold-up problem was necessary in order for the exporters to provide them with credit without the fear of default.

Secondly, the model shows that, under certain conditions, it is profitable for the exporter to offer credit not just in the form of inputs to production but also cash for consumption. Put differently, the exporter can benefit by providing the farmer with money in consumption emergencies, knowing that it would not be spent on production. This is a counterintuitive result as it seems that by providing the farmer with a cash loan for consumption, that the exporter is needlessly bearing additional risk from credit provision without receiving any benefits from improved production. Hence, such behavior might seem to be altruistic. However, we argue that this additional credit raises the value of the relationship for the farmer and makes her more reluctant to default. This in turn allows the buyer to provide higher amounts in-kind credit without fearing default thereby increasing profits. That the type of transfer may have critical implications in the functioning of informal contracts is an important implication of our model and, to our knowledge, is a result that hasn't been identified in previous theoretical work. We discuss how this result may be relevant in other settings in Section 6 where we provide concluding remarks.

We provide anecdotal evidence from the field in the form of a case study[10] from Ghana where in 1996, refrigerated sea freight became an option for pineapple exporters to ship their produce to European markets. The cost savings to the exporters of using sea freight as compared to the only other option, air shipping, was substantial. However, we argue from our qualitative interviews that this technological innovation meant that the quality of the pineapple at the time it was shipped was no longer observable. This is because the transit time to Europe took ten to twelve days by sea as opposed to a few hours by air. For the case of air freight, the quality of the pineapple at the time of shipping was essentially the quality at the time it was offered to the end customer (due to the short freight time) and so was observable for the intent and purposes of the exporter. However, for the case of sea shipping, due to the long transit time, the quality of the pineapple by the time it was received in Europe could no longer be predicted in advance by either the exporter or the farmer. We argue is that it was precisely this unobservable quality that both necessitated and facilitated the advent of credit arrangements.

In response to this change in shipping technology, as the model predicts, credit arrangements emerged between the exporters and the pineapple growers in which farmers were offered cash loans (for consumption) and in-kind loans of high quality fertilizer (for production) in exchange for a contract on the fruit. This allowed the farmers to apply fertilizer in production which they otherwise could not afford — the application of high quality fertilizer increases the odds that the ripe fruit is of high quality. This case study is thus an instance where credit institutions tailored to particular markets seemed to emerge endogenously without government interventions in response to market needs.

1.1. Related literature

Related to our work is the chapter by Ghosh et al. (2001) which summarizes the incentives uncovered by the theory of credit in developing countries. They construct separate theories incorporating moral hazard (with implications for debt overhang) and self-enforcement in credit contracts (with implications for credit rationing). The framework of our model, its underlying economics and our final goal are different from theirs. Our model simultaneously incorporates both

[7] Contract farming is a ubiquitous agricultural institution not just in Africa but across most developed and developing economies and involves both large and small scale farmers. It is prevalent in the market for tree and cash crops, fruits and vegetables, poultry, dairy products and even fish. In essence, it is an agreement (formal or informal) between farmers and buyers (private or public) of produce. It serves as an important source of credit for farmers across the developing world and provides them not just with inputs for production but also with loans which allow them to smooth consumption. See for example Bijman (2008).

[8] See for example North (1989), Acemoglu et al. (2004) and Acemoglu and Robinson (2005).

[9] For example, Schaner (2011) finds that discount factors are quite low in Western Kenya, with weekly discount factors ranging between 0.79 and 0.8. Also for Western Kenya, Dupas and Robinson (2011) who report that only 10% of their sample are somewhat patient and 22% are present biased. Other estimates for discount factors are provided by Tanaka et al. (2010) and Ashraf et al. (2006) are for Asia and are a little higher. An example of myopic behavior is the fact that poor farmers borrow repeatedly at extremely high interest rates. See Banerjee (2004) for a survey of the evidence of high interest borrowing in developing countries.

[10] While we would have liked to provide more micro level regression based evidence on the impacts of the technology change on the credit contracts, the data to do so is simply not available. The pineapple market in Ghana collapsed in 2004 due to a shift in world demand away from the variety produced in Ghana. The Goldstein and Udry (1999) data provides evidence before the shift, but there are no relevant surveys conducted between 2000 and 2003 to provide evidence post the change.