



## Mobile phones and market information: Evidence from rural Cambodia



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### ABSTRACT

Local agricultural markets in developing countries are often characterised as oligopsonistic markets, forcing farmers to sell their products below the wholesale price. However, this situation appears to be changing with the diffusion of mobile phones. We investigate how access to market information through mobile phone use affects the selling price of rice in Cambodia. We differentiate the use of mobile phones to obtain market information from household mobile phone ownership. Our results indicate that improved access to market information through mobile phone use is associated with an increase in the selling price of rice.

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### Introduction

Local agricultural markets in developing countries are often characterised by oligopsonistic markets because of high entry costs for buyers such as traders. As a result, when selling their agricultural products in the local agricultural market, farmers often have no choice but to do so below the competitive equilibrium price.

This situation has changed with the diffusion of information and communication technology (ICT). Such technology allows farmers to acquire information on market outcomes such as selling prices in other markets, enabling them to sell their agricultural products in other markets at higher prices. The mobile phone is a widely used communication device because it is relatively inexpensive and does not require an urban environment; therefore, it is used by many people in rural areas. Studies show that in countries such as the Dominican Republic, Guyana and Swaziland, 50–60% of households in rural areas own a mobile phone (Jensen, 2010). If the mobile phone contributes to the effective functioning of markets by improving access to market information, the selling prices of agricultural products in local markets should increase.

In this study, we investigate the impact of the use of mobile phones to obtain market information on the selling price of rice in rural areas in Cambodia. Our analysis suggests that the use of mobile phones is associated with an increase in the selling price. However, this effect can be observed regardless of whether farmers own a mobile phone, which implies that it is not mobile phone ownership but rather access to market information via a mobile

phone (regardless of who owns the phone) that is responsible for the increase in the selling price of rice.

The contribution of this study is that this is the first to differentiate the use of mobile phones to access market information from mobile phone ownership. The difference allows us to examine directly the impact of improved access to market information through mobile phone use on the selling price of agricultural products. Few studies have attempted to separate the difference, although many studies focus on the introduction of mobile phone or household ownership of a mobile phone.

Our analysis is subject to two limitations. First, because the features of our research design, our results do not necessarily represent the causal effect of improved access to market information through mobile phone use on the selling price of rice. However, we find a significant correlation between the improved access to market information through mobile phone use and the selling price of rice that previous studies have not examined. Second, given that our data focuses on the selling price of rice in four provinces in Cambodia, the external validity of this study is limited. The effects of access to market information through ICT on selling price of commodity may depend not only on commodity features such as whether the commodity is perishable but also on environmental conditions such as access to other market.

The rest of the paper is organised as follows. In the next section, we review previous studies regarding the effect of market information on agricultural markets and on the selling prices of agricultural products in developing countries. 'Background and data' provides background information on the agricultural situation in Cambodia and outlines the survey design of our study. 'Estimation method and results' explains the estimation approach that we

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employ and examines the effect of improved access to market information through mobile phone use on the selling price of rice. Finally, concluding remarks are presented in 'Concluding remarks'.

## Literature review

Previous studies have primarily focused on the effect of market information on arbitrage and selling prices. The role of market information in arbitrage can be explained as follows. Suppose there are two markets with one agricultural product. For simplicity, assume that price information does not diffuse over the two markets and transportation between these markets is costly. Furthermore, assume that the price of the product differs between the two markets because of different supply quantities of the product in the markets. If farmers can obtain information on the selling price in the other market and transportation costs are lower than the price difference between these markets, farmers in the market with the lower selling price will go to the other market to sell their product. As a result, arbitrage occurs between the markets, the price difference between the markets will decrease, and Pareto efficiency will be achieved.

Several empirical studies have examined the role of mobile phones in market arbitrage in local agricultural markets in developing countries. A good example of this mechanism is provided in *Jensen's (2007)* study on the market for sardines in Kerala, a southern Indian state. Before the introduction of mobile phones, to acquire information (such as the selling price of sardines) for markets other than the local market, fishermen had to go to other such markets, which required time and could be costly. Moreover, the sardines could perish on the way to the other market. As a result, fishermen usually sold their sardines in the local market, even if the selling price was low (e.g., because of an excess supply of sardines). In other words, arbitrage across markets did not occur. Mobile phones allowed fishermen to check market information without visiting other markets and to sell their sardines in other markets offering a higher price when the selling price in the local market is low. Thus, the introduction of mobile phones spurred arbitrage across markets, price dispersion across markets diminished, and excess supply (or supply shortages) of sardines in individual local markets was eliminated. As a result, both the profits of fishermen and the consumer surplus increased.

Along similar lines, *Aker (2010)* investigated the impact of mobile phones in grain markets in Niger and found that price dispersion across markets declined. The main reason for the decline in price dispersion was the reduction in transaction costs (including search cost) for traders. Aker also found that the effect of mobile phones on the price dispersion was stronger for remote markets and markets accessible only via poor-quality roads. Meanwhile, *Goyal (2010)*, focusing on the central Indian state of Madhya Pradesh, investigated the impact of an intervention conducted by ITC Ltd., a large buyer of soybeans, which provided not only internet kiosks that enabled farmers to acquire information on the wholesale price of soybeans but also provided warehouses that enabled farmers to scientifically test the quality of soybeans. Goyal also found a decrease in the dispersion of soybean prices after the intervention.

Next, let us consider the effect of market information on selling prices. Specifically, let us consider the impact of mobile phone use on the market power of buyers in local agricultural markets. Because of the high entry cost for buyers (traders, for example, incur fixed costs such as those for storage facilities and vehicles for transportation as well as variable costs such as transportation costs, and they need access to credit for the purchase of agricultural products), the entry of buyers into local agricultural markets is limited. As a result, local agricultural product markets are characterised as oligopsonistic markets, and farmers are forced to sell

their agricultural products below the wholesale price. Market information may lower the degree of market power of buyers in local agricultural markets because farmers may sell their products in other markets. Buyers must therefore set a higher price than they previously offered. In addition, mobile phones allow farmers to communicate with traders. Because this communication lowers the transaction costs for traders, the number of traders who enter a particular local agricultural market increases. In turn, this effect results in a decline in the degree of market power of buyers in local agricultural markets.

A number of empirical studies have investigated the effect of better access to market information on selling prices. *Svensson and Yanagizawa (2009)*, for example, examined the impact of market information transmitted via local FM radio stations on the farm-gate prices of maize in Uganda and found that informed farmers sell at a higher farm-gate price. Similarly, *Ochiai and Yamazaki (2013)* found that the diffusion of mobile phones in rural areas in India increases the selling price of wheat for small-scale farmers. In addition, *Lee and Bellemare (2013)* showed that farmers in the Philippines sell agricultural crops at higher prices in cases in which either a household's father or his spouse owns a mobile phone. However, household ownership of a mobile phone is not correlated with selling prices. On the other hand, focusing on short-message service-based commercial services delivering market information, weather information, and crop advisory information in Maharashtra, a state in western India, *Fafchamps and Minten (2012)* found that these factors did not affect the selling prices of agricultural products; they did find, however, that farmers that received these services changed the market in which they sold their products. Similarly, *Aker and Ksoll (2015)* showed that the intervention in which individuals were provided with access to a shared mobile phone and learned how to use them diversified a variety of crops grown by them but did not increase the likelihood of selling these crops or the farm-gate price received in Niger. Previous studies have attempted to identify the causal effect of access to market information on selling prices using either natural experiments, such as the studies by *Svensson and Yanagizawa (2009)* and *Ochiai and Yamazaki (2013)*, which employed the difference-in-differences method, or field experiments, such as the study by *Fafchamps and Minten (2012)* and *Aker and Ksoll (2015)*, which employed a randomised controlled trial approach.

In the survey used for this study, we not only asked whether farmers owned a mobile phone but also whether they used a mobile phone to obtain market information at the time that they sold their harvested rice. These questions allow us to examine directly the impact of improved access to market information through mobile phone use on the selling price of agricultural products.

## Background and data

Rice farming is an important income source in Cambodia. Rice is the main cereal crop, and 80% of farmers in Cambodia are engaged in rice farming, which covers approximately 80% of Cambodia's total cultivated land. According to the World Bank's World Development Indicators,<sup>1</sup> value added in the agriculture sector accounted for 37% of gross domestic product in 2008.

In his report on Cambodia's food market, *El-Nouh (2010)* observed that the selling price of rice in rural area tends to be lower than in urban areas because small-scale farmers – in the absence of rice farmers' associations – have relatively weak

<sup>1</sup> Accessed on March 22, 2015. <http://data.worldbank.org/data-catalog/world-development-indicators>.

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