

# The Role of Market Information in Adoption of Agricultural Seed Technology in Rural Uganda

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## ABSTRACT

*In this paper, the authors evaluate the impact of access to ICT-based market information on prices received by farmers and the intensity of adoption of improved hybrid and composite maize varieties. Propensity score matching is applied to cross-sectional survey data from farmers whose major cash crop is maize. Results indicate that adoption of improved maize has a positive and significant effect on maize yields, gross maize revenue per acre, and gross margins. The authors find that access to ICT-based market information has a positive and significant impact on the level of output prices received and the intensity of adoption of improved maize. Access to ICT-based market information implies better prices and this positively affects the intensity of adoption of improved seed. The implication is that improving food security and farm incomes should consider both the promotion of yield-augmenting agricultural technologies and improved access to ICT-based market information.*

**Keywords:** *Agricultural Technology, Food Security, Impact Evaluation, Market Information, Propensity Score Matching*

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## INTRODUCTION

This study uses the maize commodity to establish the role of market information in the adoption of agricultural seed technology in rural Uganda. This is because maize is a major nontraditional agricultural export commodity in the country. It is grown in almost all districts, easy to manage, resistant to water stress, and adaptable to different soil types (Deininger &

Okidi, 2001). It ranks high among the nation's crops for food security and poverty reduction, and it provides over 40% of the calories consumed by households in rural and urban areas of the country. In addition, about 50% of the farm households report that food self-sufficiency is the main reason for growing the maize (Mungyereza, 1998). According to RATES (2003), maize provides a living for about two million households and accounts for about 95% of smallholder farm production. However, secondary data shows that the national average

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yield for maize has not increased much between 1990 and 2007. It has been around 1.50 metric tons/hectare for the same period compared to the potential maximum yield of 6.0 metric tons/hectare (UBOS, 2007).

Previous work on poverty alleviation in Uganda has focused on improving smallholder adoption of new yield-augmenting agricultural technologies, such as improved seed (both hybrid and composite varieties). However, little commensurate investment has been made by both the public and private sectors to improve smallholder access to reliable ICT-based market information to allow them get better market prices for their production. Following results from empirical studies, we argue that access to ICT-based market information is crucial to the adoption of improved maize seed. Access to this information leads to better agricultural terms of trade in favor of the farmers which ultimately should increase purchasing power of farmers to procure improved maize seed. Moreover, we argue that access to ICT-based market information (on when, where, and which quantities to supply, and at what prices) has a significant influence on the intensity of adoption of improved maize varieties. The reliable ICT-based market information we refer to is that which is provided by FM radio stations, farmer cooperatives, or market information centers through media such as mobile phones, internet facilities, etc. The alternative source of market information is that which is provided by traders and brokers, who buy directly from the farmers. The quality of this alternative market information is of less value since these traders take advantage of information asymmetries to pay relatively lower prices to farmers.

There are many studies on the adoption of improved maize and the impact on yields in Africa (Morris *et al.*, 1999; Mwabu *et al.*, 2006; Oyekale & Idjesa, 2009; Mugisha & Diiro, 2010). There are also several studies on the impact of ICT-based market information on economic growth in developing countries (Shepherd & Schalke, 1995; Madden & Savage, 1998; Bayes *et al.*, 1999; Eggleston *et al.*, 2001; Ralandison & Shiratake, 2005; Ferris *et*

*al.*, 2004, 2006; Adejobi *et al.*, 2006; Abraham, 2007; Svensson & Yanagizawa, 2008; Kiiza *et al.*, 2010). Our work differs from both types of previous studies mentioned above in that it employs propensity score matching (PSM) methods to effectively control for hidden selection bias. The objectives of our study are; (1) to determine the impact of adoption of improved maize on farm yields and gross farm income; (2) to determine the impact of access to ICT-based market information on prices received by farmers and the intensity of adoption of improved maize in Uganda.

## ANALYTICAL FRAMEWORK

Studies that evaluate the impact of adopting improved technologies or the impact of access to ICT-based market information fail to properly control for potential differences between the technology participants and non-participants. This makes it difficult to draw definitive conclusions about the magnitude of the impacts (Rahman, 1999; Mendola, 2007). A simple analysis of differences in the mean yields or prices obtained between participants and nonparticipants is bound to produce statistically misleading results. For instance, farmers who adopt improved maize seed may be the ones who are well-motivated or wealthier than the nonadopters and these characteristics may not be obvious to the researcher. Since highly-motivated farmers may self-select into the program, a comparison of adopters with nonadopters would tend to overestimate the impact of the technology on yields or gross farm income. In addition, some farmers may disproportionately select into the program due to their higher propensity to participate in technology adoption, and this too is unobservable to the researcher. Therefore, in absence of random selection of farmers in the adoption of improved seed or access to market information, simple comparisons of mean outcomes (such as yields and prices) between adopters and nonadopters are likely to yield biased estimates of the impact (Kassie *et al.*, 2010).

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