Seed information, farm size, and the potential for adoption of zinc-fortified wheat varieties in Pakistan

Hina Nazli and Melinda Smale
Pakistan Strategy Support Program of IFPRI, and Michigan State University

Poster prepared for presentation at the Agricultural & Applied Economics Association's 2013 AAEA and CAES Joint Annual Meeting, Washington DC, August 4-6, 2013.

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Introduction

- In Pakistan, the prevalence of zinc deficiency is substantially high, especially among women and children
- Poor people do not have access to zinc-enriched food and zinc supplements
- Zinc deficiency can be controlled through bio-fortification in basic staple
- In view of the importance of wheat in food consumption in Pakistan, HarvestPlus plans to introduce a zinc-fortified wheat variety in the next few years

Research Questions

- Previous indicates slow rate of variety replacement. However, recent evidence shows the popularity of a new variety (Seher)
- Despite, a large number of farmers grow old variety (Inqilab)
- Three research question that this study investigates
  - Why leading varieties (old & new) are the most popular,
  - How adoption decisions affect by varietal traits and sources of information,
  - how the processes of adoption differ by farm size
- Objectives:
  - To examine the role of varietal traits and formal sources of information of the decision of adopting a new wheat variety, Seher

Conceptual Framework

- Trait-based model of seed variety choice, derived from the agricultural household model (Singh et al., 1986) and the consumer theory of Lancaster (1966)
- Technology adoption decision: $U_1 > U_0$
- The adoption of new technology is closely related to the processes in which farmers obtain information (e.g., formal vs informal sources) ⇒ two regression equations:
  - decision to adopt a new technology, and
  - access to a source of information (e.g., formal (extension or media) and informal (input dealers, other farmers, friends and relatives))
- The dependent variables in the two regressions are latent variables
- Issue of simultaneity between these equations ⇒ recursive bivariate probit model
  - First equation: decision to adopt Seher
  - Second equation: access to formal sources of information

Data

- The data are drawn from a survey among wheat farmers conducted during October-November 2011 in Punjab, the largest province of Pakistan.
- The sample covers 1116 wheat farmers in 93 villages, located in 23 districts of three agro-climatic zone (cotton-wheat, rice-wheat, and mixed zones)

Variables

- Information sources are classified as:
  - Formal (extension or media)
  - Informal (input dealers, other farmers, friends and relatives)
- The number of varietal traits are reduced using the principal components
- Variables are divided into six groups:
  - Individual and household characteristics (φh)
  - Farm characteristics (including farm size groups, marginal, small, and medium/large) (φf)
  - Input and output prices (P)
  - Other market characteristics (φm)
  - varietal production (φp) and consumption (φc) traits
  - Social learning (I)
- Pooled and separate regressions by farm size class are estimated

Results: Pooled Sample (N=1088)

Interdependency of two models: Wald tests, and significance of Rho support the perspective that variety choice and information choice decisions are recursive and interdependent

Variables	Variables Groups	Access to Formal sources	Adoption decision
φh, φf	Household and Farm	*	
φf	Farm size	*	
P	Input and output prices	*	*
φm	Other market variables	*	*
φp, φc	Varietal traits		*
I	Social learning		*

- The pooled model is rejected in favor of separate regressions for marginal, small-scale and medium- to large-scale farmers.

Results: Farm Size Groups

Interdependency of two models: Wald tests indicate that the choice between formal and informal sources and the choice to grow Seher should be estimated as independent probit regressions for all groups except marginal farmers

	Variables Groups	Marginal (N=377)		Small-scale (N=389)		Medium/Large-scale (N=322)	
		Access to Formal sources	Adoption decision	Access to Formal sources	Adoption decision	Access to Formal sources	Adoption decision
φh, φf	Household and Farm	*		*			
φf	Farm size	*				*	
P	Input and output prices			*		*	*
φm	Other market variables			*		*	*
φp, φc	Varietal traits		*		*		*
I	Social learning	*	*	*	*	*	*

Conclusions

- Variety choice and information choice decisions appeared interdependent
- Factors explaining these decisions differ across farm size groups
- Farmer characteristics affect adoption via the cost of acquiring information from formal sources
- Trait preferences have the strongest effects on the decision to grow Seher
- Principles of social learning play a significant role these decision equations
- Farmers having access to formal sources are more likely to grow Seher.

Policy Implications

- A variety with favorable agronomic traits like Seher would clearly be a good vehicle for reaching larger numbers of wheat farmers rapidly
- Strategies for introducing a new variety should emphasize on the delivery and the quality of information to reach the target group
- Findings concerning proxies for social learning suggest that working at community and tehsil levels may have large payoffs