

Information Technology and Rural Market Performance in Central India

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Mobile Innovations for Social and Economic Transformation:
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Motivation

- Considerable interest in information technology for market performance and rural development
- Numerous projects implemented by NGOs and Governments:
 - Use digital technology to provide information and promote development
 - Grameen Phones - Bangladesh, Telecenters- Nigeria and Peru
- Theoretical Literature on the value of information:
 - Costly search lowers competition, creates inefficient allocation of goods
 - Stigler 1961, Rothschild 1973, Salop & Stiglitz 1977, Pratt, Wise & Zeckhauser 1979
- Empirical Evidence:
 - Effects of IT on average price and price dispersion in the US
 - Brown & Goolsbee 2002, Baye, Morgan & Scholten 2006
 - Effects on developing country markets rare
 - Jensen 2007, Goyal 2009

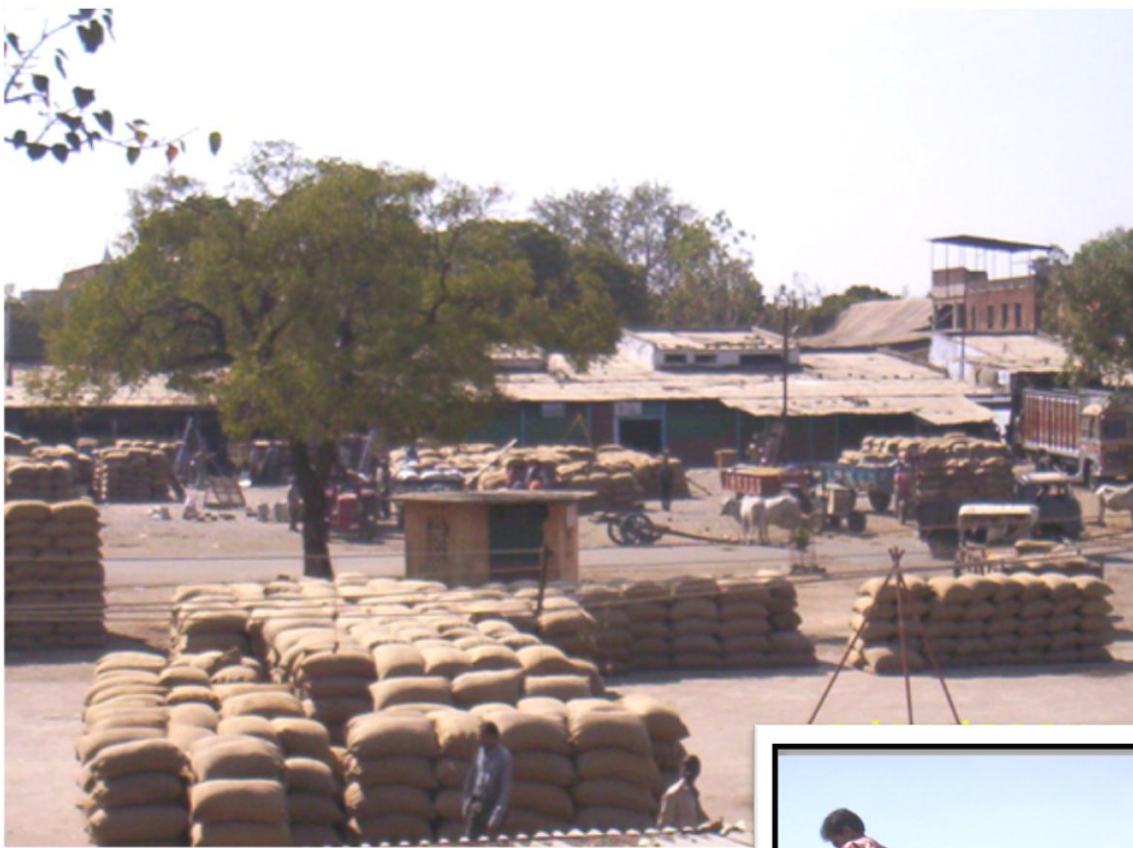
Research Question

- How do improvements in information impact market performance?
- Unique Intervention launched by private company (ITC Limited) in Central India



Rural Markets in Madhya Pradesh

- 60 million people - Agriculture contributes 30% to state GDP engaging 65% workforce
- 233 Government regulated wholesale agricultural markets (*mandis*)
- State Agricultural Marketing Act, 1972 prohibits transactions outside mandis
- Produce sold through an open outcry ascending bid auction
- Government employee visually inspects quality and sets initial price. From here the buyers bid upwards until produce is sold. Rapid Process
- Licensed traders, mostly intermediaries who sell produce up to processing companies



← Market

Auction →



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The Intervention

- Prior to the Intervention, ITC Ltd. purchased soybeans from traders
- Processes soybean. Sells oil and feed in the domestic and international market
- Beginning in October 2000, began to buy soybeans directly from farmers
- Control quality better and lower transactions cost by bypassing intermediaries
- Dual Role for the Infrastructure. Long term plan for selling consumer products
- Used a provision in the by-laws of the Act in early years to do direct buying
- Marketing Act Amended in April 2003

The Intervention

2 Dimensions

I. 1700 internet kiosks set up in villages

- Each kiosk caters to 4 other neighboring villages
- Operated by a trained farmer
- Each day, low and high price of soybean in local markets posted on a website
- ITC's daily offer price posted
- Weather updates and information on farming techniques available online

II. 45 warehouses (called hubs) set up in towns

- Provides a point of contact between farmers and ITC Ltd
- Quality scientifically tested at the hub
- Cluster of kiosks linked to each hub



↑
Kiosk

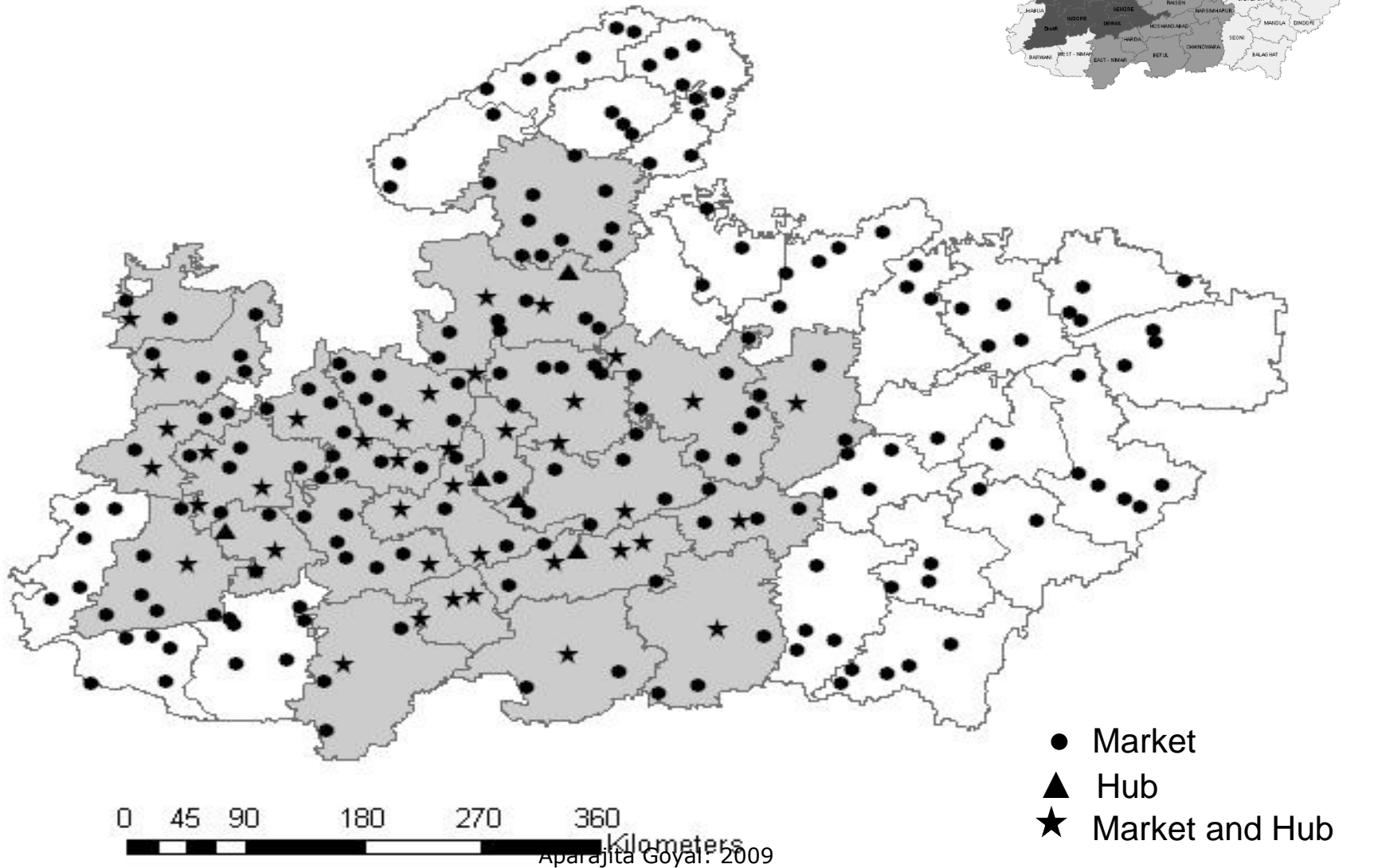


Hub →



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Distribution of Markets, Hubs and Kiosks



Theoretical Predictions

- Develop a theoretical model of this intervention
- Construct a new market-level dataset with spatial geo-coded information
- Model predicts: Information leads to higher prices
- Warehouses exert two opposing forces on market price:
 - Competition Effect: Direct buying puts an upward pressure on price
 - Composition Effect: Scientific testing of quality leads to sorting puts downward pressure on price

Data

- Price of crops in 233 markets from April 2000 to September 2005
- Price in sub-sample of 30 markets from April 1998 to September 2005
(*State Marketing Board, Government of Madhya Pradesh*)
 - Price in government regulated wholesale markets
 - Not the price offered or posted by ITC
 - Min, Max and Mode Price in a Month
 - Quality bias possible
- Sales Volume of crops in 233 main markets from April 2000-Sep 2005
(*State Marketing Board, Government of Madhya Pradesh*)
 - Volume includes markets plus ITC Hubs
 - Deducted ITC monthly procurement at hubs to get volume of sales in markets
- The timing and location of all internet kiosks and hubs. (*ITC Limited*)
 - GIS information on location of hubs and markets
- Annual District level Area cultivated, Production and Yield of Crops from 1998-2004 (*Department of Agriculture*)

Empirical Findings

Exploit inter-district variation in roll-out timing of kiosks and warehouses

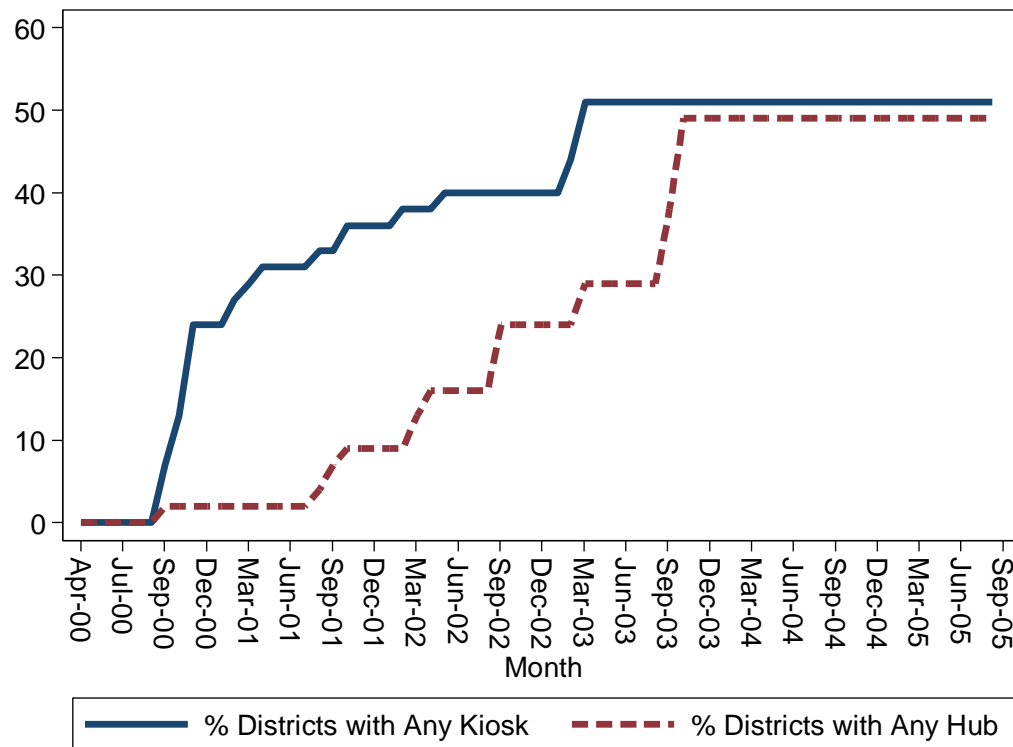
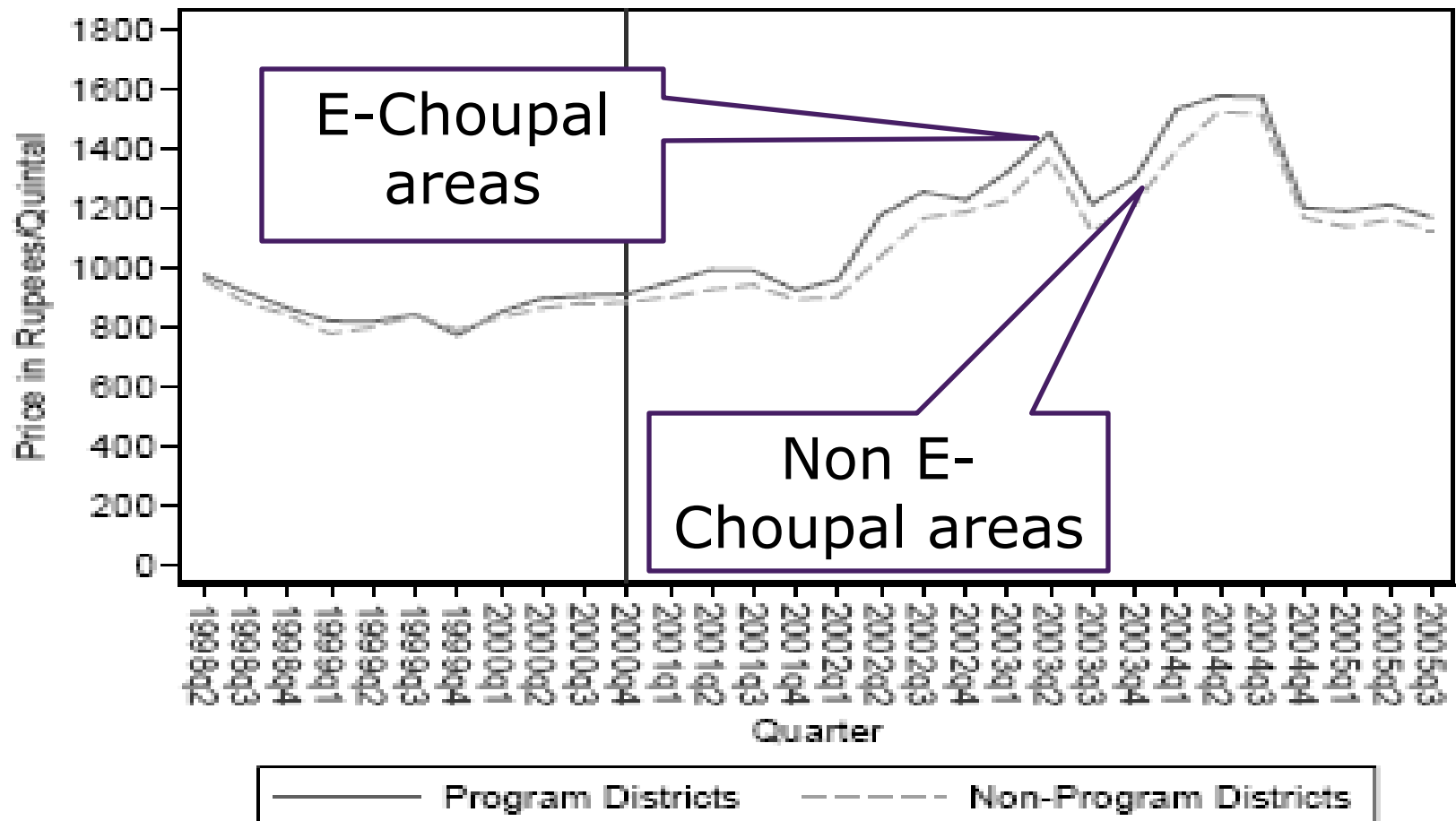


Figure 2: Broad Trends in Mode Price of Soybean Across Districts of the State



Empirical Findings

- Significant increase in the average price of soybean (1-3%) in local markets after introduction of kiosks
- Heterogeneous effects of kiosks by distance. Further away the kiosks are to the markets, the lower is the effect on price.
- Dispersion in price across markets decreasing over time
- Increase in the area under soy cultivation by 19 percent. Evidence of substitution away from rice cultivation.
- Effect of warehouses on average price in local markets is small and insignificant indicating sorting effect offsets competition effect

Conclusion

- Significant fraction of rural households depend on output markets for livelihood in developing nations.
- Innovations that improve market performance can have important effect on returns received by farmers and their behavior
- Dearth of rigorous evidence supporting positive effects of ICTs in rural markets
- Paper (Goyal, 2009) provides robust evidence that improvements in information impact market performance by increasing the competitiveness of local buyers.
- This kind of evidence is really important for policy makers to decide whether or not to supporting similar initiatives in other countries, contexts, regions

Conclusion

- Understand the mechanisms and institutional environment to scale up and mainstream similar initiatives.
- For instance, I find an effect on both average price and price dispersion because it turns out that local buyers are not all that competitive, and information to farmers lowers some of their market power - leads to an increase in average price.
- Jensen's case: perishability of fish and how to allocate it efficiently across different markets – cellphones leads to a decline in price dispersion only with no effect on average price
- Inter-linkages between buyers and sellers in terms of credit, inputs etc. important