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Master Thesis Project

The e-CHOUPAL Program and Inclusivity of the Agricultural Value Chain

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Summary

Motivation

South Asia faces a critical need for industrial development capable of generating formal employment in a context of demographic growth. The agro-industrial processing and logistics sector is recognized for its potential to create labor-intensive value (Newfarmer 2019; Barrett 2022). This coincides with the urbanization trend increasing the demand for processed food products in developing countries (Reardon 2015).

The agri-food sector in South Asia is characterized by a large number of small agricultural holdings whose production struggles to reach urban markets. The value chain is marked by strong information asymmetries where intermediaries capture the bulk of agricultural profits by taking advantage of producer isolation (Minten 2012). This exclusivity allows intermediaries to benefit from rents without this surplus translating into efficiency gains.

Wholesale markets (*mandis*), developed in India throughout the 20th century, help favor price transparency and the integration of farmers into formal markets that require standards and large production volumes (Reardon 2021). In parallel, several digital initiatives are being developed to reinforce price transparency and the efficiency of these infrastructures.

The **e-CHOUPAL system**, launched by the Indian Tobacco Company (ITC) in June 2000, inspired the eNAM mobile application currently expanding across the country. It consists of kiosks allowing farmers to access prices from various wholesale markets directly from their village. This allows farmers to benefit from better prices by stimulating competition among buyers and enhancing their bargaining power regarding the timing of the sale or the quality of their production.

Although these mechanisms have been widely studied, most evaluations rely on prices practiced in the *mandis* (Goyal 2010; Swain 2022; Levi 2020; Kumar K. 2024) or rely on samples too small to distinguish price by crop type (Kumar 2020). However, Kumar (2020) shows the prevalence of agricultural intermediaries in wholesale markets integrated with digital systems. This phenomenon suggests a potential disconnection between the prices obtained in these digitalized markets and those actually received by farmers. Indeed, Mitra et al. (2018) highlight a null impact of price information dissemination to farmers due to a structural dependence on intermediaries.

Our study uses primary survey data to measure the real benefits of e-CHOUPAL, the main objective of which is improving prices obtained by farmers through information dissemination. This will allow us to infer whether the recent deployment of digital integration solutions such as eNAM coincides with an inclusive development of the Indian agro-industrial value chain.

Research Question

Did the e-CHOUPAL digital policy fulfill its objective of increasing farm-gate prices obtained by Indian farmers?

Theoretical Framework

1. Information Asymmetry and Search Costs: Information asymmetries occur at every stage of the agricultural and trading process. Lack of knowledge regarding prices (*mandis*) prevents farmers from accessing the most attractive sales options. These markets are themselves characterized by price collusion, and manipulations regarding auctions and weighing of goods. On the farmers' side, production quality is not perfectly observed by the buyer, which limits their integration into the formal market.

2. Oligopsony Situation: The Indian rural market is often characterized by an oligopsony situation where a small number of buyers exert downward pressure on prices. The low number of buyer licenses granted, the necessary capital investment, and the lack of access to credit constitute barriers to entry for the profession (Mitra et al. 2018).

Data and Software Used

To conduct this study, I intend to use **Village Dynamics in South Asia (VDSA)** data. This data measures prices obtained by a panel of 800 agricultural households over the period 2009 to 2014. The data is differentiated for each crop type and collected via primary surveys.

The e-CHOUPAL program was implemented in at least 10 states: Madhya Pradesh, Haryana, Uttarakhand, Uttar Pradesh, Rajasthan, Karnataka, Kerala, Maharashtra, Andhra Pradesh, and Tamil Nadu. Precise implementation data for e-Choupal kiosks and e-Choupal Saagar hubs are also required and will be obtained by addressing a request to ITC Limited, as done in the context of Goyal (2010).

In addition to this analysis, we can collect price data from eNAM and non-eNAM *mandis* to compare them with the prices obtained by farmers. Complementary sources will be required to collect control variables (Rainfall, soil fertility, etc.). The software **Stata** will be used for the analysis.

Econometric Specification

I use the doubly robust Difference-in-Difference specification by Callaway and Sant'Anna (2021). For each crop type *c*, I estimate separately the average price obtained by farmers in the district. The Pscore is calculated using district-level variables, while prices and the ATT are estimated at the household level.

Specification 1: Staggered Difference-in-Difference (Callaway & Sant'Anna)

$$\mathrm{ATT}^{c}_{t,g} = \mathbf{E}\left[\left(\frac{\mathrm{Tg}}{\mathbf{E}[\mathrm{Tg}]} - \frac{\frac{\pi_g(X)(\mathrm{C})}{1-\pi_g(X)}}{\mathbf{E}\left[\frac{\pi_g(X)(\mathrm{C})}{1-\pi_g(X)}\right]}\right)\left(Y^{c}_{i,t} - Y^{c}_{i,g-1} - m_{g,t}(X)\right)\right] \quad (1)$$

- t: year
- i: agricultural household
- j: district
- c: crop type
- g: treatment cohort (date of first kiosk installation in the district)
- $ATT_{g,t}$: Average Treatment Effect on the Treated (Impact of kiosks on prices for cohort g in year t)
- T_g: treatment indicator (binary variable equal to 1 if the district is first treated in period g)
- (C): control group (binary variable = 1 for never-treated districts)
- $\pi(X)$: propensity score (probability of belonging to the treatment group)
- X: control variables:
  - **District level**: total crop production, soil quality, rainfall, distance to markets (*mandis*)
  - **Household level**: farm size, education, caste, irrigation access
- $(Y^{c}_{i,j,t} - Y^{c}_{i,j,g-1})$: Change in prices received by households for crop c between the baseline $g-1$ and year t
- $m_{g,t}$: Predicted change in price received

Identification Strategy

The identification strategy consists of a Staggered Difference-in-Difference crossing the kiosk implementation dates and the results of agricultural households in the targeted districts. Observing prices coming from surveys allows for the identification of the price actually perceived.

There will be issues of endogeneity since ITC probably selected high performing villages to implement kioks and hubs. To account for this we control for infrastructure, climatic, soil fertility and other relevant variable in each region. We will also match control with treatment village using Propensity Score Matching to make sure that both groups are comparable. Moreover, analysing the results separated by crop type will be essential since price realization depends highly on the crop cultivated and knowing that ITC used eChoupal to source specific crops such as soy.

Contribution to the Literature

Goyal (2010) constitutes the main reference testing the efficiency of the e-CHOUPAL program using *mandi* price data and a staggered Difference-in-Difference. Our study will allow for the quantification of prices **actually perceived** by farmers thanks to primary survey data and potentially analyze their difference with prices practiced in eNAM and classic *mandis*. We improve upon the double fixed effect specification of Goyal (2010) by modeling the heterogeneity of effects by treatment cohorts in accordance with the critique by Goodman-Bacon (2021)

Main References

- **Barrett, C. B., Reardon, T., Swinnen, J., & Zilberman, D. (2022).** Agri-food value chain revolutions in low-and middle-income countries. *Journal of Economic Literature*.
- **Callaway, B., & Sant'Anna, P. H. (2021).** Difference-in-differences with multiple time periods. *Journal of Econometrics*.
- **Goyal, Aparajita. (2010).** Information, Direct Access to Farmers, and Rural Market Performance in Central India. *American Economic Journal: Applied Economics*.
- **Kumar, R., et al. (2020).** Strengthening E-NAM in India: way forward. Hyderabad: ICAR.
- Kumar K, N. R., et al. (2024). Electronic-National Agriculture Market (e-NAM) and price realization: A Difference-in-Difference analysis from Andhra Pradesh, India.
- **Levi, R., et al. (2020).** The impact of unifying agricultural wholesale markets on prices and farmers' profitability. *Proceedings of the National Academy of Sciences*.
- **Minten, B., Vandeplas, A., & Swinnen, J. (2012).** Regulations, brokers, and interlinkages: the institutional organization of wholesale markets in India. *Journal of Development Studies*.
- **Mitra, S., et al. (2018).** Asymmetric information and middleman margins: An experiment with Indian potato farmers. *Review of Economics and Statistics*.
- **Newfarmer, R., Page, J., & Tarp, F. (2019).** *Industries without smokestacks: Industrialization in Africa reconsidered*. Oxford University Press.
- **Reardon, T. (2015).** The hidden middle: the quiet revolution in the midstream of agrifood value chains in developing countries. *Oxford Review of Economic Policy*.
- **Reardon, T., Liverpool-Tasie, L. S. O., & Minten, B. (2021).** Quiet Revolution by SMEs in the midstream of value chains in developing regions. *Food Security*.
- **Swain, P. K., et al. (2022).** Impact of development of National Agriculture Market (e-NAM) on farmers. *Indian Journal of Agricultural Sciences*.