

EXIM BANK: RESEARCH BRIEF

Mandis, Competition and Farmer Incomes in India

Based on Doctoral Dissertation titled 'Essays in Trade and Development Economics'



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Export-Import Bank of India instituted the International Economic Research Annual (IERA) Award in 1989. The objective of the award is to promote research in international economics, trade, development and related financing, by Indian nationals at universities and academic institutions in India and abroad. The study titled 'Essays in Trade and Development Economics' is based on the IERA Award 2019 winning thesis by Dr. Shoumitro Chatterjee, Assistant Professor of Economics, Department of Economics, The Pennsylvania State University, USA.

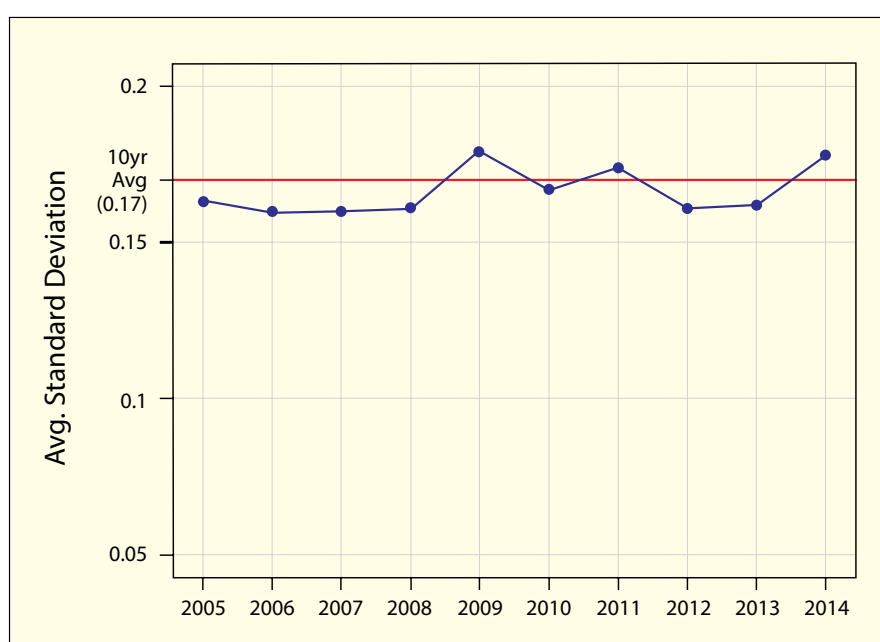
A long-standing view in India has been that inefficient intermediaries contribute to low farmer incomes as they exert market power. Two facts in the data fuel this belief. First, despite massive improvement in infrastructure, roads, and communication costs, spatial variation in prices of agricultural commodities has not declined (see **Figure 1**). This should have been the case if law of one price with perfect competition is to be taken seriously. Second, in the data there exists large wedges between wholesale and retail prices of agricultural commodities and these are indicative of large mark-ups that intermediaries charge.

The monopsony rights to regulate trade of agricultural produce provided to the intermediaries by the Agricultural Produce and Marketing Committee (APMC) acts of various states of India is believed to be the reason behind the market

inefficiencies and the market power of intermediaries. Based on the above understanding, the Government of India on 15th May, 2020 announced

three major policy reforms to further its goal of doubling farmer incomes. First, a proposed amendment to the Essential Commodity Act that would

Figure 1: Spatial Variation in Prices of Agricultural Commodities Across Mandis in India



Source: Chatterjee and Kapur, "Six Puzzles in Indian Agriculture," *India Policy Forum* 2016–17

deregulate foodstuff and stock limits would be applicable in exceptional circumstances. Second, a proposed formulation of a central law that would not bind the farmers to licensed traders in APMC Mandis and remove barriers to inter-state trade. Third, facilitating a legal framework for contract farming.

This paper studies a particular slice of the very complex problem of low farmer incomes. In particular, it examines the economic consequences of the second reform – i.e. removal of inter-state barriers to trade. In order to understand the economic consequences of a trade liberalization, it is imperative that we first understand the economic mechanism through which such a reform will operate.

The key economic mechanism proposed in this paper is that of spatial competition. The idea is that when many buyers (intermediaries) bid for a seller's (farmer's) produce, they are likely to get a higher price. If there are few buyers, competition is low, and therefore the offered price is low. This mechanism also operates in a spatial context.

In India, trade of grains takes place mostly in APMC markets or mandis. Imagine two districts, one with few mandis and the other with many. Where are prices going to be higher on average, other things being equal? Suppose a farmer negotiates with the intermediaries in a mandi and they don't offer the farmer a good price. The alternative the farmer has is to go to a nearby mandi and try his luck there. Therefore, the other alternative mandis are the farmers "outside option" or "threat point". What the farmer can get in an alternative

market is the threat he can use to get a better price in any negotiation. This outside option is presumably larger when there are many alternative markets and hence in a district with many mandis the average price that the farmer gets is likely to be higher.

The paper first establishes that this is indeed the case in the data. By using micro data on location mandis and prices of various commodities the paper shows that a one standard deviation increase in market density causes prices received by farmers to increase by about 3%. Having established that the main mechanism has an empirical bite, the paper then proceeds to study the effects of removal of inter-state trade barriers to agricultural produce.

The economic mechanism at play when inter-state barriers to agricultural trade are removed is the following. For farmers living close to state borders, this is like an increase in their outside option. In particular, now while negotiating with intermediaries they can claim to have access to a larger set of buyers. Thus, to a first order, one would expect an increase in prices at least for farmers closer to state borders.

However, the force of spatial competition is stronger. Once prices in mandis close to state borders increase, farmers negotiating in mandis slightly farther from borders also have greater outside option. This is because for them, the border markets are the "alternatives". Thus, almost via a diffusion process, removal of interstate barriers can increase prices in mandis even in interiors of states. However, the

magnitudes might be small since this diffusion is discounted by costs of transportation.

This is not where the story ends. Once farmers get better prices, they can afford to use better inputs like seeds, fertilizers, pesticides etc. This can then contribute to an increased agricultural output contributing to further increase in incomes. However, there can be a final negative force. Once supply of agricultural output increases in the economy, it will push down retail prices that would lower the overall value of agricultural surplus. Thus, it will have a dampening effect on farmer incomes.

Quantitatively, how large can each of the above forces be? In particular, what are the distributional consequences going to be – i.e. which are the regions where farmer incomes may actually decline and by how much? To answer this question this paper proposes a spatial model and bargaining and trade that flexible captures these forces.

The model embeds a Nash bargaining model with endogenous threat points in a spatial trade model. In the model, farmers live on their farms and the locations of mandis is decided exogenously by the government. Farmer first decide what to grow and upon harvest determine a market to go and sell their produce in. Once they arrive at a market, the model assumes that all costs are sunk. This is because in the negotiation process between the intermediary and the farmer, all that the intermediary cares about is to buy the produce at the lowest price possible. The negotiation between the farmer and the intermediary is modelled

as a Nash bargaining game. In the bargaining process, the outside option of the intermediary is zero because if the bargaining fails the intermediary does not get anything. The farmer on the other hand can choose to go to an alternative market if he does not get a good price. Thus, the outside option of the farmer is endogenous – it depends on the market clearing price in the alternative market.

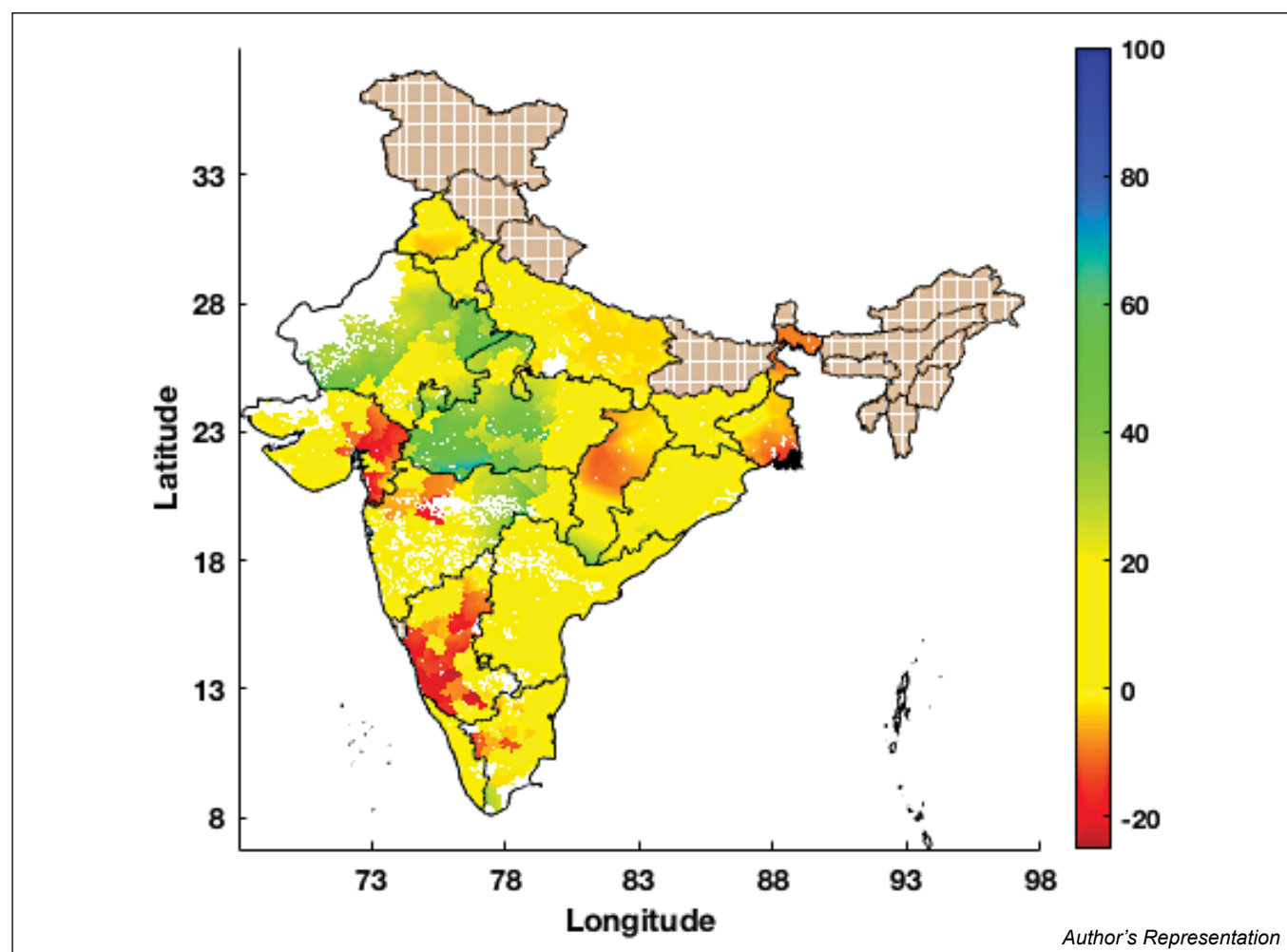
Quantitative estimates from the model suggest that inter-state trade restrictions can increase farmer prices by about 11% on average. This price response has the potential to trigger a

productivity improvement as farmers invest in better intermediate inputs like seeds and fertilizers. Average crop output could increase by 9% on average. The increased crop supply can however have an unintended negative consequence. As farmers increase supply of crops, that triggers a downward response of consumer prices. This although increases consumer welfare but could reduce farm incomes in certain locations. The model estimates suggest that compared to the overall gains, the negative effects are small and as such average prices in the country

would still increase by 9%. A small fraction of the farmers would lose and get about 10% lower prices than before. Thus, as is standard in any neo-classical trade model, a reform of the agriculture sector will create winners and losers (see **Figure 2**). The study helps in learning about the mechanisms, and quantify the magnitude and locations of the costs and benefits.

In sum, this paper shows that increasing competition in one region spreads through the rural economy via a ripple effect. In particular, simulating the effects of reforms

Figure 2: General Equilibrium Price Effects of Removing Border Restrictions to Agricultural Trade During Kharif Season



Note : Brown colour represents no data and white represents zero gains.

that prohibit inter-state trade show that such a policy not only increases incomes of farmers who live close to state borders but also of those living in the interior. Simulations also show that increased competition further increases farmer incomes because of the increased output of farmers as they optimize the use of intermediate inputs. It is found that the average increase in prices and output for the farmers with above-median gains is about 21% and 15%, respectively. Further, the value of national crop output increases by about 18%. Moreover, the results indicate that isolated studies in agricultural markets can indeed find varying estimates of market power of intermediaries because they are partly driven by spatial competition.

Thus, the key policy implications of this study are the following. Although there is evidence of market power, the quantitative estimates are moderate. Average potential gains from removal of interstate border restriction are in the 9-10% range in terms of revenue. However, there are definitely some farmers who benefit much more than others.

Although the paper points toward important gains in store specially for farmers in remote regions where intermediary may enjoy greater market power, the results must not be read without caveats. Model simulated effects do not take into account political and social complexities which can both increase or exacerbate these effects. In particular, the

economic model of this paper takes the institutions, the political economy of rural India as given. That is, this paper does not allow the politics to respond to the policy.

The market of inputs – seeds and fertilizers have been assumed to be perfectly competitive with inelastic supply. Departures from this assumption will change the quantitative magnitudes. For example, when farmers start demanding more nutrients, it may drive up their prices and limit how much extra output can be generated. Labour is another key input whose wages are competitively determined and again puts limits of increased productivity.

Finally, the model also assumes that farmers directly sell in mandis which is not always the case. Results are robust as long as the relationship between the farmer and the person who buys from the cultivator farmer and sells in a mandi does not change. This person could be a larger farmer of the village aggregating from smaller farmers or an intermediary buying from farmers and selling to larger intermediaries in mandi. Without further information on this relationship, it is outside the scope of this paper to predict the net change in prices for the actual cultivator who may not be going to the mandi.

Despite these considerations, the most important lesson perhaps is the general equilibrium distributional consequences of which that policy maker must be aware of. Basically,

small farmers take market prices as given and hence, do not take into account the externality they might cause on each other. In other words, if increased competition incentivizes them to produce more, each individual farmer does not account for the fact that a large increase in supply can cause prices to fall. Therefore, when all farmers increase agricultural output prices in certain regions fall too much such that it causes a net negative effect on farmer incomes. Even though the average effects of increased competition are positive, there are certain regions in India where farmers will lose. This prediction is not different than that of any neo-classical trade model where liberalization creates winners and losers but it does run contrary to belief among policy circles and therefore advises caution.

The contents of the publication are based on information available with Export-Import Bank of India. Due care has been taken to ensure that the information provided in the publication is correct. However, Export-Import Bank of India accepts no responsibility for the authenticity, accuracy or completeness of such information.

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