

Agricultural Pricing Policy, Farmers' Welfare in the presence of Private Traders

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Abstract

The Indian agricultural sector has been in a crisis since the pre-independence period. Although it is no longer the largest contributor to the National Income, however, it employs the majority of the Indian workforce. The agricultural sector in India is highly regulated, starting from the ownership and use of land, access to factor inputs, access to output markets, product prices, etc are directly or indirectly governed by a maze of laws. Presently, markets in agricultural products are regulated under the Agricultural Produce Market Committee (APMC) Act. There are about 2477 principal regulated markets based on geography (the APMCs) and 4843 sub-market yards regulated by the respective APMCs in India. Effectively, India has near thousands of agricultural markets. According to a presentation made last year by the union agricultural ministry, 17 states have deregulated fruits and vegetables from APMCs and as many as 19 states have provisioned contract farming into APMC Acts. Under the APMC Act, the states can establish agricultural markets, popularly known as mandis. The sale of agricultural commodities can occur only in the mandis through auction. The sales process in mandis is regulated through commission agents (CAs) who mediate between the farmers and traders. These markets exercise either monopoly/oligopoly or monopsony/oligopsony power in the appointed area and collect revenue, in terms of different “market fees” to develop the local agricultural infrastructure. It is a popular belief among policymakers that the crisis in the Indian agriculture sector can be attributed to deficient marketing, supply, and distribution chain and not due to poor agricultural practices. Thus, policymakers resorted to privatizing the agriculture sector at various levels from food procurement to food processing, which is expected to improve the bargaining position of the farmers and a more competitive price for farm output. The trading mechanism between farmers and traders is too complex to understand. In India, there has been a skewed distribution of landholdings. About 92% of farmers in India are either small or marginal farmers and only 6% of the Indian farmers are able to take the advantage of the MSP through APMCs. In our paper, we try to develop a micro theoretic model to analyse different government initiatives that might result in farmers' welfare. We also analyse how these policies will result in intra-farmers' welfare as well. We have shown that an increase in MSP may directly benefit middle and large groups of farmers. Though small or marginal farmers do not enjoy the direct benefit of higher MSP, they may enjoy higher pay-off indirectly. MSP might act as a discounted

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reservation price to the farmers. Also, MSP serves a better purpose as a government policy instrument in terms of benefitting small farmers when compared to per farmer's maximum selling quota.

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JEL Classification: D43, D47, L13, I380

1 Introduction and a brief survey of literature:

The Indian agricultural sector has been in a crisis since the pre-independence period. Although it is no longer the largest contributor to the National Income, however, it employs the majority of the Indian workforce. The agricultural sector in India is highly regulated, starting from the ownership and use of land, access to factor inputs, access to output markets, product prices, etc are directly or indirectly governed by a maze of laws. Presently, markets in agricultural products are regulated under the Agricultural Produce Market Committee (APMC) Act. Under the APMC Act, the states can establish agricultural markets, popularly known as mandis. The sale of agricultural commodities can occur only in the mandis through auction. The sales process in mandis is regulated through commission agents (CAs) who mediate between the farmers and traders. These markets exercise either monopoly/oligopoly or monopsony/oligopsony power in the appointed area and collect revenue, in terms of different “market fees” to develop the local agricultural infrastructure. In India, Punjab and Haryana are the two states where APMCs are very developed. On the other hand, Kerala never had an APMC act and Bihar repealed it in 2006. Though Bihar failed to develop an effective alternative market system. Over the years, around 18 states have allowed private markets, and 19 states have allowed direct purchases from the farmers (The Print, 2020). Despite different reforms, APMC mandis continued to be vilified and there is no conclusive evidence that the farmers have received better agricultural prices in private mandis outside APMC. The system of Minimum Support Prices (MSPs) was introduced in India in the mid-1960s to incentivize the environment for the adoption of HYV of wheat and rice, which helped India to stabilize its food prices and had some favourable impact on farm income. Over the years though India managed to be self-sufficient in terms of agricultural production and become the net exporter of agricultural products, but the foodgrains distribution system still lacks efficiency. The National Food Security Act (NFSA, 2013) was implemented to correct this system and ensured foodgrains security at a subsidised rate. To meet this requirement, the system of MSPs is still in operation. According to NSSO data, about 92% of farmers in India are either small or marginal farmers who cultivated not more than 5 acres of land making them ultimately the net buyers of food grains and only 6% of the Indian farmers are able to

take the advantage of the MSP. Thus, any rise in MSP will be beneficial for a tiny section of farmer households (De Roy, 2018).

The economic liberalization in India started in the 1990s but unfortunately bypassed Indian agriculture. In recent times as a matter of agricultural reform, the Indian government passed, though later repealed, a new farm bill, named, Farmers' Produce Trade and Commerce Act (FPTCA), Farmers Agreement on Price Assurance and Farm Services Act (FAPAFSA), and Essential Commodities Act (ECA), popularly known as, Farm Bill 2020, creating a parallel marketplace to the existing state regulated APMC markets, which brought the entire country into a prolonged debate. Those who were in the favour of the Farm Bill 2020 believed that the introduction of this new agricultural ecosystem will provide freedom of choice relating to the purchase and sale of farmers' produce through competitive alternative trading channels. It was argued that the new ecosystem might reallocate the surplus of the middlemen and distribute it between farmers and final traders thus improving farmers' welfare. It is generally believed that middlemen in agricultural value chains in developing countries appropriate significant margins (Morisset, 1998). Farmers' selling opportunities are often limited because of few handlers and costly-to-transport raw products (Durham and Sexton, 1992). (Mitra et al., 2018) also showed that the large transaction costs and regulation costs prevent potato farmers in West Bengal from selling to the wholesale buyers directly. Marketing middlemen earn large margins, which reflects barriers to entry into the trading business. The opposition to these bills comes from the various ground. Among others, the farmers' organization fears that agro-business corporations can take over the farming sector and thereby can exercise higher bargaining power to further deteriorate farmers' situation which is evident from even various developed countries as well. (Fofana and Jaffry, 2008) showed that a significant increase in concentration in the UK salmon retail subsector has heightened concerns about retail firms' ability to exercise market power in the purchase of supplies. (Sarkar, 1993) analyses the formation of agricultural prices. He showed that over time the market becomes more and more oligopolistic and market price exhibits less and less seasonality and further showed that the small farmers are forced to sell off their entire stocks earlier than the large farmers. But the question has also been raised on the role of the corporate players that can eventually monopolize the market.

It is a popular belief among policymakers that the crisis in the Indian agriculture sector can be attributed to deficient marketing, supply, and distribution chain and not due to poor agricultural practices. Thus, policymakers resorted to privatizing the agriculture sector at various levels from food procurement to food processing, which is expected to improve the bargaining position of the farmers and a more competitive price for farm output. The trading mechanism between farmers and traders is too complex to understand. Why do the majority of the farmers tend to sell their products at a very low price to the middlemen? The existing literature tried to argue that due to some 'risk-sharing contracts' with the middlemen and poor credit market infrastructure compel the farmers to sell their products at a very low price to them. But different credit market initiatives had not been able to develop the scenario at a significant level. Another group of economists believes that information asymmetry could be another plausible reason. But according to (Mitra et al., 2018) improving farmers' access to price information is unlikely to have a positive impact on farmgate prices. Other evidence suggests that higher transportation costs, transaction costs, and bureaucratic hustle may be another reason why farmers prefer to sell to the traders even at that low price.

In India, there has been a skewed distribution of landholdings. About 92% of farmers in India are either small or marginal farmers and only 6% of the Indian farmers are able to take the advantage of the MSP through APMCs. The main objective of our paper is to analyse the basic nature of trading between farmers, government, and private traders. And how different policy initiatives by the government in terms of higher MSP, or higher per farmer selling quota, or lower transportation cost, etc will affect the farmers' overall welfare along with intra-farmers welfare and the price offered by the private traders.

The rest of the paper is organised as follows. The next section describes the theoretical nature of the model. In Section 3 we show the determination of equilibrium values for the endogenous variables. In section 4 we analyse a few comparative static analyses. The final section summarizes and concludes the paper.

2 The Model:

2.1 Farmers' selling decision:

Consider a unit mass farmer each with an exogenous stock of the agricultural product $q \in [0, 1]$, which follows a probability distribution function $F(q)$. Therefore, farmers with lower (higher) values of q will imply small or marginal farmers (large farmers). Now the farmers have to decide how much of their output to sell to the government (q_G) at an exogenously fixed Minimum Support Price (MSP), \bar{P} and how much to sell to the private traders ($q - q_G$) at the price P_T , offered by the traders given that $\bar{P} > P_T$. Farmers can sell to the govt. only at some specified trading areas¹ and an individual farmer is only allowed to sell a maximum of \bar{q} amount of his agricultural product. But for selling at those trading areas farmers face various forms of market fees, bureaucratic hustle, and other forms of transaction costs, etc, which we assume to be *transportation costs* τ . Therefore pay-off function for an individual farmer is given by²

$$\pi^F = \bar{P}q_G + P_T(q - q_G) \quad (1)$$

Now, the farmers will sell their product to the govt only if, $\pi^F \geq P_T q \implies q_G \geq \frac{\tau}{\bar{P} - P_T}$
Let's assume,

$$\underline{q} = \frac{\tau}{\bar{P} - P_T} \quad (2)$$

Equation (2) implies that only farmers with an agricultural product greater than \underline{q} ³ will only be able to sell at the MSP to the government.

Therefore, the total agricultural product procured by the govt,

$$R = \int_{\underline{q}}^{\bar{q}} q f(q) dq + \int_{\bar{q}}^1 \bar{q} f(q) dq \quad (3)$$

¹e.g., APMC mandis, Centralised Procurement centres etc.

²For simplicity we are assuming production cost to be zero.

³We also assume that the govt. quota fixed for each farmer $\bar{q} \geq \underline{q}$, otherwise no farmer will be able to sell to the govt.

And the total supply available to the private traders is given by

$$Q = \int_0^{\underline{q}} q f(q) dq + \int_{\bar{q}}^1 (q - \bar{q}) f(q) dq \quad (4)$$

We can also represent equation (4) as

$$\begin{aligned} Q &= \phi(P_T) + A & \text{for } \underline{q} < \bar{q} \\ &= B & \text{for } \underline{q} \geq \bar{q} \end{aligned}$$

Where, $A = \int_{\bar{q}}^1 (q - \bar{q}) f(q) dq$ and $B = \int_0^1 q f(q) dq$.⁴

Corollary 1: *The agricultural product supply function faced by the traders is upward sloping for $\underline{q} < \bar{q}$ and vertical for $\underline{q} \geq \bar{q}$.*⁵
i.e.,

$$\begin{aligned} \frac{dQ}{dP_T} = \phi'(P_T) = \frac{q^3 f(q)}{\tau} &> 0 & \text{for } \underline{q} < \bar{q} \text{ or } P_T < \bar{P} - \frac{\tau}{\bar{q}} \\ &\rightarrow \infty & \text{for } \underline{q} \geq \bar{q} \end{aligned}$$

The following Figure 1 shows the supply curve faced by private traders. If the value of P_T is very high or the value of MSP, \bar{P} , is sufficiently low, such that $\underline{q} \geq \bar{q}$, then the supply curve become perfectly inelastic. Here, we also assume that at $\underline{q} = \bar{q}$, where the farmers are indifferent between selling their products to the govt. and to the private traders, the farmers will sell it to the private traders.

2.2 Traders' price offer decision:

Now consider there are n homogenous private traders competing in an oligopsonistic⁶ framework to buy the agricultural product from the farmers but face perfect competition in the final product market. We further assume that the ratio of the output of the finished product to agricultural input is normalised to unity⁷.

So, the profit function for the i^{th} trader is given by⁸

$$\pi_i^T = Pq_i - P_T(Q)q_i \quad (5)$$

⁴Note that A is independent of P_T .

⁵We assume that the farmer will sell his product to the private traders if he is indifferent.

⁶Zero conjectural variation is assumed throughout the analysis, i.e., $\frac{dq_i}{dq_j} = 0$, $\forall i \neq j$

⁷i.e., the quasi-fixed proportion production function faced by an individual trader is given by $x_i = q_i$

⁸The traders take the product price P as exogenously given and we assume the profit function to be concave.

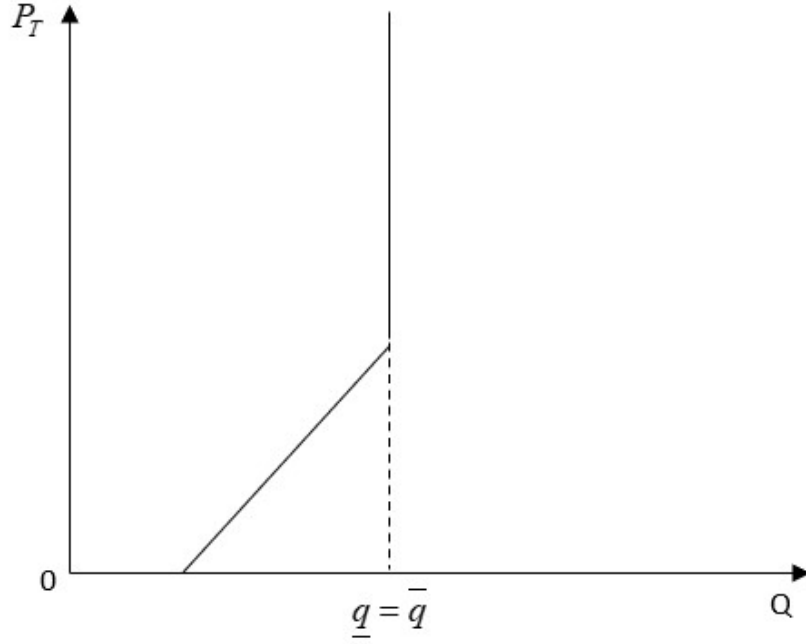


Figure 1: Supply Curve

Traders determine P_T and q_i that maximize their profit. The F.O.C. for the i^{th} trader yields,

$$\begin{aligned}
 \frac{\partial \pi_i^T}{\partial q_i} &= P - P_T - q_i \frac{\partial P_T}{\partial Q} = 0 \\
 \implies n(P - P_T) &= Q \frac{\partial P_T}{\partial Q} \\
 \implies n(P - P_T) &= \frac{A + \phi(P_T)}{\phi'(P_T)}. \tag{6}
 \end{aligned}$$

Equation (6) can be interpreted as the value of the marginal product (VMP = nP) for the agricultural input which must be equal to the marginal expenditure (ME)⁹ of purchasing one additional unit of agricultural input from the farmers at equilibrium.

3 Determination of equilibrium:

We have three¹⁰ unknowns and three equations, namely, equations (2), (4), and (6). From equation (2) we can find the value of \underline{q} in terms of P_T and then by solving equations (4) and

⁹ME = $P_T[n + \frac{1}{\epsilon_{QP_T}}]$, where, ϵ_{QP_T} is the input price elasticity of market supply.

¹⁰Actually, there are $(n + 2)$ unknowns, given that the traders are homogenous, so at equilibrium $q_i = q_j \quad \forall i = 1(1)n, \quad i \neq j$

(6) simultaneously we can find the equilibrium values of P_T^* and q_i^* .

In the following Figure 2 , Figure 3 , and Figure 4 determination of the equilibrium value of P_T^* and q_i^* are shown. Equilibrium¹¹ occurs where LL curve intersects the RR curve.

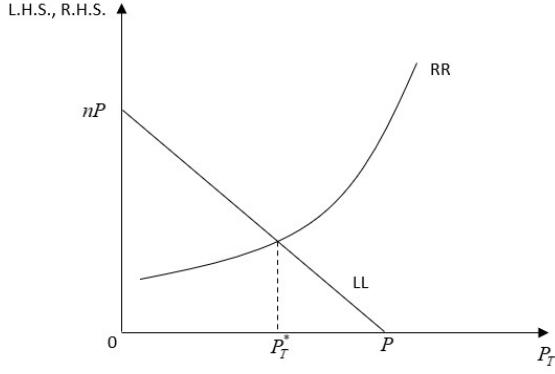


Figure 2

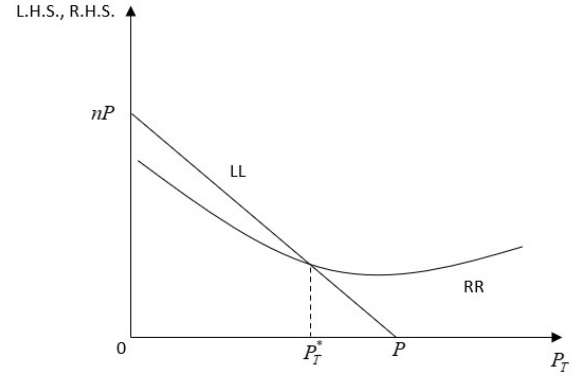


Figure 3

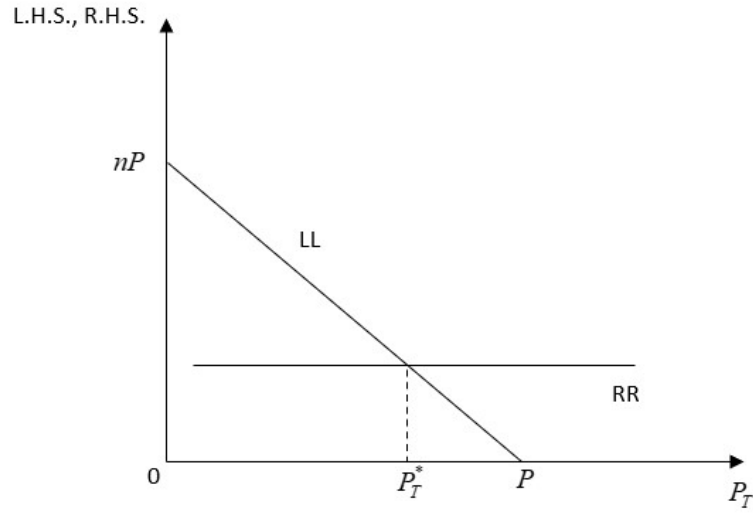


Figure 4

Lemma 3.1 *RR curve must intersect LL curve from below, i.e. $np > \frac{A + \phi(0)}{\phi'(0)}$*

¹¹S.O.C requires $\frac{Q\phi''}{\phi'^2} < 2$

Lemma 3.2 *RR curve can be upward sloping, horizontal or downward sloping depending on¹²*

$$\begin{aligned} \frac{\partial RR}{\partial P_T} \geq 0 \quad & \text{if} \quad \frac{Q\phi''}{\phi'^2} \leq 1 \\ \text{and} \quad \frac{\partial RR}{\partial P_T} < 0 \quad & \text{if} \quad 1 < \frac{Q\phi''}{\phi'^2} < 2 \end{aligned}$$

4 Comparative Statics:

Proposition 4.1 *MSP acts as a discounted reservation price to the farmers. An increase in MSP may directly benefit middle and large groups of farmers. Though small or marginal farmers do not enjoy the direct benefit of higher MSP, but they may enjoy higher pay-off indirectly.*

As MSP (\bar{P}) increases more farmers now can sell their products to the government, as \underline{q} declines directly (Eqn. 2, Figure 7). Now what will be the ultimate effect on the price offered by the private traders, P_T , depends on the elasticity of the private trader's supply curve which further depends on the distribution of the land holdings or the size of the farmers. If the magnitude of supply elasticity with respect to the fall in \underline{q} is such that more of the marginal or those lower middle farmers can now sell to the govt. overall supply to the private traders will fall sufficiently, resulting in higher P_T . We can analyse the effect graphically as well. LL curve will be unchanged as it is independent of (\bar{P}) (Eqn. 6). If the distribution function is such that the RR curve is upward sloping, which is possible if the pdf $f(q)$ is sufficiently flatter in the neighbourhood of \underline{q} , then an increase in (\bar{P}) will result in a rightward shift of the RR curve from RR to R'R' causing increase in P_T (Figure 5). Therefore all groups of farmers will be benefitted, though the middle and large group of farmers will gain more. On the otherhand P_T will fall if RR curve is negatively sloped (Figure 6) due to the distribution of land holdings, i.e. if the pdf $f(q)$ is sufficiently steeper in the neighbourhood of \underline{q} . As a result small and the marginal farmers will be worse off. And if the RR curve is horizontal then there will be no change in the equilibrium value of P_T . So only the middle and large farmers will be benefitted.

¹²Consider the following linear pdf, $f(q) = 1 + \frac{\delta}{2} - \delta q$, $q \in [0, 1]$
 $f'(q) = -\delta$, is the slope of the pdf and $\int_0^1 f(q) dq = 1$

$$\text{So, } \phi'' = \frac{q^4}{\tau^2} [3 + \frac{3\delta}{2} - 4\delta \underline{q}]$$

Now for RR curve to be positively sloped the sufficient condition requires $\phi'' < 0$ which implies the slope of the pdf evaluated at \underline{q} , $\delta < \frac{3}{4\underline{q} - 3/2}$. Therefore lower the value of δ or flatter the pdf in the neighbourhood of \underline{q} the RR curve is positively sloped. As δ rises pdf becomes steeper, so after a point RR becomes negatively sloped.

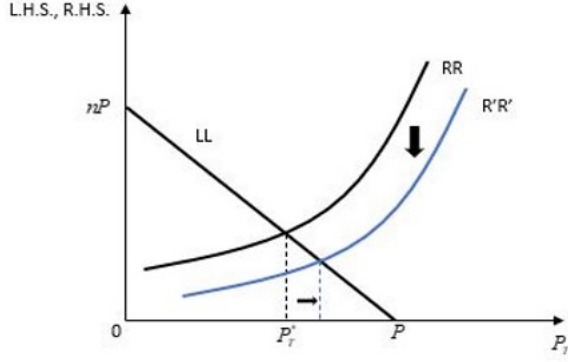


Figure 5

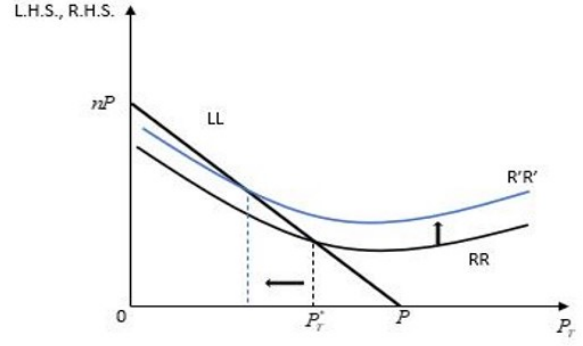


Figure 6

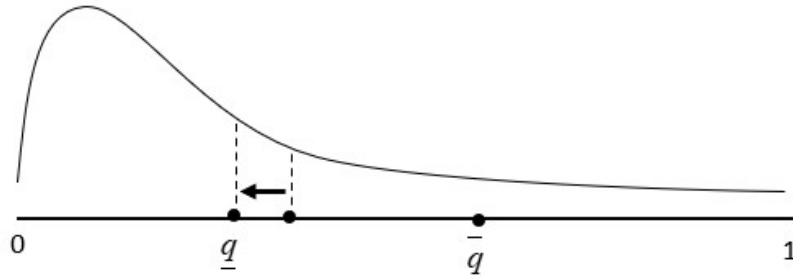


Figure 7

Proposition 4.2 *Anti-corruption or anti-bureaucratic hustle reforms in terms of lower transportation costs may as well benefit the middle and large group of farmers and small farmers will also be indirectly benefitted*

Lower transportation costs (τ) will lower the limit of \underline{q} allowing the lower middle group of farmers to sell to govt. Therefore the effects are qualitatively similar to that of rising MSP.

Proposition 4.3 *Higher per individual selling quota to the govt will directly benefit the middle and upper-middle group of farmers. Small farmers will be deprived of such policy initiatives.*

Proposition 4.4 *With a higher market concentration of the traders in terms of lower n , the incidence of oligopsonistic exploitation may rise.*

If there are higher market concentration in terms of only a few number of private traders, i.e. lower value of n , then only LL curve will pivot down to $L'L'$ as shown in Figure 8: RR curve remains unchanged (Here only positively sloped RR curve is shown). As a result equilibrium P_T^* falls worsening farmers' welfare.

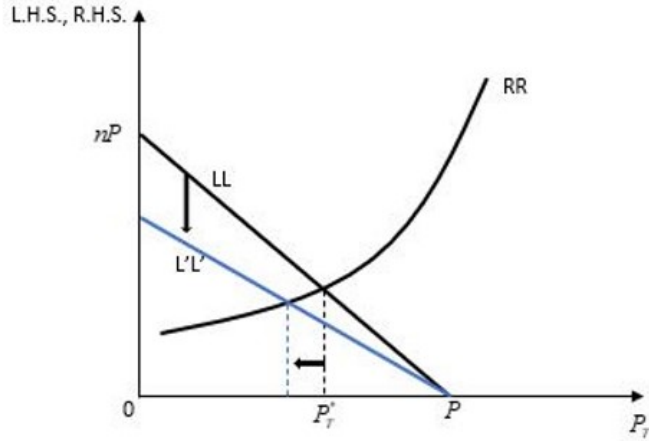


Figure 8

5 Summary of findings and conclusions:

The Indian agricultural sector has been in a crisis since the pre-independence period. Although it is no longer the largest contributor to the National Income, however, it employs the majority of the Indian workforce. The agricultural sector in India is highly regulated, starting from the ownership and use of land, access to factor inputs, access to output markets, product prices, etc are directly or indirectly governed by a maze of laws. Presently, markets in agricultural products are regulated under the Agricultural Produce Market Committee (APMC) Act. Under the APMC Act, the states can establish agricultural markets, popularly known as mandis. The sale of agricultural commodities can occur only in the mandis through auction. The distribution of land holdings is also largely skewed in developing countries like India and only 6% enjoy the direct benefit of MSP. We have shown that an increase in MSP may directly benefit middle and large groups of farmers. Though small or marginal farmers do not enjoy the direct benefit of higher MSP, but they may enjoy higher pay-off indirectly. MSP might act as a discounted reservation price to the farmers. Also, MSP serves a better purpose as a government policy instrument in terms of benefitting small farmers when compared to per farmer's maximum selling quota. We also found that anti-corruption or anti-bureaucratic hustle reforms in terms of lower transportation costs may as well benefit the middle and large group of farmers and small farmers will also be indirectly benefitted. And finally, we found out that higher market concentration of the private traders in terms of lower value of λ , increases the incidence of oligopsonistic exploitation.

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