CONTEMPORARY POLICY ISSUES IN THE NON-TRADED AGRICULTURAL SECTOR AND RURAL DISTRESS: A PARTIAL EQUILIBRIUM MODEL

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Abstract

The present paper attempts to build an analytical model in a partial equilibrium framework to explore contemporary policy issues and loan waiver scheme in the non-traded agricultural sector. In doing so, we analyze the effect of credit market reform policy, rise in loan default rate and booming agricultural prospects on credit market exploitation rate and growth of the agricultural sector. We unveil the crucial tradeoff between higher agricultural growth and higher credit market exploitation rate and we conclude that loan waiver is not a panacea for the marginal farmers.

1. INTRODUCTION

Globalization has impacted the world economy in several aspects such as free flow of knowledge, access to capital markets of foreign countries, movement of goods and services across borders etc. Twentieth century had witnessed a list of countries like India, China, Pakistan and Myanmar being liberalized along their macroeconomic and trading front and the liberalization of the overseas trade was expected to improve a docile atmosphere among nations. Opening up of the economy to foreign participants was both welcomed and condemned. Liberalization accompanied with financial market reform policies have no single direct positive effect on macroeconomic indicators of sectoral output growth, employment and prices, as general wisdom suggests. Majority of the people of India are involved in the agricultural sector, 60% of the population is dependent upon agriculture. Agriculture sector provides 27% of the GDP in India. In the context of Indian economy, agriculture sector plays a key and important role in the economic development of the country. However, the sector is burdened with many difficulties ranging from source of credit, production of crops and accessibility to market.

The most common and important problem is the source of credit. The farmers can get their credit from the formal sector and the informal sector. The formal sector includes the co-operative societies, rural banks, commercial banks. In India, during 1950-51 the share of the formal sector in total agricultural credit was 7% and in 1980-81 this share increased to 63%. The contribution of formal credit to agriculture by private sector banks aggregated to Rs. 44,093 crores against the target of Rs. 40,656 crores in the year 2006-07. On the other hand, the informal sector consists of the moneylenders, landlords, traders, zamindars etc. The informal sector constitutes 40% of total credit in the agriculture sector. Most of the times farmers are unable to get credit from the formal sectors as they do not have fixed asset, proper documents etc. Even if they get formal credit the farmers have to bribe the officials of the formal credit agency or there is usual delay in disbursement of credit (Gupta and Chaudhuri, 1997). The failure in the functioning of the formal credit institutions compels farmers to resort to the informal credit market to meet their credit needs. The informal credit market which mainly consists of the zamindars and landlords tend to exploit the farmers by charging higher rates of interest.

The formal and informal credit can be thought off as both substitutes and complements to each other. In case where the farmers gets some fraction of their total credit needs from the institutional credit sources, and borrow the other part of the required credit from informal sources, this implies that both types of credit can be treated as perfect substitutes. In another case, due to delay in disbursement of formal credit in the beginning of the crop cycle farmers borrows from informal credit sources, and they get formal credit disbursed in the middle of the crop-cycles, thus both types of credit are close comple-

ments.

The objective of the paper is to discuss various credit market reforms such as an increase in institutional credit availability and credit subsidy policy. The paper also analytically looks for the effects of the most debated policy of loan waivers in the agricultural sector and the role of globalization that is conventionally believed as expanding the manufacturing hub of the economy thus escalating the agriculture sector due to linkage effect. The analytical model developed in the paper opposes two conventional beliefs. First, it shows that loan waivers may not be the panacea for small and marginal farmers. Second, improved agricultural prospect due to expansion of the industrial (secondary) sector may not have favourable outcome on the agricultural sector. The results are very much likely, provided the degree of dependency on the informal credit market is relatively high. On the other hand, we concluded that an expansion of the formal credit availability is the first best option to improve the agriculture sector output.

The rest of the paper is structured as follows. In section 2, we review few existing literatures pertinent to the analysis. In section 3, we construct the theoretical model. In section 4 we carry out couple of comparative statics exercises. Section 5, concludes the paper.

2. LITERATURE REVIEW

The effect of globalization on the agricultural sector of the Indian economy has been a constant research among major economic theorists. Gupta and Chaudhari(1997) have shown formal and informal credit sources are substitutes and complements to each other and they have also studied interest rate determination in informal credit market in backward agricultural sector when there is a market for formal credit. Their paper presented an alternative explanation of high informal credit interest rates, for which price and credit subsidy policies of the government are responsible. Marjit, Kar and Sarkar (2004) analyzed the effect of capital mobility across sectors in determining wage inequality. Banerjee and Nag (2015) had discussed the general equilibrium model to examine the implications of financial deregulation i.e. an increase in the supply of formal credit and agricultural trade liberalization.

Marjit (2004) has also claimed that one crucial ingredient in the process of globalization is to remove protectionism from the existing import-competing sectors coupled with creating more liberalized environment for foreign capital so that the economy becomes competitive in the export market. The recent loan waiver scheme has not been theoretically analyzed much. However, an empirical investigation by Banik (2018) suggested that loan waivers would solely benefit the large farmers who own approximately more than 2 hectare of land. In this paper, we offer a theoretical evaluation of loan waivers scheme.

3. THE MODEL

In this section, we attempt to provide an analytical model in a partial equilibrium framework that essentially captures the effects of various reform measures that complements globalization. The baseline assumption is as follows: the economy is a rural economy with only agricultural sector. Agricultural sector uses credit as inputs in its production process. Credit market in the rural economy has a dominant role to play in determining agriculture output and prices of agricultural commodities that farmers receive. In the model, credit is assumed to be of two types, formal and informal credit. Both credits are considered to be perfect substitutes to each other, Gupta and Chaudhari (1997).

Demand for credit is assumed to be a positive function of agriculture output price and a negative function of informal interest rate and positive function of formal interest rate. On the other hand, the supply of formal credit is institutionally determined and is exogenous to the model. The formal interest rate is also given exogenously and is a policy parameter. The supply of informal credit is assumed to be a positive function of informal interest rate and a negative function of probability of loan default or average loan default rate. Thus credit market clears to determine the informal credit interest rate and credit level. In the product market, agricultural output supply is a positive function of formal credit level, the price of output and a negative function of informal interest rate. Demand for agricultural goods is a negative function of its own price and positive function of aggregate income output in the manufacturing sector. Agricultural output market clears to determine the equilibrium output level and equilibrium price. The following symbols are used:

$\bar{Z}_F \rightarrow formal\ credit$

$Z_I \rightarrow informal\ credit$

$\bar{r}_F \rightarrow formal\ credit\ interest\ rate$

$\mu \rightarrow informal\ credit\ interest\ rate$

$P_X \rightarrow price\ of\ agricultural\ goods$

$X \rightarrow output\ in\ agriculture\ sector$

$Y \rightarrow income\ in\ manufacturing\ sector$

$S \rightarrow formal\ credit\ subsidy$

$P_r \rightarrow probability\ of\ loan\ default$

3.1. The moneylender's decision making and the derivation of informal credit supply function

The moneylender derives utility from his expected income (T) and investment in safe asset (N). The moneylenders expected income comprises of amount invested in safe asset and expected income on informal lending (Z_I). Net income from informal lending is aggregate interest in-come net of loan default rate (P_r). Here we assume that 'P_r' is the average rate of loan default.

The utility function of the moneylender is given by-
$$U = f(T, N) \tag{1}$$

The moneylenders is constrained by:

$$T = N + (1 + \mu)(1 - P_r)(\bar{W} - N) \tag{2}$$

Refer to Appendix A for interpretation. The moneylender maximizes eq. (1) subject to constrained in eq. (2). After solving the optimization exercise (See Appendix A) we get the informal credit supply function as-

$$Z_I = Z_I(\mu, P_r) \quad ; Z_I^1 > 0,; \ Z_I^2 < 0,; \ Z_I(0, P_r) = 0,$$
$$; \ Z_I(\mu, 1) = 0$$

The rural economy is represented by following set of equations (See Appendix B):

$$Z_S = \bar{Z}_F + Z_I(\mu, P_r); Z_I^1 > 0, Z_I^2 < 0 \tag{3}$$
$$; Z_I(0, P_r) = 0 \ ; \ P_r \in [0,1]$$

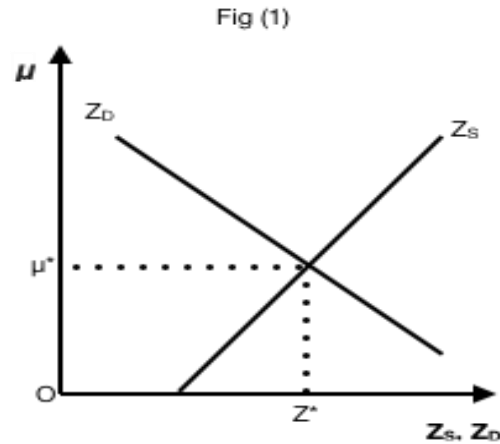$$Z_D = Z_D(\mu, \bar{r}_F(1 - s), P_X) \tag{4}$$
$$; Z_D^1 < 0, Z_D^2 > 0, Z_D^3 > 0$$

$$X_S = X_S(\bar{Z}_F, P_X, \mu) \tag{5}$$
$$; X_S^1 > 0, X_S^2 > 0, X_S^3 < 0$$

$$X_D = X_D(P_X, Y); X_D^1 < 0, X_D^2 > 0 \tag{6}$$

The endogenous variables are Z, μ, X, P_X the four equation solves for four unknowns. Policy parameters are P_r, S, Y, and $\bar{Z}_F$.

From eq. (3) we can plot credit supply function (Z_S) and from eq. (4) we can plot credit demand function (Z_D).

Fig (1)

The supply of credit is positively sloped with a horizontal intercept equal to formal credit level. The demand curve is downward sloping. At equilibrium we obtain μ^* and Z^*.

Similarly using eq. (5) and eq. (6) we can present the market for agricultural output as under and thus determine the equilibrium price and quantity in the agricultural output market.

Fig (2)
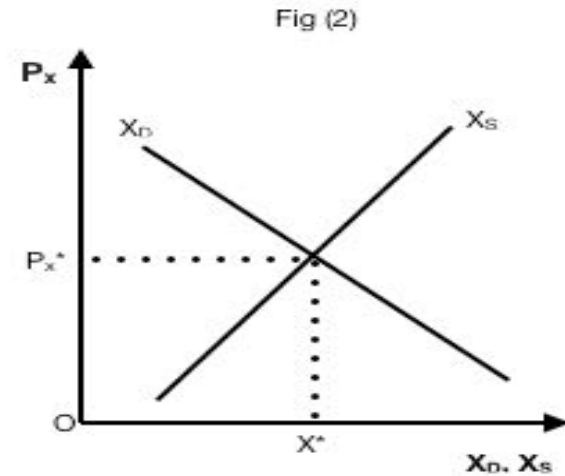
3.2. Credit market exploitation index

The credit market exploitation index is given by relative ratio of informal to formal interest rate i.e.

$$E = \frac{\mu}{r_F}$$

An increase in 'μ' implies informal interest rate is relatively higher than formal interest rate and hence a higher credit market exploitation.

4. POLICY ANALYSIS

4.1. Credit Market Reform– Subsidy Reform

Consider a fall in credit subsidy rate as a part of credit market reform policy. A fall in 'S' implies a rise in effective formal interest rate, i.e. it becomes:

$$\bar{r_F}(1-s).$$

Thus, demand for informal credit rises, since farmer's substitutes from formal to informal credit. 'Z_D' shifts rightward and 'μ' rises. Since 'μ' rises it follows from Eq. (5) that supply of output 'X_S' falls. Thus, agricultural output falls.

Proposition 1: A credit subsidy reform in terms of fall in institutional credit subsidy leads to contraction of the agricultural sector and increases credit market exploitation rate.

4.2. An Expansion of the Institutional Credit Availability

An institutional credit market reform not only implies a fall in interest subsidy but is also accompanied by an increase in level or availability of formal credit supply. Thus an increase in formal credit supply implies a rise in $\bar{Z_F}$.
It follows from eq. (3) that aggregate credit supply increases, implies a rightward shift of Z_S curve in Fig (1) Given, the demand for credit, informal interest rate falls. These effects in the credit market have a two-fold unidirectional effect on output supply. From eq.(6), increase in $\bar{Z_F}$ leads to increase in output supply and a fall in 'μ' further escalates the output supply. Thus agricultural output supply curve shifts rightward. The following results are immediate.

Proposition 2: An institutional credit reform policy in terms of increase in institutional credit supply leads to expansion of the agricultural sector and fall in credit market exploitation rate.

4.3. The Moral Hazard of Loan Waivers

The risk of loan default has an important role in the rural agricultural sector. It influences the informal credit market through several transmission processes. In this line Basu (1998) has demonstrated various channels through which the risk of loan default affects the credit market. In our present model, we incorporate the risks of loan default in a slightly different fashion.

In case of loan waiver schemes, moral hazard problem arises whereby more productive farmers who can pay off their loan, deliberately default. This has been captured in terms of a rise in loan default rate in our theoretical model. From eq. (3) it implies a decrease in informal credit supply, thus informal interest rate 'μ' rises. As a result, from eq. (5) supply of agricultural output contracts. Thus credit market exploitation rate also rises.

Proposition 3: Loan waivers are not panacea for the small and marginal farmers. Such schemes escalates the credit market exploitation rate and leads to contraction of output in the agriculture sector, thus leading to a overall rural distress. Scheme such as crop insurance; advance weather warning has a crucial role in bringing down the probability of loan default.

4.4. Improved Agriculture Prospect Due to Liberalization

It implies an improvement in agricultural sector's demand that generates from the manufacturing sector. An expansion of the manufacturing sector leads to an increase in demand for agricultural goods, as agricultural goods are used as an intermediate input or final consumption in the manufacturing sector. The demand curve of credit shifts outward, as a result, price rises. From eq. (4) it implies an increase in demand for credit. Thus informal interest rate rises, this in turn implies from eq. (5), the supply of agricultural output falls. Since both demand and supply curve in agricultural output market shifts opposite to each other, the expansion or the contraction of the agricultural sector remains ambiguous.

Proposition 4: Improved agricultural prospect in terms of escalated demand for agricultural commodities from the manufacturing sector have an ambiguous effect on the agricultural sector due to an increase in credit market exploitation rate. Agricultural sector may contract or expand depending on the magnitude of the increase in the informal credit market exploitation rate, thus it opposes the conventional belief of linkage effect.

5. CONCLUSION

In this paper, we have analyzed the role of the agricultural sector in the context of Indian economy after globalization. Towards this, we have reviewed a few models and analyzed their limited applicability under Indian conditions. In so doing, we formulate a partial equilibrium model to explore the credit market linkage with the agricultural sector. The main results of our analysis have been stated in form of propositions above. Firstly, credit subsidy reform in terms of fall in institutional credit subsidy leads to contraction of the agricultural sector and increases credit market exploitation rate.

Thirdly, loan wavers escalates credit market exploitation rate and reduces agricultural output and thus leads to rural distress. Scheme such as crop insurance; advance weather warning has a crucial role in bringing down the probability of loan default. Lastly, improvement in agricultural prospects in terms of increased demand for agricultural commodities by manufacturing sector have an ambiguous effect due to consequent increase in the credit market exploitation rate, which is in contradiction of the conventional belief of linkage effect.

APPENDIX

APPENDIX 1:

$$U = f(T, N) \qquad (A1.1)$$

$$T = N + (1 + \mu)(1 - P_r)(\bar{W} - N) \qquad (A1.2)$$

Where $Z_I = \bar{W} - N$

Max, $U = f(T, N)$

Subject to $T = N + (1 + \mu)(1 - P_r)(\bar{W} - N)$

$L = f(T, N) + \lambda[T - N - (1 + \mu)(1 - P_r)(\bar{W} - N)]$

$$\frac{\partial L}{\partial T} = \frac{\partial f}{\partial T} + \lambda = 0 \qquad (A1.3)$$

$$\frac{\partial L}{\partial N} = \frac{\partial f}{\partial N} - \lambda + \lambda(1 + \mu)(1 - P_r) = 0 \qquad (A1.4)$$

Dividing (A1.3) and (A1.4)

$$\frac{dN}{dT} = \frac{1}{1 - (1 + \mu)(1 - P_r)}$$

$$-\frac{dN}{dT} = \frac{1}{(1 + \mu)(1 - P_r) - 1} \qquad (A1.5)$$

$$\therefore Z_I = Z_I(\mu, P_r)$$

APPENDIX 2:

We get equality of supply of loan and demand fo loan from eq. (3) and (4),

$$\bar{Z}_F + Z_I(\mu, P_r) = Z_D(\mu, \bar{r}_F(1 - s), P_X) \qquad (A2.1)$$

Totally differentiating Eq. (A2.1) we get:

$$(Z_I^1 - Z_D^1) \, d\mu - Z_D^3 \, dP_X = A \qquad (A2.2)$$

$$where, A = Z_D^2 \, d\tilde{r}_F - d\bar{Z}_F - Z_I^2 \, dP_r$$

Similarly, we get equality of supply of agricultural output and demand from eq. (5) and (6) for agricultural output we get:

$$X_S\left(\bar{Z}_F, P_X, \mu\right) = X_D\left(P_X, Y\right) \qquad (A2.3)$$

Totally differentiating eq.(A2.3) we get

$$X_S^3\, d\mu + \left(X_S^2 - X_D^1\right) dP_X = B \qquad (A2.4)$$

$$where, B = X_D^2\, dY - X_S^1 d\bar{Z}_F$$

Solving (A2.2) and (A2.4) simultaneously we get

$$d\mu = \frac{\left(X_S^2 - X_D^1\right)A + Z_D^3 B}{C}$$

$$dP_X = \frac{\left(Z_I^1 - Z_D^1\right)B - X_S^3 A}{C}$$

$$where, \qquad C = \left(Z_I^1 - Z_D^1\right)\left(X_S^2 - X_D^1\right) + Z_D^3 X_S^3$$

Taken, C > 0 as a sufficient condition to solve for the changes in optimal values of the variables. For various comparative static exercises carried out we get the following result subject to the fulfillment of sufficient condition.

$$
\begin{aligned}
&when\ \tilde{r}_F > 0, & &d\mu > 0\ and\ dP_X > 0\\
&when\ d\bar{Z}_F > 0, & &d\mu < 0\ and\ dP_X < 0\\
&when\ dP_r > 0, & &d\mu > 0\ and\ dP_X > 0\\
&when\ dY > 0, & &d\mu > 0\ and\ dP_X > 0
\end{aligned}
$$

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