Unemployment and Food Security in India: A Macro-Theoretic Study

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By

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Certified that the Thesis entitled

Unemployment and Food Security in India: A Macro-Theoretic Study submitted by me for the award of the degree of Doctor of Philosophy in Arts at Jadavpur University is based upon my own work carried out under the supervision of Dr. Ambar Nath Ghosh, Professor, Department of Economics, Jadavpur University. And that neither this thesis nor any part of it has been submitted before for any degree or diploma anywhere/ elsewhere.

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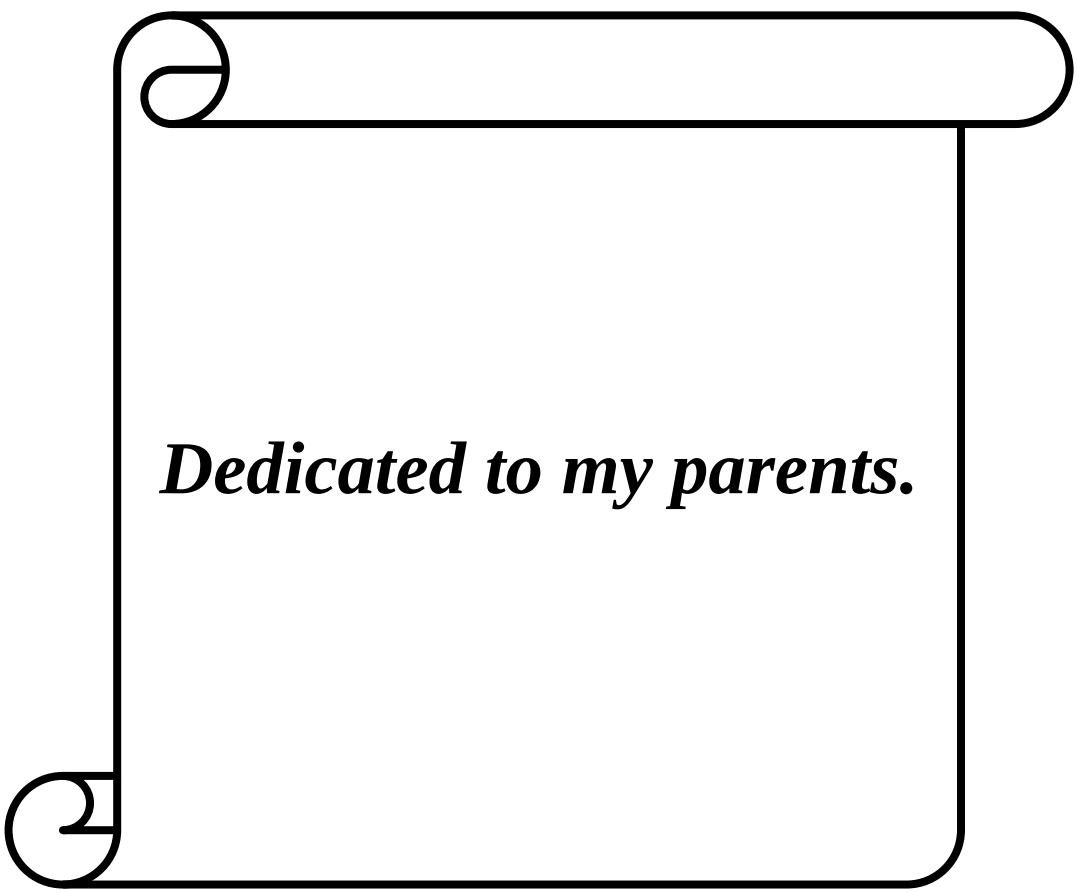
Dedicated to my parents.

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Chapter 1

Introduction: Unemployment and Food Security in India

1.1 Introduction

The objective this Ph.D. thesis is to examine the issues of unemployment and food security in India. For this purpose it develops models incorporating the relevant salient features of the Indian economy. These models belong to the tradition set by Keynes (1936), Kalecki(1954) and structuralist writers such as Rakshit (1982), Taylor (1983), Bose (1989) et al. The thesis has three core chapters: Chapters 2, 3 and 4. Chapter 2 addresses the problem of unemployment in India, while the other two chapters focus on the issue of food security in India. We introduce the main themes of these three chapters below.

1.2 Chapter 2: High Growth and Stagnant Employment in India

The organized sector, which consists principally of the corporate sector, the large non-agricultural private enterprises and the public sector, has grown at a high rate in India in the post-reform period, but employment in the organized sector has been completely stagnant (see Table 2.4 in Chapter 2). We find from Table 2.1 of Chapter 2 that GDP had grown at a high rate of around 6 percent per annum during 1994-5 – 2014-15. Again, Table 2.6 of Chapter 2 reveals that the share of the organized sector in GDP increased from 36.8 percent in 1993-94 to 43.3 percent in 2003-04 and further to 45.1 percent in 2010-11. There are no reasons to believe that the trend has been reversed since 2010-11. Thus, the organized sector has grown at a higher rate than GDP. We also find from Table 2.3 of Chapter 2 that only 6 percent of the work force was employed in the organized sector in 2004-05. Table 2.5 of Chapter 2 shows that the work force and the labour force had grown at an average annual rate of around 2 percent. Thus, the fraction of the work force employed in the organized sector has dwindled continuously, whereas the share of the organized sector in GDP has steadily increased. Given the steady high growth rate of output of the organized sector and the complete stagnation in its level of employment, the unit labour requirement has gone down steadily and rapidly. Obviously, this has been brought about by labour saving technological and managerial changes taking place in the organized sector. As should be the purpose of labour saving technological and managerial changes, the shares of the workers of the organized sector in its output must have gone down along with the unit labour requirement of production even though the money wage rate may have increased. A prima facie evidence of this phenomenon is given by the data of Table 2.7 of Chapter 2, which show that the share of wage income in the net value added in the organized manufacturing sector has steadily declined during the period under consideration. This phenomenon of a secular decline in the share of workers' income in the GVA of the organized manufacturing sector in India is quite well

documented in the literature (see, for example, Abraham and Sasikumar (2017) and Kapoor (2016)). The objective of this chapter is to examine the implications of the decline in the shares of skilled and unskilled workers in the organized sector's output on the output levels or the growth rates of the organized and the unorganized sectors using a macro model suitable for India. The existing literature on Indian economy, however, does not address this issue. Hence, the present study fills up an important gap in the literature. It also seeks to suggest policies that may generate employment in both the sectors. ILO (2009) has made an attempt at suggesting a strategy for generating employment in India. It has recommended massive investments in sectors, which are naturally employment intensive. However, it has not derived its strategy from a macro-theoretic model. Hence, it has left the issue of the problem of financing of the required massive investments unexplored. Nor has it examined the issue of the possible conflict between the goal of employment generation and that of providing the masses with the basic necessities of life in adequate quantities at affordable prices. We have shown that, if the government invests in infrastructure in the unorganized sector and finances it by taxing capitalists' income, it will raise employment significantly and heap considerable benefits on the poor. However, if the government, as it normally does, finances the increase in its investment in the unorganized sector by raising indirect tax rates, it is highly likely to lower employment and output levels in both the sectors.

1.2.1 The Model

The model is developed in line with the tradition set forth by Keynes (1936), Kalecki (1954) and the structuralist writers such as Rakshit (1982), Taylor (1983) and Bose (1989) et al. The economy is divided into two sectors: the organized sector and the unorganized sector. The output of the former is denoted by *Y*. The organized sector is assumed to be an oligopoly. Following Kalecki (1954), it is assumed that producers fix their prices by applying a fixed mark-up to the average variable cost of production and they adjust their output to meet the demand that comes forth at the prices set. However, for simplicity and without any loss of generality we assume that the price of Y , denoted P, is fixed and it is equal to unity.Had we made *P* an increasing function of the average variable cost of production, our results would have been stronger. Y is demanded for consumption by the workers of the organized sector, the capitalists (producers of Y) and the government. It is also used for purposes of investment and for export. Investment demand and capitalists' and government's consumption demand represent demand not only for Y but also for foreign goods. The unorganized sector also uses Y as an intermediate input in its production.

Accordingly, *Y* is determined by

$$Y = C_{Wy}.\left[w\frac{l_y}{L_0}Y(1-t_w) \right] + C_C.\left[\left(Y - w\frac{l_y}{L_0}Y \right)(1-t) \right] + I\left(\underset{-}{\bar{r}}, \underset{-}{e}\right) + I^A\left(\underset{-}{\bar{r}}, \underset{+}{\overline{K}} \right) + G + NX\left(\frac{P^* e}{\underset{+}{P}}, C_c(1-t).\left(1 - w\frac{l_y}{L_0}\right)_{-} Y, I\left(\underset{-}{\bar{r}}, \underset{-}{e}\right), \underset{-}{G}, \underset{+}{Y^*} \right) + mA \quad (2.1)$$

In (2.1), C_{Wy} denotes organized sector workers' fixed average and marginal propensity to consume Y. l_y is the unit labour requirement (measured in terms of labour hours) to produce a unit of Y and L_0 is the amount of labour time given by each worker in the given period. Hence, the number of workers needed to produce Y is given by $\frac{l_y Y}{L_0}$. Denoting wage payment to every organized sector worker by w in the given period of time under consideration, total wage payment to labour is $w.\frac{l_y Y}{L_0}$, which is also the real wage income of the organized sector workers, since the price of the organized sector output denoted by P is assumed to be equal to unity. w is, as standard in the Keynesian tradition or Keynes-Kalecki tradition, assumed to be fixed in the short run.

Workers pay taxes at the rate t_w on their income. $c_{Wy}.\left[w\frac{l_y}{L_0}(1-t_w) \right]$ is the total consumption demand of the workers for the output of the organized sector and its foreign substitutes. (Since most of the workers are poor, we assume for simplicity and without any loss of generality that it represents demand for the output of only the domestic organized sector). After wage payments, the residue accrues to the producers (whom we refer to as capitalists) as profit, as we have disregarded other factor payments for simplicity, i.e., we have assumed outstanding debt of the capitalists to the workers to be zero for simplicity. This does not matter, as the outstanding debt of the capitalists to the workers is fixed in the short period under consideration. So, the income of the capitalists is $\left[Y - w\frac{l_y Y}{L_0} \right]$ and if they pay tax at the rate t on their income, their disposable income is $\left[Y - w\frac{l_y Y}{L_0} \right](1-t)$. Therefore, their total consumption demand for Y is $C_C.\left[Y - w\frac{l_y Y}{L_0} \right](1-t)$, where C_c is the fixed average and marginal propensity to consume of the producers of Y. We assume that quite a large part of it represents demand for foreign goods. Hence, we have made net export (denoted NX) a decreasing function of capitalists' consumption demand. For the same reason, NX is made a decreasing function of investment (I) and government consumption (G).Signs of other partial derivatives of the *NX* function are quite self-evident. Note that Y^* denotes foreign GDP.

Aggregate investment demand is decomposed into two components: $I(\bar{r}, e)$and $I^A(\bar{r}, \overline{K})$, which give investment demands of the organized and the unorganized sectors, respectively. Both these investment demands are made decreasing functions of the interest rate denoted r. The RBI through open market operations, liquidity adjustment facility and other means seek to keep r at a target level. Hence, we treat r as RBI's policy variable here and assume it to be given at $\bar{r}$. The organized sector's investment is also made a decreasing function of the exchange rate, denoted *e*, for the following reason. India's production and investment are highly import intensive. This point may be illustrated using the following example. Think of the import intensity of teaching economics in India. All the textbooks used are foreign. All the journals referred to are foreign. All the computers and software used are imported. This is true not only of economics but also of all other subjects. Thus, India is completely dependent on the US and Western Europe for knowledge and technology. Hence, to sustain its production and investment, India has to import on a large scale. Given the prices of foreign goods in foreign currency, an increase in the exchange rate makes prices of foreign capital goods higher in domestic currency. This, given investors' expectations, reduces profitability of investment and, thereby, lowers it. Let us now explain why I^A is an increasing function of $\overline{K}$, which denotes the stock of infrastructure capital available in the unorganized sector. Land usage can be increased with investments in agriculture which include investments in irrigation, electrification, flood control facilities, improvement in rural connectivity, land reclamation, agricultural research etc. This kind of investment is land augmenting as it enhances the usage of the same plot of land in a year and enables usage of more land for purposes of production. The infrastructure capital in the unorganized sector is denoted by K. The amount of land available to the unorganized sector is an increasing function of K. As K is given in the short run, we denote it by $\overline{K}$. As an increase in $\overline{K}$ makes possible greater number of cropping on the same plot of land or cultivation of new land leading to larger levels of production and income, it induces (and also makes it possible by relaxing the credit and thereby the resource constraint for) the unorganized sector's producers to undertake larger amount of complementary investment.

m denotes the fixed intermediate input requirement per unit of the unorganized sector output. Therefore, total intermediate input requirement of the unorganized sector is given by *mA*, where *A* is the total output of the unorganized sector. The unorganized sector has to buy these intermediate inputs from the organized sector. Note that in the organized sector there takes place a decline in l_y along with a growth in Y so that employment remains stagnant. However, we regard here the process of labour saving technological and managerial changes to be independent of the process of growth in Y and treat the former process as an exogenous one. Hence, we treat l_y as an exogenous variable and do not treat it as a function of Y.

The Unorganized Sector

The output of the unorganized sector is denoted by *A*. In what follows we will seek to identify the factors that determine supply of and demand for *A*.

Supply of *A*

The unorganized sector is comprised of small rural and urban enterprises but the most dominant segment of this sector is agriculture. This sector absorbs most of the unskilled and low skilled workers of the country. Its production function is fixed coefficient and the output of this sector is denoted by A which is produced with land, labour, capital and intermediate inputs bought from the organized sector. The stocks of land and capital used in the unorganized sector are given. In contrast with the tradition set by the structuralist writers such as Rakshit (1982), Taylor (1983) et al., we have assumed the production function to be fixed coefficient even in agriculture for analytical simplicity. This assumption will not affect our results qualitatively. This assumption helps us capture in a simple way the fact that how much of the fixed amount of land and capital the producers in the unorganized sector can utilize depends crucially on the resources they have in their command to purchase intermediate inputs from the organized sector and labour.

As most of the producers of the unorganized sector are financially weak and, therefore, subject to severe credit constraint, their purchasing power depends crucially on the relative price of their output in terms of the goods produced in the organized sector given by $\frac{P_A}{P}$, where P_A denotes the price of the output of the unorganized sector. A ceteris paribus increase in $\frac{P_A}{P}$ enables the producers of the unorganized sector to purchase more intermediate inputs from the organized sector and labour and, thereby, allows them to bring more land under production in agriculture and, in general, to produce more. (This is possible in case of agriculture because of multiple cropping within a given period). Therefore, the supply of output of the unorganized sector is an increasing function of ($\frac{P_A}{P}$).

For reasons we have already specified, supply of A should be an increasing function of $\overline{K}$.

Most of the production in the unorganized sector is carried out with the help of family labour and the unorganized sector workers also supplement their income by working outside their family firms in relatively larger firms that use both family labour and hired labour. There also exists large scale surplus labour in the unorganized sector. Hence, given everything else, if the government provides employment at the wage prevailing in the unorganized sector through employment guarantee schemes, it will augment

unorganized sector's producers' income enabling them to buy more intermediate inputs from the organized sector and, thereby, bring more land under cultivation in agriculture, make greater utilization of capital in the non-agricultural enterprises and, in general, produce more. Let l_g be the total amount of employment generated in the unorganized sector through various government employment guarantee schemes. Hence, the supply function of the unorganized sector may be written as

$$A^S = A\left(\underset{+}{\frac{P_A}{P}}, \underset{+}{\overline{K}}, \underset{+}{l_g}\right) \tag{2.2}$$

A part of this supply of *A* is used for self-consumption by the producers of *A*. Family enterprises keep the part of the produce that they consider absolutely necessary for survival for self-consumption. However, for simplicity and without any loss of generality, we do not explicitly consider that part and assume the whole of the supply of *A* to be the marketable surplus of the unorganized sector.

Demand for *A*

The unorganized sector supplies principally the mass consumption goods, which belong to the category of necessities. So, demand for *A* of the capitalists and large landlords is likely to be fixed and, therefore, is ignored here for simplicity. The demand for *A* mainly comes from the organized sector workers and unorganized sector workers who do not have any family enterprises. For simplicity we assume that the latter spend all their income on *A*, while the former spend a fraction C_{wA} of their income on *A*.

Most of the output of *A* is produced in small firms using family labour and only a small fraction of output originates in the large firms. Let β be the fraction of total labour supplied by hired (landless or material means less) workers. Let l_A be the unit labour requirement for producing *A*. Therefore, the total labour required to produce *A* is $(l_A A)$. Now, since l_g denotes employment in the employment guarantee program in a given period, total employment in the unorganized sector is $(l_A A + l_g)$ and total wage income of the hired workers is $w_A.\beta.(l_A A + l_g)$, where w_A denotes the money wage rate in the *A*-sector. So, hired unorganized sector's workers' demand for *A* is $\frac{\beta w_A (l_A A + l_g)}{P_A}$. We assume w_A to be fixed. This assumption is standard in the Keynesian tradition. This also conforms to the reality in the short run. On the other hand, total wage income of the organized sector workers is $w\frac{l_y Y}{L_0}$ and their consumption demand for *A* is $C_{wA}.w(1-t_w)\frac{l_y Y}{L_0}$. So, the total demand for A is

$$A^D = \frac{C_{wA}.w(1-t_w)\frac{l_y}{L_0}Y}{P_A} + \frac{\beta w_A(l_A A) + \beta w_A l_g}{P_A} \tag{2.3}$$

The producers of the unorganized sector produce as much as they can with the resources they have at their disposal for purchasing intermediate inputs and labour and sell off their output at whatever prices they can do it. Individual producers do not have any control over either the aggregate output or the price. The price of *A* is, therefore, market clearing. The unorganized sector, accordingly, is in equilibrium when supply of *A* and demand for *A* become equal, i.e., when the following equation is satisfied:

$$\left(1 - \frac{\beta w_A l_A}{P_A}\right) A\left(\underset{+}{\frac{P_A}{P}}, \underset{+}{\bar{K}}, \underset{+}{l_g}\right) = \frac{C_{wA}.w(1-t_w)\frac{l_y}{L_0}Y}{P_A} + \frac{\beta w_A l_g}{P_A} \tag{2.4}$$

The LHS of (2.4) gives the net supply of *A*, which is defined as the supply of *A* net of the internal demand for *A* that production of *A* directly generates. Note that, for (2.4) to be satisfied for positive values of *Y* and l_g, $\frac{\beta w_A l_A}{P_A}$ has to be less than unity. We, therefore, assume this to be the case. If this were not the case, no producer would have produced *A*.

Following the structuralist tradition, we assume here that P_A clears the *A*-market. We have also ignored foreign trade in the output of the unorganized sector for simplicity.

The Foreign Exchange Market:

The BOP consists of trade surplus and net inflow of foreign capital. The latter is assumed to be exogenously given for simplicity. The equilibrium in the foreign currency market is given by the following equation:

$$NX\left(\underset{+}{\frac{P^* e}{P}}, C_c(1-t).\left(\underset{-}{1 - w\frac{l_y}{L_0}}\right)Y, \underset{-}{I(\bar{r}, e)}, \underset{-}{G}, \underset{+}{Y^*}\right) + \bar{F} = 0 \tag{2.5}$$

Where *NX*, as we have already mentioned, stands for net export and $\bar{F}$ denotes the exogenously given net inflow of foreign capital.

The specification of our model is now complete. It consists of four equations (2.1), (2.2), (2.4) and (2.5) in four endogenous variables *Y*, *A*, P_A and *e*. We solve them as follows:

Solving (2.5) for *e*, given the policy parameters and the exogenous variables, we get

$$e = e\left(C_c(1-t).\left(1 - w\frac{l_y}{L_0}\right) Y, \bar{r}, G, Y^*, \bar{F} \right) \quad (2.6)$$

Signs of the partial derivatives of (2.6) are quite self-evident from (2.5).

Substituting (2.2), (2.5) and (2.6) into (2.1), we get

$$Y = C_{Wy}.\left[\left\{w\frac{l_y}{L_0}Y\right\}(1-t_w)\right] + C_C.\left[\left(Y - w\frac{l_y}{L_0}Y\right)(1-t)\right] +$$
$$I\left(\bar{r}, e\left(C_c(1-t).\left(1 - w\frac{l_y}{L_0}\right) Y, \bar{r}, G, Y^*, \bar{F}\right)\right) + I^A(\bar{r}, \bar{K}) + G - \bar{F} + \quad (2.7)$$
$$mA\left(\frac{P_A}{P}, l_g, \bar{K}\right)$$

We can solve (2.4) and (2.7) for the equilibrium values of Y and P_A. The solution is shown in Figure 2.1, where AA and YY represent (2.4) and (2.7) respectively. The solution corresponds to the point of intersection of these two schedules.

Derivation of the Equilibrium Values of Y and P_A

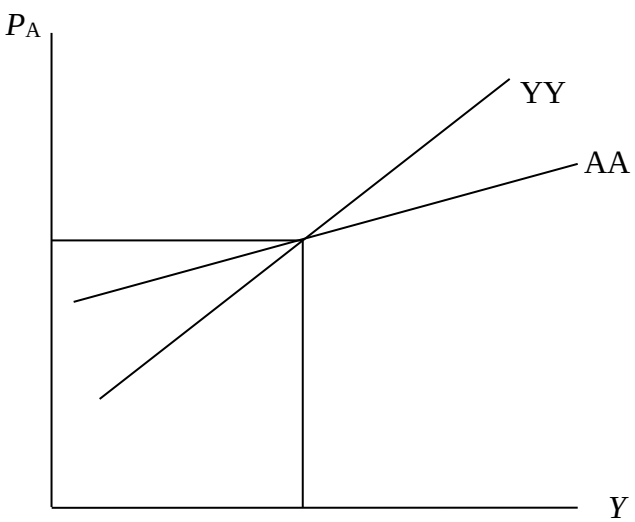

Figure 2.1

Using the model delineated above, we have carried out a few comparative static exercises. We have first focused on how a decline in the share of the organized sector

workers in the output of the organized sector is likely to affect Y, and A. We have derived the following result:

Proposition 2.1: Following a fall in the share of the organized sector workers in the output of the organized sector due to technological and managerial changes, if import intensity of consumption of the capitalists and the exchange rate sensitivity of investment are sufficiently large, conditions that are highly likely to be satisfied in reality in India, both *Y* and *A* will contract.

Since the organized sector grows without generating any employment, we have turned to the unorganized sector, which employs most of the labour force, for employment generation. We have examined first how an increase in the stock of infrastructure available to the unorganized sector is likely to affect output and employment in the two sectors. Our model has yielded the following result:

Proposition 2.2: An increase in $\overline{K}$ in the unorganized sector will bring about an increase in the output levels of both the sectors and increase employment levels in both the sectors.

We have, therefore, tried to identify the best method of financing government's investment in infrastructure for the unorganized sector. Since there are stringent restrictions on fiscal deficit under the New Economics Policy (NEP) currently being pursued by the Government of India, we have considered only two financing modes: taxation of capitalists' income and indirect taxation. Our model has yielded the following two results:

Proposition 2.3: If the government raises *G* and finances it by taxing capitalists' income, output levels of both the sectors will go up if marginal propensity to spend on imports of the capitalists is larger than that of the government expenditure on $\overline{K}$, a condition which is highly likely to be satisfied in India. Employment in both the sectors will increase too under the same condition.

Proposition 2.4: If the government raises *G* and finances it with indirect tax revenue, it is highly likely to reduce output and employment levels in both the organized and the unorganized sectors.

1.2.2 Summary of Chapter 2

The organized sector in India, which at the present contributes about half of India's GDP, grew at a high rate in the post-reform period without generating any employment. In 2004-05, it employed only about 5 percent of the labour force. In all likelihood, the fraction of the labour force employed in the organized sector is falling rapidly since then. For generating employment, therefore, one has to turn to the unorganized sector, which employs most of the labour force. This chapter shows that, if the government augments the stock of infrastructure capital in the unorganized sector, employment in both the

sectors will go up. If the government raises its investment in the infrastructure of the unorganized sector and finances it by taxing the capitalists' income, employment and output in both the sectors are highly likely to go up. If, however, the government finances its investment by hiking indirect tax rates, employment and output in both the sectors are highly likely to contract.

The model can be used to examine how an increase in l_g will affect output and employment levels under different modes of financing. We will take it up in our future research.

1.3 Chapter 3: Food Security in India under Free Market Conditions: A Macro-Theoretic Study

Food security is an important aspect of economic development in all the countries of the world. The ranking of India in the Global Hunger Index (2019) is 102 among 117 countries. This underscores very strongly the extremely poor performance of the Indian economy relative to the other economies of the world in combating hunger. The data on per capita net availability of food grains in India also give empirical support to this. Table 3.1 in Chapter 3 shows that per capita net availability of food grains (per annum) in India has declined from 186.2 kg per year to 177.9 kg per year from 1991 to 2016. It has risen slightly since then to 180 kg in 2019. It reveals a food crisis in Indian economy. The National Crime Records Bureau (NCRB) report for 2016 (NCRB(2016)) and the Government of India(2016) report underscore the country's grim agrarian crisis by revealing a high number of suicides of Indian farmers. Adoption of the New Economic Policy (NEP) in 1991 and constant monitoring by WTO since then has eroded the autonomy of the government in pursuing development policies regarding agriculture starting from input subsidy to the procurement program. This chapter seeks to show how free play of market forces endangers food security of most of the Indians.

Literature Review

The existing literature points to four important features of Indian agriculture: (i) preponderance of small and marginal farmers who own and cultivate 85% of total agricultural land holdings and account for 40 percent of aggregate marketable surplus (NABARD(2020)), (ii) low prices received by the farmers (Ahangar(2013) , Abishek (2016), Mitra & Mookherjee et al. (2018))), (iii) inadequate supply of formal credit ((Mohan (2006) ,Golait (2007),Government of India(2014)), (iv) decline in public investment in agriculture in the post-reform period (Mishra (2006), Godaraet. al.(2014)). Along with this, some studies have raised the issue of indebtedness of the farmers and farmers' suicide (Mishra (2006), Jeromi (2007), Sadanandan(2014)) in the context of Indian agriculture. There is, however, no theoretical study that incorporates all these major features of Indian agriculture and examines how India is likely to perform in the sphere of food security under free market conditions. The objective of the present chapter is precisely this.

1.3.1 The Basic Model

We have developed here a macro model which focuses principally on the food producing sector of the economy. Here we abstract from foreign trade in food for simplicity. We shall explore the implications of foreign trade in food in our future research. We have incorporated in this model all the relevant salient features of Indian agriculture delineated above.

Food sector

The output of this sector is denoted by X. Production of food requires land, labour and industrial intermediate inputs. The farmers have a given amount of land and it is assumed for simplicity that sharecropping is the mode of cultivation for large landowners. Other farmers cultivate their own land with family labour. Sharecroppers also carry out cultivation using family labour. For simplicity hired labour is ignored. The producers require "1/*a*" amount of industrial intermediate inputs to produce 1 unit of X. The assumption of fixed coefficient production function is a simple way of capturing the fact that how much food the farmers can produce depends crucially on how much industrial intermediate inputs they are able to buy. Given the preponderance of small and marginal farmers in the food sector, it may be quite realistic to assume that production of X is constrained by the availability of credit from the financial sector as the producers of this sector have very limited resources of their own to buy the essential inputs of production.

Farmers and sharecroppers cultivate land with family labour and keep α fraction of the total output for self-consumption. It is assumed that they consume only X. As their real income increases, their consumption also increases. So their consumption is an increasing function of X which in the simplest form is given by αX here. Hence, the marketable surplus of X becomes (1-α)X. In keeping with reality (see Mitra et al.(2018)), we assume that the farmers do not sell their produce directly to the consumers. Instead they sell their produce to the middlemen who are in all likelihood the representatives of the corporate sector. They are enormously mighty financially. The farmers most of whom are small and marginal have a perishable crop to sell after harvest and they have no storage facility of their own. All these factors make the bargaining strength of the middlemen infinitely large relative to the farmers. Accordingly, the middlemen offer the farmers the minimum possible price, denoted by $\overline{P}_X$, at which the farmers are willing to sell their marketable surplus. The determination of $\bar{P}_X$ can be shown with the help of the following equation:

$$\overline{P}_X = \frac{1}{a} P_Y \theta; \theta > 1 \qquad (3.1)$$

Let us explain (3.1). First, consider the non-food producing sector, which constitutes the rest of the economy. We will refer to it as the industrial sector. We denote by Y the output of industrial goods produced by the industrial sector and P_Y denotes the price of Y. $1/a$ units of Y is required as intermediate inputs to produce 1 unit of X. So, the

average variable cost of production of X is $\frac{1}{a}P_Y$. Since farmers on the average do not have any bargaining strength vis-à-vis the middlemen, a la Kalecki (1954) set $\bar{P}_X$ by applying the minimum possible mark-up to this average variable cost of production. This mark-up, denoted by θ, is taken to be exogenously given, and $\theta > 1$. This explains (3.1).

Given the preponderance of small and marginal farmers in India and given their woefully limited purchasing power, to capture, hopefully, a crucial aspect of Indian reality, we assume that food output is constrained by the amount of industrial intermediate inputs the farmers can purchase. The amount of own fund the farmers have in their possession is denoted by *S*. Using *S*, they can produce $a\frac{S}{P_Y}$ amount of *X* and the revenue of the farmers from *S*, denoted R_S, is given by

$$R_S = \bar{P}_X.a\frac{S}{P_Y}(1-\alpha) = \frac{1}{a}P_Y\theta.a\frac{S}{P_Y}(1-\alpha) = \theta(1-\alpha)S \tag{3.2}$$

In addition to their own fund, the farmers also borrow from both formal and informal credit markets. Given the lending norms of the lenders and the amount of collateral the farmers can offer, they get at the beginning of every period a fixed amount of loan from the lenders, which we denote by L_x . They use L_x to buy industrial intermediate inputs to produce *X*. They use a part of the sales proceeds from the sale of the output they produce with loan to pay off their outstanding debt along with interest at the end of every given period. They can use the rest either to augment their own consumption or to save in order to increase their own fund of the next period or for both. For simplicity, we assume that they use the rest of the sales proceeds to save to augment their own fund in the next period. We denote the amount of net revenue the farmers get from the sale of *X* produced with loan after paying back the loan along with interest by R_L. It is given by

$$R_L = \bar{P}_X a\frac{L_X}{P_Y} - (1+r_0)L_X = \theta\frac{1}{a}P_Y a\frac{L_X}{P_Y} - (1+r_0)L_X = [\theta - (1+r_0)]L_X \tag{3.3}$$

In (3.3), r_0 denotes the interest rate on the outstanding loans of the farmers. We shall explain it shortly. We assume that $[\theta - (1+r_0)] > 0$ because otherwise the farmers will not borrow. The sum of R_S and R_L constitutes farmers' own fund in the next period. Therefore, denoting farmers' own funds in periods t – 1 and t by S_{t-1} and S_t, respectively, we get

$$S_t = \theta(1-\alpha)S_{t-1} + [\theta - (1+r_0)]L_x \tag{3.4}$$

The RBI regulates interest rates in the formal credit markets. Moneylenders in the informal credit market fix their interest rates by applying fixed mark-ups to the formal lending rates. These mark-ups cover their transactions cost, profit margin and risk premia. The smaller a farmer, the higher the interest rate he faces. We denote the average

interest rate faced by the farmers by r_0. We take it to be given. We can solve (3.4) for the steady state value of S. We assume $\theta(1-\alpha)$ to be less than unity for the sake of existence of a meaningful steady state and for its stability.

Determination of the Steady State Values of S and X

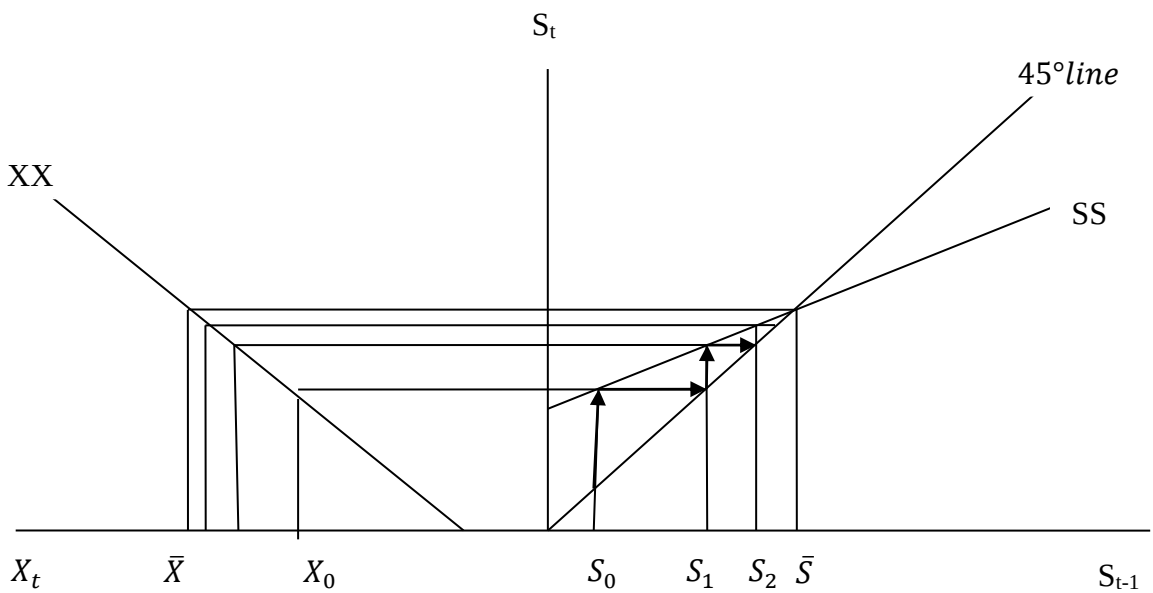

Figure 3.1

The output of food in period t is given by

$$X_t = a\frac{S_t}{P_Y} + a\frac{L_X}{P_Y} \tag{3.5}$$

Substituting the steady state value of S in (3.5), we can derive the steady state value of X.

Following Kalecki(1954), we assume that the industrial sector is an oligopoly and producers fix P_Y by applying a fixed mark-up to the average variable cost of production. The only variable input that is used in production is labour. Labour requirement per unit of Y and the money wage rate in industry, as standard, are assumed to be fixed. Hence, P_Y is fixed in (3.5).

Derivation of the steady state value of S:

The steady state value of S, denoted $\bar{S}$, as follows from equation (3.4), is given by

$$\bar{S} = \frac{[\theta - (1+r_0)]L_X}{1-\theta(1-\alpha)} \tag{3.6}$$

Substituting (3.6) into (3.5), we get the steady state value of *X*, denoted $\overline{X}$. It is given by

$$\overline{X} = \frac{a}{P_Y}\left[\frac{[\theta-(1+r_0)]L_X}{1-\theta(1-\alpha)} + L_x\right] \tag{3.7}$$

The derivation of the steady state values of S and X are illustrated graphically in Figure 3.1.The right-side panel of Figure 3.1 shows the steady state value of S whereas the left-side panel shows that of X. In the right-side panel the SS curve represents equation (3.4) in the (S_{t-1},S_t) plane. The steady state value of S, denoted by $\overline{S}$, is given by the point of intersection of SS and the 45^0 line.

1.3.2 Results Derived

We will report here the major results this chapter has derived. Eq. (3.7) yields most of the major results of the chapter. Indian food sector is dominated by the small and marginal farmers. On the other hand, the traders are highly likely to be the representatives of the capitalists or the corporate sector. Farmers' crop is perishable and they have no storage facility. Hence, their .bargaining strength is nil vis-à-vis the traders. In the absence of any kind of government support, therefore, θ will be at the lowest possible level. From (3.7), we find that a fall in θ will bring about a cumulative decline in $\overline{X}$. Accordingly, the value of θ pushed to the lowest possible level will reduce food output to a very low level.

In a free market, financial institutions are profit driven. During the Nehru-Mahalanobis era, financial institutions in India were social organisations. All the interest rates were administered by the government and the planners dictated the credit disbursal pattern. Thus, financial institutions had to lend to the farmers at very low interest rates as much credit as was necessary to enable the farmers to maximize food output by fully utilizing their land and the available infrastructure. However, following the adoption of the New Economic Policy (NEP) in July 1991 replacing the Nehru-Mahalanobis Programme, the financial institutions of India have become profit driven commercial organizations. They consider it extremely risky to lend to the small and marginal farmers because of their low credit worthiness and also because of the uncertainties associated with production and price of food. Under free market conditions, therefore, the farmers are likely to get substantially inadequate amount of loan at high interest rates. It follows from (3.7) that a fall in L_X and a rise in r_0 will lead to a large and cumulative fall in food output.

During the Nehru-Mahalanobis era, the government heavily subsidized industrial intermediate inputs purchased by farmers. Under the NEP, the farmers have to buy these inputs from the corporate sector which has tremendous monopoly power. Hence, P_Y is likely to be quite high under free market condition that the NEP seeks to establish. From (3.7) it is also clear that a given rise in P_Y will lead to a large and cumulative decline in food output. The conclusion that these results yield is that under free market conditions

food output in India is likely to be quite small relative to its potential or maximum possible level, given the land and infrastructure available to the farmers.

This chapter also examines the impact of a onetime loan waiver and that of a onetime adverse natural shock. We will report below the major results that we have derived in this regard.

1.3.3 Loan waiver

We have delineated above the kind of terrible exploitation and deprivation farmers are subject to in India under the NEP. They often take to the streets to draw the attention of the government and the people to their plight. They demand government intervention to ensure that they get just prices for their produce, cushion against uncertainties, adequate infrastructure and adequate loans on reasonable terms. Political parties in India often recommend loan waiver to give relief to the farmers. We have derived here the impact that an one time loan waiver will produce on farmers' welfare.

The result we have derived from our model is the following:

Proposition3.3: The policy of one-time loan waiver increases food output and farmers' economic condition for some periods of time following the implementation of the policy, but not permanently

1.3.4 Adverse Natural Shock

Since the stock of infrastructure available to the food sector is inadequate, adverse natural shocks lower food output in India significantly. Similarly, favourable natural conditions lead to bumper harvest. We have, therefore, examined how adverse natural shocks affect food output and farmers' economic condition. The result that we have derived is the following:

Proposition3.4: A one-period adverse natural shock will reduce food output in the period in which the shock occurs. The food output will not go back to its initial steady state level right in the next period. It will take many periods of time before it gets close to its initial steady state value. The greater the intensity of the adverse natural shock, the longer it will take for the food output to reach its initial steady state value.

The above analysis points to one reason why farmers commit suicide in India. Following a significant adverse natural shock, many farmers' food output goes much below the subsistence level leaving them hungry. Since it will take long for food output to move back to its initial level, many farmers being unable to bear the pain of hunger may commit suicide. The larger the preponderance of small and marginal farmers, the greater is likely to be the incidence of farmer suicide following a significant adverse natural shock.

It is also clear from the above analysis that the deleterious impact of an adverse natural shock may be mitigated though a policy of loan waiver. One can easily work out that through a policy of loan waiver along with suitable amount of transfers to farmers for the purpose of enabling them to increase purchases of industrial intermediate inputs, it may be possible to restore food output to its initial steady state level in the period just next to the one in which the adverse natural shock occurs.

1.3.5 Summary of the Results Derived in Chapter 3

The analysis of this chapter shows that the food security of the common man in India is gravely threatened under free market conditions. In a free market, farmers' bargaining strength is nil vis-a-vis the traders. Hence, the farmers will get for their produce the lowest possible price. In a free market, financial institutions are profit driven. As most of the arable land in India is cultivated by the small and marginal farmers who have very little to offer by way of collateral, they are likely to get a very small amount of loan at very high interest rates. Farmers also have to buy industrial intermediate inputs from the corporate sector. As the corporate sector has tremendous monopoly power, the prices of industrial intermediate inputs are likely to be fairly high. For all these reasons quite a large part of the land and infrastructure available to the farmers may remain unutilized gravely threatening the food security of the ordinary people. This study also shows that a onetime loan waiver for the farmers increases food output and improves farmers' well-being only temporarily. It does not produce a permanent impact. Finally, the study yields the result that a onetime adverse natural shock may depress food output and farmers' well-being below their respective normal levels for quite some time. This may force many farmers to starve and commit suicide.

1.4 Chapter 4: Government Intervention and Food Security: Need and Nature

In the previous chapter, we examined the issue of food security under free market conditions. We pointed to several reasons why free market conditions will gravely threaten India's food security causing immense misery to the farmers and the poor. In this chapter, we point to two more factors that adversely affect food security in a free market. The factors we identify here are first, the uncertainty associated with production and price of food and second, the behavior of the corporate sector, which, because of its monopoly power, finds it optimal to regularly hike prices of industrial intermediate inputs used in food production. The studies undertaken in this chapter and the last one show that free market forces will lead to large scale underutilization of the available land and infrastructure in the food sector. These studies point to the urgency of appropriate government's policies for maximizing food output through full utilization of the land and infrastructure of the food sector. This chapter seeks to derive these policies. It also seeks to derive the policy that the government should adopt to distribute the surplus food output of the food sector among the non-farmer people equitably. It, then, examines the implications of the recently passed three Farm Laws and concludes that the objective of these laws is to hand over Indian agriculture to the corporate sector. It, then, proceeds to examine the implications of corporatization of Indian agriculture. The importance of the

issues considered here can hardly be overemphasized. The endeavour is worthwhile because the issues considered here are examined in a rigorous theoretical framework, which we hope capture all the relevant salient features of India. Such a study, to the best of our knowledge, does not exist in the literature.

Let us briefly state the major results derived in this chapter. It first focuses on the uncertainty associated with price and production of food. Food production is highly uncertain. Adverse natural conditions can damage the crop considerably. Moreover, a long time elapses between the sowing of a crop and its harvesting. Farmers cannot know what price will prevail at the time of harvesting the crop. Food crop is perishable. Farmers, as they are financially weak, do not have adequate storage space to store their crop for a long period of time. Hence, once the crop is harvested, the farmers have to sell it off as early as possible. They have to meet their debt service charges from the sales revenue. The longer the delay in selling the crop, the larger are the debt service charges of the farmers. Moreover, any given crop is produced by a very large number of farmers. Hence, no individual farmer has any control over the total supply of the given crop. Thus, after the crop is harvested, the farmers cease to have any bargaining strength and are completely at the mercy of the traders. Thus, if the price they receive after the harvest is very low, they become bankrupt. The factors mentioned above make food production highly risky to the farmers. In any given period, the farmers have a given amount of their own fund, which they can utilize for food production. Alternatively, they can park it in a safe financial asset yielding a given interest rate. Again, the farmers can borrow at a given interest rate. How much they can borrow depends upon the collateral they can offer. Thus, in any given period, farmers' own fund plus the maximum amount of loan they can secure for food production give the total amount of fund at the disposal of the farmers for food production. We have argued in this chapter that the greater the uncertainty of food production, the smaller is the fraction of the farmers' fund the farmers will use for food production. This study points to another reason why free market adversely affects food security. Farmers use large amounts of industrial intermediate inputs for food production. The corporate sector under the control of just a few capitalists supplies the farmers with these inputs. Our study shows that the capitalists may have a vested interest in raising the prices of their products at regular intervals. A hike in the prices of industrial products will reduce farmers' demand for their products. Hence, scarce productive resources will be released from production of ingredients for food production. Capitalists, just a few in numbers, must be knowing this and they will raise their consumption and investment demand commensurately so that the scarce productive resources released from the production of food (wage goods) get utilized to cater to their needs. Thus, by raising prices the capitalists are able to grab a larger amount of goods and services at the expenses of farmers and ordinary workers. We think that this is the only reason why prices rise all the time in capitalist countries. Data on inflation show that the rate of inflation has always been positive in every capitalist country every year.

The results derived in this chapter and the last one show that to ensure full utilization of land and infrastructure available for food production, i.e. to maximize food output, government intervention in the foods sector is absolutely essential. The study in this chapter shows that to achieve this task and to eliminate farmers' dependence on credit, the government should supply the farmers with industrial inputs at prices fixed at such low levels that the farmers are able to buy as much industrial input as they need to fully utilize their land and infrastructure with their own fund in the given period. To remove price uncertainty of the farmers, the government should buy up all the marketable surplus of the farmers at a price, which we will refer to as the procurement price. The procurement price should be fixed at such a level that the farmers' sales proceeds equal the amount of farmers' own fund in the given period. This will enable the farmers to maximize food production in the next period also provided the government keeps the price at which it supplies the industrial inputs fixed. Thus, if the procurement price and the price at which the government supplies industrial inputs are kept fixed, farmers will be able to produce the potential level of food output period after period. To increase the potential level of food output, the government should invest heavily in infrastructure and research and development in the food sector. We have discussed the best way of doing it in detail in Chapter 2.

Let us now focus on the issue of distribution of the food procured by the government. The government should distribute it equally among the non-farmer population. Therefore, the government should fix a per capita quota of food by dividing the amount of food to be distributed by the number of non-farmer persons. We will call the price at which the food is distributed the ration price of food. The employed industrial workers spend all their income on food. They are assumed to be too poor to save or to consume non-essential items of consumption. Hence, the ration price of food should be fixed in such a manner that each of the industrial workers is able to buy with his income only the quota amount of food. Let us now focus on the issue of financing the food procurement cum distribution and input subsidization programme. Note that the farmers pay to the government their own fund in a given period for the industrial intermediate inputs they buy from the government. They again get back the same amount as revenue from the sale of the marketable surplus of food to the government. This part of the programme is, therefore, self-financed. The government, therefore, has to finance only the input subsidy. Let us now examine how the government can do it. Under the programme delineated above, the only sector that faces an expansion in demand is the industrial sector. This happens because output of food rises from a low level to its potential level. If the existing capacity in the industrial sector is large enough to accommodate the cumulative expansion in industrial output that this increase in demand gives rise to, the subsidy can be financed by borrowing from the RBI. In the other case, capitalists' income has to be taxed so that capitalists' consumption and investment demand go down to such an extent that the existing industrial capacity is able to fully accommodate the food policy induced increase in industrial output.

This chapter then focuses on the three recently passed Farm Laws and examines their implications in detail. The first of these three acts is called The Farmer Produce Trade and Commerce (Promotion and Facilitation) Act, 2020. This law establishes free market in agricultural produce. Previously, State Governments set up Agricultural Produce Market Committees (APMCs). Farmers could sell their produce and traders could buy farmers' produce only in the market yards designated for such transactions by the APMCs. These market yards are referred to as mandis. To ensure that the farmers get just prices for their produce and to preclude the possibility of cheating, traders could buy from the farmers their produce only in the mandis under the supervision of the State Governments. More importantly, to ensure that the farmers get just prices for their produce, the Food Corporation of India (FCI) or State Government Agencies on behalf of the FCI procured food grains from the mandis at pre-specified procurement prices (which are also referred to as minimum support prices or MSPs), which were fixed at remunerative levels and announced well ahead of the sowing of the crops to do away with the price uncertainties of the farmers. The farmers could sell as much as they wanted at the procurement prices. Even though FCI's procurement operations cover only major food grains, it effectively sets a floor to the prices of other agricultural crops as well, since farmers to a considerable extent have the option of not producing other crops in their land if they are not assured of remunerative prices for them. This is because they can use their land only to produce those crops, which are covered by the government's procurement operations.

This Act stipulates that purchase and sale of framers' produce need not be confined to the mandis. Traders can purchase farmers' produce from the farmers wherever they want. These purchases and sales can take place even on digital platforms. This Act enables the corporate sector to lure the farmers away from the mandis by offering them higher than the procurement prices initially. If this continues for a few years, the government will get the excuse to abolish the mandis and do away with its procurement operations. Once this happens, farmers with their perishable output and no storage facilities will be completely at the mercy of the mighty corporations. The corporate sector then will secure all the marketable surplus of the farmers at the lowest possible price.

The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020 is the second of the three Acts. This Act creates a legal framework for contract farming in agriculture. Under this Act, a buyer and a farmer can enter into a written contract prior to the production or rearing of any farm produce for the delivery of an agricultural produce of a specific quality and standard at a specific time at a specific price. The buyer may also supply the farmers with all the different kinds of inputs. Before the time of the delivery, the buyer can assess whether the quality of the produce to be delivered meets the standard specified in the contract. He can hire the services of an expert agent for this purpose also. If the farm output does not come up to the contract-specified quality, the buyer can refuse to buy it.

This Act is of considerable concern to us all. The reason is the following. Most of the farmers are fund-constrained. The paucity of the fund does not enable most of the farmers to fully utilize their land. This may lure the farmers into contract farming if the buyer provides them with all the necessary inputs on an adequate scale. However, since agriculture is a nature process, farmers cannot guarantee that the quality of the output will come up to a specific standard. Moreover, there is always the possibility that the expert agency appointed by the buyer for assessing the quality of the output may declare it substandard on the basis of many fine criteria. In other words, the specification of quality in the contract opens up the possibility of cheating by the corporate buyers who are enormously mighty financially relative to the Indian farmers. If the buyer refuses to buy the farm produce on the ground that it is not of the contract-specified quality, the farmer will have to pay to the buyer all the costs he has incurred in providing the farmer with the necessary inputs. The farmer obviously will not be able to pay without selling off his land. This way this Act also facilitates transfer of land from the farmers to the mighty corporations.

The third of the three acts, The Essential Commodities (Amendment) Act, 2020, states that the government will not interfere with the supplies of essential food stuff such as cereals, pulses, onions, edible oilseeds, oils etc. except under extraordinary circumstances such as war, natural disaster, extraordinary price increase etc. The government will also not impose any ceiling on the amount of stock that traders or processors in farm produce hold as long as the stock held does not exceed the installed storage capacities of the traders and processors. This Act, therefore, enables the corporate sector to stock as much farm produce as they want by installing commensurately large storage capacities.

The objective of these acts is to pave the way for withdrawal of all kinds of government intervention in the production and distribution of agricultural produce and handover the agricultural sector along with all the arable land to the giant corporations. This chapter has examined the implications of corporatization of Indian agriculture along with those of withdrawal of procurement operations and input subsidies from the farm sector and the financial sector reforms that have made banks and other financial institutions profit driven. With the withdrawal of government's procurement operations and subsidization of farm inputs, there will take place drastic fall in the prices received by farmers for their marketable surplus of food. Input prices will also rise steeply. At the same time, the financial sector reforms that have made the banks and other financial institutions profit-driven will lead to a large fall in the amount of loan the farmers are able to secure and a steep rise in the interest rates they face. All these changes, as our study in the previous chapter shows, will lead to a drastic fall in farmers' output of food. This is likely to drive small and medium farmers to bankruptcy. They will not be able to pay off their debt service charges after meeting their subsistence requirement of food. Their unpaid debt service charges will accumulate and they will be forced to sell off their land to pay off their debts. Our study also shows that periodic occurences of natural calamities, without any government relief, will also force many of the farmers to sell off their land for

survival. Thus, the major part of the farmers' land will pass on to the corporate sector. Thus, per capita food consumption will fall drastically and unemployment rate will rise sharply in the farmer households, a large section of which is likely to become landless on account of the three Farm Laws. This chapter also studies how the corporate sector will use the farmers' land that has come into its possession. Given the high degree of monopoly power enjoyed by the corporate sector, its profit rate in the non-food sector may be quite high. It may not consider farming profitable unless profit rate is as high as in the non-food sector. Given the technology and the prices of industrial inputs, profit rate in the food sector as faced by the corporate sector depends upon the price at which it sells food. They may not take to farming unless this price is sufficiently high. It will also use highly capital intensive method of farming. Given the highly capital intensive methods of production used in the non-food sector and the corporate food sector, food output has to be quite small to make the market price of food as high as the corporate sector requires. Thus, it is highly likely that the corporate sector will use for food production just a small segment of the farmers' land that has gone into their possession. Therefore, this chapter concludes that corporatization of Indian agriculture will gravely threaten India's food security and raise unemployment and poverty manifold much to the misery and suffering of the common man.

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Chapter 2

High Growth and Stagnant Employment in India: A Macro-Theoretic Analysis

Abstract

Unemployment is a burning issue in India. In the post-reform period, employment had been more or less stagnant in the organized sector even though the average annual growth rates of both GDP and the value added of the organized sector at constant prices were quite high. Obviously, there had been taking place labour saving technological and managerial changes along with growth in the organized sector. We are concerned here about how this kind of technological and managerial changes is likely to affect India. The objective of this kind of technological and managerial changes is to eliminate the bargaining strength of the workers and bring about a decline in the shares of the workers of the organized sector in the output of the organized sector. This chapter develops a simple macro model incorporating, hopefully, all the relevant salient features of the Indian economy to show how these changes generate strong recessionary forces slowing down the growth rates of both the organized and the unorganized sectors. It also seeks to suggest policies for generating employment in both the sectors. It derives the result that the larger the stock of infrastructure capital in the unorganized sector, the higher will be the levels of output and employment in both the sectors. It also shows that, if the government invests in infrastructure in the unorganized sector and finances it by taxing capitalists' income, employment is highly likely to go up significantly. The policy will also heap considerable benefits on the poor. However, if the government finances its investment expenditure by imposing indirect taxes, employment and output levels are likely to contract in both the sectors.

2.1 Introduction

The organized sector, which consists principally of the corporate sector, the large non-agricultural private enterprises and the public sector, has grown at a high rate in India in the post-reform period, but employment in the organized sector has been completely stagnant (see Table 2.4). We find from Table 2.1 that GDP had grown at a high rate of around 6 percent per annum during 1994-5 – 2014-15. Again, Table 2.6 reveals that the share of the organized sector in GDP increased from 36.8 percent in 1993-94 to 43.3 percent in 2003-04 and further to 45.1 percent in 2010-11. There are no reasons to believe that the trend has been reversed since 2010-11. Thus, the organized sector has grown at a higher rate than GDP. We also find from Table 2.3 that only 6 percent of the work force was employed in the organized sector in 2004-05. Table 2.5 shows that the work force and the labour force had grown at an average annual rate of around 2 percent. Thus, the share of the work force employed in the organized sector has dwindled continuously, whereas the share of the organized sector in GDP has steadily increased. Given the steady high growth rate of output of the organized sector and the complete stagnation in its level of employment, the unit labour requirement has gone down steadily and rapidly. Obviously, this has been brought about by labour saving technological and managerial changes taking place in the organized sector. As should be the purpose of labour saving technological and managerial changes, the shares of workers of the organized sector in its output must have gone down along with the unit labour requirement of production even though money wage rate may have increased. A prima facie evidence of this phenomenon is given by the data of Table 2.7, which show that the share of wage income in the net value added in the organized manufacturing sector has steadily declined during the period under consideration. This phenomenon of a secular decline in the share of workers' income in the GVA of the organized manufacturing sector in India is quite well documented in the literature (see, for example, Abraham and Sasikumar (2017) and Kapoor (2016)). The objective of this chapter is to examine the implications of the decline in the shares of skilled and unskilled workers in the organized sector's output on the output levels or the growth rates of the organized and the unorganized sectors using a macro model suitable for India. The existing literature on Indian economy, however, does not address this issue. Hence, the present study fills up an important gap in the literature. It also seeks to suggest policies that may generate employment in both the sectors. ILO(2009) has made an attempt at suggesting a strategy for generating employment in India. It has recommended massive investments in sectors, which are naturally employment intensive. However, it has not derived its strategy from a macro-theoretic model. Hence, it has left the issue of the problem of financing of the required massive investments unexplored. Nor has it examined the issue of the possible conflict between the goal of employment generation and that of providing the masses with the basic necessities of life in adequate quantities at affordable prices. We have shown that, if the government invests in infrastructure in the unorganized sector and finances it by taxing capitalists' income, it will raise employment significantly and heap considerable benefits on the poor. However, if the government, as it normally does, finances the increase in its investment in the

unorganized sector by raising indirect tax rates, it is highly likely to lower employment and output levels in both the sectors.This chapter uses a framework similar to the one developed in Ghosh and Ghosh (2019). We delineate this framework below.

2.2 The Model

We divide the economy broadly into two main sectors: the unorganized or the traditional sector and the organized or the modern sector. In India, the organized sector is defined as the one that consists of all non-agricultural enterprises employing more than ten employees or more without power and five employees or more with power. Thus, we define the organized sector as the one that consists of all large non-agricultural enterprises. The major feature of the organized sector is that it is an oligopoly. Producers in this sector, a la Kalecki (1954), set the prices and adjust their output to demand that comes forth at the prices set. The output in this sector is, thus, demand constrained. As this sector is an oligopoly, prices remain rigid in this sector in the short run.

List of notations

A	Output of unorganized sector
A^D	the total demand for A
A^S	the supply function of the unorganized sector
β	the fraction of total labour supplied by hired (landless or material means less) workers
C_C	average and marginal propensities to consume the output of the organized sector of capitalists
C_{wA}	average and marginal propensities to consume the output of the organized sector of workers
C_{Wy}	average and marginal propensities to consume the output of the unorganized sector of workers
e	the exchange rate
$\bar{F}$	the exogenously given net inflow of foreign capital
G	Government purchase of Y
$I^A(\bullet)$	unorganized sector's investment demand for Y
$I(\bullet)$	Investment demand for Y
$\bar{K}$	The infrastructure capital in the unorganized sector
l_A	the unit labour requirement for producing A
l_g	the total amount of employment generated in the unorganized sector through various government employment guarantee schemes
l_y	the unit labour requirement (measured in terms of labour hours) to produce a unit of Y
L_0	the amount of labour time given by each worker in the given

	period
m	the fixed intermediate input requirement per unit of unorganized sector output
$NX(\bullet)$	Net export of organized sector
P	the price of the organized sector output
P_A	price of the output of the unorganized sector
P^*	P^* denotes the price of foreign goods
t	the income tax rate of producer's
t_w	the income tax rate of worker's
w	w is the money wage rate of the organized sector workers
w_A	the money wage rate in the A-sector
Y	Output of domestic organized sector
Y^*	Output of foreign organized sector

Let us now consider the unorganized sector. It consists of all other non-agricultural enterprises (which are small) and agriculture. The latter is by far the dominant segment in the unorganized sector. The distinguishing feature of this sector is that the producers in this sector are credit constrained. They produce as much output as they can using the amounts of inputs they can purchase with the financial resources they have at their disposal and the markets clear through the adjustment in prices. We will specify the features of the organized and the unorganized sectors in detail below:

The Organized Sector:

The output of this sector is denoted by *Y*. It is produced with capital and labour. The stock of capital is given, as the model is a short-run one. Production of the organized or the modern sector is highly import intensive and the production function is fixed coefficient.

In line with the tradition set by the structuralist writers such as Kalecki (1954), Rakshit (1983), Taylor (1982), Bose(1989) et al, we assume that the output of the modern or the organized sector is demand determined. Producers set the prices of their products and adjust their outputs to demand that comes forth at the prices set. The price of the output of the organized sector is denoted by *P*and it is fixed and assumed to be equal to unity for simplicity. The major components of aggregate demand for *Y* are consumption, investment, net export, and the demand arising from the unorganized or the traditional sector for *Y*, as it uses the goods produced in the organized sector as intermediate inputs in its production. It also uses the output of the organized sector also for purposes of investment.

The consumption demand for the output of the organized/modern sector comes from both the workers and the capitalists of the organized sector, although quite a large part of

the wage income is spent on the mass consumption goods produced by the unorganized sector. The average and marginal propensities to consume the output of the domestic organized sector and its foreign substitutes of workers and capitalists are assumed to be different and they are denoted by C_{wy} and C_c respectively.

Investment demand of the organized sector for Y , as standard, is assumed to be a decreasing function of the interest rate. In case of India, an important determinant of the cost of investment is the exchange rate (e) as a large part of the investment demand of the organized sector represents demand for imported capital goods. So, a ceteris paribus increase in e raises the cost of investment and, hence, given expectations, reduces investment demand for Y. Organized sector's production is highly import intensive. An increase in e, therefore, generates a strong cost-push. The corporate sector in India is heavily indebted to the foreigners. An increase in e raises debt service charges on external loans in domestic currency substantially. All these adverse supply shocks demoralize the investors and dampen investment demand. Data on exchange rates, growth rates and capital formation given in Tables 2.2 and 2.1 show that in all the years of recession (2011-12 – 2013-14) the exchange rate increased substantially indicating a strong inverse relationship between the exchange rate, rate of capital formation and growth rate in India. For all these reasons, we think that investment is highly sensitive to exchange rate in India. Hence, we have incorporated e as a determinant of investment and made it a decreasing function of e.

Besides the organized sector's investment demand for the organized sector's output, the unorganized sector also requires the organized sector's output for investment purposes. We have made the unorganized sector's investment demand a decreasing function of interest rate and an increasing function of the aggregate infrastructure capital of the unorganized sector, denoted $\overline{K}$, for reasons we will explain shortly.

Investment demand is, thus, inversely related to both r and e and is an increasing function of $\overline{K}$. Note that, we have assumed here that the prices of foreign goods in terms of foreign currency are fixed since India is a small open economy. In India, RBI seeks to keep r at a target level through its Liquidity Adjustment Facility and open market operations. We, therefore, regard it as a policy variable of the RBI and denote its exogenously given value by $\bar{r}$.

As standard, the net export of Y (denoted NX) depends positively on the real exchange rate $p \equiv \frac{P^* e}{P}$, (where P^* denotes the price of foreign goods in foreign currency and P denotes the domestic price level in domestic currency), and foreign GDP (denoted Y^*). It is also likely to depend negatively upon C, I and G, as they represent demand for both domestic and foreign goods. Thus, G, C and I enter as arguments in the net export function. Organized sector's workers' consumption demand for organized sector's output and its foreign substitutes is likely to be much less import intensive than capitalists' consumption demand. Hence, for simplicity and without any loss of generality, we only

keep capitalists' consumption demand as an argument in the net export function. Similarly, unorganized sector's investment demand for *Y*, which we denote by I^A, is unlikely to be much import intensive. Following an increase in $\overline{K}$, which consists in rural electrification, setting up of flood control and irrigation facilities, investments in land reclamation and R&D that generates better seeds, production techniques, implements etc., producers in the unorganized sector will be induced to make complementary investments in facilities and implements such as new electric connection, pump sets, tube wells, better implements etc., as the increase in infrastructure capital relaxes crucial constraints operating on production. Import intensity of these investments is negligible and may, therefore, be ignored. For this reason, we have not incorporated I^A in the net export function. The organized sector also supplies the unorganized sector with intermediate inputs such as fertilizer, pesticide etc. Even though India has to meet a part of its fertilizer requirement with import, import intensity of the intermediate input demand of the unorganized sector is much less than those of *I*, *G* and capitalists' consumption. Hence, we have not explicitly considered intermediate input demand of the unorganized sector as a determinant of net export. This we have done for simplicity and without any loss of generality. Accordingly, *Y* is given by

$$Y = C_{Wy}.\left[w\frac{l_y}{L_0}Y(1-t_w) \right] + C_C.\left[\left(Y - w\frac{l_y}{L_0}Y \right)(1-t) \right] + I(\underset{-}{\bar{r}}, \underset{-}{e}) + I^A\left(\underset{-}{\bar{r}}, \underset{+}{\overline{K}} \right) + G + NX\left(\underset{+}{\frac{P^* e}{P}}, C_c(1-t).\left(\underset{-}{1} - w\frac{l_y}{L_0} \right)Y, I(\underset{-}{\bar{r}}, e), \underset{-}{G}, \underset{+}{Y^*} \right) + mA \tag{2.1}$$

In (2.1), *w* is the money wage paid to each of the organized sector workers in the given period and *w*, as standard in the Keynesian tradition or Keynes-Kalecki tradition, is assumed to be fixed in the short run. l_y is the unit labour requirement (measured in terms of labour hours) to produce a unit of *Y* and L_0 is the amount of labour time given by each worker in the given period. Hence, the number of workers needed to produce *Y* is given by $\frac{l_y Y}{L_0}$. Total wage payment to labour is $w.\frac{l_y Y}{L_0}$, which is also the real wage income of the organized sector workers, since the price of the organized sector output denoted by *P* is assumed to be equal to unity. In the structuralist tradition developed on the lines set by Keynes and Kalecki, the organized sector is assumed to be an oligopoly in consonance with reality. In such a scenario, prices display marked rigidity on account of oligopolistic interdependence among producers captured in a certain way in the kinked demand curve oligopoly model. In the Keynes-Kalecki (structuralist) tradition, producers set the prices on the basis of cost. We have, however, made prices rigid and independent of cost for analytical simplicity. Had we made *P* an increasing function of the cost of production, our results would have been stronger.

Workers pay taxes at the rate t_w on their income. $c_{Wy}.\left[w\frac{l_y}{L_0}(1-t_w)\right]$ is the total consumption demand of the workers for the output of the organized sector and its foreign substitutes. (Since most of the workers are poor, we assume for simplicity and without any loss of generality that it represents demand for the output of only the domestic organized sector). After wage payments, the residue accrues to the producers as profit, as we have disregarded other factor payments for simplicity, i.e., we have assumed outstanding loan of the capitalists taken from the workers to be zero for simplicity. This does not matter, as the outstanding loan of the capitalists taken from the workers and the average interest rate that applies to it are fixed in the short period under consideration. So, the income of the capitalists is $\left[Y-w\frac{l_yY}{L_0}\right]$ and if they pay tax at the rate *t* on their income, their disposable income is $\left[Y-w\frac{l_yY}{L_0}\right](1-t)$. Therefore, their total consumption demand for Y is $C_c.\left[Y-w\frac{l_yY}{L_0}\right](1-t)$. We assume that quite a large part of it represents demand for foreign goods. Hence, we have made net export a decreasing function of capitalists' consumption demand. Signs of other partial derivatives of the *NX* function are quite self-evident.

Aggregate investment demand is decomposed into two components: $I(\bar{r},e)$and $I^A(\bar{r},\overline{K})$, which give investment demands of the organized and the unorganized sectors, respectively. Both these investment demands are made decreasing functions of the interest rate denoted r. The RBI through open market operations, liquidity adjustment facility and other means seek to keep r at a target level. Hence, we treat r as RBI's policy variable here and assume it to be given at $\bar{r}$. The organized sector's investment is also made a decreasing function of the exchange rate, denoted *e*, for the following reason. India's production and investment are highly import intensive. This point may be illustrated using the following example. Think of the import intensity of teaching economics in India. All the text books used are foreign. All the journals referred to are foreign. All the computers and software used are imported. This is true not only of economics but also of all other subjects. Thus, India is completely dependent on the US and Western Europe for knowledge and technology. Hence, to sustain its production and investment, India has to import on a large scale. Given the prices of foreign goods in foreign currency, an increase in the exchange rate makes prices of foreign capital goods higher in domestic currency. This, given investors' expectations, reduces profitability of investment and, thereby, lowers it. Let us now explain why $I^A$is an increasing function of $\overline{K}$, which denotes the stock of infrastructure capital available in the unorganized sector. Land usage can be increased with investments in agriculture which include investments in irrigation, electrification, flood control facilities, improvement in rural connectivity, land reclamation, agricultural research etc. This kind of investment is land

augmenting as it enhances the usage of the same plot of land in a year and enables usage of more land for purposes of production. The infrastructure capital in the unorganized sector is denoted by K. The amount of land available to the unorganized sector is an increasing function of K. As K is given in the short run, we denote it by $\overline{K}$. As an increase in $\overline{K}$ makes possible greater number of cropping on the same plot of land or cultivation of new land leading to larger levels of production and income, it induces (and also makes it possible by relaxing the credit and thereby the resource constraint for) the unorganized sector's producers to undertake larger amount of complementary investment.

m denotes the fixed intermediate input requirement per unit of the unorganized sector output. Therefore, total intermediate input requirement of the unorganized sector is given by *mA*, where *A* is the total output of the unorganized sector. The unorganized sector has to buy these intermediate inputs from the organized sector. Note that in the organized sector there takes place a decline in l_y along with a growth in Y so that employment remains stagnant. However, we regard here the process of labour saving technological and managerial changes to be independent of the process of growth in Y and treat the former process as an exogenous one. Hence, we treat l_y as an exogenous variable and do not make it a function of Y.

The Unorganized Sector

The output of the unorganized sector is denoted by *A*. In what follows we will seek to identify the factors that determine supply of and demand for *A*.

Supply of *A*

The unorganized sector consists of small rural and urban enterprises but the most dominant segment of this sector is agriculture. This sector absorbs most of the unskilled/low skilled workers of the country. Its production function is fixed coefficient and the output of this sector is denoted by A which is produced with land, labour, capital and intermediate inputs bought from the organized sector. The stocks of land and capital used in the unorganized sector are given. In contrast with the tradition set by structuralist writers such as Rakshit (1982), Taylor (1983) et al. we have assumed the production function to be fixed coefficient even in agriculture for analytical simplicity. This assumption will not affect our results qualitatively. This assumption helps us capture in a simple way the fact that how much of the fixed amount of land and capital the producers in the unorganized sector can utilize depends crucially on the resources they have in their command to purchase intermediate inputs from the organized sector and labour.

Land usage can be increased with investments in agriculture which include investments in irrigation, electrification, flood control facilities, improvement in rural connectivity, land reclamation, agricultural research etc. This kind of investment is land augmenting as it enhances the usage of the same plot of land in a year and enables usage of more land for purposes of production. The infrastructure capital in the unorganized sector is

denoted by K. The amount of land available to the unorganized sector is an increasing function of K. As K is given in the short run, we denote it by $\overline{K}$. As an increase in $\overline{K}$ makes possible greater number of cropping on the same plot of land or cultivation of new land leading to larger levels of production and income, it induces (and also makes it possible by relaxing the credit and thereby the resource constraint for) the unorganized sector's producers to undertake larger amount of complementary investment.

As most of the producers of the unorganized sector are financially weak and, therefore, subject to severe credit constraint, their purchasing power depends crucially on the relative price of their output in terms of the goods produced in the organized sector given by $\frac{P_A}{P}$, where P_A denotes price of the output of the unorganized sector. A ceteris paribus increase in $\frac{P_A}{P}$ enables the producers of the unorganized sector to purchase more intermediate inputs from the organized sector and labour and, thereby, allow them to bring more land under production in agriculture and, in general, to produce more. (This is possible in case of agriculture because of multiple cropping within a given short period). Therefore, the supply of output of the unorganized sector is an increasing function of ($\frac{P_A}{P}$).

Most of the production in the unorganized sector is carried out with the help of family labour and the unorganized sector workers also supplement their income by working outside their family firms in relatively larger firms that use both family labour and hired labour. There also exists large scale surplus labour in the unorganized sector. Hence, given everything else, if the government provides employment at the wage rate prevailing in the unorganized sector through employment guarantee schemes, it will augment unorganized sector's producers' income enabling them to buy more intermediate inputs from the organized sector and, thereby, bring more land under cultivation in agriculture and, in general, produce more. Let l_g be the total amount of employment generated in the unorganized sector through various government employment guarantee schemes. Hence, the supply function of the unorganized sector may be written as

$$A^S = A\left(\underset{+}{\frac{P_A}{P}}, \underset{+}{\overline{K}}, \underset{+}{l_g}\right) \tag{2.2}$$

A part of this supply of *A* is used for self consumption by the producers of *A*. Family enterprises keep the part of the produce that they consider absolutely necessary for survival for self consumption. However, for simplicity and without any loss of generality, we do not explicitly consider that part and assume the whole of the supply of *A* to be the marketable surplus of the unorganized sector.

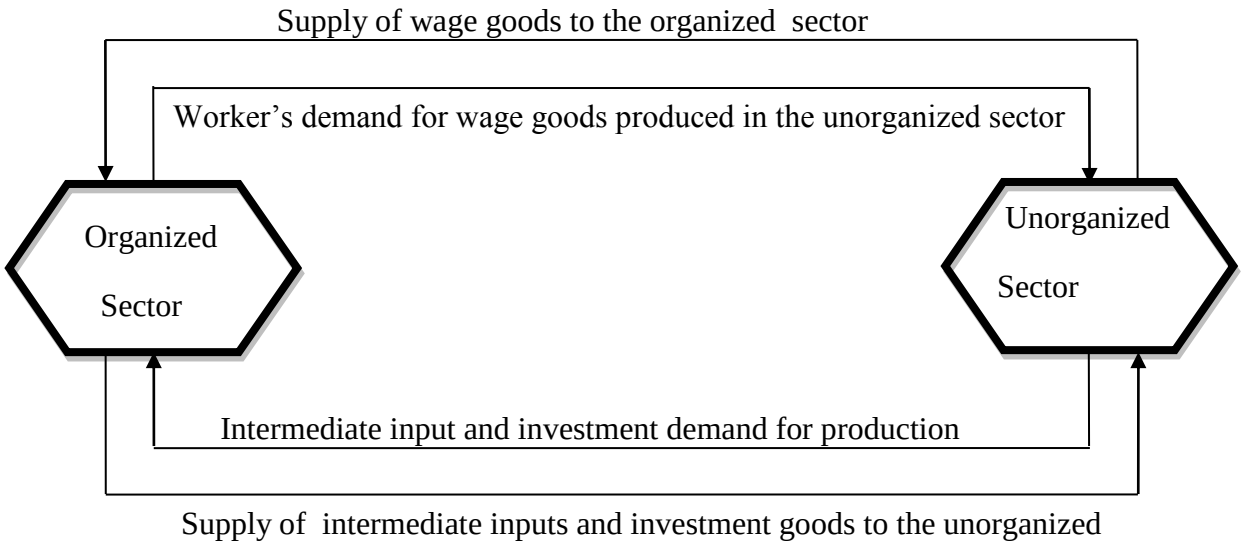
Demand for *A*

The unorganized sector supplies principally the mass consumption goods, which belong to the category of necessities. So demand for *A* of a small number of rich organized sector producers and large landlords is likely to be fixed and, therefore, is ignored here for simplicity. The demand for *A* mainly comes from the organized sector workers and unorganized sector workers who do not have any family enterprises. For simplicity we assume that the latter spend all their income on *A*, while the former spend a fraction C_{wA} of their income on *A*.

Most of the output of *A* is produced in small firms using family labour and only a small fraction of output originates in the large firms. Let β be the fraction of total labour supplied by the hired (landless or material means less) workers. Let l_A be the unit labour requirement for producing *A*. Therefore, the total labour required to produce *A* is $(l_A A)$. Now, since l_g denotes employment in the employment guarantee program in a given period, total employment in the unorganized sector is $(l_A A + l_g)$ and total wage income of the hired workers is $w_A.\beta.(l_A A + l_g)$,where w_A denotes the money wage rate in the *A*-sector. So, hired unorganized sector's workers' demand for *A* is $\frac{\beta w_A (l_A A + l_g)}{P_A}$. We assume w_A to be fixed. This assumption is standard in the Keynesian tradition. This also conforms to the reality in the short run. On the other hand, total wage income of organized sector workers is $w\frac{l_y Y}{L_0}$ and their consumption demand for *A* is $C_{wA}.w(1-t_w)\frac{l_y Y}{L_0}$. So, the total demand for A is

$$A^D = \frac{C_{wA}.w(1-t_w)\frac{l_y}{L_0}Y}{P_A} + \frac{\beta w_A (l_A A) + \beta w_A l_g}{P_A} \qquad (2.3)$$

Chart 1



The producers of the unorganized sector produce as much as they can with the resources they have at their disposal for purchasing intermediate inputs and labour and sell off their output at whatever prices they can do it. Individual producers do not have any control over either the aggregate output or the price. The price of *A* is, therefore, market clearing. The unorganized sector, accordingly, is in equilibrium when supply of *A* and demand for *A* become equal, i.e., when the following equation is satisfied:

$$\left(1-\frac{\beta w_A l_A}{P_A}\right).A\left(\underset{+}{\frac{P_A}{P}},\underset{+}{\overline{K}},\underset{+}{l_g}\right)=\frac{C_{wA}.w(1-t_w)\frac{l_y}{L_0}Y}{P_A}+\frac{\beta w_A l_g}{P_A} \qquad (2.4)$$

The LHS of (2.4) gives the net supply of *A*, which is defined as the supply of *A* net of the internal demand for *A* that production of *A* directly generates. Note that, for (2.4) to be satisfied for positive values of *Y* and l_g, $\frac{\beta w_A l_A}{P_A}$ has to be less than unity. We, therefore, assume this to be the case. If this were not the case, no producers would have produced *A*.

Following the structuralist tradition, we assume here that P_A clears the *A*-market. We have also ignored foreign trade in the output of the unorganized sector for simplicity. The inter-relationship between the organized and the unorganized sector is presented in the form of a flow chart (see Chart 1).

The Foreign Exchange Market:

The BOP consists of trade surplus and net inflow of foreign capital. The latter is assumed to be exogenously given for simplicity. The equilibrium in the foreign currency market is given by the following equation:

$$NX\left(\underset{+}{\frac{P^{*}e}{P}},\underset{-}{C_c(1-t).\left(1-w\frac{l_y}{L_0}\right)}Y,\underset{-}{I(\bar{r},e)},\underset{-}{G},\underset{+}{Y^{*}}\right)+\bar{F}=0 \qquad (2.5)$$

Where *NX*, as we have already mentioned, stands for net export and $\bar{F}$ denotes the exogenously given net inflow of foreign capital. Both are expressed in terms of Y.

The specification of our model is now complete. It consists of four equations (2.1), (2.2), (2.4) and (2.5) in four endogenous variables *Y*, *A*, P_A and *e*. We solve them as follows:

Solving (2.5) for *e*, given the policy parameters and the exogenous variables, we get

$$e=e\left(\underset{+}{C_c(1-t).\left(1-w\frac{l_y}{L_0}\right)}Y,\underset{-}{\bar{r}},\underset{+}{G},\underset{-}{Y^{*}},\underset{-}{\bar{F}}\right) \qquad (2.6)$$

Signs of the partial derivatives of (2.6) are quite self-evident from (2.5).

Substituting (2.2), (2.5) and (2.6) into (2.1), we get

$$Y=C_{Wy}.\left[\left\{w\frac{l_y}{L_0}Y\right\}(1-t_w)\right]+C_C.\left[\left(Y-w\frac{l_y}{L_0}Y\right)(1-t)\right]+$$
$$I\left(\bar{r},e\left(\underset{+}{C_c(1-t).\left(1-w\frac{l_y}{L_0}\right)}Y,\underset{-}{\bar{r}},\underset{+}{G},\underset{-}{Y^{*}},\underset{-}{\bar{F}}\right)\right)+I^{A}\left(\bar{r},\bar{K}\right)+G-\bar{F}+ \qquad (2.7)$$
$$mA\left(\frac{P_A}{P},l_g,\bar{K}\right)$$

We can solve (2.4) and (2.7) for the equilibrium values of *Y* and P_A. The solution is shown in Figure 2.1, where AA and YY represent (2.4) and (2.7), respectively. Both AA and YY are positively sloped. The reason is the following. First, focus on AA. From (2.4) it follows that, if from any (Y, P_A) on AA, Y rises, there emerges an excess demand for A at the given P_A. To restore equilibrium, with Y remaining at its higher value, P_A has to be raised, since an increase in P_A raises net supply of A and lowers demand for A (see (2.4). Now, consider YY. Following a ceteris paribus unit increase in Y from any given (Y,P_A) on YY, as follows from (2.7). disposable income of the workers and capitalists increases by less than unity and their aggregate consumption demand goes up

by even a smaller amount. There also takes place an increase in e lowering investment demand. Hence, at the given P_A, there emerges an excess supply of Y. To restore equilibrium in the Y-market, with Y fixed at its higher value, P_A has to be raised as it raises unorganized sector's demand for Y (see (2.7)). The solution corresponds to the

Derivation of the Equilibrium Values of Y and P_A

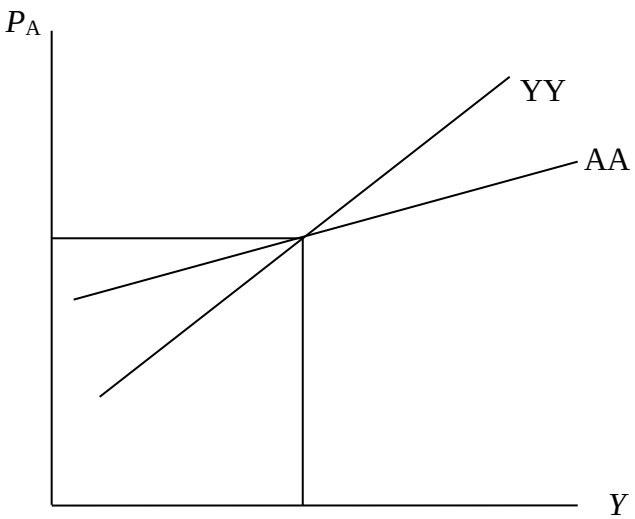


Figure 2.1

point of intersection of these two schedules. In section A.1 in the appendix, we have derived the slopes of the YY and AA schedules and derived the stability condition. We have sown there that both YY and AA are upward sloping and the equilibrium is stable if YY is steeper than the AA schedule.

2.3 Effect of Labour Saving Technological Progress

As we have already pointed out, employment in the organized sector has been stagnant since 1994 even though GDP in general and the output of the organized sector in particular have grown at high rates (see Tables 2.1 and 2.6). Obviously, there has been taking place labour saving technological and managerial changes along with the growth in *Y*. Clearly, given the sustained growth in the output of the organized sector at a high rate and the complete stagnation in employment in the organized sector, the labour saving technological and managerial changes referred to above brought about a secular decline in the unit requirement of both skilled and unskilled labour. Thus, l_y has declined steadily and L_0 must have increased. Obviously, as should be the major purpose of these labour saving changes, there must have taken place a sustained decline in the share of workers in the output of the organized sector, i.e., $w\frac{l_y}{L_0}$ must have declined steadily all through the period under consideration, even though the nominal wage rate may have increased. As we have already mentioned, we get prima facie evidence in support of this conjecture from the data of Table2.7 . We shall examine the implications of this decline

in the organized sector's workers' share on both *Y* and *A*. In section A.2 in the appendix, we have derived mathematically that a fall in $w\frac{l_y}{L_0}$ reduces both *Y* and *A*. We shall explain the intuition of the result below:

Following a fall in the share of the workers in the output of the organized sector, their consumption demand for the domestic organized sector's output goes down, while capitalists' consumption demand increases. However, the major part of the latter, if not the whole of it, is likely to represent demand for imported goods. Hence, at the initial equilibrium (Y, P_A, e), consumption demand for the domestic organized sector's output is likely to go down. On the other hand, the increase in consumption demand for imported goods creates a BOP deficit inducing a rise in *e*. The increase in *e* is unlikely to produce much of an impact on the real exchange rate, as the rise in *e* is likely to substantially raise *P*, since India's production is highly import intensive. (To avoid analytical complications, we have not made *P* an increasing function of *e*). In India, the rise in the exchange rate improves net export principally through its dampening impact on investment, which lowers demand for not only domestic investment goods but also imported capital goods. Thus, at the initial equilibrium (Y, P_A), there is likely to emerge a large excess supply of *Y* in countries like India. The decline in the workers' income in the organized sector also reduces demand for unorganized sector's output creating an excess supply of *A* at the initial equilibrium (Y, P_A). Thus, P_A will fall reducing *A* and, thereby, contributing to the excess supply of *Y*. *Y*, will, therefore, also begin to decline. P_A, *A* and *Y* will, accordingly, go on falling until the new equilibrium is reached. The above discussion yields the following proposition.

Proposition 2.1: Following a fall in the share of the organized sector workers in the output of the organized sector due to technological and managerial changes, if import intensity of consumption of the capitalists and the exchange rate sensitivity of investment are sufficiently large, conditions that are highly likely to be satisfied in reality in India, both *Y* and *A* will contract. Thus, growth rates of both Y and A will contract under the conditions specified above.

Let us explain in brief why a fall in the values of *Y* and *A* indicate decline in the growth rates of *Y* and *A*. The purpose of the kind of static macro models presented here is to explain the actual short period growth rates and inflation rates. The model represents an economy in a given period. Output and price levels of the previous period are given and known in the period under consideration. Hence, determination of the output and price level in the given period amounts to determination of the growth rate of output and the inflation rate from the previous period to the given period. Thus, our model states that, given everything else, following a decline in the organized sector's workers' share in the organized sector's output, growth rates of *Y* and *A* would be less than what they otherwise would have been. One can see in this context Romer (2000, 2012). More precisely, this model identifies the rate of growth in the share of the organized sector's

workers in the output of the organized sector as an important determinant of the growth rates of Y and A and the rate of inflation in P_A. The growth rates of Y and A and the rate of inflation in P_A have been found to be increasing functions of the rate of growth in the shares of the organized sector workers in organized sector's output.

2.4 The Effect of an Increase in $\overline{K}$

The organized sector employed only 6 percent of the workforce in 2004-05 in India and it grew since then without generating any employment. The labour force, however, grew at the rate of almost 3 percent during 1999-2000 – 2004-2005 (see Tables 2.3, 2.4 and 2.5). There is no reason to suppose that these trends have changed much since then. Therefore, one can safely presume that almost all the workforce is employed in the unorganized sector at the present. Since there is likely to be large scale surplus labour in the unorganized sector given the dominance of family enterprises and self-employed people, growth in the unorganized sector may be the most important way of generating gainful employment. We, therefore, examine here how an increasein the stock of infrastructure capital in the unorganized sector is likely to affect the economy. We will carry out this comparative static exercise using Figure 2.2, where the initial equilibrium (Y, P_A) corresponds to the point of intersection of YY and AA schedules representing (2.7) and (2.4), respectively. Following an increase in $\overline{K}$, as follows from (2.4), there emerges excess supply of A at any given (Y, P_A) on the initial AA schedule (since $\frac{\beta w_A l_A}{P_A}$ is less than unity) . To restore equilibrium in the A sector at any given Y, P_A has to be lowered.

Effect of an Increase in $\overline{K}$

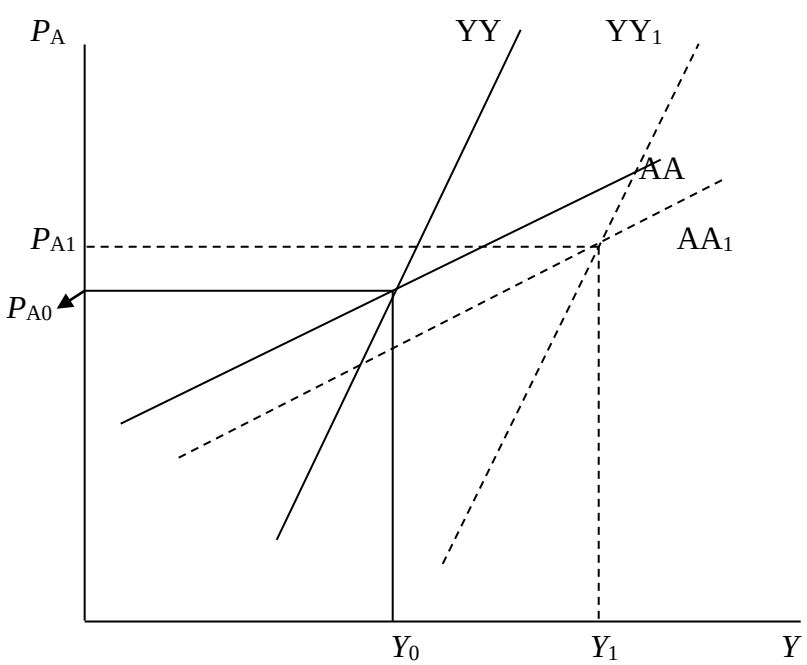


Figure 2.2

Note that P_A need not be lowered to the level that restores output of the unorganized sector to its initial level, since a ceteris paribus fall in P_A also raises demand for *A* (see (2.4)). Thus, AA shifts downward. The new AA schedule is labeled AA_1 in Figure 2.2. Let us now focus on YY. Corresponding to any given (Y, P_A) on the initial YY, there now emerges an excess demand for Y . This happens for two reasons. First, the increase in the supply of A raises the intermediate input demand for *Y* from the A-sector. Second, there takes place an increase in investment demand of the A sector (see (2.7)). The increase in investment demand is given by $I\frac{A}{\overline{K}}d\overline{K}$.

Thus, at any given (Y, P_A) on the initial YY, there emerges an excess demand of $\left(mA_{\overline{K}} + I\frac{A}{\overline{K}}\right)d\overline{K}$. Hence, to restore equilibrium in the Y-sector, at any given *Y*, P_A has to be lowered. If P_A is lowered to the level that restores supply of A to its initial level, excess demand for Y is not removed on account of the larger investment demand of the A sector (see (2.7)). Thus, to restore equilibrium in the Y-sector, P_A has to be lowered even below that level. Therefore, downward shift in the YY schedule will be larger than that of the AA schedule. The new YY schedule is labeled YY_1. *Y* will, therefore, be larger in the new equilibrium. Direction of change in P_A is, however, ambiguous. If P_A is higher or the same as before, A must be larger (see (2.2)). If P_A is less, *A* has to be greater to satisfy (2.4), since *Y* is larger. Hence, *A* must be larger in the new equilibrium. Accordingly, growth rates of both Y and A will go up. Employment in both the sectors will increase too.

The adjustment process may now be explained as follows. An increase in $\overline{K}$ consists in, for example, electrification of new areas, expansion of irrigation, flood control facilities, larger scale of activities in R&D that yields better seeds, farming practices, better implements etc. Therefore, an increase in $\overline{K}$ induces the unorganized sector's producers to undertake complementary private investment, for example, in new electric connections, implements etc. Import intensities of these investments in India are practically nil. The increase in infrastructure capital enables the farmers and other producers, who are not resource constrained, to bring more land under production and/or utilize their land and capital more intensively and, thereby, produce more *A* and demand more intermediate inputs from the organized sector. Thus, at the initial equilibrium Y, P_A and *e*, there emerges an excess supply of *A* and excess demand for *Y*. P_A will fall to restore equilibrium in the A-sector. As P_A falls, supply of *A* falls, while demand for *A* rises (see (2.4). Hence, equilibrium in the A-sector will be restored at a higher level of *A*. Thus, even at this lower P_A, there will still exist excess demand for *Y* at the initial equilibrium *Y*. Hence, *Y* will expand raising demand for *A*. Thus, Y, P_A and A will go on rising until the new equilibrium is reached.

The above discussion yields the following proposition:

Proposition 2.2: An increase in $\overline{K}$ in the unorganized sector will bring about an increase in the growth rates of outputs of both the sectors and increase the employment level in the unorganized sector.

We have proved this proposition mathematically in section A.3 in the appendix.

Since more than 95 percent of the work force is engaged in the unorganized sector, as follows from our above discussion, raising $\overline{K}$ is the most important way of generating employment.

2.5 Effect of an Increase in *G* to Raise $\overline{K}$ Financed by Taxation of Capitalists' Income

We will examine here how an increase in *G*, which consists in investing in $\overline{K}$, financed by taxing the capitalists is likely to affect the economy. We shall study the effect of this using Figure 2.3, where the initial equilibrium values of *Y* and P_A denoted by Y_0 and P_{A0} respectively correspond to the point of intersection of YY and AA schedules. Here, government expenditure rises by *dG* financed by taxing capitalists' income. Hence, $dG = d\left[t.\left(1-\frac{wl_y}{L_0}\right)Y\right]$ (see (2.7)). Let us now examine how YY and AA are affected by these changes. Focus on YY first. Corresponding to any (Y, P_A) on YY, as follows from (2.7), aggregate demand for *Y* changes by

$$Z = [(1-C_c).dG + I_e e_G dG] \tag{2.8}$$

Let us now derive the value of $de = e_G dG$ from (2.5). Taking total differential of (2.5) treating *Y* and all exogenous variables other than *G* as fixed, setting $dG = d\left[t.\left(1-\frac{wl_y}{L_0}\right)Y\right]$, and, then, solving for *de*, we get

$$de = e_G dG = \frac{-(-NX_{CC}C_c - (-NX_G))dG}{NX_p \frac{\partial p}{\partial e} + (-NX_I)(-I_e)} \tag{2.9}$$

In the expression on the RHS of the above equation, NX_{CC} denotes the partial derivative of *NX* with respect to capitalists' consumption. From the above it follows that $de < 0$, if $-NX_{CC}C_c > -NX_G$. This means that *e* will fall if import intensity of capitalists' consumption is larger than that of government expenditure on $\overline{K}$, a condition which is

quite likely to be satisfied. The reasons may be explained as follows. As we have already explained earlier, capitalists constitute a miniscule section of Indians, but they have in their command most of India's GDP. Hence, their consumption consists of the finest consumption items available globally from items of food and clothing to luxury cars, yachts, jets and islands. Since, India does not have any independent knowledge or technological base, almost all these consumption items are secured from abroad. Therefore, $-NX_{CC}$ is likely to be quite large. Government's investment in flood control, irrigation, electrification, road building, R&D etc., are carried out with domestic materials in the main. Only the high-tech capital goods and components are imported. Moreover, government can design its investments in such a way that their import intensity is minimized. Hence, $(-NX_G)$ is unlikely to be very large. Thus, the value of *de* given by (2.9) is likely to be negative. Hence, the increase in aggregate demand for *Y* given by, as follows from (2.8), $[(1-C_C).dG + I_e e_G dG]$ that takes place at any given (Y, P_A) on the initial YY is likely to be positive.

Thus, corresponding to any given (Y, P_A) on the initial YY schedule, there emerges excess demand for *Y*, if import intensity of capitalists' consumption is higher than that of government's expenditure on $\overline{K}$. Under these conditions, corresponding to any given P_A, the Y- sector will be in equilibrium at a larger *Y*. Accordingly, YY shifts to the right. The AA schedule, as follows from (2.4), remains unaffected. Both *Y* and P_A will, therefore, go up in the new equilibrium under the condition specified above. *A* will go up too with the increase in P_A.

We have derived this result mathematically in section 2.A.4 in the appendix.

This yields the following proposition:

Proposition 2.3: If the government raises *G* and finances it by taxing capitalists' income, growth rates of both the sectors will go up if marginal propensity to spend on imports of the capitalists ($-NX_{CC}C_C$) is larger than that of the government expenditure on $\overline{K}$, a condition which is highly likely to be satisfied in India. Employment in both the sectors will increase too under the same condition.

2.6 Effect of an Increase in *G* to Raise $\overline{K}$ Financed by Indirect Taxation of Sales of *Y*

Here, we consider the case where the increase in *G* to raise $\overline{K}$ is financed by indirect taxation**.** Usually, the government does not raise income tax rates to finance its additional expenditures for reasons that we shall explain later. Its favourite source of finance is indirect taxes and recently Government of India has undertaken an ambitious programme of reform of indirect taxation, which it refers to as the Goods and Services Tax (GST). Under the GST, efforts have been made to increase the coverage of indirect taxation over goods and services produced and producers and sellers of goods and services to the

maximum possible extent. The objective is to raise as much revenue as possible from indirect taxation even though it is highly regressive and unjust. We assume that sales of Y are taxed at the rate τ so that from every unit of Y sold, capitalists pay to the government $P\tau$ as tax, where P is the price of Y set by the producers. Thus, buyers of Y face the price $P(1+\tau)$ and the government receives $P\tau Y$ as indirect tax revenue. Denoting the real value of government's indirect tax revenue by T, we have

$$T = \frac{P\tau Y}{P(1+\tau)} = \frac{\tau}{(1+\tau)}Y \equiv vY \qquad\qquad v \equiv \frac{\tau}{(1+\tau)} \tag{2.10}$$

Workers' and capitalists' real incomes in this case are given by $\frac{wl_y}{L_0 P}(1-v)Y$ and $\frac{PY}{P(1+\tau)} - \frac{wl_y}{L_0 P}(1-v)Y = \left(1 - \frac{wl_y}{L_0 P}\right)(1-v)Y$. Incorporating these in (2.7) and setting $P=1$ and $dt = dt_w = 0$ for simplicity, we rewrite it as follows:

$$Y = C_{Wy}.\left[\left\{w\frac{l_y}{L_0}Y\right\}(1-v)\right] + C_c.\left[\left(Y - w\frac{l_y}{L_0}Y\right)(1-v)\right] +$$
$$I(\bar{r},e) + I^A(\bar{r},\bar{K}) + G - \bar{F} + mA\left(\frac{P_A}{P}(1-v), l_g, \bar{K}\right) \equiv C.(1-v)Y + I(\bar{r},e) + \tag{2.11}$$
$$I^A(\bar{r},\bar{K}) + G - \bar{F} + mA\left(\frac{P_A}{P}(1-v), l_g, \bar{K}\right)$$

Where $C \equiv C_{Wy}.w\frac{l_y}{L_0} + C_c.\left(1 - w\frac{l_y}{L_0}\right)$

Incorporating the indirect tax, we rewrite (2.4) and (2.5) as (2.12) and (2.13), respectively:

$$\left(1 - \frac{\beta w_A l_A}{P_A}\right)A\left(\underset{+}{\frac{P_A}{P}}\underset{+}{(1-v)}, \underset{+}{\bar{K}}, \underset{+}{l_g}\right) = \frac{C_{wA}.w\frac{l_y}{L_0}Y}{P_A} + \frac{\beta w_A l_g}{P_A} \quad ; \quad p'_A \equiv \frac{P_A}{P}(1-v),\ p_A \equiv \frac{P_A}{P} \tag{2.12}$$

And

$$NX\left(\underset{+}{\frac{P^* e}{P}}(1-v), \underset{-}{C_c}(1-v).\left(1 - w\frac{l_y}{L_0}\right)Y, I(\bar{r},e,\bar{K}), G, Y^*\right) + \bar{F} = 0 \tag{2.13}$$

In the present case, the government raises *G* to raise $\overline{K}$ and finances it with indirect tax revenue. Therefore, in this case, we set

$$dG = d(vY) \tag{2.14}$$

From (2.14), we get

$$dv = \frac{dG}{Y} - \frac{v}{Y}dY \tag{2.15}$$

To derive the impact of this policy on *Y*, we take total differential of (2.11) treating all exogenous variables other than dG as fixed, set $dG = d(vY)$, use (2.15) and, then, solve for *dY*. This gives

$$dY = C.dY - C.d(vY) + I_e de + dG + mdA = C.dY + (1-C).dG + I_e de + mdA \tag{2.16}$$

To derive the value of *de*, we take total differential of (2.13) treat all exogenous variables other than *G* and *v* as fixed, use (2.14) and (2.15) and, then solve for *de*. This gives

$$de = \frac{B_g dG + B_y dY}{B_e} \equiv b_g dG + b_y dY \tag{2.17}$$

Where

$$B_g \equiv \left[\left(NX_{p'}\, p\frac{1}{Y} + \left(-NX_G\right)\right) - \left(\left(-NX_{CC}\right)C_c\left(1 - w\frac{l_y}{L_0}\right)\right)\right] > 0\,; \quad p' \equiv \frac{P^* e}{P}(1-v),\ p \equiv \frac{P^* e}{P} \tag{2.17i}$$

B_g gives the increase in BOP deficit due to a ceteris paribus unit increase in *G*. A part of it represents an increase in demand for imported goods. It also raises indirect tax rate pushing up domestic price level. As close substitutes of Indian goods are available almost in all countries, there is likely to take place substantial fall in net export and, therefore, large increase in BOP deficit. These two effects are captured by the first term of the expression on the RHS of (2.17i). A part of the unit increase in indirect tax revenue comes from the capitalists, whose consumption demand for imported goods falls lowering BOP deficit. The second term captures this. However, in the net, BOP deficit is likely to rise in Indian conditions (because of the very high price elasticity of net export) and it is sensible to assume B_g to be positive.

$$B_y \equiv \left[(1-v)\left(-NX_{CC}\right)C_c\left(1 - w\frac{l_y}{L_0}\right) - NX_{p'}\, p\frac{v}{Y}\right] < 0 \tag{2.17ii}$$

B_y measures the decrease in BOP deficit due to a ceteris paribus unit increase in *Y*. A part of it accrues to the capitalists whose consumption demand for imports rises as a result. This is captured by the first term of the expression on the RHS of (2.17ii). The unit increase in *Y* also enables the government to reduce indirect tax rate, which lowers domestic price giving a boost to net export. This is given by the second term. The second term is likely to dominate for reasons we have already explained. Hence, B_y is likely to be negative.

$$B_e \equiv NX_{p'} \frac{\partial(p(1-v))}{\partial e} + (-NX_I)(-I_e) > 0 \qquad (2.17iii)$$

B_e measures the absolute value of the fall in BOP deficit that a ceteris paribus unit increase in *e* brings about. First, it raises real exchange rate and, thereby, raises net export. This is given by the first term on the RHS of (2.17iii). However, this term is likely to be small in India, since an increase in the exchange rate also raises the price level in India. Hence, its effect on real exchange rate is likely to be small. We have, however, not captured this in our model for simplicity. An increase in the exchange rate also reduces investment in India and, thereby, lowers investment demand for imported goods. This is given by the second term. Thus, B_e is positive. Therefore,

$$b_g \equiv \frac{B_g}{B_e} > 0 \quad \text{and} \quad b_y \equiv \frac{B_y}{B_e} < 0 \qquad (2.17iv)$$

We shall now derive the value of *dA*. For that, we first take total differential of (2.12) treating all exogenous variables other than *v* as fixed, use (2.15) and, then, solve for dP_A. This yields

$$dP_A = \frac{\overline{D}_g}{S_{P_A}} dG + \frac{\overline{D}_y}{S_{P_A}} dY \qquad (2.18)$$

Where

$$S_{P_A} = \left(1 - \frac{\beta w_A l_A}{P_A}\right) A_{p'_A} (1-v) \frac{1}{P} + \frac{C_{wA} w \frac{l_y}{L_0} Y + \beta w_A l_g + \beta w_A l_A A}{P_A^2} > 0 \qquad (2.18i)$$

S_{P_A} measures the absolute value of the fall in the excess demand for *A* that a ceteris paribus unit increase in P_A brings about. The first term of the expression on the RHS of (2.18i) gives the increase in the supply of *A* that a unit increase in P_A leads to. The second term gives the absolute value of the fall in demand for *A* that a unit increase in P_A causes.

$$\overline{D}_g = \left(1 - \frac{\beta w_A l_A}{P_A}\right) A_{p'_A} p_A \frac{1}{Y} > 0 \qquad (2.18ii)$$

$\overline{D}_g$ measures the increase in excess demand for A that a ceteris paribus unit increase in *G* brings about. A unit increase in *G* financed by additional indirect tax revenue, raises indirect tax rate pushing up the price of *Y*. This lowers net supply of *A* given by the expression on the RHS of (2.18ii) and, hence, excess demand for *A* goes up by the same amount.

$$\overline{D}_Y = C_{wA} \frac{w\frac{l_y}{L_0}}{P_A} - \left(1 - \frac{\beta w_A l_A}{P_A}\right) A_{p'_A} p_A \frac{v}{Y} > 0 \qquad (2.18iii)$$

$\overline{D}_Y$ measures the increase in the excess demand for *A* that a ceteris paribus unit increase in *Y* brings about. The first term of the expression on the RHS of (2.18iii) gives the increase in demand for *A* that it causes. The unit increase in *Y* also lowers indirect tax rate and thereby gives a boost to the net supply of A given by the second term. We consider it sensible to assume that the first term dominates. Hence, we assume $\overline{D}_Y$ to be positive.

Now, using (2.12), we get

$$dA = A_{p'_A} d\left(p_A(1-v)\right) = A_{p'_A}\left((1-v)dP_A - P_A dv\right) \qquad \because P = 1 \qquad (2.19)$$

Substituting (2.15) and (2.18) into (2.19) and rearranging terms, we write (2.19) as

$$dA = A_{p'_A}\left((1-v)\frac{\overline{D}_g}{S_{P_A}} - P_A \frac{1}{Y}\right) dG + A_{p'_A}\left((1-v)\frac{\overline{D}_Y}{S_{P_A}} + P_A \frac{v}{Y}\right) dY \equiv A_g\, dG + A_Y\, dY \qquad A_g < 0, A_Y > 0 \qquad (2.20)$$

Let us first focus on the first term on the RHS of (2.20). We shall argue that it is negative. Following an increase in *G* by *dG*, with *Y* remaining unchanged at its initial equilibrium value, *v* rises by $\frac{dG}{Y}$ lowering p'_A by $P_A \frac{dG}{Y}$ at the initial equilibrium P_A. This creates an excess demand for *A* of $\overline{D}_g dG$ at the initial equilibrium P_A. Hence, P_A rises by $\frac{\overline{D}_g}{S_{P_A}} dG$ to remove the excess demand. The increase in P_A removes the excess demand for *A*not only by raising supply of *A* but also by lowering demand for *A*. Hence, in the new equilibrium, with *Y* remaining unchanged at its initial equilibrium value, *A* is

less. Therefore, the first term in (2.20) is negative, i.e., $A_g < 0$. From (2.18i) and (2.18ii), we find that $(1-v)\frac{\overline{D}_g}{S_{P_A}} < (1-v)\frac{\left(1-\frac{\beta W_A l_A}{P_A}\right)A_{p'_A}\frac{p_A}{Y}}{\left(1-\frac{\beta W_A l_A}{P_A}\right)(1-v)A_{p'_A}\frac{1}{P}} = \frac{P_A}{Y}$

Let us now focus on the second term. Following an increase in *Y* by *dY*, *v* falls by $\frac{v}{Y}dY$ raising p'_A by $P_A\frac{v}{Y}dY$ at the initial equilibrium P_A. This raises supply of *A* at the initial equilibrium P_A. The increase in *Y* also raises demand for *A*. Thus, there emerges an excess demand for *A* of $\overline{D}_Y dY$ at the initial equilibrium P_A. Accordingly, P_A rises by $\frac{\overline{D}_Y dY}{S_{P_A}}$. As P_A and, therefore, p'_A rises, supply of *A* increases further. Hence, $A_Y > 0$. One can also check from (2.18i) and (2.18iii) that $\overline{D}_Y$ and S_{P_A} are positive. Hence $A_Y > 0$.

Substituting (2.17) and (2.20) into (2.16) and, then, solving for *dY*, we get

$$dY = -\frac{\left[(-I_e)b_g + m(-A_g) - (1-C)\right]dG}{1-\left[C + I_e b_Y + mA_Y\right]} < 0 \qquad (2.21)$$

Let us now explain the expression on the RHS of (2.21). The numerator measures the excess supply of *Y* that is created at the initial equilibrium *Y* following the increase in *G* by *dG* financed by additional indirect tax revenue, when *e* and P_A adjust to keep the BOP and the market for *A* in equilibrium. Even though *G* increases by *dG*, the additional indirect tax revenue of *dG* comes from the workers and capitalists reducing their consumption demand by *C*.*dG*. Thus, in the net, demand for *Y* goes up by $(1-C)dG$. The hike in the indirect tax rate that has to be made to raise indirect tax revenue by *dG* at the initial equilibrium *Y* raises domestic price of *Y* substantially reducing net export and this is likely to be much larger than the decline in capitalists' consumption demand for imported goods. Moreover, a part of the additional government expenditure may be on imported goods. Therefore, *e* rises by $b_g dG$ lowering investment demand by $(-I_e)b_g dG$. The hike in the indirect tax rate and the consequent increase in the price of *Y* lowers *A* by $(-A_g)$ reducing demand for *Y* by $m(-A_g)$. Thus, in the net, aggregate demand for *Y* at the initial equilibrium *Y* falls by $\left[(-I_e)b_g + m(-A_g) - (1-C)\right]dG$, which is highly likely to be positive in India. Let us explain. First, note that *C*, which denotes the marginal propensity to consume out of *Y* is likely to be quite high and, therefore,

quite close to unity. We have already explained why $(-I_e)$ and b_g are likely to be quite large in India. Production of *A* is also highly *Y*-intensive. Hence, both *m* and $(-A_g)$ are likely to be quite large. For these reasons, $[(-I_e)b_g + m(-A_g) - (1-C)]dG$ is highly likely to be positive. There, thus, emerges an excess supply at the initial equilibrium *Y* and *Y* has to fall to remove this excess supply.

The denominator measures the decline in the excess supply of *Y* per unit fall in *Y*, when *e* and P_A adjust along with the decline in *Y* to keep the foreign currency market and the *A*-market in equilibrium. The denominator is positive for reasons of stability (see (2.A.13) and the discussion below it in the appendix). Per unit decrease in *Y*, excess supply falls by unity, given the level of demand for Y. However, the unit decline in *Y* also lowers demand for Y in various ways. First, it directly reduces consumption demand of the workers and capitalists by *C*. The unit decrease in *Y* forces the government to raise the indirect tax rate, which, in turn, raises the price of *Y*. It, as we have already explained, is likely to create a BOP deficit even though the fall in consumption expenditure partly represents reduced consumption expenditure on imported goods also. Thus, *e* will rise by b_Y lowering I by $I_e b_Y$. Again, the unit decrease in *Y* lowers demand for *A* at the initial equilibrium P_A and the rise in the price of *Y* reduces supply of *A* at the initial equilibrium P_A. For both these reasons, P_A will adjust to equilibrate the *A* market lowering *A* and demand for *Y* by A_Y and mA_Y, respectively. Therefore, in the net, per unit decline in *Y* excess supply of *Y* falls by the denominator.

Substituting (2.21) into (2.20), we get

$$dA = A_g\, dG + A_Y \left\{ - \frac{[(-I_e)b_g + m(-A_g) - (1-C)]dG}{1 - [C + I_e b_Y + mA_Y]} \right\} < 0 \qquad (2.22)$$

Thus, both *Y* and *A* are quite likely to decline if the government raises *G* and finances it by raising indirect tax collection.

The adjustment process may be explained as follows. Government raises *G* and finances it by raising indirect tax collection. As a result, demand for *Y*, given everything else, rises by $(1-C)dG$. This will have its repercussions in the foreign currency market. A part of the additional government spending may be made on imported goods, while capitalists' demand for imported goods will fall. However, the major impact will come from the hike in the indirect tax rate and the increase in the price of *Y* that it brings about. As close substitutes of Indian products are available everywhere, this price rise will substantially reduce net export and in the net produce a large BOP deficit sending the exchange rate soaring. It will equilibrate the foreign currency market, as we have already explained, mainly by reducing investment demand, which is highly import intensive. The rise in the price of *Y* will also reduce supply of *A* and create an excess demand in the A-market at

the initial equilibrium P_A. P_A will rise to equilibrate the A-market. However, a rise in P_A not only raises supply of *A* but also lowers demand for *A*. Hence, in the new equilibrium *A* will be less. This will also lower demand for *Y* coming from the *A* sector. Thus, in the net, demand for *Y* is likely to fall creating an excess supply of *Y* at the initial equilibrium *Y*. *Y* will therefore fall to equilibrate the *Y*-sector. However, the fall in *Y* will reduce government's indirect tax collection inducing it to hike indirect tax rate further. This will again, through the process described above, will lower *I* and *A* and bring about a further contraction in *Y*. This process of contraction in *Y* and *A* will continue until the new equilibrium is reached. Our above discussion yields the following proposition:

Proposition 2.4: If the government raises *G* and finances it with indirect tax revenue, it is highly likely to reduce output and employment levels in both the organized and the unorganized sectors.

2.7 Conclusion

India has abundant supplies of skilled and unskilled labour. Policy makers' complete apathy to providing every member of the labour force with suitable quality jobs has led to an extremely unfortunate situation. The organized sector, the fastest growing sector of the economy contributing almost half of the GDP, not only employed just six percent of the workforce in 2004-05, but also grew without creating any employment since 1994-95. Obviously, along with growth, there has been taking place in the organized sector labour displacing technological and managerial changes. Clearly, the purpose of these changes was to eliminate the bargaining strength of the workers and bring about a secular decline in the share of workers in the output of the organized sector. Labour saving managerial and technological changes allow growth to occur without generating any employment. On the other hand, growth in the labour force creates a vast pool of unemployed workers destroying the bargaining strength of the workers. This kind of technological and managerial changes are, therefore, the surest way for the capitalists to increase their share in GDP at the cost of the workers. This chapter shows that, redistribution of income from the workers to the capitalists in the organized sector is highly likely to bring about a contraction in the levels of employment and output in both the sectors. The reason may be stated as follows. Following the redistribution of income stated above, workers' consumption demand for the organized sector's output will fall, while capitalists' consumption demand will increase. However, most of the additional consumption demand is likely to constitute demand for imported consumption goods as capitalists represent a miniscule class of extremely rich people. Hence, consumption demand for the organized sector's output will fall. The additional import demand will raise the exchange rate and, thereby, will make foreign goods including foreign capital goods dearer. Since in India investment demand is highly import intensive, cost of investment will go up and lower investment demand. The fall in consumption and investment demand will lead to a contraction in the output of the organized sector. Again, a fall in the organized sector's workers' income will reduce demand for the

output of the unorganized sector's output as well. Hence, output and employment in the unorganized sector will contract too.

This chapter also derives the result that an improvement in infrastructure in the unorganized sector gives a boost to production in the unorganized sector and raises unorganized sector's demand for intermediate inputs and capital goods produced in the organized sector and both of these lead to an expansion in the levels of output and employment in both the sectors.

There has taken place almost complete jobless growth in the organized sector in India in the post-reform period, even though its real value added has grown phenomenally. Given the Government of India's policy of non-interference with the technology choice of the entrepreneurs of the organized sector, one has to turn to the unorganized sector for employment generation. This chapter shows that an exogenous increase in infrastructure capital in the unorganized sector will raise output and employment levels in both the sectors. It also shows that, if the government invests in infrastructure in the unorganized sector and finances it by taxing the capitalists' income, employment is highly likely to go up and there will take place expansion in both the sectors. However, if the government, as it normally does, finances the increase in its investment in the unorganized sector by raising indirect tax rates, it is highly likely to lower employment and output levels in both the sectors.

Our model can be used to examine the impact of an increase in l_g on the output and employment levels in the two sectors under different modes of financing. We plan to take it up in our future research.

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Table 2.1

Growth Rate of GDP, Net FDI, Foreign Portfolio Investment, Government Consumption and Gross Fiscal deficit (GFD)

Year	Growth Rate of GDP At Factor Cost (At constant prices Base 2004-05)	Net FDI (US $ Million)	Net Portfolio Investment (US $ Million)	Total (US $ Million)	Government Consumption (in Rsbn)	GFD[1] (% of GDP)	Rate Of GDCF[2]	Rate Of NDCF
2000-01	5.3	3270	2590	5860	3247.27	5.65	24.6	16.7
2001-02	5.5	4734	1952	6686	3323.69	6.19	24.6	16.5
2002-03	5.0	3157	944	4101	3317.53	5.91	25.4	17.3
2003-04	8.1	2388	11377	13765	3409.62	5.48	27.3	19.5
2004-05	7.0	3712	9291	13003	3545.18	3.88	32.8	25.5
2005-06	9.5	3033	12492	15525	3860.07	3.96	34.9	27.8
2006-07	9.6	7693	6947	14640	4005.79	3.38	36.2	29.2
2007-08	9.6	15891	27434	43325	4389.19	2.54	39.0	32.2
2008-09	6.7	22343	-14032	8311	4845.59	5.99	35.6	27.9
2009-10	8.4	17965	32396	50361	5517.02	6.48	38.4	30.9
2010-11	8.4	11305	30292	41597	5843.52	5.87	39.8	32.5
2011-12	6.5	22006	17171	39177	6345.59	5.89	38.8	31.1
2012-13	4.5	19819	26891	46710	6620.33	5.06	38.9	30.9
2013-14	4.7	21564	4822	26386	6873.89	4.85		

Source: RBI [1]Gross fiscal deficit, [2]Gross domestic capital formation

Table 2.2

Exchange Rate of the Indian Rupee vis-a-vis the US Dollar (Monthly average)

Year/ Month	US $ Average	Year/ Month	US $ Average	Year/ Month	US $ Average	Year/ Month	US $ Average
2008		Oct	46.7211	Jul	44.4174	Apr	54.4971
Jan	39.3737	Nov	46.5673	Aug	45.2788	May	55.1156
Feb	39.7326	Dec	46.6288	Sep	47.6320	Jun	58.5059
Mar	40.3561	2010		Oct	49.2579	Jul	60.0412
Apr	40.0224	Jan	45.9598	Nov	50.8564	Aug	64.5517
May	42.1250	Feb	46.3279	Dec	52.6769	Sep	64.3885
June	42.8202	Mar	45.4965	2012		Oct	61.7563
Jul	42.8380	Apr	44.4995	Jan	51.3992	Nov	62.7221
Aug	42.9374	May	45.8115	Feb	49.1671	Dec	61.7793
Sep	45.5635	June	46.5670	Mar	50.3213	2014	
Oct	48.6555	Jul	46.8373	Apr	51.8029	Jan	62.1708
Nov	48.9994	Aug	46.5679	May	54.4735	Feb	62.3136
Dec	48.6345	Sep	46.0616	June	56.0302	Mar	61.0021
2009		Oct	46.7211	Jul	55.4948	Apr	60.3813
Jan	48.8338	Nov	46.5673	Aug	48.3350	May	59.3255
Feb	49.2611	Dec	46.6288	Sep	54.3353	June	59.7143
Mar	51.2287	2011		Oct	52.8917	Jul	60.0263
Apr	50.0619	Jan	45.3934	Nov	54.6845	Aug	60.9923
May	48.5330	Feb	45.4358	Dec	54.6439		
June	47.7714	Mar	44.9914	2013			
Jul	48.4783	Apr	44.3700	Jan	54.3084		
Aug	48.3350	May	44.9045	Feb	53.7265		
Sep	48.4389	June	44.8536	Mar	54.5754		

Source: RBI

Table 2.3

Sectoral Shares in Work Force (2004-05)

	Organised Sector	**Unorganized sector**
Percentage of Workforce Employed 2004-05	**6**	**94**

Source: NSSO 61st Round

Table 2.4
Employment in the Organized sector (in million)

Year	Growth Rate Of GDP At Constant (2004-05) Prices	Number of Workers Employed
1994-95	**6.4**	**27.53**
2000-01	**5.3**	**27.79**
2001-02	**5.5**	**27.20**
2003-04	**8.1**	**26.45**
2004-05	**7.0**	**26.46**
2005-06	**9.5**	**26.96**
2006-07	**9.6**	**27.24**
2007-08	**9.6**	**27.55**
2008-09	**6.7**	**28.18**
2009-10	**8.4**	**29.00**
2010-11	**8.4**	**29**
2011-12	**5.3**	**29.65**

Source: RBI

Table 2.5

Labour Force, Work force and Unemployment (in million)

	1993-94	1999-00	2004-05	1999-00 to 2004-05 Point to point annualised Growth rate
Labour Force	387.94	406.05	469.06	2.93
Work Force	374.45	397.00	457.82	2.89
Number of Unemployed	7.49	9.05	17.24	

Source: NSSO and Report of the Task Force on Employment Opportunities (planning Commission)

Table 2.6

Contributions of the Organized Sector and the Unorganized Sector to the Value added of Major Sectors of Production and NDP

	1993-94		2003-04		2010-2011	
Industry	**Organized**	**Unorganized**	**Organized**	**Unorganized**	**Organized**	**Unorganized**
Agriculture, Forestry and Fishing	3.5	96.5	4.1	95.9	5.8	94.2
Mining, manufac Turing	64.2	35.8	60.5	39.5	64.5	35.5
Electricity, construction and services	47.1	58.9	53.1	46.9	42.2	51.8
NDP	36.8	63.2	43.3	56.7	45.1	54.9

Source: CSO (2005): National Accounts Statistics 2005, Government of India and National Accounts Statistics 2012, Government of India

Table 2.7

Share of Wage in the Net Value Added of the Organized Manufacturing Sector

Year	Wage/NVA	E/NVA
1990-91	25.60837619	39.962135
1991-92	24.77360615	38.24844028
1992-93	23.62322467	38.68204933
1993-94	19.89892122	32.3853645
1994-95	20.29125577	32.5677205
1995-96	20.06521796	32.36510722
1996-97	16.87517837	29.48901451
1997-98	17.89320363	31.46523061
1998-99	17.06744177	30.67889995
1999-2000	16.97329792	30.8718755
2000-2001	19.26644502	35.3141847
2001-2002	19.01443998	35.38379755
2002-2003	17.22701817	32.00533666
2003-04	15.01709971	28.74386123
2004-05	12.94119363	24.78039248
2005-06	12.07694285	23.73090671
2006-07	11.19244953	22.42742604
2007-08	10.59613904	21.89461019
2008-09	11.32545249	24.52627358
2009-10	11.64315067	24.82748124
2010-11	12.1556146	26.01504869
2011-12 (R)	13.08202487	28.13385202
2012-13	13.01676982	27.94267692

Source: Annual Survey of Industries, Ministry of Statistics and Programme Implementation.

Where W= WAGES TO WORKERS

E=TOTAL EMOLUMENTS and, NVA= NET VALUE ADDED.

Appendix

2.A.1 Stability of equilibrium

The aggregate planned demand for *Y* as given by the R.H.S. of equation (2.7) in the text is denoted by $\overline{E}$. $\overline{E}$ is a function of P_A and *Y*, given the exogenous variables such as $\frac{wl_y}{L_0}, \overline{K}, t, l_g$ and *G*, among others. Thus, we can rewrite equation (2.7) as

$$Y = \overline{E}\left(\underset{+}{Y}, \underset{+}{P_A}\right) \tag{2.A.1}$$

Equation (2.A.1) can be rewritten as

$$E = \overline{E}(Y, P_A) - Y = 0 \tag{2.A.2}$$

E denotes excess demand for Y.

We rewrite (2.A.2) as

$$E\left(\underset{+}{Y}, \underset{+}{P_A}\right) = 0 \;;\; E\left(\underset{+}{Y}, \underset{+}{P_A}\right) \equiv \overline{E}\left(\underset{+}{Y}, \underset{+}{P_A}\right) - Y \tag{2.A.3}$$

Let us now explain the signs of the partial derivatives of $E(\bullet)$.

From (2.7), we get

$$E_Y = C_{wy}.(1-t_w)\frac{wl_y}{L_0} + C_c.(1-t)\left(1-\frac{wl_y}{L_0}\right) - (-I_e)e_Y \quad -1<0 \quad 0<\frac{wl_y}{L_0}<1, \; e_Y > 0 \tag{2.A.3i}$$

Let us explain the sign of E_Y. Note that $\frac{wl_y}{L_0}$ is the share of wage income in *Y*. Hence, it is positive but less than 1. Let us now derive the value of e_Y. Taking total differential of (2.5) in the text treating all exogenous variables as fixed and solving for $\frac{de}{dY}$, we get

$$\frac{de}{dY}(\equiv e_Y) = \frac{(-NX_{cc})C_c(1-t)\left(1-w\frac{l_y}{L_0}\right)}{NX_p\frac{\partial\left(\frac{P^*e}{P}\right)}{\partial e} + (-NX_I)(-I_e)} > 0 \tag{2.A.3ii}$$

Let us explain the expression on the RHS of (2.A.3ii). NX_{cc} measures the change in net export per unit increase in capitalists' consumption. It is negative as a part (if not the whole) of the unit increase in capitalists' consumption represents additional demand for imported goods. Thus, the numerator gives the fall in net export that a unit increase in *Y* leads to as it raises capitalists' income. BOP, therefore, goes into deficit. To remove it, *e* has to rise so that net export is restored to its initial equilibrium value. The denominator gives the increase in net export due to a ceteris paribus unit increase in *e*. A unit increase in *e* raises net export in two ways. First, it raises net export by raising the real exchange rate given by the first term in the denominator. However, this term is likely to be small in India. Since production in India is highly import intensive, an increase in *e* raises *P* substantially. Hence, the effect of an increase in *e* on the real exchange rate is likely to be insignificant. (For simplicity, we have not made *P* an increasing function of *e* in our model). However, as we have already argued, in India investment is likely to be highly sensitive to exchange rate and an increase in *e* raises net export mainly by lowering *I* quite a large part of which represents demand for imported goods. This explains the sign of e_Y. It is, therefore, clear that E_Y is negative.

Again from (2.7) we get,

$$E_{P_A} = mA_{p_A} > 0 \;\; p_A \equiv \frac{P_A}{P} \qquad (P \text{ is fixed and equal to unity by assumption}) \qquad (2.A.3iii)$$

Similarly, we can write (2.4) in the text as

$$D \equiv A^D - A^S = D\underset{-}{\underset{+}{\left(P_A, Y\right)}} = 0 \qquad (2.A.4)$$

Let us explain the signs of the partial derivatives of (2.A.4). From (2.4) we get

$$D_Y = C_{wA}.(1-t_w)\frac{wl_y}{L_0}\frac{1}{P_A} > 0 \qquad (2.A.4i)$$

and

$$D_{P_A} = -\left(C_{wA}.(1-t_w)\frac{wl_y}{L_0}Y + \beta w_A l_g\right)\left(\frac{1}{P_A^2}\right) - \left[\left(1-\frac{1}{P_A}\beta w_A l_A\right)A_{p_A} + A\beta w_A l_A \frac{1}{P_A^2}\right] < 0 \qquad (2.A.4ii)$$

The first term on the RHS gives the fall in demand for *A* per unit rise in P_A, while the second term gives the rise in the supply of *A*. Both lead to a fall in the excess demand for *A*.

The solution of (2.4) and (2.7) or that of (2.A.3) and (2.A.4) is shown diagrammatically in the text in Figure 2.1, where YY and AA schedules represent (2.A.3) (or (2.7)) and

(2.A.4) (or (2.4)), respectively. The equilibrium values of Y and P_A correspond to the point of intersection of the two schedules. Their slopes in the (Y, P_A) plane are given by

$$\left(\frac{dP_A}{dY}\right)_{YY} = \frac{E_{P_A}}{-E_Y} > 0 \qquad \text{(2.A.4iii)}$$

And

$$\left(\frac{dP_A}{dY}\right)_{AA} = \frac{-D_{P_A}}{D_Y} > 0 \qquad \text{(2.A.4iv)}$$

The adjustment mechanisms of Y and P_A may be written as follows:

$$\frac{dY}{dt} = \alpha.E(Y, P_A) \qquad \alpha > 0 \qquad \text{(2.A.5)}$$

$$\frac{dP_A}{dt} = \beta..D(Y, P_A) \qquad \beta > 0 \qquad \text{(2.A.6)}$$

Linearising $E(\bullet)$ and $D(\bullet)$ using Taylor's series in the neighborhood of the equilibrium values of Y and P_A denoted by Y_0 and P_{A0} respectively, we rewrite equations (2.A.5) and (2.A.6) as follows:

$$\frac{dY}{dt} = \alpha.E_Y.(Y - Y_0) + \alpha.E_{P_A}.(P_A - P_{A0}) \qquad \text{(2.A.7)}$$

$$\frac{dP_A}{dt} = \beta.D_Y.(Y - Y_0) + \beta.D_{P_A}.(P_A - P_{A0}) \qquad \text{(2.A.8)}$$

We can write (2.A.7) and (2.A.8) as

$$\begin{bmatrix} \frac{d(Y - Y_0)}{dt} \\ \frac{d(P_A - P_{A0})}{dt} \end{bmatrix} = \begin{bmatrix} \alpha \\ \beta \end{bmatrix} \begin{bmatrix} \underset{-}{E_Y} & \underset{+}{E_{P_A}} \\ \underset{+}{D_Y} & \underset{-}{D_{P_A}} \end{bmatrix} \begin{bmatrix} (Y - Y_0) \\ P_A - P_{A0} \end{bmatrix} \qquad \text{(2.A.9)}$$

From (2.A.9) it follows that the equilibrium is stable if

$$E_Y + D_{P_A} < 0 \qquad \text{(2.A.10)}$$

And

$$\begin{vmatrix} E_Y & E_{P_A} \\ - & + \\ D_Y & D_{P_A} \\ + & - \end{vmatrix} (\equiv \Delta) > 0 \qquad (2.A.11)$$

From (2.A.3i) and (2.A.4ii) it follows that (2.A.10) is satisfied.

(2.A.11) is satisfied if

$$\frac{-E_Y}{E_{P_A}} > \frac{D_Y}{-D_{P_A}} \qquad (2.A.12)$$

The LHS and RHS of (2.A.12) represent the slopes of YY and AA, respectively (see (2.A.4iii) and (2.A.4iv). Thus, for the equilibrium to be stable, the slope of YY has to be greater than that of AA in the (Y, P_A) plane.

We also give another interpretation of (2.A.12). (2.A.12) implies

$$E_Y + E_{P_A} \frac{D_Y}{-D_{P_A}} < 0 \qquad (2.A.13)$$

The first term of the expression on the LHS of (2.A.13) gives the fall in excess demand for *Y* per unit increase in *Y*, when *e* adjusts to keep BOP in equilibrium and P_A remains unchanged. Let us now explain the second term. When *Y* increases, demand for *A* rises at the initial equilibrium P_A. P_A as a result will rise and equilibrate the *A*-market. Per unit increase in *Y*, P_A will go up by $\frac{D_Y}{-D_{P_A}} > 0$ raising supply of *A* and, thereby, demand for *Y* by $E_{P_A} \frac{D_Y}{-D_{P_A}} > 0$. Thus, the expression on the LHS of (2.A.13) gives the change in the excess demand for *Y* per unit increase in *Y* when *e* and P_A adjust to keep the BOP and the A-market in equilibrium. Therefore, (2.A.13) implies that, when *Y* increases and *e* and P_A adjust along with the increase in *Y* to keep the BOP and the A-market in equilibrium, excess demand for *Y* should fall. Alternatively, when *Y* declines and *e* and P_A adjust along with the decrease in *Y* to keep the BOP and the A-market in equilibrium, excess supply of *Y* should fall.

2.A.2 Derivation of the Effect of a Decline in the Share of the Organized Sector Workers on *Y* and *A*

Taking total differential of (2.A.3) and (2.A.4) treating all exogenous variables other than $w\frac{l_y}{L_0}$ as fixed, we get

$$E_Y dY + E_{P_A} dP_A = -\varepsilon_1 \equiv -\frac{\partial E}{\partial\left(\frac{wl_y}{L_0}\right)} d\left(\frac{wl_y}{L_0}\right) \tag{2.A.14}$$

$$D_Y dY + D_{P_A} dP_A = -\varepsilon_2 \equiv -\frac{\partial D}{\partial\left(\frac{wl_y}{L_0}\right)} d\left(\frac{wl_y}{L_0}\right) \tag{2.A.15}$$

From (2.7) and (2.5) in the text, we get

$$\varepsilon_1 \equiv \frac{\partial E}{\partial\left(w\frac{l_y}{L_0}\right)} d\left(w\frac{l_y}{L_0}\right) = \left[\left[\left(C_c(1-t)-C_{wy}(1-t_w)\right)\right]Y - \left(-I_e\right)\left(\frac{\left(-NX_{CC}\right)C_c(1-t)}{NX_p\frac{\partial p}{\partial e}+\left(-NX_I\right)\left(-I_e\right)}\right)\right]\left(-d\left(\frac{wl_y}{L_0}\right)\right) \tag{2.A.16}$$

From (2.A.16) it is clear that $\varepsilon_1 < 0$ (when $d\left(w\frac{l_y}{L_0}\right) < 0$), if $C_{wy}(1-t_w)$ is larger than $C_c(1-t)$. Even if $C_{wy}(1-t_w)$ is less than $C_c(1-t)$, $\varepsilon_1 < 0$, if consumption of capitalists is sufficiently import intensive so that $\left(-NX_{cc}\right)$ is sufficiently large and investment is sufficiently sensitive to exchange rate; conditions which, we think, are quite likely to be satisfied in Indian context. Capitalists in India are extremely rich. According to a report recently published by Oxfam India (2018), only 1 percent of Indians own 73 percent of India's wealth. This estimate has been made on the basis of declared assets. If undeclared assets were taken into account, the inequality in the distribution of wealth would have been much more extreme. Obviously, the capitalists belong to the richest 1 percent of Indians and, therefore, also command the major part of GDP. Hence, they partake of the best of the consumption items available globally. Since, the finest consumption items are produced abroad, $\left(-NX_{CC}\right)$ is likely to be almost unity. We have also pointed out that $\frac{\partial p}{\partial e}$ is likely to be very small in India. Under these conditions $\left[\left(-I_e\right)\left(\frac{\left(-NX_{CC}\right)C_c(1-t)}{NX_p\frac{\partial p}{\partial e}+\left(-NX_I\right)\left(-I_e\right)}\right)\right]$ will be approximately equal to $\left[\left(\frac{C_c(1-t)}{\left(-NX_I\right)}\right)\right]$, where $\left(-NX_I\right) < 1$. Thus, in Indian conditions, as should be clear from the discussion made above, ε_1 is highly likely to be negative.

$$\varepsilon_2 = \frac{\partial D}{\partial\left(w\frac{l_y}{L_0}\right)} d\left(w\frac{l_y}{L_0}\right) = \frac{Y}{P_A} C_{wA}(1-t_w)\left[d\left(w\frac{l_y}{L_0}\right)\right] < 0, \qquad \text{since } d\left(w\frac{l_y}{L_0}\right) < 0 \quad \text{(2.A.17)}$$

From (2.A.14) and (2.A.15), we get

$$dY = \frac{\begin{vmatrix} -\varepsilon_1 & E_{P_A} \\ + & + \\ -\varepsilon_2 & D_{P_A} \\ + & - \end{vmatrix}}{\Delta} < 0 \qquad \text{(2.A.18)}$$

$$dP_A = \frac{\begin{vmatrix} \frac{\partial E_Y}{\partial Y} & -\varepsilon_1 \\ - & + \\ \frac{\partial D_{P_A}}{\partial Y} & -\varepsilon_2 \\ + & + \end{vmatrix}}{\Delta} < 0 \qquad \text{(2.A.19)}$$

Since $\Delta > 0$ (see (2.A.11)), $dY < 0$ and $dP_A < 0$, if $\varepsilon_1 < 0$ (2.A.20)

$$dA = A_{p_A} dP_A < 0 \qquad \text{(2.A.21)}$$

2.A.3 Effect of an Increase in $\overline{K}$

We shall derive mathematically the effect of an increase in $\overline{K}$. Taking total differential of (2.A.3) (or (2.7) in the text) and (2.A.4)(or (2.4)in the text) treating all exogenous variables other than $\overline{K}$ as fixed, we get

$$E_Y dY + E_{P_A} dP_A = -\varepsilon_3 \equiv -E_{\overline{K}} d\overline{K} \qquad \text{(2.A.22)}$$

$$D_Y dY + D_{P_A} dP_A \equiv -\varepsilon_4 = -D_{\overline{K}} d\overline{K} \qquad \text{(2.A.23)}$$

Where

$$\varepsilon_3 \equiv E_{\overline{K}} d\overline{K} = \left\{ I\frac{A}{\overline{K}} + mA_{\overline{K}} \right\} d\overline{K} > 0 \quad \text{(from (2.7) in the text)} \qquad \text{(2.A.24)}$$

Let us now focus on ε_4.

$$\varepsilon_4 = \frac{\beta w_A l_A}{P_A} A_{\overline{K}} d\overline{K} - A_{\overline{K}} d\overline{K} < 0 \qquad \text{(since } \frac{\beta w_A l_A}{P_A} < 1\text{, see (2.4) in the text)} \qquad \text{(2.A.25)}$$

From (2.A.22) and (2.A.23), we get

$$dY = \frac{\begin{vmatrix} -\varepsilon_3 & E_{P_A} \\ - & + \\ -\varepsilon_4 & D_{P_A} \\ + & - \end{vmatrix}}{\Delta} \qquad (2.A.26)$$

From (2.A.26) it follows that, since $\Delta > 0$ (see (2.A.11)

$dY > 0$ if $\frac{\varepsilon_3}{E_{P_A}}$ (absolute value of the vertical shift of YY) $> \frac{-\varepsilon_4}{-D_{P_A}}$ (absolute value of the vertical shift of AA) (2.A.27)

We shall now show that (2.A.27) is satisfied.

Substituting the values of ε_3, ε_4, D_{P_A} and E_{P_A} given by (2.A.24), (2.A.25), (2.A.4ii) and (2.A.4iii), respectively into (2.A.27) and multiplying both sides by A_{P_A}, we have

$$\frac{\varepsilon_3}{E_{P_A}} A_{P_A} = \frac{\left\{I_{\bar{K}} + mA_{\bar{K}}\right\} d\bar{K}}{mA_{P_A}} A_{P_A} = \left(\frac{I_{\bar{K}}}{m} + A_{\bar{K}}\right) d\bar{K} > \frac{\left(1 - \frac{\beta w_A l_A}{P_A}\right) A_{\bar{K}} d\bar{K}}{\left(1 - \frac{\beta w_A l_A}{P_A}\right) A_{P_A}} A_{P_A} = A_{\bar{K}} d\bar{K} > \frac{-\varepsilon_4}{-D_{P_A}} A_{P_A} =$$

$$\frac{\left(1 - \frac{\beta w_A l_A}{P_A}\right) A_{\bar{K}} d\bar{K}}{\left(C_{wA}.(1-t_w)\frac{wl_y}{L_0} Y + \beta w_A l_g + A\beta w_A (l_A)\right)\left(\frac{1}{P_A^2}\right) + \left[\left(1 - \frac{1}{P_A}\beta w_A l_A\right) A_{p_A}\right]} A_{P_A}$$

$$\because \left(C_{wA}.(1-t_w)\frac{wl_y}{L_0} Y + \beta w_A l_g + A\beta w_A (l_A)\right)\left(\frac{1}{P_A^2}\right) + \left[\left(1 - \frac{1}{P_A}\beta w_A l_A\right) A_{p_A}\right] > \left(1 - \frac{\beta w_A l_A}{P_A}\right) A_{P_A}$$

(2.A.28)

From (2.A.28) it is clear that (2.A.27) is satisfied.

From (2.A.22) and (2.A.23), one can easily deduce that the sign of dP_A is ambiguous. However, one can easily prove that whatever be the direction of change in P_A, *A* will be larger in the new equilibrium. If P_A is higher, as follows from (2.2) in the text, *A* must be larger. If P_A is the same or lower, as follows from (2.4) in the text, *A* must be larger to satisfy (2.4), since *Y* is larger.

2.A.4 The effect of an increase in G to raise $\overline{K}$ financed by taxing capitalists' income

Taking total differential of (2.A.3) and (2.A.4) treating all exogenous variables other than G as fixed and setting $dG = d\left[t\left(1-w\frac{l_y}{L_0}\right)Y\right]$, we get

$$E_Y dY + E_{P_A} dP_A = -\varepsilon_5 \equiv -E_{\overline{G}} d\overline{G} \tag{2.A.29}$$

$$D_Y dY + D_{P_A} dP_A = -\varepsilon_6 \equiv -D_{\overline{G}} d\overline{G} \tag{2.A.30}$$

Taking total differential of (2.A.3) treating all variables other than G and $t\left(1-w\frac{l_y}{L_0}\right)Y$ as fixed and setting $dG = d\left[t\left(1-w\frac{l_y}{L_0}\right)Y\right]$, we get

$$\varepsilon_5 = (1-C_c)d\overline{G} + I_e e_G d\overline{G} \tag{2.A.31}$$

Taking total differential of (2.5) in the text treating all variables other than G and $t\left(1-w\frac{l_y}{L_0}\right)Y$ as fixed and setting $dG = d\left[t\left(1-w\frac{l_y}{L_0}\right)Y\right]$, we get

$$\frac{de}{dG}(\equiv e_G) = -\frac{(-NX_{cc})C_c - (-NX_G)}{NX_p \dfrac{\partial\left(\dfrac{P^* e}{P}\right)}{\partial e} + (-NX_I)(-I_e)} \tag{2.A.32}$$

From (2.A.32) it fallows that $e_G < 0$ if $-(NX_{cc})C_c > -(NX_G)$ (2.A.33))

From (2.A.31) it follows that $\varepsilon_5 > 0$ if (2.A.33) is satisfied. Again, from (2.A.4) (or (2.4) in the text) it follows that

$\varepsilon_6 = 0$ (2.A.34)

Solving (2.A.29) and (2.A.30), we get

$$dY = \frac{\begin{vmatrix} -\varepsilon_5 & E_{P_A} \\ - & + \\ 0 & D_{P_A} \\ & - \end{vmatrix}}{\Delta} > 0 \qquad \text{(when (2.A.33) is satisfied since } \Delta > 0\text{)} \tag{2.A.35}$$

$$dP_A = \frac{\begin{vmatrix} E_Y & -\varepsilon_5 \\ \underset{-}{D_Y} & \underset{-}{0} \\ \underset{+}{} & \end{vmatrix}}{\Delta} > 0 \text{ when (2.A.33) is satisfied} \qquad \text{(2.A.36)}$$

$$dA = A_{P_A}\, dP_A > 0 \qquad \text{(see (2.2))} \quad \text{when (2.A.33) is satisfied} \qquad \text{(2.A.37)}$$

Chapter 3

Food Security in India under Free Market Conditions: A Macro-Theoretic Study

Abstract

This chapter addresses the issue of food security in India. This chapter shows that under conditions of free market in India, food output is likely to be substantially less than its potential level given the stocks of available land and agricultural infrastructure. Because of the preponderance of small and marginal farmers in Indian agriculture, Indian farmers' bargaining strength vis-à-vis agricultural traders is very low; they have to keep a large fraction of their output for self-consumption; they are unable to secure credit on an adequate scale and interest rates charged on these loans are also fairly high. All these factors, as we have shown in this chapter, make food output in India substantially less than its potential level gravely threatening India's food security. Inadequate agricultural infrastructure makes India's food sector subject to vagaries of nature. In such circumstances, as this chapter shows, even a one-period incidence of natural adversity depresses food output below its normal level for several periods. During these periods of below normal food output, food output of the poorest of the farmers may be less than the subsistence level making them starve and commit suicide. We have also shown that the policy of one-time loan waiver improves food output and farmers' economic condition only temporarily. However, in times of one-period incidence of natural adversity, the policy of one-time loan waiver can provide some relief to the farmers.

3.1 Introduction

Food security is an important aspect of economic development in all the countries of the world. The ranking of India in Global Hunger Index (2019) is 102 among 117 countries. This underscores very strongly the extremely poor performance of Indian economy relative to the others economies of the world in combating hunger. The data on per capita net availability of food grains in India also give empirical support to this. Table 3.1 in Chapter 3 shows that per capita net availability of food grains (per annum) in India has declined from 186.2 kg per year to 180.5 kg per year from 1991 to 2019. It reveals a food crisis in Indian economy. The National Crime Records Bureau (NCRB) report for 2016 (NCRB(2016)) and the Government of India(2016) report underscore the country's grim agrarian crisis by revealing a high number of suicides of Indian farmers. Adoption of the New Economic Policy (NEP) in 1991 and constant monitoring by WTO since then has eroded the autonomy of the government in pursuing development policies regarding agriculture starting from input subsidy to the procurement program. This chapter seeks to show how free play of market forces endangers food security of most of the Indians.

Table 3.1: Per Capita Net Availability of Food grains (Per Annum) in India

Year	Per capita food grains (kg per year)
1991	186.2
2001	151.9
2011	170.9
2012	169.3
2013	179.5
2014	178.6
2015	169.8
2016	177.7
2017	178.4
2018	180.1
2019	180.5

Source: Ministry of Agriculture & Farmers Welfare, Government of India

Literature Review

The existing literature points to four important features of Indian agriculture: (i) preponderance of small and marginal farmers who own and cultivate 85% of total agricultural land holdings and account for 40 percent of aggregate marketable surplus (NABARD(2020)), (ii) low prices received by farmers (Ahangar(2013) , Abishek (2016), Mitra&Mookherjee et al. (2018))), (iii) inadequate supply of formal credit ((Mohan (2006) ,Golait (2007), Government of India(2014)), (iv) decline in public investment in agriculture in the post-reform period (Mishra (2006), Godara et. al.(2014)). Along with this, some studies have raised the issue of indebtedness of the farmers and farmers' suicide (Mishra (2006), Jeromi (2007), Sadanandan(2014)) in the context of Indian agriculture. There is, however, no theoretical study that incorporates all these major features of Indian agriculture and examines how India is likely to perform in the sphere

of food security under free market conditions. The objective of the present chapter is precisely this.

3.2 The Basic Model

We have developed here a macro model which focuses principally on the food producing sector of the economy. Here we abstract from foreign trade in food for simplicity. We shall explore the implications of foreign trade in food in our future research. We have incorporated in this model all the relevant salient features of the Indian agriculture delineated above.

List of notations

α	Fraction of the total output kept for self-consumption
θ	Mark-up , reflecting the bargaining strength of the farmers vis a vis the middlemen
a	Technological parameter, "1/a" amount of industrial intermediate inputs are required to produce 1 unit of X.
L_x	A fixed amount of loan from the lenders that the farmers get at the beginning of every period
N	The state of nature
P_Y	The price of Y
r_0	The interest rate on the outstanding loans of the farmers
R_L	The amount of net revenue the farmers get from the sale of X produced with loan after paying back the loan along with interest
R_S	The revenue of the farmers from S, denoted
S	The amount of own fund the farmers have in their possession is denoted by S
S_t	Farmers' own funds in periods t
S_{t-1}	Farmers' own funds in periods t – 1
$\overline{S}$	The steady state value of S
$\overline{X}$	The steady state value of X
X	Output of unorganized sector
Y	The output of industrial goods produced by the industrial sector (which also produces essential intermediate inputs for X sector)

Food sector

The output of this sector is denoted by X. Production of food requires land, labour and industrial intermediate inputs.The farmers have a given amount of land and it is assumed for simplicity that sharecropping is the mode of cultivation for large landowners. Other farmers cultivate their own land with family labour. Sharecroppers also carry out cultivation using family labour. For simplicity hired labour is ignored. The producers require "1/*a*" amount of industrial intermediate inputs to produce 1 unit of X. The assumption of fixed coefficient production function is a simple way of capturing the fact that how much food the farmers can produce depends crucially on how much industrial intermediate inputs they are able to buy. Given the preponderance of small and marginal farmers in the food sector, it may be quite realistic to assume that production of X is constrained by the availability of credit from the financial sector as the producers of this sector have very limited resources of their own to buy the essential inputs of production.

Farmers and sharecroppers cultivate land with family labour and keep α fraction of the total output for self-consumption. It is assumed that they consume only X. As their real income increases, their consumption also increases. So their consumption is an increasing function of X which in the simplest form is given by αX here. Hence, the marketable surplus of X becomes (1-α)X. In keeping with reality (see Mitra et al.(2018)), we assume that the farmers do not sell their produce directly to the consumers. Instead they sell their produce to middlemen who are in all likelihood the representatives of the corporate sector. They are enormously mighty financially. The farmers most of whom are small and marginal have a perishable crop to sell after harvest and they have no storage facility of their own. All these factors make the bargaining strength of the middlemen infinitely large relative to the farmers. Accordingly, the middlemen offer the farmers the minimum possible price, denoted by $\overline{P}_X$, at which the farmers are willing to sell their marketable surplus. The determination of $\bar{P}_X$ can be shown with the help of the following equation:

$$\overline{P}_X = \frac{1}{a} P_Y \theta;\ \theta > 1 \qquad (3.1)$$

Let us explain (3.1). First, consider the non-food producing sector, which constitutes the rest of the economy. We will refer to it as the industrial sector. We denote by Y the output of industrial goods produced by the industrial sector and P_Y denotes the price of Y. $1/a$ units of Y is required as intermediate inputs to produce 1 unit of X. So the average variable cost of production of X is $\frac{1}{a}P_Y$. Since farmers on the average do not have any bargaining strength vis-à-vis the middlemen, the middlemen, a la Kalecki (1954), set $\bar{P}_X$ by applying the minimum possible mark-up to this average variable cost of production. This mark-up, denoted by θ, is taken to be exogenously given, and $\theta > 1$. θ is set at such a level that the farmers get the minimum profit they need to undertake production for the market. If farmers do not get a minimum profit from the marketable surplus of food, they

will produce only for self-consumption using traditional technology and inputs that they can produce themselves. This explains (3.1).

Given the preponderance of small and marginal farmers in India and given their woefully limited purchasing power, to capture, hopefully, a crucial aspect of Indian reality, we assume that food output is constrained by the amount of industrial intermediate inputs the farmers can purchase. The amount of own fund the farmers have in their possession is denoted by *S*. Using *S*, they can produce $a\frac{S}{P_Y}$ amount of *X* and the revenue of the farmers from *S*, denoted R_S, is given by

$$R_S = \bar{P}_X .a\frac{S}{P_Y}(1-\alpha) = \frac{1}{a}P_Y\theta.a\frac{S}{P_Y}(1-\alpha) = \theta(1-\alpha)S \tag{3.2}$$

In addition to their own fund, the farmers also borrow from both formal and informal credit markets. Given the lending norms of the lenders and the amount of collateral the farmers can offer, they get at the beginning of every period a fixed amount of loan from the lenders, which we denote by L_x. They use L_x to buy industrial intermediate inputs to produce *X*. They use a part of the sales proceeds from the sale of the output they produce with loan to pay off their outstanding debt along with interest at the end of every given period. They can use the rest either to augment their own consumption or to save in order to increase their own fund of the next period or for both. For simplicity, we assume that they use the rest of the sales proceeds to save to augment their own fund in the next period. We denote the amount of net revenue the farmers get from the sale of *X* produced with loan after paying back the loan along with interest by R_L. It is given by

$$R_L = \bar{P}_X a\frac{L_X}{P_Y} - (1+r_0)L_X = \theta\frac{1}{a}P_Y a\frac{L_X}{P_Y} - (1+r_0)L_X = [\theta - (1+r_0)]L_X \tag{3.3}$$

In (3.3), r_0 denotes the interest rate on the outstanding loans of the farmers. We shall explain it shortly. We assume that $[\theta - (1+r_0)] > 0$ because otherwise the farmers will not borrow.The sum of R_S and R_L constitutes farmers' own fund in the next period. Therefore, denoting farmers' own funds in periods t – 1 and t by S_{t-1} and S_t, respectively, we get

$$S_t = \theta(1-\alpha)S_{t-1} + [\theta - (1+r_0)]L_x \tag{3.4}$$

The RBI regulates interest rates in the formal credit markets. Moneylenders in the informal credit market fix their interest rates by applying fixed mark-ups to the formal lending rates. These mark-ups cover their transactions cost, profit margin and risk premia. The smaller a farmer, the higher the interest rate he faces. We denote the average interest rate faced by farmers to be r_0. We take it to be given. We can solve (3.4) for the

steady state value of S. We assume $\theta(1-\alpha)$ to be less than unity for the sake of existence of a meaningful steady state and for its stability.

The output of food in period t is given by

$$X_t = a\frac{S_t}{P_Y} + a\frac{L_X}{P_Y} \tag{3.5}$$

Substituting the steady state value of S in (3.5), we can derive the steady state value of X.

Following Kalecki(1954), we assume that the industrial sector is an oligopoly and producers fix P_Y by applying a fixed mark-up to the average variable cost of production. The only variable input that is used in production is labour. Labour requirement per unit of Y and the money wage rate in industry, as standard, are assumed to be fixed. Hence, P_Y is fixed in (3.5).

Derivation of the steady state value of S:

The steady state value of S, denoted $\bar{S}$, as follows from equation (3.4), is given by

$$\bar{S} = \frac{[\theta-(1+r_0)]L_X}{1-\theta(1-\alpha)} \tag{3.6}$$

Let us explain the RHS of (3.6). At $S_{t-1}=0$, excess of S_t over S_{t-1} is given by $[\theta-(1+r_0)]L_X$ – see (3.4). Per unit increase in S_{t-1}, S_t goes up by $(1-\alpha)\theta$, vide (3.4), reducing $(S_t - S_{t-1})$ by $[1-(1-\alpha)\theta]$. Therefore, to reduce $(S_t - S_{t-1})$ by $[\theta-(1+r_0)]L_X$, S_{t-1} has to rise from zero by $\frac{[\theta-(1+r_0)]L_X}{1-\theta(1-\alpha)}$. This explains equation (3.6).

Substituting (3.6) into (3.5), we get the steady state value of *X*, denoted $\bar{X}$. It is given by

$$\bar{X} = \frac{a}{P_Y}\left[\frac{[\theta-(1+r_0)]L_X}{1-\theta(1-\alpha)} + L_x\right] \tag{3.7}$$

The derivation of the steady state values of S and X are illustrated graphically in Figure3.1.The right-side panel of Figure 3.1 shows the steady state value of S whereas the left-side panel shows that of X. In the right-side panel the SS curve represents equation (3.4) in the (S_{t-1},S_t) plane. The steady state value of S, denoted by $\bar{S}$, is given by the point of intersection of SS and the 45^0 line. If the resources of the farmers are lower than $\bar{S}$, say S_0, in a given period, then it will increase in the next period to S_1. S will go on increasing from S_1 to S_2 and so on, until it reaches $\bar{S}$. In the left-side panel the XX curve represents (3.5). It shows the values that X assume corresponding to different values of S. The steady state value of X corresponds to the steady state value of S on XX.

Determination of the Steady State Values of S and X

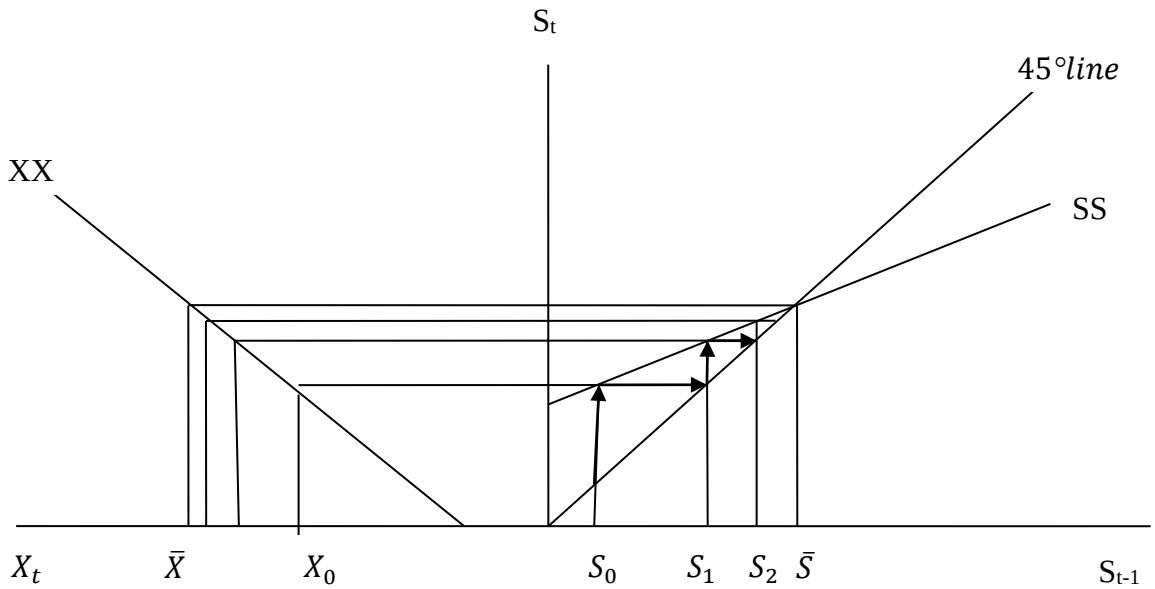

Fig.3.1

We shall now identify the major determinants of X and, thereby, seek to explain why India's food security is extremely fragile in free market conditions.

3.3 The effect of a fall in L_X

In the pre-reform period, financial institutions were non-profit making social organizations, which were an integral part of planning. Interest rates were administered by the planners at low levels and the financial institutions disbursed credit to different sectors including the food sector at these administered interest rates on such a scale that the planned production and investment targets in all the different sectors of production were fulfilled. In the post-reform period, under the New Economic Policy, financial institutions have become commercial profit seeking organizations. Hence, they have become extremely averse to lending to small and marginal farmers who have very little collateral to offer. Financial institutions consider it extremely risky to lend to such producers and, therefore, charge very high interest rates on such loans. Small and marginal farmers, therefore, have to borrow from the indigenous money lenders (NSSO 70^{th} round), who give them very small amount of loans at very high interest rates. We, therefore, examine here how a decline in L_X for exogenous reasons affects *X*. We shall do this with the help of Figure 3.2, where the initial steady state S corresponds to the point of intersection of the 45^0 line and the SS schedule representing (3.4) corresponding to the initial L_X. The initial steady state X corresponds to the initial steady state S on the XX schedule representing (3.5) corresponding to the initial value of L_X.A ceteris paribus fall in L_X by dL_X, as follows from equation (3.4), will shift the SS curve downward by $[\theta-(1+r_0)]$.Let us explain. A fall in L_X by dL_X in period t-1 will reduce farmers' own fund in period t by the amount $[\theta-(1+r_0)]dL_X$, given the value of S_{t-1}. Hence, at any given S_{t-1}, S_t will be less by this amount and SS curve will shift down in the first quadrant of

Figure 3.2. As a result, the steady state value of S will fall from $\bar{S}$to S'. The contraction in the steady state value of S will be larger than the fall in L_X. One unit fall in L_X in period t-1 will reduce S_t by $[\theta-(1+r_0)]$ – see (3.4).Therefore, vide (3.2) and (3.4), the revenue of the farmers in period t+1, that is, S_{t+1} will shrink by $[\theta-(1+r_0)](1-\alpha)\theta$. In the similar manner, S_{t+2} will fall by $[\theta-(1+r_0)][(1-\alpha)\theta]^2$. The process of contraction in S will continue until the fall in S that takes place in each period eventually falls to zero. Thus, the total change in S due to a unit reduction in L_X or the fall in the steady state value of S will be

$$d\bar{S} = -[\theta-(1+r_0)]dL_X - [\theta-(1+r_0)](1-\alpha)\theta dL_X - [\theta-(1+r_0)][(1-\alpha)\theta]^2 dL_X - \ldots\ldots\ldots$$
$$= -\frac{[\theta-(1+r_0)]}{1-(1-\alpha)\theta}dL_X \qquad (3.8)$$

One can easily check that the value of $d\bar{S}$ yielded by (3.6) following a ceteris paribus unit fall in L_X tallies with (3.8).

Let us now examine how X will behave following a ceteris paribus decline in L_X by dL_X. From (3.5) it follows that following a change in L_X by $dL_X< 0$, value of X_t corresponding to any given S_t will fall by $[(adL_X)/P_Y]$. XX schedule in the left panel of Figure 3.2 will, therefore, shift to the left. The new XX schedule is labeled $XX^{/}$. The new steady state X corresponds to the new steady state S on $XX^{/}$. The new steady state X is labeled $X^{/}$. From (3.5) it follows that the fall in the steady state value of X is given by

$$d\bar{X} = \frac{a}{P_Y}\left[d\bar{S} + dL_X\right] = \frac{a}{P_Y}\left[\frac{\theta-(1+r_0)}{1-\theta.(1-\alpha)}+1\right]dL_X \qquad (3.9)$$

Let us now examine how X falls over time. In period 0, L_X falls by dL_X lowering X by $(a/P_Y)dL_X$. This will reduce farmers' revenue from the sale of X in period 0 and their own fund in period 1, S_1, by θdL_X and $[\theta-(1+r_0)]dL_X$, respectively - see (3.2), (3.3) and (3.4). Therefore, X in period 1 will fall by $(a/P_Y)[\theta-(1+r_0)]dL_X$. Hence, farmers' revenue from the sale of X in period 1 and, thereby, their own fund in period 2 will fall by $[\theta(1-\alpha)][\theta-(1+r_0)]dL_X$. Hence, X in period 2 will fall by $(a/P_Y)[\theta(1-\alpha)][\theta-(1+r_0)]dL_X$. This will reduce farmers' revenue from the sale of X and, thereby, their own fund in period 3 by $[\theta(1-\alpha)]^2[\theta-(1+r_0)]dL_X$. Therefore, X in period 3 will go down by $(a/P_Y)[\theta(1-\alpha)]^2[\theta-(1+r_0)]dL_X$. The process of contraction will go on until the fall in S that takes place in each successive period eventually falls to zero. Thus, the total fall in X is given by

$$dX = \frac{a}{P_Y} dL_X + \frac{a}{P_Y}[\theta - (1+r_0)]dL_X + \frac{a}{P_Y}[\theta(1-\alpha)][\theta - (1+r_0)]dL_X + \frac{a}{P_Y}[\theta(1-\alpha)]^2[\theta - (1+r_0)]dL_X + \ldots\ldots\ldots = \frac{a}{P_Y}\left[1 + \frac{[\theta - (1+r_0)]}{1-\theta(1-\alpha)}\right]dL_X \quad (3.10)$$

It is clear that (3.10) tallies with (3.9). The above analysis yields the following proposition:

Proposition 3.1: A given fall in L_X brings about a large and cumulative fall in X.

One can easily deduce that the effect of an increase in r_0 is similar.

Effect of a Fall in L_X

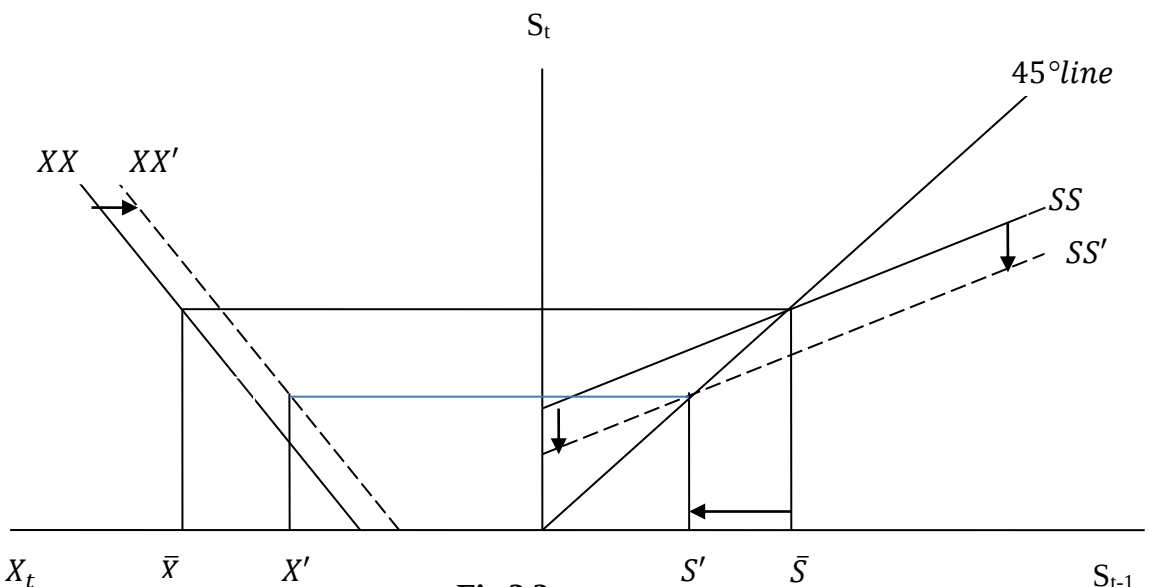

Fig.3.2

Following the adoption of the New Economic Policy (NEP), the policy of directed credit has been shelved and financial institutions have become profit driven. Under such circumstances, they are likely to supply most of their loans to large corporations whom they regard as quality borrowers and unlikely to provide much loan to small and marginal farmers who produce the bulk of the aggregate food output in India. Financial institutions are likely to consider it extremely risky to lend to small and marginal farmers as they have little to offer by way of collateral and there is a great deal of uncertainty associated with both food output and food prices. Hence, under the new economic policy, provision of credit to the food sector is likely to be woefully inadequate leading to large scale under-utilization of land and infrastructure available to the food sector. In times of recession and perceptible increase in the incidence of bank frauds, as is the case at the present in India, financial institutions will tighten credit standards and their perception as regards the riskiness of lending to the small and marginal farmers will worsen and credit supply to the food sector as a result will fall substantially weakening

India's food security to a considerable extent. In the Nehru-Mahalanobis era, financial institutions functioned under the administered interest rate and directed credit programme. Under this programme, the financial institutions had to lend to the food sector as much credit as was necessary to achieve the food production targets specified in the plans at interest rates fixed for the food sector by the planners. These interest rates were fixed at low levels so that the farmers could afford to take as much loan as was necessary to fulfill the plan targets. Clearly, liberalization of the financial sector under the NEP , as our above analysis suggests, has gravely threatened India's food security by lowering supply of credit and raising cost of credit substantially to the farmers.

Effect of a Rise in P_Y

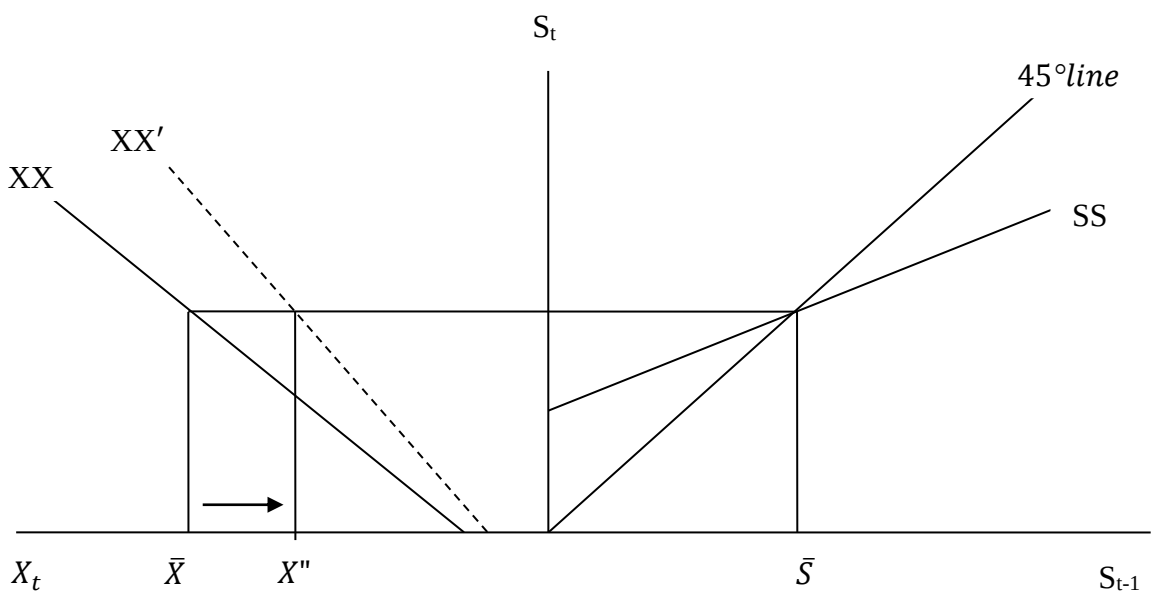

Figure 3.3

3.4 The effect of an increase in P_Y

During the Nehru-Mahalanobis era, prices of almost all the essential non-agricultural goods were administered by the government. Under the New Economic Policy, however, the government is allowing the prices to be set by market forces. Since then prices of all the essential industrial intermediate inputs have been rising continuously. The government is also regularly raising the prices of the essential industrial intermediate inputs still under its control. Of late, hiking indirect tax rates on essential industrial intermediate inputs such as diesel has become a favourite source of raising revenue of the government. We, therefore, consider it important to examine the effect of an increase in P_Y on the steady state values of S and X. We can explain this graphically with help of Figure 3.3, where the initial steady state S denoted $\bar{S}$ corresponds to the point of intersection of SS representing (3.4) and the 45^0 line. The steady state value of X

corresponds to $\bar{S}$ on XX representing (3.5) in the second quadrant. The SS curve and the steady state value of S following a ceteris paribus increase in P_Y remain unaltered (see equation (3.4)).But it alters the XX schedule in two ways. First it reduces the horizontal intercept of the XX schedule. The horizontal intercept of this schedule shows the amount of X that is produced with the help of loan when S_t=0. An increase in P_Y lowers the purchasing power of the given amount of loan taken by the farmers in order to buy intermediate inputs from the industrial sector. Hence, the amount of X produced contracts. Second, it makes the XX schedule steeper. For both these reasons, a smaller amount of X gets produced at any S_t because of the higher input costs. So XX schedule rotates as well as shifts to the left. The steady state value of X falls to *X*". As we derive from (3.5), the fall in the steady state value of X is given by

$$d\bar{X} = -a\frac{[\bar{S} + L_X]}{P_Y^2}dP_Y \tag{3.11}$$

From (3.11) we get the following proposition:

Proposition 3.2: A rise in P_Y brings about a large fall in X.

The industrial sector, as we have already specified, is an oligopoly and P_Y is set by applying a fixed mark-up to the average variable cost of production. Government's policies play a crucial role in the determination of P_Y in India. Government imposes indirect taxes on the production and sales of industrial products. It also administers the prices of many essential intermediate inputs such as oil, railway fares, power tariffs, coal prices etc. If the government raises indirect tax rates and the administered prices noted above, P_Y will rise threatening India's fragile food security. Moreover, under the New Economic Policy, with all the safeguards protecting the small and medium industrial enterprises from competition from the large corporations gone, the corporate sector is growing in India at a much faster rate than the rest of the industrial sector. The consequent increase in the degree of concentration is also putting substantial upward pressure on industrial prices threatening gravely India's food security.

3.5 Loan waiver

We have delineated above the kind of terrible exploitation and deprivation farmers are subject to in India. They often take to the streets to draw the attention of the government and the people to their plight. They demand government intervention to ensure that they get just prices for their produce, cushion against uncertainties, adequate infrastructure and adequate loans on reasonable terms. Political parties in India often recommend loan waiver to give relief to the farmers. We examine here what kind of impact a one-time loan waiver is likely to produce on the farmers' economic condition and India's food security.

Suppose in a given period, period 0, $L_X(1+r_0)$ is waived. This waiver is applicable to period 0 only. We shall examine its impact using Figure 3.4, where SS represents

equation(3.4). With $L_X(1+r_0)=0$, SS, as follows from (3.4) shifts upward by $L_X(1+r_0)$. The new SS is labeled SS/. The equation of the SS/ schedule, as follows from (3.4), is given by

$$S_t = \theta(1-\alpha)S_{t-1} + \theta L_x \qquad (3.4a)$$

Using (3.4a), we can derive the value of S_1. It is given by (assuming that $S_0 = \bar{S}$)

$$S_1 = \theta(1-\alpha)S_0 + \theta L_x = \theta(1-\alpha)\bar{S} + \theta L_x \qquad (3.4b)$$

In period 1, however,SS' moves back to SS, since the loan waiver here, as is usually the case, a one-time programme. The XX schedule, however, as follows from (3.5), remains unaffected. Suppose in period 0, the economy was in the steady state with $S_0=\bar{S}$. In period 0, there is loan waiver and the farmers' saving of $L_X(1+r_0)$ on account of the loan waiver will be added to their own fund in period 1. In period 1, therefore, S will increase from $\bar{S}$ by $L_X(1+r_0)$ and X by $L_X(1+r_0).(a/P_Y)$ from $\bar{X}$ to X^* in Figure 3.4– see (3.5). However, from period 2 onward S and along with it X will go on falling until they become equal to $\bar{S}$and $\bar{X}$ again. The time paths of S and X are shown in Figure 3.4 with arrows. Thus, a one-time loan waiver will raise X only temporarily.

The Impact of a Loan Waiver

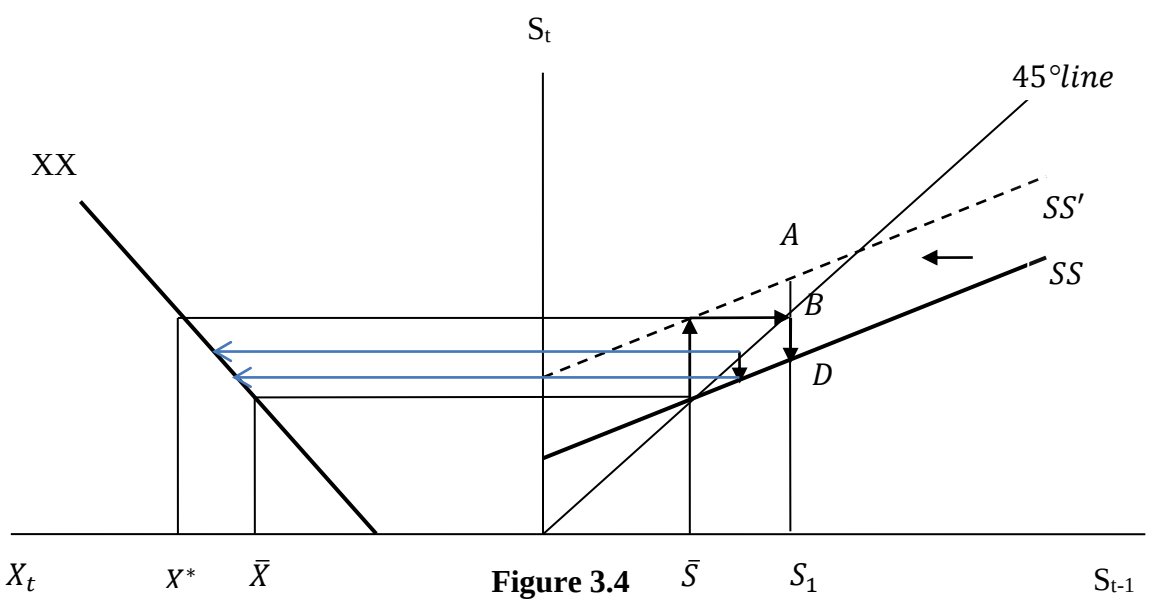

Figure 3.4

Let us now compute the time paths of S and X using (3.4), (3.4a) and (3.5). The loan waiver takes place in period 0. As a result, farmers' own fund in period 1, as follows from (3.4), rises by $dS_1 = L_X(1+r_0)$. They will use it to buy industrial intermediate inputs to produce more X in period 1. The additional X they will produce in period 1is

$dX_1 = a.\frac{L_X(1+r_0)}{P_Y}$. They will use α fraction of it for self-consumption and sell off the rest for augmenting their own fund in the next period. The additional sales revenue in period 1 will, therefore, be $\theta(1-\alpha)L_X(1+r_0)$. If the loan waiver were permanent, i.e. if $L_X(1+r_0)$ were zero in every period, S_2 in period 2 would have gone up by the whole of the additional sales revenue in period 1. Let us explain this point a little more. If the loan waiver were permanent, i.e. if the loan waiver had taken place in every period, the value of S_t in every period from period 1 onward would have been given by (3.4a) and S would have increased from period 1 onward along SS/ representing (3.4a) in Figure 3.4. Hence, if there had taken place loan waiver in period 1, S in period 2 would have increased by AB as shown in Figure 3.4 and AB = $\theta(1-\alpha)L_X(1+r_0)$ It is clear from (3.4a) that if S_1 rises by $L_X(1+r_0)$, S_2 will go up by $\theta(1-\alpha)L_X(1+r_0)$. However, in period 1, there is no loan waiver and the farmers have to pay debt service charges of $L_X(1+r_0)$, which is given by the length AD in Figure 3.4, for the L_X amount of loan taken at the beginning of period 1. Therefore, total change in S in period 2 is given by $dS_2 = \theta(1-\alpha)L_x(1+r_0) - L_x(1+r_0) = -[1-\theta(1-\alpha)]L_x(1+r_0)$, which equals, in terms of Figure 3.4, AB – AD = - BD. In period 2, therefore, X and, thereby, sales revenue decline by $dX_2 = a\frac{dS_2}{P_Y} = -\frac{a}{P_Y}[1-\theta(1-\alpha)]L_X(1+r_0)$ and $-\theta(1-\alpha)[1-\theta(1-\alpha)]L_X(1+r_0)$, respectively. Farmers' own fund in period 3 will, therefore, fall by $dS_3 = -\theta(1-\alpha)[1-\theta(1-\alpha)]L_X(1+r_0)$ lowering X and sales revenue in period 3 by $dX_3 = a\frac{dS_3}{P_Y} = -\frac{a}{P_Y}\theta(1-\alpha)[1-\theta(1-\alpha)]L_X(1+r_0)$ and $-[\theta(1-\alpha)]^2[1-\theta(1-\alpha)]L_X(1+r_0)$, respectively. This process of contraction will continue until the fall in S that takes place in each successive period eventually falls to zero. When that happens, the economy achieves a new steady state (which, as we shall show presently, is the initial steady state). Thus, the total changes in S and X are given by the following:

$$dS = L_X(1+r_0) - [1-\theta(1-\alpha)]L_X(1+r_0) - \theta(1-\alpha)[1-\theta(1-\alpha)]L_X(1+r_0) - [\theta(1-\alpha)]^2[1-\theta(1-\alpha)]L_X(1+r_0) - \ldots\ldots\ldots\ldots = 0 \quad (3.12)$$

$$dX = \frac{a}{P_Y}L_X(1+r_0) - \frac{a}{P_Y}[1-\theta(1-\alpha)]L_X(1+r_0) - \frac{a}{P_Y}\theta(1-\alpha)[1-\theta(1-\alpha)]L_X(1+r_0) - \frac{a}{P_Y}[\theta(1-\alpha)]^2[1-\theta(1-\alpha)]L_X(1+r_0) - \ldots\ldots\ldots\ldots = 0 \quad (3.13)$$

From the above analysis we get the following proposition:

Proposition3.3:The policy of one-time loan waiver increases food output and farmers' economic condition for some periods of time following the implementation of the policy, but not permanently.

Even though the one-time policy of loan waiver does not improve farmers' economic condition and food output permanently, it may be of great help to the farmers in times of stress caused by adverse natural factors. We shall show this in the next section.

3.6 Adverse Natural Shock

Food production largely depends on the state of nature in India where there is a huge deficiency in infrastructural facilities to combat natural adversities. The scenario has become all the more depressing on account of the drastic decline in public investment in infrastructure in the post-reform period (Mishra (2006), Godara et. al.(2014)). An adverse natural shock drastically reduces food output corresponding to any given stocks of land, infrastructure and the amount of intermediate inputs used. Outputs of many of the small and marginal farmers become so low that they have to use a larger fraction of the outputs for self-consumption for survival. We incorporate the following modifications to capture the impact of natural adversities. We assume that the average productivity of the industrial inputs instead of being *a* is *aN*, where *N* represents the state of nature. It is unity when the state of nature is normal and the worse the state of nature, the smaller is the value it assumes. Similarly, the fraction of food output kept for self-consumption is now (α / N) instead of being α .It is now reasonable to rewrite (3.1) as

$$\bar{P}_X = \frac{1}{aN} P_Y \theta \tag{3.14}$$

Let us explain (3.14) in detail. N is less than unity when nature is worse than normal. *N* is greater than unity when nature is better than normal. In (3.14), we adhere to the principle that the traders apply a fixed mark-up to the average variable cost of production to determine the price they offer to the farmers. They take into account the value of *N*, while computing the average variable cost of production. Thus, in times of adverse natural shock that depresses output below its normal level, traders' offer price becomes higher than its normal level and conversely. To induce farmers to undertake production for the market, they should be assured of some minimum profit. To ensure that, the traders have to take into account the value of N for computing the average variable cost of production and they have to fix θ in such a manner that this condition is fulfilled.

Incorporating all the changes noted above in (3.4) and (3.5), we get

$$S_t = (1 - \frac{\alpha}{N})\theta . S_{t-1} + [\theta - (1 + r_0)]L_X \tag{3.15}$$

Note that the revenue from the sale of marketable surplus of food produced with farmers' own fund is $\bar{P}_X\left(1-\frac{\alpha}{N}\right)\frac{S_{t-1}}{P_Y}aN=\theta\left(1-\frac{\alpha}{N}\right)S_{t-1}$. Again, net revenue from the sale of food produced with loan is given by $\bar{P}_X\frac{L_X}{P_Y}aN-(1+r_0)L_X=[\theta-(1+r_0)]L_X$. This explains (3.15). The food output as follows from equation (3.5) now becomes

$$X_t=aN\frac{S_t}{P_Y}+aN\frac{L_X}{P_Y} \tag{3.16}$$

The Impact of a One-Period Adverse Natural Shock

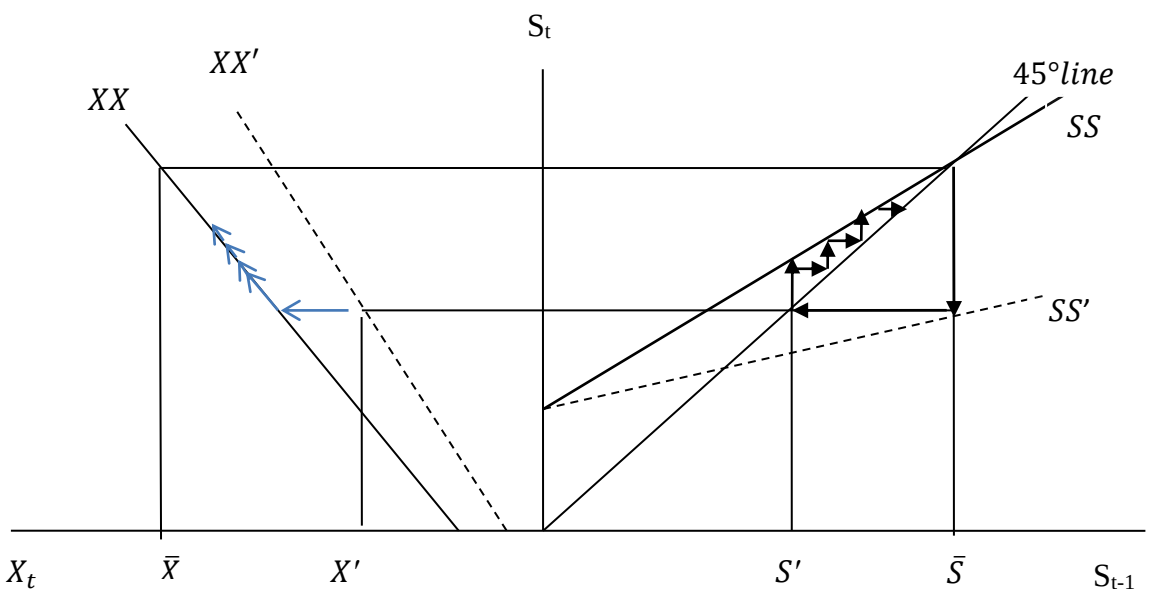

Figure 3.5

The impact of a fall in N

Let us examine the impact of a one-period fall in the value of *N* from 1 on the production of food and farmers' economic condition.We shall do this first with the help of Figure 3.5, where the SS schedule in the first quadrant represents (3.15), for *N* = 1. The XX schedule in the second quadrant represents (3.16), with *N* = 1. Let us now examine how these schedules will shift following a decline in *N* by *dN*< 0. Let us focus on the SS schedule first. Deterioration in the state of nature in period 0, captured by a fall in *N* by *dN* from one, will keep the vertical intercept of SS unchanged, but reduce its slope by $\frac{\alpha\theta}{N^2}dN$. Hence, SS will rotate downward. The new SS schedule is labeled SS/. Focus now on XX. Both its horizontal intercept and slope become smaller. It, therefore, shifts to the left and become steeper. The new XX is labeled XX/. If the shock lasts only for

one period, in the next period, both SS and XX will move back to their old positions. We shall now describe how S and X will behave over time following a one-period adverse natural shock. Suppose initially the economy was in steady state with $S = \bar{S}$ and $X = \bar{X}$, respectively. Also suppose that the one-time adverse natural shock occurs in period 0 lowering X in period zero to X/ – see Figure 3.5. As a result, *S* in period 1 will fall to S/ - See Figure 3.5. From the next period, period 2, however, S and X will start rising back towards their initial steady state values as shown by the arrows in Figure 3.5. Let us now compute the changes in S and X over time using (3.15) and (3.16).

Let us suppose that the economy was in steady state with $X = \bar{X}$ and $S = \bar{S}$ and the adverse natural shock occurred in period 0. X in period 0, therefore, as follows from (3.16), fell from its steady state value $\bar{X}$ by (denoting the value of *dN* in period 0 by dN_0)

$$dX_0 = a\left[\frac{\bar{S} + L_X}{P_Y}\right]dN_0 \tag{3.17}$$

from $\bar{X}$ to X' as shown in Figure 3.5. This reduces farmers' revenue from the sale of X in period 0 lowering farmers' own fund in period 1. As we derive from (3.15), the fall in S in period 1 is given by

$$dS_1 = \alpha\theta\bar{S}\frac{1}{N^2}dN_0 < 0 \quad \because dN_0 < 0 \text{ and } S_0 = \bar{S} \tag{3.18}$$

Note that, the larger the absolute value of dN_0, i.e., the greater the intensity of the adverse natural shock, the more is the fall in S_1. In period 1, *N* again rises by $-dN_0$ to 1. This means that the value of *dN* in period 1 is $-dN_0$. As a result, X in period 1 changes by, as follows from (3.16) (and also using (3.17))

$$dX_1 = \left[\frac{aN}{P_Y}\right].dS_1 + \left[\frac{S_1}{P_Y}a + \frac{L_X}{P_Y}a\right](-dN_0) = \left[\frac{aN}{P_Y}\right].dS_1 + \left[\frac{\bar{S}}{P_Y}a + \frac{L_X}{P_Y}a\right](-dN_0) = \left[\frac{aN}{P_Y}\right].dS_1 + \left[-dX_0\right] \tag{3.19}$$

(Note that the initial value of $S_1 = \bar{S}$. It dropped from $\bar{S}$ by dS_1 in period 1 because of the adverse natural shock in period 0.)

From (3.19), it is clear that if dS_1 were 0, X_1 would have been equal to $\bar{X}$. However, the larger is $|dS_1|$, the smaller is dX_1 relative to $(-dX_0)$. From the above discussion it follows that the larger the – dN_0, i.e., the greater the intensity of the natural shock, the lower is X_1 relative to $\bar{X}$.

Let us now focus on period 2. From (3.15) it follows that (setting N = 1)

$$S_2 = \theta(1-\alpha)S_1 + L_X.[\theta - (1+r_0)] \tag{3.20}$$

Note that

$$S_1 = \bar{S} - (-dS_1) \tag{3.21}$$

Substituting (3.21) into (3.20) and rearranging terms, we get

$$S_2 = \theta(1-\alpha)\bar{S} + L_X.[\theta - (1+r_0)] - \theta(1-\alpha)(-dS_1) = \bar{S} - \theta(1-\alpha)(-dS_1) \tag{3.22}$$

It is clear from (3.21) and (3.22) that S_2 is larger than S_1, since $\theta.(1-\alpha) < 1$. Again, (setting N = 1)

$$X_2 = \frac{a}{P_Y}[S_2 + L_X] = \frac{a}{P_Y}[\bar{S} - \theta(1-\alpha)(-dS_1) + L_X] > \frac{a}{P_Y}[\bar{S} - (-dS_1) + L_X] = X_1 \tag{3.23}$$

Let us now focus on period 3. From (3.15), (3.20) and (3.22), we get (setting N = 1)

$$S_3 = \theta(1-\alpha)S_2 + L_X.[\theta - (1+r_0)] = \theta(1-\alpha)\bar{S} + L_X.[\theta - (1+r_0)] - [\theta(1-\alpha)]^2(-dS_1) = \bar{S} - [\theta(1-\alpha)]^2(-dS_1) > S_2 \tag{3.24}$$

Therefore, as follows from (3.16) (setting N = 1)

$$X_3 = \frac{a}{P_Y}[S_3 + L_X] = \frac{a}{P_Y}[\bar{S} - [\theta(1-\alpha)]^2(-dS_1) + L_X] > \frac{a}{P_Y}[\bar{S} - \theta(1-\alpha)(-dS_1) + L_X] = X_2 \tag{3.25}$$

This is how slowly over time S and X will move up to their initial respective steady state values. The above analysis yields the following proposition:

Proposition3.4: A one-period adverse natural shock will reduce food output in the period in which the shock occurs. The food output will not go back to its initial steady state level right in the next period. It will take many periods of time before it gets close to its initial steady state value. The greater the intensity of the adverse natural shock, the longer it will take for the food output to reach its initial steady state value.

The above proposition points to one reason why farmers commit suicide in India. Following a significant adverse natural shock, many farmers' food output goes much below the subsistence level leaving them hungry. Since it will take long for food output to move back to its initial level, many farmers being unable to bear the pain of hunger

may commit suicide. The larger the preponderance of small and marginal farmers, the greater is likely to be the incidence of farmer suicide following a significant adverse natural shock.

It is also clear from the analysis of this section and that of the previous one that the deleterious impact of an adverse natural shock may be mitigated though a policy of loan waiver. One can easily deduce that through a policy of loan waiver along with suitable amount of transfers to the farmers for the purpose of enabling them to increase purchases of industrial intermediate inputs, it may be possible to restore food output to its initial steady state level in the period just next to the one in which the adverse natural shock occurs.

The Impact of a Fall in the Price Received by Farmers

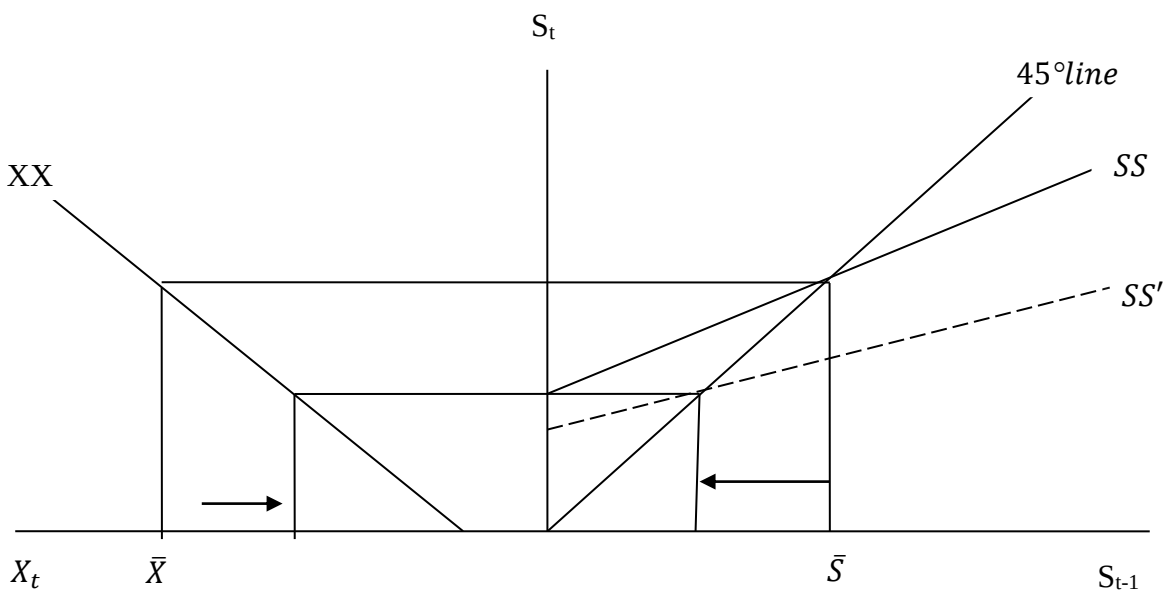

Figure 3.6

3.7 The impact of a decrease in $\bar{P}_X$

Given the preponderance of small and marginal farmers in Indian agriculture, the bargaining strength of the farmers is very low relative to that of the agricultural traders. The less the relative bargaining strength of the farmers, the smaller is the value of θ and, therefore, the lower is $\bar{P}_X$ - see (3.1). We shall here examine the impact of a decline in θ using Figure3.6, where the initial steady state *S*, labeled $\bar{S}$, corresponds to the point of intersection of the SS schedule representing (3.4) and the 45^0 line. The initial steady state *X* corresponds to $\bar{S}$ on the XX schedule representing (3.5) in the second quadrant. Following a fall in θ by $d\theta < 0$, both the vertical intercept and the slope of the SS schedule become smaller, It, therefore, shifts downward and becomes flatter. The XX schedule, however, remains unaffected. Hence, steady state values of both S and X go down making India's food security more fragile.

The fall in the steady state value of S, as we derive from (3.6), is given by

$$d\bar{S} = \frac{L_X\, d\theta}{1-\theta(1-\alpha)} + \frac{[\theta-(1+r_0)]L_X}{[1-\theta(1-\alpha)]^2}(1-\alpha)d\theta < 0 \tag{3.26}$$

The fall in $\bar{S}$, as follows from (3.5),lowers the steady state value of X by

$$d\bar{X} = a.\left(\frac{d\bar{S}}{P_Y}\right) = \left(\frac{a}{P_Y}\right)\left\{\frac{L_X\, d\theta}{1-\theta(1-\alpha)} + \frac{[\theta-(1+r_0)]L_X}{[1-\theta(1-\alpha)]^2}(1-\alpha)d\theta\right\} < 0 \tag{3.27}$$

Let us examine how S and X fall following a decline in θ using (3.4) and (3.5). Suppose the fall in θ takes place in period 0. From (3.4) it follows that

$$S_1 = [\theta(1-\alpha)]S_0 + [\theta-(1+r_0)]L_X \tag{3.28}$$

We assume that initially the economy was in steady state so that $S_0 = \bar{S}$ and S_1 would have been equal to $\bar{S}$ if θ had stayed unchanged. Following the decline in θ and the consequent fall in the sales revenue, S_1 falls, as follows from (3.28), by

$$dS_1 = [(1-\alpha)S_0 + L_X]d\theta = [(1-\alpha)\bar{S} + L_X]d\theta \tag{3.29}$$

Therefore, in period 1, X falls from its steady state value $\bar{X}$ by

$$dX_1 = \frac{a}{P_Y}dS_1 \tag{3.30}$$

This fall in X lowers farmers' own fund in period 2 further. From (3.4), we know that

$$S_2 = [\theta(1-\alpha)]S_1 + [\theta-(1+r_0)]L_X \tag{3.31}$$

One should note that θ in (3.31) is the new lower θ. From (3.31), it follows that

$$dS_2 = [\theta(1-\alpha)]dS_1 \tag{3.32}$$

Hence, as follows from (3.5), X in period 2 falls by

$$dX_2 = \frac{a}{P_Y}dS_2 \tag{3.33}$$

Similarly, in period 3,

$$dS_3 = [\theta(1-\alpha)]dS_2 = [\theta(1-\alpha)]^2 dS_1 \tag{3.34}$$

And

$$dX_3 = \frac{a}{P_Y}dS_3 \tag{3.35}$$

Thus, through successive periods, there will take place a cumulative decline in S and X until the fall in X that takes place in each successive period eventually falls to zero. Thus, the total fall in S and X are given by (using (3.29) and (3.6))

$$dS = dS_1 + [\theta(1-\alpha)]dS_1 + [\theta(1-\alpha)]^2 dS_1 + \ldots\ldots\ldots\ldots = \frac{1}{1-[\theta(1-\alpha)]} dS_1 = \left[\frac{L_X}{1-[\theta(1-\alpha)]} + \frac{[\theta-(1+r_0)]L_X}{[1-\theta(1-\alpha)]^2}(1-\alpha)\right] d\theta \quad (3.36)$$

and

$$dX = \frac{a}{P_Y} dS_1 + \frac{a}{P_Y}[\theta(1-\alpha)]dS_1 + \frac{a}{P_Y}[\theta(1-\alpha)]^2 dS_1 + \ldots\ldots\ldots\ldots = \frac{a}{P_Y}\frac{1}{1-[\theta(1-\alpha)]} dS_1 = \frac{a}{P_Y}\left[\frac{L_X}{1-[\theta(1-\alpha)]} + \frac{[\theta-(1+r_0)]L_X}{[1-\theta(1-\alpha)]^2}(1-\alpha)\right] d\theta \quad (3.37)$$

The above analysis yields the following proposition:

Proposition 3.5: A given fall in θ will lead to a cumulative fall in food output greatly jeopardizing India's food security.

From our above discussion we find that under free market conditions, the greater the preponderance of the small and marginal farmers, the less is the bargaining strength of the farmers relative to the agricultural traders and, hence, the lower is the price the farmers' produce fetches. This lower price will bring about a large fall in food output substantially undermining India's food security.

3.8 Conclusion

India has made a transition from a planned economy to a market economy. In consequence, the financial institutions, which were social organizations disbursing credit in accordance with the pattern specified in the plans, have turned into profit-seeking firms. Public investment that grew phenomenally in the plan era creating agricultural infrastructure at a rapid pace, tapered off in the post-reform period leaving agriculture vulnerable to the vagaries of nature. Small and marginal farmers, the producer of the major part of agricultural output in India, who enjoyed considerable protection in the plan era have become subject to extremely exploitative and discriminatory market forces in the post reform period. All these factors, the study in this chapter shows, have considerably weakened India's food security and has led to gross underutilization of land and infrastructure available for food production. The paper also shows that the policy of one-time loan waiver improves food security only temporarily. However, it may be of considerable use in mitigating the impact of a one-period adverse natural shock. Adverse natural shocks, as this chapter shows, may be one important reason why so many farmers in India commit suicide every year.

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Chapter 4

Government Intervention and Food Security: Need and Nature

Abstract

The previous chapter pointed to several reasons why free market gravely threatens food security of most of the Indians and causes immense suffering of the farmers. This chapter first identifies two more reasons why free market is inimical to the food security of most Indians. It shows that uncertainty associated with food production and food price in a free market discourages farmers from fully utilizing whatever small amount of resources they have at their command for food production. It also argues that the capitalists may have a vested interest in hiking the prices of industrial goods including those that are used as intermediate inputs in food production and every round of increase in these prices will lower food output. It thus points to the necessity of government intervention in the food sector to ensure food security. It, then, proceeds to derive the policies by means of which the government can put an end to farmers' dependence on loans and enable the farmers to maximize food output by fully utilizing the land and infrastructure available to the farmers for food production. It then examines the implications of the three recently passed Farm Laws in India and argues that these laws will hand over Indian agriculture to the capitalists. All the small and medium farmers are highly likely to lose all their land to the capitalists. They will become unemployed landless labourers. The capitalists are highly likely to utilize only a small part of this land for food production using immensely capital intensive methods of production. Hence, most of the ordinary Indians are highly likely to face starvation and deprivation to the extreme.

4.1 Introduction

In the previous chapter, we examined the issue of food security under free market conditions. We pointed to several reasons why free market conditions will gravely threaten India's food security causing immense misery to the farmers and the poor. In this chapter, we point to two more factors that adversely affect food security in a free market. The factors we identify here are first, the uncertainty associated with production and price of food and second, the behavior of the corporate sector, which, because of its monopoly power, finds it optimal to regularly hike prices of industrial intermediate inputs used in food production. The studies undertaken in this chapter and in the previous one show that free market forces will lead to large scale underutilization of the available land and infrastructure in the food sector. These studies point to the urgency of appropriate government's policies for maximizing food output through full utilization of the land and infrastructure of the food sector. This chapter seeks to derive these policies. It also seeks to derive the policy that the government should adopt to distribute the surplus food output of the food sector among the non-farmer people equitably. It, then, examines the implications of the recently passed three Farm Laws and concludes that the objective of these laws is to hand over Indian agriculture to the corporate sector. It, then, proceeds to examine the implications of corporatization of Indian agriculture. The importance of the issues considered here can hardly be overemphasized. The endeavour is worthwhile because the issues considered here are examined in a rigorous theoretical framework, which we hope capture all the relevant salient features of India. Such a study, to the best of our knowledge, does not exist in the literature.

4.2 Uncertainty and Food Production

Income from food production is highly uncertain. This is because farmers are uncertain about how favourable or unfavourarable the natural conditions will be for food production and the price at which they will be able to sell their produce after harvest. Under these circumstances, how do the farmers decide how much fund to allot to food production? In what follows, we will seek to resolve this issue. Let us denote the amount of income (inclusive of interest charges) the farmers earn from every rupee allotted to food production by π. The cost of allotting one rupee to food production is (1 + r) rupees, where r is the interest income (payment) if he had lent out (borrowed) one rupee for the given production period of food. Therefore, farmers' profit from T rupees allotted to food production is given by

List of notations

α	A fixed fraction of food output used by the farmers for self-consumption
β	Parameter of the utility function of farmer's
γ	Fixed mark-up used to determine P_Y

ϵ	$\frac{\gamma - 1}{\gamma}$
σ	Standard deviation of π
μ	Mathematical expectation or mean of π
ρ	Standard deviation of $\tilde{R}$
μ	$\frac{\bar{X}}{X^*}$
π	The amount of income (inclusive of interest charges) the farmers earn from every rupee allotted to food production
$\emptyset$	The fraction of food output the government keeps for building a buffer stock
φ	the cash-deposit ratio of the banks
$1/a$	The amount of industrial intermediate input required per unit of X
b	Marginal propensity to invest due to an increase in profit
B	The net cost of government's operations
C	Average and marginal propensity to consume industrial goods of the capitalists and food traders
dH	The addition to the stock of high-powered money due to government's borrowing from the central bank.
D	$\frac{B}{P_Y}$
$I(\cdot)$	Investment demand for Y
l	The amount of labour required per unit of Y
l_0	The amount of labour capitalists require per unit of food production
$\bar{L}$	The amount of land the farmer households initially had in their possession before corporatization of food sector
L_X	A fixed amount of loan from the lenders that the farmers get at the beginning of every perio
L^D	Demand for new credit
L^S	The amount of new credit generated in the given period by
N_t	The size of the non-farmer population in period t
P_X	Market clearing price of X

$\bar{P}_X$	The minimum possible price offered by the food traders to the farmers
P_X^*	The price at which the government buys as much food as the farmers want to sell to it
P_Y	The price of the industrial output
$\bar{r}$	Targeted interest rate set by the RBI
R	Commercial banks' borrowing from the central bank
R	Mathematical expectation of $\tilde{R}$
$\tilde{R}$	Farmers' profit from T rupees allotted to food production is given by
$\bar{S}$	The steady state value of S
T	Period
T	Rupees allotted to food production
$\bar{T}$	Amount of lumpsum tax taken from the capitalists
$U = U(\bullet)$	Utility function of a representative farmer
W	The money wage rate of the industrial sector
X^*	The maximum X that can be produced, given the amount of land and infrastructure available in the food sector
X_c	The amount of food produced by the corporate sector by
$\bar{x}_t$	The per capita quota of food fixed by government
X	Food output
Y	The industrial output
$\bar{Y}$	Full capacity Y
Y^e	Equilibrium Y

$$\tilde{R} = [\pi - (1 + r)]T \quad (4.1)$$

Since π is uncertain, we assume that farmers have a probability distribution defined over it and $E(\pi) = \mu$and $\sqrt{E(\pi - \mu)^2} = \sigma$. Taking mathematical expectation of (4.1), we get

$$R \equiv E(\tilde{R}) = [\mu - (1 + r)]T \quad (4.2)$$

(4.2) gives farmers' expected income from T rupees allotted to food production.We assume here that $\mu > (1 + r)$. Otherwise, farmers will not undertake food production.

The risk associated with T rupees allotted to food production is given by the standard deviation of $\tilde{R}$. Denoting it by ρ, we get

$$\rho = \sqrt{E\left(\tilde{R} - R\right)^2} = \sigma T \tag{4.3}$$

Eqs. (4.2) and (4.3) simply tell us that the larger the amount of a farmer's investment in food production (denoted by T here), the more is his expected income from food production and the greater is the risk associated with food production. Depending on his taste and preference over risk and return, he will choose the T that he considers optimum. Note that T is likely to have an upper limit set by the amount of land and infrastructure available to the farmer. If T is raised above this upper limit, π from every rupee of this excess amount of T is likely to be zero or negligible.

Substituting (4.3) into (4.2), we get

$$R \equiv E\left(\tilde{R}\right) = [\mu - (1 + r)]\frac{1}{\sigma}\rho \tag{4.4}$$

(4.4) gives all the combinations of R and ρ the farmers can choose by changing T. From (4.3) it is clear that if T is raised by $\frac{1}{\sigma}$ rupees, ρ rise by 1 unit. Again, from (4.2) we find that, if T rises by $\frac{1}{\sigma}$ rupees, R increase by $[\mu - (1 + r)]\frac{1}{\sigma}$ rupees. Thus, every unit of increase in ρ from zero, raises R by $[\mu - (1 + r)]\frac{1}{\sigma}$rupees. This explains (4.4). If we plot (4.4) in a diagram in the (ρ, R) plane, it will be a ray through the origin. We call it the budget line of the farmer. It gives all the combinations of ρ and R the farmer can have by varying T. From these combinations, the farmer will choose one depending on his taste and preference over risk and return.

Let us now describe a farmer's taste and preference. It is captured in his utility function in risk and return. Assuming further that the farmers are risk-averse, the utility function is given by

$$U = U(R, \rho)\ \frac{\partial U}{\partial R} > 0 \text{and} \frac{\partial U}{\partial \rho} < 0 \tag{4.5}$$

To choose T, farmers maximize (4.5) subject to (4.4). For simplicity we assume that the farmers' utility function has the following form:

$$U = R - \rho^{\beta}\ ;\ \ \beta > 1 \tag{4.6}$$

Substituting (4.4) into (4.6), we write it as

$$U = [\mu - (1 + r)]\frac{1}{\sigma}\rho - \rho^{\beta} \tag{4.7}$$

Maximizing (4.7), we get the optimum value of ρ. It is given by

$$\rho = \left([\mu - (1+r)]\frac{1}{\beta\sigma}\right)^{\frac{1}{\beta-1}} \quad (4.8)$$

The degree of uncertainty associated with food production, as perceived by the farmers, is captured by σ. The larger the value of σ, the greater is the uncertainty that the farmers associate with food production. From (4.8) it follows that the larger the σ, the lower is the ρ the farmers will choose. From (4.3) it follows that, following a given increase in the value of$\boldsymbol{\sigma}$, T will fall more than proportionately. Let us explain this result. From (4.3) it follows that following a given increase inσ, the risk associated with any given amount of T rises, but, as follows from (4.2), expected income from any given T remains unchanged. Moreover, from (4.4) we find that, a unit increase in ρ raises R by a smaller quantity. This makes risk-taking less rewarding. For both the reasons mentioned above, investment in food production becomes less attractive. This induces the farmer to lower T.

This yields the following proposition:

Proposition 4.1: Any change that makes food production more uncertain to the farmers will induce them to allot smaller amount of fund to food production jeopardizing India's food security.

Note that for most of the small and marginal farmers, the amount of T they can secure is likely to be less than their optimum T. However, for farmers who are not so small, the amount of T they can secure may be larger than their optimum T. These farmers will surely lower their investment in food production following an increase in the uncertainty associated with food production. The smaller farmers will also reduce their investment in food production, if the increase in uncertainty lowers their optimum T below the T they can garner.

From the above it follows that the better the irrigation facilities in dry land areas, the better the drainage and flood control facilities in rain-fed areas, the more the robustness of the crops, the less is the uncertainty associated with agricultural production and hence, the larger will be farmers' investment in food production. Thus, the larger the levels of public investment in irrigation, flood control facilities and drainage, the larger the level of public investment in R&D to invent more robust varieties of high yielding seeds, the greater will be government's contribution to India's food security. During the Nehru-Mahalanobis era, government used to invest on a large scale in the areas noted above. However, as we have already noted in Chapter 3, in the post-reform period, there has taken place a drastic decline in the kind of public investment noted above. Farmers are subject to price uncertainty also. At the time of sowing a crop, the farmers do not know what price will prevail at the time of harvest. During the Nehru-Mahalanobis era, to remove the price uncertainty of the farmers, the government adopted procurement policy for food grains. Under this policy, the government bought from the farmers as much food grains as the farmers wanted to sell at a price called the procurement price. This procurement price was fixed at remunerative levels and it was made known to the

farmers much before the sowing season so that the farmers did not have any price uncertainty. The three recently enacted Farm Laws pave the way for the withdrawal of government's food procurement operations and, thereby, increase manifold price uncertainty of the farmers. Clearly, the decline in public investment in agricultural infrastructure and the recently passed Farm Laws gravely threaten India's food security. We will discuss the implications of these Farm Laws in detail later.

4.3 Industry-Agriculture Interaction and Food Security

We will refer to the non-agricultural sector as the industrial sector. Following the structuralist tradition (based on the works of Keynes (1936) and Kalecki(1954)) set by such writers as Taylor(1983), Rakhsit(1982) , Malllik(1977), Bose (1989) et al, we assume that the industrial output is determined by its demand and its price is set by applying a fixed mark-up to the average variable cost of production. Therefore, the industry equilibrium condition is given by

$$Y = c.\left(1 - \frac{W}{P_Y} l\right) Y + c.\left(\frac{P_X - \bar{P}_X}{P_Y}\right) X(1-\alpha) + I\left(\bar{r}, \left(1 - \frac{W}{P_Y} l\right) Y\right) + \frac{1}{a} X \qquad (4.9)$$

Let us explain (4.9). We assume that the industrial output, denoted *Y*, is used for purposes of consumption by the industrial producers, whom we will refer to as capitalists, and also by the traders in food. It is also used for purposes of investment and as an intermediate input in food production. It is produced with labour and capital. Since we are concerned with a given short period, the stock of capital in the industrial sector is given. The only variable input is labour. The amount of labour required per unit of *Y* is *l*. The money wage rate of the industrial sector is *w* and it is assumed to be fixed in the short run. The price of the industrial output is denoted by P_Y. Assuming the fixed cost to be zero for simplicity, the amount of profit in the industrial sector in terms of the industrial output is given by $\left(1 - \frac{W}{P_Y} l\right) Y$. Average and marginal propensity to consume industrial goods of the capitalists is *c*, which lies between 0 and 1. Thus, the first term on the RHS of (4.9) gives the consumption demand of the industrialists for industrial goods. The second term gives consumption demand of the food traders for industrial goods. Let us explain. Their marginal and average propensity to consume industrial goods is assumed to be the same as that of the capitalists. In fact, they may be the same set of people. *X* denotes food output of which a fixed fraction α is used by the farmers for self-consumption. They sell the rest to the traders. The traders buy $(1-\alpha)X$ amount of food from the farmers at the minimum possible price $\bar{P}_X$. How they set $\bar{P}_X$ is given by (3.1) in Chapter 3. They sell this amount in the market at the price P_X. This explains the second term. The third term gives the investment demand for industrial goods. It is assumed to be a decreasing function of interest rate denoted *r* and an increasing function of the profit level in industry. We assume that the larger the profit level in industry, the more buoyant is the animal spirit of the investors. The monetary policy of the RBI consists in keeping *r* at a target level. We, therefore, regard *r* as a policy variable of the RBI and assume that

the RBI keeps it at $\bar{r}$. Finally, $\frac{1}{a}X$ gives the intermediate input demand for Y of the food sector. $\frac{1}{a}$is the amount of industrial intermediate input required per unit of X.

The average variable cost of production in the industrial sector is given by Wl. Following Kalecki (1954), we assume that$P_Y$is set by applying a fixed mark-up γ to the average variable cost of production. Thus,

$$P_Y = \gamma Wl\,; \qquad \gamma > 1 \tag{4.10}$$

We assume that the workers in the industrial sector consume only food and they are too poor to save. The justification of this assumption is that the wages of the highly skilled well-to-do workers are included in the profit and the food demand of the well-to-do people is fixed and, hence, their demand for food can be ignored without any loss of generality. Hence, we have ignored here the food demand of the well-to-do people consisting of the highly skilled workers, capitalists and traders in food. Hence, the food market is in equilibrium when the following condition is satisfied:

$$(1-\alpha)X = \frac{Wl}{P_X}Y \tag{4.11}$$

We further assume that the food sector is in steady state so that, as we get from (3.6) of the previous chapter,

$$X = a.\left[\frac{\bar{S}+L_X}{P_Y}\right] \tag{4.12}$$

Where $\bar{S}$ is the steady state value of S and L_X denotes the given amount of loan that the farmers secure from the formal and informal credit markets. $\bar{S}$is given by

$$\bar{S} = \frac{[\theta-(1+r_0)]L_X}{1-\theta(1-\alpha)} \tag{3.6}$$

Substituting (4.11) into (4.9), we get

$$Y = c.Y - c.\left(\frac{\bar{P}_X}{P_Y}\right)X(1-\alpha) + I\left(\bar{r}, \left(1-\frac{W}{P_Y}l\right)Y\right) + \frac{1}{a}X \tag{4.13}$$

Again, substituting (3.1), $\bar{P}_X = \theta\frac{1}{a}P_Y$, into (4.13), we get

$$Y = c.Y + \frac{1}{a}[1-c.\theta(1-\alpha)]X + I\left(\bar{r}, \left(1-\frac{W}{P_Y}l\right)Y\right) \tag{4.14}$$

Determination of the Equilibrium Y

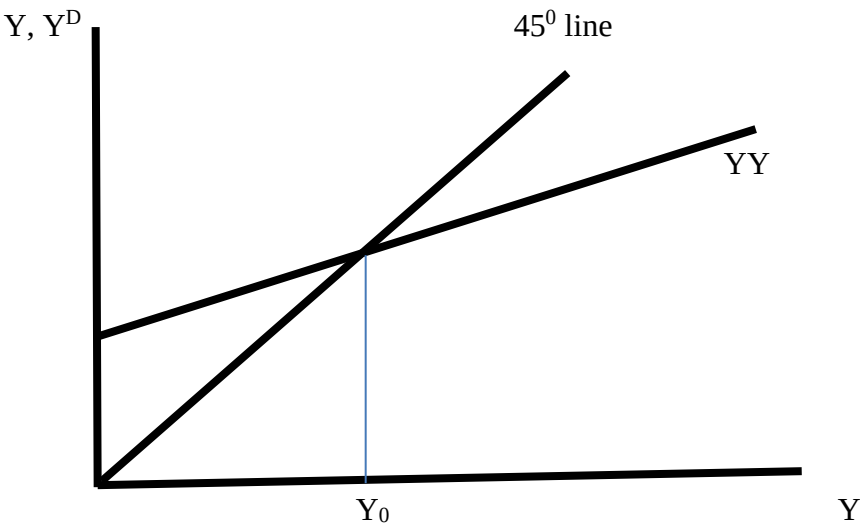

Figure 4.1

Finally, substituting (4.10), (4.12) and (3.6) into (4.14), we get

$$Y = c.Y + [1 - c.\theta(1-\alpha)]\frac{1}{\gamma Wl}\left[\frac{\{\theta-(1+r_0)\}}{1-\theta(1-\alpha)} + 1\right]L_X + I\left(\bar{r}, \frac{\gamma}{1+\gamma}Y\right) \qquad (4.15)$$

We can solve (4.15) for the equilibrium value of *Y*. We show the solution in Figure 4.1 where the equilibrium Y corresponds to the point of intersection of the 45^0 line and the YY line representing the RHS of (4.15). The RHS gives demand for Y denoted Y^D. The equilibrium Y is labeled Y_0. The slope of the YY line is assumed to be less than unity for stability.

4.4 The Effect of an Increase in γ

We will now examine how an increase in γ is likely to affect Y. This we will do first diagrammatically using Figure 4.1. Let us examine how the YY schedule will shift following a given increase in γ. Consider the second term. $P_{Y=} = \gamma Wl$ will go up lowering food output. This will reduce intermediate input demand for food output. There is an opposite effect as well. Food traders' profit in terms of Y rises raising their demand for industrial output. This is given by $c.\theta(1-\alpha)\frac{1}{\gamma Wl}\left[\frac{\{\theta-(1+r_0)\}}{1-\theta(1-\alpha)} + 1\right]L_X$. Despite the fall in food output, their revenue in terms of Y, given by *WlY* (see (4.11)), remains unchanged at the initial equilibrium Y, but their cost of procuring food in terms of Y will fall. However, the former contractionary effect will dominate the latter expansionary effect since, as we assumed in the previous chapter, $\theta(1-\alpha) < 1$ and we also know that $0 < c < 1$. It will also raise the profit rate of the capitalists at the initial equilibrium Y. This will induce the capitalists to raise investment demand. Capitalists are just a few in numbers. They have to protect their enormous wealth and business empire from the

masses. Hence, they are likely to be a closely knit community and work in unison to manage their businesses. They must know that an increase in the mark-up will lower demand of the farmers. Hence, they are likely to raise their investment demand substantially to offset the reduction in farmers' demand. This will give the capitalists an opportunity of grabbing a larger part of aggregate output for purposes of investment. In fact, it is highly plausible that the capitalists will always keep their investment at such a level that the productive capacities of their own production facilities are fully utilized. However, even then, there may exist considerable excess capacity in the non-corporate segment of the industrial sector.Thus, the capitalists may from time to time raise the mark-up to grab a larger part of the aggregate industrial output. It should be noted in this context that quite a substantial part of capitalists' investment may represent building up production facilities (assembling facilities) for producing newer varieties of existing goods, imbibing newer more labour saving techniques for producing existing goods and competing out their smaller rivals. Thus, they do not add to societies' productive capacity but make existing production facilities obsolete or redundant.If this line of thought is true, then, following an increase in γ, the YY line is highly likely to stay unaffected or shift upward and, therefore, the equilibrium Y will remain unchanged or rise. X will fall impoverishing the farmers and the poor industrial workers. In sum, one may reasonably argue that it is highly plausible that following a given increase in the mark-up, aggregate demand for industrial output will not decline. Even if Y falls, it will be confined to the non-corporate segment of the industrial sector. This yields the following proposition:

Proposition 4.2: It is highly likely that in India the capitalists under free market conditions may have a vested interest in hiking up the industrial prices from time to time to grab a larger part of the aggregate industrial output. This will reduce food output adversely affecting the economic well-being of the farmers and the poor industrial workers.

4.5 Government's Policy to Ensure Food Security

Our assessment of the performance of the food sector under free market conditions in the previous chapter and in this one shows that the free market gravely threatens India's food security and leads to gross underutilization of land and infrastructure in the food sector. Lack of bargaining strength of the farmers vis-à-vis the traders pushes down prices received by the farmers to the lowest possible level. Profit driven financial institutions extend grossly inadequate amounts of credit to the farmers at exorbitant interest rates. Occurrence of adverse natural conditions causes untold suffering to the farmers. Uncertainties regarding prices of agricultural produce and natural conditions deter the farmers from using all the financial resources they have at their disposal for the purpose of cultivation. Finally, capitalists at regular intervals hike prices of industrial products forcing the farmers to buy less of the essential industrial inputs for production. All these factors lead to low food output and gross underutilization of land and infrastructure of the food sector. Obviously, to ensure food security and, thereby, to remove the scourge

of malnutrition and hunger, the government has to intervene in the food sector to ensure optimum prices for farmers' produce, adequate levels of credit to the farmers at low or no interest rate, removal of farmers' uncertainties and regulation of prices of essential industrial inputs needed for food production. To remove price uncertainty, the government should undertake the following policies. It should buy directly from the farmers as much food as the farmers want to sell at appropriately high prices. The government should directly supply the farmers with industrial inputs on an adequate scale at appropriately low prices. It should make up fully the losses of the farmers due to adverse natural factors. It should also maintain a buffer stock of food so that it can maintain adequate supply of food to the farmers and other people in times of poor natural conditions. Under such circumstances, it will be optimal for the farmers to fully utilize all the financial resources they can garner for cultivation and farmers' own fund in period t will be given by

$$S_t = \frac{P_X^*}{\bar{P}_Y}(1-\alpha)aS_{t-1} + \left(\frac{P_X^*}{\bar{P}_Y}a - 1\right)L \qquad (4.16)$$

Let us explain (4.16). Note first that here the farmers buy industrial inputs and produce food using these intermediate inputs, family labour and a given stock of capital. Their stock of capital consisting of bullocks and small implements is given and they produce these capital goods themselves. These assumptions again are simplifying ones. Neither labour nor capital acts as a constraint on food output. The factor that constrains food output is the amount of industrial intermediate inputs farmers are able to purchase. S_t and S_{t-1} denote farmers' own fund (fund owned by the farmers and not secured as loans or transfers) in period t and period t-1, respectively. P_X^*denotes the price at which the government buys as much food as the farmers want to sell to it. $\bar{P}_Y$denotes the price at which the government supplies industrial intermediate inputs to the farmers, α is the fraction of farmers' output, which the farmers use for self-consumption. Farmers can produce a amount of food using 1 unit of the industrial intermediate input and L denotes the amount of interest-free loan the government gives to the farmers. (4.16) is valid if and only if the farmers sell all their marketable produce to the government, buys industrial intermediate inputs and secures loans only from the government.We are now in a position to explain (4.16). Focus on the first term. Clearly, $a.\frac{S_{t-1}}{\bar{P}_Y}$ gives the amount of food farmers produced in period t-1 with their own fund. Out of this, they used $\alpha.a.\frac{S_{t-1}}{\bar{P}_Y}$ for self-consumption and sold off the rest to the government at P_X^*. The first term, therefore, gives the amount of revenue the farmers earned at the end of period t-1. This constitutes a part of his own fund in period t. Let us now consider the second term. $\frac{P_X^*}{\bar{P}_Y}aL$gives the revenue farmers earn from the sale of food produced using the loan L. We assume here for simplicity that they pay off the loan from this revenue and use the rest not for consumption but for adding to their own fund in period t. Thus, the expression on the RHS of (4.16) gives the total amount of fund at the disposal of the farmers. Let us now discuss how the government should determine P_X^*, $\bar{P}_Y$and L.

Suppose the maximum X that can be produced, given the amount of land and infrastructure available in the food sector is X^*. The amount of fund needed to produce X^*denoted $S^1$is given by

$$S^1 = \left(\frac{1}{a}X^*\right)\bar{P}_Y \tag{4.17}$$

It is desirable for the government to achieve the target of raising X to X^* as fast as possible. It is also desirable to remove farmers' dependence on loans. One possible strategy of achieving these goals may be derived in the following manner. Setting $L = 0$, we rewrite (4.16) as follows.

$$S_t = \frac{P_X^*}{\bar{P}_Y}(1-\alpha)aS_{t-1} \tag{4.18}$$

From (4.18) it follows that if the government sets $\frac{P_X^*}{\bar{P}_Y}$ in such a manner that $\frac{P_X^*}{\bar{P}_Y}(1-\alpha)a = 1$ so that

$$\frac{P_X^*}{\bar{P}_Y} = \frac{1}{(1-\alpha)a} \tag{4.19}$$

S will be stationary at S_{t-1}.From (4.17) it follows that the government can set $\bar{P}_Y$ in such a manner that

$$S_{t-1} = \left(\frac{1}{a}X^*\right)\bar{P}_Y \text{so that } \bar{P}_Y = \frac{aS_{t-1}}{X^*} \tag{4.20}$$

From (4.19) and (4.20) it follows that the government should set P_X^* at

$$P_X^* = \frac{S_{t-1}}{(1-\alpha)X^*} \tag{4.21}$$

Under the policy noted above, the government does not allow any private player to trade in food.

4.5.1 Government's Policy Regarding Distribution of Food

In what follows, we will discuss how the government should distribute $(1-\alpha)X^*$amount of food among the non-farmer population. We assume that the government's objective is to distribute this amount of food equally among the non-farmer population. Let us focus on a given period, Period t, say. The size of the non-farmer population in period t is given by N_t. Assuming that every industrial worker supplies 1 unit of labour in any given period, the number of industrial workers is given by lY. The government keeps a fraction $\emptyset$ of $(1-\alpha)X^*$ for building a buffer stock of food and distributes the rest equally among the N_t number of non-farmer individuals. We do not seek to explain here how the government determines $\emptyset$. We take it as exogenously given. Thus, the government fixes a per capita quota of food given by

$$\bar{x}_t = \frac{(1-\emptyset)(1-\alpha)X^*}{N_t} \tag{4.22}$$

At what price should the government sell food? Since the government wants the non-farmer workers to have $\bar{x}_t$ amount of food each, it can set the price in such a manner that the industrial workers are just able to buy the quota amount of food. Thus, denoting the sale price of food in the given period by by p_{xt}, we get

$$\frac{W}{p_{xt}} = \bar{x}_t \text{or,} \quad p_{xt} = \frac{W}{\bar{x}_t} \tag{4.23}$$

We have delineated above government's policies regarding procurement and distribution of food. Note that, under this policy, the government procures the whole of the food output, uses a part of it to build a buffer stock of food and distributes the rest equally among the people. Clearly, to implement this policy, the government has to bar private players from entering the food procurement and distribution sector. We will now focus on the issue of how the government should finance this policy.

Before proceeding to the issue of financing, make note of the following point. One can argue that what the government achieves through its food procurement and input subsidization operations can also be achieved by giving the farmers sufficiently large amounts of transfers in every period. The problem with this line of thought is the following. One can easily check that the required amount of this transfer will depend upon the values of θ and P_Y. The capitalists can always lower θ and raise P_Y to completely neutralize the good effect of the transfer and get it transferred to themselves in every period.

4.5.2 Financing Government's Food Policy Programme

Under the policy delineated above, the government buys $P_X^*(1-\alpha)X^*$ amount of food and sells a part of it to the industrial workers. The sales revenue of the government is WlY. The government can, therefore, buy $\frac{WlY}{P_Y} = \frac{1}{\gamma}Y$ amount of industrial goods with this sales revenue (see (4.10)). The government also buys industrial goods worth$P_Y\frac{1}{a}X^*$ and sells them at $\bar{P}_Y\frac{1}{a}X^*$ to the farmers. The net cost of government's operations, denoted *B*, is given by

$$B = P_X^*(1-\alpha)X^* + (P_Y - \bar{P}_Y)\frac{1}{a}X^* - WlY \tag{4.24}$$

Substituting (4.20) and (4.21) into the above equation, we get

$$B = S_{t-1} + P_Y\frac{1}{a}X^* - S_{t-1} - WlY = P_Y\frac{1}{a}X^* - WlY \tag{4.25}$$

Dividing both sides of the above equation by $P_Y = \gamma Wl$, we get

$$\frac{B}{P_Y} = \frac{1}{a}X^* - \frac{1}{\gamma}Y \equiv D \tag{4.26}$$

The policy delineated above creates demand for $\frac{1}{a}X^*$ amount of industrial goods. Under the given policy, the industry equilibrium condition is given by

$$Y = c.\frac{\gamma-1}{\gamma}Y + I\left(\bar{r}, \frac{\gamma-1}{\gamma}Y\right) + \frac{1}{a}X^* \tag{4.27}$$

For simplicity, we decompose the investment function and write it as

$$Y = c.\frac{\gamma-1}{\gamma}Y + I(\bar{r}) + b.\left(\frac{\gamma-1}{\gamma}\right)Y + \frac{1}{a}X^* \tag{4.28}$$

In (4.28), b is a positive constant. Solving (4.28), we get

$$Y = \frac{I(\bar{r})+\frac{1}{a}X^*}{1-(c+b)\epsilon} \text{where } \epsilon \equiv \frac{\gamma-1}{\gamma} \tag{4.29}$$

If the value of Y given by the above equation, denoted Y^e, is less than or equals the full capacity Y, denoted $\bar{Y}$, the whole of D can be financed by money creation, i.e. by borrowing from the Reserve Bank of India. If, however, Y^eexceeds $\bar{Y}$, the government should collect a given amount of tax $\bar{T}$ from the capitalists so that

$$\frac{(c+b)\bar{T}}{1-(c+b)\epsilon} = Y^e - \bar{Y} \quad \text{or, } \bar{T} = \frac{(Y^e-\bar{Y})(1-(c+b)\epsilon)}{c+b} \tag{4.30}$$

If $\bar{T}$is greater than D, the government should save $(\bar{T} - D)$. If $\bar{T}$is less than D, the part of D that is not covered by the tax revenue should be financed by borrowing from the RBI. To derive the implication of this programme of financing, we will introduce the financial sector following the line suggested in Ghosh and Ghosh (2019). We assume that the financial sector consists only of the central bank and the commercial banks and the capitalists deposit their surplus income given by $[1-(c+b)]\left[\left(\frac{\gamma-1}{\gamma}\right)Y - \bar{T}\right]$ with the commercial banks. For simplicity, we do not explicitly consider the factor income that is generated in the banking sector. Denoting the amount of new credit generated in the given period by L^S, we get

$$L^S = (1-\varphi)(1-c-b)\left[\left(\frac{\gamma-1}{\gamma}\right)Y - \bar{T}\right] + \frac{dH}{P_Y} \tag{4.31}$$

In (4.31), dH denotes the addition to the stock of high-powered money due to government's borrowing from the central bank and φ denotes the cash-deposit ratio of the banks, which we assume to be fixed. Obviously,

$$\frac{dH}{P_Y} = D - \bar{T} \tag{4.32}$$

The central bank seeks to keep r at a target level $\bar{r}$ by allowing the commercial banks to borrow as much as they want from the central bank at $\bar{r}$ and to keep as much of their surplus fund as they want with the central bank at $\bar{r}$.

Demand for new credit, denoted L^D, is given by

$$L^D = I(\bar{r}) + (D - \bar{T}) \tag{4.33}$$

Credit market is in equilibrium when the following condition is satisfied:

$$(1-\varphi)(1-c-b)\left[\left(\frac{\gamma-1}{\gamma}\right)Y - \bar{T}\right] + \frac{dH}{P_Y} + R = I(\bar{r}) + (D - \bar{T}) \tag{4.34}$$

In the above equation, R denotes commercial banks' borrowing from the central bank. It may be positive or negative.

Using (4.32), we rewrite (4.34) as

$$(1-\varphi)(1-c-b)\left[\left(\frac{\gamma-1}{\gamma}\right)Y - \bar{T}\right] + R = I(\bar{r}) \tag{4.35}$$

Substituting the value of Y^e for Y in the above equation, we can solve it for R.

Let us examine the financial implications of government's operations. In the food sector, the government buys $(1-\alpha)X^*$ amount of food at the price P_X^* and sells $\frac{1}{a}X^*$ amount of industrial input at the price $\bar{P}_Y$. The government sets P_X^* and $\bar{P}_Y$ in such a manner that the government gets from its sale to the farmers S_{t-1}, which goes back to the farmers as proceeds from the sale of $(1-\alpha)X^*$ amount of food. This part of the government's operation is, therefore, self-financed. From the industrial sector, the government buys $\frac{1}{a}X^*$ amount of industrial goods. If it finances this purchase by borrowing from the central bank, $\frac{1}{a}X^* = \frac{dH}{P_Y}$. As the government buys $\frac{1}{a}X^*$amount of industrial goods, Y will, if there is sufficient excess capacity, increase by $\frac{\frac{1}{a}X^*}{1-(c+b)\epsilon}$ of which $\epsilon\left[\frac{\frac{1}{a}X^*}{1-(c+b)\epsilon}\right]$ will accrue to the capitalists and workers will get the rest $(1-\epsilon).\left[\frac{\frac{1}{a}X^*}{1-(c+b)\epsilon}\right]$, which will go into the hands of the government as revenue from the sale of food to the workers. The government can pay back this part of its loan to the central bank. If it does so, on the asset side of the central bank's asset-liability balance sheet, central bank's credit to the government will rise by $\frac{1}{a}X^*\left\{1-(1-\epsilon).\left[\frac{1}{1-(c+b)\epsilon}\right]\right\} = \frac{dH}{P_Y}\left[\frac{\epsilon(1-(c+b))}{1-(c+b)\epsilon}\right]$. We will now show below that the liabilities of the central bank will also rise by the same amount.

The capitalists will deposit their saving of$\big(1-(c+b)\big)\epsilon\left[\frac{\frac{1}{a}X^*}{1-(c+b)\epsilon}\right]$ amount to the commercial banks. The commercial banks will not be able to extend any extra loan at $\bar{r}$.

Hence, it will hold ρ fraction of this new deposit as reserve and lend out the rest to the central bank at $\bar{r}$. Therefore, the liabilities of the central bank will rise by $\big(1-(c+b)\big)\epsilon\left[\frac{\frac{1}{a}X^*}{1-(c+b)\epsilon}\right]=\frac{dH}{P_Y}\left[\frac{\epsilon(1-(c+b))}{1-(c+b)\epsilon}\right]$.This is how the adjustment will occur in the financial sector, when the initial amount of excess capacity in the industrial sector is sufficiently large. Similarly, the adjustment process of the other case can be carried out quite easily.

4.6 The Recently Passed Farm Laws and Food Security: Capitalists' Bid to Takeover Indian Agriculture

We will examine here how the recently passed Farm Laws are likely to affect India's food security. These laws constitute a part of the ongoing process of Economic Reforms in India, which has been undertaken by the Government of India since the adoption of the New Economic Policy in July 1991. Prior to that, India followed the Nehru-Mahalanobis strategy of economic development since 1955. Nehru-Mahalanobis programme was implemented through a series of Five Year Plans. The objective of the Nehru-MahalanobisProgramme was to achieve self-reliance, provide the poor with food, clothing and shelter at low prices and create a system of universal healthcare and education so that all the people could gain access to quality health care and education on the scale one requires or wants completely free of cost. Achieving self-reliance meant putting an end to India's dependence on imported goods for sustaining its production, consumption and investment. To achieve these goals, the government undertook a massive programme for developing India's industry and agriculture. It imposed stringent restrictions on production, investment, export, import and consumption of the private sector to stop leakages of scarce productive resources into uses that were not necessary for achieving the goals mentioned above. The government assumed the central role in the development programme and made most of the investments in both industry and agriculture. To develop agriculture, the government started investing heavily in major irrigation projects so that farmers in dry land areas were assured of adequate water supply. It also invested in drainage and flood control facilities in rain-fed areas to protect farmers' crop from being flooded. It also invested substantially in agricultural research and development to invent new varieties of seeds that had larger productivity relative to the traditional varieties of seeds. Agricultural production is a nature process and considerable time may elapse between the sowing and harvesting of a crop. At the time of sowing the crop, the farmers cannot know what price their crop will fetch at the time of harvest. This discourages farmers from undertaking production for the market. To remove this price uncertainty, the government undertook procurement operations for the major food grains. Under this operation, the farmers could sell to the government as much of their output as they wanted at a price called the procurement price. The government fixed the procurement price at a level that ensured for the farmers a satisfactory rate of profit and the government announced this procurement price much ahead of the sowing season. The government used the food procured for two purposes. It kept aside a part of it to build a buffer stock of food grains to tide over periods of poor

agricultural production due principally to adverse natural factors. It distributed the rest among the people at low prices, which were much less than the procurement price. It set up a public distribution system for this purpose. It also fixed the prices of all essential non-agricultural goods. To regulate prices of essential agricultural goods such as cereals, pulses, edible oils, potatoes, onions etc. the government passed Essential Commodities Act, which empowered the government to regulate the supplies of all these essential items by imposing ceilings on the stocks of these items that traders or processors of these items could hold. The objective of the New Economic Policy (NEP) is to put an end to all kinds of government interventions and regulations of the Nehru-Mahalanobis era. It seeks to sell-off all the government enterprises built during the Nehru-Mahalanobis era along with all the natural resources of the country to the capitalists. In sum, the objective of the NEP is to hand over the country to the capitalists so that they get to own almost all the capital and natural resources of the country and run and manage the country the way they want to. The NEP is being implemented through a series of economic reforms. The recently passed Farm Laws, a part of the ongoing process of reforms, seeks to hand over Indian agriculture to the capitalists. The three Farm Laws that have been passed in 2020 are the following: The Farmer Produce Trade and Commerce (Promotion and Facilitation) Act, 2020, The Farmers (Empowerment and Protection) Agreement and, finally, The Essential Commodities (Amendment) Act, 2020. In what follows, we will discuss these Acts one by one.

4.6.1 The Farmer Produce Trade and Commerce (Promotion and Facilitation) Act, 2020

This law establishes free market in agricultural produce. Previously, State Governments set up Agricultural Produce Market Committees (APMCs). Farmers could sell their produce and traders could buy farmers' produce only in the market yards designated for such transactions by the APMCs. These market yards are referred to as mandis. To ensure that the farmers get just prices for their produce and to preclude the possibility of cheating, traders could buy from the farmers their produce only in the mandis under the supervision of the State Governments. More importantly, to ensure that the farmers get just prices for their produce, the Food Corporation of India (FCI) or State Government Agencies on behalf of the FCI procured food grains from the mandis at pre-specified procurement prices (which are also referred to as minimum support prices or MSPs), which were fixed at remunerative levels and announced well ahead of the sowing of the crops to do away with the price uncertainties of the farmers. The farmers could sell as much as they wanted at the procurement prices. Even though FCI's procurement operations covered only major food grains, it effectively set a floor to the prices of other agricultural crops as well, since farmers to a considerable extent had the option of not producing other crops in their land if they were not assured of remunerative prices for them.This is because they could use their land only to produce those crops, which were covered by the government's procurement operations.

This Act stipulates that purchase and sale of framers' produce need not be confined to mandis. Traders can purchase farmers' produce from the farmers wherever they want. These purchases and sales can take place even on digital platforms. The question that immediately arises is why the government made this Act. Clearly, selling their produce outside mandis is highly risky for the farmers, as there is a strong possibility of cheating. Therefore, farmers will be willing to sell their produce outside mandis if and only if prices offered are sufficiently higher than the procurement price and these sufficiently higher prices have to be offered by traders who have substantial business goodwill. The question is why any trader of substantial business goodwill would buy farmers' produce outside mandis at such higher prices, when they can buy farmers' produce at much lower prices from the mandis only. Clearly, therefore, this Act will produce no effect on the purchase and sale of farmers' produce unless the government abolishes the mandis and stops its procurement opearations. Naturally, therefore, this Act has created the apprehension among the farmers and non-farmers alike that the real purpose of putting this Act in place is to enable the government to withdraw all its interventions in the market of farmers' produce, i.e. this Act creates opportunities for the government to abolish mandis and stop its procurement operations leaving the farmers at the mercy of the capitalists. Let us illustrate this point with an example. Given this Act, the giant corporations, who have substantial business goodwill, may devise several strategies to facilitate the withdrawal of government interventions in the market for farmers' produce. For example, they can in the initial years offer prices much higher than the procurement prices to lure the farmers away the mandis and the FCI. If this continues for some years, the government gets the excuse for abolishing the mandis and stopping its procurement operations. Once the government withdraws from the market for farmers' produce, the corporations become free to lower their offer prices to the farmers to the lowest possible levels. Once the mandis are abolished, opportunities for large scale cheating open up too. Most of the farmers are too poor to afford the cost of seeking redress in courts. Use of digital platforms may facilitate this process of cheating, as most of the farmers are illiterate or semi-literate and operations of digital trading platforms may be incomprehensible to them. In the absence of government protection, most of the farmers are likely to lose very substantially on account of both low prices and cheating. Most of them may be pushed to a situation where they find that they are not able to service their debts and they may have to sell off their land to pay off their debts. Thus, the real purpose of this Act is to set into motion a process that will make the farmers lose their land to the large corporations. Let us explain this statement in terms of our model. Focus on (3.6). The capitalists bent on grabbing the land of the farmers may make θ as small as possible. Through their hold over private and public financial institutions, the capitalists may make $r_0$quite high. This is how the capitalists may reduce $\bar{S}$ to the minimum possible level. This may drive the medium and small farmers to bankruptcy. Let us explain. For them $X = a.\left[\frac{\bar{S}+L_X}{P_Y}\right]$may fall below or just about equal its subsistence level. In such a scenario, they will not be able to service their debts nor will they be able to sustain production. They will have no option other than that of selling off their land to the capitalists and become landless workers. Even those farmers whose $\bar{S}$ is not that

small, may not be able to sustain production. The reason is the following. Adverse natural conditions occur quite often. As we have shown in the previous chapter, in times of natural calamities, outputs of farmers fall much below their normal levels and the outputs take quite a long period of time to gradually get back to their normal levels. Thus, in times of natural calamities, many relatively well-to-do farmers, in the absence of any relief from the government, may not be able to meet their subsistence requirements if they meet their debt service obligations. They may also be forced to sell off their land to the capitalists. The rest of the farmers may have to keep unused quite a large segment of their land. They may eventually consider it optimal to sell off their unused land. Thus, this Act paves the way for the capitalists to take over a substantial part of the farmers' land and start full-fledged capitalist farming.We, thus, get the following proposition:

Proposition 4.3: The Farmer Produce Trade and Commerce (Promotion and Facilitation) Act, 2020 paves the way for the capitalists to take over the land of the farmers and start full-fledged capitalist farming in India,

4.6.2 The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020

This Act creates a legal framework for contract farming in agriculture. Under this Act, a buyer and a farmer can enter into a written contract prior to the production or rearing of any farm produce for the delivery of an agricultural produce of a specific quality and standard at a specific time at a specific price. The buyer may also supply the farmers with all the different kinds of inputs. Before the time of the delivery, the buyer can assess whether the quality of the produce to be delivered meets the standard specified in the contract. He can hire the services of an expert agent for this purpose also. If the farm output does not come up to the contract-specified quality, the buyer can refuse to buy it.

The Act also specifies a dispute settlement mechanism. In case of any dispute, which the buyer and the farmer cannot settle between themselves, either party can apply to the Sub-Divisional Magistrate for the settlement of the dispute. The Sub-Divisional Magistrate will settle the dispute within thirty days. If either party is not satisfied with the verdict of the Sub-Divisional Magistrate, he can appeal to the Collector. The Collector will settle the dispute within thirty days. The Collector is the supreme authority for appeal. No party can move any court challenging the verdicts of the Collector or the Sub-Divisional Magistrate.

This Act is of considerable concern to us all. The reason is the following. Most of the farmers are fund-constrained. The paucity of the fund does not enable most of the farmers to fully utilize their land. This may lure the farmers into contract farming if the buyer provides them with all the necessary inputs on an adequate scale. However, since agriculture is a nature process, farmers cannot guarantee that the quality of the output will come up to a specific standard. Moreover, there is always the possibility that the expert agency appointed by the buyer for assessing the quality of the output may declare

it substandard on the basis of many fine criteria. In other words, the specification of quality in the contract opens up the possibility of cheating by the corporate buyers who are enormously mighty financially relative to the Indian farmers. If the buyer refuses to buy the farm produce on the ground that it is not of the contract-specified quality, the farmer will have to pay to the buyer all the costs he has incurred in providing the farmer with the necessary inputs. The farmer obviously will not be able to pay without selling off his land. This way this Act also facilitates transfer of land from the famers to the mighty corporations.

4.6.3 The Essential Commodities (Amendment) Act, 2020

This Act states that the government will not interfere with the supplies of essential food stuff such as cereals, pulses, onions, edible oil seeds, oils etc. except under extraordinary circumstances such as war, natural disaster, extraordinary price increase etc. The government will also not impose any ceiling on the amount of stock that traders or processors in farm produce hold as long as the stock held does not exceed the installed storage capacities of the traders and processors. This Act, therefore, enables the corporate sector to stock as much farm produce as they want by installing commensurately large storage capacities.

The objective of these acts is to pave the way for withdrawal of all kinds of government intervention in the production and distribution of agricultural produce and handover the agricultural sector to the giant corporations. We will examine below the implications of corporatization of Indian agriculture.

4.7 Corporatization of Indian Agriculture and Food Security

During the Nehru-Mahalanobis era, the government undertook procurement operations to remove price uncertainty of the farmers and ensure for them a remunerative rate of return. The government also subsidized inputs used in agriculture. A nation-wide network of public sector banks was set up covering even the remotest areas to provide the farmers with loans in adequate quantities. These banks were not profit-driven. They extended loans to farmers at low interest rates not to make profit but to make sure that farmers' all genuine credit needs were fully met. The objective of all these policies was to enable the farmers to fully utilize all their available land and infrastructure. Thus, we can reasonably argue, during the Nehru-Mahalanobis era, farmers could fully utilize their land and produce X^*. Under the New Economic Policy (NEP) adopted in July 1991 replacing the Nehru-Mahalanobis Strategy, economic reforms in the financial sector have made public sector banks profit driven. Efforts are now being made to hand them over to the corporate sector. The recently passed Farm Laws discussed above seek to establish free market in agriculture and hand it over to the corporate sector. How will it affect the well-being of the ordinary people in India? We will discuss that below:

With the establishment of the free market, all the protection given by the government to the farmers will be gone. Following the withdrawal of the procurement operations and

abolition of mandis, farmers with their perishable crop and no facility of storage and distribution will be completely at the mercy of the corporate traders who will buy farmers' produce at the lowest possible price. The banks will offer very small amounts of loans at high interest rates. As a result, farmers will not be able to fully utilize the land and infrastructure available to them. In this situation, the price they will receive and their resources and output will be given by the following equations derived in the previous chapter

$$\overline{P}_X = \frac{1}{a} P_Y \theta;\ \theta > 1 \tag{3.1}$$

$$S_t = \theta(1-\alpha)S_{t-1} + [\theta - (1+r_0)]L_x \tag{3.4}$$

$$X_t = a\frac{S_t}{P_Y} + a\frac{L_X}{P_Y} \tag{3.5}$$

$$\overline{S} = \frac{[\theta - (1+r_0)]L_X}{1-\theta(1-\alpha)} \tag{3.6}$$

$$\overline{X} = \frac{a}{P_Y}\left[\frac{[\theta - (1+r_0)]L_X}{1-\theta(1-\alpha)} + L_x\right] \tag{3.7}$$

Let us discuss the implications of establishment of free market in agriculture using (3.6) and (3.7). With the withdrawal of government's procurement operations and abolition of mandis, θ will fall substantially. With the financial sector reforms making banks profit driven, L_X will fall and r_0 will rise by large amounts. Finally, with the withdrawal of input subsidies, P_Y will rise sharply. Thus, as is clear from (3.6) and (3.7), both farmers' own fund and farmers' food output will fall drastically. This will drive many farmers to bankruptcy. They will not be able to repay their loans after meeting their subsistence requirement of food. They will be forced to sell off their land to the corporate sector. Moreover, periodic occurrence of adverse natural conditions not countered by any kind of government relief will also reduce food output of many farmers below the level that will allow them to subsist after paying off their debts. This will force these farmers to sell off their land to the capitalists to tide over the crises – see the discussion in section 3.6 in the previous chapter. Thus, we can safely assume that with the establishment of the free market, the farmers will lose all the land that they are unable to cultivate with the resources at their command to the corporate sector. Thus, farmers' output will fall from X^* to $\bar{X}$ given in (3.7). If we assume that farmers need 1 unit of labour to produce 1 unit of food and one farmer supplies one unit of labour in any given period, then employment of family labour will fall by the amount $(X^* - \bar{X})$ and, assuming that the total number of workers in farmers' families is X^*,their per capita food consumption will fall by $\frac{(1-\alpha)(X^*-\bar{X})}{X^*} = (1-\alpha)(1-\mu)$, where $\mu \equiv \frac{\bar{X}}{X^*}$. Let us now measure the extent of unemployment and land loss in farmer households following the establishment of free

market. Suppose farmer households initially had in their possession $\bar{L}$ amount of land. Now, $(1-\mu)X^*$ numbers of workers are unemployed and they have lost possession of $(1-\mu)\bar{L}$ amount of land to the corporate sector. The capitalists who own and run the corporations are enormously wealthy. They have many alternative uses of land. They can keep the land unused for long periods of time if profitable opportunities for using it do not crop up. They can use it for their own consumption as well. They can set up industries on the land. The point is that the capitalists will use the land for food production provided they get a minimum rate of return from it, which compensates for its not being used for other purposes. Given P_Y and other technological factors, rate of profit on agricultural production depends on P_X. Suppose the minimum P_X that induces capitalists to undertake food production is given by $\bar{P}_X$. Also suppose the amount of labour capitalists require per unit of food production is l_0, which is substantially less than unity. This is because the technology used by the capitalists is very highly capital intensive relative to that of the farmers. Denoting the amount of food produced by the corporate sector byX_c, the food sector equilibrium condition in the situation delineated above may be written as (see (4.11) and the discussion above it)

$$(1-\alpha)\bar{X} + X_c = \frac{WlY}{\bar{P}_X} + \frac{Wl_oX_c}{\bar{P}_X} \qquad (4.36)$$

Determination of the Food Output of the Corporate Sector

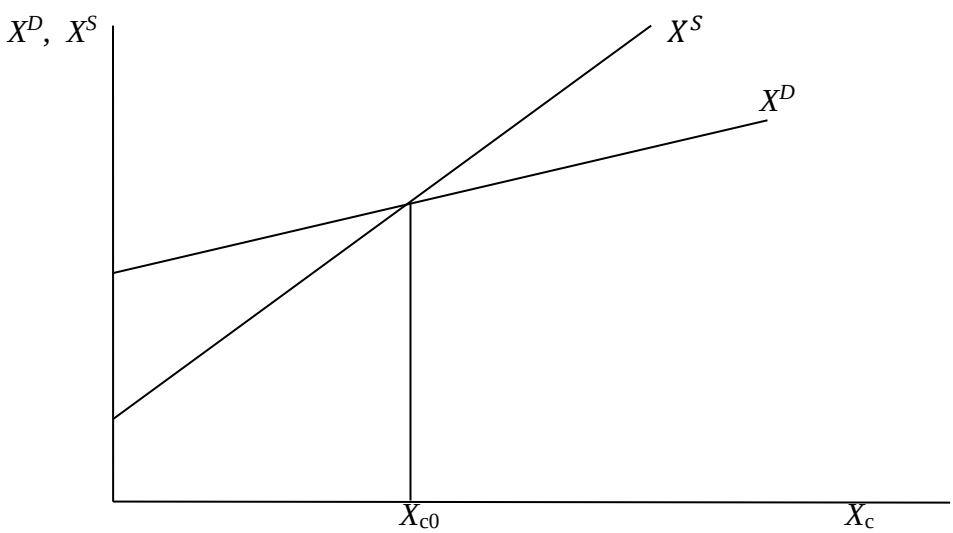

Figure 4.2

We assume in (4.36) that the members of the farmer households who find employment in the corporate sector spend the whole of their wage income on food. The justification of this assumption is that we consider it reasonable to assume that the major part of the unemployed workers in the farm sector consist of members of those households who have lost all their land to the capitalists following the establishment of the free market. They will be in desperate need for employment and compete very fiercely for jobs. They are likely to compete out those who have not lost all their land. In any case, even if we

had replaced this assumption with a more general one, our results would not have been affected.

Substituting (4.29) into the above equation, we get

$$(1-\alpha)\bar{X}+X_c=\frac{Wl\left[\frac{I(\bar{r})+\frac{1}{a}(\bar{X}+X_c)}{1-(c+b)\left(\frac{\gamma-1}{\gamma}\right)}\right]}{\bar{P}_X}+\frac{Wl_oX_c}{\bar{P}_X}=\left(\frac{Wl}{\bar{P}_X}\right).\left[\frac{I(\bar{r})+\frac{1}{a}\bar{X}}{1-(c+b)\left(\frac{\gamma-1}{\gamma}\right)}\right]+\left[\left(\frac{Wl}{\bar{P}_X}\right)\frac{\frac{1}{a}}{1-(c+b)\left(\frac{\gamma-1}{\gamma}\right)}+\left(\frac{Wl_o}{\bar{P}_X}\right)\right]X_c \quad (4.37)$$

We assume that the first term on the RHS, which gives demand for food that comes forth from the industry when $X_c = 0$ is larger than the first term on the LHS, which gives the supply of food to industry from the farmers. We further assume that the demand for food that is generated per unit of X_C, given by the coefficient of X_c on the RHS of (4.37), is less than unity. Given these assumptions, we can solve (4.37) for X_c. The solution is shown in Figure 4.2 where X_c is measured on the horizontal axis and the values of the LHS and RHS giving the values of food supply to industry and food demand from industry, respectively, are measured on the vertical axis. X^Dschedule and X^S schedule represent the LHS and the RHS of (4.37), respectively. The equilibrium X_c corresponds to the point of intersection of the two schedules.

From (4.37) it follows that, if $\bar{P}_X$ rises, the X^D schedule will shift downward, while the X^S schedule will remain unaffected. Hence, the equilibrium X_c will decline. Again, if *l* or l_o falls, the X^D schedule will shift downward, while the X^S schedule will remain unaffected. This will also lower the equilibrium value of X_c. The corporate sector in India is under the control of just a few capitalists. They are highly likely to be a united lot for the following reasons. They have to protect their enormous business empire, wealth and income from the masses and the government. To protect their enormous wealth and business empire from the masses and the government, they have to usurp State Power so that they have the legislature, executive and the judiciary completely under their control. This they do by setting up/taking over and running political parties. A political party requires a nation-wide network of workers and services of the media. To meet this requirement, an enormous amount of fund is needed. The larger the amount of fund at the disposal of a political party, the greater is its competitive strength. Hence, only the wealthiest of the people can set up and run political parties. The capitalists are by far the wealthiest of the people of the country. They have to have the State Power to protect and expand their business empire. Hence, they set up and run political parties just like their other business enterprises. Obviously, the capitalists, since they are just a handful in numbers, have to be united to achieve their purpose. If they are a divided lot and fight and compete among themselves, all of them will lose. Political parties, accordingly, work for the capitalists. Farm Laws obviously have been passed at the behest of the capitalists for their benefit at the expense of the farmers. Given the monopoly position of the capitalists, the profit rate of the corporate sector is likely to be

fairly high. This will make $\bar{P}_X$ quite high too. Thus, X_C will be quite small. Hence, unemployment in farmer households, given by$(1-\mu)X^* - l_o X_C$, will be quite large. They will also suffer from malnutrition and hunger. The data cited in Chapter 2 show that employment in the organized sector comprising principally the corporate sector and the public sector has been stagnant in the post reform period despite fairly high growth rate of its value added. Thus, labour saving technological and managerial changes must have been taking place in the organized sector at a rapid pace to keep employment stagnant. The major part of the unorganized sector produces substitutes of the products of the organized sector. Quite a large part of the rest of the unorganized sector supplies the organized sector with the services of low skilled workers, whom the organized sector no longer employs. With so much of farmers' land being available to the capitalists, opportunities open up to scale up their investment substantially. To make these investments profitable, they will use State Power and all other means that are at their disposal such as their control over finance, their financial might etc. to compete out the competing part of the unorganized sector and to bring in automation to obviate the needs of the low skilled workers. In short, the organized sector will gobble up the rest of the unorganized sector just the way they will swallow up Indian agriculture. The release of land from food production will facilitate that process. Thus, l and l_o will go on falling over time leading to growth in unemployment, poverty, hunger and malnutrition. We can summarize our finding in the form of the following proposition:

Proposition 4.4: Following the establishment of free market in agriculture and reforms in the financial sector that makes financial institutions profit driven, there will take place a drastic fall in the prices received by the farmers and the amount of loans they can secure and a steep rise in the interest rate on loans. These changes will lead to a very substantial fall in farmers' output. This coupled with periodic occurences of natural calamities will force most of the small and medium farmers to sell off all their land to the capitalists. This will turn them into landless workers. Given the very high rate of profit the capitalists are likely to enjoy in industry because of their tremendous market power, the minimum price of food that will induce them to cultivate will be very high. They are also likely to use highly capital intensive methods of cultivation. Under these conditions, capitalists are likely to use only a small part of the farmers' land that has come into their possession for cultivation gravely threatening food security of most of the Indians.

4.8 Conclusion

In the last chapter, we sought to explain why India's food security will be adversely affected under free market conditions. In this chapter, we first identify two more reasons why free market is likely to harm food security. First, food production is highly uncertain. Adverse natural conditions can damage the crop considerably. Moreover, a long time elapses between the sowing of a crop and its harvesting. Farmers cannot know what price will prevail at the time of harvesting the crop. Food crop is perishable. Farmers, as they are financially weak, do not have adequate storage space to store their crop for a long period of time. Hence, once the crop is harvested, the farmers have to sell

it off as early as possible. They have to meet their debt service charges from the sales revenue. The longer the delay in selling the crop, the larger are the debt service charges of the farmers. Moreover, any given crop is produced by a very large number of farmers. Hence, no individual farmer has any control over the total supply of the given crop. Thus, after the crop is harvested, the farmers cease to have any bargaining strength and are completely at the mercy of the traders. Thus, if the price they receive after the harvest is very low, they become bankrupt. The factors mentioned above make food production highly risky to the farmers. In any given period, the farmers have a given amount of their own fund, which they can utilize for food production. Alternatively, they can park it in a safe financial asset yielding a given interest rate. Again, the farmers can borrow at a given interest rate. How much they can borrow depends upon the collateral they can offer. Thus, in any given period, farmers' own fund plus the maximum amount of loan they can secure for food production give the total amount of fund at the disposal of the farmers for food production. We have argued in this chapter that the greater the uncertainty of food production, the smaller is the fraction of the farmers' fund the farmers will use for food production. The reason is simple. The larger the fraction of the fund the farmers use for food production, the larger is the expected income and, at the same time, the greater is the risk. Depending upon the farmers' preference over risk and return, the farmers choose what fraction of the fund to be utilized for food production. If uncertainty associated with food production goes up, the expected income from any give fraction of the given fund invested in food production will remain the same, but the risk associated with it will go up. This will induce the farmers, if they are risk averse, to invest a small fraction of the given fund in food production. Thus, under free market conditions, farmers may utilize only a small part of their given fund for food production. This will seriously aggravate the problem of underutilization of land and other resources the farmers have at their disposal for food production.

This study points to another reason why free market adversely affects food security. Farmers use large amounts of industrial intermediate inputs for food production. The corporate sector under the control of just a few capitalists supplies the farmers with these inputs. Our study shows that the capitalists may have a vested interest in raising the prices of their products at regular intervals. A hike in the prices of industrial products will reduce farmers' demand for these products. Hence, scarce productive resources will be released from the production of ingredients for food production. Capitalists, just a few in numbers, must be knowing this and they will raise their consumption and investment demand commensurately so that the scarce productive resources released from the production of wage goods get utilized to cater to their needs. Thus, by raising prices the capitalists are able to grab a larger amount of goods and services at the expenses of farmers and ordinary workers. We think that this is the only reason why prices rise all the time in capitalist countries. Data on inflation show that the rate of inflation has always been positive in every capitalist country every year.

The results derived in this chapter and the last one show that to ensure full utilization of land and infrastructure available for food production, i.e. to maximize food output in any

given short period, government intervention in the foods sector is absolutely essential. To achieve this task and to eliminate farmers' dependence on credit, the government should supply the farmers with industrial inputs at prices fixed at such low levels that the farmers are able to buy as much industrial input as they need to fully utilize their land and infrastructure with their own fund in the given period. To remove price uncertainty of the farmers, the government should buy up all the marketable surplus of the farmers at a price, which we will refer to as the procurement price. The procurement price should be fixed at such a level that the farmers' sales proceeds equal the amount of farmers' own fund in the given period. This will enable the farmers to maximize food production in the next period also provided the government keeps the price at which it supplies the industrial inputs fixed. Thus, if the procurement price and the price at which the government supplies industrial inputs are kept fixed at appropriate levels, farmers will be able to produce the potential level of food output period after period. To increase the potential level of food output, the government should invest heavily in infrastructure and research and development in the food sector. We have discussed the best way of doing it in detail in Chapter 2.

Let us now focus on the issue of distribution of the food procured by the government. The government should distribute it equally among the non-farmer population. Therefore, the government should fix a per capita quota of food by dividing the amount of food to be distributed by the number of non-farmer persons. We will call the price at which the food is distributed the ration price of food. The employed industrial workers spend all their income on food. They are assumed to be too poor to save or to consume non-essential items of consumption. Hence, the ration price of food should be fixed in such a manner that each of the industrial workers is able to buy with his income only the quota amount of food. Let us now focus on the issue of financing the food procurement cum distribution and input subsidization programme. Note that the farmers pay to the government their own fund in a given period for the industrial intermediate inputs they buy from the government. They again get back the same amount as revenue from the sale of the marketable surplus of food to the government. This part of the programme is, therefore, self-financed. The government, therefore, has to finance only the input subsidy. Let us now examine how the government can do it. Under the programme delineated above, the only sector that faces an expansion in demand is the industrial sector. This happens because output of food rises from a low level to its potential level. If the existing capacity in the industrial sector is large enough to accommodate the cumulative expansion in industrial output that this increase in demand gives rise to, the subsidy can be financed by borrowing from the RBI. In the other case, capitalists' income has to be taxed so that capitalists' consumption and investment demand go down to such an extent that the existing industrial capacity is able to fully accommodate the food policy induced increase in industrial output.

This chapter then focuses on the three recently passed Farm Laws and examines their implications in detail. The first of these three acts is called The Farmer Produce Trade and Commerce (Promotion and Facilitation) Act, 2020.This law establishes free market

in agricultural produce. Previously, State Governments set up Agricultural Produce Market Committees (APMCs). Farmers could sell their produce and traders could buy farmers' produce only in the market yards designated for such transactions by the APMCs. These market yards are referred to as mandis. To ensure that the farmers get just prices for their produce and to preclude the possibility of cheating, traders could buy from the farmers their produce only in the mandis under the supervision of the State Governments. More importantly, to ensure that the farmers get just prices for their produce, the Food Corporation of India (FCI) or State Government Agencies on behalf of the FCI procured food grains from the mandis at pre-specified procurement prices (which are also referred to as minimum support prices or MSPs), which were fixed at remunerative levels and announced well ahead of the sowing of the crops to do away with the price uncertainties of the farmers. The farmers could sell as much as they wanted at the procurement prices. Even though FCI's procurement operations cover only major food grains, it effectively sets a floor to the prices of other agricultural crops as well, since farmers to a considerable extent have the option of not producing other crops in their land if they are not assured of remunerative prices for them. This is because they can use their land only to produce those crops, which are covered by the government's procurement operations.

This Act stipulates that purchase and sale of framers' produce need not be confined to mandis. Traders can purchase farmers' produce from the farmers wherever they want. These purchases and sales can take place even on digital platforms. This Act enables the corporate sector to lure the farmers away from the mandis by offering them higher than the procurement prices initially. If this continues for a few years, the government will get the excuse to abolish the mandis and do away with its procurement operations. Once this happens, farmers with their perishable output and no storage facilities will be completely at the mercy of the mighty corporations. The corporate sector then will secure all the marketable surplus of the farmers at the lowest possible price.

The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020 is the second of the three Acts. This Act creates a legal framework for contract farming in agriculture. Under this Act, a buyer and a farmer can enter into a written contract prior to the production or rearing of any farm produce for the delivery of an agricultural produce of a specific quality and standard at a specific time at a specific price. The buyer may also supply the farmers with all the different kinds of inputs. Before the time of the delivery, the buyer can assess whether the quality of the produce to be delivered meets the standard specified in the contract. He can hire the services of an expert agent for this purpose also. If the farm output does not come up to the contract-specified quality, the buyer can refuse to buy it.

This Act is of considerable concern to us all. The reason is the following. Most of the farmers are fund-constrained. The paucity of the fund does not enable most of the farmers to fully utilize their land. This may lure the farmers into contract farming if the buyer provides them with all the necessary inputs on an adequate scale. However, since

agriculture is a nature process, farmers cannot guarantee that the quality of the output will come up to a specific standard. Moreover, there is always the possibility that the expert agency appointed by the buyer for assessing the quality of the output may declare it substandard on the basis of many fine criteria. In other words, the specification of quality in the contract opens up the possibility of cheating by the corporate buyers who are enormously mighty financially relative to the Indian farmers. If the buyer refuses to buy the farm produce on the ground that it is not of the contract-specified quality, the farmer will have to pay to the buyer all the costs he has incurred in providing the farmer with the necessary inputs. The farmer obviously will not be able to pay without selling off his land. This way this Act also facilitates transfer of land from the famers to the mighty corporations.

The third of the three acts, The Essential Commodities (Amendment) Act, 2020, states that the government will not interfere with the supplies of essential food stuff such as cereals, pulses, onions, edible oilseeds, oils etc. except under extraordinary circumstances such as war, natural disaster, extraordinary price increase etc. The government will also not impose any ceiling on the amount of stock that traders or processors in farm produce hold as long as the stock held does not exceed the installed storage capacities of the traders and processors. This Act, therefore, enables the corporate sector to stock as much farm produce as they want by installing commensurately large storage capacities.

The objective of these acts is to pave the way for withdrawal of all kinds of government intervention in the production and distribution of agricultural produce and handover the agricultural sector to the giant corporations. This chapter has examined the implications of corporatization of Indian agriculture along with those of withdrawal of input subsidies from the farm sector and the financial sector reforms that have made banks and other financial institutions profit driven. With the withdrawal of government's procurement operations and subsidization of farm inputs, there will take place drastic fall in the prices received by farmers for their marketable surplus of food. Input prices will also rise steeply. At the same time, the financial sector reforms that have made the banks and other financial institutions profit-driven will lead to a large fall in the amount of loan the farmers are able to secure and a steep rise in the interest rates they face. All these changes, as our study shows, will lead to a drastic fall in farmers' output of food. This is likely to drive small and medium farmers to bankruptcy. They will not be able to pay off their debt service charges after meeting their subsistence requirement of food. Their unpaid debt service charges will accumulate and they will be forced to sell off their land to pay off their debts. Our study also shows that periodic occurences of natural calamities, without any government relief, will also force many of the farmers to sell off their land for survival. Thus, the major part of the farmers' land will pass on to the corporate sector. Thus, per capita food consumption will fall drastically and unemployment rate will rise sharply in the farmer households, a large section of which is likely to become landless on account of the three Farm Laws. This chapter also studies how the corporate sector will use the farmers' land that has come into its possession.

Given the high degree of monopoly power enjoyed by the corporate sector, its profit rate in the non-food sector may be quite high. It may not consider farming profitable unless profit rate is as high as in the non-food sector. Given the technology and the prices of industrial inputs, profit rate in the food sector as faced by the corporate sector depends upon the price at which it sells food. They may not take to farming unless this price is sufficiently high. It will also use highly capital intensive method of farming. Given the highly capital intensive methods of production used in the non-food sector and the corporate food sector, food output has to be quite small to make the market price of food as high as the corporate sector requires. Thus, it is highly likely that the corporate sector will use for food production just a small segment of the farmers' land that has gone into their possession. Therefore, this chapter concludes that corporatization of Indian agriculture will gravely threaten India's food security and raise unemployment and poverty manifold much to the misery and suffering of the common man.

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Chapter 5

Conclusion: Summary of the Main Results of the Thesis

5.1 Introduction

The objective this Ph.D. thesis is to examine the issues of unemployment and food security in India. For this purpose it develops models incorporating the relevant salient features of the Indian economy. These models belong to the tradition set by Keynes (1936), Kalecki(1954) and structuralist writers such as Rakshit (1982), Taylor (1983), Bose (1989) et al. The thesis has three core chapters: Chapters 2, 3 and 4. Chapter 2 addresses the problem of unemployment in India, while the other two chapters focus on the issue of food security in India. We summarize the main results of these three chapters below.

5.2 Chapter 2: High Growth and Stagnant Employment in India

The objective of this chapter is to examine how a decline in the share of the organized sector workers in the output of the organized sector is likely to impact the growth rates of outputs of the organized sector and the unorganized sector. It also seeks to suggest strategies for generating employment in India. The reason why we consider this endeavor worthwhile may be delineated as follows. In the post-reform period, the organized sector has grown at a high rate without generating any employment. In 2004-5, it employed only about 6 percent of the total work force and contributed about half of the GDP. Given the steady high growth rate of output of the organized sector and the complete stagnation in its level of employment, the unit labour requirement has gone down steadily and rapidly. Obviously, this has been brought about by labour saving technological and managerial changes taking place in the organized sector. As should be the purpose of labour saving technological and managerial changes, the shares of workers of the organized sector in its output must have gone down along with the unit labour requirement of production even though money wage rate may have increased. A prima facie evidence of this phenomenon is given by the data of Table 2.7 of Chapter 2, which show that the share of wage income in the net value added in the organized manufacturing sector has steadily declined during the period under consideration. This phenomenon of a secular decline in the share of workers' income in the GVA of the organized manufacturing sector in India is quite well documented in the literature (see, for example, Abraham and Sasikumar (2017) and Kapoor (2016)). The objective of this chapter is to examine the implications of the decline in the shares of skilled and unskilled workers in the organized sector's output on the output levels or the growth rates of the organized and the unorganized sector using a macro model suitable for India. It also seeks to suggest policies that may generate employment in both the sectors. ILO(2009) has made an attempt at suggesting a strategy for generating employment in India. It has recommended massive investments in sectors, which are naturally employment intensive. However, it has not derived its strategy from a macro-theoretic model. Hence, it has left

the issue of the problem of financing of the required massive investments unexplored. Nor has it examined the issue of the possible conflict between the goal of employment generation and that of providing the masses with the basic necessities of life in adequate quantities at affordable prices.

5.2.1 The Model

The model is developed in line with the tradition set forth by Keynes (1936), Kalecki (1954) and the structuralist writers such as Rakshit (1982), Taylor (1983), Bose (1989) et al. The economy is divided into two sectors: the organized sector and the unorganized sector. The output of the former is denoted by *Y*. The organized sector is assumed to be an oligopoly. Following Kalecki (1954), it is assumed that producers fix their prices by applying a fixed mark-up to the average variable cost of production and they adjust their output to meet the demand that comes forth at the prices set. However, for simplicity and without any loss of generality, we assume that the price of Y , denoted P, is fixed and it is equal to unity.Had we made *P* an increasing function of the average variable cost of production, our results would have been stronger. Y is demanded for consumption by the workers of the organized sector, the capitalists (producers of Y) and the government. It is also used for purposes of investment and for export. Investment demand and capitalists' and government's consumption demand represent demand not only for Y but also for foreign good. The unorganized sector also uses Y as an intermediate input in its production.

In this model, C_{Wy} denotes organized sector workers' fixed average and marginal propensity to consume Y, *w* is the money wage rate of the organized sector workers which is, as standard in the Keynesian tradition or Keynes-Kalecki tradition, assumed to be fixed in the short run. l_y is the unit labour requirement (measured in terms of labour hours) to produce a unit of *Y* and L_0 is the amount of labour time given by each worker in the given period. Hence, the number of workers needed to produce *Y* is given by $\frac{l_y Y}{L_0}$. Assuming the wage payment to every organized sector worker to be *w* in the given period of time under consideration, total wage payment to labour is $w.\frac{l_y Y}{L_0}$, which is also the real wage income of the organized sector workers, since the price of the organized sector output denoted by *P* is assumed to be equal to unity. (Note that the expansion in Y is accompanied by labourswing technological changes so that employment in the organized sector remains fixed. However, here we assume that the process of changes in Y and the process of labour saving technological changes are independent of one another and regard the latter process as exogenous. Hence, we treat l_y as an exogenous variable and do not make it dependent on Y.)

Workers pay taxes at the rate t_w on their income. $c_{Wy}.\left[w\frac{l_y}{L_0}(1-t_w)\right]$ is the total consumption demand of the workers for the output of the organized sector and its foreign substitutes. (Since most of the workers are poor, we assume for simplicity and without any loss of generality that it represents demand for the output of only the domestic organized sector). After wage payments, the residue accrues to the producers (whom we refer to as capitalists) as profit, as we have disregarded other factor payments for simplicity, i.e., we have assumed outstanding debt of the capitalists to the workers to be zero for simplicity. This does not matter, as the outstanding debt of the capitalists to the workers is fixed in the short period under consideration. So, the income of the capitalists is $\left[Y-w\frac{l_yY}{L_0}\right]$ and if they pay tax at the rate *t* on their income, their disposable income is $\left[Y-w\frac{l_yY}{L_0}\right](1-t)$. Therefore, their total consumption demand for *Y* is $C_C.\left[Y-w\frac{l_yY}{L_0}\right](1-t)$, where C_c is the fixed average and marginal propensity to consume of the producers of Y. We assume that quite a large part of it represents demand for foreign goods. Hence, we have made net export (denoted NX) a decreasing function of capitalists' consumption demand. For the same reason, NX is made a decreasing function of investment (I) and government consumption (G).The other determinants of net export are the real exchange rate $\frac{P^*e}{P}$, where P^* and *e* denote the price of foreign goods in foreign currency and the exchange rate, respectively, and foreign GDP, which we denote byY^*.

Aggregate investment demand is decomposed into two components: $I(\bar{r},e)$ and $I^A(\bar{r},\overline{K})$, which give investment demands of the organized and the unorganized sectors, respectively. Both these investment demands are made decreasing functions of the interest rate denoted r. The RBI through open market operations, liquidity adjustment facility and other means seek to keep r at a target level. Hence, we treat r as RBI's policy variable here and assume it to be given at $\bar{r}$. The organized sector's investment is also made a decreasing function of the exchange rate, denoted *e*, for the following reason. India's production and investment are highly import intensive. This point may be illustrated using the following example. Think of the import intensity of teaching economics in India. All the text books used are foreign. All the journals referred to are foreign. All the computers and software used are imported. This is true not only of economics but also of all other subjects. Thus, India is completely dependent on the US and Western Europe for knowledge and technology. Hence, to sustain its production and investment, India has to import on a large scale. Given the price of foreign goods in foreign currency, an increase in the exchange rate makes prices of foreign capital goods higher in domestic currency. This, given investors' expectations, reduces profitability of

investment and, thereby, lowers it. Let us now explain why I^A is an increasing function of $\overline{K}$, which denotes the stock of infrastructure capital available in the unorganized sector. Land usage can be increased with investments in agriculture which include investments in irrigation, electrification, flood control facilities, improvement in rural connectivity, land reclamation, agricultural research etc. This kind of investment is land augmenting as it enhances the usage of the same plot of land in a year and enables usage of more land for purposes of production. The infrastructure capital in the unorganized sector is denoted by K. The amount of land available to the unorganized sector is an increasing function of K. As K is given in the short run, we denote it by $\overline{K}$. As an increase in $\overline{K}$ makes possible greater number of cropping on the same plot of land or cultivation of new land leading to larger levels of production and income, it induces (and also makes it possible by relaxing the credit and thereby the resource constraint for) the unorganized sector's producers to undertake larger amount of complementary investment.

m denotes the fixed intermediate input requirement per unit of the unorganized sector output. Therefore, total intermediate input requirement of the unorganized sector is given by *mA*, where *A* is the total output of the unorganized sector. The unorganized sector has to buy these intermediate inputs from the organized sector.

The Unorganized Sector

The output of the unorganized sector is denoted by *A*. In what follows we shall seek to identify the factors that determine supply of and demand for *A*.

Supply of *A*

The unorganized sector is comprised of small rural and urban enterprises but the most dominant segment of this sector is agriculture. This sector absorbs most of the unskilled workers of the country. Its production function is fixed coefficient and the output of this sector is denoted by A which is produced with land, labour, capital and intermediate inputs bought from the organized sector. The stocks of land and capital used in the unorganized sector are given. In contrast with the tradition set by structuralist writers such as Rakshit (1982), Taylor (1983) et al., we have assumed the production function to be fixed coefficient even in agriculture for analytical simplicity. This assumption will not affect our results qualitatively. This assumption helps us capture in a simple way the fact that how much of the fixed amount of land and capital the producers in the unorganized sector can utilize depends crucially on the resources they have in their command to purchase intermediate inputs from the organized sector and labour.

As most of the producers of the unorganized sector are financially weak and, therefore, subject to severe credit constraint, their purchasing power depends crucially on the relative price of their output in terms of the goods produced in the organized sector given

by $\frac{P_A}{P}$, where P_A denotes price of the output of the unorganized sector. A ceteris paribus increase in $\frac{P_A}{P}$ enables the producers of the unorganized sector to purchase more intermediate inputs from the organized sector and labour and, thereby, allows them to bring more land under production in agriculture and, in general, to produce more. (This is possible in case of agriculture because of multiple cropping within a given period). Therefore, the supply of output of the unorganized sector is an increasing function of ($\frac{P_A}{P}$).

For reasons we have already specified, supply of A should be an increasing function of $\overline{K}$.

Most of the production in the unorganized sector is carried out with the help of family labour and the unorganized sector workers also supplement their income by working outside their family firms in relatively larger firms that use both family labour and hired labour. There also exists large scale surplus labour in the unorganized sector. Hence, given everything else, if the government provides employment at the wage prevailing in the unorganized sector through employment guarantee schemes, it will augment unorganized sector's producers' income enabling them to buy more intermediate inputs from the organized sector and, thereby, bring more land under cultivation in agriculture, make greater utilization of capital in the non-agricultural enterprises and, in general, produce more. Let l_g be the total amount of employment generated in the unorganized sector through various government employment guarantee schemes. Hence, the supply of A is an increasing function of l_g as well.

Demand for *A*

The unorganized sector supplies principally the mass consumption goods, which belong to the category of necessities. So demand for *A* of the capitalists and large landlords is likely to be fixed and, therefore, is ignored here for simplicity. The demand for *A* mainly comes from the organized sector workers and unorganized sector workers who do not have any family enterprises. For simplicity we assume that the latter spend all their income on *A*, while the former spend a fraction C_{wA} of their income on *A*.

The producers of the unorganized sector produce as much as they can with the resources they have at their disposal for purchasing intermediate inputs and labour and sell off their output at whatever prices they can do it. Individual producers do not have any control over either the aggregate output or the price. The price of *A* is, therefore, market clearing. The unorganized sector, accordingly, is in equilibrium when supply of *A* and demand for *A* become equal.

We have also ignored foreign trade in the output of the unorganized sector for simplicity.

The Foreign Exchange Market:

The BOP consists of trade surplus and net inflow of foreign capital. The latter is assumed to be exogenously given for simplicity. From the data of exchange rate it seems reasonable to assume that India has a flexible exchange rate regime. Hence, the external sector is in equilibrium when the BOP is zero.

5.2.2 Effect of a decline in the share of the organized sector workers in the output of the organized sector measured by $\frac{wl_y}{L_0}$

Using the model delineated above, we have carried out a few comparative static exercises. We have first focused on how a decline in the share of the organized sector workers in the output of the organized sector is likely to affect Y and A. We have derived the following result:

Proposition 2.1: Following a fall in the share of the organized sector workers in the output of the organized sector due to technological and managerial changes, if import intensity of consumption of the capitalists and the exchange rate sensitivity of investment are sufficiently large, conditions that are highly likely to be satisfied in reality in India, both *Y* and *A* will contract. Thus, growth rates of both Y and A will contract under the conditions specified above.

In what follows, we will try to explain the intuition of this result. Following a fall in the share of the workers in the output of the organized sector, their consumption demand for the domestic organized sector's output goes down, while capitalists' consumption demand increases. However, the major part of the latter, if not the whole of it, is likely to represent demand for imported goods. Hence, at the initial equilibrium (Y, P_A, e), consumption demand for the domestic organized sector's output is likely to go down. On the other hand, the increase in consumption demand for imported goods creates a BOP deficit inducing a rise in *e*. The increase in *e* is unlikely to produce much of an impact on the real exchange rate, as the rise in *e* is likely to substantially raise *P*, since India's production is highly import intensive. (To avoid analytical complications, we have not made *P* an increasing function of *e*). In India, the rise in the exchange rate improves net export principally through its dampening impact on investment, which lowers demand for not only domestic investment goods but also imported capital goods. Thus, at the initial equilibrium (Y, P_A), there is likely to emerge a large excess supply of *Y* in countries like India. The decline in the workers' income in the organized sector also reduces demand for unorganized sector's output creating an excess supply of *A* at the initial equilibrium (Y, P_A). Thus, P_A will fall reducing *A* and, thereby, contributing to the excess supply of *Y*. *Y*, will, therefore, also begin to decline. P_A, *A* and *Y* will,

accordingly, go on falling until the new equilibrium is reached. The above discussion yields Proposition 2.1.

Let us explain in brief why a fall in the values of Y and A indicates a decline in the growth rates of Y and A. The purpose of the kind of static macro models presented here is to explain the actual short period growth rates and inflation rates. The model represents an economy in a given period. Output and price levels of the previous period are given and known in the period under consideration. Hence, determination of the output and price level in the given period amounts to determination of the growth rate of output and the inflation rate from the previous period to the given period. Thus, our model states that, given everything else, following a decline in the organized sector's workers' share in the organized sector's output, growth rates of Y and A would be less than what they otherwise would have been. One can see in this context Romer (2000, 2012). More precisely, this model identifies the rate of growth in the share of the organized sector's workers in the output of the organized sector as an important determinant of the growth rates of Y and A and the rate of inflation in P_A. The growth rates of Y and A and the rate of inflation in P_A have been found to be increasing functions of the rate of growth in the shares of the organized sector workers in the organized sector's output.

5.2.3 The Effect of an Increase in $\overline{K}$

The organized sector employed only 6 percent of the workforce in 2004-05 in India and it grew since then without generating any employment. The labour force, however, grew at the rate of almost 3 percent during 1999-2000 – 2004-2005 (see Tables 2.3, 2.4 and 2.5 of Chapter 2). There is no reason to suppose that these trends have changed much since then. Therefore, one can safely presume that almost all the workforce is employed in the unorganized sector. Therefore, the government should strive to step up the growth rate of the unorganized sector to provide everyone with gainful employment. We, therefore, examine here the impact that a given increase in $\overline{K}$ produces on Y and A. Our analysis yields the following proposition:

Proposition 2.2: An increase in $\overline{K}$ in the unorganized sector will bring about an increase in the growth rates of outputs of both the sectors and increase employment levels in both the sectors.

The intuition of the result may be explained as follows. An increase in $\overline{K}$ consists in, for example, electrification of new areas, expansion of irrigation, flood control facilities, larger scale of activities in R&D that yields better seeds, farming practices, better implements etc. Therefore, an increase in $\overline{K}$ induces the unorganized sector's producers to undertake complementary private investment, for example, in new electric connections, implements etc. Import intensities of these investments in India are practically nil. The increase in infrastructure capital enables the farmers and other producers, who are not resource constrained, to bring more land under production and, thereby, produce more A and demand more intermediate inputs from the organized

sector. Thus, at the initial equilibrium Y, P_A and *e*, there emerges excess supply of *A* and excess demand for *Y*. P_A will fall to restore equilibrium in the A-sector. As P_A falls, supply of *A* falls, while demand for *A* rises (see (2.4). Hence, equilibrium in the A-sector will be restored at a higher level of *A*. Thus, even at this lower P_A, there will still exist excess demand for *Y* at the initial equilibrium *Y*. Hence, *Y* will expand raising demand for *A*. Thus, *Y*, P_A and *A* will go on rising until the new equilibrium is reached.

Since more than 95 percent of the work force is engaged in the unorganized sector, as follows from our above discussion, raising $\overline{K}$ is the most important way of generating employment.

5.2.4 The Effect of an Increase in G to Raise $\overline{K}$ Financed by Taxing Capitalists' Income

We examine here the impact that an increase in G to raise $\overline{K}$ financed by taxing capitalists' income will produce on Y, A and P_A. The result we get is the following:

Proposition 2.3 : If the government raises *G* and finances it by taxing capitalists' income, growth rates of both the sectors will go up if marginal propensity to spend on imports of the capitalists is larger than that of the government expenditure on $\overline{K}$, a condition which is highly likely to be satisfied in India. Employment in both the sectors will increase too under the same condition.

The intuition of the above result may be briefly stated as follows. Following an increase in *G* by *dG* financed by taxation of capitalists' income, aggregate demand for *Y* at the initial equilibrium (Y, P_A, e) will go up by $(1-C_c)dG$. However, the increase in *G* will be partly spent on imported goods lowering net export, (*NX*),by $NX_G dG$. On the other hand, the decline in capitalists' consumption will also reduce their demand for imported consumption goods raising net export by $-NX_{cc}C_c.dG$, where $-NX_{cc}$, which measure the amount of increase in capitalists' demand for imported consumption goods per unit increase in their consumption demand, is the import intensity of capitalists' consumption and $-NX_{cc}C_c$ is the capitalists' marginal propensity to spend on imports. It measures the increase in capitalists' demand for imported consumption goods per unit increase in capitalists' income. Since the capitalists constitute a small class of extremely rich people and since India is technologically backward, import intensity of capitalists' consumption may be reasonably taken to be unity. On the other hand, government spending on irrigation, drainage, flood control facilities etc. will be mostly on domestic products. Only the high-tech products will be imported. Moreover, the government can design its spending in such a manner that its import intensity is reduced to the minimum. For all these reasons, net export in the net is likely to rise lowering *e*. The fall in *e* will raise investment demand. Thus, at the initial equilibrium (Y, P_A), in all likelihood, there will emerge an excess demand for *Y* inducing the producers of *Y* to raise *Y*. The increase

in *Y* will create an excess demand for *A* leading to a rise in both P_A and *A*. This is how *Y*, P_A and *A* are highly likely to go on rising until the new equilibrium is reached. This explains proposition 2.3.

5.2.5 Effect of an Increase in G to raise $\overline{K}$ Financed by Means of Indirect Taxation

We will examine here the impact of an increase in G to raise $\overline{K}$ financed by raising indirect tax collection. The analysis yields the following result:

Proposition 2.4: If the government raises *G* and finances it with indirect tax revenue, it is highly likely to reduce output and employment levels in both the organized and the unorganized sectors.

The intuition of the result may be explained as follows. Government raises *G* and finances it by raising indirect tax collection. The additional indirect tax revenue comes from both the workers of the organized sector and the capitalists. Since marginal propensity to consume the output of the organized sector of both these classes of people is less than unity, demand for *Y*, at the initial equilibrium Y, e and P_A, goes up. This will have its repercussions in the foreign currency market. A part of the additional government spending may be made on imported goods, while capitalists' demand for imported goods will fall. However, the major impact will come from the hike in the indirect tax rate and the increase in the price of *Y* that it brings about. As close substitutes of Indian products are available everywhere, this price rise will substantially reduce net export and in the net produce a large BOP deficit sending the exchange rate soaring. The increase in the exchange rate will have insignificant impact on the real exchange rate in India. This is because production in India is highly import intensive and a rise in the exchange rate by raising the cost of production will raise the domestic price level substantially. However, it will also make foreign capital goods costlier. This will reduce investment demand in India significantly as India's investment is highly import intensive. Therefore, the rise in the exchange rate will equilibrate the foreign currency market mainly by reducing investment demand. The rise in the price of *Y* will also reduce supply of *A* and create an excess demand in the A-market at the initial equilibrium P_A and Y. P_A will rise to equilibrate the A-market. However, a rise in P_A not only raises supply of *A* but also lowers demand for *A*. Hence, in the new equilibrium in the unorganized sector, *A* will be less, with Y remaining unchanged at its initial equilibrium value. This will also lower demand for *Y* coming from the *A* sector. Thus, in the net, demand for *Y* is likely to fall creating an excess supply of *Y* at the initial equilibrium *Y*. *Y* will therefore fall to equilibrate the *Y*-sector. However, the fall in *Y* will reduce government's indirect tax collection inducing it to hike indirect tax rate further. This will again, through the process described above, will lower *I* and *A* and bring about a further contraction in *Y*. This process of contraction in *Y* and *A* will continue until the new equilibrium is reached. This explains Proposition 2.4.

5.2.6 Summary of Chapter 2

The organized sector in India, which contributes about half of India's GDP, grew at a high rate in the post-reform period without generating any employment. In 2004-05, it employed only about 5 percent of the labour force. In all likelihood, the fraction of the labour force employed in the organized sector is falling rapidly since then. For generating employment, therefore, one has to turn to the unorganized sector, which employs most of the labour force. This chapter shows that, if the government augments the stock of infrastructure capital in the unorganized sector, employment in both the sectors will go up. If the government raises its investment in the infrastructure of the unorganized sector and finances it by taxing the capitalists' income, employment and output in both the sectors are highly likely to go up. If, however, the government finances its investment by hiking indirect tax rates, employment and output in both the sectors are highly likely to contract.

5.3. Chapter 3: Food Security in India under Free Market Conditions: A Macro-Theoretic Study

Food security is an important aspect of economic development in all the countries of the world. The ranking of India in the Global Hunger Index (2019) is 102 among 117 countries. This underscores very strongly the extremely poor performance of Indian economy relative to the others economies of the world in combating hunger. The data on per capita net availability of food grains in India also give evidential support to this. Table 3.1 in Chapter 3 shows that per capita net availability of food grains (per annum) in India has declined from 186.2 kg per year to 180.1 kg per year from 1991 to 2019. It reveals a food crisis in Indian economy. The National Crime Records Bureau (NCRB) report for 2016 (NCRB(2016)) and the Government of India(2016) report underscore the country's grim agrarian crisis by revealing a high number of suicides of Indian farmers. Adoption of the New Economic Policy (NEP) in 1991 and constant monitoring by WTO since then has eroded the autonomy of the government in pursuing development policies regarding agriculture starting from input subsidy to the procurement program. This chapter seeks to show how free play of market forces endangers food security of most of the Indians.

Literature Review

The existing literature points to four important features of Indian agriculture: (i) preponderance of small and marginal farmers who own and cultivate 85% of total agricultural land holdings and account for 40 percent of aggregate marketable surplus (NABARD(2020)), (ii) low prices received by farmers (Ahangar(2013) , Abishek (2016), Mitra&Mookherjee et al. (2018))), (iii) inadequate supply of formal credit ((Mohan (2006) ,Golait (2007),Government of India(2014)), (iv) decline in public investment in agriculture in the post-reform period (Mishra (2006), Godaraet. al.(2014)). Along with this, some studies have raised the issue of indebtedness of the farmers and farmers' suicide (Mishra (2006), Jeromi (2007), Sadanandan(2014)) in the context of Indian

agriculture. There is, however, no theoretical study that incorporates all these major features of Indian agriculture and examines how India is likely to perform in the sphere of food security under free market conditions. The objective of the present chapter is precisely this.

5.3.1 The Basic Model

We have developed here a macro model which focuses principally on the food producing sector of the economy. Here we abstract from foreign trade in food for simplicity. We shall explore the implications of foreign trade in food in our future research. We have incorporated in this model all the relevant salient features of Indian agriculture delineated above.

Food sector

The output of this sector is denoted by X. Production of food requires land, labour and industrial intermediate inputs. The farmers have a given amount of land and it is assumed for simplicity that sharecropping is the mode of cultivation for large landowners. Other farmers cultivate their own land with family labour. Sharecroppers also carry out cultivation using family labour. For simplicity hired labour is ignored. The producers require "1/a" amount of industrial intermediate inputs to produce 1 unit of X. The assumption of fixed coefficient production function is a simple way of capturing the fact that how much food the farmers can produce depends crucially on how much industrial intermediate inputs they are able to buy. Given the preponderance of small and marginal farmers in the food sector, it may be quite realistic to assume that production of X is constrained by the availability of credit from the financial sector as the producers of this sector have very limited resources of their own to buy the essential inputs of production.

Farmers and sharecroppers cultivate land with family labour and keep α fraction of the total output for self-consumption. It is assumed that they consume only X. As their real income increases, their consumption also increases. So their consumption is an increasing function of X which in the simplest form is given by αX here. Hence, the marketable surplus of X becomes (1-α)X. In keeping with reality (see Mitra et al.(2018)), we assume that the farmers do not sell their produce directly to the consumers. Instead they sell their produce to the middlemen who are in all likelihood the representatives of the corporate sector. They are enormously mighty financially. The farmers most of whom are small and marginal have a perishable crop to sell after harvest and they have no storage facility of their own. All these factors make the bargaining strength of the middlemen infinitely large relative to the farmers. Accordingly, the middlemen offer the farmers the minimum possible price, denoted by $\overline{P}_X$, at which the farmers are willing to sell their marketable surplus.

Let us explain how $\bar{P}_X$ is determined. First, consider the non-food producing sector, which constitutes the rest of the economy. We will refer to it as the industrial sector. We denote by Y the output of the industrial goods produced by the industrial sector and P_Y denotes the price of Y. $1/a$ units of Y is required as intermediate inputs to produce 1 unit

of X. So the average variable cost of production of X is $\frac{1}{a}P_Y$. Since farmers on the average do not have any bargaining strength vis-à-vis the middlemen, the middlemen, a la Kalecki (1954) set $\bar{P}_X$ by applying the minimum possible mark-up to this average variable cost of production. This mark-up, denoted by θ, is taken to be exogenously given, and $\theta > 1$.

Given the preponderance of small and marginal farmers in India and given their woefully limited purchasing power, to capture, hopefully, a crucial aspect of Indian reality, we assume that food output is constrained by the amount of industrial intermediate inputs the farmers can purchase. The amount of own fund the farmers have in their possession is denoted by S. Using S, they can produce $a\frac{S}{P_Y}$ amount of X and the revenue of the farmers from S, denoted R_S, is given by $R_S = \bar{P}_X.a\frac{S}{P_Y}(1-\alpha) = \frac{1}{a}P_Y\theta.a\frac{S}{P_Y}(1-\alpha) = \theta(1-\alpha)S$. In addition to their own fund, the farmers also borrow from both formal and informal credit markets. Given the lending norms of the lenders and the amount of collateral the farmers can offer, they get at the beginning of every period a fixed amount of loan from the lenders, which we denote by L_x . They use L_x to buy industrial intermediate inputs to produce X. They use a part of the sales proceeds from the sale of the output they produce with loan to pay off their outstanding debt along with interest at the end of every given period. They can use the rest either to augment their own consumption or to save in order to increase their own fund of the next period or for both. For simplicity, we assume that they use the rest of the sales proceeds to save to augment their own fund in the next period. We denote the amount of net revenue the farmers get from the sale of X produced with loan after paying back the loan along with interest by R_L. It is given by $R_L = \bar{P}_X a\frac{L_X}{P_Y} - (1+r_0)L_X = \theta\frac{1}{a}P_Y a\frac{L_X}{P_Y} - (1+r_0)L_X = [\theta - (1+r_0)]L_X$. r_0 denotes the interest rate on the outstanding loans of the farmers. We shall explain it shortly. We assume that $[\theta - (1+r_0)] > 0$ because otherwise the farmers will not borrow. The sum of R_S and R_L constitutes farmers' own fund in the next period. Therefore, denoting farmers' own funds in periods t – 1 and t by S_{t-1} and S_t, respectively, we get equation (3.4) of Chapter 3:

$$S_t = \theta(1-\alpha)S_{t-1} + [\theta - (1+r_0)]L_x \tag{3.4}$$

The RBI regulates interest rates in the formal credit markets. Moneylenders in the informal credit market fix their interest rates by applying fixed mark-ups to the formal lending rates. These mark-ups cover their transactions cost, profit margin and risk premia. The smaller a farmer, the higher the interest rate he faces. We denote the average interest rate faced by farmers by r_0. We take it to be given. We can solve (3.4) for the

steady state value of S. We assume $\theta(1-\alpha)$ to be less than unity for the sake of existence of a meaningful steady state and for its stability.

The output of food in period t is given by eq.(3.5) of Chapter 3. It is reproduced below:

$$X_t = a\frac{S_t}{P_Y} + a\frac{L_X}{P_Y} \tag{3.5}$$

Substituting the steady state value of S in (3.5), we can derive the steady state value of X.

Determination of the Steady State Values of S and X

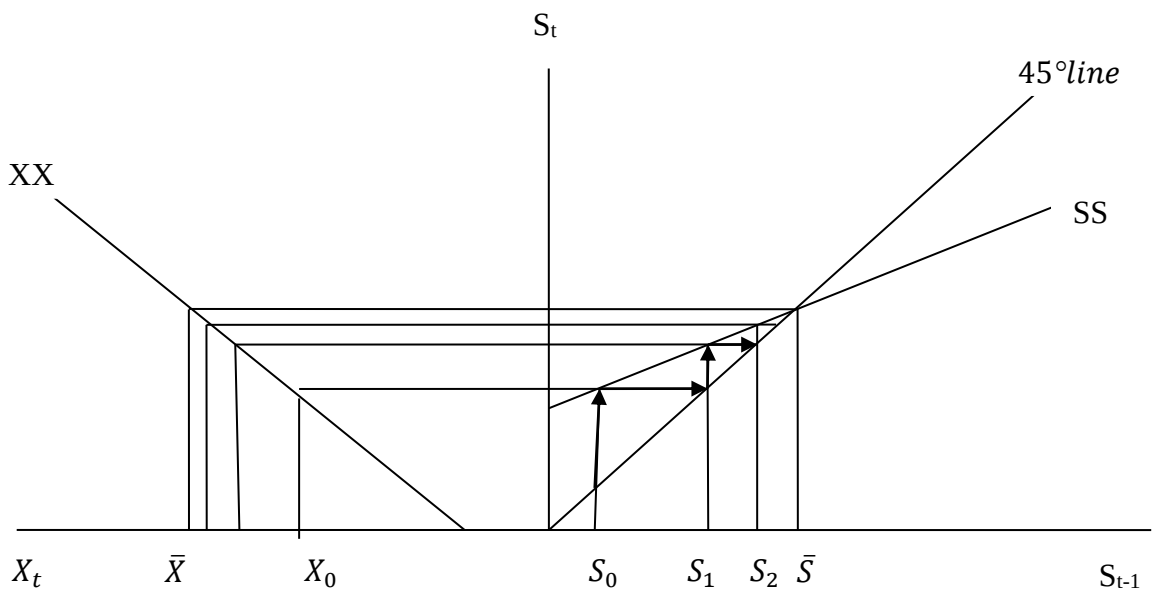

Figure 3.1

Following Kalecki(1954), we assume that the industrial sector is an oligopoly and producers fix P_Y by applying a fixed mark-up to the average variable cost of production. The only variable input that is used in production is labour. Labour requirement per unit of Y and the money wage rate in industry, as standard, are assumed to be fixed. Hence, P_Y is fixed in (3.5).

The steady state value of S, denoted $\bar{S}$, as follows from equation (3.4), is given by eq.(3.6) of Chapter 3.

$$\bar{S} = \frac{[\theta - (1+r_0)]L_X}{1-\theta(1-\alpha)} \tag{3.6}$$

Substituting (3.6) into (3.5), we get the steady state value of *X*, denoted $\bar{X}$. It is given by eq.(3.7) of Chapter 3.

$$\bar{X} = \frac{a}{P_Y}\left[\frac{[\theta - (1+r_0)]L_X}{1-\theta(1-\alpha)} + L_x\right] \tag{3.7}$$

The derivation of the steady state values of S and X are illustrated graphically in Figure 3.1.The right-side panel of Figure 3.1 shows the steady state value of S whereas the left-side panel shows that of X. In the right-side panel the SS curve represents equation (3.4) in the (S_{t-1},S_t) plane. The steady state value of S, denoted by $\bar{S}$, is given by the point of intersection of SS and the 45^0 line.

5.3.2 Results Derived

We will report here the major results this chapter has derived. Eq. (3.7) yields most of the major results of the chapter. Indian food sector is dominated by the small and marginal farmers. On the other hand, the traders are highly likely to be the representatives of the capitalists or the corporate sector. Farmers' crop is perishable and they have no storage facility. Hence, their bargaining strength is nil vis-à-vis the traders. In the absence of any kind of government support, therefore, θ will be at the lowest possible level. From (3.7)and also from (3.4) and Figure 3.1, we find that a fall in θ will bring about a cumulative decline in $\bar{X}$. Accordingly, the value of θ pushed to the lowest possible level will reduce food output to a very low level.

In a free market, financial institutions are profit driven. During the Nehru-Mahalanobis era, financial institutions in India were social organisations. All the interest rates were administered by the government and the planners dictated the credit disbursal pattern. Thus, financial institutions had to lend to the farmers at very low interest rates as much credit as was necessary to enable the farmers to maximize food output by fully utilizing their land and the available infrastructure. However, following the adoption of the New Economic Policy (NEP) in July 1991 replacing the Nehru-MahalanobisProgramme, the financial institutions of India have become profit driven commercial organizations. They consider it extremely risky to lend to the small and marginal farmers because of their low credit worthiness and also because of the uncertainties associated with production and price of food. Under free market conditions, therefore, the farmers are likely to get substantially inadequate amount of loan at high interest rates. It follows from (3.7) and also from (3.4) and Figure 3.1, that a fall in L_X and a rise in r_0 will lead to a large and cumulative fall in food output.

During the Nehru-Mahalanobis era, the government heavily subsidized industrial intermediate inputs purchased by farmers. Under the NEP, the farmers have to buy these inputs from the corporate sector which has tremendous monopoly power. Hence, P_Y is likely to be quite high under free market condition that the NEP seeks to establish. From (3.7)and also from (3.4) and Figure 3.1, it is also clear that a given rise in P_Y will lead to a large and cumulative decline in food output. The conclusion that these results yield is that under free market conditions food output in India is likely to be quite small relative

to its potential or maximum possible level, given the land and infrastructure available to the farmers.

This chapter also examines the impact of a onetime loan waiver and that of a onetime adverse natural shock. We explain them below:

Loan waiver

We have delineated above the kind of terrible exploitation and deprivation farmers are subject to in India under the NEP. They often take to the streets to draw the attention of the government and the people to their plight. They demand government intervention to ensure that they get just prices for their produce, cushion against uncertainties, adequate infrastructure and adequate loans on reasonable terms. Political parties in India often recommend loan waiver to give relief to the farmers. We examine here what kind of impact a one-time loan waiver is likely to produce on the farmers' economic condition and India's food security.

The Impact of a Loan Waiver

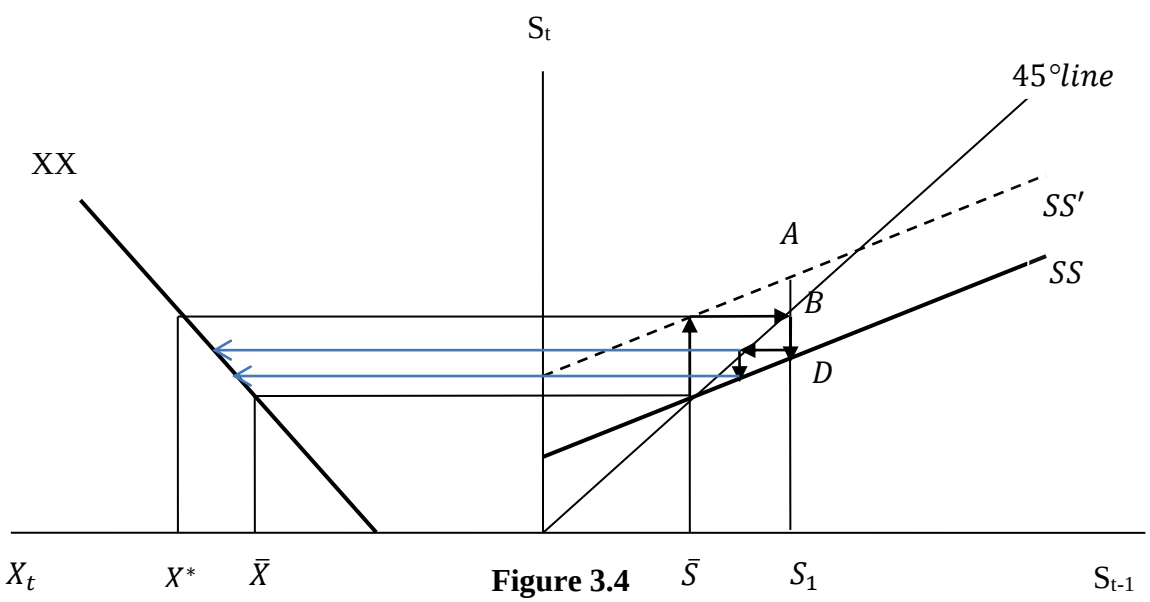

Figure 3.4

Suppose in a given period, period 0, $L_X(1+r_0)$ is waived. This waiver is applicable to period 0 only. We shall examine its impact using Figure 3.4 of Chapter 3, where SS represents equation (3.4). With $L_X(1+r_0)=0$, SS, as follows from (3.4) shifts upward by $L_X(1+r_0)$. The new SS is labeled SS/.

In period 1, however, SS' moves back to SS, since the loan waiver here, as is usually the case, a one-time programme. The XX schedule, however, as follows from (3.5), remains unaffected. Suppose in period 0, the economy was in the steady state with $S_0=\bar{S}$. In period 0, there is loan waiver and the farmers' saving of $L_X(1+r_0)$ on account of the loan waiver will be added to their own fund in period 1. In period 1, therefore, S will increase from $\bar{S}$ by $L_X(1+r_0)$ and X by $L_X(1+r_0).(a/P_Y)$ from $\bar{X}$ to X^* - see (3.5). However, from period 2 onward S and along with it X will go on falling until they become equal to $\bar{S}$

and $\bar{X}$ again. The time paths of S and X are shown in Figure 3.4 with arrows. Thus, a one-time loan waiver will raise X only temporarily.

Adverse Natural Shock

Food production to a considerable extent depends on the state of nature in India where there is a huge deficiency in infrastructural facilities to combat natural adversities. The scenario has become all the more depressing on account of the drastic decline in public investment in infrastructure in the post-reform period(Mishra (2006), Godara et. al.(2014)). An adverse natural shock drastically reduces food output corresponding to any given stocks of land, infrastructure and the amount of intermediate inputs used. Outputs of many of the small and marginal farmers become so low that they have to use a larger fraction of the outputs for self-consumption for survival. We incorporate the following modifications to capture the impact of natural adversities. We assume that the average productivity of the industrial inputs instead of being *a* is*aN*, where *N* represents the state of nature. It is unity when the state of nature is normal and the worse the state of nature, the smaller is the value it assumes. Similarly, the fraction of food output kept for self-consumption is now (α / N)instead of being α .It is now reasonable to rewrite the price setting rule as eq.(3.14) of Chapter 3, since the average variable cost of production is $\frac{1}{aN}$.

$$\bar{P}_X = \frac{1}{aN} P_Y \theta \qquad (3.14)$$

The Impact of a One-Period Adverse Natural Shock

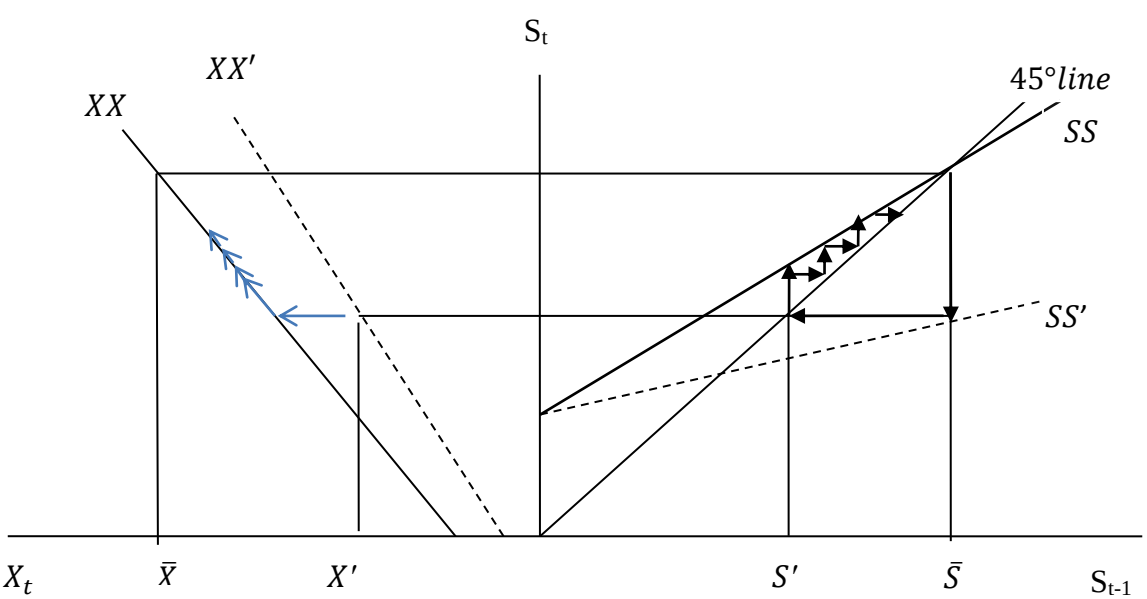

Figure 3.5

Let us explain (3.14) in detail. N is less than unity when nature is worse than normal. *N* is greater than unity when nature is better than normal. In (3.14), we adhere to the

principle that the traders apply a fixed mark-up to the average variable cost of production to determine the price they offer to the farmers. They take into account the value of *N*, while computing the average variable cost of production. Thus, in times of adverse natural shock that depresses output below its normal level, traders' offer price becomes higher than its normal level and conversely. To induce farmers to undertake production for the market, they should be assured of some minimum profit. To ensure that, the traders have to take into account the value of N for computing the average variable cost of production and they have to fix θ in such a manner that this condition is fulfilled.

Incorporating all the changes noted above in (3.4) and (3.5), we get eq. (3.15) of Chapter 3:

$$S_t = (1-\frac{\alpha}{N})\theta.S_{t-1} + [\theta - (1+r_0)]L_X \qquad (3.15)$$

Note that the revenue from the sale of marketable surplus of food produced with farmers' own fund is $\overline{P}_X\left(1-\frac{\alpha}{N}\right)\frac{S_{t-1}}{P_Y}aN = \theta\left(1-\frac{\alpha}{N}\right)S_{t-1}$. Again, net revenue from the sale of food produced with loan is given by $\overline{P}_X\frac{L_X}{P_Y}aN - (1+r_0)L_X = [\theta-(1+r_0)]L_X$. This explains (3.15).The food output as follows from equation (3.5) now becomes eq. (3.16) of Chapter 3.

$$X_t = aN\frac{S_t}{P_Y} + aN\frac{L_X}{P_Y} \qquad (3.16)$$

The impact of a one-period fall in N

Let us examine the impact of a one-period fall in *N* from unity on the production of food and farmers' economic condition. We shall do this with the help of Figure 3.5 of Chapter 3, where the SS schedule in the first quadrant represents (3.15), for *N* = 1. The XX schedule in the second quadrant represents (3.16), with *N* = 1. Let us now examine how these schedules will shift following a decline in *N* by *dN*< 0. Let us focus on the SS schedule first. Deterioration in the state of nature in period 0, captured by a fall in *N* by *dN*from one, will keep the vertical intercept of SS unchanged, but reduce its slope by $\frac{\alpha\theta}{N^2}dN$. Hence, SS will rotate downward. The new SS schedule is labeled SS$^{/}$. Focus now on XX. Both its horizontal intercept and slope become smaller. It, therefore, shifts to the left and become steeper. The new XX is labeled XX$^{/}$. If the shock lasts only for one period, in the next period, both SS and XX will move back to their old positions. We shall now describe how S and X will behave over time following a one-period adverse natural shock. Suppose initially the economy was in steady state with $S = \overline{S}$ and $X = \overline{X}$, respectively. Also suppose that the one-time adverse natural shock occurs in period 0

lowering X in period zero to $X^{/}$ – see Figure 3.5. As a result, *S* in period 1 will fall to $S^{/}$ - See Figure 3.5. From the next period, period 2, however, S and X will start rising back towards their initial steady state values as shown by the arrows in Figure 3.5.

The above analysis points to one reason why farmers commit suicide in India. Following a significant adverse natural shock, many farmers' food output goes much below the subsistence level leaving them hungry. Since it will take long for food output to move back to its initial level, many farmers being unable to bear the pain of hunger may commit suicide. The larger the preponderance of small and marginal farmers, the greater is likely to be the incidence of farmer suicide following a significant adverse natural shock.

It is also clear from the above analysis that the deleterious impact of an adverse natural shock may be mitigated though a policy of loan waiver. One can easily work out that through a policy of loan waiver along with suitable amount of transfers to farmers for the purpose of enabling them to increase purchases of industrial intermediate inputs, it may be possible to restore food output to its initial steady state level in the period just next to the one in which the adverse natural shock occurs.

5.3.3 Summary of the Results Derived in Chapter 3

The analysis of this chapter shows that the food security of the common man in India is gravely threatened under free market conditions. In a free market, farmers' bargaining strength is nil vis-a-vis the traders. Hence, the farmers will get for their produce the lowest possible price. In a free market, financial institutions are profit driven. As most of the arable land in India is cultivated by the small and marginal farmers who have very little to offer by way of collateral, they are likely to get a very small amount of loan at very high interest rates. Farmers also have to buy industrial intermediate inputs from the corporate sector. As the corporate sector has tremendous monopoly power, the prices of industrial intermediate inputs are likely to be fairly high. For all these reasons quite a large part of the land and infrastructure available to the farmers may remain unutilized gravely threatening the food security of the ordinary people. This study also shows that a onetime loan waiver for the farmers increases food output and improves farmers' well-being only temporarily. It does not produce a permanent impact. Finally, the study yields the result that a onetime adverse natural shock may depress food output and farmers' well-being below their respective normal levels for quite some time. This may force many farmers to starve and commit suicide.

5.4 Chapter 4: Government Intervention and Food Security: Need and Nature

In the previous chapter, we examined the issue of food security under free market conditions. We pointed to several reasons why free market conditions will gravely threaten India's food security causing immense misery to the farmers and the poor. In this chapter, we point to two more factors that adversely affect food security in a free market. The factors we identify here are first, the uncertainty associated with production

and price of food and second, the behavior of the corporate sector, which, because of its monopoly power, finds it optimal to regularly hike prices of industrial intermediate inputs used in food production. The studies undertaken in this chapter and the last one show that free market forces will lead to large scale underutilization of the available land and infrastructure in the food sector. These studies point to the urgency of appropriate government's policies for maximizing food output through full utilization of the land and infrastructure of the food sector. This chapter seeks to derive these policies. It also seeks to derive the policy that the government should adopt to distribute the surplus food output of the food sector among the non-farmer people equitably. It, then, examines the implications of the recently passed three Farm Laws and concludes that the objective of these laws is to hand over Indian agriculture to the corporate sector. It, then, proceeds to examine the implications of corporatization of Indian agriculture. The importance of the issues considered here can hardly be overemphasized. The endeavour is worthwhile because the issues considered here are examined in a rigorous theoretical framework, which we hope capture all the relevant salient features of India. Such a study, to the best of our knowledge, does not exist in the literature.

Let us briefly state the major results derived in this chapter. It first focuses on the uncertainty associated with price and production of food. Food production is highly uncertain. Adverse natural conditions can damage the crop considerably. Moreover, a long time elapses between the sowing of a crop and its harvesting. Farmers cannot know what price will prevail at the time of harvesting of the crop. Food crop is perishable. Farmers, as they are financially weak, do not have adequate storage space to store their crop for a long period of time. Hence, once the crop is harvested, the farmers have to sell it off as early as possible. They have to meet their debt service charges from the sales revenue. The longer the delay in selling the crop, the larger are the debt service charges of the farmers. Moreover, any given crop is produced by a very large number of farmers. Hence, no individual farmer has any control over the total supply of the given crop. Thus, after the crop is harvested, the farmers cease to have any bargaining strength and are completely at the mercy of the traders. Thus, if the price they receive after the harvest is very low, they become bankrupt. The factors mentioned above make food production highly risky to the farmers. In any given period, the farmers have a given amount of their own fund, which they can utilize for food production. Alternatively, they can park it in a safe financial asset yielding a given interest rate. Again, the farmers can borrow at a given interest rate. How much they can borrow depends upon the collateral they can offer. Thus, in any given period, farmers' own fund plus the maximum amount of loan they can secure for food production give the total amount of fund at the disposal of the farmers for food production. We have argued in this chapter that the greater the uncertainty of food production, the smaller is the fraction of the farmers' fund the farmers will use for food production. This study points to another reason why free market adversely affects food security. Farmers use large amounts of industrial intermediate inputs for food production. The corporate sector under the control of just a few capitalists supplies the farmers with these inputs. Our study shows that the capitalists may have a vested interest in raising the prices of their products at regular intervals. A

hike in the prices of industrial products will reduce farmers' demand for their products. Hence, scarce productive resources will be released from production of ingredients for food production. Capitalists, just a few in numbers, must be knowing this and they will raise their consumption and investment demand commensurately so that the scarce productive resources released from the production of food (wage goods) get utilized to cater to their needs. Thus, by raising prices the capitalists are able to grab a larger amount of goods and services at the expenses of farmers and ordinary workers. We think that this is the only reason why prices rise all the time in capitalist countries. Data on inflation show that the rate of inflation has always been positive in every capitalist country every year.

The results derived in this chapter and the last one show that to ensure full utilization of land and infrastructure available for food production, i.e. to maximize food output, government intervention in the foods sector is absolutely essential. The study in this chapter shows that to achieve this task and to eliminate farmers' dependence on credit, the government should supply the farmers with industrial inputs at prices fixed at such low levels that the farmers are able to buy as much industrial input as they need to fully utilize their land and infrastructure with their own fund in the given period. To remove price uncertainty of the farmers, the government should buy up all the marketable surplus of the farmers at a price, which we will refer to as the procurement price. The procurement price should be fixed at such a level that the farmers' sales proceeds equal the amount of farmers' own fund in the given period. This will enable the farmers to maximize food production in the next period also provided the government keeps the price at which it supplies the industrial inputs fixed. Thus, if the procurement price and the price at which the government supplies industrial inputs are kept fixed, farmers will be able to produce the potential level of food output period after period. To increase the potential level of food output, the government should invest heavily in infrastructure and research and development in the food sector. We have discussed the best way of doing it in detail in Chapter 2.

Let us now focus on the issue of distribution of the food procured by the government. The government should distribute it equally among the non-farmer population. Therefore, the government should fix a per capita quota of food by dividing the amount of food to be distributed by the number of non-farmer persons. We will call the price at which the food is distributed the ration price of food. The employed industrial workers spend all their income on food. They are assumed to be too poor to save or to consume non-essential items of consumption. Hence, the ration price of food should be fixed in such a manner that each of the industrial workers is able to buy with his income only the quota amount of food. Let us now focus on the issue of financing the food procurement cum distribution and input subsidization programme. Note that the farmers pay to the government their own fund in a given period for the industrial intermediate inputs they buy from the government. They again get back the same amount as revenue from the sale of the marketable surplus of food to the government. This part of the programme is, therefore, self-financed. The government, therefore, has to finance only the input

subsidy. Let us now examine how the government can do it. Under the programme delineated above, the only sector that faces an expansion in demand is the industrial sector. This happens because output of food rises from a low level to its potential level. If the existing capacity in the industrial sector is large enough to accommodate the cumulative expansion in industrial output that this increase in demand gives rise to, the subsidy can be financed by borrowing from the RBI. In the other case, capitalists' income has to be taxed so that capitalists' consumption and investment demand go down to such an extent that the existing industrial capacity is able to fully accommodate the food policy induced increase in demand for industrial output.

This chapter then focuses on the three recently passed Farm Laws and examines their implications in detail. The first of these three acts is called The Farmer Produce Trade and Commerce (Promotion and Facilitation) Act, 2020.This law establishes free market in agricultural produce. Previously, State Governments set up Agricultural Produce Market Committees (APMCs). Farmers could sell their produce and traders could buy farmers' produce only in the market yards designated for such transactions by the APMCs. These market yards are referred to as mandis. To ensure that the farmers get just prices for their produce and to preclude the possibility of cheating, traders could buy from the farmers their produce only in the mandis under the supervision of the State Governments. More importantly, to ensure that the farmers get just prices for their produce, the Food Corporation of India (FCI) or State Government Agencies on behalf of the FCI procured food grains from the mandis at pre-specified procurement prices (which are also referred to as minimum support prices or MSPs), which were fixed at remunerative levels and announced well ahead of the sowing of the crops to do away with the price uncertainties of the farmers. The farmers could sell as much as they wanted at the procurement prices. Even though FCI's procurement operations cover only major food grains, it effectively sets a floor to the prices of other agricultural crops as well, since farmers to a considerable extent have the option of not producing other crops in their land if they are not assured of remunerative prices for them. This is because they can use their land only to produce those crops, which are covered by the government's procurement operations.

This Act stipulates that purchase and sale of framers' produce need not be confined to mandis. Traders can purchase farmers' produce from the farmers wherever they want. These purchases and sales can take place even on digital platforms. This Act enables the corporate sector to lure the farmers away from the mandis by offering them higher than the procurement prices initially. If this continues for a few years, the government will get the excuse to abolish the mandis and do away with its procurement operations. Once this happens, farmers with their perishable output and no storage facilities will be completely at the mercy of the mighty corporations. The corporate sector then will secure all the marketable surplus of the farmers at the lowest possible price.

The Farmers (Empowerment and Protection) Agreement on Price Assurance and Farm Services Act, 2020 is the second of the three Acts. This Act creates a legal framework for

contract farming in agriculture. Under this Act, a buyer and a farmer can enter into a written contract prior to the production or rearing of any farm produce for the delivery of an agricultural produce of a specific quality and standard at a specific time at a specific price. The buyer may also supply the farmers with all the different kinds of inputs. Before the time of the delivery, the buyer can assess whether the quality of the produce to be delivered meets the standard specified in the contract. He can hire the services of an expert agent for this purpose also. If the farm output does not come up to the contract-specified quality, the buyer can refuse to buy it.

This Act is of considerable concern to us all. The reason is the following. Most of the farmers are fund-constrained. The paucity of the fund does not enable most of the farmers to fully utilize their land. This may lure the farmers into contract farming if the buyer provides them with all the necessary inputs on an adequate scale. However, since agriculture is a nature process, farmers cannot guarantee that the quality of the output will come up to a specific standard. Moreover, there is always the possibility that the expert agency appointed by the buyer for assessing the quality of the output may declare it substandard on the basis of many fine criteria. In other words, the specification of quality in the contract opens up the possibility of cheating by the corporate buyers who are enormously mighty financially relative to the Indian farmers. If the buyer refuses to buy the farm produce on the ground that it is not of the contract-specified quality, the farmer will have to pay to the buyer all the costs he has incurred in providing the farmer with the necessary inputs. The farmer obviously will not be able to pay without selling off his land. This way this Act also facilitates transfer of land from the famers to the mighty corporations.

The third of the three acts, The Essential Commodities (Amendment) Act, 2020, states that the government will not interfere with the supplies of essential food stuff such as cereals, pulses, onions, edible oilseeds, oils etc. except under extraordinary circumstances such as war, natural disaster, extraordinary price increase etc. The government will also not impose any ceiling on the amount of stock that traders or processors in farm produce hold as long as the stock held does not exceed the installed storage capacities of the traders and processors. This Act, therefore, enables the corporate sector to stock as much farm produce as they want by installing commensurately large storage capacities.

The objective of these acts is to pave the way for withdrawal of all kinds of government intervention in the production and distribution of agricultural produce and handover the agricultural sector to the giant corporations. This chapter has examined the implications of corporatization of Indian agriculture along with those of withdrawal of input subsidies from the farm sector and the financial sector reforms that have made banks and other financial institutions profit driven. With the withdrawal of government's procurement operations and subsidization of farm inputs, there will take place drastic fall in the prices received by farmers for their marketable surplus of food. Input prices will also rise steeply. At the same time, the financial sector reforms that have made the banks and

other financial institutions profit-driven will lead to a large fall in the amount of loan the farmers are able to secure and a steep rise in the interest rates they face. All these changes, as our study in the last chapter shows, will lead to a drastic fall in farmers' output of food. This is likely to drive small and medium farmers to bankruptcy. They will not be able to pay off their debt service charges after meeting their subsistence requirement of food. Their unpaid debt service charges will accumulate and they will be forced to sell off their land to pay off their debts. Our study also shows that periodic occurences of natural calamities, without any government relief, will also force many of the farmers to sell off their land for survival. Thus, the major part of the farmers' land will pass on to the corporate sector. Thus, per capita food consumption will fall drastically and unemployment rate will rise sharply in the farmer households, a large section of which is likely to become landless on account of the three Farm Laws. This chapter also studies how the corporate sector will use the farmers' land that has come into its possession. Given the high degree of monopoly power enjoyed by the corporate sector, its profit rate in the non-food sector may be quite high. It may not consider farming profitable unless profit rate is as high as in the non-food sector. Given the technology and the prices of industrial inputs, profit rate in the food sector as faced by the corporate sector depends upon the price at which it sells food. They may not take to farming unless this price is sufficiently high. It will also use highly capital intensive method of farming. Given the highly capital intensive methods of production used in the non-food sector and the corporate food sector, food output has to be quite small to make the market price of food as high as the corporate sector requires. Thus, it is highly likely that the corporate sector will use for food production just a small segment of the farmers' land that has gone into their possession.Therefore, this chapter concludes that corporatization of Indian agriculture will gravely threaten India's food security and raise unemployment and poverty manifold much to the misery and suffering of the common man.

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