AGRICULTURAL DEVELOPMENT, MARKETED SURPLUS AND PRICE OF FOODGRAINS IN INDIAN ECONOMY

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THESIS SUBMITTED
IN
FULFILMENT OF THE REQUIREMENT FOR
THE DEGREE OF DOCTOR OF PHILOSOPHY
IN
ECONOMICS

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SHILONG,
MEGHALAYA (INDIA)
SEPTEMBER 1993

1.0 Introduction

1.1 Development and Growth

The term 'economic development' is used interchangeably with such terms as economic growth and economic progress. But the economists draw technical distinctions among these three concepts. However, all the three terms have one common parameter and that is 'change'. Change can also be of two types: desirable and undesirable. Expansion in the values of a large variety of variables such as output, employment, etc. is generally considered to be desirable, while a decrease in their values is regarded as undesirable. Naturally, progress, development and growth all are related to the desirable changes in such variables as income, consumption, investment, employment, etc.. But the values of the variables like output and income depend upon the quality and the quantity of the factor inputs and the techniques that are used in the production processes.

The growth of output may occur through a variety of processes : the growth process may be of factor multiplication variety or it may be of factor transformation type (Barewald, F. 1969). Under the factor multiplication process, increases in output may result from the increases in the quantities of the factor inputs of the given quality used in the production processes based on the prevalent techniques of production. Obviously, the output per unit of

factor inputs does not change, and the number and nature of inputs used also remain invariant through time. Such growth processes tend to be constrained by the upper bounds of resource supplies, especially the sources of non-renewable and natural variety. This we may call economic progress. As this process is constrained by supply bottlenecks, the scope of rise in output is limited, and the growth process may not be sustained over long periods. In the first process, quantitative expansion in both the inputs and the outputs takes place without altering the organisational and institutional set up and the technological inter-relations between inputs and output. As against this, under the factor transformation process, output may be raised by using the same quantity of given inputs of superior quality. Use of better techniques of production often leads to an improvement in the quality of factor inputs and their productivities. Technological changes may also warrant the use of new factor inputs which may lead to the quantitative augmentation and qualitative transformation of the conventional inputs hitherto used in the production processes. In all these cases, output per unit of factor inputs used in the production process tends to rise. As against the first process, the second process is associated with the qualititative transformation of the factor inputs as a result of which the given inputs

yield more output per unit of factor inputs used in the production process.

The developing economies have the advantage that the superior techniques they need have already been developed and exploited commercially by the developed economies of the West. So the developing economies may choose one or more techniques from the available stock which are more efficient and superior to the ones that are being currently used. The borrowed techniques have, however, to be adopted and adapted to the local conditions. Besides, the induction of such techniques and new products often necessitate changes in the institutional, organisational and even social structure. Consequently, the resultant changes tend to be all embracing and all pervading. Such expansion in output/income may be defined as economic development (Bhatia, V.G. 1967). However, the developed countries have no such advantage. The superior technique has to be first developed by them through their own R and D and then it has to be adopted for commercial exploitation., But the induction of new technology does not require introduction of all pervasive and comprehensive changes in their socio-economic structures. This process may be defined as economic growth. We have used the terms growth and development in the second sense. But the actual growth process may not be of a pure variety, it may be a mixture of various processes.

1.2 Importance of Agricultural Sector

The primary sector occupies the central place in the developing economies and their regional units in which it generates the highest proportion of output and absorbs the greatest proportion of the labour force. The explosive growth of population and the relatively limited size of the secondary and tertiary sectors of these economies dictate that either the non-agricultural sector should grow at such high rates as are warranted by the growth of the labour force or the ever rowing numbers of job seekers flocking to the labour markets will continue to be accommodated and absorbed in the primary sector in general and agriculture in particular. But the modern secondary and tertiary sectors of these economies are relatively capital intensive whereas the primary sector in general and the agriculture in particular is relatively labour intensive which enables the primary sector to generate relatively more employment per unit of capital. It may be noted that irrigation and cropping intensity have got a very high employment potential Prakash and Sushma, 1984 (Prakash, S. and Rajan, P. 1977). Due to the predominance of agriculture in the economy, the growth of such an economy hinges mainly upon the growth performance of its agricultural sector. The growth of agriculture and the economy as a whole are so closely related that the rapid growth of the former accelerates

the growth of the entire economy, whereas the sluggish or negative growth or stagnation of the agricultural output makes the entire economy slide down the developmental path (Prakash, S. and Rajan, P. 1977). The agricultural sector of these economies poses difficult problems as a very large segment of this sector has been entwined in the low income, low wage and low productivity equilibrium trap for long. Only its small part is modern and reasonably developed. Besides, like the national economy and its constituent sectors, the agriculture in developing economies is also characterised by a variety of dualisms. The traditional and the less developed segment of agriculture is characterised by the low level primitive technology and low productivity - both per unit of area cultivated and per person employed, and hence, low returns to investment. Since the less developed segment of agriculture is relatively predominant in the rural economy, explosive population growth makes the developing economies face the food shortages. The strategy of development may, therefore, focus mainly on agriculture as the core development process. Only an adequately and properly developed agricultural sector may furnish an appropriate base for rapid industrialisation. So evolving of a appropriate strategy of development requires delineating of the current status, problems, bottlenecks and constraints as well as the factors that are conducive to growth so

as to facilitate the determining of the contours of future potential of development of the national and the regional economies. Besides, the identification and evolution of the contribution of the individual elements of the composite growth process may help in dermining the relative strengths and weaknesses of the growth processes in operation so far. It may be facilitated by the decomposition of the overall growth of output into its components. This is especially true for the growth of agricultural output where the induction of new techniques of production lies at base of the Green Revolution in India. Green Revolution technology, in its turn, hinges upon the intensive use of land augmenting inputs like high yielding seed varieties, water, fertilisers, pesticides, etc. and the adoption of modern cultural practies. However, a part of growth of agricultural output in general and foodgrains in particular results also from the growth of area under cultivation. Therefore, growth may be decomposed into two components : increase in output due to growth of yield and rise in output due to growth of area.

1.3 Importance of Price

The price theory lies at the base of economic theory. Some economists consider price theory to be coterminous with economic theory itself as economic problem arises mainly in the process of pricing of the

goods and allocation of means of production. As Robbins emphasises, there arises an economic problem only when a good or service is scarce and this scarcity becomes effective when the good/service enters into the circle of exchange (Robbins, 1948). Not only this, the price theory is the unifying and interegrating factor. Different parts of economic theories may be fitted together by means of price theory to explain the working of an economic system in its entirety. As Townsend, 1971 highlights, light dawns, arguments fall into place, and as we proceed to apply economic theory it is found that what we are applying in nine cases out of ten is price theory. This puts the practical importance of price theory in place, notwithstanding the fact that price theory has remained among the 'emptier boxes of econometrics', The empirical research in the field of prices, in fact, appear to have been stalled by the problem of identification against which Henry Moore, (1958) stumbled Prakash, (1986). All the same, efforts have been made to bridge the gap between the real life phenomena and theoretical postulates relating to price formation processes. The diversity of these efforts explains the variety of price theories. The evolution of price theory has tended to conform to emerging forms of the market structures and pricing practices therein. However, two market forms have dominated the scene. The monopoly and perfect competition had dominated the

existing market structure since the times of Aristotle to the first quarter of the present century. Only two theories of pricing, namely the competitive price theory and monopoly price theory have naturally remained the exclusive framework of the analysis of pricing processes. Such efforts as those of Cournot (1927) to formulate the doupoly model of pricing behaviour of the firm remained only honourable exceptions while economic development in general and industrial revolution in particular brought into existence the market forms which conformed neither to purely competitive nor purely monopolistic market structures. Real life market structures are mixed and mongrel type. This divergence between theory and empirical facts prompted J. Robinson, (1954), Triffin (1949) and Chamberlin (1950) to put forward new price theories of monopolistic and imperfect competition. Meanwhile rapid technological development has made second industrial revolution feasible. The deepening of economic development has been accompanied by the technological transformation of economic structures whereby economic development has ever been expanding the market size, the technological revolution has continously raised the scale of production, organisational and managerial evolution has kept pace with these twin processes. Consequently, small and even medium size firms tended to be eliminated or subsumed

by the larger ones which in turn, have been replaced by bigger and bigger multi-national corporations. Technological feasibility and economic viability have both being dictating the adoption of bigger and bigger scales of operation both in the industrial and commercial fields. The technological and economic viability has tended to reduce progressively the number of viable firms warranted by ever increasing market size. This has led to the emergence of new market forms which have come to be known euphemistically in the literature as oligopolistic competition. Initially extension of classical doupoly model has been found adequate to deal with the analysis of such market structures but further and further differentiation between varying market structures has given rise to newer and newer price theories based on oligopolistic market forms. Kinky demand curve analysis, price leadership and mark-up principles form part of important developments in this field. This has been further enriched by the contributions of such economists as Sylos-Labini (1962), Means (1972), Pashigan (1968) and Bhagawati (1970). An attempt has been made to generalise the description of these varied price theories under a general rubric name of cost pricing, average cost pricing, full cost pricing or mark-up principle.

The wartime conditions necessitated the imposition of controls and regulation even in the most liberal

societies of the West while the socialist countries of the East developed and perfected tools of planning to tackle the problems of development paving the way for the development of the theory of administered prices. Contributions of such economists as Lange (1938) and Lerner (1953) may be mentioned as important landmarks in the evolution of price theory of this variety though means first introduced the concept of 'administered prices' for such prices as do not respond to change in demand. These prices are determined consciously and deliberately by the producers irrespective of the conditions of demand. Such pricing process was associated with the monopolistic markets. But now this term refers to those prices that prevail in socialist economies in general and mixed economies in particular where some prices are determined by executive order or an administrative fiat. Administered prices now refer generally to publically controlled and regulated prices.

Andrews (1969), Bains (1956), Stackelberg (1952), Hotelling (1925) and Domberger (1983) may be mentioned as important contributors to the theory of prices.

The entire post second world war period has been marked by the persistence of inflationary pressures almost throughout the world economy. Surprisingly, the recessionery phases have also been emerging periodically with almost monotonic regularity. This is

at variance with the theoretical postulates according to which inflation and depression are two different phases of trade cycles. The problem has been further accentuated by the oil crises of seventies. The new empirical phenomena of existence of recession in the midst of inflation does not fit well into any existing theoretical framework, be it classical, neo-classical, Keynesian, neo-Keynesian, or neo-monetarist whose propositions fail to grapple with these new empirical realities (Prakash, 1980). This has generated an urgent need to re-evaluate the existing price theory and if possible develop the new one which is capable of explaining the differential behaviour patterns of various sectoral prices in an economy. Several efforts have been made in this direction. Efforts of Means, Andrews and Dombergers in this direction may be mentioned. Hicksian (1965) framework of fix and flex prices has also been found appropriate for telescoping the differential behavioural traits of the sectoral prices whereas input output analysis has been found to be an appropriate methodological tool for the study of fix prices. Notable contributions have been made on the basis of the combination of these analytical framework and methodological tools (Prakash, 1980, 1986).

1.4 Price Behaviour in Developing Countries

The countries of the third world have experienced inflation even before stagflation started affecting the

economies of the developed West. However, the inflation in the developing economies is structurally different from that which has characterised the developed economies of the West (Mathur and Prakash, 1980). The differences between the two types of inflation are embedded in the different economic structures associated with the two groups of the economies. Therefore, the problem of inflation in the third world countries like India may be understood and explained properly and adequately only if the basic features of economic structure are explicitly incorporated in the analytical framework. One of the characteristic features of the countries of the third world is that the economies are highly dualistic and these economies are dominated by primary production in general and agriculture in particular both in terms of output and employment. Within agriculture, foodgrains are in the centre stage both in terms of area and output of these crops. Foodgrains have consistently been accounting for 80-82 per cent of the total area under cultivation (Prakash and Goel, 1984). Besides, the foodgrains absorb the largest proportion of the consumption expenditure of the households. Prices of foodgrains, therefore, dominate the prices of all other goods in the Indian economy. Movement of the general price level depends upon the magnitude and direction of the movements of the cereal prices (Prakash and Goel,

1985a). Prices of agro-raw materials, on the one hand,(Prakash and Goel, 1985b) and the wages of industrial workers,on the other, are uniquely related to the prices of foodgrains(Prakash,1981). Indian economy has, in fact, been described to be on food standard(Prakash and Goel,1986). This is inspite of the fact that the domination of the economy by agriculture has been steadily diminishing whereas the tertiary sector has been gaining ascendance through structural transformation of the economy which is evident from the following table.

Table 1
Proportionate shares of G D P and labour force by industry of origin. (in percentage).

Sectors / Years	Primary		Secondary		Tertiary	
	GDP	labour	GDP	labour	GDP	labour
1950-51	59.61	72.695	14.47	8.995	25.92	18.31
1960-61	55.13	72.28	17.28	10.61	27.58	17.11
1970-71	48.49	71.79	20.67	9.73	30.87	18.48
1980-81	41.52	69.36	21.60	11.30	36.88	19.34
1990-91	33.73	68.2	27.85	11.40	38.42	20.40

Sources: Economic Survey of India and census of India.

The output of secondary and tertiary sectors has been increasing more rapidly than that of agriculture. Therefore, the proportionate share of agriculture in GDP has declined by 25.88 percentage points in 40 years. But income generated in the agricultural sector has increased in absolute terms from Rs.4734 crores in 1950-51 to Rs.144613 crores in 1990-91 of foodgrains has also increased from 50.82 million tonnes in 1950-51

to 129.39 million tonnes in 1990-91. Agricultural income in 1980-81 in 1951 prices has risen 8.46 times its level in 1951. Output of foodgrains has increased 2.6 times its level in 1951. Besides, agricultural prices in general, and foodgrain prices in particular dominate the price structure in the economies like the Indian one. Changes in the agricultural prices and output have led to the revolutionary changes in the structure of the developing economy of India. Increase in the cultivated area, on the one hand, and rise in yield per unit of cultivated area, on the other, are the two basic factors of growth of agricultural output. Whereas total area under cultivation can be raised only marginally through reclaimation of the waste and uncultivable land, on the one hand, and the diversion of land from the forests and other non-agricultural uses, on the other there exits a vast scope to raise output through improvements in yield. Inter-crop transfers of land as the means of raising area under an individual crop(s) at micro level also happen to be an important source of acreage growth. Growth of yield can, however, be ensured through the adoption of better technology, improved cultural practices, optimal crop-mix and efficient management. Yield enhancing technology warrants investment in such inputs as HYV seeds, water, fertilisers, pesticides and insecticides at the farm level whereas public investment in agricultural R and D, extension services and

infrastructural facilities has to be steadily raised at the macro level. Consequently, the growth of agricultural output is generally accompanied by a steady rise in the cost per unit of cultivated area, on the one hand and unit cost of output, on the other. Prices of agricultural output have to rise steadily if the growth of yield, and hence, output is to be sustained over prolonged periods. Agricultural prices in general and foodgrain prices in particular consequently rise consistently with development. Rising costs of agricultural inputs also tend to induce rise in agricultural prices. But differential changes in prices lead to changes in the sectoral terms of trade. The pattern of income distribution also changes via the changes in agricultural prices and output. Income of the farmers, in fact, changes in the same proportion in which the prices of agricultural goods change (Prakash,et al.1981). This implies that the agricultural development and the consequent improvement in the economic condition of the farmers lead to steady and consistent increase in demand both for foodgrains and the manufactured goods leading to wide structural changes in the economy. Then, remunerative prices are needed to the foodgrain producers to sustain the agricultural growth in general as an incentive and inducement for agricultural investment and to cover the rising cost of production otherwise agricultural development will flounder.

It may imply that the sustenance of agricultural development over prolonged periods may lead to the transformation of flex into fix prices as farmers can not be expected to sell their production below the production cost in the long run. If the farmers, small or big, have to sell their output below the cost price, their farming firms will have to close down in the long run. The long run price of agricultural goods can not be below the cost of production. In the mature stages of agricultural development, agricultural prices including those of foodgrains will be determined by cost of production. This may be adopted as the working hypothesis which may facilitate explanation of such phenomenon as the rising instead of falling prices even when the bumper crops have been harvested. Alternatively, more complex and intricate hypotheses may be formulated to analyse the differential movements of the price of foodgrains in the different phases of the cycles and/or different income/output conditions. Foodgrain prices may be considered to be flex in nature. Foodgrains prices, like all other flex prices, can not be determined by simple supply and demand relations. Their determination is embodied essentially in the intricate facets of the behavioural patterns of the producers. Supply of foodgrains may diverge significantly from output both in the downward and upward phase of the production cycles which frequently

affect the agricultural sector of the economy. Supply of foodgrains depends largely upon the marketed surplus whereas the marketable surplus will, in its turn, depend upon the output. Marketed surplus is infact, the most decisive determinant of the prices of foodgrains. But the marketed surplus tends to behave in structurally different ways under different income/output and price situations. Therefore, the behaviour of foodgrains prices will depend upon the marketed surplus rather than total output. Only that portion of total production which is actually sold is the decisive determinant of foodgrain prices. It may, however, be noted that at the micro farm level, prices are independent of farmers' decision to sell. Given their cash requirements, higher the price lower will be the sales and lower the prices, higher will be the sales. Thus, prices will determine farmers' marketed surplus at micro level rather than the sales being the determinants of prices. At the macro level of the market, prices will be governed by the stocking behaviour of the independent intermediate traders. Desired stocks will, in turn, depend on future price expectations. Desired stocks relative to market arrivals will then determine the prices. If stock demand is higher than the market arrivals, prices will be pulled above the flow equilibrium level. If stock element of demand is lower than the market arrivals will push the prices below the flow equilibrium level.

Equilibrium prices will prevail at a level at which desired and actual stocks are equal. At macro level of the market also price will thus be inversely related with the sales to the market. It is because of the fact that producers themselves happen to be the consumers and stock holders of grains as well. But consumption rather than the sales of the foodgrains to the market may behave as the residual of the identity. Mathur and Ezekiel (1964), hypothesize that (a) demand curve of foodgrains for the producers is positively sloped and (b) farmers' supply curve of foodgrains is negatively sloped or at best, it is backward bending. The marketable surplus will be more important from the point of view of price determination. Besides the cost of cultivation prices to a great extent, will determine the marketed surplus at farm level while the marketed surplus, in turn, will determine the prices of foodgrains at the market level. If the prices are high, farmers will be required to sell less while at lower prices they will have to sell more in order to meet their demand for liquid cash irrespective of whether the cash requirements are fixed or flexible. Prices and sales will, therefore, be related inversely rather than directly to each other. As against this, if the farmers offer greater quantities for sale, the prices will tend to be lower, whereas lower offers to the market for sales will tend to push the prices up in

the market; price and sales will again be marked by an inverse relationship. But the detailed empirical investigation of the interrelations between the marketed surplus and prices have not been developed sufficiently as yet. Paucity of data and the technical difficulties have often obstructed efforts to analyse empirically the relationship between prices and sales. The inter-relations have often been confirmed through indirect evidences [See Mathur and Prakash, (1980) Prakash and Tripathi, (1985) Prakash and Sushma, (1981) Deepak Ghosh (1987).

2. Objectives

The present study intends :

(i) an important objective of the study is to analyse the sources of agricultural development with special reference to foodgrains and its impact upon prices,

(ii) agricultural development implies growth of output which represents supply responses of agriculture to growth stimulant, we have however, distingushed between the supply response on static condition and supply response in dynamic condition. Under static condition supply response referes to increase output due to acreage growth. Under this state acreage increase is the main source of growth of output. Under dynamic condition yield growth is the main determinant of agricultural development. Therefore, an important objective is

to evaluate the validity of this distinction between the static and dynamic supply response of agriculture,

(iii) as sales, consumption and stocks of foodgrains at the farm level are intimately related, it will be an important objective to evaluate the consumption behaviour. Consumption of foodgrains is only a part of overall consumption, we will, therefore, like to examine the temporal changes in total consumption, on the one hand, and consumption of foodgrain on the other,

(iv) another important objective is to study the inter-relationships between public stock, procurement, public distribution and imports of foodgrains in India. A general equalibrium model will be developed to determine their functional relations,

(v) we will endeavour to develop a full fledged general equilibrium model of the flex prices,

(vi) to be specific, we will try to evaluate the influence of the level of prices upon the level of marketed surplus and changes in it, and

(vii) to identify the major determinants of the magnitudes and direction of change in the marketed surplus in general and its relationship with the prices of foodgrains in particular.

3. Hypotheses

The following hypotheses will be tested :

1. First hypothesis to be tested is that the sustained growth of agriculture is accounted mainly by the growth of yield. Yield rather thanprice which determines the supply response of agriculture;
2. An associated hypothesis to be tested is that the cultivation cost and hence, unit cost of agricultural output rises with development, warranting consistent growth of agricultural prices in general and foodgrain prices in particular;
3. General equilibrium framework warrants the consideration of output, consumption and sales together. It is, therefore, proposed to test the relevance of the hypothesis that the permanent income determines aggregate consumption while the foodgrains component of aggregate consumption is govered by the Engel's Law;
4. Another hypothesis to be tested is that the genesis of inflation in India is embodied in the prices of foodgrains;
5. When output is high, prices remain relatively stable and pressure of demand on public distribution is slack. this facilitates the replenishing of buffer stock. When output falls, prices tend to escalate which intensifies pressure

on public stock for distribution. Consequently, public stock has to be depeted. Thus, fluctuations of prices and public distribution are induced by fluctuation of output. Therefore, we will test the hypothesis that (i) Desired stock may be treated as a function of output (ii) Public distribution of gains is directly related to market price. (iii) Internal procurement may be taken to be a function of public distribution. If output declines, marketed surplus well aslo decline proportionaly and consequently price will to increase.

6. The Mathur hypothesis of inverse relation between the marketed surplus and prices is based on the assumption of the fixity of the farmers' cash requirements. T.N. Krishnan established that this behaviour of the marketed surplus is independent of the fixity or otherwise of farmers' cash requirements. Mathur and Prakash have subsequently found empirical evidence to support the hypothesis on the basis of a model without this assumption. Indubala Tripathi has empirically demonstrated the validity of Mathur hypothesis with Punjab data (Tripathi 1981) despite the growth of cash requirements;

Prakash has formulated a dynamic functional relation between the marketed surplus and farmers'

cash requirements where marketed surplus emerges as an inverse function of cash requirements. We will empirically estimate this model to test the hypothesis under consideration;

7. Marketed surplus is not completely immune to the changes in the level of output. On a priori grounds, marketed surplus and output may be postulated to be directly related to each other. We will test this hypothesis also.

CHAPTER XII

CONCLUSIONS AND RESUME

12.0 The following are the major findings derived from empirical analysis of these studies :

12.0.A. The major findings of the trend growth of output and its components are as follows :

1. The output of all crops has grown positively except that of gram in composite and post-green revolution periods and tur in pre-green revolution period. Wheat has recorded high growth both in composite and post-green revolution periods while maize has recorded high growth only in pre-green revolution period.

2. The growth of output has been dominated by the growth of yield, by and large, in the post-green revolution period whereas area has grown negatively in case of 4 crops.

3. Green revolution has been triggered mainly by paddy and wheat while course grains like maize, jowar and bajra have lagged behind. But the course grains have not been completely passed over by the green revolution, howsoever low the growth of yield might have been.

4. Pulses have been by-passed, by and large, by the green revolution. Output growth in their case has been accounted by the acreage rises.

12.0.B.**The major findings of decomposition of volume of growth of agricultural output are as follows :**

12.0.B.(i) **Pre-green Revolution Period :**

(i) The growth of output in value terms has been dominated by prices in pre-green revolution period also,

(ii) The growth of area has accounted for the second largest share of volume growth of output and the contribution of yield in pre-green revolution period has ranged from negligible to marginal in case of most of the crops.

(iii)The degree of responsiveness of volume of output to yield is the highest in this period.

(iv) Wheat and to a lesser extent rice have been the two crops in case of which the role of yield in the volume growth has been notable,

(v) In case of course grains and pulses domination of growth of volume growth by prices has been due to the building up of demand pressures on prices whereas acreage response to prices has been blunted by stagnancy of yield resulting in reduced profitability and attractiveness of these crops. These results lend substantial credence to the proposition that overall profitability that depends both on relative price and yield gains the main determinant of acreage response. Price rise by itself will not induce changes in cropping patterns if the yield gains remain negligible in a

dynamic state when agricultural output tends to grow due to breakthroughs in yield.

12.0.B.(ii) Post green - Revolution Period :

(i) The recent technological change has been epitomised as 'Green Revolution". The discovery of the miracle seed is the core of the new technology which involves higher cost.

(ii) Increase in cost is expected to lead to rise in price which, in turn, has been reflected in the high growth of volume of output, dominated by the share of prices.

(iii)The green revolution is spreading fast because the growth of yield has sustained the growth of national output during the post-green revolution period.

(iv) In case of crops whose yield has remained low due to non-availability of new technology, specially hyv of seeds, output has been falling below demand, leading to the building up of demand full variety of inflationary pressures, which have been further accentuated by stagnant or declining acreage under these less profitable crops.

(v) Acreage response to prices may either be positive or negative, depending upon the stagnancy or growth of yield. Hence, it is yield rather than price which shapes and guides the allocation of area under conditions of dynamic growth.

12.0.B.(iii) **Decade wise :**

(i) The volume of output has recorded moderate growth in almost all the decades except for tur, 'other pulses' and wheat.

(ii) The rising prices have emerged as the dominant or primary factor of growth, yield has emerged as the dominant factor over area after the first decade in almost all cases,

(iii)The volume of output of foodgrains, jowar and tur have recorded low growth in the first decade. The constraints to the growth of these crops seem to have been over come by the second decade,

(iv) Most of the individual crops, both among cereals and pulses, have climbed up the green revolution band wagon by the end of the third decade,

(v) Yield growth has slackened in case of early starters and leaders of the green revolution whereas the late starters have gathered momentum.

12.0.C.The major findings of determinants of land among different crops under conditions of dynamic growth are as follows :

(i) Changes in the farm- product prices are neither the necessary nor the sufficient condition of change in area under cultivation,

(ii) Acreage response to changes in price of creals, jowar and gram is negative,

(iii)Relative rather than absolute prices and yields govern the cropping pattern,

(iv) Distinction between stationary and dynamic conditions of growth of the farm economy is essential for delineating the magnitudes and direction of interrelations between price and area under cultivation, on the one hand, and price and yield, and yield and area, on the other,

(v) Yield emerges as the more decisive determinant of acreage responses than price in case of such crops as rice, wheat and maize which have registered dramatic growth of yield under the impact of applications of green revolution technology in production. Acreage elasticity with respect to yield equals or exceeeds unity in case of all such crops,

(vi) Acreage response to prices has been either negative or zero for almost all the crops analysed in this study, and

(vii) Acreage adjustment to the changes in relative prices and yields seems to be instantaneous rather than lagged.

These results suggest modifications of conventional hypothesis so as to match empirical conditions with the assumptions of analysis when the crop-yields grow rapidly on application of modern technology to cultivation.

12.0.D.The major findings of empirical prognostication of aggregate consumption function with Indian data are as follows :

Econometric experiments have furnished empirical evidence to support Keynesian hypothesis that observed consumption is functionally related to observed income, Keynesian inequality $0 < e(y) < 1$ being also satisfied as e(y), long run income elasticity of current consumption, is 0.924 and income elasticity of per capita consumption is lower than this, its value being 0.79. Empirical experiments have also furnished evidence to validate permanent income hypothesis. Permanent income elasticity of permanent consumption also satisfies basic inequality $0 < e(p) < 1$ though the long run elasticity is as low as 0.36. Thus, the results support both Keynesian and Friedmanian hypotheses. We have followed trend method for determining permanent components of income and consumption to distinquish their magnitudes from observed income and consumption. The method seems to be valid for separating permanent from transient components.

12.0.E.The major findings of determinants of consumption of foodgrains in a complete demand system.

Log-linear distributed lag form of Engel function furnished the empirical evidence that all 9 commodity groups except food emerge as superior convenience or

luxuries. Elasticities range from 1.35 for recreation education and cultural service to 2.42 for transport and communication. The high long run elasticities confirm the fact that Indian consumers behaviour is entrapped in poverty syndrome which makes all goods except food superior at the given income price constraints. The adding up theorem that the weighted sum of income elasticities of consumption expenditure on different goods approximate unity (0.994) is almost exactly satisfied. The average lag involved in the adjustment of consumption expenditure to changes in income differ from one commodity group to another. It ranges from as low as 0.02 for rent, fuel and power to as high as 2.19 years for food. The longest lagged envolved in food imply that the impact of growth of real income becomes perceptibly visible only in the phased and lagged manner, evoking even slower consumption responses.

12.0.F. The major findings of the study of interrelationship between public distribution and buffer stocks of foodgrains in India are as follows :

The study highlights the inter-relations between buffer stocks, public distribution, internal procurement and imports of grains in the Indian economy.

Buffer stocks are determined mainly by output. But the impact of a change in output upon stocks is spread over several periods. As against this, market price is the chief determinant of the demand for public distribution, and the impact of scarcity and price hikes remains operative for several years. Public distribution, in its turn, determies internal procurement. But imports are determined both by the stock and flow elements of demand.

Unless output is immunized against the destablishing effects of adverse weather conditions and internal procurement is raised sufficiently to meet public distribution needs, Indian economy will have to depend upon imports for food security. Elasticity estimates may be used for policy purposes.

12.0.G.The major findings of the price movements in Indian economy are as follows :

The general inflation has been dominated by the agriculatural prices in general and foodgrains prices in particular.

The seasonal fluctuations, registering a low in certain months high in others have been prominent. The pattern of these intra year variations are largely determined by the timings of the crop seasons. The entire seasonal pattern of all commodity prices is considerably influenced by the price behaviour of foodgrains. Generally, the prices rule low in the post harvest seasons and high in the lean seasons. On an

average there has been 4 to 10 per cent difference between the post harvest and lean period prices.

The following suggestions can be given for the policy purpose from these empirical evidences.

1. The Indian inflation rate can be controlled by stabilizing foodgrain prices.
2. The variations in agricultural prices can be controlled by stabilizing the price of foodgrains in general and prices of rice and wheat in particular.
3. The more than 10 per cent seasonal variations of these two commodities can be reduced by ensuring stable patterns of sales to the markets.

12.0.H. The major findings of the relationship between marketed surplus, output and price are as follows :

1. The propensity to consume by the Indian farmers is higher than sale and stock. The propensity to consume is 0.39 whereas propensity to sale and stock are 0.27 and 0.34 respectively.
2. Output can be treated as a proxy of cash requirement.
3. Cash requirement/output directly related with output.
4. The market supply curve is backward bending because the sales to the market is inversely related to the price. At higher prices farmers cash requirement can be met by salling less.

Interestingly the Mathur-Ezekiel hypothesis has envisaged the backward-bending supply to be valid at the farm level for marginal, small and engage in subsistence farmings. But our results show that the hypothesis to be valid at the aggregate market levels that the sales behaviour of Indian farmers remain dominated by subsistence syndrome.