WHOLESALE PRICES VARIABILITY OF AGRICULTURAL PRODUCTS IN INDIA – *A STATEWISE ANALYSIS*

Dissertation submitted to the Jawaharlal Nehru University in the partial fulfilment of the requirements for the award of the Degree of

MASTER OF PHILOSOPHY

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1998

Dedicated to

My Beloved Parents

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CERTIFICATE

This is to certify that the dissertation entitled ***WHOLESALE PRICES VARIABILITY OF AGRICULTURAL PRODUCTS IN INDIA – A STATEWISE ANALYSIS*** submitted by **Abinash Nayak**, in partial fulfilment of the requirements of the award of the degree of Master of Philosophy of the University, is to the best of my knowledge, a bonafide work and may be placed before the examiners for evaluation.

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CHAPTER I

INTRODUCTION

Agricultural price policy has been a controversial subject in India. During the early sixties, scholars recognised the importance of the indirect effects of food prices on rural incomes via supply response and employment generation. The persistence of mass poverty even after the success of the Green Revolution, extensive malnutrition, despite accumulation of large food stocks and the shrinking effective demand for food, suggested that the direct short run effects of food prices on the real incomes of poor households would remain immediate and important. In any event there is a growing realisation that the inter-linkages between agricultural performance, labour absorption, food price behaviour and rural poverty are extremely complex. "The operation of these casual linkages are impinge on the year to year income mobilities of poor households"[1].

Before the mid-1960s the activities of the government in the food grain economy were limited in scope to the import of food grain and its distribution - mainly in urban areas under various forms of rationing. Thereafter with the adoption and promotion of 'new agricultural strategy' based on the cultivation of high yielding varieties of seeds with the use of 'modern' inputs - fertilisers, pesticides etc., in areas of assured water supply, the government began to play a major role in the transformation of the agricultural sector. This led to involvement

[1] De Janvry and Subbarao - Agricultural price policy, Income distribution in India.

of the state in diverse activities such as the development of infrastrutural facilities, provision of subsidies of different kinds, supply of inputs and credits, and the promotion of agronomic research for exotic crop varieties to Indian conditions.[2]

The agricultural price policy which evolved subsequently must thus be seen as an essential part of a larger package of policies designed to promote rapid growth in a few regions endowed well with irrigation facilities, and to encourage private investment in the necessary means for the cultivation of new varieties. It can be argued that given the highly skewed distribution of land and assets and a marked regional concentration of irrigation areas, the policy package was bound to promote both inter and intraregional disparities. Hence one can perceive a built-in-regressive character in the price policy and locate it within the overall policy of promoting growth through various production incentives, a policy not based on adequate consideration of its likely distribution consequences.

Both before and after independence, the government of India had been constituting 'committees' and 'commissions' with a fair regularity to investigate the 'food problem' and suggest ways to resolve it. But all these bodies were adhoc in response to periodic scarcities, the works and recommendation of these various bodies had no lasting impact on Indian agrarian economy.

I.II Food Policy of Government of India:

A careful examination of the post war food policy reveal that the policy.

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[2] N. Krishnaji, 'Agricultural Price Policy' - A survey with reference to Indian Food Grain Economy, EPW, 1990.

a) was consumer oriented not withstanding occasion as references to providing incentives to producers.

b) has been excessively insurance oriented

c) has been a product of shortages not tailored to meet situations of plenty

d) has followed typically bureaucratic approach with heavy reliance on legislative and administrative measures e.g.: rationing, movement controls, stock restrictions, enactment of essential commodities etc.

e) has lacked a long term perspective on imports bufferstocking and movement restrictions and has governed by ad hoc considerations.

f) displayed lack of trust in private traders who were seen as agents responsible for rise in consumer prices and also by their activities create shortages to earn high profits.

g) lacked cost consciousness in management of food economy.

Food policy of government during the planning period had three aspects (a) the measures to raise output of foodgrains (b) measures to improve the distribution system of food grains, (c) large scale imports of foodgrains to be resorted to curb the temporary scarcities.

Though the government had accepted the importance of technocratic measures in increasing food production right from the beginning of the planning period, yet serious attempts in this direction were made only after 1966 with the adoption of the new agricultural strategy. Till 1966-67, the main emphasis was on

expansion of irrigation facilities. However increased attention has been paid to the use of biochemical and mechanical innovations in order to increase production and productivity.

It was recognised long back that land reforms are an essential condition for promoting agricultural development. Therefore the government introduced measures to abolish intermediary rights on land and all state governments adopted legislations for the purpose. Ceilings on holdings were prescribed, rents regulated and rights of ownership conferred on the tenants. These methods were to help in effecting changes in land relationships.

The government has held the view that there is a positive relation between price incentives and production. Accordingly it set up the Agricultural Prices Commission in 1965. The commission has been recommending procurement and support prices for a number of important agricultural crops.

In order to stabilise prices of food grains and rationalise the pattern of distribution, food zones were organised in March 1964 when the country was divided into foodgrains surplus and foodgrains deficit zones, and movement of private trade from one state to another state was banned. The government took upon itself the task of procuring food grains from the surplus states and distributing them to the deficit states through the public distribution system. However, the zonal system had a number of evils. The surplus states used this system to help their farmers in realising high profits. On the other hand it increased price disparities among different regions and prices in deficit shot up substantially while

prices in surplus states remained lower than what they would have been under unrestricted trade.

To improve the food situation it is necessary to ensure regularity and certainly in food supplies. Because of excessive dependence on monsoons, it is not possible to stabilise production. Accordingly it becomes essential to create adequate bufferstock in years of large supplies to meet the extra demand during lean years. Such a policy can ensure regularity in supply even when production in irregular. Keeping these considerations in view, the government set up the Food Corporation of India in January 1965, to undertake purchase, handling, transport, storage and distribution of food grains and other food stuffs on behalf of the government. The covered storage capacity available with the corporation upto October 1993 was approximately 18 million tonnes. Also it ensures on the otherhand that farmers get remunerative prices for their produce and on the otherhand the consumers get food grains from central pool at uniform prices fixed by the government of India.

Procurement in India is generally undertaken under price support operations. Food grains procured by government are sold through the fair price shops and rationshops. With the increasing production of wheat and rice in the recent years and the increasing demand on the PDS, the role of FCI has been increased as it is the sole repository of food grains meant for PDS. However our main emphasis is on the aspect of prices.

In 1957, government set up Foodgrains enquiry committee under the Chairmanship of Ashok Mehta[3]. The committee held that there has been a tremendous demand side pressure on prices on amount of rising purchasing power, distribution of income among the lower strata of population, high income elasticity of demand for food grains, shift in food consumption to superior grains and general rise in demand for foodgrains due to urbanisation and industrialisation.

It was only in 1965 that a permanent body viz the Agricultural Price Commission, was set up with presumably long run goals in view. The APC is an advisory body with all the decision making powers resting with the government. The APC was charged with the responsibility of evolving a balanced and integrated price structure "in the perspective of the overall needs of the economy and with due regard to the interests of the producer and consumer". The terms of reference of the commission refer not only to the need for providing price incentives for promoting agricultural growth but also to the need to 'ensure rationale utilisation of land and other productive resources' and to the likely effect of the price policy on the rest of the economy. Particularly on cost of living, level of wages, industrial cost structure etc[4].

The primary function of Agricultural Price Commission was to determine a balanced, well integrated price policy, that would be fair to both the producers and consumers and would achieve for the country as a whole, an optimum land use and

[3] INDIA 1957 – Ashokmehta Committee
[4]Report of APC on price policy for Kharift cereals – 1965-66.

production pattern in the light of national requirements. Recognising the implication of food price behaviour for income distribution as well as for industrial growth, the original terms of reference for the commission gave overriding importance to the need for over all price stability.[5]

Agricultural price policy refers to all those activities of government which cause a different agricultural price regime to prevail than would be the case under unimpeded conditions. Historically the role of agriculture in developing countries was envisaged as one of the providing support to industrial sector. For this end farm prices were deliberately kept low so as to provide cheap food and raw material to industry.

Lacklustre performance of agriculture in developing countries and consequent food shortages, however forced them to reconsider their development strategy. In particular it called for a review of farm prices -policies. The need to provide support to most promising new agricultural strategy, based on high yielding varieties, further necessitated a shift in the stance of price policy from 'negative' price policy (keeping terms of trade against agriculture) to a more 'positive' price policy (improve or at least maintain terms of trade against agriculture).[6]

In India there has been a steep rise in the prices of agricultural commodities over the planning period. This has had many adverse effects. Because of the heavy

[5] D.S. Tyagi – Farmer's response to Agricultural prices in India.
[6] Krishna : Price policy and Economic Development (1977, p.498)

weightage of agricultural commodities in the overall index of wholesale prices in India, this trend of rising prices of agricultural commodities has contributed considerably to overall increase in prices over the decades. The rising spiral of prices has spelt misery to the poorer sections of the population whose purchasing capacity has suffered a substantial erosion.

Prices of most of the agricultural crops have shown a rising trend and have contributed their mite in further pushing up the index of agricultural prices. During 1983-84 to 1994-95, the index number of wholesale prices of rice registered an increase from 125 to 300, that of wheat rose from 126 to 281, while that of pulses from 93 to 367. Prices of most other crops like raw cotton, groundnuts, jute etc. also showed considerable increases. Hence there have been deliberate policy by the government to keep the food prices and its amplitude of fluctuations low to keep the inflationary trends in the economy under check.

I.III Role played by APC

The price fixation concept has been examined by numerous economists like Krishna and Roy Choudhury (1980), Subbarao (1986), Sidhu (1979), Gulati and Sharma (1990); and Nadkarni (1987). Through its various reports, the commission claims to be influenced by numerous factors e.g. (1) change in input prices, (ii) cost of production (iii) risk factors (iv) market prices (v) demand and supply (vi) effect on individual cost structure (vii) effect on general price level (viii) international market situation (ix) intercrop price policy (x) input output price policy (xi) parity

between raw materials and finished products prices (xii) parity between prices paid and prices received (xiv) trends approach.

Government policies divide Farm prices into administered prices and free market prices. Administered prices are fixed by the government for a given product or products at the level of seller (producer, processor, trader) or consumer. The free market prices on the otherhand are the result of interaction of demand and supply forces but are also influenced by government policies.

Agricultural prices influence in:

(a) raising aggregate output by encouraging use of more resources, improving the use of resources and reducing price risk

(b) raising resources for industry and government by manipulating terms of trade and imposition of taxes.

(c) stabilising prices and incomes by moderating seasonal price fluctuations and reducing year to year variations

(d) protecting low income consumer against undue rise in food prices

(e) raising employment by turning relative prices favourable to labour intensive crops

(f) reducing inter regional disparities by favouring those crops which are grown in backward regions

(g) achieving self sufficiency in food grains

The foodgrain prices committee 1964, recommended the setting up of an Agricultural Price Commission. It stated that it was desirable that, 'the price policy of all agricultural commodities should come within the purview of agricultural prices commission, so that a balanced and integrated price structure could be evolved and the claims of competing crops on limited resources can be resolved in the perspective of the overall needs of the economy". Accordingly the Agricultural Price Commission was set up in 1965. It was renamed Commission for Agricultural Costs and Prices (CACP) in 1985. Ever since its inception, the commission has been announcing minimum support prices, procurement prices and issue prices for a number of agricultural commodities. The government has been accordingly fixing these prices for different agricultural commodities for past several years.

I.IV Literature Review

The functions, nature and structure of agricultural prices and forces shaping and influencing agricultural price policies have been intensely debated[7]. During 1960s, T.W. Schultz the renowned agricultural economist, rebuked the developing countries for their policy preference for industrialisation and viewing agriculture's contribution as a supplier of cheap food, cheap labour and public revenue.[8]

[7] Krishna (1967-1982), Kahlon and Tyagi (1983), Krishnaji (1990); Dantwala (1967, 1976, 1981) Dandekar (1991), Subbarao (1986), Nadkarni (1987) Mellore and Ahmed (1988).

[8] M.L. Dantwala – Agricultural price policy 1988.

Streeten emphasised that higher price by itself cannot augment production. The beneficial effect of incentive prices is conditional on non price factors. "The whole emphasis of the argument of the book is that the absence of non-price measures (availability of credit; fertiliser and assured water supply, transport, communication, tenurial systems, land distribution and many others), many of them in public sector, some of them public goods, impedes agricultural response to prices by themselves in developing countries". There must be institutional arrangements and above all new cost reducing technology must be available to facilitate the incentive of higher prices to become effective. Streeten does not accept the view that higher prices will induce complementary action leading to development of improved technology, transport, storage, more irrigation and better water control and management. Such development needs deliberate state action.

NCAER (1969), in a comprehensive study on the structure and behaviour of agricultural prices in India, fitted a regression equation to the index numbers of wholesale price of wheat for the period 1950-65. The equation comprised of money supply with the public and percapita net availability of wheat from domestic production as the explanatory variables. The estimated coefficients were statistically significant at 1 percent level and the equation had $R^2 = 0.86$ for the entire period.

Thamarajakshi (1970), incorporated the influence of percapita availability of rice along with percapita availability of wheat and money supply with the public, to explain the variations in wheat prices for the period 1952-53 to 1967-68.

She calculated the wheat prices on the basis of 17 selected centres and regressed this on various explanatory variables. In her estimation $R^2 = 0.91$, only money supply turned out to be statistically significant at 1 percent level, the other two explanatory variables, namely per capita availability of wheat and rice, were not statistically significant even at 10 per cent level.

Ray (1972) explained the variations in the prices of food grains, cereals, rice and wheat separately over the period 1952 to 1968 through money supply and gross percapita availability of concerned grains, in the current and previous year. In case of wheat per capita availability was calculated from the domestic production only. Also the coefficients of estimated equation were statistically significant at 5 percent level, with $R^2 = 0.94$.

Krishnaji (1973) made a study for post 1965 era and inducted in his postulate, besides excess demand, the Government intervention in the form of support operations and imposition of zoning, through the use of dummy variables. He created three dummies in all, two for zoning and one for the years when support operations were carried out. For excess demand, he found a 'proxy' in the issues of all foodgrains through public distribution system. The hypothesis underlying the use of this 'proxy' was that in case of excess demand for wheat in the open market, pressure on the public distribution system would mount up resulting in increased offtake and vice versa. The regression equation estimated for the period 1951-52 to 1971-72, provided a good fit with $R^2 = 0.976$.

As far as the supply response function is concerned, Ashok Gulati in his book "Agricultural Price Policy in India, An Econometric Approach" used the simplified version of the Nerlovian partial adjustment model for estimating wheat output response. Assuming static price expectations and incorporating 'shifter' variables like rainfall and irrigated area under wheat, the reduced form of Nerlovian model became,

$$QWT = A_0 + A_1 PRB_{T(t-1)} + A_2 RN(Gt) + A_3 RN(st) + A_4 IAW_{(t)} + A5QW_{(t-1)}.$$

Where

QW_t = Actual output in thousand tonnes

PRB_t = Index of price ratios i.e. price received by wheat grower divided by weighted price of barley and gram

RN_{Gt} = Average rainfall during the months of December, January and February, the months relevant for the growth of wheat crop in millimetres

RN_{st} = Average rainfall during the months of August, September and October, the months relevant for the sowing of wheat crop in millimetres

IAW_t = Irrigated area under wheat as a ratio of total wheat area.

t, t-1 = time period

The result suggested the longrun price elasticity to be 0.684 which indicates that total effect of 10% rise in relative price of wheat in period (t-1) on the wheat

output will be to the tune of 6.84 percent. The result contaminated with $R^2 = 0.957$. The short run price elasticity of 0.27 with respect to price variable suggested that a 10 percent increase in relative price of wheat in (t-1) is likely to stimulate wheat output by 2.73 percent in period t.

The model of wheat sector by Gulati (1987) provides a more explicit treatment to procurement price and its linkages to other variables. The model consists of a system of ten equations and an identity. The equations determine procurement price (two equations), issue price, output, procurement, imports, wholesale price, twice adjusted wholesale price and prices received by farmers, and issues through PDS. Closing stocks are residually determined through an identity. This model uses price variables in supply equation after putting it of issue price bias and market arrival bias. The model does not have any equation on commercial absorption or demand conditions.

D.S. Sidhu (1990), emphasized that the elasticities of marketed surpluses with respect to production being greater than one for these crops, the increased production led to a more than proportionate increase in market arrivals. The increased surpluses and correlated demand for non-conventional commercial inputs have put a greater pressure on the existing marketing system and exposed its inadequacies. Hence the country has entered a stage of development where marketing has become a serious constraint both in the sale of agricultural products and supply of crucial inputs, thereby slowing the development process. Despite major market interventions by the government, the marketing system continues to

be suboptimal. The agricultural price policy which shape the marketing system remains controversial.

Krishna and Roychoudhury (1980) estimated procurement function for wheat at all India level for the period 1965-66 to 1975-76. They regressed the procurement of wheat as a function of the output and the ratio of procurement price to open market price. The open market price was denoted by EAWPI of wheat. Their results revealed that the coefficients of output and price ratio were highly significant with expected signs. The elasticity of procurement with respect to output turns out to be as high as 2.32 and elasticity of procurement with respect to the procurement price/wholesale price ratio is even higher (3.72)[9].

In the "Government intervention in Foodgrain Economy: Case of rice and wheat", (1994), Dr. Sharma had determined the support/procurement price functions for rice and wheat. The hypothesis was that these support price determination is influenced by an average of previous three years wholesale prices and the high cost nature of new technology, induced the farmers to take interest in input-output prices ultimately influencing the support/procurement prices.

On the basis of these hypothesis the support/procurement price function for rice and wheat are

RPPI = F[RC2AII (-2); $RTAP_3$; POLIT]

WPPI = F[WC2AII (-2); $WTAP_3$; POLIT]

[9] Krishna and Ray Chaudhuri (1980)

Where,

RPPI = Index of procurement price of rice,

WPPI = Index of procurement price of wheat

RC2II = Cost of production of paddy, weighted average of states.

WC2AII = Cost of production of wheat, weighted average of states.

RTAPA3 = Previous three year's average of twice adjusted wholesale price index or rice

POLIT = Dummy variable equals '0' from 1969-70 to 1978-79 and '1' from 1979-80 onwards.

The result revealed that the support price of rice and wheat to be strongly influenced by trend in wholesale prices and cost of production.

Also in the same topic he has formulated the open market price functions. The regression model to determine the open market price function was

RTAPRL = F[ROAI, GDPNAG, WOAI, $RTAPRL_{-1}$]

WTAPRL = F[WOAI, GDPNAG, ROAI, $WTAPRL_{-1}$]

Where,

RTAPRL = Twice adjusted wholesale price index of rice deflated by general price level

WTAPRL	=	Twice adjusted wholesale price index of wheat deflated by general price level.
ROAI	=	All India output of rice
WOAI	=	All India output of wheat
GDPNAG	=	Gross domestic non agricultural product at 1980-81 prices.

The estimates of open market price functions obtained through 3SLS system estimation for rice and wheat reveal that all coefficients bear expected signs and are statistically significant. The overall explanatory power of the equations given by adjusted R^2 is also satisfactory. It reveals that the private storage behaviour differs for the two commodities. Compared to wheat there seems to be greater stories of rice and greater time lag between production and availability. This was further corroborated by the fact that elasticity with current supply is less for rice than wheat[10].

This study makes an attempt to analyse whether there exists interstate disparities in growth rate and variations in wholesale prices. Also whether the government intervention has been effective enough to reduce the interstate disparities of variability in wholesale prices for different products in different states . An attempt has been made to determine the causative factors that govern the variability in wholesale prices

[10] Dr. Pradeep Kumar Sharma – "Government intervention in Foodgrain Economy, Case of Rice & Wheat" (1994).

I.V Chapter Plan :

In this study, the first chapter is introductory in nature and also covers review of literature. The second chapter includes the objective of the study, the database, hypothesis and methodology. The third chapter analysis the necessity of government intervention to reduce fluctuations in wholesale prices and to reduce the interstate disparities. The fourth chapter deals with the analysis of interstate disparities in growth rates and variability of wholesale prices. The interyear variability in wholesale prices in different states and the variability of wholesale prices in All India level have been studied in the Fifth Chapter. An attempt has had been made to determine the causative factors affecting the variability in wholesale prices.

CHAPTER – II

OBJECTIVE HYPOTHESIS AND METHODOLOGY

II.1 Objective and scope of study :

Although commission for agricultural cost and prices determine this support or procurement prices by considering the cost of production of the respective crops. Moreover a note is taken up the international prices as well as wholesale prices prevailing in the previous year. One may note that trends in wholesale price levels have an important bearing on support price determination for two reasons. Firstly, these prices reflect demand and supply position of the commodity in question. The larger the size of free market in relation to the controlled one, the more representative these prices are of market conditions. Secondly, support / procurement prices cannot remain out of line with open market prices especially if the preceding year was a normal year. If they do, the efforts of government in procuring food grains would not be much successful not withstanding movement restrictions, zoning etc. At the same time, procurement prices cannot simply follow current open market prices which may reflect an abnormal situation such as a drought. An automatic increase in support price in response to an increase in wholesale price will further raise wholesale price and can lead to a vicious circle of price rise. This can also burden the government with increasing responsibility of procuring food grains. However, a trend in wholesale prices of the concerned commodity can be a good guide while fixing support price.

This factor is considered to be so important that Krishna and Roy Choudhuri (1980:17) have affirmed that "in case of rice as well as wheat, procurement price has simply followed the trend of the market wholesale prices with time lag. In other words, the market price has been the leader price and procurement price a reluctant follower.

In some ways this is a more important basis of price fixation than cost of production. While market prices are a matter of fact, the cost of production (or the bulk of it) is by and large a matter of opinion. The correct wholesale prices exert greater and more immediate influence on support prices than cost of production. Farmers expect the government to raise support prices in the light of increase in open market prices. Failure to do so has resulted in poor procurement in the past. Even if the government does not fully respond to the current open market prices, a secular rise in wholesale prices has to be reflected in support prices.

To a considerable extent, this study is inspired by the fact that in recent years there appears to be an all round realisation of the importance of agricultural prices, as mirrors of the overall success or otherwise, of the Govt policy. A number of persons choose to steer clear of studying such variables as prices and more so those as unpredictable and abstract as agricultural prices. Hence a humble attempt has been made to study this variable, particularly from the point of view of its inter year and intra year variability.

Specifically we wish to probe into the impact which has been made on variability of agricultural prices in India, as a result of Government intervention. We seek to find out : How effective has the price policy of the APC i.e. CACP

proved to be in the specific efforts of controlling temporal price variability ? Apart from this also to study whether there exists interstate differences in wholesale price variations. If so then what are the basic reasons those are responsible for interstate difference in variation in wholesale prices.

Since the quantum of data and the ensuing calculations involved are of very bulky nature, we have limited our scope to a study of five major crops under the purview of agricultural price commission . Wholesale price analysis (based on monthly data) were undertaken for the chosen three major states, generally choosing three major states each producing a particular crop.

II.II Data base:

The study is based largely on secondary data, published by Ministry of Agriculture, Government of India; The different sources those have provided the data collections are :

(i) "Bulletin on Food Statistics" – Published by Directorate of Economics and Statistics, Ministry of Agriculture, Government of India.

(ii) "Agricultural prices in India" – Published by Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.

(iii) Statistical Abstracts for different states for various years published by respective State Governments.

(iv) "Agricultural Statistics at a glance" – Published by Ministry of Agriculture, Government of India.

(v) Indian crop calendar, Ministry of Agriculture, Government of India.

(vi) Reports of Agricultural prices commission (CACP) for various crops and years.

(vii) Estimates of area, production and yield of principal crops in India for different years.

(viii) Bulletin on commercial crop statistics.

II.III Hypothesis and Methodology

The following hypothesis have been tested in the context of selected crops and states:

a) "Government intervention in agricultural pricing has resulted in reducing the variability in wholesale prices in the states."

b) Second degree parabolic function, having a shape of inverted U, captures the temporal profile of the coefficient of variation such that for each crop, the coefficient of variation keeps on rising up to a particular point of the time period after which, it starts declining.

c) The growth rate of prices and the interyear variability is higher in the post government intervention era than the pre-government intervention period.

d) Variability in wholesale prices is governed by variability in production.

e) Irrigation intensity for the particular crop affects the variability in wholesale prices.

II.IV Selection of Crops and Time Period :

For the analysis of Interstate disparity in growth rates of wholesale prices, have been explain by estimating the impact of variability in production on impact of variability in wholesale prices and impact of variability in irrigation on variability in wholesale prices, three major products rice, wheat and Bajra had been taken in to account. This is simply because rice and wheat both play a crucial role in the subsidised food item category as they are the most necessary food products. Bajra being the inferior commodity basically consumed by the lower sections of people, had been considered. Also the government price policy in due course of time revolves around the fixation of prices of rice and wheat prominently and also subsidies prima facie meant for these two major crops.

But for the state level time series analysis, five major selected crops had been taken into consideration. We have taken rice, wheat, bajra out of the necessary food category. The groundnut has been considered as part and parcel of studying the variability in prices, out of the category of oilseeds and pulses. Similarly as far as cash crops is concerned cotton has been included in the analysis.

The reference period for the present study is 1950 to 1992. Considering in the time period most of the studies pertained to 1961-62 onwords to the close of 1980's, this study covers the period from 1950 to 1992. This is due to the fact that the time period just before and after the formation of Agricultural price commission (1965) is of importance to know the feasibility of Agricultural price

commission in controlling the variability in agricultural prices, and reducing the interstate disparity in prices. Hence enlarged data of a longer time period had been taken into consideration.

II. V Choice of States:

As far as the growth rate in wholesale prices of Rice, Wheat and Bajra is concerned for studying impact of variability in production on the variability in wholesale prices, and impact of irrigation on price fluctuation, 14 major producing states have been taken into account for rice, 9 for wheat and 7 for bajra. But as far as the state level analysis of intra year variability in whole sale prices is concerned, it was decided to limit the analysis to not more than three states, for each crop considered in the study. The reason being that for prices, the data covers a considerably long span of time and data of more than three states would have made the study bulky, without adding much substance beyond what is captured through the experience of three major states. The criteria for choosing the states was generally to choose the three highest producing states for each crop, as well as to ensure that together they accounted for a major proportion of total All India production of the crop. In the wholesale price analysis, for one or two crops we had to be contented with only two states because of data limitations. Besides we had also taken into account the whole sale prices were available for the same centre in any given state for each crop. In the interest of above consideration, occasionally the next best alternative states was taken.

II.VI Methodology:

In the case of determining growth rate of wholesale prices for different states semilog equations have been used (log y = a+bt). An attempt has also been made to study price variability over four decades, from different angles. We divide the entire period into two broad eras : the pregovernment intervention and postgovernment intervention era. The former ends roughly an year or two after a crop entered the purview of APC. To analyse the variability of prices over time the coefficient of variation have been calculated for each of the pre and post government intervention periods. We have calculated original yearly data as well as on the basis of three year moving averages obtained from original data. After completing the above, an additional exercise was to eliminate excessively abnormal years in each case and to re-calculate the standard deviation and coefficient of variation for a final review.

Then second degree parabolic function was fitted to temporal profile of coefficient of variation, using the equation $Yij = a+bT+cT^2$ with the year of reversibility being identified as T = b/2c. The graph of coefficient of variation against time was obtained in each case. This has been done to study the effectiveness of agricultural price commission in controlling the variability in agricultural prices in due course of time and reducing the interstate disparity in variability in wholesale prices.

Lastly a regression model have seen fitted taking variability of wholesale prices as dependent variable and variability in production, the irrigation intensity of particular crop concerned and the variability in relative price (in case of wheat),

as the explanatory variable to study the effect of variability in these factors on the variability of wholesale prices.

To sum up, The trend growth rate of wholesale prices have been calculated for various states using semilog regression model taking price as dependent and time as explanatory variable. The model fitted was in the form

$$\log Y = a+bT$$

For conducting the variability analysis, each year has been divided into four quarters, consisting three months each.

(a) the basis for such division is that Q1 is the harvest peak marketing quarter in each case; the second and third quarters (Q2 and Q3) are the following intermediate quarters; while the last quarter Q4 is the quarter preceding the next harvest.

(b) The maximum price differential have been calculated assuming the price prevailing in the first quarter to be the minimum price as it is lowest in maximum number of cases and taking the maximing price out of Q2, Q3 or Q4 since the price prevailing in the fourth quarter need not necessarily always be the highest.

(c) to be sure that judgement on the temporal behaviour of price variability, we computed the coefficient of variation across the twelve months of each year for each crop. The time seriesly each coefficient of variation was transformed to a graph so as to develop a broad idea of whether the fluctuations since

introduction of government's interventionist policies have mellowed down. To lend statistical authenticity, to visual impression gathered through inspection of the graphs, the fitted a second degree polynomial of the type

$$Yij = a+bT+cT^2$$

Where Y_{ij} is the coefficient of variation for the i^{th} crop in j^{th} state, T stands for the chronological time.

Our priori assumption is that statistically b is positive and c is negative so that the time graph of C.V. shows an upward trend to begin with, continues to rise for some years and then conforms to a downward trend. If the empirical reality is as described just above, then there is a time frame where C.V. maintains the maximum level. In other words it flips over from the stage of rising trend to declining trend. In the above question this point of time is reached when T = b/2c. To put it in our context, the intrayear price variability becomes less and less pronounced beyond (b/2c)th year of our series.

In terms of indicators of variability computed by us, the success of government intervention is established by its effectiveness in reducing the interstate disparities in wholesale prices. If it had any success then which are the states among the considered ones that have benefited much.

Finally regression analysis have been undertaken by taking C.V. in price as dependent and CV in production, CV in irrigation intensity and the relative price (in case of wheat) for knowing whether these have any effect on price variability.

CHAPTER III

CASES FOR GOVENRMENT INTERVENTION, A PARTIAL EQUILIBRIUM APPROACH

III.I. NECESSITY OF GOVENMENT INTERVENTION :

The necessity of intervention of government for the pricing of agricultural product owes to many reasons :

(i) Land is limited in quantity. It's supply is not inexhaustible. That means the perfect inelastic supply of land leads to excessive pressure on land for food production and hence heavy foodgrain prices due to increasing demand for foodgrains with the increase in population. As the land is non-reproduciable, the increased consumption demand for food pressurises land which not only enhances land rent but also affects the food prices.

(ii) Land is pre-eminently subject to diminishing returns. Modern economists have veered round to the view that diminishing, constant and increasing returns are not separate but three phases of one general law of variable proportions. Uptill Marshall it was thought that law of diminishing returns applied to agriculture only. The law examines the production function with one variable factor, keeping the quantities of other factor fixed. "As the proportion of one factor in a combination of factors is increased, after a point, first the marginal and then

the average product of the factor would be diminished".[1] The occurrence of diminishing marginal physical returns after a point has been confirmed by the overwhelming empirical evidence. Indeed, if the diminishing returns did not occur, one could grow adequate amount of foodgrains even in a flower pot by using more dozens of labour and capital. Prof. R.G. Lipsey is right when he emphasises, "Indeed, were the hypothesis of diminishing returns incorrect, there could need to be no fear that the present population explosion will bring with it a food crisis. If the marginal product of additional workers applied to a fixed quantity of land were constant, then world food production could be expanded in proportion to the increase in population merely by keeping the same proportion of the populations on farms. As it is, diminishing returns means an inexorable decline in the marginal product of each additional labour as an expanding population is applied, with static techniques, to a fixed world supply of agricultural land."[2]

On the other hand, developing countries have not made much progress in technical knowledge and in accumulation and using adequate capital and equipment like machinery, tools, fertiliser etc. It is no wonder therefore that agricultural productivity has not risen sufficiently. In fact marginal productivity of labour has gone down. The phenomenon of disguised unemployment found in agriculture of developing countries reveals that marginal productivity of worker is zero or nearly zero. It is hence clear that actual experience regarding the behaviour

[1] F. Benham – Economics 1960.
[2] R.G. Lipsey – Introduction to positive Economics p. 216.

of agricultural productivity in both developed and developing countries is in no way a contradiction to the law of diminishing returns, the operation of which is subject to the condition that technical knowledge, capital equipment and other aids of production remain the same.

(iii) Land is heterogeneous in quality. Quality of land, i.e., its fertility and location, varies. Some pieces of land are more fertile than others. Again some pieces of land are more favourably situated than others. That to say they are located nearer to the market centres, where the produce is to be sold. Fertility of tracts of land varies primarily because of the differences in the nature of soil, temperature, rainfall and other climatic factors. With a given application of labour and capital, some pieces of land will yield more output per acre than others. Hence the differences in fertility will bring about differences in the costs of production of various farmers operating on the different grades of land. The farmers working on the superior or more fertile grades of land will have their average cost curves at a lower level than those working on the inferior or less fertile grades of land. Likewise, difference in location will cause differences in costs of various farmers, because of the differences in transportation costs. Hence owing to heterogeneous quality of land, the productivity as well as the prices vary.

III.II Allocative efficiency and government intervention

The case for government intervention can also be judged on the ground of resource allocation and social welfare. Resource allocation or economic efficiency

plays a crucial role in determining the courses of action on the part of government which is welfare oriented. By economic efficiency we mean that resource allocation to the production of a good is such that it maximises social welfare, i.e. satisfaction of the consumers. Hence, where as under perfect competition allocation of resources is pareto optimum and therefore social welfare is maximum, under monopoly resources are misallocated causing loss of social welfare. We can compare the allocative efficiency of perfect competition and imperfect competition.

Perfect competition is regarded as an ideal market form as under it social welfare is maximum. Economic efficiency is achieved in the long run competitive equilibrium. There are two different notions of economic efficiency. First, economic efficiency is interpreted as the production of a commodity with the least possible combination of resources. Secondly, the economic efficiency is interpreted in broader terms, namely, the resource allocation among commodities and hence composition of production mix, such that it is in accordance with the preferences of consumers and maximises their satisfaction. In the second sense, economic efficiency is often refered to as allocative efficiency or optimum direction of production.

The second concept of economic efficiency, in the sense of allocation of resources which maximises the satisfaction of consumers, is also achieved in competitive equilibrium, because of prices being equated with MC under perfect competition as a condition of equilibrium. Price may be interpreted as the marginal utility (indicating willingness to pay) which a consumer derives from the

consumption of a commodity. The consumer's satisfaction or total utility will be maximised if the marginal cost of production of a commodity, which reflects the opportunity cost of resources, used in its production, equals price of the commodity. If the level of production falls short of the equality between M.C. and price, this would show some units of the good are not being produced which adds to satisfaction of the consumer more than it costs society to produce them. Hence maximum welfare is achieved if production of commodity is expanded to the level of equality point of MC with price. We can explain the achievement of allocative efficiency ensuring maximum welfare with the help of concept of consumers surplus and producers surplus.

In the fig.(1) DD is the demand curve which reflects the marginal utility of the commodity as the consumer consumes more unit of it. SS is the supply curve for the commodity which under perfect competition is derived from horizontal summation of marginal cost curve and therefore indicates marginal cost of production.

(a) Price equate demand and supply and hence help to clear the market such that producers can maximise their profit and consumers can maximise their utility.

(b) Allocation of resources is efficient when, for each commodity the condition P=MC is satisfied. Since in equilibrium P=MC for every industry in perfectly competitive market, it follows that universal perfect competition fulfils the condition for allocative efficiency by ensuring price = marginal cost in each industry.

Imperfect competition have been criticised on the grounds of misallocation of resources or economic inefficiency in resource allocation. By economic efficiency we mean that resource allocation to the production of a good is such that it maximises social welfare, i.e. the satisfaction of consumers. Hence, whereas under perfect competition allocation of resources is pareto optimum and hence social welfare is maximum, under monopoly, resources are misallocated causing loss of social welfare.

Under perfect competition industry will be in equilibrium with ON output being produced and price OP_c or NA of the product is determined by the forces of demand for and supply of the product and is equal to marginal cost of production. In the diagram, under perfect competition price will be NA or Op_c which is equal to marginal cost at ON level of output. It will be seen that with Op_c or NA as market price, buyers obtain consumer's surplus equal to area ATP_c (fig.2).

Now under imperfect competition the output will be produced at OM. The Price will be set at Op_m or ML of the product. With output equal to OM and price Op_m, the monopolists gain is P_mLEP_c, on the otherhand, with the rise in price to Op_m and fall in output to OM under monopoly, the consumers surplus has been reduced to LTP_m. Therefore, under monopoly consumers have suffered a loss of consumer surplus equal to the area APL_mP_c. Out of the total loss of consumer surplus, monopolist has gained profits equal to the area P_mLEP_c. Hence where as consumer loses, the producer gains due to monopoly. There has been redistribution of income in favour of the monopolist. But the consumer's loss of surplus is more

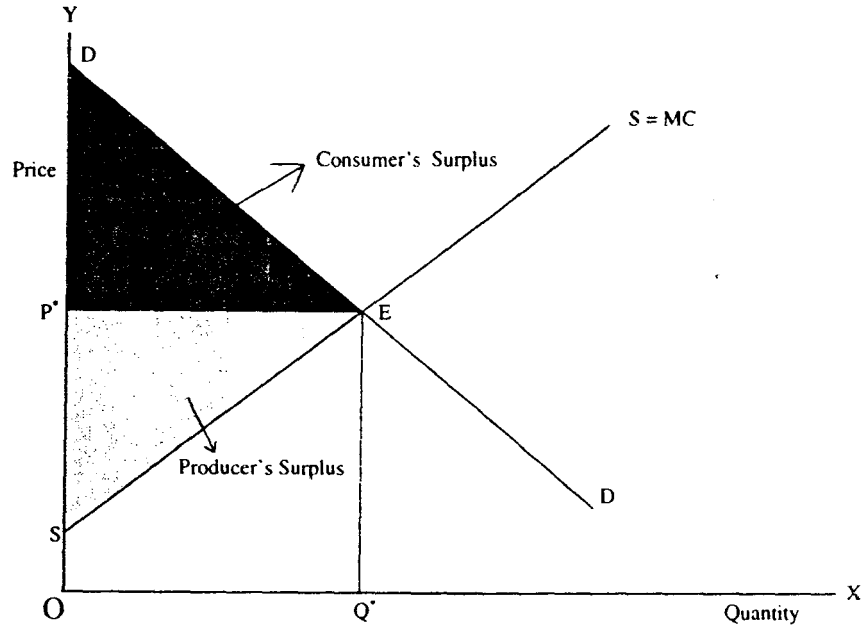


Fig. No. 1

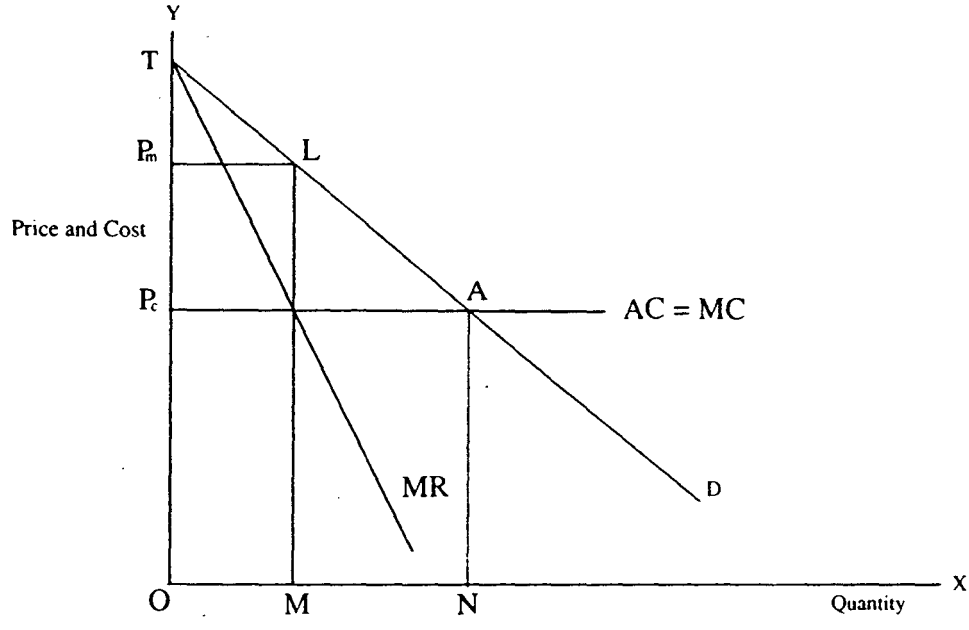


Fig. No. 2

than the gain of profits by the monopolist. There is net loss of consumer's welfare equal to the area LEA.

Hence monopoly causes misallocation of resources and net loss of welfare (dead weight loss) by not producing the level of output of the commodity whose price equals marginal cost of production. In addition to causing net welfare loss, monopoly has also caused transfer of income away from the consumers. The momentary gain of the monopolist equal to the area P_mLEP_C representing this transfer of income to monopolist producer; the monopolist has gained at the expense of consumers. Hence monopoly affects income distribution in an economy.

When marginal cost curve is a horizontal straight line, the loss in welfare occurs only in case of consumers. But when marginal cost curve is rising, the loss in welfare due to reduction in output by the monopolist will occur not only in reduction in consumer surplus, but also in producer surplus. Maximum social welfare or economic efficiency is achieved when the sum of consumers' surplus and producer surplus is the maximum. In a perfectly competitive equilibrium where quantity demanded equals quantity supplied or price equals marginal cost, the sum of consumers surplus and producers surplus is maximum and hence perfect competition ensures maximum social welfare or economic efficiency. But to be in equilibrium and maximise profits, monopolist does not equate price with marginal cost Instead he equates marginal revenue with marginal cost and hence reduces output and raises price and thereby causes loss of welfare. Loss in welfare as

measured by the reduction in the sum of consumers surplus and producer's surplus is depicted in the fig.3.

Under perfect competition, equilibrium is at D where price is P* and quantity OQ*. If monopoly comes into existence, the monopolist producer will charge a higher price P_m. The loss in consumer surplus suffered by the buyers is equal to area P^*DAP_m. Due to the higher price charged by the monopolist, his gain in profits or producer surplus equals to P^*DAP_m. Apart from the net loss of consumer surplus, there is also a loss of producer surplus due to reduction in output by the monopolist. The producer's surplus is lost by BDE due to reduction in output. The loss in producer's surplus BDE is also a dead-weight loss caused by the inefficiency or lower production due to monopoly because this has not transferred to or benefited any other. Hence the total deadweight welfare loss caused by the monopoly is equal to the whole area AED which is the sum of net loss of consumers surplus ABD and the loss of producers surplus equal to BDE, represents social cost of monopoly (fig.3).

Hence, monopolist not only makes supernormal profits in general and increases inequalities in income distribution, but also causes inefficiency in the allocation of resources of the society. It has therefore been realised to regulate monopoly with a view to achieving two objectives. First it is regulated to improve income distribution and prevent exploitation of consumers by monopolist. Secondly, monopoly is regulated so as to ensure economically efficient allocation of resources. In order to improve allocation of resources or the distribution of

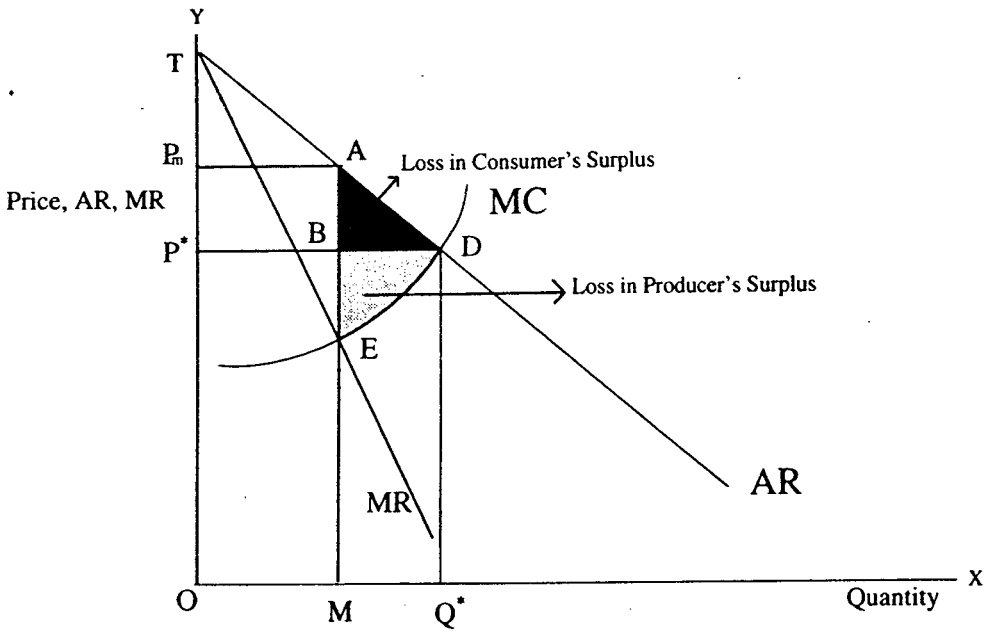


Fig. No. 3

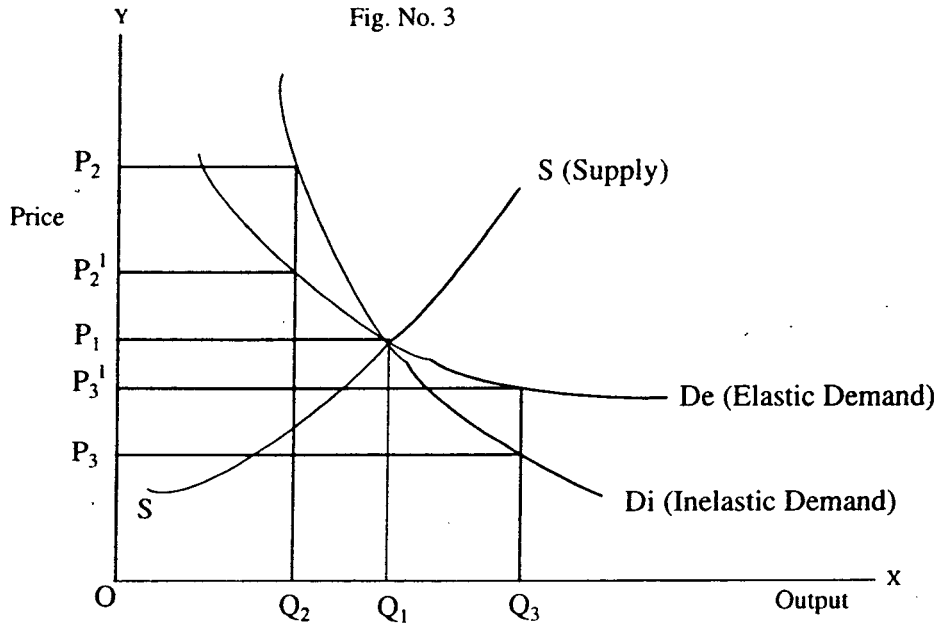


Fig. No. 4

income, the government decides to regulate the price charged by the monopoly. Hence there is the crucial role to be played by the Agricultural Price Commission in fixing the varieties of prices at the level that maximises social welfare.

III.III. CASE OF PRICE FLUCTUATION :

Fluctuations in price caused by unplanned fluctuations in supply operating on, elastic and inelastic demand curves. If there are unplanned variations/fluctuations in agricultural output then actual output and sales will diverge from their planned level. Unplanned fluctuation in output, will cause price variations in the opposite direction i.e. higher the output, lower the price. For given output fluctuations, the smaller the elasticity of demand for the product, the larger is the price variations (fig.4). The different cases that emerge are :

(a) if elasticity of demand exceeds unity (ed>1), then unplanned increase in supply will raise the farmers revenue while unplanned decrease in supply will lower them.

(b) if elasticity of demand is less than unity (ed<1), then consumer's total expenditure on the product and hence farmers revenues will rise when price rises, and fall when price falls. Hence a good harvest will bring reductions in total farm revenues while bad harvest will bring increase in farm revenue.

(c) If elasticity happens to be unity, then farmer's revenues will not vary as output and prices vary because every change in output will be met by an exactly compensating change in price, so that total expenditure remains constant.

Hence to meet the fluctuations in demand and supply the Food Corporation of India has been entrusted with the responsibility of maintaining bufferstocks of foodgrains on behalf of the government. Also the Agricultural price has been fixed by APC to restrict the price fluctuations. Here our main emphasis is on studying the variability of agricultural prices, its growth rate and the interstate disparity in variability of wholesale prices.

III.IV. Nature of Dualism in Foodgrain Market

In India, as in other developing countries, foodgrain economy is subject to intervention by government in various degrees. Arguments advanced in justification of such intervention are generally based in the nature of demand and supply of food grains. Low price elasticity of demand for foodgrains, the biological nature of foodgrains supplies and seasonality of production cause wide fluctuations in food grain prices. Prices rise (decline) disproportionately, i.e., more than the decline in output. High and unstable prices can affect consumption levels. This is clearly undesirable in a country like India having a large population with low incomes and poor nutritional levels. Since a reduction in consumption is not a politically acceptable solution, the burden of adjustment falls on the supplies which can come from domestic production, depletion of stocks or imports or a combination of these three.

There are wide interstate differences in the availability of foodgrains. There are many food deficit states which are dependent on surplus states for their supplies. There are also interclass differences in food availability. The government therefore aims at protecting the vulnerable classes with low incomes and poor economic access to food grains by segmenting the market and supplying low price foodgrains through its public distribution system. In practice however, this system operates as a universal food subsidy programme.

These features of food economy have induced direct and active public intervention to achieve various objectives.

(a) to increase food production by inducing farmers through better output prices and subsidised input prices.

(b) to increase nutritional standards of the vulnerable sections of society by distributing foodgrains at low prices through public distribution system and wage employment programme;

(c) to maintain a stock of foodgrains to meet the requirements of the public distribution system and to tide over crop shortages for maintaining overall stability of inter seasonal prices;

(d) to reduce the dependence on imports to save foreign exchange and avoid political armtwisting by exporting countries.

(e) to achieve regional equity in production as well as distribution of foodgrains.

The main strategy of food management in India has been to divide the foodmarket into two segments: a government controlled segment and an open market segment. In the former, the government policies with the demand and supply forces to achieve certain goals that have been already enumerated. The rest of the market, though technically working within the normal demand and supply framework; is closely related to and influenced by the controlled segment of the market. Such dualism is typical of developing countries.

The instruments used to manage the food economy include procurement of foodgrains through a pre-designed parastatal at a price fixed by the government on the recommendation of an expert body on agricultural prices; maintenance of food stocks consisting of stock meant for the public distribution system and buffer stocks to even out temporal price fluctuations; distribution of foodgrains of concessional prices through a network of fair price shops and also through wage employment programmes; complete monopoly on imports and restrictions on exports; restriction on movement of foodgrains within the country through zoning of various kinds; monopoly procurement of foodgrains thereby preventing entry of private traders in the market; imposition of compulsory levy on producers, traders and processors; and legislative instruments such as declaring certain commodities as essential commodities and fixing stockholding and price limits.

In the dualistic food market of the type, the share of government tends to be large enough to influence open market system. In such a situation, policy makers often want to evaluate the effects of various government actions on the entire food

economy. Since the effects of a given exogenous change is felt on more than one segment of the food economy, it is important to study the food sector in a composite framework reflecting interlinkages between various subsystems. Emphasis in the study is on the variability of wholesale prices and the interstate dispareties in it.

III.V. Magnitude of Intervention

Government not only directly controls product markets in different ways but also intervenes in input markets. In product markets, government undertakes procurement, maintains stocks, regulates imports, distributes foodgrains at concessional prices, imposes several administrative restrictions to facilitate food management. In input markets, government either directly steps in and makes public investments as in irrigation projects or supplies inputs at subsidised prices.

The central Government maintains foodstocks commensurating to the requirements of (a) the prescribed minimum buffer stock for food security; (b) operational stock for monthly releases of foodgrains for supply through the PDS, and of (c) market intervention stock for release in the open market (Table.1). Wheat procurement during April-June 1996 at 8.18 million tonnes was lower by over 4 million tonnes over last year's procurement of 12.33 million tonnes. The fall in the quantity of procurement of this magnitude was rather unexpected, given the earlier assessment of a normal wheat crop in 1995-96. It was only in late 1996, that a fresh assessment of crop output revealed that the wheat crop in 1995-96 may

NET AVAILABILITY, PROCURMENT AND PUBLIC DISTRIBUTION OF FOODGRAINS

(Million tonnes)

Year	Net production of foodgrains	Net imports	Net availability of foodgrain@	Procurement	Public distribution#	Col. 3 as % of Col. 4	Col. 5 as % of Col. 2	Col. 6 as % of Col. 4
1	2	3	4	5	6	7	8	9
1951	48.1	4.8	52.4	3.8	8.0	9.2	7.9	15.3
1952	48.7	3.9	52.0	3.5	6.8	7.5	7.2	13.1
1953	54.1	2.0	56.6	2.1	4.6	3.5	3.9	8.1
1954	63.3	0.8	63.9	1.4	2.2	1.3	2.2	3.4
1955	61.9	0.5	63.2	1.3	1.6	0.8	2.1	2.5
1956	60.7	1.4	62.6	Neg.	2.1	2.2	Neg.	3.4
1957	63.4	3.6	66.2	0.3	3.1	5.4	0.5	4.7
1958	58.3	3.2	61.8	0.5	4.0	5.2	0.9	6.5
1959	69.0	3.9	72.3	1.8	5.2	5.4	2.6	7.2
1960	67.5	5.1	71.2	1.3	4.9	7.2	1.9	6.9
1961	72.0	3.5	75.7	0.5	4.0	4.6	0.7	5.3
1962	72.1	3.6	76.1	0.5	4.4	4.8	0.7	5.7
1963	70.3	4.5	74.8	0.8	5.2	6.1	1.1	6.9
1964	70.6	6.2	78.1	1.4	8.7	8.0	2.0	11.1
1965	78.2	7.4	84.6	4.0	10.1	8.8	5.2	11.9
1966	63.3	10.3	73.5	4.0	14.1	14.0	6.3	19.2
1967	65.0	8.7	73.9	4.5	13.2	11.7	6.9	17.8
1968	83.2	5.7	86.8	6.8	10.2	6.5	8.2	11.8
1969	82.3	3.8	85.6	6.4	9.4	4.5	7.8	11.0
1970	87.1	3.6	89.5	6.7	8.8	4.0	7.7	9.9
1971	94.9	2.0	94.3	8.9	7.8	2.1	9.3	8.3
1972	92.0	(-)0.5	96.2	7.7	10.5	(-)0.5	8.3	10.9
1973	84.9	3.6	88.8	8.4	11.4	4.0	9.9	12.8
1974	91.6	5.2	97.1	5.6	10.8	5.3	6.2	11.1
1975	87.4	7.5	89.3	9.6	11.3	8.4	10.9	12.6
1976	105.9	0.7	95.8	12.8	9.2	0.7	12.1	9.6
1977	97.3	0.1	99.0	9.9	11.7	0.1	10.1	11.8
1978	110.6	(-)0.6	110.2	11.1	10.2	(-)0.5	10.0	9.2
1979	115.4	(-)0.2	114.9	13.8	11.7	(-)0.2	12.0	10.2
1980	96.0	(-)0.3	101.4	11.2	15.0	(-)0.3	11.6	14.8
1981	113.4	0.7	114.3	13.0	13.0	0.6	11.4	11.4
1982	116.6	1.6	116.9	15.4	14.8	1.4	13.2	12.6
1983	113.3	4.1	114.7	15.6	16.2	3.5	13.7	14.1
1984	133.3	2.4	128.6	18.7	13.3	1.8	14.0	10.4
1985	127.4	(-)0.4	124.3	20.1	15.8	(-)0.3	15.8	12.7
1986	131.6	0.5	133.8	19.7	17.3	0.4	15.0	12.9
1987	125.5	(-)0.2	134.8	15.7	18.7	(-)0.1	12.5	13.8
1988	122.8	3.8	130.8	14.1	18.6	2.9	11.5	14.2
1989	148.7	1.2	147.2	18.9	16.4	0.8	12.7	11.1
1990	149.7	1.3	144.8	24.0	16.0	0.9	16.0	11.0
1991	154.3	(-)0.1	158.6	19.6	20.8	Neg.	12.7	13.1
1992	147.3	(-)0.4	148.5	17.9	18.8	(-)0.3	12.2	12.7
1993*	157.5	3.1	149.8	28.1	16.4	2.1	17.9	10.9
1994*	161.2	1.1	154.8	26.0	14.0	0.7	16.1	9.1
1995*	167.6	0.4	169.8	22.6	15.3	0.2	13.5	9.0
1996*	157.9	-1.2	165.2	19.8	20.5	-0.7	12.5	12.4
1997*	**174.4**	**1.0**	**177.2**	**23.6**	**20.5**	**0.6**	**13.5**	**11.6**

* Provisonal.

Neg. Negligible.

@ Net availability = Net production+Net imports - changes in Government stocks.

\# Includes quantities released under the Food for Work Programme during the year 1978 to 1990.

Notes: Production figures relate to agricultural year: 1951 figures correspond to 1950-51 and so on.
Figures for procurement and public distribution relate to calender years.

Source: 1. Ministry of Food.
2. Directorate of Economics & Statistics, Department of Agriculture & Cooperation.

have been lower by about 3 million tonnes over the production of 65.6 million tonnes in preceding years. Consequently 1995-96 foodgrains output was scaled down to 185 million tonnes as against the earlier estimate of 191 million tonnes. In the current rice year 1996-97, 80.58 lakh tonnes of rice had been procured between October 1996 to January 1997 as against 64.37 lakh tonnes during the corresponding period of the last year.

The comfortable stock position that characterised 1995-96 because somewhat difficult in the later part of 1996-97, especially for wheat. Wheat stock in July, 1996 at 13.9 million tonnes, was only marginally above the buffer stock norm but fell short of the latter in the beginning of October 1996. To meet the situation, the Government has already announced imports upto two millions of wheat and permitted roller flour mills to import wheat under OGL. Position of rice stock in the central pool continues to be comfortable and as on 1st October 1996, about 9.34 million tonnes of rice was in stock as against 6 million tonnes buffer stock norm for that month. The rice surplus of over three million tonnes was however less than that of 1995.

In pursuance of its goal, to keep prices of foodgrains low for the consumers but at the same time providing incentive to producers, government makes available key agricultural inputs at subsidised prices and bears heavy fiscal burden as input subsidies. In India, subsidy is offered on fertilisers, elasticity, credit and irrigation. This is besides the direct food subsidy, which results from selling foodgrains at

prices lower than their economic costs. Fertiliser subsidy is explicitly provided for in the budget and hence draws much attention and debate. Subsidy in irrigation, credit and elasticity represents losses to the organisations supplying these inputs at a price less than the cost of supply. Input subsidies impose burden on country's resources and provide perverse signals for resource allocation. These subsidies are unevenly distributed across states and crops.

Hence the presence of government in rice and wheat market is substantial not only in terms of the quantities handled but also in terms of its administered price policy which influences the open market prices output and inputs. The policy is supplemented by legislative and administrative measures.

CHAPTER IV

INTRAYEAR VARIABILITY IN WHOLESALE PRICES

As far as the effectiveness of government intervention in controlling wholesale prices is concerned, relative price to plays an efficient allocative role and does not lead to undesirable cropping pattern shifts. Policies must be designed to cover all the major crops on a countrywide basis, an impossible task to accomplish. Secondly since public distribution of subsidized grain cannot cope with entire market demand, the impact of policies on market process assumes importance. Hence with the government handling only a fraction of the marketed surplus, the pricing objective may in the end be defeated by market forces. The design of price policies with only a limited control over the market not only involves an appropriate combination of procurement, stock accumulation and depletion policies but must necessarily be based on a sound knowledge of implied working of dual markets. The biggest hindrance in this respect is not lack of knowledge about production trends and demand elasticity but over virtual ignorance about private traders at different tiers of grain market and their impact on prices.

Apart from this more factors responsible for the price behavior are, firstly weather and irrigation induced output fluctuations of wide order, combined with high price flexibility coefficients; and secondly the bounty of good harvests being used more for stock building than for price reductions. The asymmetry between the protection of producer interests through price support-inherent in withholding

supplies in good years and the protection of consumer is most obvious in this aspect of government operation.

As far as interstate disparity is concerned, the trends in price and the relations between procurement and market prices may not uniformly hold across regions and corps. For rice, until the mid seventies support prices didn't cover costs in West Bengal and the southern states but they did in the case of northern states. Thereafter however the procurement prices of rice have been increased substantially so as to cover costs uniformly in all producing regions.

Also uniform purchase prices (generally fixed in relation to costs prevailing in high cost region) are likely to have promoted interregional inequalities because of wide variation in costs. In case of open market prices the determination requires properly specified supply-demand prices model but crude calculations can be done on the basis of available demand elasticities and price flexibility's coefficients under the assumption that output levels are exogeneously given.

In a predominantly agricultural economy, the over all rate of economic growth depends to a very large extent, on the rate of growth in agriculture. In India, achievement in the agricultural sector will continue to be a determining factor in the achievements of plan targets for many years to come. The success or failure of programme of agricultural development, in turn depends decisively on the way farmers react to such programmes, since, it is ultimately the farmer who makes the final decision concerning the allocation of land and other resources for particular crop enterprises.

Several measures of public policy can directly or indirectly influence the farmer's decisions. In a freemarket economy, price policy could be considered as one of the potent instruments affecting the farmer's decisions regarding resource allocation. Commenting on Mellor's book "Towards a theory of Agricultural Development,"[1] Theodore W schultz states that "Since there is as yet no known way of organizing and integrating the production activities of numerous farmer's among each other and with the rest of the economy except by system of prices, the requirements of an efficient system of prices should have been high on agenda."[2] Many economists agree with schultz, though in varying degrees, on the role which prices can play in accelerating the rate of development of agriculture.

A positive price policy as a part of growth policy, according to Rajkrishna, has three important functions.[3] (i) to accelerate the growth of agricultural output as a whole : (ii) to accelerate or decelerate growth of output of individual crops or in the context of planning to steer the crop mix according to the targets ; and (iii) to secure adequate increase in the marketed supply of food crops in countries where a large part of output is retained by the peasants for home consumption. In India, as a consequence of rapid technological changes which are taking place in agriculture, the relative profitability position of different crop enterprises is undergoing significant changes which in turn, necessitate the use of price policy for seering the cropmix according to targets. However, for making the price policy an effective instrument for inducing desired changes in resource allocation to different crop

[1] J.W. Mellor (I-58)
[2] Theodre W. Schultz (I-79)
[3] Rajkrishna (I-45)

enterprises, the knowledge of how Farmers react to different price changes is essential.

The degree of price responsiveness is basically an empirical question. There are, however well known and serious difficulties in measuring the degree of responsiveness of producers to price changes. They arise mainly from the difficulties in approximately theoretical formulation of functional relationship to observed real world situations. These difficulties are further compounded because of the timelag between changes in production capacity and changes in output. Despite these problems, the phenomenon of price changes of agricultural commodities and its impact on supplies of these commodities has been a topic of investigation in several studies.[4] Hence here we consider the case of price fluctuations.

Our analysis revolves around the variability in wholesale prices, within each marketing year. For this purpose monthly wholesale prices are the basis of our analysis. Agricultural output is subject to fluctuations, both interyear and intrayear. Where as demand increases at a steady pace with increasing income and population (fig.5), supply does not follow the same pattern (fig.6). For visual clarity the following three figures represent, roughly the typically expected demand and supply patterns of any agricultural commodity over time.

Due to increase in population and living standards or to say the purchasing power along with monetised economy, the quantity demand pattern for

[4] Rajkrishna (I-41), Jaikrishna and M.S. Rao (I-40), Dharam Narain (II-24), N.C.A.E.R. (II-25) Nerlove (II-26), Falcon (I-19), Behrman (II-2).

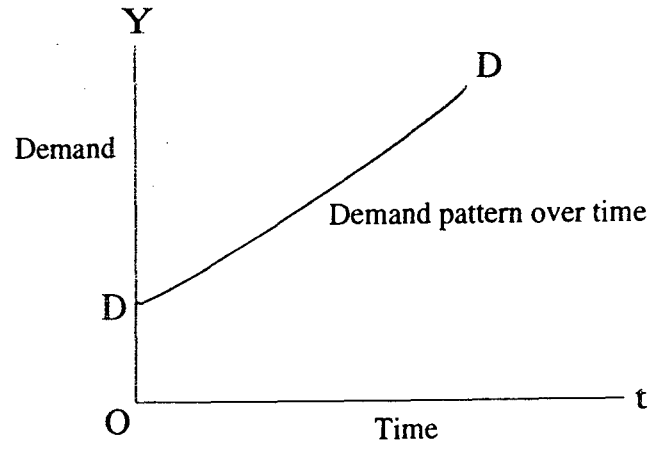


Fig. No. 5

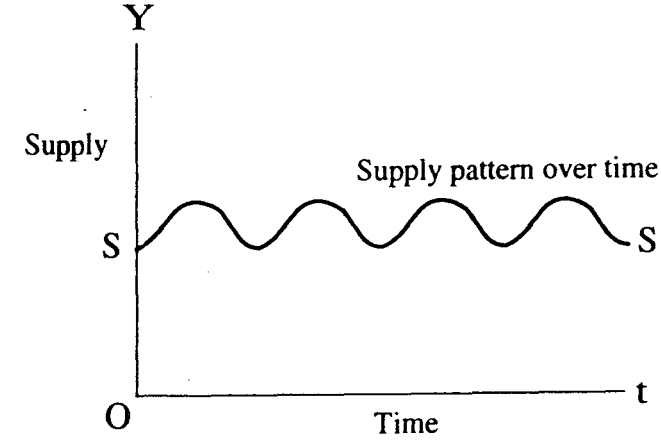


Fig. No. 6

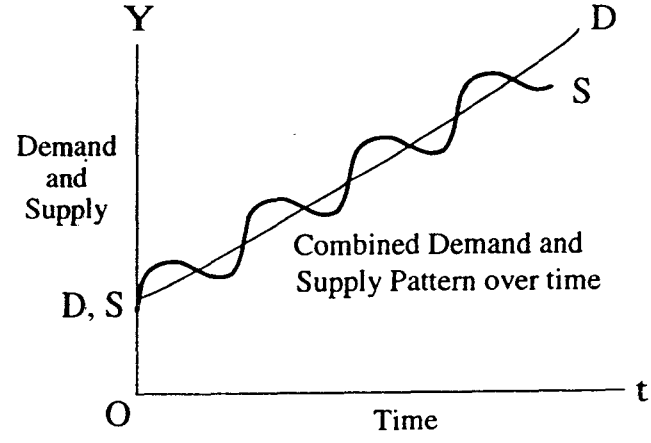


Fig. No. 7

agricultural commodity gradually increases over time. The supply pattern shows fluctuating trend over the time owing to the exogenous factors as well as incentives and disincentives of production over time.

The fig.7, depicts the combined demand and supply pattern over time though the quantity of supply is highly fluctuating, there has been a tendency to approach the demand function. Hence such a zigzag and uncorrelated pattern of demand and supply of an agricultural commodity leads to a situation of either excess demand or excess supply, depending upon which peak is higher than the other. This demand supply imbalance gets mirrored in price fluctuations, intra and interweekly; monthly, seasonally; yearly both intertemporally and interregionally.

The government has attempted price stabilisation through an integrated system of support/procurement, buffer stocks and subsequent disposal. Through these mechanisms, the government can definitely reduce the amplitude of the price fluctuations if not eliminate them, completely. It may also be pointed out that price variations can also take place due to imperfections in the market. Hence with the development of a sound market infrastructure, especially improvement in transportation, price differences can be reduced considerably.

The focus of our study is exclusively on the aspect of price stability. As an operational objective, looking into price stability appears more feasible than quantity stability because, while price can be measured, the quantity available for consumption can not be precisely measured. Secondly it is prices which significantly influence production and consumption decisions, and thirdly, if prices

are stabilised, within reasonable upper limits, consumers will have adequate real income to purchase the quantities they need.

Performance of Indian agriculture has undoubtedly been impressive since the beginning of economic planning particularly when viewed against the background of stagnation in the pre independence period. Although there is no acceleration in the growth of food grains output after the introduction of new technology, i.e. since the mid 1960s, the concentration of growth in the developed regions and the large farm sector has led to a faster growth of marketed surpluses and accumulation of adequate stocks of foodgrains output after the introduction of new technology i.e. since the mid 1960s, the concentration of growth in the developed regions and the large farm sectors has led to a faster growth of marketed surpluses and accumulation of adequate stocks of food grains with the government. The attainment of self sufficiency in foodgrains has thus been associated with a low rate of labour use of agriculture and slow improvement in percapita consumption of food grains in the less developed regions where a large part of the country's population remain below poverty lines.

The instability in agricultural production and hence the variability in prices has increased in post green revolution period on account of rise in the sensitivity of output to variations in rainfall. The rising vulnerability of agricultural output, to droughts is traceable to the high complementarily of new seed fertiliser technology with water and the inadequate expansion of irrigation facilities. Although area under irrigation has increased from about 17% of cultivable area in 1950s to

around 40% now, a good part of irrigation is itself dependent on rainfall. In this sense the uncertainty of irrigation has been increasing in the recent period.

The objective is to bring out the growth in wholesale prices and its variations since the beginning of economic planning of India to date and to identify the factors responsible for variations in sensibility of prices, particularly of food grains. As such stable or steady growth can never be a realistic or attainable goal. Yet there is significant scope to reduce instability in wholesale prices through appropriate policy interventions. In fact, measures to reduce the instability in wholesale prices upto a point will prove to be less costly to the economy and polity than the costs of providing employment ot landless labour and the marginal farmers through public distribution system by maintaining large stocks of food grains. It is this concern that had prompted us to examine the prospects for reducing the instability in wholesale prices and interstate disparity in its and to outline the measures for achieving this.

There are wide disparities in rates of growth of wholesale prices between different states. These disparities seem to have been affected by the disparities in growth rate of production which have widened in the post green revolution period when much smaller number of states examined above average growth rate than during 1960s. Variation in the performance of individual states seemed to be as significant as interstate variation in performance within each of the above two periods.

Shifts in cropping pattern over a period of time in terms of changes in the relative importance of each crop in the total crop output of the country, as well as

the locational (interstate) shifts in crops can influence the instability in output at different levels. Such shifts in cropping patterns reflect the changes in comparative advantages caused by changes in infrastructural conditions and institutional development. A shift in cropping pattern in favour of crops which are highly sensitive to rainfall can result in increasing instability in total crop output. Similarly a shift in the location of centres of growth towards regions, which are particularly vulnerable to rainfall or irrigation variations, can result in raising the overall instability in crop output. Such shifts in their wake may alter the offsetting patterns between the output of various crops across the states. In general, concentration of growth in a few regions may weaken the offsetting effects hence thereby reinforcing instability in supply of output and hence prices.

An interesting aspect of the Indian economic growth is the correlation between agricultural growth and overall growth or level of overall development. Punjab, Haryana, Madhya Pradesh and Gujarat are clear examples of such a correlation. The two other states where agricultural growth has been higher than the national average in the post green revolution period are Utter Pradesh and Andhra Pradesh.

But as well known, agricultural breakthrough, in these states has occurred within regions characterised by higher overall development. All these states and regions are characterised by better infrastructure in respect of public irrigation, rural electrification, roads, literacy levels, land tenure systems, credit and marketing institutions, administrative capabilities etc. The resource position of the farmers as well as of the governments in these states is distinctly above the

national average. These factors are particularly favourable to the breakthrough in yields from input intensification. The experience also shows that there is no unique relationship between growth and instability. The experience of Punjab and Haryana shows for example that instability is not an inevitable accompaniment of growth. Rather it depends on the infrastructural environment in which growth is brought about. Hence corresponding to interstate disparities in agricultural growth and output, there prevails the interstate disparities in prices particularly the wholesale prices in which we are concerned.

IV.I. Interstate disparity in Growth rate of wholesale prices:

In order to analyse the existence and persistence of intrastate disparities in wholesale prices, we have used the semilog model to calculate the growth rate. This provides the trend growth rate in wholesale prices. The semilog model is provided by the equation.

$$\text{Log } Y = a + bt$$

Where log Y stands for the logarithmic value of the wholesale prices of particular product for a particular state during a particular period. 't' stands for the time period concerned. Here in our case t has been choosen as the time frame between 1950-1992. 'a' is the constant and b is the coefficient of time.

The equation have been made for thirteen states in case of rice, nine states in case of wheat and seven states in case of Bajra. The result has been provided in the table and the graph also have been displayed. Along with the growth rate of

wholesale prices of the states, the all India growth rate has also been calculated in order to make our analysis more viable and to substantiate it convincingly.

As far as the growth rate in wholesale prices of rice (table 4.1) is concerned (Graph 4.1), Gujarat has the lowest growth rate in wholesale prices of rice at 2.202 per cent per annum. On the other hand Punjab possess highest growth rate during the same period, touching 4.493 per cent per annum. The all India trend growth rate in wholesale prices stood at 2.79 per cent per annum. West Bengal, 2.802, Orissa 2.893, Karnataka 2.89, Madhya Pradesh 3.096 and Andhrapradesh, 2.809 are the states that have possessed the trend growth rate higher than the all India level.

On the other hand Assam 2.176, Bihar 2.504, Kerala 2.624, Maharashtra 2.439, Uttar Pradesh 2.695, and Tamil Nadu 2.647 per annum, are the states in which the growth rate remained lower than the growth rate of wholesale prices of rice in all India level during 1950 to 1992.

In all cases the T value remained between 11.827 (U.P.) to 39.595 (Andhra Pradesh), and t remaining significant at 1 percent level in all cases. Hence the result emphases that there persists interstate disparity in growth rate of wholesale prices of states and also they have deviated from the national level.

From the above analysis it is quite clear that the major rice producing states and where the marketing facilities have been developed, have possessed higher growth rates.

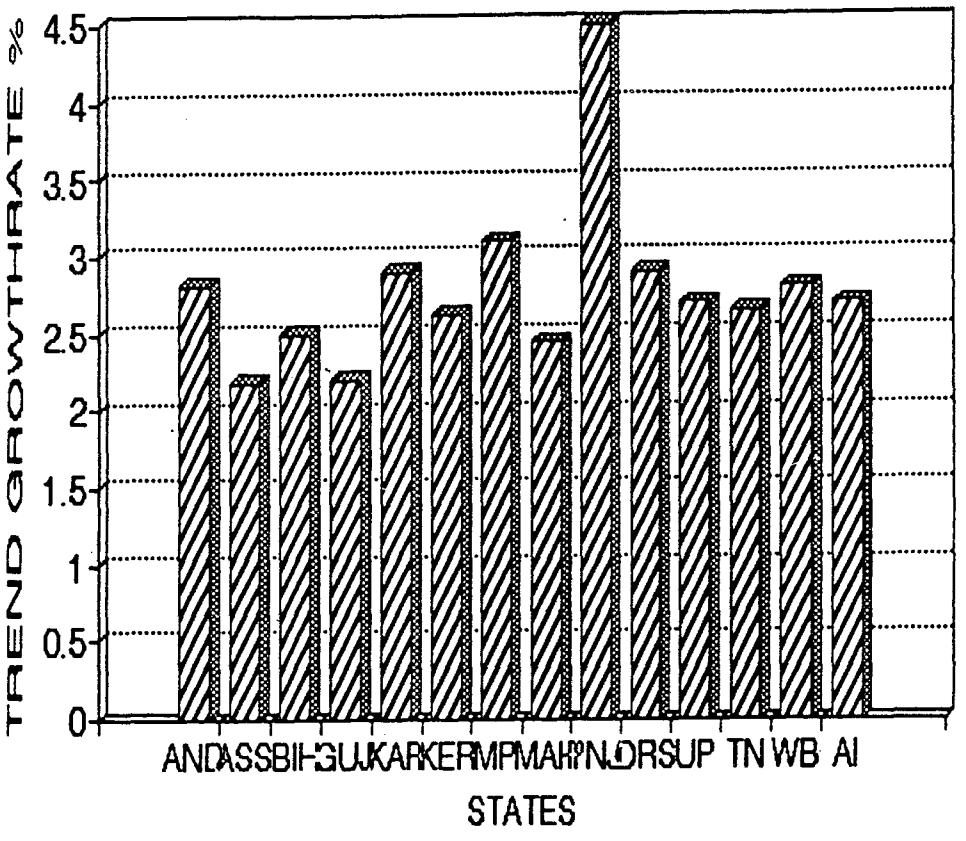
TABLE NO. 4.1

TREND GROWTH RATE IN WHOLESALE PRICE OF RICE (1950--1992)

STATES	CONST.	b coeff.	Growth Rt	R^2	T	Sig.T
ANDH	1.47220	0.02809	2.809	0.97512	39.595	0
ASS	1.58780	0.02176	2.176	0.89817	18.784	0
BIH	1.59315	0.02504	2.504	0.92200	21.809	0
GUJ	1.69709	0.02202	2.202	0.85800	15.546	0
KAR	1.50220	0.02888	2.888	0.95492	29.108	0
KER	1.50212	0.02624	2.624	0.96112	31.470	0
MP	1.42890	0.03096	3.096	0.94742	26.847	0
MAH	1.54282	0.02439	2.439	0.86770	16.197	0
PNJ	1.39172	0.04493	4.493	0.90423	19.433	0
ORS	1.44228	0.02893	2.893	0.97051	36.284	0
UP	1.52623	0.02695	2.695	0.77762	11.827	0
TN	1.49024	0.02647	2.647	0.91973	21.409	0
WB	1.53105	0.02802	2.802	0.96506	33.237	0
All India	1.51599	0.0279	2.79	0.96356	32.524	0

GROWTTH RATE OF WHOLESALEPRICE OF RICE

(1950-1992)



If we consider the trend growth rate in wholesale prices of wheat, then it is clear from the table 4.2 and (Graph 4.2) that Madhyapradesh possessed highest level of growth of wholesale prices in wheat at 2.93 percent per annum. On the other hand Himachal maintained the lowest growth rate of wholesale price of wheat among the states concerned. In Himachal the growth rate remained at 2.158 percent per annum. If we consider the case of all India level, then the growth rate of wholesale prices of wheat in all India level remained at 2.52 percent.

Punjab is the only state other than Madhya Pradesh which maintained a higher growth rate of wholesale price of wheat than all India level and followed by Madhya Pradesh. The growth rate of Punjab remained at 2.695 percent per annum.

In case of the growth rate in wholesale prices of Bajra for the states (table 4.3) is concerned (Graph 4.3), Uttar Pradesh is the state which maintained highest growth rate in wholesale prices. The growth rate of wholesale prices remained at 2.8%. On the otherhand the lowest growth rate was maintained by Gujarat 2.302%The all India average touched the level of 2.58%. The states those possessed lower growth rate than all India average are Maharashtra 2.491%, Rajasthan 2.341%, Tamil Nadu 2.379%. On the otherhand except Uttar Pradesh, Andhra Pradesh 2.761% and Punjab 2.538% are the other states those maintained higher growth rate than the all India level.

For a better analysis the time period has been divided into two segments. The first one contaminates with the pre-government intervention phase (1950-1965) and the second one with the post government intervention phase 1966-1992.

TABLE NO.4.2

TREND GROWTH RATE IN WHOLESALE PRICE OF WHEAT (1950--1992)

STATES	CONST.	b coeff.	Growth Rt	R^2	T	Sig. T
BIH	1.56555	0.02180	2.180	0.89479	18.444	0
GUJ	1.56170	0.02189	2.189	0.92731	22.590	0
HIM	1.56286	0.02158	2.158	0.91213	20.377	0
KAR	1.62340	0.02215	2.215	0.84379	14.699	0
MP	1.41730	0.02931	2.931	0.91800	21.162	0
MAH	1.52186	0.02441	2.441	0.96038	31.140	0
PNJ	1.39093	0.02695	2.695	0.96825	34.924	0
RAJ	1.48361	0.02277	2.277	0.94094	25.245	0
UP	1.49318	0.02234	2.234	0.93251	23.510	0
All India	1.51338	0.02515	2.518	0.95672	29.736	0

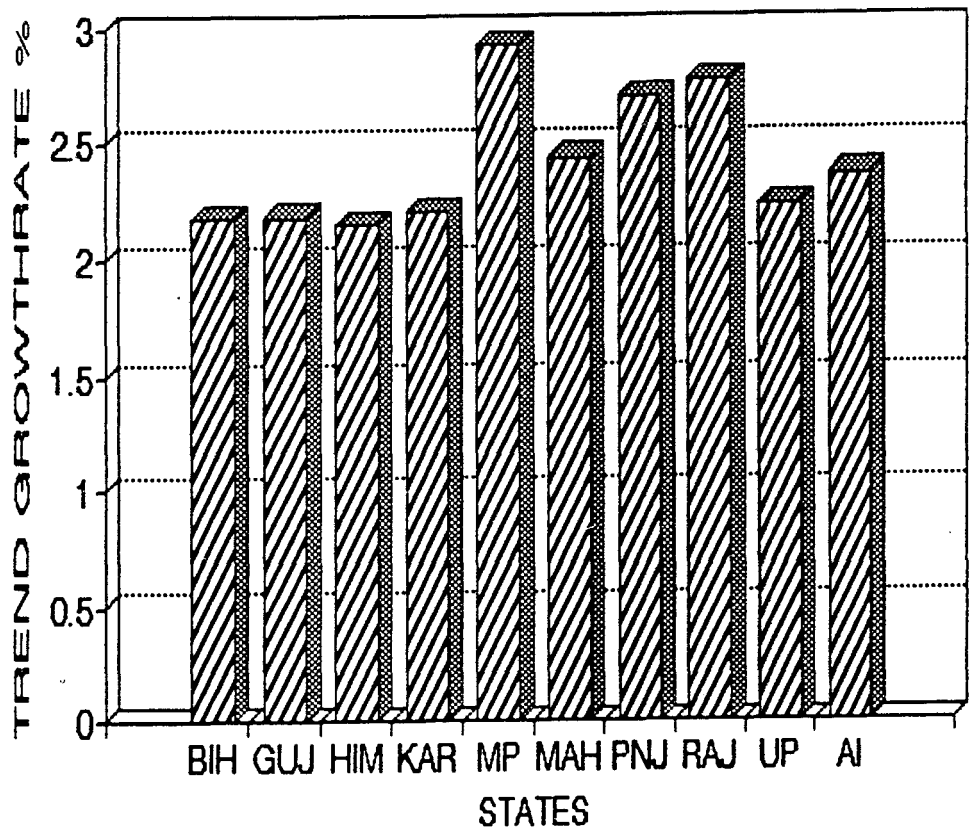
TABLE NO.4.3

TREND GROWTH RATE IN WHOLESALE PRICES OF BAJRA (1950--1992)

STATES	CONST.	b coeff.	Growth Rt	R^2	T	Sig.T
ANDH	1.28825	0.02761	2.761	0.95964	30.838	0
GUJ	1.48415	0.02302	2.302	0.92612	22.393	0
MAH	1.42039	0.02491	2.491	0.92407	22.063	0
PNJ	1.33903	0.02538	2.538	0.94551	26.345	0
RAJ	1.43708	0.02341	2.341	0.86729	16.168	0
UP	1.31836	0.02796	2.796	0.95158	28.039	0
TN	1.38165	0.02379	2.379	0.93170	23.359	0
All India	1.38127	0.02515	2.518	0.95022	27.632	0

GROWTTH RATE OF WHOLESALEPRICE OF WHEAT

(1950-1992)



The trend growth rates of wholesale prices have been calculated for these two different phases.

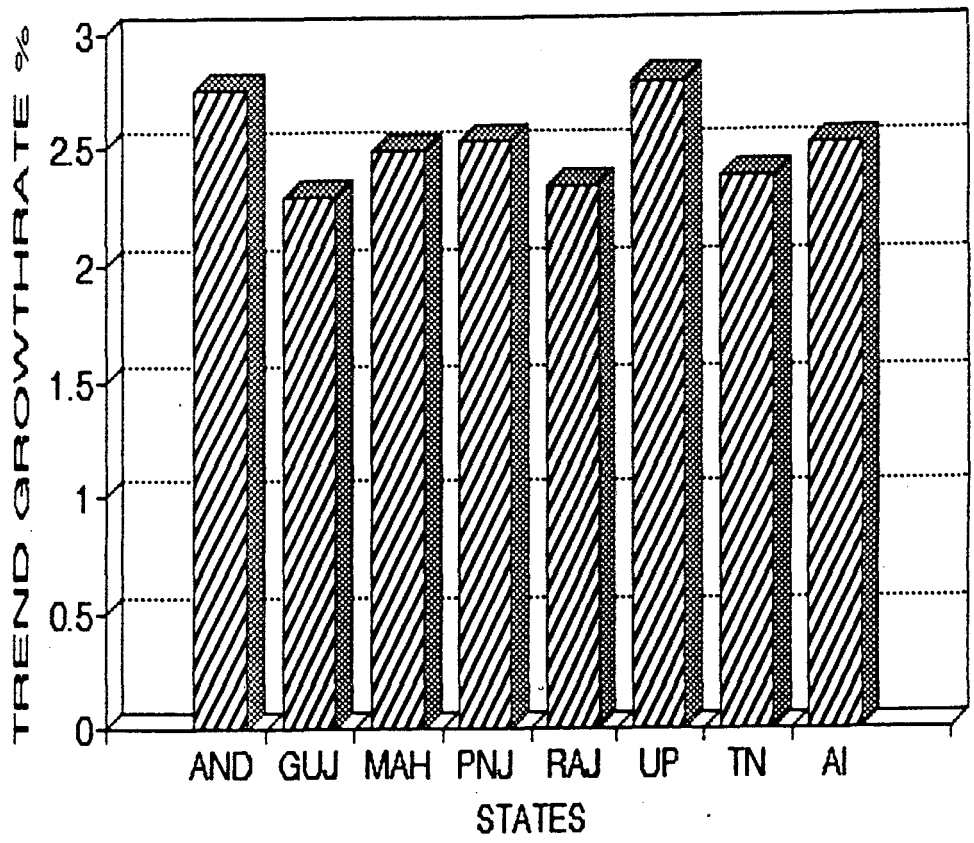
For rice in the pre government intervnetion phase the growth rate (table 4.4) have been highest in case of Punjab at 2% at lowest in case of Kerala at 1.35%. After Punjab, Andhra Pradesh 1.87%, Orissa 1.6%, Tamil Nadu 1.59% and West Bengal 1.54% maintained growth rate below 2% level.

But in the second phase 1966-1992, Uttar Pradesh maintained growth rate (table 4.5) of 2.1% which is lowest among the states considered. On the other hand Punjab maintained a highest growth rate in wholesale price of rice at 4.7% followed by Maharashtra 3.6%, Tamil Nadu, 3.5%, Madhya Pradesh 3.4%, Andhra Pradesh 3.0%, Kerala 3.0%, Karnataka 2.88%, Orissa 2.7%, Gujarat 2.4% and Bihar 2.3%. The analysis shows that the growth rate of whole price of rice is more in case of second period than the first period.

As far as wheat is concerned, the growth rate of wholesale prices was highest in case of Karnataka at 2.7% followed by Maharahstra 1.7%, Uttar Pradesh 1.3%, Punjab 1.2%, and lowest in case of Himachal at 1.1% (Table 4.6). If we analyse growth rate sequence in the second phase, Madhya Pradesh (table 4.7) has possessed highest growth in wholesale prices at 3.4% level whereas Karnataka attained lowest growth rate 1.07% level. The highest growth rate was followed by Punjab 2.9%, Maharashtra 2.6%, Bihar 2.25%, Uttar Pradesh 2.2%, Gujarat 2.17%, Rajasthan 1.9%, Himachal 1.8%. This depicts that the growth rate of wholesale

GROWTTH RATE OF WHOLESALEPRICE OF BAJRA

(1950-1992)



price of wheat was greater in period II than period I. Also the disparity in growth rate of prices prevailed among these states.

In case of bajra for the 1st period (table 4.8), the growth rate of whole sale prices was highest in case of Maharahstra at 2.4% level whereas Gujarat shown the growth rate of 1.5%. In the second phase Uttar Pradesh (table 4.9) at 3% maintained highest growth rate in wholesale prices whereas Tamil Nadu at 2.1% and Maharashtra at 2.1% maintained the lowest growth rate in wholesale prices. Therefore from the analysis it is obvious that the growth rate of wholesale prices was more in the second phase than the first phase of non intervention of government in foodgrain economy.

IV.II. Intrayèar Variability in Wholesale Prices

Agriculture being essentially an economic activity, is influenced and directed in its production plans by the movement of the prices. The production in industries, is not a continuous one. The production is centred round the one or at the most two harvesting seasons in a year, while the demand for agricultural production is a continuous one. Hence all the production brought into the market after harvesting is done, cannot be demanded by the consumers, they will demand only a part of it for their consumption. The rest must be stored and brought into the market when the demand arises and supply from the product is not there.

The variations in prices at different points of the production year of the agricultural crop are necessary if the demand for it and the supply of it are to be adjusted throughout the year. Hence variation in prices are exercised in the

TABLE NO.4.4

Trend Growth Rate of Wholesale Prices (RICE)

(1950-1965)

	Const.	b coeff.	Growth rate	R^2	T value	sig. t.
ANDH	1.550	0.019	1.80	0.7490	6.2340	0.000
ASS	1.760	0.017	1.70	0.0015	0.1380	0.892
BIH	1.713	0.014	1.40	0.1018	1.2140	0.246
GUJ	1.918	0.016	1.60	0.1298	-1.3920	0.187
KAR	1.594	0.016	1.58	0.4558	3.3000	0.006
KER	1.622	0.014	1.35	0.9099	11.4590	0.000
MP	1.616	0.014	1.40	0.2327	1.9910	0.067
MAH	1.746	0.017	1.70	0.1660	1.6100	0.130
PNJ	1.567	0.020	2.00	0.5090	3.6700	0.028
ORS	1.521	0.016	1.60	0.5030	5.6400	0.001
UP	1.701	0.019	1.90	0.0008	-0.1030	0.919
TN	1.667	0.015	1.54	0.2817	5.4230	0.009
WB	1.614	0.015	1.54	0.6935	5.4230	0.000

TABLE NO. 4.5

Trend Growth Rate of Wholesale Prices (RICE)

(1966-1992)

	Const.	b coeff.	Growth rate	R^2	T value	sig. t.
ANDH	1.8640	0.030	3.00	0.960	24.800	0
ASS	1.8230	0.028	2.77	0.939	19.600	0
BIH	2.0050	0.023	2.30	0.904	15.360	0
GUJ	2.0058	0.024	2.40	0.879	13.407	0
KAR	1.9438	0.029	2.88	0.926	17.700	0
KER	1.8079	0.030	3.00	0.964	25.840	0
MP	1.8480	0.034	3.40	0.950	21.608	0
MAH	1.7070	0.036	3.60	0.980	22.260	0
PNJ	2.0430	0.047	4.70	0.778	9.350	0
ORS	1.9015	0.027	2.70	0.944	20.473	0
UP	2.0370	0.021	2.10	0.920	16.966	0
TN	1.7480	0.035	3.50	0.960	23.940	0
WB	1.9870	0.026	2.60	0.928	18.020	0

TABLE NO. 4.6

Trend Growth Rate of Wholesale Prices (WHEAT) (1950-1965)

	Const.	b coeff.	Growth rate	R^2	T value	sig. t.
BIH	1.633	0.012	1.2	0.026	2.152	0.05
GUJ	1.655	0.016	1.6	0.0148	1.49	0.16
HIM	1.612	0.011	1.1	0.262	2.151	0.05
KAR	1.528	0.027	2.7	0.71	5.7	0
MP	1.648	0.018	1.8	0.001	0.074	0.94
MAH	1.580	0.017	1.7	0.53	3.832	0.0021
PNJ	1.508	0.012	1.2	0.75	6.283	0
RAJ	1.560	0.015	1.5	0.338	2.578	0.0229
UP	1.556	0.013	1.3	0.312	2.432	0.3

TABLE NO.4.7

Trend Growth Rate of Wholesale Prices (WHEAT) (1966-1992)

	Const.	b coeff.	Growth rate	R^2	T value	sig. t.
BIH	1.885	0.0225	2.2500	0.81227	10.401	0
GUJ	1.889	0.0217	2.17	0.93	18.228	0
HIM	1.95	0.018	1.8	0.84	11.489	0
KAR	2.146	0.0107	1.07	0.5	5.035	0
MP	1.788	0.034	3.4	0.952	22.387	0
MAH	1.8547	0.026	2.6	0.956	23.36	0
PNJ	1.76154	0.029	2.9	0.958	23.251	0
RAJ	1.88503	0.019	1.9	0.903	15.322	0
UP	1.8411	0.0218	2.18	0.8969	14.749	0

TABLE NO. 4.8

Trend Growth Rate of Wholesale Prices (BAJRA) (1950-1965)

	Const.	b coeff.	Growth rate	R^2	T value	sig. t.
ANDH	1.329	0.022	2.2	0.727	5.89	0.0001
GUJ	1.542	0.015	1.5	0.427	3.118	0.0082
MAH	1.408	0.024	2.4	0.65	4.917	0.0003
PNJ	1.37	0.02	2	0.693	5.425	0.001
RAJ	1.544	0.016	1.6	0.062	0.931	0.369
UP	1.38	0.02	2	0.575	4.201	0.001
TN	1.403	0.019	1.9	0.663	5.068	0.0002

TABLE NO. 4.9

Trend Growth Rate of Wholesale Prices (BAJRA) (1966-1992)

	Const.	b coeff.	Growth rate	R^2	T value	sig. t.
ANDH	1.698	0.028	2.80	0.907	15.639	0
GUJ	1.826	0.023	2.30	0.8511	11.955	0
MAH	1.843	0.021	2.10	0.794	9.828	0
PNJ	1.734	0.025	2.46	0.855	12.167	0
RAJ	1.790	0.024	2.38	0.807	10.233	0
UP	1.706	0.030	3.00	0.916	16.522	0
TN	1.780	0.021	2.10	0.805	10.175	0

adjustment of supply and demand with each other. Simon Kuznet emphasised on seasonal variations and to him, "seasonal variation is defined as, the changes in rate of activity attributable to the influence of climatic and conventional seasons". Hence the seasonal variation in prices are caused by the influence of climate and conventional seasons.

As the things stand, the differences in the cost of production of a particular commodity in different seasons of the year are very great, hence most of the production of agricultural commodities is concentrated in particular seasons of the year. If the anticipated prices in future are not higher than the current prices, all would like to sell now and it would depress the present market and would bring the prices down so that cost of carrying the stock might be met with.

The changes in prices from whatever the cause they arise, are in themselves facts of considerable economic significance. The stability or instability of prices of particular commodities will affect directly the business methods and fortunes of all those who are concerned with their production, distribution and consumption.

Now in the next step we analyse the intrayear variability in wholesale prices for rice, wheat, Bajra, Groundnut and cotton for three major producing estates. Also we have to examine the nature of interstate variability and whether the APC has been effective to reduce intrastate variability.

The intra year variability of prices can be based on more than one type of data. One can use such detailed data (as weekly average wholesale prices) and look across the changing temporaral behaviour of such prices. Such detailed data for

numerous crops and numerous states extending over 40 years or so are extremely difficult to come by on a comparable basis; any such attempt may perhaps generate problems of its own into which we need not go in the present study. The most useful and readily available data are monthly average wholesale prices, recorded for individual marketing centres, covering a wide spectrum of crops. Our choice falls back on such monthly data, covering the long stretch of time between 1950-51 to 1991-92. Inspite of sporadic gaps, one discovers for one crop or another, in one region or the other, and occasional changes in definition or some other lacunae built into the long time series is covered. In the analysis set out, in this chapter, we have taken three major commodities for the study of price behaviour namely rice, wheat and Bajra for the major producing states. In case of rice thirteen states and nine and seven states for wheat and Bajra respectively has been considered. The wholesale prices of all markets in each states have been taken into account. The time period covered is 1950 to 1992. The growth rates of wholesale prices have been calculated for all the states concerned for all the three products, in order to know the interstate disparities in wholesale prices. Apart from this the all India trend growth rate for the some time frame has also been calculated for making the analysis more viable and deriving concrete results.

To make our analysis and study much more meaningful, the intrayear variability in wholesale prices for some selected crops of three major producing states in each case have been taken into account. Hence the commodities chosen are rice, wheat, Bajra, groundnut and cotton. The intrayear variability based on monthly average wholesale prices can be worked out in many different ways.

However we have made use of the monthly prices without entering into questionable comparisons. An extremely useful purpose is served if we look at the coefficient of variations, of the time series worked out across the 12 monthly prices, for each year of our study. Each coefficient of variation shows the intrayear variability, when all the 12 months of the marketing years are considered individually. The exercise how ever does not provide the ultimate answer to the question of variability before and after the commencement of government intervention.

A meaningful procedure would be to see the difference between first quarter of the year in consideration and the last quarter. In brief, we are comparing the price differences between Q1 and Q4 assuming Q1 possess the lowest magnitude of wholesale price, being the first harvesting quarter and then examining their temporal behaviour between 1950-1990.

Rice:

For rice three main rice producing states West Bengal, Andhra Pradesh and Tamil Nadu have been considered. In each states all markets have been taken into consideration. The total time span covered by us into three different periods. Period-I typical of preintervention market conditions. Period-II roughly contains from 1966 to 1974-75 when government intervention encompassed an effective feature of price announcements well in advance but having mild effects of actual procurement for buffer stock operations. Around mid seventies bufferstock procurements were launched in a full throated manner and accordingly national periodisation puts period-III to represent decade beyond mid 1970's.

In case of West Bengal, the maximum price differential in percentage terms was at a high amplitude and fluctuated vigorously during period-I. But in period-II the price differential became higher than period-I and attained the maximum (86.23) in 1971. Then gradually the magnitude of price differential decreased and the amplitude of fluctuation declined during the IIIrd period. There was less discrepancy between the price in the quarter which the product arrived and the price in which the quarter touched the maximum in the market (Table 4.10).

In case of Andhra Pradesh, the maximum price differential was at lower level in the initial phases of 1st period. In 1st period it attained maximum in 1958 (37.14). Then again the magnitude of price differential dampened. Also the amplitude of fluctuation in the price differential is not so high in period I. In period II, the price differential increased to a maximum in 1967 (44.61) and then it declined. But the amplitude of fluctuation in price differential was greater in 2nd period. Also though in the third period the amplitude of fluctuation was high, the magnitude of maximum price differential gradually declined in the third period (Table 4.10).

In case of Tamil Nadu the picture is different. In the first period the price differentials on an average showed an increasing trend but with greater fluctuations. In the second period the price differentials remained at a lower level. In the end of the second period it increased but declined in the initiation of the third period. Gradually the price differentials remained lower in the third period (Table 4.10).

Apart from this, if we have a glance at the variability in wholesale prices, then the intrayear price variability was at high level when price differential attained maximum, at most number of cases. The average position depicts the increased magnitude of coefficient of variation during period I. The period II shows higher magnitude of coefficient of variation (Table 4.10). The coefficient of variation attained maximum in 1971 and then gradually the coefficient of variation declined in period III. Also the amplitude of fluctuations in coefficient of variation petered out from time to time. Hence the fluctuation in coefficient of variation of wholesale prices of rice in West Bengal gets stagnated with due course of time. Therefore it can be said that this happened due to the effectiveness of government intervention in the foodgrain economy (Graph 4.4).

As far as the coefficient of variation is concerned, to observe the intrayear price variability in Andhra Pradesh, it was at a lower level in the initial phase of period I. Then it suddenly increased and the coefficient of variation was at a greater amplitude of fluctuations (Graph 4.5). The coefficient of variation attained maximum in 1967. Though it declined, it remained at a high magnitude but with less amplitude of fluctuations. In third period the magnitude of coefficient of variation decreased and the fluctuation became stagnated with the exception in 1986 when it increased vigorously. But at the end of the period the coefficient of variation declined.

As far as the coefficient of variation in wholesale prices of Tamil Nadu is concerned, it has an increasing trend and high fluctuating scenario in the first period. In the second period though fluctuated at a lesser amplitude, it increased. In

TABLE NO. 4.10

WHOLESALE PRICE ANALYSIS OF RICE

(1951-1990)

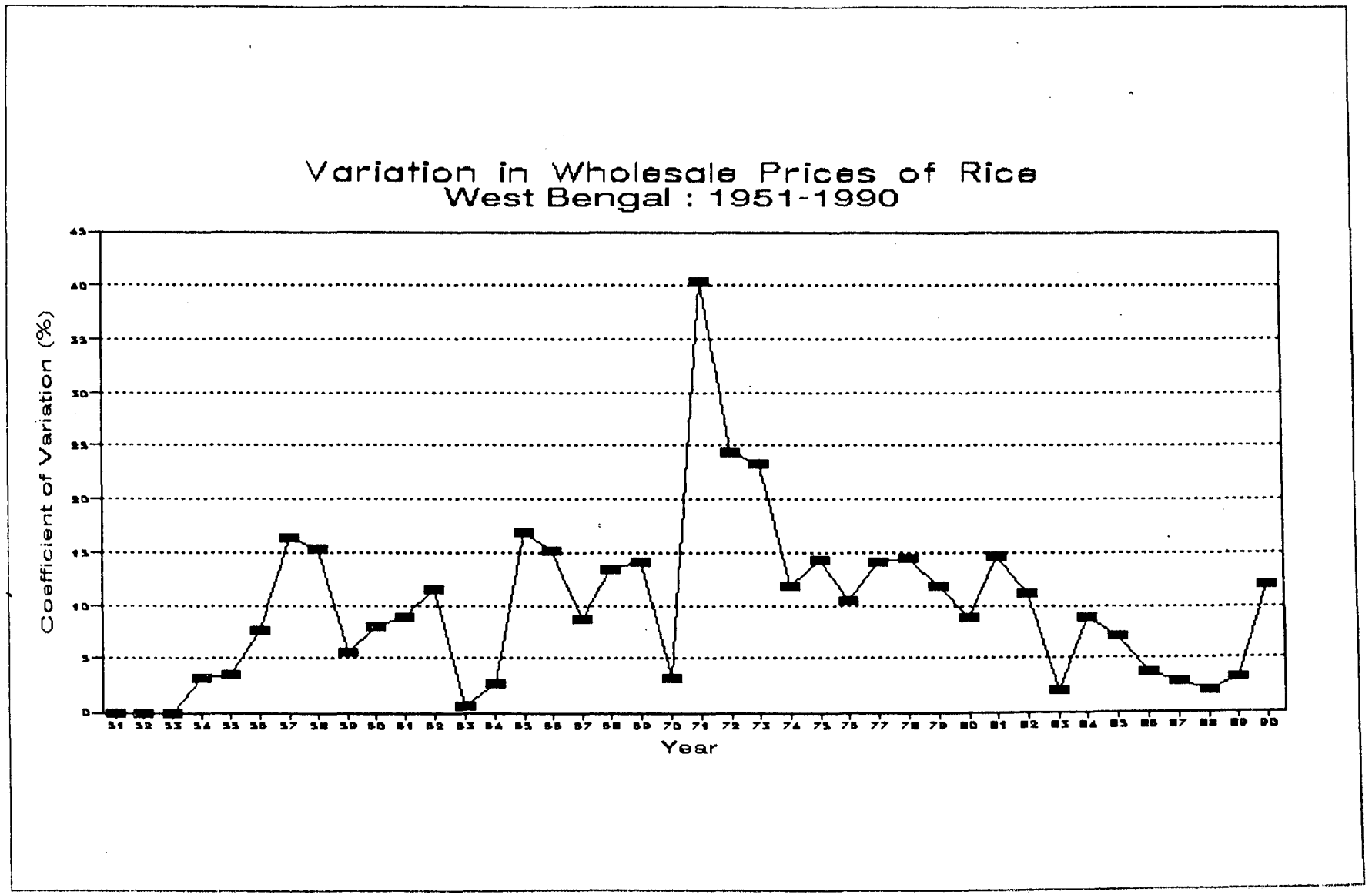
	:WESTBENGAL		:ANDHRAPRADESH		:TAMILNADU	
YEAR	MAX.PRICE		MAX.PRICE		MAX.PRICE	
	DIFF.%	CV	DIFF.%	CV	DIFF.%	CV
1951	28.08	0.12	7.2	0.29	5.58	1.257
1952	21.06	0.08	18.78	0.18	19.08	6.93
1953	6.78	0.16	6.21	10.95	10.41	11.26
1954	32.08	3.15	1.08	4.9	3.27	3.28
1955	19.71	3.60	5.22	2.68	4.08	3.92
1956	20.35	7.70	3.83	5.8	-4.38	4.6
1957	40.32	16.48	-1.97	1.39	16.58	5.84
1958	26.70	15.42	37.14	12.51	-27.25	18.18
1959	7.63	5.71	-5.5	5.97	25.44	10.22
1960	18.99	8.11	3.84	1.77	-0.92	5.19
1961	26.43	8.87	-6.71	7.94	6.55	5.65
1962	31.47	11.47	1.64	8.14	-0.78	3.84
1963	-0.66	0.55	-2.01	7.8	9.22	5.31
1964	3.37	2.72	-3.82	1.7	2.52	2.05
1965	23.78	16.97	-0.02	0.01	7.53	3.56
1966	36.81	15.21	1.61	1.32	9.7	4.63
1967	18.08	8.82	44.61	15.82	-14.63	7.12
1968	34.60	13.37	0.54	7.42	6.8	6.35
1969	37.37	14.02	-9.64	9.12	10.2	5.46
1970	1.34	3.15	7.04	6.26	3.6	7.1
1971	86.23	40.35	-13.47	10.8	2.4	7.96
1972	73.01	24.34	-1.6	8.45	14.1	9.3
1973	58.94	23.36	39.69	13.86	21.76	15.51
1974	32.00	11.88	-1.12	12.6	36.03	12.77
1975	37.93	14.28	-3.02	11.31	12.6	6.01
1976	27.47	10.43	14.55	10.94	-6.52	2.97
1977	38.90	14.06	-11.36	12.83	11.7	1.78
1978	42.57	14.57	0.84	10.03	0.76	0.42
1979	21.12	11.78	15.51	8.68	10.4	2.01
1980	20.86	8.97	4.08	8.82	9.62	4.26
1981	36.18	14.60	9.56	10.72	9.6	4.15
1982	23.28	11.17	4.14	7.49	2.7	3.98
1983	2.21	2.03	14.14	11.41	2.34	1.14
1984	12.08	9.01	13.1	7.06	4.38	2.65
1985	13.86	7.23	12.78	2	1.17	2.32
1986	6.12	3.69	12.42	15.37	0.48	2.09
1987	10.08	2.78	6.12	2.31	0.36	4.34
1988	7.86	2.09	6.93	2.14	0.87	3.9
1989	5.31	3.23	4.14	2.14	3.93	3.86
1990	3.24	12.10	11.34	1.61	3.27	8.16

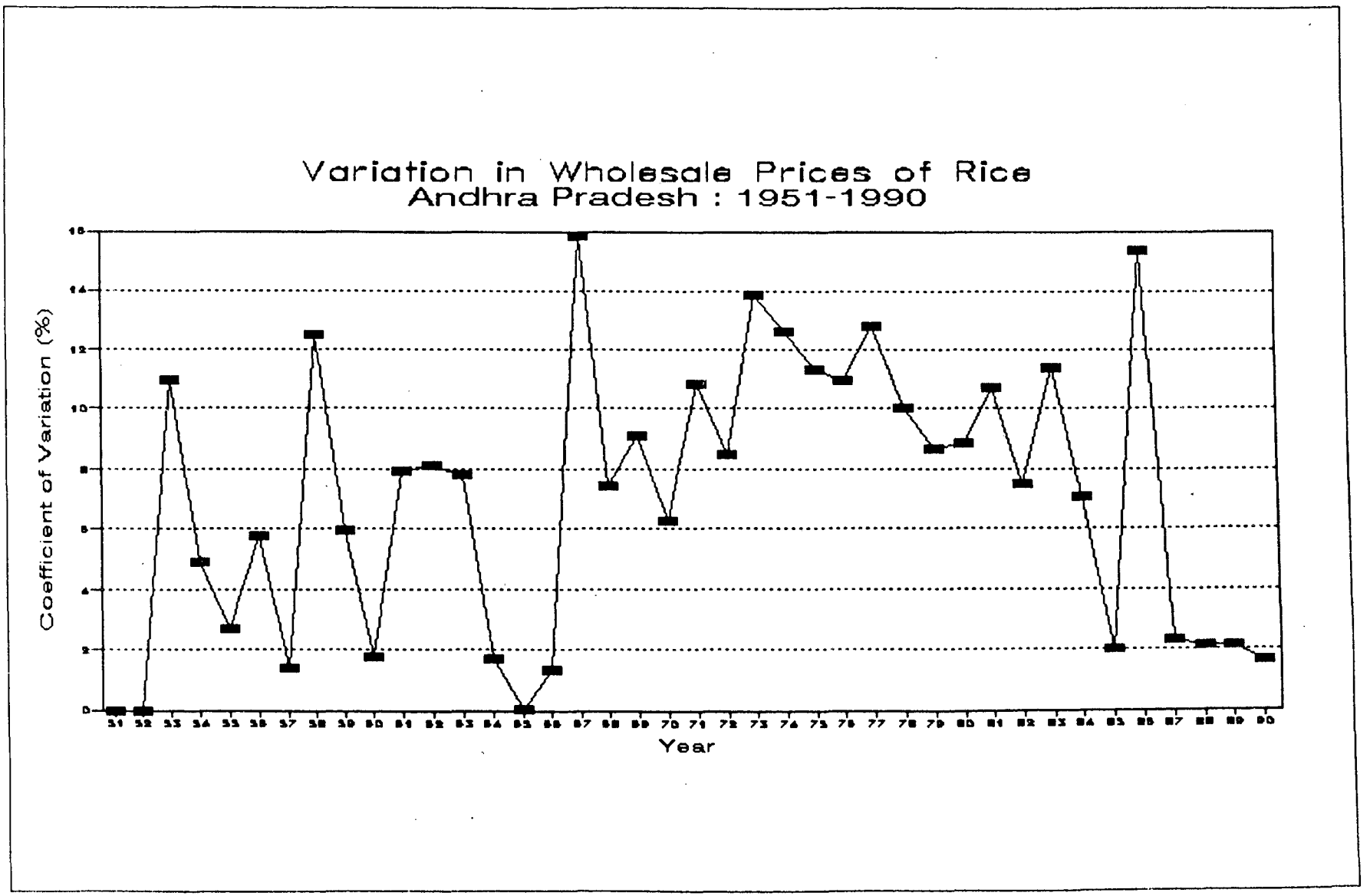
the third period the coefficient of variation declined and remained at low level with lesser amplitude of fluctuations. Also another aspect is that the coefficient of variation attained higher values when the price differentials have been maximum (Graph – 4.6).

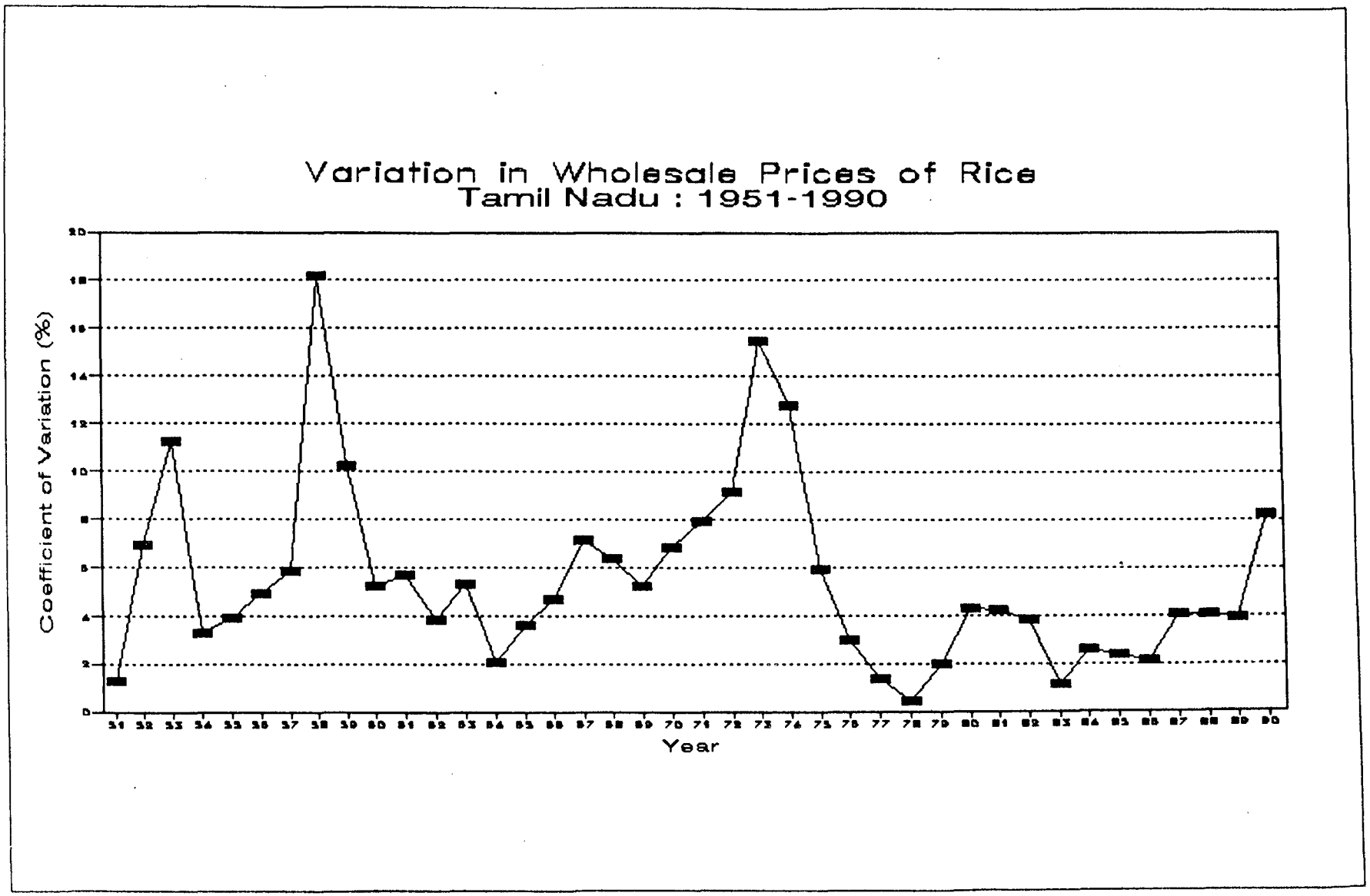
Then it will be worthwhile to have a glance at the results of the second degree polynomial fitted for the time series of C.V., in order to verify whether the hypothesis of reversibility from an increasing to decreasing trend is discernible. Also at the same time to identify the time where reversibility point is 21.49 i.e. during 1971-72 the coefficient of variation of wholesale prices of rice in West Bengal touched the peak level. It increased upto that point of time and then after that gradually declined (Table 4.12a).

As far as Andhra Pradesh and Tamil Nadu is concerned, the reversibility occurs. In case of West Bengal, the reversibility point remains in 22.56 and 21st period i.e. 1973-74 and 1971-72 for Andhra Pradesh and West Bengal respectively. Hence in case of Andhra Pradesh upto 1973-74 the coefficient of variation increased and afterwards it starts declining. In case of Tamil Nadu it is slightly earlier when the coefficient of variation starts declining.

This owes to the fact that the breakthrough in volume of production due to rice technology commenced in early seventies. Price policy for rice acquired full enthusiasm alongwith massive purchases on government account since the early 1970s onwards. Hence decline in month to month variability in wholesale prices had taken place since 1971/72 most effectively.


Variation in Wholesale Prices of Rice
West Bengal : 1951-1990
Coefficient of Variation (%)
Year


Variation in Wholesale Prices of Rice
Andhra Pradesh : 1951-1990
Coefficient of Variation (%)
Year


Variation in Wholesale Prices of Rice
Tamil Nadu : 1951-1990
Coefficient of Variation (%)
Year

Wheat:

We have taken three important and major producing states such as Uttar Pradesh, Punjab and Madhya Pradesh to study the interstate variations and the effectiveness of government intervention in case of wheat. In the first period the price differential was of a high magnitude and with greater amplitude of fluctuations in case of Uttar Pradesh. It attained 83.74 percent and 92.26 percent in 1964 and 1966 respectively. But with the commencement of period II, the price differential gradually declined. In the third period the price differential remained at a higher level upto 1982 where it attained 59.37 percent level. Then it declined substantially and the amplitude of fluctuation vanished too (Table 4.11).

In case of Punjab, the price differential fluctuated vigorously in period I. The magnitude of price differential remained at a higher level and also the amplitude of fluctuation varied frequently at a high rate. In 1966 it attained maximum. The reason may be due to the prevalence of drought conditions. Then gradually the price differential decreased. But at the initiation of the third period the price differentials remained at a higher level. Then it gradually declined in the end of the third period (Table 4.11).

If we take the coefficient of variation in wholesale prices in Uttar Pradesh, then it is obvious from the graph (4.7) that the amplitude of fluctuation was highest in Uttar Pradesh, attaining the peak in 1966, CV gradually declined with lesser fluctuations. In the third period the coefficient of variation gradually became lower and amplitude of fluctuation peters away.

TABLE 4.12a

ESTIMATED POLYNOMIAL

RICE

	WEST BENGAL	ANDHRA PRADESH	TAMIL NADU
b coefficient	1.60116 (2.289)	0.82764 (3.639)	1.71821 (0.3879)
c coefficient	-0.0372 (-2.186)	-0.0183 (-3.408)	-0.0499 (-0.81947)
b/2c	21.49	22.56	21.002
R^2	0.96	0.89	0.92

ESTIMATED POLYNOMIAL

WHEAT

	UTTAR PRADESH	PUNJAB	MADHYA PRADESH
b coefficient	0.55714 (1.6589)	0.22209 (0.8629)	0.51254 (0.0114)
c coefficient	-0.0153 (-1.9297)	-0.0067 (-1.0972)	-0.0129 (-0.03412)
b/2c	18.17	16.62	19.89
R^2	0.94	0.86	0.78

ESTIMATED POLYNOMIAL

BAJRA

	RAJASTHAN	GUJARAT	MAHARASHTRA
b coefficient	0.84943 (0.0018)	0.16519 (0.4238)	0.78448 (0.0082)
c coefficient	-0.0188 (-0.0036)	-0.0005 (-0.9362)	-0.0198 (-0.0204)
b/2c	22.56	17.68	19.78
R^2	0.93	0.84	0.76

TABLE NO. 4.11

WHOLESALE PRICE ANALYSIS OF WHEAT

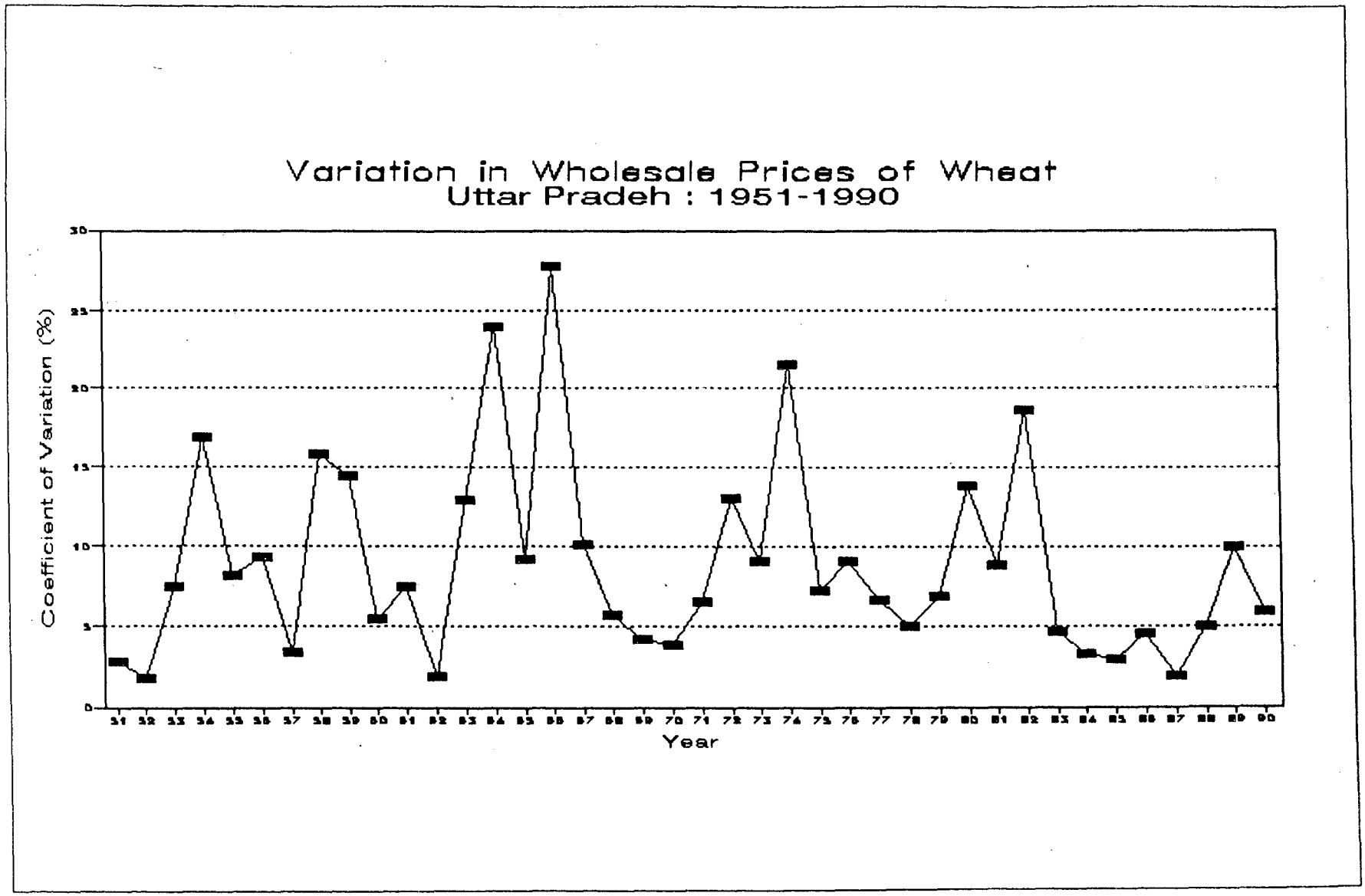
(1951-1990)

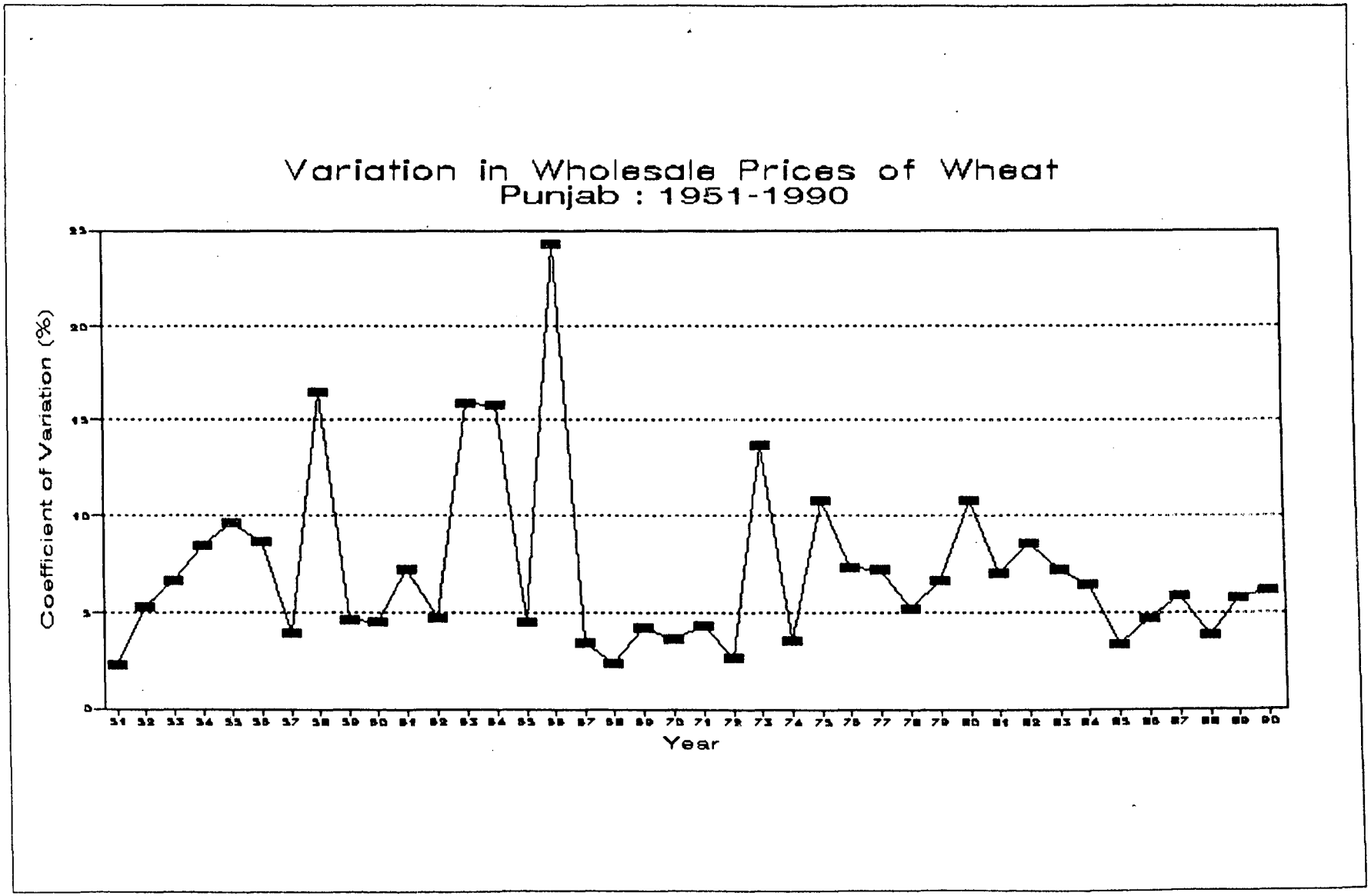
	:UTTARPRADESH		:PUNJAB		:MADHYAPRADESH	
	MAX.PRICE		MAX.PRICE		MAX.PRICE	
YEAR	DIFF.%	CV	DIFF.%	CV	DIFF.%	CV
1951	11.18	2.83	6.96	2.2	8.28	1.89
1952	8.82	1.74	16.02	5.226	19.44	9.29
1953	4.08	7.45	5.22	6.632	20.88	5.48
1954	-4.98	16.8	5.58	8.405	21.69	9.04
1955	17.19	8.2	7.92	9.57	16.74	11.55
1956	28.39	9.27	24.05	8.63	11.46	6.11
1957	4.92	3.33	0.97	3.91	12.58	5.04
1958	42.96	15.83	55.47	16.45	0.15	16.66
1959	17.2	14.39	5.48	4.59	39.9	5.09
1960	13.59	5.51	10.59	4.45	8.82	3.57
1961	19.55	7.51	14.72	7.21	-1.28	7.93
1962	3	1.89	-1.38	4.63	21.94	4.5
1963	38.51	12.84	42.27	15.86	2.63	14.46
1964	83.74	23.9	29.36	15.83	35.65	11.01
1965	27.46	9.13	2.37	4.49	27.39	3.15
1966	92.26	27.76	86.85	24.21	3.98	12.75
1967	6.42	10.1	-4.58	3.39	13.11	24.29
1968	8.25	5.71	3.07	2.33	51.66	5.8
1969	7.27	4.21	8.33	4.22	2.56	9.51
1970	7.81	3.9	6.8	4.1	26.78	3.93
1971	14.98	6.57	9.21	4.29	-1.21	5.97
1972	34.5	12.97	1.71	2.66	15.74	9.17
1973	22.5	9.08	35.41	13.67	8.21	8.15
1974	53.42	21.49	6.8	3.45	17.76	17.46
1975	-12.23	7.15	25.15	10.72	57.7	13.18
1976	21.59	9.12	15.68	7.32	-5.44	8.56
1977	14.55	6.68	4.38	7.18	22.97	7.12
1978	12.89	5.07	11.66	5.11	14.61	3.88
1979	13.62	6.88	16.52	6.56	2.14	7.95
1980	34.43	13.88	27.98	10.7	23.06	14.14
1981	21.03	8.81	17.69	6.95	36.84	13.09
1982	59.37	18.61	24.77	8.56	-16.85	12.14
1983	1.02	4.63	18.1	7.15	35.44	4.97
1984	6.51	3.29	15.24	6.4	12.28	6.08
1985	1.86	2.95	15.57	3.31	12.69	9.93
1986	5.88	4.56	13.32	4.68	14.58	8.23
1987	10.89	1.91	11.88	5.77	7.92	2.54
1988	4.08	4.97	10.89	3.78	12.6	6.62
1989	6.69	9.93	5.31	5.76	10.44	3.95
1990	10.44	5.94	6.12	6.15	7.2	4.76

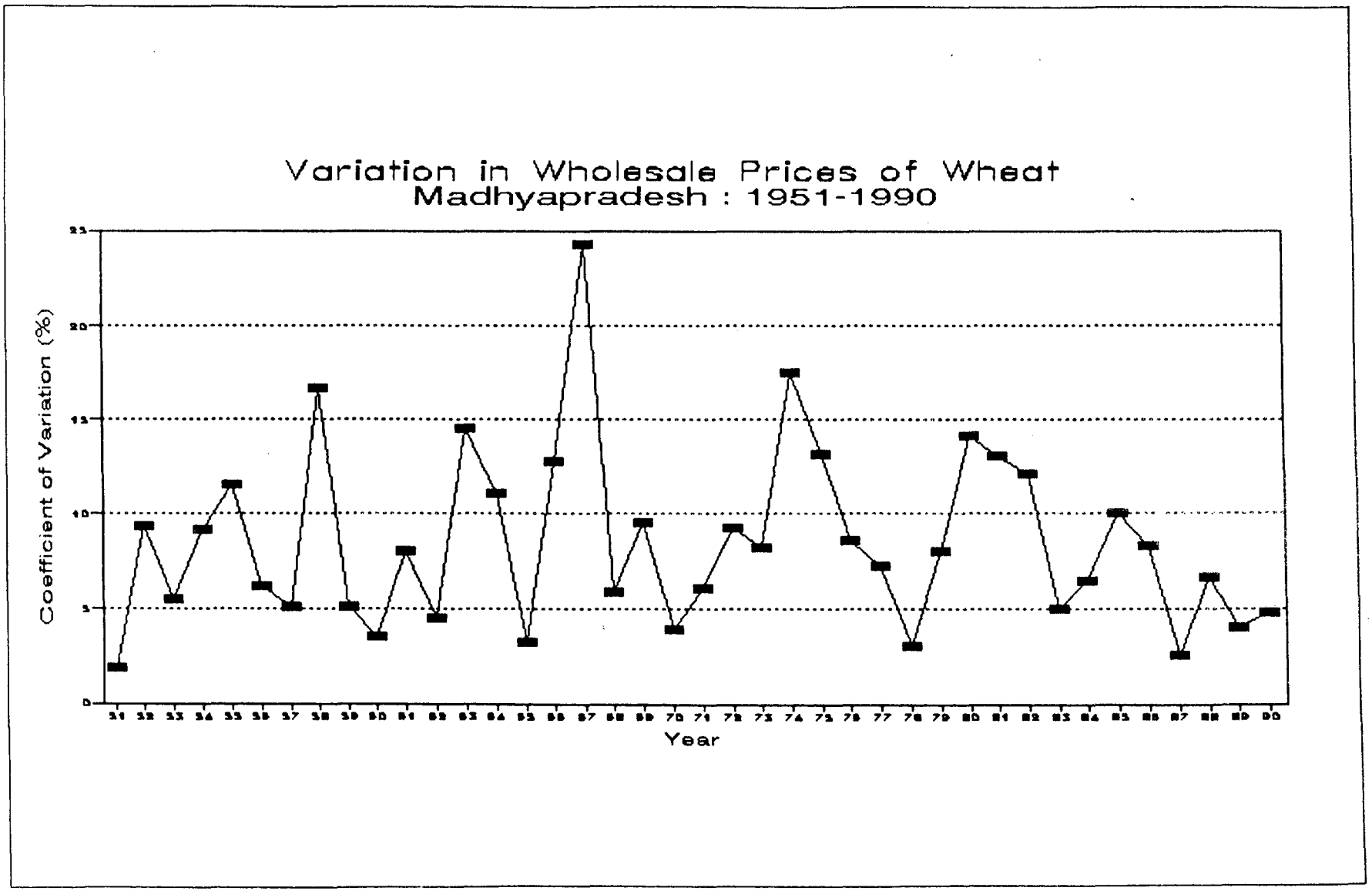
As far as the coefficient of variation of wholesale prices of wheat in Punjab is considered (Table 4.11), the coefficient of variation maintained a similar trend accordingly. In the initial phases of period I, the coefficient of variation gradually increased but after a certain period it declined and fluctuated at a greater amplitude unless and until it reached the maximum (24.21) in 1966. Then it remained at a lower level, during the initiation of the third period it remained at a higher level and gradually the coefficient of variation maintained a lower magnitude alongwith low amplitude of fluctuations (Graph 4.8).

If we verify the second degree polynomial, then the trend of coefficient of variation in wholesale prices comes out clearly. For Uttar Pradesh the reversibility point is 18.17 (b/2C). That indicates the fact that the coefficient of variation in wholesale prices increased up to 1968-69 and after that the coefficient of variation gradually decreased. Hence the reversibility test justifies the inverse V position of the intrayear coefficient of variation curve at the 18^{th} to 19^{th} period. But in case of Punjab the reversibility test puts the point to be 16.62 (table 4.12a) i.e., the 1966-67 period maintains the optimum position of coefficient of variation. Upto that point the trend in variation in wholesale prices increased and after that it declined. In case of Madhya Pradesh (Graph 4.9), the reversibility point falls at 19.89 i.e., 1969 to 1970.Hence the trend in variability of wholesale prices was increase upto that point and after that the variability declined.

Hence as a whole, Punjab seems to be the most successful state in reducing the intra year variability in wholesale prices of wheat followed by Uttarpradesh and Madhya Pradesh. But the peak level of variability revolves round 1967-1968


Variation in Wholesale Prices of Wheat
Uttar Pradeh : 1951-1990
Coefficient of Variation (%)
Year


Variation in Wholesale Prices of Wheat
Punjab : 1951-1990
Coefficient of Variation (%)
Year


Variation in Wholesale Prices of Wheat
Madhyapradesh : 1951-1990
Coefficient of Variation (%)
Year

which was a drought period mostly affecting the northern belt. Also the government intervention has been successful in controlling the variability in wholesale prices as justified from the reversibility point. Because Agricultural Price Commission has been formed in 1965. Hence one cannot expect sudden reduction in variability of prices. If we consider then the interstate intra year variability in wholesale prices, Madhyapradesh is less effective than the other two states regarding the commencement of reversibility time owing to the fact that Madhyapradesh does not possess well integrated marketing facilities like Punjab and Uttarpradesh. Hence the variability in wholesale prices declined lately in case of Madhyapradesh.

Bajra :

Department of Food constituted another Technical Group on Bufferstocks of foodgrains, followed by the 1975 Technical group, in order to examine the feasibility of buffer stocking policy of foodgrains for VIth plan period. To suggest the 'grain mix' in the buffer and operational stocks was one among the terms of references of the Group. While the Technical group decided to study the two major cereals wheat and rice separately; with regard to coarse grains the Group felt that the quantities involved at that time were not large and hence these were not considered by them. It was only several years after the setting up of APC, that the NAFED (National Agricultural Cooperative Marketing Federation) was designated to undertake support purchase of coarse grains in collaboration with state cooperative marketing agencies or any other agency nominated by the state. There is hardly any buffer stocking policy to speak of, for coarse grains and not all coarse

grains are given adequate attention in practice, by the Agricultural Price Commission in matters of price announcements and their effective implementation.

In case of Rajasthan, the price differential was lower in the first period. Also the amplitude of fluctuation was lower in the first period. Only during 1962 to 1964 the magnitude of price differential increased but after that again it declined when entered into the second period. During the second period the price differential touched high level in 1971 and 1973 touching 55.76 and 68.52 respectively. Then gradually the price differential declined with lesser amplitude of fluctuations in the third period (Table 4.13).

If we consider the case of Gujrat, the table (4.13) reveals that the magnitude of price differential was at a lower level in the first period. The amplitude of fluctuation though was low, increased during the end of first period. In the second period the fluctuation was high. It increased to 42.46 in 1973. After that the price differential became low and again started increasing in the initiation of 1980s. It attained maximum in 1985 (45.17). Then after it decreased to a considerable extent.

Maharastra shows a better trend than the other two states Rajsthan and Gujrat as far as the price differential is concerned (Table 4.13). Price differential remained at a low level in the First period. Then in the final stages of first period the price differential attained the maximum. In the second period the price differential on an average remained at a higher level than the first period. The attainment of optimum price differential in the first period specially in 1963-64

TABLE NO: 4.13

WHOLESALE PRICE ANALYSIS OF BAJRA

(1951-1990)

	:RAJSTHAN		:GUJRAT		:MAHARASTRA	
YAER	MAX.PRICE		MAX.PRICE		MAX.PRICE	
	DIFF.%	CV	DIFF.%	CV	DIFF.%	CV
1951	4.17	2.392	2.07	1.54	9.66	0
1952	2.04	2.394	0.72	9.49	7.44	0
1953	3.39	2.471	6.48	8.22	6.96	4.44
1954	7.08	10.85	4.14	10.85	1.62	21.73
1955	8.82	16.92	11.79	15.66	10.14	8.27
1956	5.15	4.55	9.52	4.92	-1.82	5.67
1957	4.44	8.48	0.18	5.21	1.51	7.68
1958	4.17	6.63	8.36	3.97	10.24	5.26
1959	13.26	5.39	1.82	5.03	14.3	6.42
1960	6.46	5.04	6.28	5.62	-3.01	3.08
1961	0.77	4.24	1.16	3.78	7.95	6.54
1962	15.06	6.43	-7.03	8.87	-11.31	8.6
1963	41.97	17.37	28.26	11.33	78.66	25.91
1964	28.62	13.58	18.8	7.82	47.48	17.71
1965	9.64	7.15	2.21	3.84	8.81	8.92
1966	14.81	7.58	22.85	10.19	11.36	8.51
1967	4.75	16.24	-13.55	8.55	12.2	8.15
1968	16.45	10.7	25.05	14.2	31.02	13.69
1969	10.14	8.92	6.73	5.63	25.46	9.71
1970	-19.66	14.08	-10.11	12.07	5.53	6.98
1971	55.76	17.88	42.3	14.81	43.12	14.34
1972	36.21	14.36	26.77	13.49	69.19	21.93
1973	68.52	24.24	42.46	15.33	32.43	11.42
1974	7.83	15.69	-19.13	15.95	19.8	10.92
1975	-18.98	12.26	6.4	13.09	-2.7	7.27
1976	23.93	9.34	4.6	5.11	6.84	8.15
1977	-3.03	7.57	-1.25	12.27	5.03	4.48
1978	17.33	10.28	8.37	4.63	10.94	7.58
1979	16.22	6.93	12.04	8.62	19.72	10.41
1980	41.01	13.87	23.21	8.61	57.55	17.28
1981	5.36	3.2	6.21	5.43	10.4	4.88
1982	17.98	10.35	18.85	9.54	16.33	8.19
1983	0.49	5.67	9.62	11.66	8.08	3.24
1984	35.9	18.13	45.17	19.17	-3.81	5.86
1985	20.52	6.24	28.62	16.95	3.84	6.12
1986	0.54	1.9	28.17	16.93	5.87	6.87
1987	4.32	13.5	22.32	8.05	7.38	3.32
1988	6.72	11.68	18.81	17.71	6.84	5.19
1989	12.24	4.23	9.72	15.48	6.12	8.68
1990	1.21	10.05	7.74	8.57	8.37	4.2

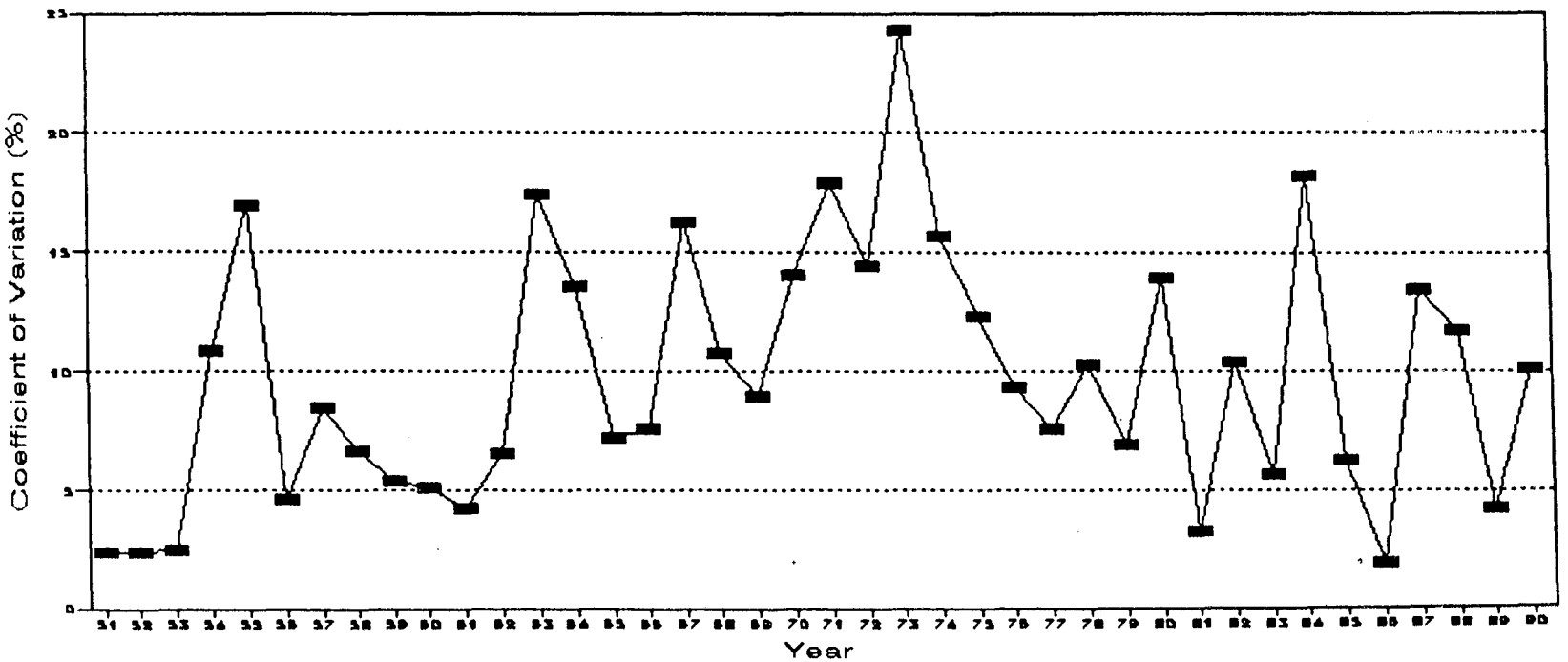
may be attributed to drought conditions prevailing. In the third period gradually the price differential have been declined. (table 4.13)

The coefficient of variation of wholesale prices in Rajasthan maintained a same trend as the price differential. The magnitude of coefficient of variation remained low in the Ist period, also the low was the amplitude of fluctuations in C.V. during the second period it attained a higher level and ultimately it became lower in the third period. (Graph 4.10)

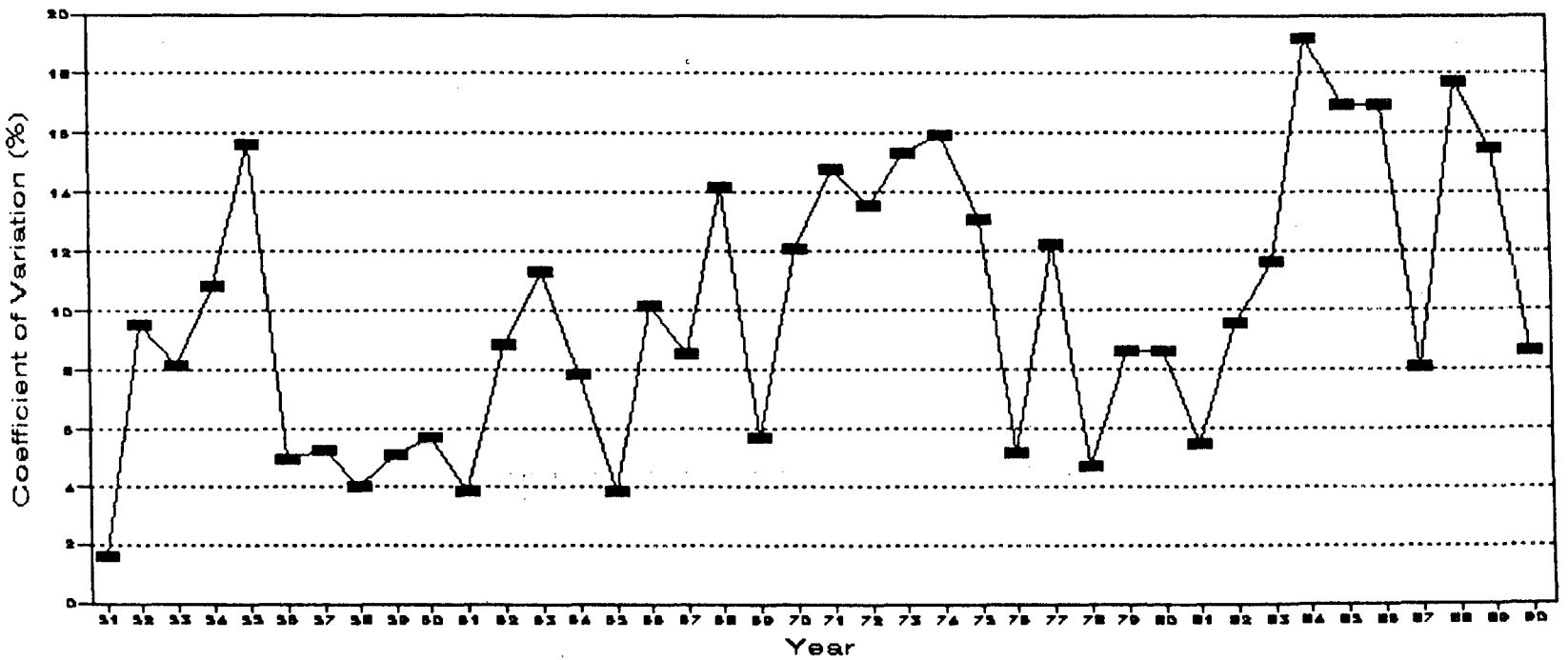
If we analyse the polynomial function, it provides the fact that in case of , Rajsthan the reversibility point occurred to be 22.56 ie. Upto 1972-73, the coefficient of variation increased to the optimum and then it declined. Hence upto 1972-73, the C.V. increased and after that the variability slopes downward. This shows the effectiveness of government policy to be late in case of bajra in Rajsthan.

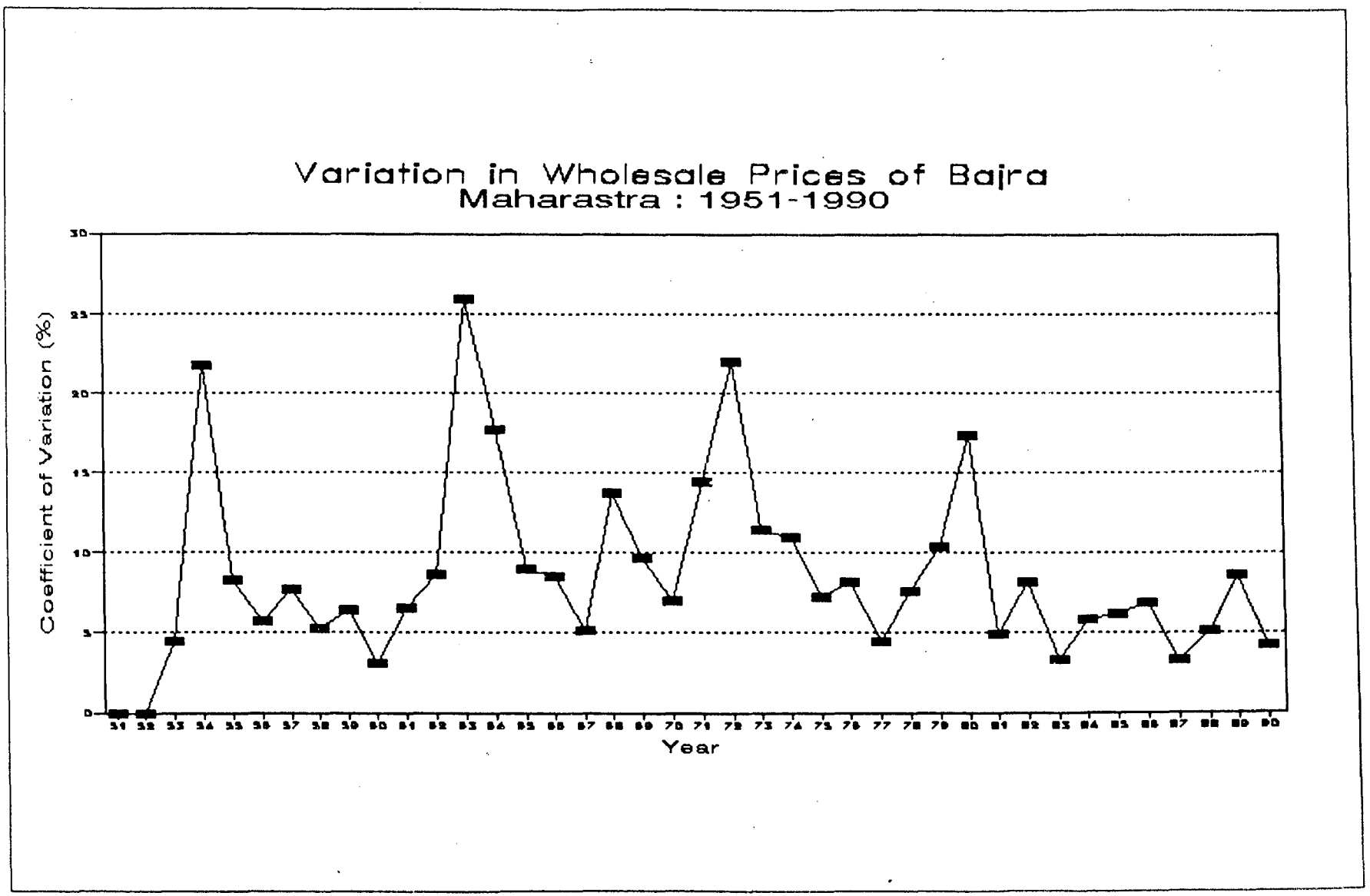
As far as the coefficient of variation in wholesale prices is concerned, in case of Gujarat it was at a lower level in the first period (Table 4.13), except certain cases when the coefficient of variation was at high level denoting high amplitude of fluctuations. The level of coefficient of variation increased in the second period and also the amplitude of fluctuation increased to a considerable extent. In the third period the coefficient of variation in wholesale prices of bajra in Gujrat couldn't provide a particular trend,. But at the end of the third period, the coefficient of variation drastically reduced (Graph 4.11).

Variation in Wholesale Prices of Bajra
Rajsthan : 1951-1990



Variation in Wholesale Prices of Bajra
GUJRAT : 1951-1990




Variation in Wholesale Prices of Bajra
Maharastra : 1951-1990
Coefficient of Variation (%)
30
25
20
15
10
5
0
Year

If we analyse the polynomial function of $Y=a+bt+ct^2$ for the coefficient of variation, then in case of Gujrat the reversibility point fits to 17.68 (table 4.12a) implying thereby the timeframe 1968-69 to be the reversibility point in coefficient of variation that means the coefficient of variation of wholesale prices of bajra increased upto 1968-69 and then that shows a declining trend. Here two types of conclusion emerges, Firstly from the graphical analysis the coefficient of variation though declined in the third period, still then at some cases it was exceptionally at higher levels than others. Secondly the reversibility test determines that the government intervention has been significantly effective in setting a reducing trend in wholesale price variations. Hence that indicates that the exceptional cases with high magnitude of coefficient of variation is due to some extraordinary circumstances affecting the marketing system.

The same trend as the price differentials prevailed in case of coefficient of variation in wholesale prices of bajra as far as the intrayear variability is concerned in case of Maharastra (Table 4.13). In the first period the coefficient of variation increased and attained the maximum in 1963-64 after which the coefficient of variation decreased gradually during second and third period, unless and until the amplitude of fluctuation peters away (Graph 4.12).

If we analyse the polynomial function, then the reversibility point sees to seems to be 19.78 ie. the 1969-70 acts as the point of time upto which the coefficient of variation had shown an increasing trend and then afterwards has shown the decreasing trend. It is due to the fact that the agricultural price commission's effectiveness had been felt lately that expected.

TABLE 4.14

WHOLESALE PRICE ANALYSIS OF GROUNDNUT

(1951-1990)

	:GUJRAT		:ANDHRAPRADESH	
YEAR	MAX.PRICE		MAX.PRICE	
	DIFF.%	CV	DIFF.%	CV
1951	24.06	1.17	10.17	1.94
1952	19.56	6.49	8.01	10.19
1953	24.75	5.55	20.88	12.21
1954	16.32	13.35	9.27	12.25
1955	11.34	18.84	15.21	8.64
1956	22.85	8.31	1.17	8.81
1957	20.28	9.29	9.77	7.85
1958	22.68	9.24	17.8	7.97
1959	21.45	9.01	18.28	8.56
1960	29.15	10.25	1.09	2.97
1961	5.8	2.73	15.97	8.38
1962	15.99	7	35.93	16.38
1963	32.04	12.25	25.24	11.22
1964	31.38	10.51	36.26	14.93
1965	14.13	6.15	10.73	13.67
1966	21.88	13	23.32	16.75
1967	0.57	12.77	45.9	16.28
1968	25.17	9.75	-10.57	8.5
1969	30.73	12.23	24.45	11.39
1970	9.24	4.87	59.61	20.1
1971	14.33	6.59	8.75	6.25
1972	46.7	16.65	-6.9	9.74
1973	31.76	10.76	49.75	22.96
1974	-5.62	11.75	25.38	8.91
1975	16.25	13.22	37.33	11.28
1976	68.31	19.72	54.25	20.66
1977	10.51	10.29	16.25	7.76
1978	41.07	16.93	21.26	10.08
1979	15.98	7.89	1.77	5.54
1980	0	6.12	16.03	8.47
1981	4.49	4.63	18.18	8.24
1982	14.48	9.57	-4.77	4.21
1983	26.57	10.56	6.12	6.23
1984	3.79	4.07	5.31	6.12
1985	3.42	3.27	9.18	3.36
1986	9.45	4.95	11.58	5.79
1987	6.12	16.63	-7.38	12.6
1988	1.86	25.72	11.52	4.9
1989	10.26	11.23	8.16	10.22
1990	1.71	6.35	22.77	7.2

Hence for the coefficient of variation in wholesale prices if we make interstate comparison, then it is obvious that the effectiveness of government intervention felt earlier in case of Gujrat than in Maharastra and Rajshtan as far as bajra is concerned. But the picture of price differential and coefficient of variation is more satisfactory in case of Maharastra. This indicates that as far as the interstate disparity is concerned, the government intervention has not made effective presence in reducing the variability in wholesale prices. Maharastra shows a good response than other two states though responded lately to the government intervention.

Groundnut :

Between 1960 and 1980, India switched from being a net exporter of edible oils to the world's single largest importer. During this period stagnation in supply resulted in widening the gap between demand and supply, in the domestic market. There are evidences of increasing risks associated with government farming and hence there have reasons of variability in groundnut prices. The problems of stability in the groundnut market are extremely important for government pricing policies and market interventions in the form of commodity stabilisation programmes. Here we have studied the measures of variability in wholesale price and price differential for the possible reasons for the high instability in the groundnut market and the interstate disparity thereby.

As far as Gujrat is concerned, the price differential maintained a higher magnitude in the initial phases of Ist period. The amplitude of fluctuation also

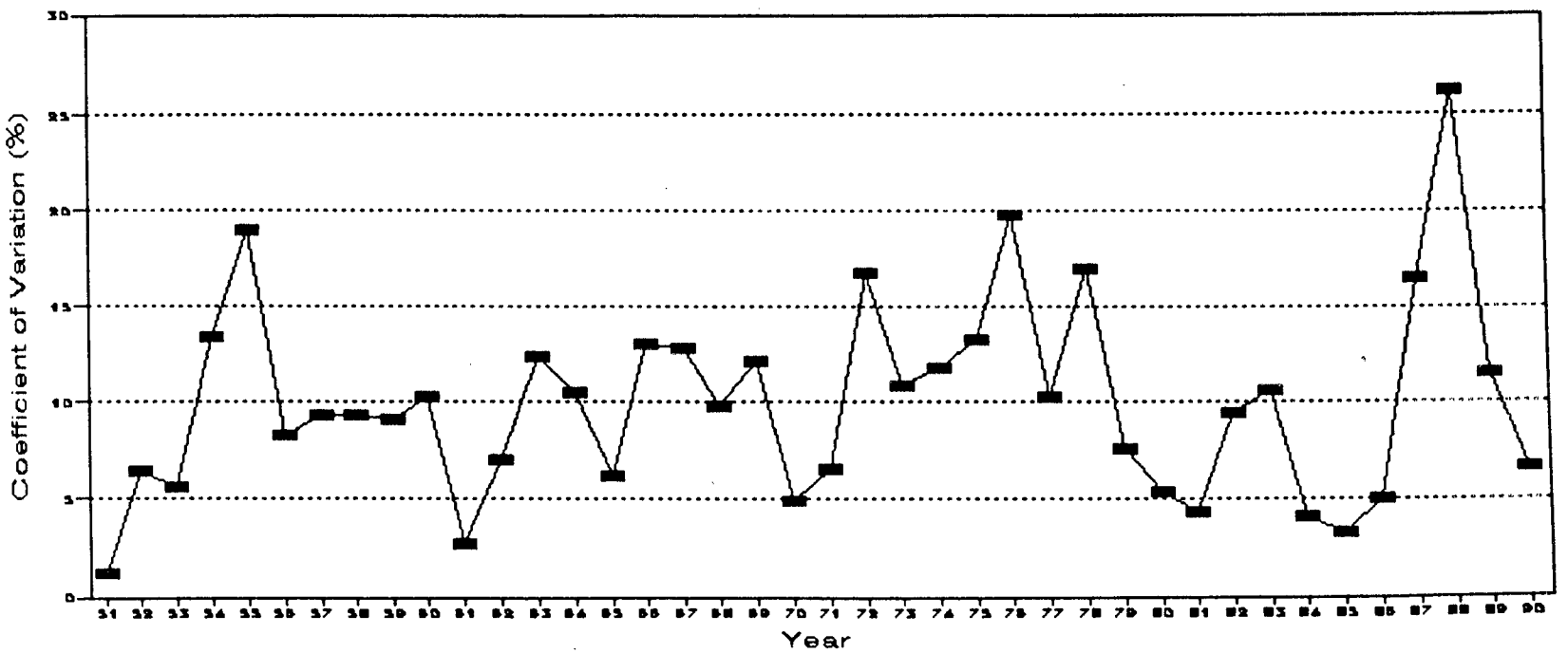
remained at a lower level. But in the second period the price differential increased to a higher level and attained the maximum in 1976 ie.. 68.31. After that it declined substantially and the amplitude of fluctuation in price differential also decreased to a considerable extent. (Table 4.14)

In case of Andrapradesh, in the first period though the magnitude of price differential was low, the amplitude of fluctuation was high. It increased slowly and remained at a higher level with lesser amplitude of fluctuation. It attained the maximum in 1970, after which it declined and entered into third period in a declining trend. Also during the third period the amplitude of fluctuation petered out as evident from the table (4.14).

If the consider coefficient of variation, then it is obvious that the intrayear variability in the wholesale prices of groundnut in Gujarat (Table 4.14) was at a lower level in the first period. The amplitude of fluctuation was low during the first period. In the second period, gradually the magnitude of coefficient of variation increased. Along with this the amplitude of fluctuation also increased. But after 1975, the magnitude of coefficient of variation gradually declined, except the case of 1988 when the magnitude of coefficient of variation attained a peak level, after which it declined suddenly (Graph 4.13).

If we consider the case of polynomial function fitted to the interstate variability in wholesale prices then it is quite clear that upto 1978-79, the coefficient of variation shown an increased trend, after which it had shown a declining trend except the case of 1988 when the coefficient of variation was

Variation in Wholesale Prices of Groundnut, Gujrat : 1951-1990



Variation in Wholesale Prices of
Groundnut, Andhrapradesh : 1951-1990

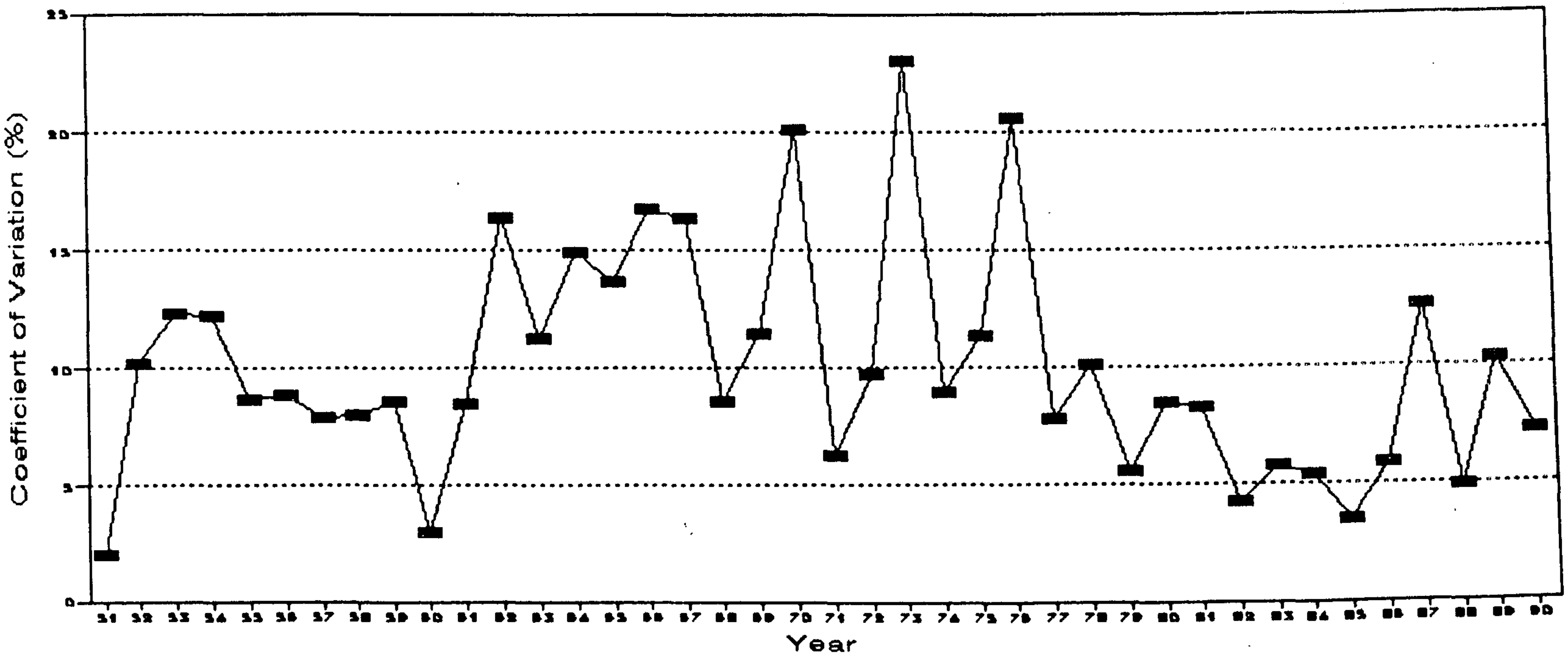


Table No. 4.12b

ESTIMATED POLYNOMIAL

GROUND NUT

	GUJARAT	ANDHRA PRADESH
b coefficient	0.23826 (0.4182)	0.63579 (0.0418)
c coefficient	-0.0042 (-0.5418)	-0.017 (0.0039)
b/2c	28.43	18.67
R^2	0.835	0.91

ESTIMATED POLYNOMIAL

COTTON

	ANDHRA PRADESH	KARNATAKA
b coefficient	1.1498 (0.1682)	1.32637 (1.68)
c coefficient	-0.025 (-0.2739)	-0.0348 (-1.42)
b/2c	22.9	19.04
R^2	0.73	0.81

maximum. That may have happened due to the prevalence of extraordinary situation at that point of time.

In the initial phases the coefficient of variation of wholesale prices of Groundnut in Andhrapradesh was at a higher level upto 1950s. Then it declined and the magnitude of coefficient of variation increased during 1960s. In the second period the coefficient of variation had shown greater amplitude of fluctuation (Table 4.12b). Upto 1978 the coefficient of variation maintained a higher level, but after that it decreased persistently until the amplitude of fluctuation slowed down (Graph 4.14).

If we analyse the reversibility test as determined by the polynomial function, the reversibility point in case of Andhrapradesh (Table 4.12b)is found to be 18.67. That indicates the fact that the coefficient of variation has shown an increasing trend upto 1969-70 after which it declined gradually. This is due to the fact that the government intervention has an impact on the variability in wholesale prices of groundnut in Andhrapradesh, four or five years latter than its actual intervention.

From this analysis it is obvious that the government intervention was ineffective in reducing the variability in wholesale prices of groundnut among the states concerned. If it had any impact, Andhrapradesh captured it earlier than Gujrat. Secondly the coefficient of variation of Andrapradesh remained at a lower level than that of Gujrat in most of the cases. Hence it is obvious that Andrapradesh might have been at an advantage of better production conditions,

incentives and marketing facilities than Gujrat, due to which there is interstate disparity.

Cotton :

In India cotton is grown in almost all the states but it is the western region comprising Gujrat, Maharastra and Madhyapradesh, which produce 45% of the production in India. In Southern region, cotton is prominently grown in the states of Andhrapradesh, Karnatak and Tamil Nadu. In north west, Punjab, Haryana and Rajasthan predominate in production of cotton.

We face major limitations regarding the availability of monthly wholesale price data of cotton, for the states in western and northern regions. Hence Andhra Pradesh and Karnatak have been taken as two sample states for this crop. Being aware of the fact that this will not make our analysis truly representative from realistic point of view, than what might have emerged had we taken the most important cotton producing states. Our obvious constraint was the confidentiality of cotton prices statistics that are not published for all the months of a year.

As far as Andhra Pradesh is concerned, the first quarter initials from January to March. The price differential was at a lower magnitude during the initial phases of period I. After that the price differential gradually increased along with increased amplitude of fluctuations. In 1957 and 1961 the price differential maintained a negative value, -6.12 and –3.6 respectively. During the second phase price differential gradually increased. Also along with the increase in magnitude of price differential on an average, the amplitude of fluctuation increased. With the

TABLE 4.15

WHOLESALE PRICE ANALYSIS OF COTTON

(1951-1990)

	:ANDHRAPRADESH		:KARNATAKA	
YEAR	MAX.PRICE		MAX.PRICE	
	DIFF.%	CV	DIFF.%	CV
1951	9.81	2.61	7.68	3.07
1952	12.15	7.44	10.14	7.98
1953	12.78	6.2	2.79	11.91
1954	15.12	1.19	7.83	7.42
1955	8.64	5.27	3.93	5.66
1956	3.85	5.26	26.41	12.24
1957	-6.12	6.72	1.51	6.62
1958	16.18	8.52	3.34	4.39
1959	8.75	5.66	5.82	6.8
1960	7.18	10.15	-2.02	12.93
1961	-3.6	8.18	23.06	13.83
1962	2.69	2.22	27.94	20.5
1963	19.79	11.83	10.02	7.24
1964	18.31	16.55	4.98	9.4
1965	14.38	7.18	118.07	33.97
1966	7.05	4.89	-7.32	7.67
1967	-8.15	5.63	13.71	10.22
1968	20.61	10.18	-11.91	13.3
1969	6.52	4.74	29.64	14.4
1970	29.2	19.31	5.72	9.57
1971	13.03	6	26.16	13.9
1972	7.33	10.3	43.77	18.71
1973	24.04	9.23	-5.55	11.92
1974	-10.44	10.17	-3.39	4.75
1975	-12.12	20.78	62.31	24.87
1976	49.1	19.59	-11.08	17.72
1977	-9.1	12.84	-20.09	21.93
1978	-11.47	28.51	23.09	10.17
1979	12.1	19.89	50.92	20.13
1980	9.38	12.31	-0.73	6.82
1981	15.16	12.12	54.83	4.02
1982	15.43	11	18.3	18.47
1983	23.89	18.02	17.28	7.3
1984	15.24	8.4	12.42	6.73
1985	12.42	7.47	10.62	1.19
1986	10.08	4.23	21.24	1.5
1987	11.79	10.06	24.48	2.59
1988	8.01	3.57	9.81	2.21
1989	8.91	2.52	10.08	1.64
1990	6.96	1.46	12.63	1.62

initiation of third period the price differential gradually declined. The amplitude of fluctuation in the price differential also declined in the third period (Table 4.15).

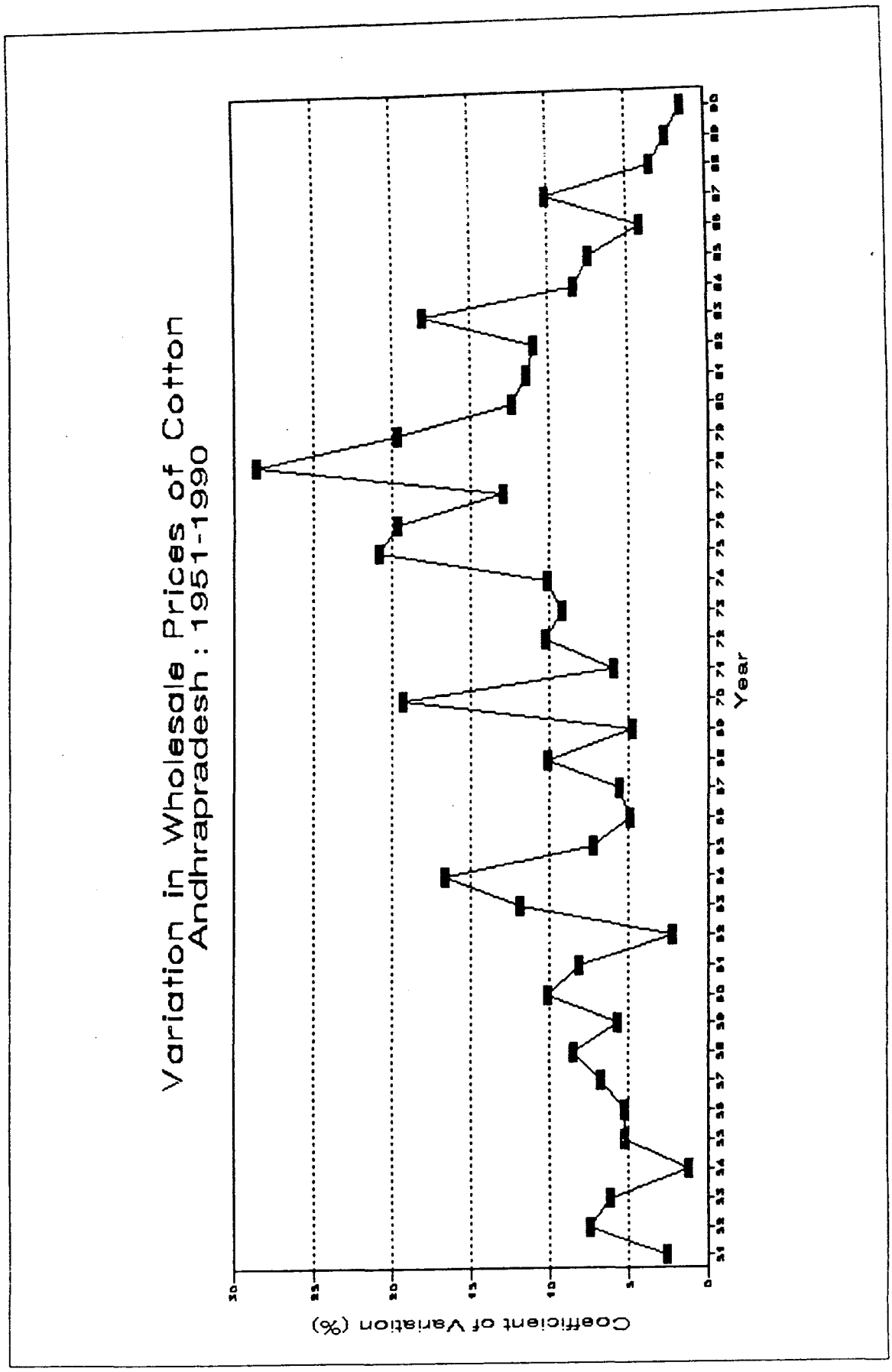
If we consider the case of Karnataka, and analyse the price differentials, then it is obvious that in the initial phase of stage I, the price differential remained at a lower level. Also the amplitude of fluctuation in price differential was low. With the initiation of the second period, the magnitude of prices differential increased, as well as the amplitude increased. The price differential attained maximum of 118.07 in 1965. Then during third period the price differential declined except the exceptional cases of 1975, 1979, and 1982 when it attained the level of 62.31, 50.92 and 54.83, respectively. On an average, the magnitude of price differential remained at a low level in the third period (Table 4.15).

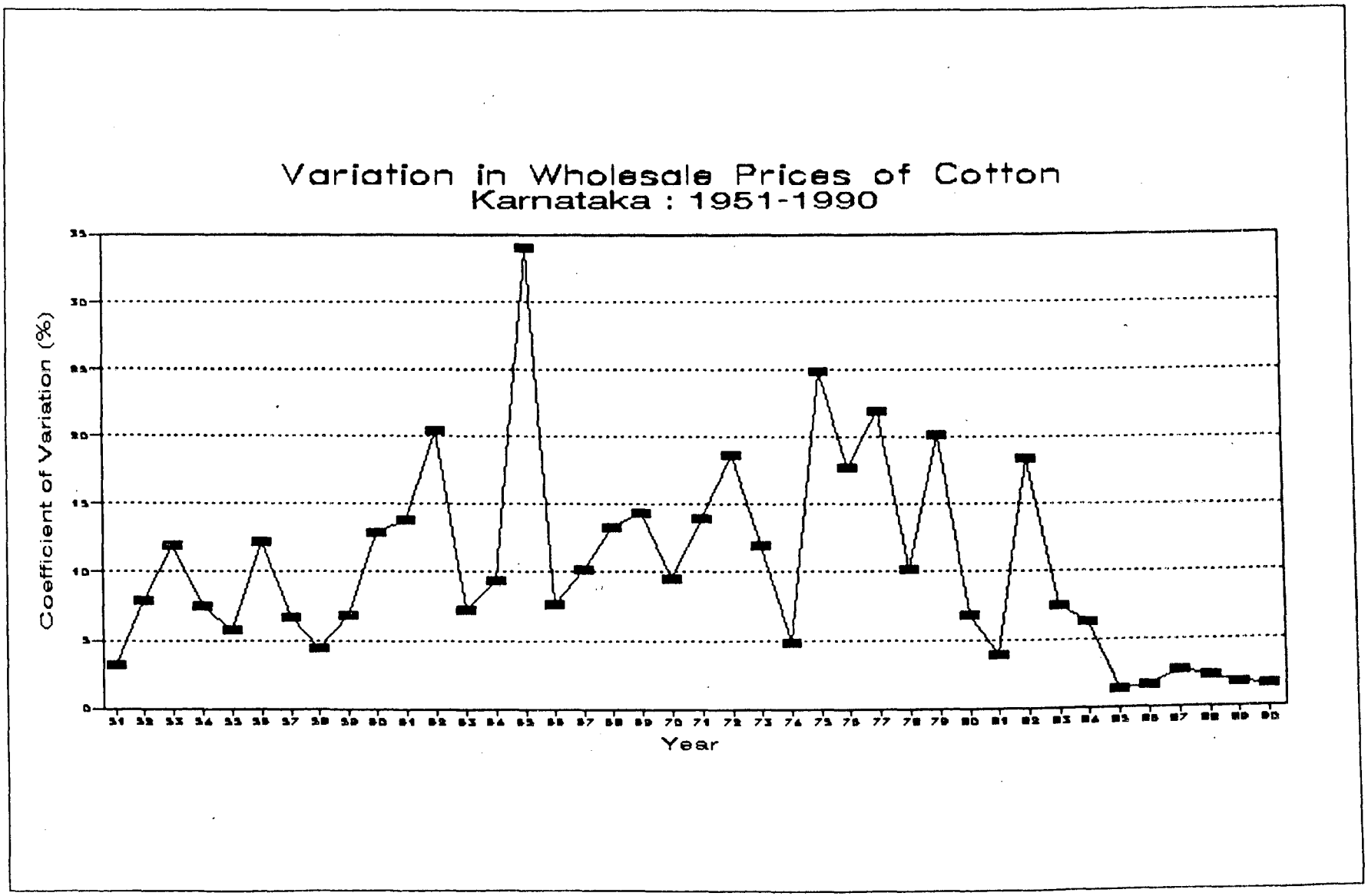
If we analyse the coefficient of variation in wholesale prices, then in Andhra Pradesh the trend of coefficient of variation was similar to that of the trend of price differential. The magnitude of coefficient of variation remained at a lower level and the amplitude of coefficient of variation maintained a lower level in the first period. Then afterwards the magnitude as well as the amplitude of coefficient of variation increased during the second period unless and until the magnitude of coefficient of variation attained the peak level of 28.51 in 1978. At that time the price differential was –11.47. After 1978 the C.V. in terms of magnitude gradually declined except some exceptional case of 1983 and 1987. When the coefficient of variation attained 18.02 and 10.06. But in an average the coefficient of variation of wholesale prices in cotton measuring the intrayear variability declined during the

third period. Also the amplitude of fluctuation in coefficient of variation declined unless and until it peters away (Graph 4.15).

For empirical verification if we analyse the extended polynomial, then it is evident that the reversibility point is 22.9 which corresponds to the time frame of 1972-73. Hence this emphasises the fact that upto 1972-73, the coefficient of variation maintained an increasing trend after which it declined. Though in terms of magnitude the C.V. attained maximum in 1978, this was due to some exceptional reasons such as crop failure, and lack of incentives to farmers. Hence deleting the exceptional fluctuations it seems to be a matter of fact that the government intervention has taken six to seven years to be effective in controlling the variability in wholesale prices of cotton in Andhra Pradesh.

As far as the coefficient of variation is concerned, the magnitude of coefficient of variation of wholesale prices of cotton in Karnataka remained at a lower level in the first period. Also the amplitude of fluctuation remained at a lower level. But with the initiation of second period, the magnitude of coefficient of variation moved to a higher level. The amplitude of fluctuation in it also increased. In the initiation of the third period, the magnitude of coefficient of variation declined. But from 1975 onwards the coefficient of variations amplitude of fluctuation increased which slowed down in 1980s. After 1981 onwards, the magnitude of coefficient of variation gradually decreased, along with the amplitude of fluctuation, unless and until the amplitude of fluctuation stagnated (Graph 4.16).


Variation in Wholesale Prices of Cotton
Andhrapradesh : 1951-1990
Coefficient of Variation (%)
Year


Variation in Wholesale Prices of Cotton
Karnataka : 1951-1990
Coefficient of Variation (%)
Year

If we analyse the polynomial function, then the reversibility test for variability in wholesale prices of cotton in Karnataka, then the reversibility point comes to be 19.04 (Table 4.12b). This emphasises the time frame of 1969-70 to be the reversibility period upto which the coefficient of variation in wholesale prices of cotton in Karnatak increased and after that it declined gradually though with some exceptional cases. In 1965 the coefficient of variation attained maximum due to lack of conducive natural atmosphere where as the amplitude of fluctuation was high from 1975 to 1981 due to poor supply response and lack of incentives to cotton growing farmers. Also the fact may be that the government intervention was effective lately by five years in case of Karnataka.

If we make interstate comparison for the variability in wholesale prices of cotton, then though the government intervention is effective in Karnataka earlier than Andhra Pradesh, still then Andhra Pradesh shows a good tendency of lesser variability in wholesale prices than Karnataka.

Therefore from the above analysis it is obvious that in case of rice there is interstate disparities in coefficient of variation. Andhra Pradesh lately captured the low variability in prices due to effectiveness in Government intervention than West Bengal and Tamil Nadu. At the same time Andhra Pradesh maintained low magnitude of coefficient of variation than other two states. In case of wheat the result coming out of the analysis reveals the fact that the effectiveness of government policy is more prominent in case of Uttar Pradesh and Punjab where as it is less prominent in case of Madhya Pradesh. Hence the government intervention has not been effective enough in reducing the interstate disparities in variability of

wholesale prices. In case of bajra, in Rajasthan and Maharashtra the effectiveness of Government policy is prominent where as in case of Gujarat, the effectiveness remained subdued. In case of groundnut as well as cotton similar picture emerges. Intrayear variability in wholesale prices and its trend are not similar in the states concerned. Also the reversibility point of time differed. Hence it can be said that though in individual states the government policy has been more or less successful in reducing the variability in wholesale prices as evident from the reversibility test, but still the interstate disparity prevails. The government intervention has not been effective enough in reducing the interstate disparity in variability in wholesale prices.

CHAPTER V

INTER YEAR VARIABILITY IN WHOLESALE PRICES

As a consequence of the agricultural sector recording a trend rate of growth of output of 2.7 percent per annum that is slightly higher than the growth of population, India's dependence on imports of foodgrains has been reduced considerably since the mid seventies. Not withstanding these developments, the fact remains that the rate of growth has remained far short of the needs of the economy and has been lower than plan targets. There are also year to year fluctuations causing fluctuations in the food prices. Because of unequal distribution of assured irrigation facilities and other infrastructure across regions, the spread of new seed fertiliser technology has been quite uneven. This has led to increasing inter regional disparity in the levels and growth of agricultural output in general and food output in particular in India which ultimately has affected the prices as well.

At least two factors seem to be contributing to increased fluctuations in crop output. Crop output particularly of food grains, is sensitive to variations in irrigation. Modern inputs like fertilisers being highly complementary to water, the demand for them is influenced significantly by the variations in irrigation. With the fluctuation in irrigation there also prevails the fluctuation in output. Hence there have been sensitivity of output with respect to variation in irrigation. Secondly changes in prices of inputs like fertilisers relative to those of crops would also

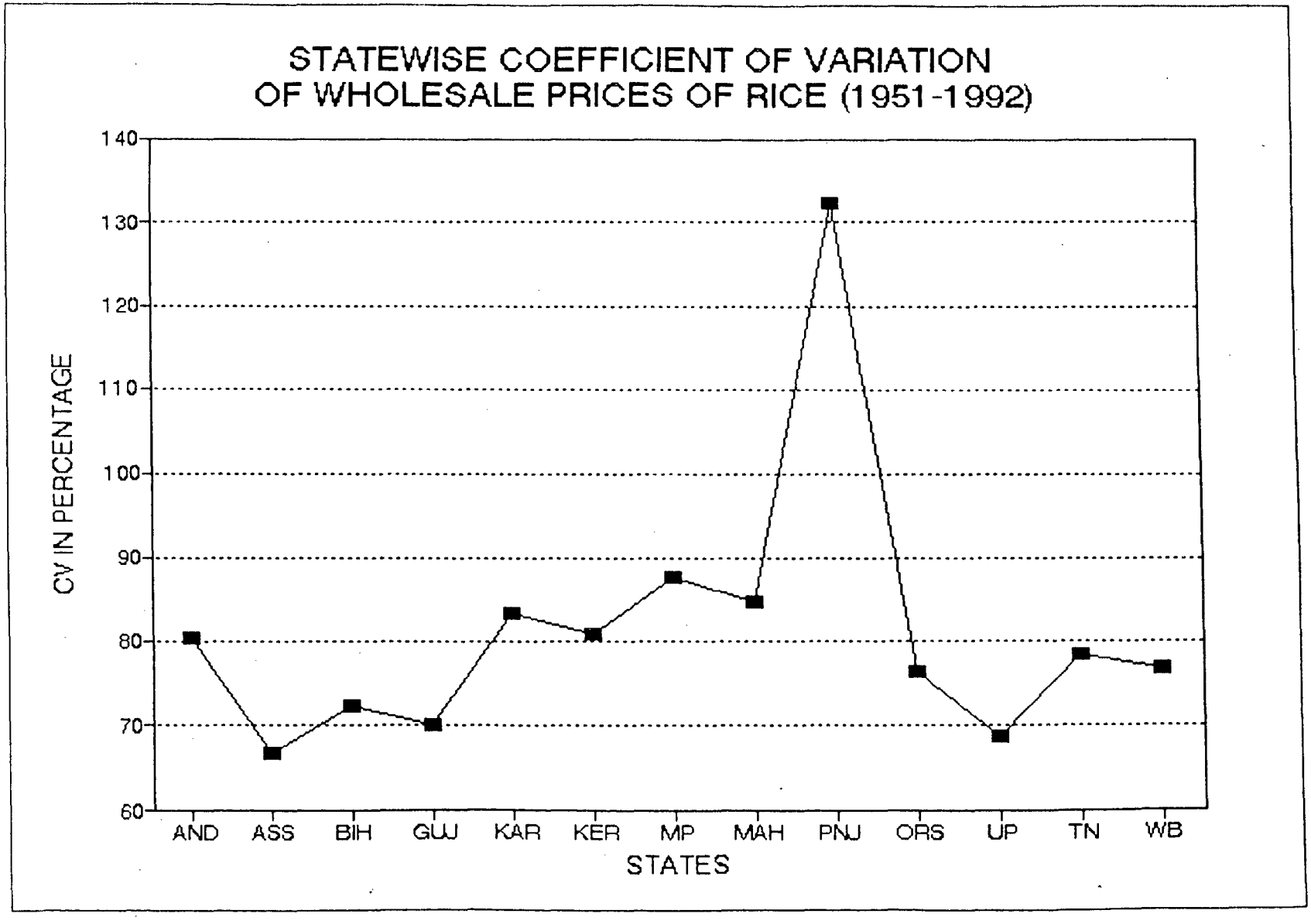
influence the demand for inputs resulting in variations in output and hence it ultimately leads to the fluctuation of prices. With the adoption of new technology, and increasing use of modern inputs, the fluctuation in prices have been expected to be reduced, due to lack of fluctuation in output.

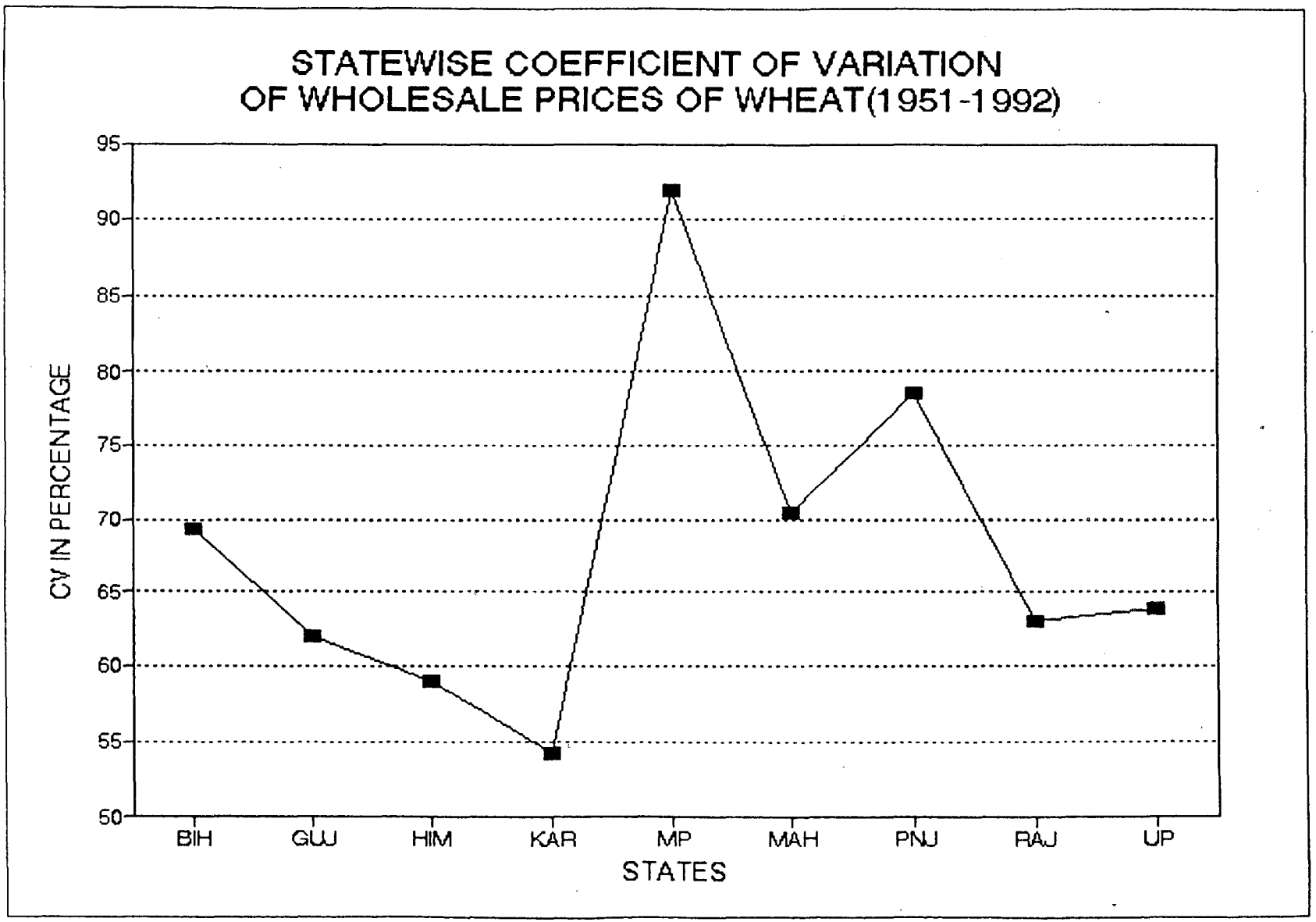
In view of pressing need of the economy to achieve self sufficiency in food grains, it was understandable that efforts should be concentrated on regions which are adequately served with assured sources of irrigation and where farmers are well endowed in terms of resources for investment as well as favourable institutional framework providing the necessary incentives for investment and effort. These factors together with a producer oriented agricultural price policy led to a fast growth of food grains output in the developed regions. The consumption of food grains being already at a high level, a considerably larger proportion of increment in food grains output was marketed. As a result, not only the stocks in food grains with government grew at a faster rate but the growth of these surpluses was on a relatively stable path while the food grain output growth in the country as a whole became more unstable leading to instability in prices.

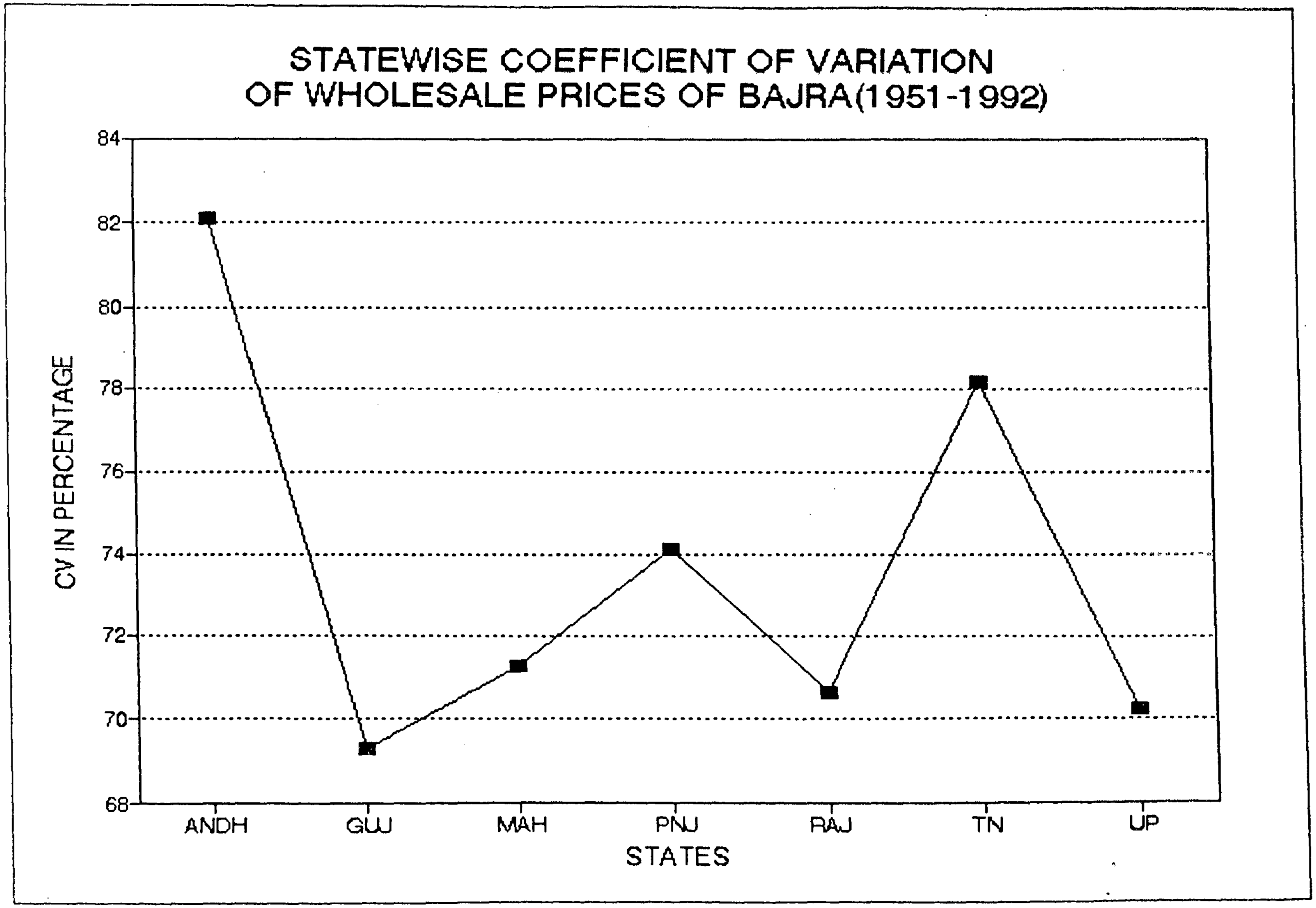
The association between input use and growth performance of the crops in different states is evident. That also leads to the peculiar disparity in the growth rate and variability of prices. There has been marked increase in the level of irrigation, consumption of fertilisers, area under HYVs as also the consumption of energy for farm mechanisation. This was supported by a Farm price policy, both for inputs as well as outputs on the consideration that farmers are price responsive.

Apart from calculating the intrayear variability in wholesale prices, the interyear variability also can project the picture of interstate disparity in wholesale prices. The interstate disparity from the inter year variability has been learned, by taking the coefficient of variation in wholesale prices from 1951-1992 for 13 states in case of rice, 9 states in case of wheat and 7 states in case of Bajra. Then coefficient of variation in wholesale prices during this period has been compared between different states.

In case of rice Punjab shows maximum coefficient of variation of 133%. The C.V. is exceptionally high due to the fact that there have been production of high quality of basmati rice. The fluctuations in the magnitude of wholesale prices of basmati rice has been effective enough in putting the coefficient of variation at a higher level, apart from this in mid 1960s, Punjab observed the drought conditions which had a negative impact on the supply response leading to higher fluctuation in prices during those periods. Assam shows the lowest coefficient of variation of the magnitude of 66% during the same period. The lowest variability is due to the fact that in Assam basically the production have been lower and hence it was dependent on other sources where the government have to interfere. That has led to a more stable price. In Madhya Pradesh the C.V. was 88.16% followed by Maharashtra (84.86%), Karnataka (82.13%), Kerala (80.73%), Tamil Nadu (78.6)%), West Bengal (76.8%), Orissa (76.3%), Bihar (71.46%), Uttar Pradesh (68.4%) respectively (Graph 5.1). This shows that there have been inter state disparity in coefficient of variation. This may be due to the fact that before


STATEWISE COEFFICIENT OF VARIATION
OF WHOLESALE PRICES OF RICE (1951-1992)
CV IN PERCENTAGE
140
130
120
110
100
90
80
70
60
AND
ASS
BIH
GUJ
KAR
KER
MP
MAH
PNJ
ORS
UP
TN
WB
STATES


STATEWISE COEFFICIENT OF VARIATION
OF WHOLESALE PRICES OF WHEAT(1951-1992)
CV IN PERCENTAGE
95
90
85
80
75
70
65
60
55
50
BIH
GUJ
HIM
KAR
MP
MAH
PNJ
RAJ
UP
STATES



STATEWISE COEFFICIENT OF VARIATION OF WHOLESALE PRICES OF BAJRA(1951-1992)

government intervention there have been higher fluctuations in wholesale prices especially before the mid 1960s. The exceptional situation of drought conditions and natural calamities have also led to fluctuation in output of rice as rice cultivation prima facie depends on the monsoon and irrigation and the irrigation even depends on the watertable which is dependent on the rainfall. Apart from this all states have not been successful enough in adopting the new farm technology due to distortion in institutional incentives of production. This has led to fluctuation of output and hence price as well.

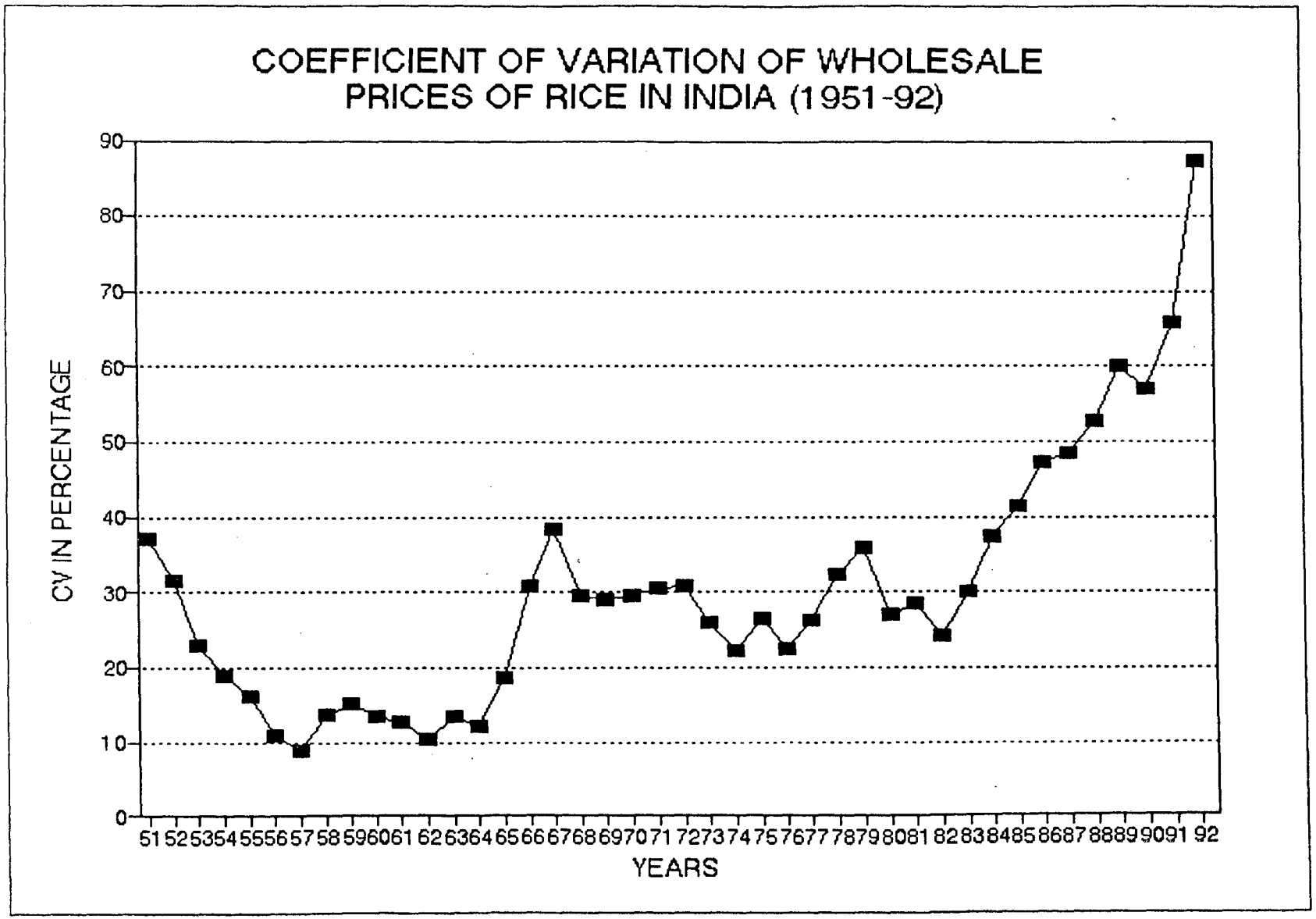
The picture of wheat is something different. The coefficient of variation of wheat prices remained at a lower level than the coefficient of variation of rice for different states during the same period. The inter year variability was lowest in case of Karnataka at 54% where as it remained at 93% level which is highest in case of Madhya Pradesh. The inter year coefficient of variation of wholesale prices has 77.4% for Punjab, followed by 71.23% in case of Maharashtra, 68.24% for Bihar, 63.8% for Uttar Pradesh, 63.6% for Gujarat, 63.37% for Rajasthan, Himachal (58.5%) respectively (Graph 5.2). If we take into account the interstate disparity, then Madhya Pradesh, Punjab and Maharashtra had shown a higher magnitude of coefficient of variation than other states. The coefficient of variation of the states other than the three named states, were of similar trend.

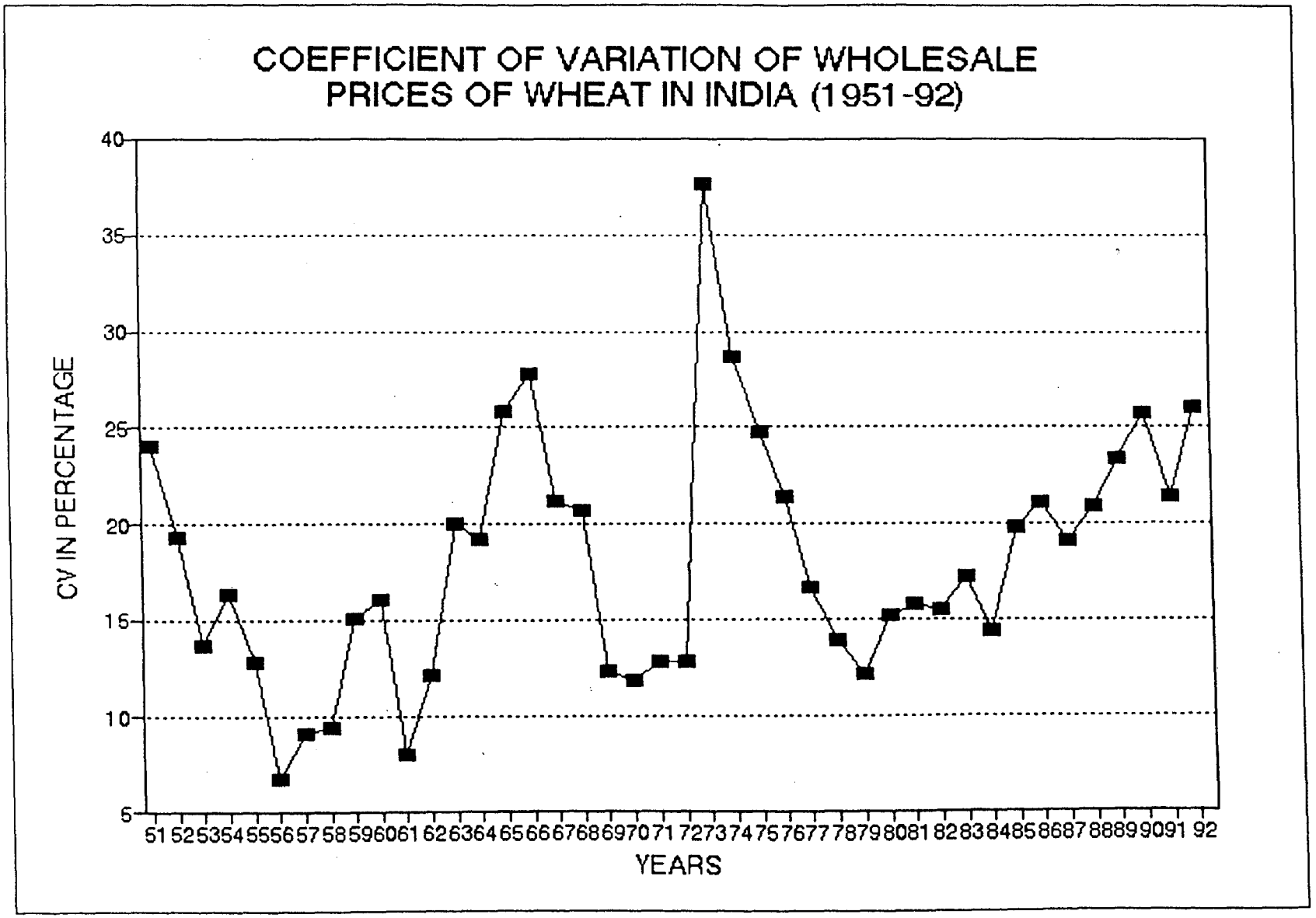
Hence this depicts the fact that the coefficient of variation of wholesale prices except for some selected states remained at a lower level and to some extent similar magnitude. That indicates that interstate disparity in terms of inter year

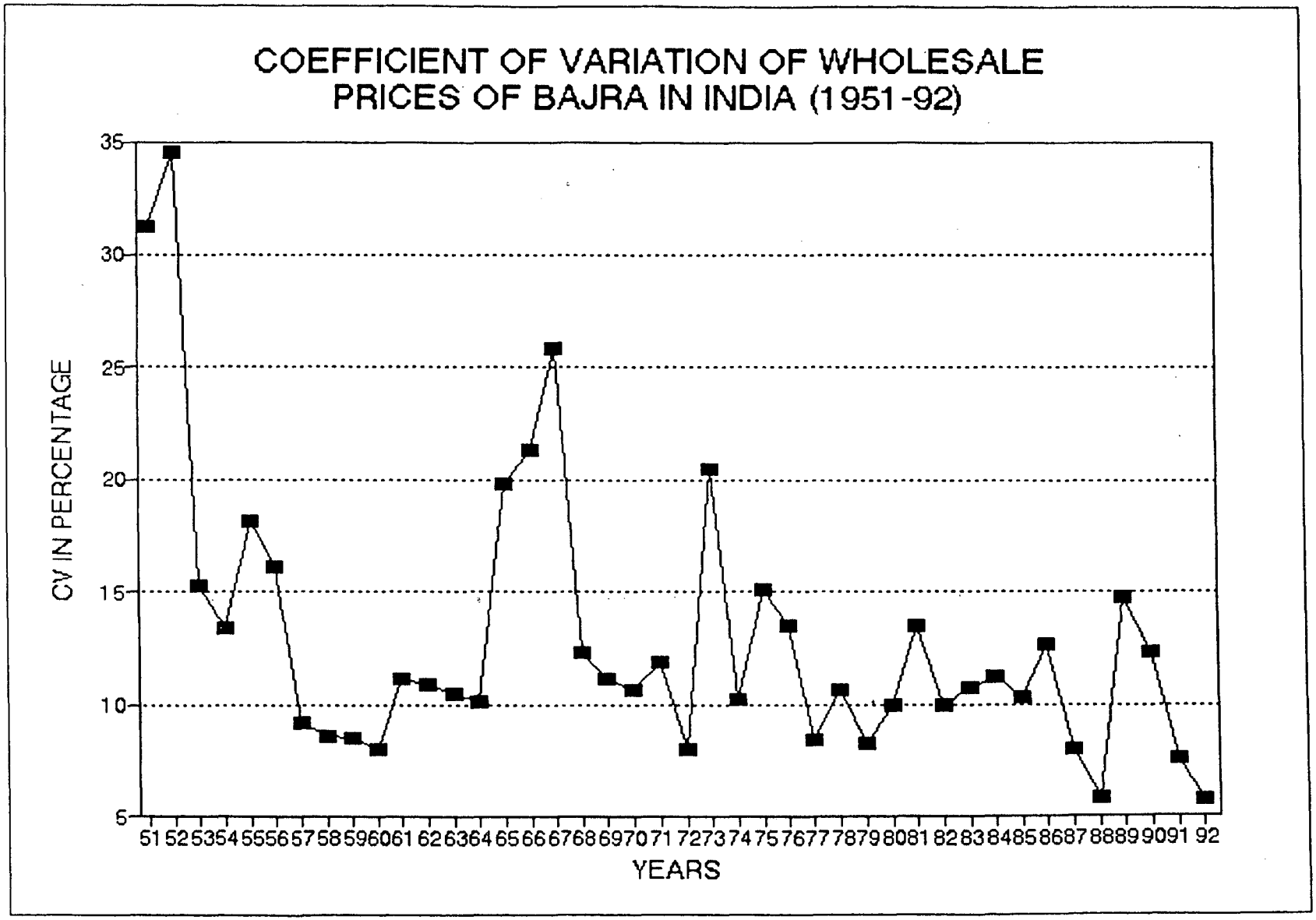
variability is low for these states. But for other three states where the inter year variability have been exceptionally high may be considered individually. In case of Punjab, it has been to large extent known to be the one among largest producer of wheat. Apart from this the marketing facility have been developed with the high consumer's demand. Along with this the fluctuation of output in extraordinary drought conditions had affected the food supply and hence the price situation. In case of Madhya Pradesh, on the other hand the lack of infrastructural facilities and low institutional incentives to farmers had been affecting the output fluctuation and the prices negatively. Apart from this, as we have observed in the previous analysis the government intervention have been effective in reducing the agricultural prices lately than its formations. Hence that had maintained the variability of wholesale prices not only at higher level but also made disparities in the variability.

If we consider the case of bajra, then the graph (5.3) depicts the interstate disparity in the inter year variation in wholesale prices and suggests that Andhra showed highest coefficient of variation during 1951-1992 at 82.02 percent level on the otherhands Gujarat had shown the lowest coefficient of variation at 69.18 percent.

Then Tamil Nadu's coefficient of variation is of the magnitude of 78.2% followed by Punjab, Maharashtra, Rajasthan and Uttar Pradesh. This clearly reveals the fact that there prevails the interstate disparity, if we take into account the intertemporal price behaviour particularly the coefficient of variation. In case of Andhra Pradesh the coefficient of variation remained at exceptionally higher level


COEFFICIENT OF VARIATION OF WHOLESALE PRICES OF RICE IN INDIA (1951-92)
CV IN PERCENTAGE
0
10
20
30
40
50
60
70
80
90
51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92
YEARS


COEFFICIENT OF VARIATION OF WHOLESALE PRICES OF WHEAT IN INDIA (1951-92)
CV IN PERCENTAGE
40
35
30
25
20
15
10
5
51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92
YEARS


COEFFICIENT OF VARIATION OF WHOLESALE PRICES OF BAJRA IN INDIA (1951-92)
CV IN PERCENTAGE
35
30
25
20
15
10
5
51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92
YEARS

owing to the fact that the production of bajra had been varied considerably creating greater instability in wholesale prices. Basically bajra is termed as an inferior commodity and consumed by the poorer sections of the people. But with the demand for bajra being reduced due to increased purchasing power of the poorer public, price behaviour of bajra had been affected accordingly.

The case of interstate disparity in the variability in wholesale prices of these three commodities becomes quite clear if we take the coefficient of variation of wholesale prices in the all India level. As far as the rice is concerned (Graph 5.4), in the 1950s, the coefficient of variation gradually declined upto 1957. After 1957, the coefficient of variation of wholesale prices in different states gradually increased. From 1967 to 1981, the coefficient of variation remained almost stagnant and the amplitude of fluctuation was also less. After 1982 onwards the coefficient of variation increased at a rapid pace indicating there by that after 1981, the interstate disparity in all India level have been magnified.

In case of wheat the C.V. was at a higher level in the initial phases (Graph 5.5). Then it declined and had shown greater amplitude of fluctuation upto the early 1970s. After 1974 onwards, the coefficient of variation remaining at a lesser magnitude, gradually increased over time. Therefore the case of wheat shows that in mid sixties and early seventies there have been unambiguous fluctuations in coefficient of variation of wholesale prices. This perhaps was due to the fact that the prevalence of drought conditions in the mid sixties in the major wheat producing areas have a serious set back on the production front which ultimately

affected the prices. At the same time the wheat producing states which did not experience the drought condition, maintained the usual price level. The discrepancies between the drought affected area made the interstate disparity in wholesale prices to a greater extent. Also the distortions in the production pattern due to distortions in incentives to production mattered much in determining the variability in wholesale prices at the all India level.

If we take into account the coefficient of variation of wholesale prices at the all India level for bajra, then it's quite clear as depicted in the (Graph 5.6), that the coefficient of variation remained at an unambiguously higher level during 1951 and 1952. From 1953 onwards the coefficient of variation gradually decreased. Again during 1965 the CV increased as the amplitude of fluctuation is evident upto 1980s. After 1982, the C.V. became steady and decreased onwards, except the case of 1989 when it maintained a higher level.

Analysis of coefficient of variation of bajra shows that it remained at a lower level than other two products at the all India level. Secondly during mid 1960s and early 1970s, the coefficient of variation was high. In the early 1950s the high coefficient of variation was due to the fact that at that time the production of bajra was at a lower level in a fewer pockets were associated with it. Along with this no standard prices was maintained at the market level. But during the mid 1960s, the prevalence of adversary conditions in monsoon that made the greater fluctuation in the production pattern as a whole and the regional distortions in the

production pattern which made the coefficient of variation to be maintained at a higher level.

In case of the inter year variability when we divide the time period into two phases and calculate the coefficient of variations, then the coefficient of variation is higher in period II than period I (Table 5.1). The coefficient of variation was lower in period I, consisting 1951-1965 in comparison to the period II (1966-90). In case of period I Punjab maintained the coefficient of variation in wholesale prices of rice at 36.3% whereas Maharashtra's coefficient of variation was 11.54. In period II Punjab has highest 152.01 percent whereas Uttar Pradesh possessed lowest coefficient of variation 42.88%. The exceptionally high coefficient of variation in case of Punjab is due to the single crop quality specially the high quality basmati rice which price fluctuated more. TH-6912

In case of wheat (Table 5.1), in the first period of 1961-65, Karnataka had high coefficient of variation of wholesale prices (36.87%) in terms of inter-year variability whereas Punjab has lowest at 15.31 percent. During the period II, M.P. has highest coefficient of variation in the wholesale prices of wheat at 67.12 percent whereas Karnataka has the lowest. In maximum cases the coefficient of variation was higher in period II than period I.

If we take into account bajra (Table 5.1), then in period I, Maharahstra has highest coefficient of variation at 36.06% whereas Rajasthan has lowest coefficient of variation of wholesale prices at 24.3 percent. During the second period, Andhra

TABLE NO.5.1

COEFFICIENT OF VARIATION OF WHOLESALE PRICES

	RICE			WHEAT			BAJRA	
	1951-65	1966-92		1951-65	1966-92		1951-65	1966-92
ANDH	20.255	56.126	BIH	29.913	50.727	ANDH	26.454	58.505
ASS	14.224	40.647	GUJ	23.473	41.977	GUJ	24.604	49.037
BIH	20.988	48.534	HIM	22.7742	39.124	MAH	36.068	48.532
GUJ	21.697	50.182	KAR	36.875	25.642	PNJ	24.472	51.517
KAR	23.321	57.573	MP	18.873	67.127	RAJ	24.303	48.765
KER	14.339	59.501	MAH	25.665	49.472	UP	26.554	53.905
MP	14.683	60.257	PNJ	15.313	59.317	TN	24.685	48.477
MAH	11.54	66.792	RAJ	17.361	39.667			
PNJ	36.305	152.012	UP	25.966	43.171			
ORS	20.912	49.146						
UP	29.905	42.878						
TN	15.9	56.728						
WB	18.256	50.681						

Pradesh has the highest coefficient of variation at 58.5 percent whereas Uttar Pradesh has the lowest coefficient of variation at 48.47 percent.

Hence from all these observations it is emphatically concluded that the coefficient of variations in term of inter year variability has been increased in all these commodities and the disparity of coefficient of variations is also evident in all these states concerned.

In the next step we fit a regression equation taking the coefficient of variation in wholesale prices as the function of C.V. in production in that particular time period (t) and CV of irrigation intensity for particular crop concerned.

Then for rice the equations is

$CVWPR = f[CVPDR_t + CVII_{nt}]$

For wheat,

$CVWPW = f[CVWDW_t + CVII_{nt} + CVWRPWC_{t-1}]$

For Bajra

$CVWPB = f[CVPDB_t + CVII_{nt}]$

Where CVWPR = Coefficient of variation of wholesale price of rice

$CVWPDR_t$ = coefficient of variationof production of rice

CIInt = Coefficient of variation of irrigation intensity

CVWPW = Coefficient of variation of wholesale price of wheat

$CVPDW_t$ = Coefficient of variation of production of wheat in time t

CVWPB = Coefficient of variation of wholesale price of bajra

$CVPDB_t$ = Coefficient of variation of production of bajra in time t

$CVWRPWC_{t-1}$ = Coefficient of variation of reliable price of wheat with respect to cotton

The result is

$$CVWPR = 28.28377 - 0.40486\ CVPDR - 3.2867\ CVIInt \quad \text{..... (1)}^{**}$$
$$(-2.866) \qquad (-3.808) \qquad R^2 = 0.96$$

$$CVWPW = 26.134 - 0.07861\ CVPDWC - 2.8964\ CVIInt + 1.1525\ CVWRPWC_{t-1}$$
$$(-2.791) \qquad (-3.881) \qquad (3.793) \quad R^2 = 0.98. \quad \text{.....(2)}^{**}$$

$$CVWPB = 23.76 - 0.07953\ CVPDB - 1.47487\ CVIint \quad \text{.....(3)}^{**}$$
$$(-3.427) \qquad (-4.480) \qquad R^2 = 0.89$$

The figures in ( ) are T values

** represents significance at five percent level.

The estimated results show that if 1 percent increase in the production of rice, there will be 4 percent fall in the prices, which is theoretically proof other things remaining constant. The 1 percent increase in the irrigation intensity is negatively related to 3.3 percent variation in prices of rice, which is statistically significant at 5 percent level. This regressive equation have captured 96 percent of variation.

Similarly in case of wheat the independent variables like production and irrigation intensity which are negatively related with dependent variable. But the relative prices of wheat with respect to cotton is with positive sign. The equation elucidates that 1 percent increase in production and irrigation intensity has 0.07 percent and 2.8 percent fall in the wholesale prices of wheat. But in the case of variable like the

relative price of wheat with respect to cotton, with 1 percent increase in this variable there will be 1.1 percent increase in wheat prices and it is also significant statistically at 5 percent level. The equation have captured 98 percent of variation.

Then in case of bajra also these two explanatory variable i.e. the production and irrigation are negatively explained where the coefficient are 0.07 percent and 1.4 percent when there is 1 percent increase in the explanatory variables. That indicates that with 1 percent increase in production and irrigation intensity there is 0.07 percent of 1.4 percent fall in the wholesale prices respecting. The equation captures 89 percent variation in case of bajra.

CHAPTER VI

CONCLUSION

The behaviour of prices in India varies from commodity to commodity. Broadly we distinguish the behaviour of prices of food grains, non food agricultural crops, industrial consumer goods, industrial raw materials and capital goods and services. For our analysis we had taken three major food grain crops i.e rice, wheat and bajra for interstate intrayear and inter year variability analysis. Also we have estimated the growth rates. Ground nut being the major oilseed group and cotton from the commercial crops have been taken for the analysis.

Food price depends on the relative supply and demand for food grains. Of the total food production, only small part, typically about one third is marketed and in practice it is this marketed surplus that effectively influences the food price behaviour. The demand for food is basically a function of non-agricultural income and to some extent also of food price. The prices of food grains used to fluctuate widely in relation to the variation in food grains output. But in recent years the government procurement pricing policy and buffer stock operation have stabilised food grain prices to a considerable extent. But the apprehension in our mind prima facie is whether there has been interstate disparity in wholesale prices if any?

During the course of analysis we have calculated the average annual growth rate of prices. The growth rate of wholesale prices differ from state to state. In case of rice Punjab have shown highest growth rates where as all other states

maintained growth rates level within 2.2 to 3.2 percent per annum. For the growth rate of wholesale prices of wheat, Madhya Pradesh, Punjab and Rajasthan attained a high growth rate between 2.2 to 2.3 percent . In case of bajra , the states of Guajrat and Uttar Pradesh possess high growth rate of above 2.5 percent per annum . In this case all other states maintained 2.2 to 2.5% growth rate.

For interstate comparison the growth rate is not enough. It only cannot substantiate the prevalence of distortions in wholesale prices. Hence the coefficient of variation and price differentials had been taken into account to make the study worthwhile. As far as the trend of price differential is concerned, it clearly depicts the disparities among the states. Firstly though in the initial phases price differential remained low and increased in the second phase until it declined in the third phase. This trend is true for all states at for all crops that had been taken into account. But the fact which comes out from the analysis is that price differential has not shown declining trend at the same time for all the states. In some states it had been late by 2 to 5 years, than expected. This is due to the fact that the intervention of government in the food economy has not been effective uniformly for all states concerned. Secondly the price differential has been at different levels for different states for a same product. This occurs due to the fact that the maximum and minimum harvest prices in different quarters differed from state to state. Apart from this the harvesting quarter also differed among the states leading to different conditions affecting the production.

In our analysis of intrayear variability in wholesale prices the trend of variability remained different for different states. Not only that the reversibility point also differed. In case of rice for West Bengal, Andhra Pradesh and Tamil Nadu the reversibility point remained around 22. For wheat Uttar Pradesh, Punjab and Madhya Pradesh had shown the reversibility point at around 18.

In case bajra, Rajasthan, Gujarat and Maharashtra possessed the reversibility point around 19. For ground nut in case of Gujarat, the reversibility point was 28.43 and that of Andhra Pradesh 18.67 revealing a huge discrepancy between the two. Apart from this in case of cotton of Andhra Pradesh and Karnatak the reversibility point seems to have occurred at 22.9 and 19.04 level respectively.

From the above analysis it is obvious that Tamil Nadu has shown early response in the reduction of intrayear variability of wholesale prices in rice, followed by West Bengal and Andhra Pradesh. That is primarily due to the fact that the APC has been effective in setting the declining variability in Tamil Nadu than other states. But if we compare the level of intrayear variability then Andhra Pradesh has shown a better picture. The C.V. remained at a lower level than other two states as far as the intrayear variability is concerned.

In case of wheat the reversibility trend has been set earlier with the decline of intrayear variability in wholesale prices in Punjab, followed by Uttar Pradesh and Madhya Pradesh. Due to high level of production and greater market accessibility coupled with the effective role of APC the variability in wholesale prices was under control in Punjab. The modern technology which has found its

fullest manifestation in Punjab whereas the other regions have not been able to adopt break through in the technological progress to a satisfactory level. That but also the nature of prices as well.

Gujarat has been more responsive to the government intervention, for which the reversibility point have been much earlier than Rajasthan and Maharashtra. Though Gujarat had shown the early response, the case of Maharashtra shows that it had maintained a lower variability than other two states. Hence obviously the interstate disparity is prevailing. But in case of bajra the fact remains that this is prima facie consumed by the poorer people. Hence its supply response has been low than rice and wheat.

It is not adequate to analyse the interstate variability in food prices from the intrayear variability alone. Hence the intertemporal price variation had been taken into account to make our analysis more comprehensive. The intertemporal price variability shows the coefficient of variation of different states during the period concerned i.e. 1951-1992 in our study. The coefficient of variation of wholesale prices of rice is maximum in case of Punjab where as it is minimum in case of Assam. The coefficient of variation of wholesale prices of wheat is maximum in case of Madhya Pradesh and Minimum in case of Karnataka. The CV of wholesale prices of Bajra is maximum in case of Andhra Pradesh showing higher fluctuations and minimum in case of Gujarat. There had been wide disparities in the variation in wholesale prices projecting the interstate disparity.

In the all India level the coefficient of variation trend shows that in the initial phases from 1951 to 1964, the coefficient of variation in wholesale prices of rice, wheat and Bajra have been at low level. During 1965 to the early Part of the 1980s, the coefficient of variation of wholesale price of all these commodities, not only maintained a higher magnitude but also poses greater amplitude of fluctuation. After 1980 onwards the coefficient of variation gradually increased for all these commodities. This trend emphasises the fact that in the initial phases there were higher fluctuations in the output which led to high C.V. in wholesale prices. This was aggravated by the lack of supply responsive measures. With the planning and production capacity generation the low coefficient of variation gradually decreased. But with the mid 1960s, the drought condition in some states was responsible enough to make the C.V. to be high. But after that the inter-regional disparity in the implementation of new agricultural technology and less accessibility to institutional economy by the farming class, there was interstate disparity in production and distortion in the supply response. This has led to disparity in the price situation among different states.

The major reason behind the instability in output is not only the disparity in the adoption of new technology but also the adverse agroclimatic condition in which the technology is used. The new seed fertiliser technology has raised the response of output to water. Hence with a given variability in irrigation or water, the instability in output will be greater leading to fluctuations in prices.

The whole period have been divided into two phases pre government intervention period i.e. 1950-1965 and post government intervention period i.e. 1966-1992. In both cases the growth rate and the inter temporal variability in wholesale prices have been calculated. The result reveal that not only there prevail the interstate disparity in both the phases, but also the growth rate and inter year variability are at low level in the first period where as they are of high magnitude in the second period. Hence even though the government intervention is there, still interstate disparity prevails; growth rate and coefficient of variation of wholesale prices are of high magnitude as well.

In order to analyse the causative factors behind the variability in wholesale prices, the regression model has been fitted taking variability in production and irrigation intensity as the explanatory variable for rice and bajra. In case of wheat another explanatory variable has been added eg. The variability in relative prices of wheat with respect to cotton. The results shows that in all cases of rice, wheat and bajra, the explanatory variables are negatively related to the dependent variables, except the relative price of wheat with respect to cotton, where the explanatory variable is positively released to the wholesale price variability of wheat. Hence the demand and supply pattern in the market are relatively placed in such a manner that the fluctuation in production and irrigation affects the fluctuation in prices negatively.

Therefore the result corroborates the hypothesis that no only the growth rate and coefficient of variations of wholesale prices differ among states, but also the

government intervention have been partially successful in reducing the intra-year variability. The analysis of the reversibility test reveals that in some states the government intervention has been effective earlier in reducing the intrayear variability whereas in other states the effectiveness bit lately. On the other hand the inter year variability in wholesale prices have increased in the latter phases of government intervention than the earlier phases. The government intervention in the food grains economy has not been completely reduced the interstate disparity in the variability of wholesale prices. However the regression equation shows that the variability in product and irrigation affects the variability of wholesale prices of agricultural commodities. Hence the policy implications should be such that it affects the production and irrigation intensity in order to reduce the fluctuation of wholesale prices particularly in case of poor performing states.

BIBLIOGRAPHY

Acharya, S.S. (1981): Parity Issues in Pricing of Foodgrains Output, *Indian Journal of Agricultural Economics*, October-December, 1981 (Conference Number), Vol. XXXVI, No.4.

Ahluwalia, Isher Judge (1979): *Behaviour of Prices and Outputs in India*, MacMillan and Co., 1979, Delhi.

Chopra, R.N. (1981): *Evolution of Food Policy in India*, MacMillan and Co., Delhi, 1981.

Dandekar, V.M. (1968): Agricultural Price Policy: A critique of Dantwala, *Economic and Political weekly*, 16 March, 1968, Vol. III, NO.11.

Dantwala, M.L. (1966): Principles and Problems of Agricultural Price Determination, *Journal of the Indian Society of Agricultural Statistics*, June 1966, Vol. XVIII, Vol. II, No.2.

Divatia, V.V. and Pani (1968): Variations in Cereals Prices, 1951-52 to 1966-67, An Explanatory Model, *Economic and Political Weekly*, July 1968 (Special Number), Vol. III, No.26-28.

George, P.S. (1979): *Public Distribution of Foodgrains in Kerala – Income Distribution Implications and Effectiveness*, Research Report NO.7, International Food Policy Research Institute, Washington, D.C., march 1979.

George, P.S. (1983): *Government Interventions in Foodgrain Marketers (Procurement and Public Distribution of Foodgrains in India)*, Centre for Management in Agriculture, Indian Institute of Management, Ahmedabad, 1983.

George, P.V. (1968): *Price Behaviour in India*, University of Bombay, 1968.

Ghosh, A.B. (1974): *Price Trends and Policies in* India, Vikas Publishing House Pvt. Ltd., 1974.

Government of India, (1943): *Report of Foodgrains Policy Committee*, Chairman – Theodore Gregory.

Government of India (1957): *Report of Foodgrains Enquiry Committee*, Chairman – Ashok Mehta, Department of Food, Ministry of Food and Agriculture, Government of India, 1957.

Government of India (1966): *Foodgrains Policy Committee*, Chairman – B. Venkatappiah, Department of Food, Ministry of Food and Agriculture, Government of India, 1966.

Gulati, Ashok (1984): *Some Aspects of Agricultural Price Policy – A Case Study of Wheat in India,* Ph.D. Dissertation, University of Delhi, August 1984.

Gulati, Ashok (1985): *Supply Response of Wheat in India- Model, Review and Estimation* (Mimeograph), Working Paper No.2, Deptt. of Business Economics, University of Delhi, July 1985.

Gupta, R.P. (1973): *Agricultural Prices in a Backward Economy*, National Publishing House, Delhi, 1973.

Janvry, Alain de and Subbarao, K. (1984): *Agricultural Price Policy and Income Distribution in India.* Working Paper No.274, California Agricultural Experiment Station, Giannini Foundation of Agricultural Economics, University of California, June 1984.

Jha, B.V. (1971): *Agricultural Price Stabilisation in India*, Shot Publications, Calcutta, 1971.

Kahlon, A.S. and Tyagi D.S. (1983): *Agricultural Price Policy in India*, Allied Publishers Private Ltd., New Delhi, 1983.

Kaur, Rajbans (1975): *Agricultural Price Policy in Economic Development*, University of Chicago Press, Chicago, Illinois, 1974.

Krishna, Raj (1967B): *Agricultural Price Policy and Economic Development* published in Agricultural Development and Economic Growth, edited by Herman M. Southworth and Bruce F. Johnston, Cornell University Press, 1967.

Krishna, Raj (1982): Some Aspects of Agricultural Growth, Price Policy and Equity in Developing Countries, *Food Research Institute Studies*, Stanford University, Vol. XVIII, No.3, 1982.

Krishna, Raj and Chhiber, Ajay (1983): *Policy Modeling of a Dual Grain Market: The Case of Wheat in India*, Research Report No.38, International Food Policy Research Institute, Washington D.C., May 1983.

Krishna, Raj and Raychaudhuri, G.S. (1980): *Some Aspects of Wheat and Rice Price Policy in India*, World Bank Staff Working Paper No. 381, Washington D.C., International Bank for Reconstruction and Development, April 1980.

Krishnaji, N. (1973): Wheat Price Movements, *Economic and Political Weekly*, 30 June 1973, Vol. VIII, No.26.

Mellor, John W. (1968): The Functions of Agricultural Prices in Economic Development, *Indian Journal of Agricultural Economics*, January-March 1968, Vol.XXIII, No.1.

Nadkarni, M.V. (1973): *Agricultural Prices and Development with Stability*, National Publishing House, Delhi, 1973.

National Council of Applied Economic Research (1969): *Structure Behaviour fo Prices of Foodgrains*, National Council of Applied Economic Research, New Delhi, 1969.

Nerlove, Mark (1958): *Dynamics of Supply: Estimation of Farmers' Response to Price,* Johns Hopkins Press, Baltimore, 1958.

Ray, S.K. (1972): Effects of Consumption Availability Fluctuations on Foodgrain Prices, *Economic and Political Weekly*, 24 June, 1972, Vol. VII, No.26 (Review of Agriculture)

Ray, S.K. (1981): Weather, Prices and Fluctuations in Agricultural Production, *Indian Economic Review*, October-December, 1981, Vol. XVI, No.4.

Ray, S.K. (1983): *Growth and Stability in Indian Agriculture* (Mimeo), E/88/83, Institute of Economic Growth, Delhi, June 1983.

Ray Chaudhuri, G.S. and Krishna, Raj (1979): Some Aspects of Wheat Price Policy in India, *Indian Economic Review*, October 1979, Vol. XIV (New Series), No.2.

Sharma Pradeep Kumar: *Government Intervention in Foodgrain Economy – A Case of Rice, Wheat and Bajra*, Ph.D. Dissertation, 1994.

Singh, L.S. (1983): *Agricultural Price Policy and Stabilization Measures in India,* Capital Publishing House, Delhi, 1983.

Subbarao, K. (1978): Rice Price Behaviour and Public Procurement: An Analysis of the Experience of Andhra Pradesh, *Indian Journal of Agricultural Economics*, July-September 1978, Vol. XXXIII, No. 3.

Thamarajakshi, R. (1970): Determinants of Wheat Prices, *Agricultural Situation in India*, Working Paper I, Department of Business Economics (University of Delhi), South Delhi Campus, Benito Jaurez Road, Delhi, July 1984.

Tyagi, D.S. (1974): *Farmers' Response to Agricultural Prices in India: A Study in Decision Making*, Heritage Publishers, Delhi, 1974.

Rao, C.H.H.: *Fluctuations in Agricultural Growth: An Analysis of unstable increase in productivity*, Economic and Political Review, 1968.

Cohen, R.L.: *The Economics of Agriculture,* London: James Nishert and Company Ltd., 1955.

Edgar Thomas: *Introduction to Agricultural Economics*, London, 1954.

Lipsey, R.G.: *Introduction to Positive Economics*

Bhalla, G.S.: *Pricing Mechanism and Agricultural Price Policy.*

George Blyn: *Agricultural Trends in India (1891-1947)*, 1966.

Rao, C.H.H.: *Changes in Rural Poverty in India, Implication for growth.*

Dhawan, B.D.: *Impact of Irrigation on multiple cropping*, Economic and Political Weekly, March 1992.

Dev S. Mahendra: *Constrains on Agricultural Productivity – A District Level Analysis*, Economic and Political Weekly, Sept. 1991.

Purkayastha Dipankar & Subramanian Alka: *Price and Income Stabilisation in Indian Groundnut Market*, Economic and Political Weekly, Feb 22, 1986.

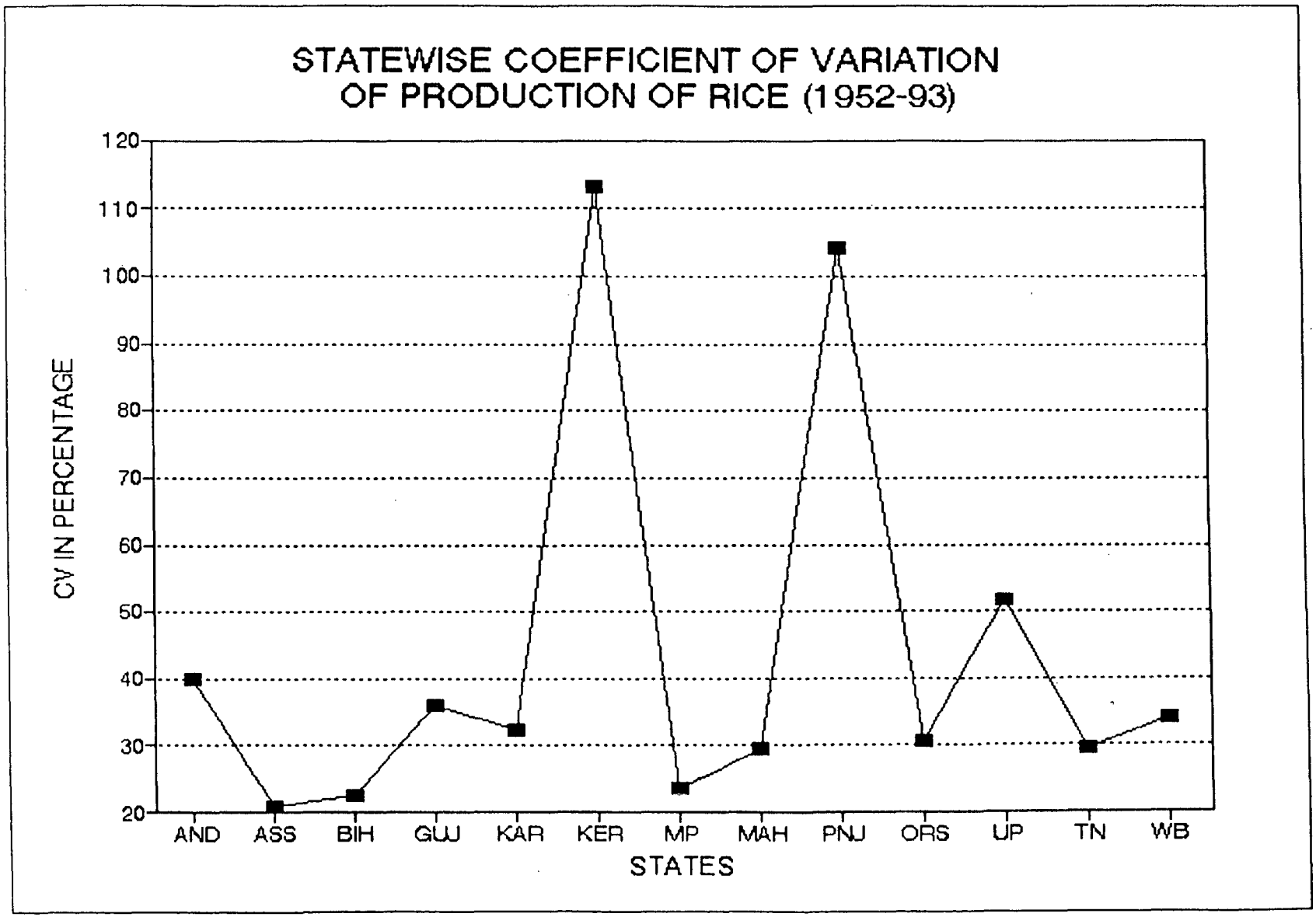
Sidhu D.S.: *Some Aspects of Agricultural Marketing and Pricing Politics in India*, Indian Journal of Agricultural Economics, Oct-Dec 1990.

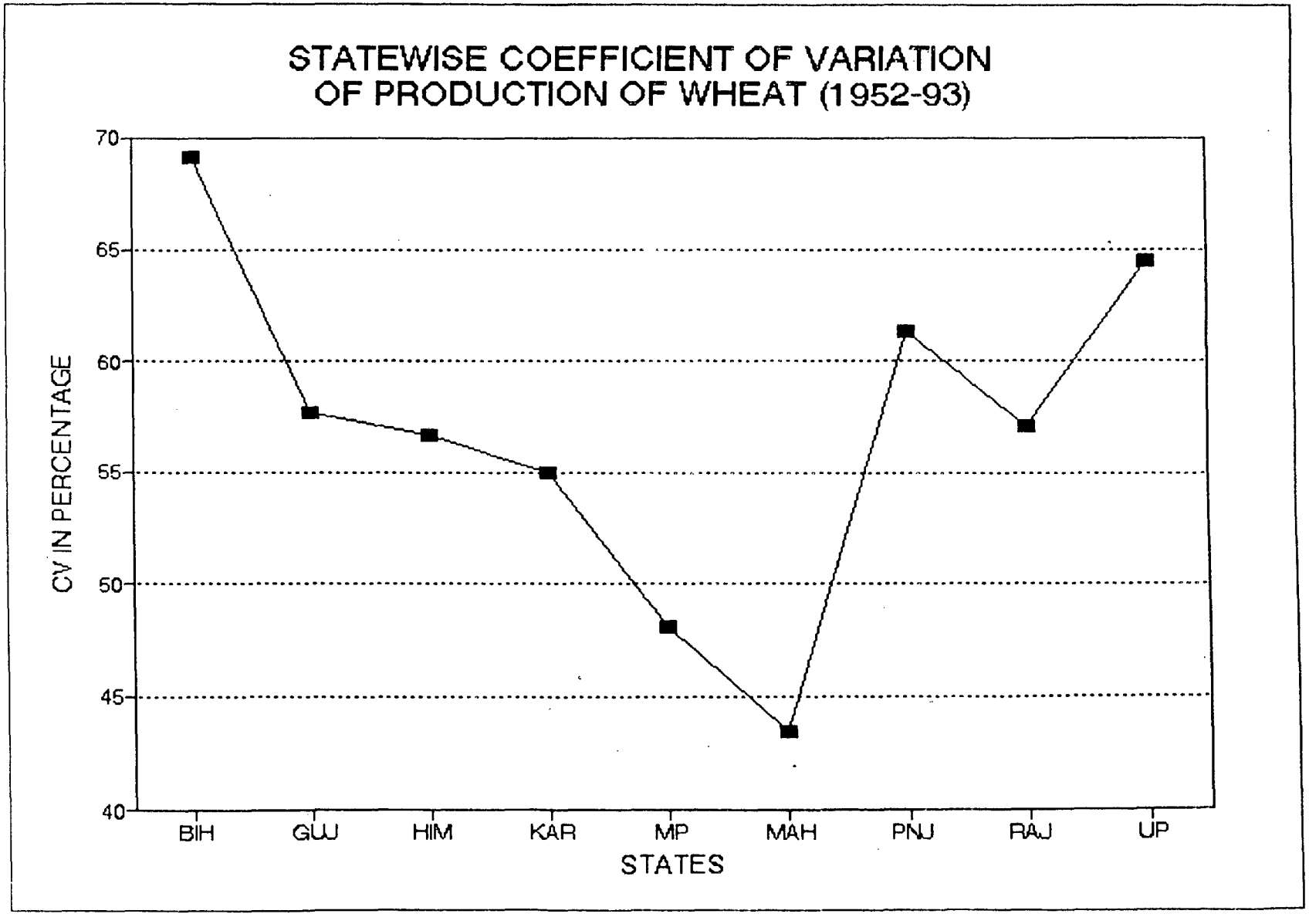
Achary a S.S. & Agarwal N.L.: *Agricultural Prices Analysis and Policy*, Economic and Political Weekly, 1994.

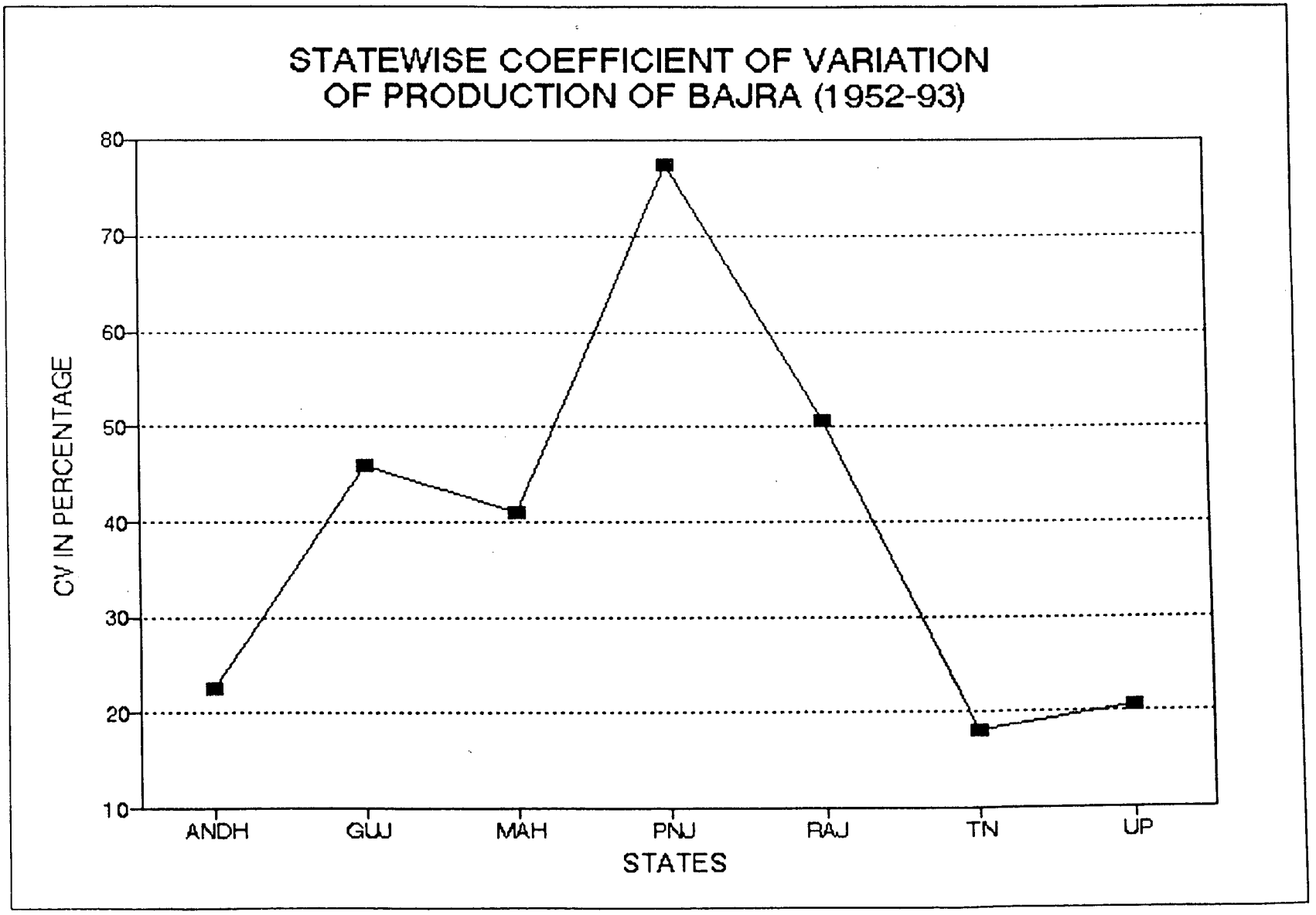
Dev Nathan: *On Agricultural Prices*, Economic and Political Weekly, Dec. 1982.

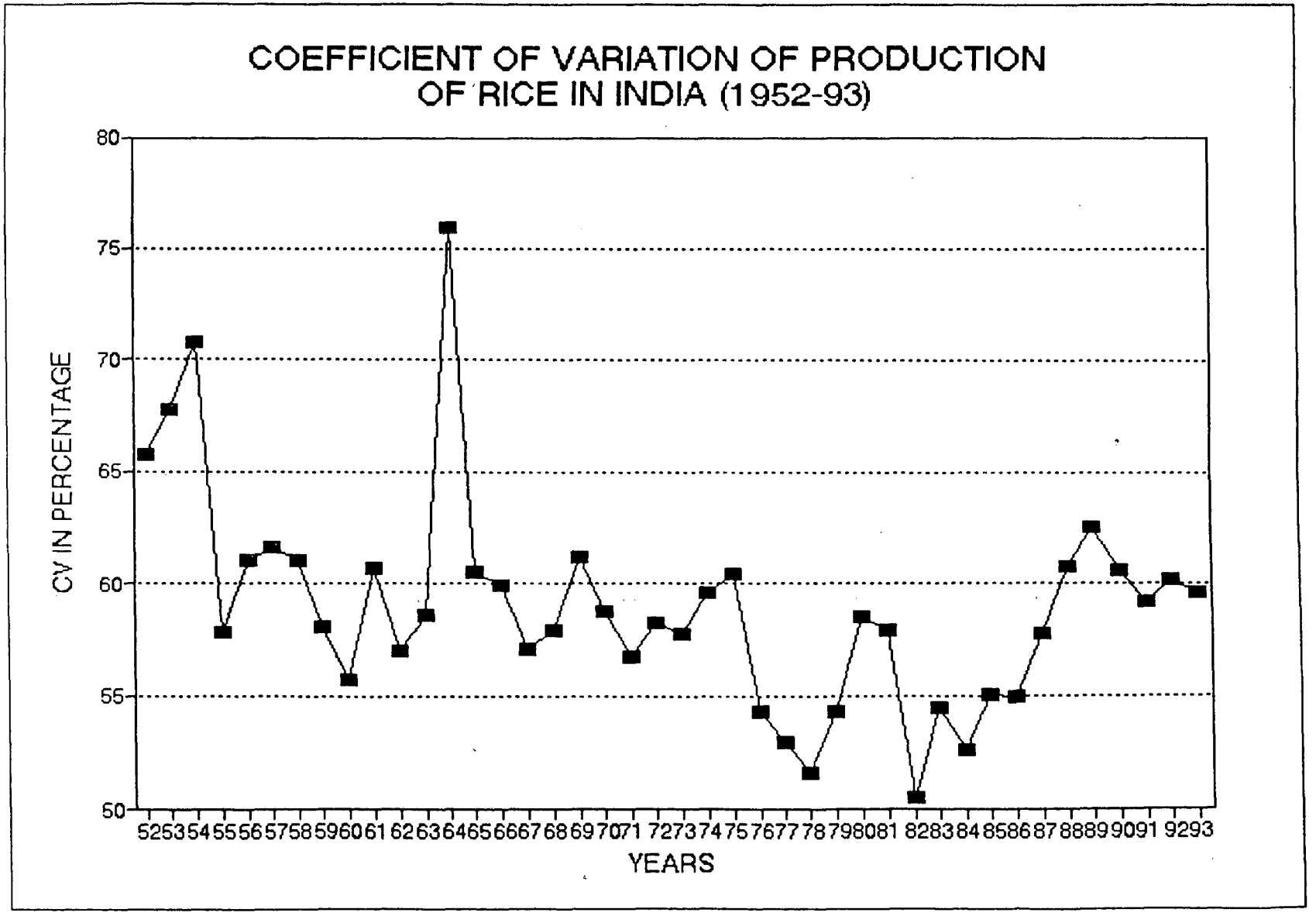
EPW Research Foundation – *Wholesale and Consumer Prices*, Economic and Political Weekly, Sept. 1993.

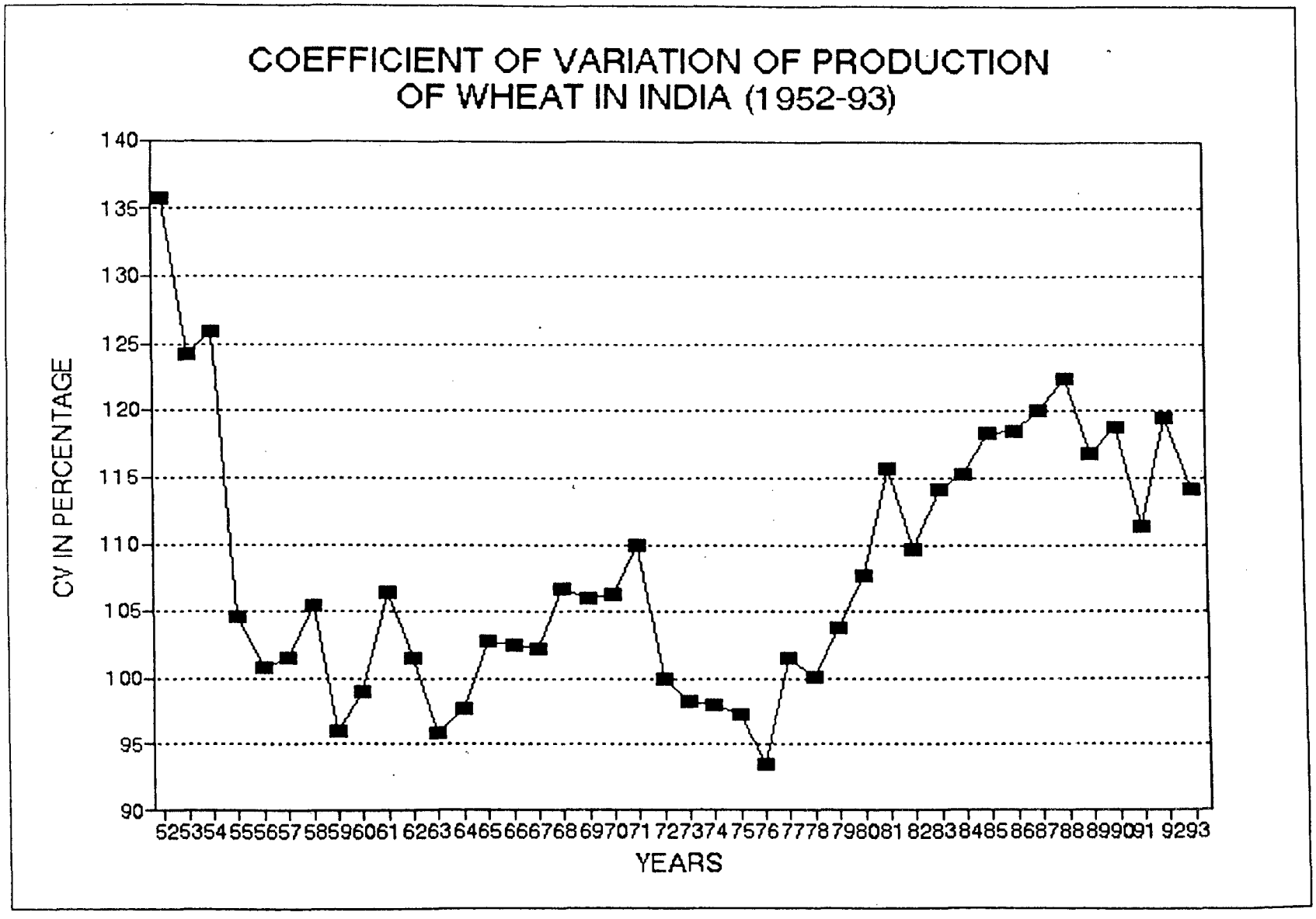
Mishra, V.N. & Hazell B.R.: *Price and Non Price Factors in Agricultural Development*, Economic and Political Weekly, 1996.

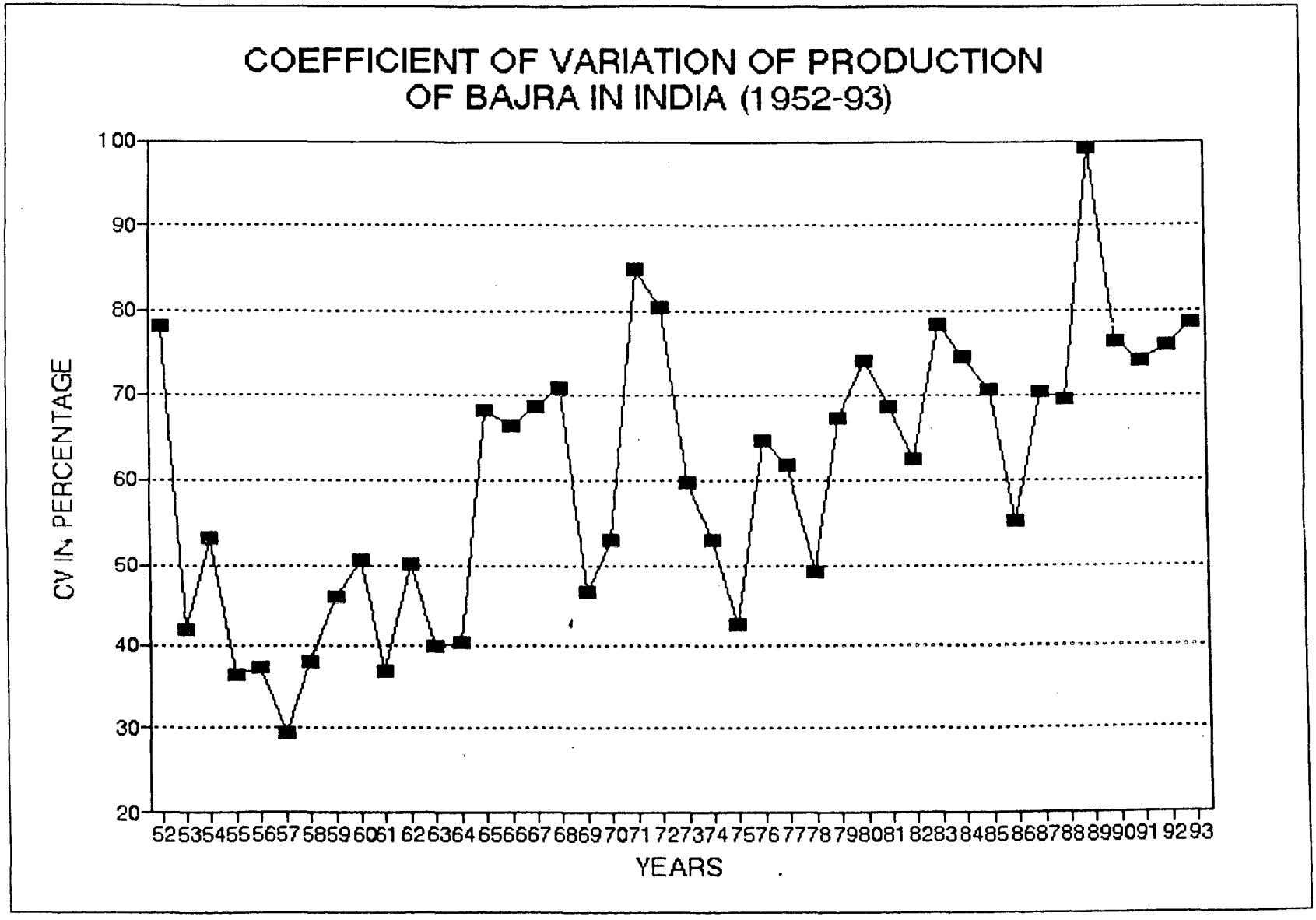

STATEWISE COEFFICIENT OF VARIATION
OF PRODUCTION OF RICE (1952-93)
CV IN PERCENTAGE
120
110
100
90
80
70
60
50
40
30
20
AND
ASS
BIH
GUJ
KAR
KER
MP
MAH
PNJ
ORS
UP
TN
WB
STATES


STATEWISE COEFFICIENT OF VARIATION
OF PRODUCTION OF WHEAT (1952-93)
CV IN PERCENTAGE
70
65
60
55
50
45
40
BIH
GUJ
HIM
KAR
MP
MAH
PNJ
RAJ
UP
STATES


STATEWISE COEFFICIENT OF VARIATION
OF PRODUCTION OF BAJRA (1952-93)
CV IN PERCENTAGE
80
70
60
50
40
30
20
10
ANDH
GUJ
MAH
PNJ
RAJ
TN
UP
STATES


COEFFICIENT OF VARIATION OF PRODUCTION
OF RICE IN INDIA (1952-93)
CV IN PERCENTAGE
80
75
70
65
60
55
50
52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93
YEARS


COEFFICIENT OF VARIATION OF PRODUCTION
OF WHEAT IN INDIA (1952-93)
CV IN PERCENTAGE
140
135
130
125
120
115
110
105
100
95
90
52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93
YEARS


COEFFICIENT OF VARIATION OF PRODUCTION
OF BAJRA IN INDIA (1952-93)
CV IN PERCENTAGE
100
90
80
70
60
50
40
30
20
52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93
YEARS