

**EFFECT OF GOVERNMENT INTERVENTION ON VARIABILITY OF
AGRICULTURAL PRICES IN INDIA : 1950-51 TO 1985-86**

Dissertation submitted to the Jawaharlal Nehru University
in partial fulfilment of the requirements for
the award of the Degree of
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NEW DELHI—110067. INDIA
1988**



This work is dedicated to
The Single Power that moves
this Universe & manifests
itself within each one of us -
without which this work and
no work could ever be
completed.

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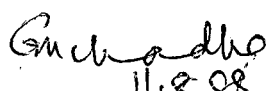
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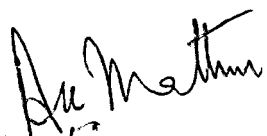
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CERTIFICATE

This is to certify that this dissertation entitled "EFFECT OF GOVERNMENT INTERVENTION ON VARIABILITY OF AGRICULTURAL PRICES IN INDIA: 1950-51 to 1985-86", submitted by Mrs. Shalini Lugani in partial fulfilment of the requirements for the award of Master of Philosophy (M.Phil.) degree of this University, has not been previously submitted for any degree of this or any other University and this is her own work.

We recommend this dissertation be placed before the examiners for evaluation.


11.8.88
Prof. G.K. CHADHA
Supervisor


Prof. A.K. MATHUR
Chairperson

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New Delhi,
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SHALINI LUGANI.

PREFACE

An appropriate and effective price policy is an essential ingredient for ensuring the process of sustained growth in the agricultural sector. Inasmuch as this sector still dominates the total economic scenario in the country, more surely in terms of output and employment, the behaviour of agricultural prices is bound to have important effects on non-agricultural prices through a network of forward and backward linkages. Thanks to the recent strides in the Indian economy including the growing transformation of the agricultural sector in many parts of the country, the farm non-farm price trade-offs have assumed crucial significance. Again, thanks to the increasing involvement of the large mass of agricultural producers in commercial transactions, agricultural prices have started touching upon the welfare and living standards of practically the whole rural community. In brief, agricultural prices are of great political and economic significance in the present-day Indian economy.

Every economy has to formulate a suitable price policy in accordance with the realities of its own situation. In spite of the tremendous expansion registered by Indian agriculture since the inception of planning, we have not been able to tide over the fluctuations in production and consequently in prices. Mild ups and downs in agricultural

production and prices can never be ruled out, yet it is the big upswings and/or downswings as also the frequency of their occurrence that distorts the planning vision of the producers, and injects in them, a high degree of uncertainty. To achieve a reasonable degree of price stability the need for government intervention, therefore, stands undisputed.

The basic objective of this study is to conduct an inquiry into the effect that government intervention has had on the variability of agricultural prices of major crop groups for selected states. An attempt has been made to study variability from different angles, for harvest as well as wholesale prices. To lend analytical rigour to the analysis of price variability, concrete hypotheses have been formulated and each case under study, empirically tested.

It is hoped that this study will throw some additional light on the existing literature.

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CHAPTER I

THE CASE FOR PRICE INTERVENTION

For the development of the agricultural sector of a developing economy, policy interventions have to be pursued on many different fronts and in varying combinations. Building infrastructural facilities, creating rural institutions, evolving new technological packages, providing effective marketing support, etc. are the major areas of policy interventions. Needless to say, such interventions have to be pushed through in a complementary fashion so that laxity on one front may not defeat the effects of others. Although one may discover recommendations only for tenancy reforms in studies dealing with agrarian realities; for technological input-use patterns in studies concerned with backward agriculture; for granting price and other market incentives in studies focussed on marketing problems, and so on, yet the macro-development nuances should not be lost when the overall position of agriculture is to be seen. Yet, in its own right, each such study sheds deep insight into specific aspects connected with agricultural growth and development. Of late, the aspect of marketing support, or more expressly, the price policies pursued by many developing economies, has acquired unprecedented importance. Nearer home in India never before have the farm lobbies been so

articulate in demanding higher product prices and other related concessions. Never before has the issue of farm prices invited so much debate and public concern, especially because it is becoming an area of great political significance both to the ruling political party as also the opposition parties. In many cases, impressions are thrown out, probably more in speech than in writing, that the price policies pursued by the government have not been of much benefit to the farmers. In brief, the area of price policy and its growth effects is still ~~full~~^{full} of controversies and political heat.

Price intervention for agricultural development has to contend with a number of special features that emanate from the nature of demand and supply functions for this sector. We may briefly familiarize ourselves of the basic differences between the nature of production, demand and supply peculiarities, in agriculture contrasted with those in industry and trade, etc. There are substantial differences in the natural conditions under which production must be carried on, and in the sociological background, which lead to important differences on the supply side.¹

Many agricultural products are joint products and the costs attributable to the various products, cannot be separated as they often can be in industry. As a general rule, farming in the old, densely populated developing

economies, especially in situations of ever declining land:man ratios is undertaken in small-sized units and gives comparatively much less scope for the division of labour and large scale organisation which is typical of industry in most cases. In fact it is the agricultural sector which comes nearest to being justifiably called perfectly competitive much more than industry.

The agricultural industry is largely of a seasonal nature and further, because of the impact of weather and biological factors, yields of farm products vary considerably from season to season, and quite often, even in nearby locations. Even in the situation of an improved technological production plan accompanied by the observance of improved farm practices, the final output is never in the hands of the tiller; his hard work, intelligence and conscientiousness cannot tide over the vagaries of nature which may overtake him suddenly and unexpectedly. Then very often, supply adjusts itself very slowly to price changes - there is a lagged response between changes in price and the consequent change in supply. In some cases, the change in supply becomes cyclical in nature, generating what are known as cob-web fluctuations in prices. Such cob-web price fluctuations are rather unheard of in the case of industrial products.

Even now, in many poor, developing economies agriculture is often regarded as a way of life as well as a means of livelihood, so that political, social and other non-economic considerations influence its organization more than that of other forms of activity.

Finally, it may be said that on the whole, agriculture requires a much greater proportion of land, in relation to its employment of other factors of production, than does industry.

And Land as a factor of production has some distinct characteristics,² which are of great significance to economists and farmers:

- a) Land is pre-eminently subject to diminishing return;
- b) Land is limited in quantity - its supply is not inexhaustible; and
- c) Land is heterogeneous in quality.

In turn, these factors come into operation because of the unchecked population growth.

On the demand side the differences, though important, are less clear-cut. Agriculture is largely concerned with the production of a basic necessity of life, viz. food. Thus, as a higher standard of living is made possible with technological and economic growth, we cannot expect the demand for agricultural products to increase as rapidly as does

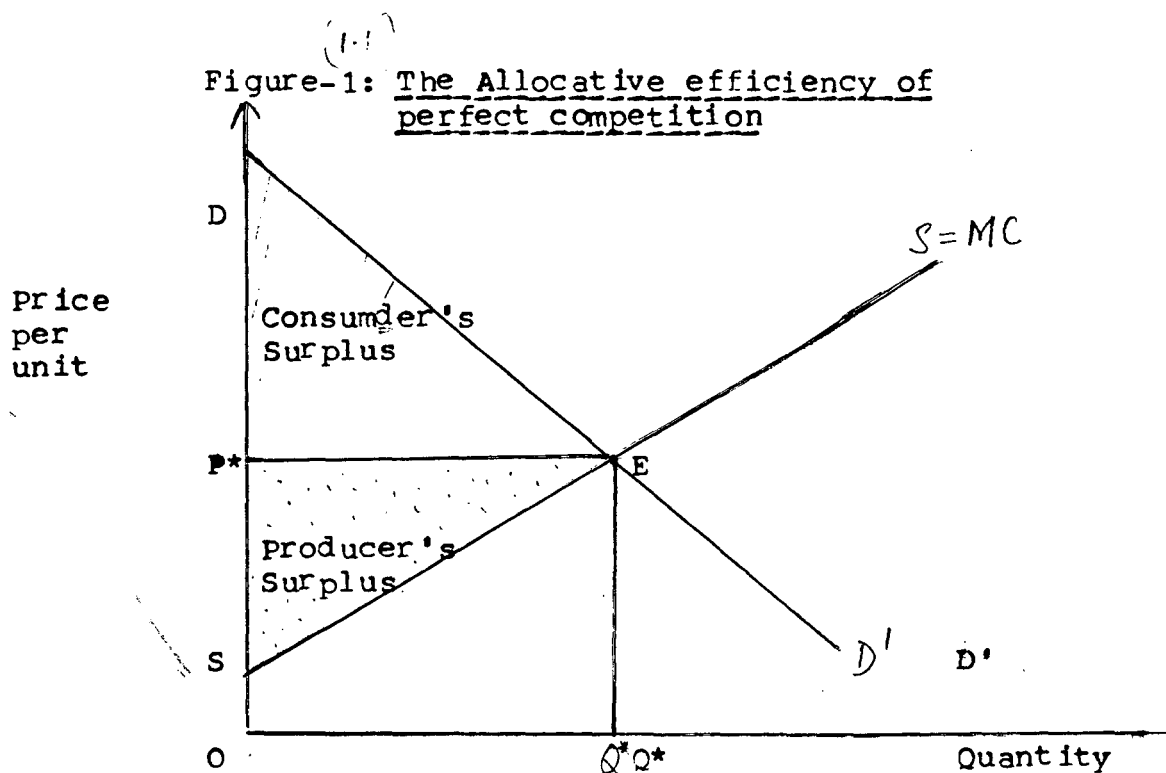
the demand for industrial products. Thus in general, agricultural sector grows less rapidly than its industrial counterpart and the number of people employed in it decline, as development proceeds. Moreover, at any given time the demand for agricultural products is relatively price-inelastic. Moreover, the nature of agricultural products is such that, they are generally perishable and it is more difficult to postpone their consumption for long.

These differences between agriculture and industry, have their own implications for the behaviour of agricultural prices and the need for government intervention. In a perfectly competitive market system, the prices perform a number of functions. Firstly, prices equate demand and supply and hence help to clear the market, such that producers can maximise their profits and consumers can maximise their utility. Secondly, the allocation of resources among commodities is efficient when, for each commodity the condition $\text{Price} = \text{Marginal Cost}$ is satisfied. Since in equilibrium, price is equal to marginal cost for every industry in a perfectly competitive market, it follows that universal perfect competition fulfills the condition for allocative efficiency by ensuring that Price equals marginal cost in every industry.

A graphic interpretation of allocative efficiency may be shown as follows:

Consider a competitive industry, where forces of

demand and supply establish a competitive price. Because the industry supply curve represents the sum of the Marginal cost curves of the firms in the industry, the market-clearing price is one at which price equals marginal cost. In figure (1), such a price is shown as p^* and the corresponding output is q^* . For every unit produced up to this output, the value consumers would be willing to pay, as shown by the demand curve DD' , is greater than the opportunity cost of the resources used to produce it, as shown by the $S=MC$ curve. (Where S denotes supply and MC denotes marginal cost.)



The shaded area above P^* viz. DEP^* , represents the consumer's surplus - a concept we are all familiar with, in micro-economic theory. The area SEP^* below P^* is the Producer's surplus.

This concept is analogous to that of consumer's surplus.³ It is the excess of producers' receipts over the minimum that would have to be paid to persuade them to produce a given quantity. Since a firm will produce any unit that will at least cover its marginal cost, all that needs to be paid to call forth q^* units of production is the area below the marginal cost curve. Since actual receipts are the whole area p^* times q^* , the producers' surplus is the light shaded area between the MC curve and the price P^* viz. SEP^* .

The two shaded areas DEP^* and SEP^* , together represent the sum of consumers' surplus and producers' surplus. Micro economic theory tells us, that allocative efficiency is achieved when the sum of the surplus is maximised. This occurs at the price and output P^* and Q^* respectively, where price equals marginal cost. The perfectly competitive market price, P^* provides exactly that signal. This can be directly compared with the situation prevailing under imperfect competition e.g. a monopolistic market structure, which has been depicted in figure (1.2)⁽²⁾. We have seen that, allocative efficiency requires that Price equals marginal cost so that consumers pay for the last unit purchased, an amount just equal to the opportunity cost of producing that unit. However, at the monopoly output, price is greater

than marginal cost and consumers thus pay for the last unit, an amount that exceeds the opportunity cost of producing it.

(1.2)
Figure- : The allocative inefficiency of Imperfect Competition (Monopoly)

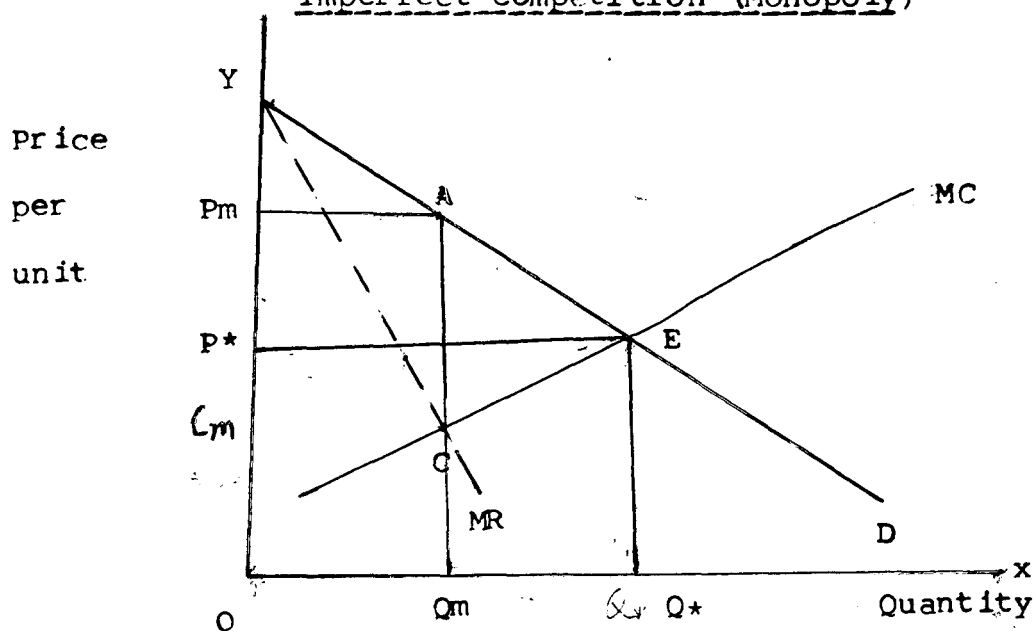


Figure (2) shows how a monopolist's profit maximising equilibrium is arrived at, by equating marginal cost with marginal revenue (point C) at the output Q_m . This output is produced at a marginal cost of C_m and sold for a much higher price of P_m . The shaded area AEC in figure 1.2, shows the gain in consumers' plus producers' surpluses that would occur if price were reduced to P^* and production increased to Q^* (as occurs through the free price-mechanism under perfect competition). This has sometimes been described as the "deadweight loss" due to the allocative inefficiency of monopoly (or any other imperfectly competitive market

structure, where firms face downward-sloping demand curves).

A third function of the "invisible hand" or the price-mechanism is that prices serve as signals to entrepreneurs to allocate their investment funds in the desired channels. Thus, on theoretical grounds, price mechanism helps to optimise welfare and resource allocation. It is logical, therefore, to question the need for interfering with the normal functioning of market forces. If agricultural marketing indeed conforms to the norms of perfect competition, such interventions would inject unnecessary distortions which should not be a happy situation both for producers and consumers.

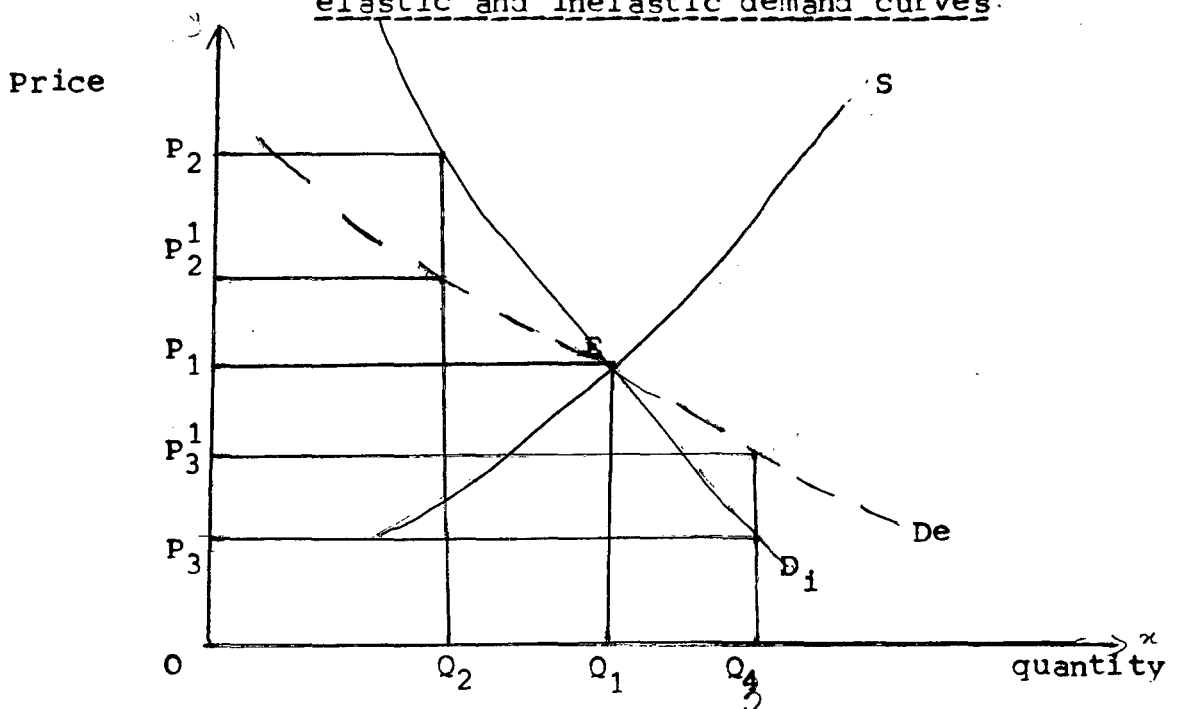
However, in reality, the normal functioning of price mechanism is not optimum, because a perfectly competitive market structure in its "pure" theoretical form, does not exist. The 'ceteris paribus' conditions which are postulated to enable prices to perform the optimal functions, are most often absent⁴ in our sector of concern, viz. Agriculture.

Governments have felt it necessary to intervene in the agricultural sector and very often, we find that an array of controls, supports and subsidies have been built into agricultural markets.

Left to itself, we know that agricultural production is subject to large variations due to factors beyond human

control; lack of rainfall; invasion of pests; floods and other natural events are all capable of reducing output to a level well below that planned by farmers, while exceptionally favourable conditions can cause production to be well above the planned level. We may now ask what our theory of price predicts about the effect of these unplanned fluctuations in supply.⁵

Figure-~~2~~^(1.3): Fluctuations in price caused by unplanned fluctuations in supply operating on, elastic and inelastic demand curves.



In figure ~~(2)~~^(1.3), the supply curve S , shows the total quantity that farmers desire to produce and offer for sale at various prices. If there are unplanned variations/fluctuations in agricultural output then, actual output and sales will diverge from their planned level.

Two demand curves have been drawn, one is relatively elastic (D_e) and the other is relatively inelastic (D_i) over the quantity range from Q_2 to Q_3 .

In a world in which plans were always fulfilled, price would settle at the equilibrium level of P_1 with output Q_1 . But unplanned output fluctuations will cause the actual price to fluctuate. If, for example, the crop is poor so that the actual production is Q_2 , then a shortage will develop; prices will rise to P_2 in the case of demand curve D_i and to P_2^1 in the case of curve D_e . In each case, the quantity demanded will be reduced to a point at which it is equal to the available supply. If, on the other hand, growing conditions are very favourable and actual production exceeds planned production, a surplus will occur and price will fall. For example, when production is Q_3 , price will fall to P_3 in the case of curve D_i and to P_3^1 in the case of curve D_e . In each case, the fall in price increases the quantity demanded sufficiently to absorb the extra unplanned supply, but the fall in price will be larger when the demand curve is D_i than when it is D_e . We have, thus, derived the following prediction: Unplanned fluctuations in output, will cause price variations in the opposite direction (the higher the output, the lower the price); for given output fluctuations, the smaller the elasticity of demand for the product, the larger the price variations.

Now we may consider the effects on the revenues received by farmers from the sale of their crops. Total revenue is the product of the total quantity sold and price of the product in question.

$$(TR = \text{Price} \times \text{quantity}).$$

Drawing upon the relationship between demand elasticity and total expenditure/revenue we find that:

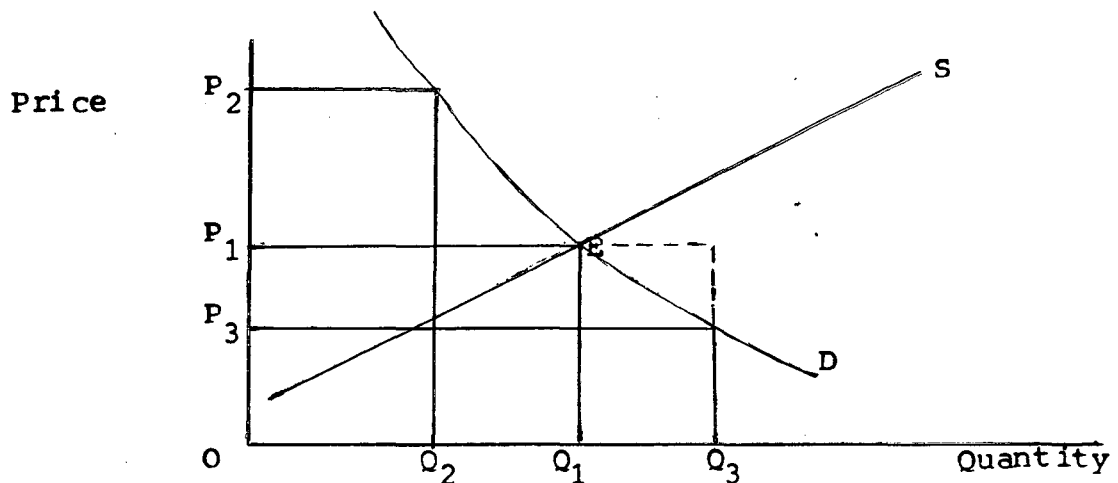
- (a) If elasticity of demand exceeds unity (elastic demand) then unplanned increases in supply will raise the farmers' revenues while unplanned decreases in supply will lower them.
- (b) If elasticity is less than unity (inelastic demand) then, consumers' total expenditure on the product and thus farmers' revenues will rise when price rises and fall when price falls. Thus, a good harvest will bring reductions in total farm revenues while bad harvests will bring increases in farm revenue.
- (c) If the elasticity happens to be unity then farmers' 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.

Agricultural markets are subject, not only to short-run instabilities due to uncontrollable changes in output,

but also, to cyclical instabilities due to shifts in demand and lagged supply adjustments to price changes.

Without going into dynamic models at this stage, it will suffice to state, that violent price and income fluctuations of farmers, have undesirable implications for their investment decisions as well. If stability does not exist, the farmers' propensity to invest is considerably reduced. This in turn will have repercussions on growth of agricultural output which in turn sets into motion a chain of reactions for the rest of the economy. We need not re-iterate here that if agricultural development is not satisfactory, it acts as a brake on smooth, overall economic development of a country.

Figure- ^(1.4) : Policies designed to stabilize price in the face of unplanned fluctuations in supply



By referring to figure 4) we can try and illustrate how the Government may intervene to stabilize price and

income. The two goals of stable incomes and reasonably high incomes may very often conflict with one another. A Government policy designed to keep prices stable at P_1 should work as follows: As production exceeds Q_1 the Government can enter as a purchaser and add to its stocks (Amount $Q_3 - Q_1$ in this example). If there is a shortage, with actual production being Q_2 , the Government can sell the amount $Q_1 - Q_2$ from its stocks. We assume that the Government does not consume any of the commodity but only holds stocks.

If the average level of production around which the year-to-year figure fluctuates is Q_1 , then the Government can successfully stabilize price at P_1 indefinitely. However this policy will not stabilize farmers' incomes. Farmers will now be faced with an infinitely elastic demand at price P_1 : Whatever the total quantity produced, they will be able to sell it at price P_1 . For example, if total production is Q_3 , then Q_1 will be brought by the public and $Q_3 - Q_1$ by the Government. Total farm income in this case, will be given by the area representing the quantity Q_3 multiplied by the price P_1 .

Similarly if total production were Q_2 then this quantity will be sold by farmers and the Government will also sell $Q_1 - Q_2$ out of its stocks, so as to keep price at P_1 . Total farm income will then be given by the area representing quantity Q_2 multiplied by price P_1 .

This analysis shows that, if prices are held constant, and farmers sell their entire production each year then farmers' incomes will fluctuate in proportion to fluctuations in production. This Government policy will, therefore, not eliminate income fluctuations but will simply reverse their direction. Now bumper crops will be associated with high incomes, while small crops will be associated with low incomes. (Given an inelastic demand curve D.)

What then, should a Government's policy be, if it wishes to stabilize farmers' revenues through its own purchases and sales in the open market? Too much price stability causes revenues to vary directly with production as shown in figure (1;4), while too little price stability causes them to vary inversely with production as in the free-market case originally considered in figure (1;3). It appears that perhaps the Government should aim at some intermediate degree of price stability. In fact, if it allows prices to vary in inverse proportion to variations in production, revenues will be stabilized. A 10 per cent rise in production, for example, should be met by a 10% fall in price, and a 10% fall in production by a 10% rise in price.

Each year farmers sell their whole crop. When production unexpectedly exceeds normal output, the Government enters the market and buys enough to prevent price from

tumbling. Instead it allows price to fall only by the same proportion that production has increased above normal, and similarly so, for unplanned shortages.

Thus, as farmers encounter unplanned fluctuations in their output, they encounter exactly offsetting fluctuations in prices, so that their revenues are stabilized.

If this policy is successful, the following results will ensue: firstly, there will be smaller fluctuations in the price of this product than if price were determined on a completely free market. Secondly, total revenues of the producers will be stabilized in the face of fluctuations in production. Finally the Government scheme is self-financing. In fact, ignoring the costs of storage, the scheme will show a profit, because the Government will be buying at low prices (below P_1) - and selling at higher prices (above P_1). In this sense, this scheme has a financial advantage over the previous one, in which the Government completely stabilized prices. In that case, the Government would have made all sales and purchases at the same price P_1 and there would no trading profit, to set against the costs of storage.

The above analysis uses the theory of price to illustrate and predict the consequences of some of the many types of stabilization schemes. It is natural to ask that if such schemes have all the advantages outlined

above, then why is there so much trouble with most of the actual stabilization programmes of the Government?

This is partly because of uncertainty combined with political pressure applied by farmers. Demand and supply curves are never known exactly in reality, so the central authorities do not know what the average production will be over a number of years, at each possible price. Therefore, they do not know exactly what level of income they can try to achieve while also keeping sales from stocks equal to purchases from stocks on average, over a large number of years. If, due to farmers' pressure, the price and hence income level is fixed too high it will cause excess supply and Government will have to buy unsold crops in most years. If stocks continue to be built up over the years, they will have to be given away, destroyed or dumped thus forcing the price down to defeating the very purpose for which they were originally purchased.

We may thus continue to theorise about the types of stabilization programmes and their consequences but without going into further ifs and buts, what has emerged ^{clearly} from our analysis, is that the case for active government intervention in the sphere of agricultural price policy does indeed exist in the real world. Its proper conception and implementation is, of course, a must and one of the reasons why a good policy in theory,

fails in practice. In fact even in the U.S.A. - the citadel of free capitalism⁶ one finds that an important aim of Government intervention in agriculture, has been "stabilising, supporting and protecting farm incomes and prices."

It is well known, that this intervention has assumed phenomenal dimensions lately, particularly with reference to subsidies to their domestic agriculture and "dumping" on the international market. However, that becomes an area for independent research by itself, and will not be dealt with here. Government intervention measures should aim at improving the bargaining power of small producers in relation to distributors and to prevent monopolistic and restrictive practices which operate against public interest. Moreover, the state also prescribes standards of quality and grading of produce for the benefit of the producers.

All this cannot generally be expected from the private producers. Therefore on various grounds, the need for intervention in agricultural pricing, production and marketing etc. arises, and this can plug in several loopholes which remain, provided the Government intervention^{ist} policies themselves are sound and implemented correctly - at the proper time and in a proper manner. Since our focus is on the pricing aspect, it may be mentioned in this context, that various empirical studies⁷

have indicated that although area and output of specific crops show varying degree of price elasticity, the price elasticity of aggregate farm output in developing countries, is not very high. In fact, there are studies to show that aggregate output responds more favourably to technological changes like increases in irrigated area, adoption of HYVs and application of fertilisers etc. than to a mere price stimulus. However it may be emphasised, that it is generally, not possible to sustain significant increases in agricultural output which may have been brought about through new technology without providing adequate price incentives. As a matter of fact, prices play more effective roles after technology of production improves, purchased inputs increase in importance, inter-sectoral linkages grow apace and economic calculus of farm producers gears itself more and more to factor-product price ratios and so on. The need for intervention thus gets magnified as production structure climbs higher on the technology ladder. Needless to say, it has to be a continuous process.

The growth in agricultural output can come about through:

- a) increase in area under a crop;
- b) increase in the yield levels of individual crops;
and
- c) changes in the cropping pattern through shifts from low to high value crops.

since prices play an important role in determining the allocation of resources and in inducing capital formation, they can affect all these three factors and consequently agricultural production.

The changes in cropping pattern can be influenced by the movement of relative prices. The yield/hectare can be enhanced by more efficient utilisation of production resources which can be induced through favourable commodity prices. In fact prices can also encourage the adoption of improved technology by making it profitable.

An increase in net sown area or increase in cropping intensity, can both increase area under crops and agricultural prices can influence them both. Remunerative agricultural prices can induce cultivation on such lands, which were not under cultivation hitherto, by making cultivation on these lands, profitable. Prices can also help to make the cultivation of a second crop profitable, where such possibilities exist.

Thus, it may be clearly conveyed, that an appropriate price policy does play an important and positive role in the development of agriculture, especially when accompanied by adequate investment to promote adoption of new technology.

In the following chapter, we will review how agricultural price policy was visualized by Indian policy makers and its main tenets. Before that, we will attempt to present a general background of agricultural price policy

as viewed in different countries, over different time periods.

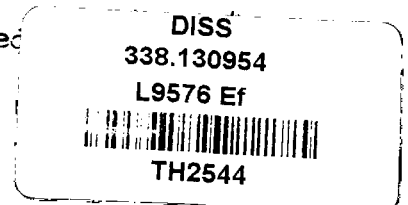


It may be mentioned, that the context of agricultural development, differs in different parts of the world.⁸ It may differ in terms of the resource potential available to it; the product pattern characterizing it and the demand outlook confronting it.

In some countries, demand is less than supply while in others demand exceeds supply; in some countries, a single crop dominates while in others a diversified crop mix operates. In some countries development of agriculture takes place through intensification plus extension while in others there is scope only for intensification. Thus, in short, different countries are faced with diverse agricultural situations and, therefore, different policy instruments are required to suit the given conditions. A discussion of the empirical details of particular situations will not be presented here. We will rather broadly outline what these general principles are.

Historically, the main objectives of agricultural price policy (in West Europe and USA) have been Price stabilization and Income stabilization. It was found that, initially as a part of development policy, agricultural price policy has generally been used

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negatively, all over the world. Terms of Trade of agriculture were depressed through (a) Taxation (or confiscation) of a part of agricultural output; (b) Lower product prices paid to farmers; and (c) Higher prices charged for non-farm products. In fact, a positive price policy in the early stages, was considered as a "historical Novelty".⁹ However a negative policy could not continue for long because a certain critical minimum rate of growth of agriculture is needed for achieving and sustaining general economic growth and development - (either because of the initial importance of agricultural sector in the early developmental stages or because of the dynamic complementarity of the two growth processes).¹⁰

If this critical minimum rate of growth could have been achieved through a negative price policy, then there might have been no need of a positive price policy. However, experiences all over the world showed that this was not so. The main reasons were that:

- 1) Population growth and the demand for food, far outstripped food supplies;

- 2) Cheap imports could not continue for long;

- 3) Peasantry in almost all countries started gaining awareness, becoming bold and defiant and therefore willing to respond to a negative price policy;

4) Moreover, it is a realistic fact of most political economies, that since the majority of the voters came from the agricultural sector, Governments have been forced to turn to a positive price policy.

As outlined earlier, the three main functions of agricultural prices are:¹¹

- a) to serve as an allocator of resources, signalling to both producers and consumers regarding the level of agricultural production and consumption;
- b) to help in the distribution of income; and
- c) act as an influence on capital formation.

Ample literature is available on this, which need not be reiterated. When agricultural price policy becomes part of general growth policy, it serves to (a) increase the growth of agricultural output as a whole, (b) steer the crop-mix according to targets, and (c) increase the marketed surplus and commercialisation.

In order to formulate an effective price policy, we need empirical knowledge about the degree of responsiveness of different variables to price changes. Most of the research work has been done on the responsiveness of single acreages. Price elasticity of supply of acreages is considered to be a good approximation of supply elasticity of output. The emerging pattern can be summarized under Low (0-0.1), Medium (0.1 to 0.4), and High (0.4-0.7) response.

Only subsistence crops fall into the first category; subsistence as well as marketed crops in the second and only marketed cash crops in the third category.

To obtain the responsiveness of market supply, we need market supply functions which are difficult to estimate directly. It is possible for market supply response to be negative, in spite of output supply response being positive. Different combinations are possible, depending upon the underlying conditions, for which different methods have been used.

The least amount of work so far, has been done on the responsiveness of aggregate output. Many complicated empirical realities emerge, once a ^{deeper} ~~probe~~ probe is undertaken. For analyzing the contribution of price movements to agricultural growth, production functions do not suffice because they include only input-output physical relation, and the price variable is not included. For this, we need to make use of time series supply functions.

Finally we may reiterate, that, while measuring the contribution of price movements to agricultural growth, we must not lose sight of the fundamental reality, that transformation of traditional agriculture, is primarily a techno-organisational episode.¹² It cannot be brought about, only by price movements. However, favourable price

movements can speed up the adoption and wider diffusion of innovations, while unfavourable ones, can slow down or arrest the processes of input absorption, capacity utilization and institutional adjustments, in the agricultural sector.

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CHAPTER II

It was pointed out in the previous chapter, that in many situations, the rate of absorption of new knowledge and inputs may depend critically on the price and risk milieu.¹ While we cannot assert that all peasants everywhere respond equally strongly to economic incentives, yet given a minimum degree of monetization and transport development, a fairly large proportion of peasants do respond to price incentives in some aspects of their behaviour. Thus, having accepted that, even though the adoption of new technology by farmers may remain the 'prime mover' in shifting the production function, but a positive price policy is needed to interact with and trigger off the process of growth and stability. We may go on to state that any policy to improve the price milieu of a developing agriculture should take into consideration, the following aspects:

- (a) The variability of agricultural prices which determines the riskiness of farming;
- (b) the relative prices of various crops which affect the allocation of land and other inputs amongst crops;
- (c) the ratio of the general level of agricultural product prices to the level of agricultural input

prices; and

- (d) the ratio of the general level of agricultural product prices to the general level of non-agricultural prices.

Although in theory these price relationships can be visualized as independent entities yet quite often, any set of measures of price regulation will simultaneously affect all of them. Therefore, the price policy followed, should be based upon a consideration of its effects on all the key price relationships. It cannot be over-emphasized² that agricultural output and agricultural prices are pace-settlers for the general price level in the Indian Economy, and their stability contributes very largely to the stability of the general price index. Thus, while the developed countries have sought to achieve price and income stabilization objectives for their agricultural sectors through agricultural price policies; in India, (and other developing countries) the desired objective has been to use agricultural price policy, as an instrument of growth, so as to:

- cushion the producer against severe fluctuations and instabilities by guaranteeing him a minimum price support;
- induce him to invest in and adopt improved technology in agriculture;
- induce the desired outputs of different crops according to growth targets;

- induce an increase in aggregate agricultural output through more and efficient input-use;
- induce the farmers to market a larger proportion of their produce;
- and protect the consumers especially the poorer among them, against an excessive rise in prices.

As becomes evident a little later, most of the tenets of agricultural price policy enumerated above (and in the previous chapter) have been taken up in the Indian economy, from time to time. So much has been deliberated upon and provided for on the policy front that today agricultural price regime is one of the most elaborately administered area of official support and intervention. It is in order, therefore, to look into the manner in which price policies and their administration have been taken up in the Indian case. We divide our discussion into two phases - phase-I covering the pre-1965 period and phase-II dealing with policy interventions since 1965.

Price policy before 1965:

That the Independent Indian Government inherited a rather dilapidated economy is only too well known. Also, the structural weaknesses of our economy, especially the excessive dependence on agriculture and a terribly narrow industrial base, had also to be reckoned with when India gained her political independence. Talking expressly of

the farm sector, it is fairly well known that till about the mid-sixties, the Indian agriculture presented a scenario of shortages of foodgrains, excessive dependence on food imports, practically no significant breakthrough in domestic production, a highly fluctuating production profile, an era of price instability, and so on. Rapidly increasing population, steadily rising pace of urbanization and per capita incomes led to an increase in the demand for foodgrains which was generally in excess of the supplies. In brief, Indian agriculture was backward and concrete policies had to be devised to ensure a steady expansion of agricultural output. The policy thrust, however, changed its focuss from time to time.

During the fifties, the main thrust of agricultural policy was to bring about institutional reforms and strengthening of agricultural infrastructure. As the sixties set in, the main emphasis of policy intervention shifted towards technological change and development; technology was recognised as an explicit growth variable.

Pricing policy as an independent entity in itself and its importance as a catalyst for continued expansion of agricultural output, was accorded explicit recognition only with the setting up of the APC in 1965.

For the first decade or so of the planning era in India, policy interventions were directed mainly towards

the protection of the interests of the consumers through adoption of regulatory measures and programmes aimed at increasing agricultural production. These were accorded high priority. Yet, during the late fifties and the early sixties when the prices of some important agricultural commodities tended to slump, it called for effective government intervention to lend support and protection to the cultivators. Perhaps, for the first time, the need for a definite producer-oriented price policy was felt during the early sixties. Nevertheless, the pre-1965 history clearly shows that till the establishment of the APC in 1965, all interventionist policy measures were more in the nature of ad-hoc arrangements to meet emergent situations, rather than as instruments of a long-term policy oriented towards expanding agricultural output and producer incentives.

For example, due to the good harvest of 1953-54, when prices of foodgrains witnessed a steep fall, the Government fixed minimum prices for jowar, bajra, maize, wheat, rice and groundnut and also made some purchases at these prices. In the realm of foodgrains price policy the Government tried to strike a balance between producers' and consumers' interests.

During periods of high foodgrain prices, the steps taken, included imposition of restrictions on the movement

of foodgrains, fixation of maximum control prices, increased imports from abroad, procurement and requisitioning of stocks of foodgrains and their distribution at subsidised rates to vulnerable sections of the population and in deficit areas, ban on exports and control on bank advances against stocks of foodgrains etc.

In 1957, zonal restrictions on the movement of foodgrains were introduced with the objective of promoting regional self-sufficiency avoiding cross movements and reducing speculative activity. The zonal system, however, had its own problems such as keeping producers prices in surplus areas artificially lower or keeping consumer prices in surplus area lower than would be the case otherwise, and so on. In actual operation, especially in the matter of ironing out regional scarcities or surpluses of food on an equitable basis, the zones did not serve their purpose well. The whole zoning scheme was described as "a bundle of contradictions"³ and "geared more to politics than to economics, to votes than to prices..." The Government had finally to drop the zonal restrictions.

From 1958 onwards, when the Government of U.P. asked the farmers to surrender half of their stocks to the Government at less than the market price, they began to boycott the established market places and conducted transactions outside market premises and official marketing hours. In

areas of severe shortages like Maharashtra, where the differences between controlled and free prices is very large, the farm families themselves are reported to have started taking grains directly to the consumers. In a nutshell then, the point is that several examples of boycott of controlled prices by farmers in India can be quoted. Therefore, Governmental policies must show an awareness of the consequences of their actions before laying them down.

When the prices of foodgrains continued to rise since mid-fifties, a scheme of state trading in foodgrains, was introduced for the first time. This scheme envisaged inter-alia: (a) an ultimate pattern, and (b) an interim scheme. Under the former, it was envisaged that farm surpluses could be collected through service co-operatives at the village level; channelised through marketing co-operatives and distributed through retailers' and consumers' co-operatives.

Under the interim scheme, the wholesale traders were required to take out licenses and to submit periodical returns of stocks and of purchases and sales. The Government was to acquire progressively larger marketed surpluses of foodgrains from them.

The experience of state trading was not a very happy one in the deficit states where the flow of market arrivals

of rice and wheat was adversely affected despite higher output. An enquiry conducted under the auspices of the Ministry of Food & Agriculture, revealed that the farmers' withheld their stocks from the market with the expectation of getting higher prices in later months or to insure themselves against the risk of having to re-purchase wheat for consumption or seed requisitions at higher prices later during the year.

Due to the decline in market arrivals, there was a rise in prices and Government discontinued its operations of rice and paddy, in deficit and marginally placed states. Bigger food zones were adopted and procurement of rice since 1960-61 was confined to the surplus states of Punjab, Madhya Pradesh and Uttar Pradesh. In December 1962 Government intensified its procurement operations, both as a price support measure and also for building up stocks. After the harvest of the wheat crop of 1960-61, when prices tended to touch rather low levels, zonal restrictions on wheat movement, and restrictions on bank advances against hypothecation of stocks of wheat, were both given up. These measures helped to check any undue decline in prices.

Until the advent of the Third Plan, the Government's foodgrains price policy continued to be one of tiding over emergent price situations. Only in the Third Five Year Plan, the need for fixing guaranteed minimum prices for

foodgrains, as a support to farmers was stressed for the first time as a regular policy measure. Price policy measures aimed at directly protecting the interests of producers, had not really originated till then. It began to be recognised for the first time that the fixation and declaration of minimum prices for important agricultural commodities was essential for an effective programme of agricultural production. The Third Plan document had the following comprehensive understanding to offer in this regard "The producer of foodgrains must get a reasonable return" and

"...A policy designed to prevent sharp fluctuations in prices and to guarantee a certain minimum level is essential in the interest of increased production. It is important also that appropriate measures or policies should be enunciated and announced well in time to ensure that the benefit accrues to the farmers. The other objective, no less essential, is to safeguard the interest of the consumer and it is particularly necessary to ensure that the prices of essential commodities such as foodgrains do not rise excessively."

The Report also mentioned that -

"For achieving the high targets of agricultural production set for the Third Plan, it is important that growers should have full confidence that the additional effort and investment which are called for would yield adequate return... The assurance of minimum remunerative prices for important cereals and cash crops like cotton, oilseeds and jute over the period of the plan will provide the necessary incentives for increasing production,

thus adding to the various development programmes provided for the Third Plan. With this object in view, decision regarding the prices at which Government should buy and sell should be taken sufficiently in advance of the sowing season."

A beginning in this direction was made in March 1962 by fixing a minimum price for wheat at Rs.13 per maund for fair average quality of common varieties of white wheat when delivered at notified markets. However, market prices did generally remain above the minimum price fixed and the Government hardly found it necessary to purchase wheat at the minimum price except for small quantities purchased in a few markets. The purchase prices of rice differed from State to State and within a State, from variety to variety.

Although minimum prices for the 2 major cereals, viz. wheat and rice were fixed, it was not considered necessary to entrust the work of making purchases, to any independent or autonomous organisation. In Punjab, Madhya Pradesh and Uttar Pradesh, purchasing agents were appointed in a number of wholesale markets for purchasing wheat on behalf of the Government of India.

Regarding rice and paddy the question arose, should the Government fix minimum prices for paddy and rice separately, or for both; then, if minimum prices were fixed for paddy and the Government were to purchase it from the producers there would arise the practical problems.

of grading, milling and storage of paddy. The varieties of rice and their prices varied from region to region. Keeping all these problems in view, the Government fixed procurement prices for rice only, though state Governments were advised to keep a close watch on the prices of paddy. In spite of the support given to rice prices, if the prices of paddy in any particular region registered a steep fall, State Governments were advised to ask the mills to purchase paddy at prices corresponding to the procurement price for rice.

The case of sugarcane is one of special significance. Minimum price for this commodity was fixed by the Government as early as 1949-50. The factors taken into account in fixing these prices, included (a) cost of production of sugarcane; (b) the return to the growers from alternative crops and the general trend of prices of other agricultural commodities; and (c) the availability of sugar to the consumer at a fair price. Measures relating to the price policy with respect to sugar, were generally directed towards safeguarding the interests of consumers. These were based from time to time on devices such as control on bank advances against stocks of sugar, control over prices, production, movement and distribution of sugar, licencing of wholesale dealers in sugar, etc. In the year 1959, special incentives were offered for maximising sugar production.

For oilseeds and vegetable oils there was no statutory control regarding their prices. However, indirect measures were taken from time to time, to influence the movement of prices in the desired direction and/or to prevent excessive fluctuations therein. These indirect measures included changes in import and export policy, regulation of forward trading, exercise of control over bank advances, etc.

In the case of Cotton, statutory control on prices was imposed in 1943 when its prices increased unprecedentedly. The policy of fixation of minimum and maximum prices of cotton, was continued since then, except for a few months in 1948. The main objectives of cotton price policy (before 1965) were: (a) to keep a check on cotton prices so that cloth might be made available to the consumers at reasonable prices; (b) to ensure a reasonable return to cotton growers for their produce; (c) to maintain adequate floating stocks in the country to meet the requirements of mills; and (d) to encourage increased production in India of a better and longer staple cotton. Due to the tight supply position of cotton in the country, cotton prices were generally nearer the ceiling than the floors and the need for the Government to enter the market for giving price support to cotton, did not arise.

Jute is another important agricultural commodity in the case of which, steps were taken from time to time,

to stabilise prices at a level which would provide some incentive to the grower and be economical for the jute industry. In the late fifties as domestic output expanded and prices fell, imports were progressively reduced. When in 1960-61, jute prices tended to move very high, imports of raw jute were stepped up and certain restrictive and regulatory measures with respect to future transaction were enforced. A buffer stock agency was set up, to undertake purchase operation.

The problem of providing a remunerative price to the grower to safeguard his interests, was complicated by the fact that, since the demand for raw jute depended upon the demand for jute goods abroad, there was simultaneously a need for maintaining a fair relationship between the prices of raw jute and the prices of jute goods.

In order to stabilise raw jute prices at reasonable levels from all angles, and to prevent excessive fluctuations, the Government took steps from time to time, to control speculation and forward trading. In order to evaluate the Government operations in foodgrains, one has to be clear about what objectives the Government should have been trying to achieve through its operations. Broadly speaking the following goods, are generally accepted:

- (a) to bring about a steady growth of consumption
(and increase supply fluctuations from year to year);

- (b) "Fair" price distribution to an increasing proportion of the low-income families of the country;
- (c) To socialize (sale & purchase by Government) an increasing proportion of the marketed surplus, in order to realize objective (b);
- (d) Self sufficiency - Government used imports as well as domestic purchases to realize objectives (a) and (b) however subject to the realization of these objectives imports ought to be minimised and eventually eliminated.

This list of objectives though not exhaustive, does include the hard-core of what the Government should have been trying to achieve, by its operations.

Raj Krishna was able to find a quantitative indicator of the achievement of each of these objectives and found that "neither the import policy nor the stock policy of the government seems to have stabilized consumption." Neither was any serious evidence discovered, regarding the Government's attempt to reduce the extreme dependence of its operations on imports till the Third Plan. In this context, it may be in order to quote Raj Krishna's findings:

"Our analysis shows that if objectives had been defined clearly and consistently, and Government operations had been quantitatively determined by them, considerable progress would have been made by now towards their realization..."

further,

"performance has been poorer than promise in every respect. The growth of average consumption has not been stabilized. Imports have not been minimised..." (in fact 64 m.t.s. of grain were imported)

"The marketed surplus has not been socialized".

Instead of promising to nationalize the entire marketed surplus and obtaining only 8 per cent of it, the Government demand have gradually come to acquire a little more than half of it; instead of trying to introduce universal rationing on a widespread scale and not succeeding, the Government could have consciously chosen to serve only the most deserving people through its FPS system.

"Thus a legal, rational, two-market two-price system could have existed instead of the illegal, two-market, two-price regime, which overambitious rationing and price control have brought into being."

Finally, Krishna alleged that

"Slogans have been repeated ad nauseum: National self-sufficiency, Monopoly procurement, Nationalization of the Grain trade, Price stabilization, Buffer stocks, National food Budget etc. etc. But the actual determination of the important magnitudes involved in Government operations has been utterly erratic and unprincipled - the outcome of a clumsy administrative-cum-political handling of one exigency after another. The world of slogans and the world of real behaviour have flourished in splendid isolation from each other."

We may conclude this section by stating that, three of the basic foundations needed for building a sound

agricultural economy⁴, are:

- a productive technology package;
- efficient delivery services; along with
- remunerative and stable market prices for agricultural products.

We have seen that the market place in agricultural sector can indeed inflict undeserved losses on the farmer, even when he has applied modern technology and produced efficiently to meet the requirements of the economy. It is in this perspective, that with the introduction of modern farm technology in the mid-1960's, the Government simultaneously evolved a price support mechanism through the establishment of an Agricultural Prices Commission (APC) while the A.P.C. were to advise on agricultural price policy on year to year basis, for various crops and crop combinations, the related purchase mechanism were to be handled by government agencies including the FCI and state government departments.

Here we may briefly mention that the APC was to advise on the price policy of agricultural commodities particularly paddy, rice, wheat, jowar, pulses, sugarcane, and commercial crops like jute, cotton oilseeds etc. with a view to evolving a balanced and integrated price structure, keeping in view the overall

needs of the economy and the interests of the producer and consumer. While recommending the policy and relative price structure, the APC was required to keep in view, the following:

- (1) the need to provide incentive to the producer for adopting technology and for maximising production;
- (2) the need to ensure rational utilisation of land and other production resources; and
- (3) the likely effect of the price policy on the rest of the economy, especially on the cost of living, level of wages, industrial cost structure, etc. It could also suggest non-price measures which might complement the objectives set out.

The Period after 1965:

In 1965, the highest priority was given to maximise production since the country was passing through a critical shortage of foodgrains. When an overall balance between demand and supply was in sight in 1980, the criteria for the Commission were modified. The details of this change and the ensuing debate will be dealt with, in reasonable detail, later on in this chapter.

Proceeding chronologically, we find that since the mid-sixties, the complexion of the food situation in India, has undergone a sea change, largely due to the genetic

revolution in cereal crops such as wheat and rice so that the country no longer suffers from chronic food shortages. The food economy has acquired a measure of stability and self-sufficiency as a result of which the economy has been able to dispense with large imports of foodgrains which, in earlier years, had been a source of heavy drain on foreign exchange resources.

Besides lending considerable support on the production front, Government's intervention in the foodgrain marketing prevented undue decline in prices and thus helped the producer in years of bumper harvest; it also helped the consumer particularly in years of short crop by holding the price line through releases from Government stocks. Further, as a result of expanded production and decline in unit cost both physical and economic access to food has increased in the country. Today India has generated a surplus in wheat. Whereas in 1970, as much as 12.9 per cent of average per capita income was required to buy a quintal of wheat, less than 7 per cent of per capita income in 1984-85 was sufficient to purchase that quintal of wheat. This underscores the enhancement of food security.

While this qualitative transformation has taken place in the food economy, the oilseed economy in striking contrast, has displayed a chequered progress bordering on near-

stagnation during recent years. Next to cereals and pulses, oilseeds constitute the most important segment of the country's agricultural economy, but the oilseed production has been slow and halting, lagging substantially behind the country's requirements. During the period 1967-68 to 1978-79, the growth rate of oilseed production has been only 1.6 per cent per annum.⁶

In this connection, it is often assumed rather simplistically, that in view of the persistent shortage of oilseeds, production curves of these crops can be lifted by merely moving the relative price structure in favour of oilseeds. In the late sixties, a price climate had to be created to favour cereal production, till a better technology became available.

However, the policy of price preference for oilseeds and pulses during the eighties, has begun to work only in those areas where a conjunction of the 3 pre-conditions of technology, delivery services and price support infrastructure have materialised. The process of acreage shift in favour of oilseeds is best illustrated by the experience of Assam, Orissa, Gujarat, Andhra Pradesh and Rajasthan where the share of area under oilseeds in the gross cropped area has gone up significantly.

However, in the absence of the three pre-conditions there was no visible impact on output even though market

price structure had turned highly favourable to oilseeds. This underscores the limitations of production augmentation efforts via price policy in the case of such technologically backward crops. Their growth needs to be stimulated through prime moving technological development and institutional improvements, supported by a complementary price policy, which by its positive interaction would raise the overall profitability of these crops for farmers. The policy complementarities need to be underlined particularly for these crops.

Over the last 2 decades, the maturity and judgement of the Indian farmer who has responded remarkably when all these three conditions have prevailed, have been widely acknowledged. Soyabean, for instance, has registered a 17-fold increase in acreage in Madhya Pradesh during the last 10 years.

In its Report on price policy for the 1979-80 crop of Rapeseed and Mustard, the APC noted that

...given the sensitive and intensely speculative nature of oilseed market and high variability in oilseed production, prices of oilseeds and edible oils display great erraticity even within the same season...

In view of the mercurial nature of oilseed and edible oil prices, an important problem was to moderate the violent intra-seasonal fluctuations in market prices by ensuring the even flow of supplies throughout the

year and mitigating the price uncertainties confronting the farmers. The system of marketing, processing and distributing of oils was largely located in the private sector, which did not prove quite conducive to augmenting domestic production or providing relief to the consumer. The APC, thus repeatedly, stressed the need for active and judicious intervention in the market by a Public Agency which, if supported by the appropriate infrastructural facilities, would strengthen the price support operations. Support prices for groundnut and sunflowerseed, were announced for the first time during the 1976-77 season. Later, they were extended to soyabean and rapeseed and mustard, by the 1978-79 season.

The activities of the FCI, the CCI and JCI in the case of foodgrains, cotton and jute respectively, have considerably strengthened the administration of price policy for these crops and contributed to their overall development. In the case of oilseeds also, the hitherto make-shift arrangements for the conduct of price support operations are being discontinued and one may hope for a substantial improvement in yields of various oilseeds, with the launching of the Technology Mission on oilseeds and with the appointment of NAFED (National Agricultural Co-operative Marketing Federation) as the price support agency for oilseeds and an appropriate strengthening of

NAFED's infrastructure to carry out its role.

However, if the relative price of a particular commodity is increased unduly in order to encourage its production, it would become difficult to encourage production of competing crops in which better technologies may exist; in the process, the benefit of improved technology and reduced unit costs may be lost to the community at large. It would be self-defeating to increase also, the prices of the substitute/competing crops, in which case the society will not only lose the benefit of technology, but may also be subjected to an unwarranted increase in price levels of such substitute/competing crops. Thus, it has been adequately emphasised, that price policy can influence cropping pattern in the desired direction only upto a point. Beyond this, it should be judiciously used in conjunction with a viable technology, delivery services, and input prices for achieving a rational cropping pattern. Operated in isolation, the price factor per se, may not produce, in the Indian situation, any significant or lasting changes in the cropping pattern.

In a developing economy with imperfect markets, speculative elements tend to hoard the commodities and charge the consumer a price far higher than justified to cover the cost of storage and finance. Therefore, maintenance of a certain stability in prices is a part

of Government policy and in this context, buffer stocks maintained by the Government ^{play} policy an important role, in mitigating the undue seasonal spurts in prices. It is, therefore, of great importance to examine whether or not and to what extent, the price policy in India was successful in curtailing inter-year fluctuations and reducing intra-year variations.

It may be instructive to look into the specific crop sectors, especially for commercial crops, as regards the degree of success associated with government price policies pursued from time to time. The price policy for raw cotton for the period 1965-66 to 1970-71 was not a great success. In July 1970, the Government of India, set up the CCI which took several years to become a viable organisation. The ICDP (Intensive Cotton District Programme) was launched in 1971-72 to meet the challenge of raising the total output and productivity of cotton in the country.

It was the 1977-78 season however, which marked a turning point when acreage under cotton went up to more than 78 lakh hectares, stabilising around 80 lakh hectares in the next 3 years.

A review of the price policy for Jute tends itself to a cut-off point into two broad time periods. The first period from 1947-48 to 1964-65, as we have already

seen, was one of trial and error, when the price policy was somewhat ad hoc in nature. The second period, ensuing from 1965-66 onwards, is one of positive direction, setting out to achieve increasing production of the fibre, minimise price fluctuations, adopt improved technology, and bring about institutional changes for strengthening the marketing structure of this important commercial crop. The jute price policy options became difficult in the seventies, with the emergence of high-yielding varieties of paddy which started offering greater competition to jute for area in the jute growing tracts. By mid-seventies, the technological breakthrough in the cultivation of paddy which gave it an edge over jute in the Eastern States, seemed to have suffered a lull. Moreover, lifting of controls on inter-state movement of rice helped jute to regain its lost ground and raw jute/paddy price parity again became favourable to the fibre crop. From 1979-80 onwards, the jute industry seemed to have turned the corner. The internal demand for jute goods went up. Also, foreign buyers were prepared to pay higher prices for jute goods and consequently the demand-pull led to enhanced profitability of the industry. The performance of price policy in the sphere of raw jute sector vitally affected production, exports, internal sales, prices, etc. of the jute manufactures.

Regarding sugarcane, we find that its price policy has a long history into which we do not wish to go at this stage. In fact, we have already highlighted the essential features in our discussion of the pre-1965 phase.

The minimum statutory cane price is fixed by the Government of India, under the provisions of the Sugarcane (control Order, 1966 after giving consideration to the recommendations of the APC and the views of the State Governments, the industry, the cane growers, and other concerned interests. The minimum cane price is fixed with the objective of ensuring the payment of a guaranteed price for cane by the factory to the growers. Thus, the main elements of the statutory minimum price as are practised today, can be summarised as follows:

- (a) a minimum cane price;
- (b) a basic level of sugar recovery;
- (c) a premium for every 0.1 per cent increase in sugar recovery over the basic level; and
- (d) the average sugar recovery of the factory during a fixed period (optimum period).

The disquieting feature of the Indian sugar economy during the past few decades has been instability in production, showing itself in the large and recurring imbalances between the demand for and supply of sugar.

The implementation of a minimum price for almost 5 decades has not completely succeeded in evening out or moderating the severity of fluctuations that occur in the sugarcane economy with almost precise regularity.

In 1974, the Government received the Report of the Sugarcane Industry Enquiry Commission. The Commission came out with a scheme on the sharing of Extra Sales Realisation from sugar with the cane growers (known as the Bhargawa formula). However, this formula was not given a fair trial. Various State Governments brought into practice a system informally known as the sugar-advised prices. As a result of the intervention from the cane growing states in the matter of fixing the cane prices, the Central direction of sugarcane price policy was lost. In its reports for 1978-79, 1979-80 and 1980-81, the APC strongly recommended doing away with the mechanism of the state-advised prices.

The past history as also the recent experience, reveal the fact that sudden policy changes and ad hoc measures to manage the crises created more problems rather than solving them. The basic problem of cyclical fluctuations in the sugarcane economy could not be tided over.

We have briefly reviewed the Government measures involved in the pricing of different agricultural products in India, ever since the setting up of the APC. Let us

now take up some theoretical and practical issues involved in choosing and setting the prices and some questions which remain unanswered as yet. The discontent about price policy has arisen on several counts.⁸

...that it has failed to give parity prices for agriculture or to prevent deterioration in terms of trade, that it does not enable farmers to cover costs of production, that the procurement prices are lower than market prices, that these prices do not cover the costs, and that prices are deliberately depressed and distorted as indicated by their being lower than the world market prices. Policies like movement restrictions and levies have been opposed not only on the ground of their being depressive on prices but also oppressive in terms of the harassment caused. The discontent is not entirely unfounded, yet it would be misleading to swear by these beliefs as nothing but the whole truth. They need to be examined rather than taken for granted. They also raise the question whether any of these criteria such as terms of trade, cost of production or world prices could be mechanically used either to assess the reasonableness of prices or to determine the procurement prices.

Further, price policy has not only to be concerned with ensuring reasonable prices to farmers but also imparting a reasonable measure of stability to them and striking a balance between the interests of the farmers and those of the consumers.

Recognising the implications 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 overall price stability.

Until the early 1970s, free-market prices were high and governmental procurement (at lower than free-market prices) never exceeded 20 per cent of output. With the escalation of fertiliser prices following the global oil crisis in 1974, farm input costs rose in varying degrees for different crops and for different classes of farmers depending on the shares of purchased inputs in total costs. This led to a series of agitations, usually led by large farmers, for higher support prices for agricultural commodities, particularly basic foodgrains. Responding to pressure from the farm lobby in 1979, the Janata Government attempted to change the terms of reference of the Commission, to include in its purview, the specific claims of the farmers for a "parity price". But the move was thwarted by the Chairman of the Commission (Dharm Narain) who felt that the proposed change, with an accent on the mechanical principle of parity, would substantially undermine the ability of the Commission to make recommendations with due regard for consideration of overall price stability. Ironically, the terms of reference were amended in 1980 by the Government of the re-established Congress (I) and the move to change the terms of reference of the Commission was given support. Furthermore, in the farmers' agitations for higher support prices, even the radical political parties have sided with the rich farmers' lobbies of the conservative parties, underscoring a simple yet crucial

fact of Indian political economy namely, the dominance of the surplus-producing rich farmers in all political parties.⁹

Given the essentiality of price policy as an instrument in sustaining agricultural growth, a fundamentally important question is, what should be the guiding principles for determining agricultural prices? Four alternative norms which have been suggested for guiding producer price determination are:

- (1) Cost of Cultivation Criterion;
- (2) Output-input price parity criterion;
- (3) Inter-crop price parity criterion;
- (4) The ruling price criterion.

To arrive at prices for policy recommendations which contain all the desired attributes, is indeed a difficult task, for policy makers.

Nevertheless, it would be relevant to concentrate mainly on the question as to how APC takes note of the cost of production, what cost concepts are used, and their propriety. Investigations of the cost of cultivation and profitability were launched in the fifties by the Directorate of Economics and Statistics, Department of Agriculture, Government of India, through "Studies in the Economics of Farm Management" for various crops and regions. After the setting up of the APC, the Directorate initiated systematic and regular studies under the "Comprehensive Scheme

of Studying Cost of Cultivation of Principal Crops" through Agricultural Universities and other agencies. Started on a modest scale covering only four states, the scheme is now extended to cover almost all states.

Four concepts of costs were employed by the Farm Management Studies which have continued to be useful today, though with some modifications. These concepts are:

A_1 = All actual expenses in cash and kind incurred by owner operators;

A_2 = Cost A_1 + rent paid for leased in land;

B = Cost A_2 + rental value of owned land (net of land revenue) and interest on owned fixed capital excluding land;

C = Cost B + imputed value of family labour.

The APC has been taking into account two cost concepts in recommending prices:

- (a) Cost A_3 = Cost A_2 + imputed cost of family labour. and
- (b) Cost C, which is the most comprehensive of cost concepts.

The policy seems to cover the former by a comfortably good margin and at least just cover the latter, as far as practicable, though not necessarily for every state and every year. The Farm Management Studies had shown that though cost A_2 is covered by most of the farmers, many - particularly small farmers - could not cover cost C.

Covering cost A_3 ensures only the survival of the farm and family in the short run while covering Cost C would ensure reproduction of its capital in the long run too. But the policy of covering Cost C has some difficulties, tending to inflate the costs.

Due to the pressure of the farmer's lobby on the APC, to make the calculation of costs more liberal, a special Experts' Committee under the chairmanship of Prof. S.R. Sen had looked into the demands. Keeping in view, the limitations of the Farm Management Studies, the Committee recommended a new scheme as follows:

Costs A_1 and A_2 remained the same;

B_1 = Cost A_1 + interest on value of owned capital assets (excluding land);

B_2 = Cost B_1 + rental value of owned land (net of land revenue);

C_1 = Cost B_1 + imputed value to family labour;

C_2 = B_2 + imputed value of family labour.

This new scheme distinguishes "constituents that are price determining from those that are price determined". However, the Committee could not bring itself to firmly recommend the exclusion of imputed rent on land from costs for the purpose of price fixation.

Farmers had demanded that cost of family labour be imputed on the basis of minimum wages fixed by the

Government, but the Sen Committee did not accept this and proposed that the imputation has to be on the basis of actual wage rates paid to attached labour and net unimplemented wage rates. Farmers also demanded an allowance for risks in agriculture to be made in the costs. This was not supported by the Sen Committee on the ground that risk is supposed to be covered by profit. This is not a valid reason because several risks are internalised as costs. When risk conditions for a crop vary from region to region, differential taxes and subsidies can meet the situation better than a uniform increase in prices to allow for the risk factor.

A fairly comprehensive cost concept is thus taken into account by the APC. While recommending prices, however, the APC does not follow a mechanical or rigid formula due to several practical difficulties. One of the difficulties is that the cost calculations are available only with a time lag; while costs are 'ex post facto', procurement prices have to be announced in advance. It may be noted, that though costs differ according to the production conditions and agrarian structure, the price variation does not correspond to these differences. The price variation depends not only on quality differences but also on the conditions of market and infrastructure.

Under such circumstances, the approach of the APC as clarified by Kahlon, formerly its Chairman, has been that "price will not be allowed to fall below the level that covers the cost of efficient production and provides a reasonable margin of profits."

The word 'efficient' does not necessarily mean the least cost production, but reasonably efficient. A certain amount of intuitive judgement is involved in determining what this level of efficiency should be. However, it is clear that any policy of covering the cost of all or the bulk of the farmers would mean a significant price rise, particularly when it comes on top of adopting a liberal concept of cost that covers not only fixed costs but also parts of surplus above costs. Such a procurement price would be totally out of alignment with market forces and would force the Government to accumulate stocks which cannot be sold without a huge subsidy.

An important question in the fixation of procurement and support price is whether each state can have its own price or should the whole country have a uniform pricing. The demand for setting up the Agricultural Prices Commission at State levels, to fix prices in each state separately, has been voiced by farmers, both because the States are more amenable to pressures from farmers' movement and also because cost conditions differ across

States. The State-level Commission meet the first need but not necessarily the second, since costs differ equally within a State. As Nadkarni has aptly put it, -

If diversity in costs is to be the criterion, there needs to be an APC for each farmer!

This is not to say that the States have not been departing at times from the procurement prices announced by the Centre, both openly and in the form of incentives like bonus and concessions in purchase taxes being passed on to farmers, apart from transport and cartage allowances - advantages which they cannot get when they sell in the free market. Nevertheless, the price fixed by the Centre serves as a standard with reference to which and in the light of local circumstances, the state can fix its price and dole out other concessions and incentives.

Another aspect of pricing relates to the dilemma faced by the authorities with regard to farm subsidies. Nearly 75 per cent of all holdings, are held by small and marginal farmers and it has therefore been suggested that the medium and large farmers should not be given the benefit of input subsidy and that they should be charged higher prices for fertilizers. "The Long Term Fiscal Policy" statement submitted to the Parliament in December 1985 by the Finance Minister set out the limitations

within which input and other subsidies have to be held down. Dual pricing of a widely used input like fertiliser would necessitate issue of identity-cards to some 70 million small and marginal farmers for drawal of fertilisers at subsidised prices through some 150,000 fertilizer dealers. There is, moreover, great scope for leakage; medium and large farmers may not find it difficult to secure these cards from small and marginal farmers. The cost of administration would be prohibitively high. In the balance, a dual pricing system does not appear to be feasible for pricing inputs like fertilisers. Fertiliser subsidy reached a level of nearly Rs. 2,000 crores in 1985-86.¹⁰

The authorities face a dilemma in trying to tackle the problem of growing expenditure on subsidies. These subsidies serve important social and economic purposes; and an attempt to contain subsidies is bound to create some problems. Since the support/procurement prices are to a certain extent cost based, input subsidies help in holding down the procurement/support prices to a reasonable level to subserve the interests of the consumers. Viewed in this framework, both fertilizer subsidies and price-support programmes are needed as complementary instruments of the twin policy of promoting productivity and holding the price line. At the same time, if subsidies continue to grow at the present rate, they will either be at the

expense of developmental expenditure; or they may lead to higher budget deficits, which, in turn, will affect costs and prices thereby increasing demands for further subsidies. They may also result in inefficient use of inputs. There is, therefore, a need to contain subsidies within a reasonable limit and the farmer has to be prepared to pay a realistic price for inputs like fertilizer irrigation and electricity.

Another aspect which has been argued upon by many economists, is that the country as a whole would be a loser if it follows a price regime which substantially differs from the international market price levels. In this context, we may mention that the behaviour of prices in the international market is not explicitly mentioned in the terms of reference of the APC (now CACP). However, when the world market prices of wheat were higher than the domestic prices, there had been frequent demands by those representing interests of the farming community, that prices be adjusted to the International market price levels. On these demands, the CACP in one of its Reports had observed:

A facile argument for a sizeable increase in the procurement price for wheat is often built on the ground that the world market price for the cereal is high. In so arguing, it is forgotten that what sustains the high price of wheat outside is the purchasing capacity of the consumer in the affluent economies. The appropriateness of an administered price for the grain in the Indian context cannot be detached

from the paying capacity of the vast mass of the low-income consumers in the country.

Apart from the basic point relating to paying capacity of the low-income consumers, the major problem in using international prices as a guide to national price policy, is the instability of the world market prices. A recent example is that of the U.S. wheat market which was \$ 139 per tonne in December 1985 and came down in seven months to \$ 101, in July 1986. It is also impossible to assess, with any degree of certainty, whether a current price change is a temporary fluctuation, or whether it represents a change in the trend. Such volatility in the international market price is an important impediment. In a study conducted at International Food Policy Research Institute, it was observed that during the period 1961-80, the coefficient of variation in rice prices was 30.29 per cent in the international market; while it was only 8.27 per cent in the Indian market. The likely impact of reduced procurement prices on the investment by farmers and consequently on production is also an important reason against the acceptance of world market prices as the guiding principle for determining domestic price policies.

Farmers' decisions are influenced not only by the prices he receives for his produce but also by the prices he pays for goods and services purchased by him for use

in the production activity on the farm or for consumption in the farm household. The relative shifts in prices of agricultural and non-agricultural commodities over time have thus a direct bearing on the fortunes and welfare of the farm family.

Since 1980, the CACP is expected to take into account, inter alia, the changes in commodity terms of trade between agricultural and non-agricultural sectors while recommending support/procurement prices. The ratio of indices of prices received and prices paid by the agricultural sector is a widely used measure of the commodity terms of trade.

The impact of adverse movement in terms of trade can be mitigated by increasing productivity in the agricultural sector. It may be added that agricultural activity is subject to weather fluctuations which are too frequent to permit a stable relationship between the prices of agricultural and non-agricultural commodities. Viewed in this context, terms of trade have to be treated as a medium term concept and cannot be applied for price adjustments on year-to-year basis. Price policy, however, must take cognisance of movements in terms of trade over a period of time, and implement corrective measures as and when warranted. The entire question of terms of trade had given rise to a long drawn debate in which different

economists had taken differing stands with regard to the concept, definition, interpretation and implications of terms of trade. The criterion of terms of trade should, however, be read together with the criterion of introduction of technology and justice to the consumer.

The timing of announcement of agricultural price is another important aspect so that the farmer is aware of what is ensuing. The Government has, therefore, decided to lay down a time schedule for the announcement of procurement/minimum support prices of crops which will be strictly adhered to. The time schedule is given in Annexure II.

Finally, it may be recognised that the declaration of price policy by itself cannot lead to the desired goal of increased production and earnings of the farmers. An adequate marketing infrastructure is an indispensable prerequisite for effectively implementing the price support operations.

In conclusion, it may be worthwhile to set out all (or most) of the objectives which an integrated approach to foodgrain price policy may include:⁴

- (i) to avoid excessive fluctuations not only in prices but also in incomes;
- (ii) to maintain stability of prices;
- (iii) to raise agricultural income/production;

- (iv) to arrest the cost of agricultural development;
- (v) to ensure a proper cropping pattern;
- (vi) to ensure a production performance in conformity with the planned targets;
- (vii) to safeguard the interests of all consumers or some particular sections of society;
- (viii) to maintain a reasonable relationship between the prices of agricultural commodities and those of manufactured articles, to ensure that terms of trade between these two sectors of the economy do not change sharply; and
- (ix) to reduce the prices to a reasonable level.

While this list does not claim to be all-encompassing, yet it seeks to cover all major aspects involved.

In the Indian conditions, any framework of a foodgrains price policy must emphasise (a) an increase in agricultural production, especially of foodgrains and (b) an assurance of minimum level of consumption to the consumers. Such a policy must bring a relative price stability in the interest of the consumers as well as of the producer, thus reducing the long term as well as the seasonal variations. While normal and reasonable fluctuations cannot be done away with completely violent and too frequent oscillations are what an effective government policy and intervention must seek to eliminate. And this is exactly the specific aspect that this study aims to focus on - whether or not, and to what extent, has policy intervention succeeded in mollifying the amplitude of price fluctuations of chosen crops for chosen states over almost a three decade period of time.

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CHAPTER III

THE OBJECTIVE, DATA BASE AND THE METHODOLOGY

THE OBJECTIVE AND SCOPE OF THE STUDY:

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 Government 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. Therefore, a humble attempt has been made to study this very 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 pricing policy of the APC (now CACP) proved to be in the specific realm of controlling temporal price variability?

Since the quantum of data and the ensuing calculations involved are of a very bulky nature, we limited our scope to a study of eleven major crops from amongst the total of twenty-two crops currently under the purview

of the APC. Both harvest price analysis (annual data) as well as wholesale price analysis (based on monthly data) were undertaken for the chosen crops, generally choosing three major states producing each particular crop.

Data Base:

The study is based largely on secondary data, published by the Ministry of Agriculture, Government of India. The following were the sources of data:

- (i) Agricultural prices in India published by the Directorate of Economics & Statistics, Department of agriculture and Co-operation, Ministry of Agriculture, Government of India. Volumes ranging from 1950-51 to 1984-85 were consulted.
- (ii) Bulletin on Food Statistics published also by the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India, 1963-64 to 1984-85.
- (iii) Statistical Abstracts for different states for various years published by the respective state Governments.
- (iv) Agricultural Statistics at a glance published by the Ministry of Agriculture, Government of India.
- (v) Indian Crop Calendar, Ministry of Agriculture, Government of India.
- (vi) Reports of the Agricultural Prices Commission (now CACP) for various crops and years.
- (vii) Estimates of Area production & yield of principal crops in India for different years.
- (viii) Bulletin on Commercial crop statistics: 4 volumes 1976-77 to 1978-79, 1971-72 to 1975-76, 1968-69 to 1971-72 and 1963-64 to 1968-69

Hypotheses & Methodology:

The following hypotheses have been tested in the context of selected crops and states. In chapter IV, pertaining to ^{an} analysis of variability of harvest prices, the hypothesis to be tested is:

- (1) Government intervention in agricultural pricing has resulted in reducing the variability in farm harvest prices.

In chapter V which deals with wholesale prices, the two hypotheses proposed to be tested are:

- (2) Since the inception of Government intervention, the magnitude of price hike per month has generally been dwindling and has gradually become smaller than the magnitude of carrying costs per month, and
- (3) A second-degree parabolic function, in the shape of an inverted V, captures the temporal profile of the coefficient of variation such that each crop, the C.V. keeps on rising upto a particular point of time beyond which it starts declining.

The presence of reversibility testifies to the success of government policy in reducing inter-month variability and the point of reversibility suggests the year (s) beyond which the magnitude of variability gets lessened.

Selection of Crops and time period:

The above-mentioned hypotheses are being tested for major crops so as to represent almost all dominant sub-groups viz. cereals including coarse cereals, pulses, oilseeds, and commercial crops. The first hypothesis (1) has been tested for eleven crops viz. rice, wheat, jowar, bajra, barley, maize, gram, groundnut, sugar, cotton and jute, for the period 1950-51 to 1985-86 since continuous comparable data on harvest prices was available to us, for this period.

The second and third hypotheses have been tested for ten crops which are the same as for the harvest price analysis, with the exception of sugarcane. Sugarcane being a perennial crop, did not fit in with the framework of the analysis of monthly behaviour of prices, as designed for the fifth chapter on wholesale prices; *therefore,* it was dropped after chapter IV. In fact, even in chapter IV the harvest prices data pertain to (raw) sugar and not sugarcane which was not available on a comparable temporal and spatial basis. While in harvest price analysis every crop has been dealt with in an individual section each, in wholesale price analysis, the chapter is divided into four broad sections and the ten crops classified in accordance with the sub-group into which they fall. The time period taken for wholesale

price analysis^{is} from 1956-57 to 1984-85, since prior to 1956-57 monthly price data in several cases was rather scattered. Moreover, this year occurs after the re-organisation of States. The publication of wholesale prices beyond 1985 is awaited as yet. For analytical convenience, the details of data used are outlined in chapters IV and V. ^{separately.} In terms of cropped area and volume of production, the chosen eleven crops are ~~re~~quite important.

Choice of States:

It was decided to limit each analysis to not more than three states each, for every crop considered. The reason being that both for harvest and wholesale price analysis, the price data covers a considerably long span of time and 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 criterion 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 considerable proportion of the total All India production of a crop.

In the wholesale price analysis, for one or two crops, we had to rest content with only two states or to substitute one state for another whenever severe data

deficiencies, e.g. absence of several months' data for a number of years continuously or spread over the entire time period, confronted us. Besides, it had also to be taken into account, that the wholesale prices were available for the same centre in any given state for each crop, for the complete time period considered. In the interest of the above considerations, occasionally the next best alternative state was taken.

It may be useful to look at the tabulated summary of the original lot of crops and states taken

Table-3.1 : Statewise percentage share in production for eleven crops, 1984-85

Crop	State	Percentage share of State in All-India production
1. Rice	West Bengal	13.8
	Andhra Pradesh	11.9
	Tamil Nadu	9.2
	Total for 3 States	<u>34.9</u>
2. Wheat	Uttar Pradesh	36.1
	Punjab	23.0
	Madhya Pradesh	8.4
	Total	<u>67.5</u>
3. Jowar	Maharashtra	42.7
	Karnataka	14.6
	Madhya Pradesh	14.4
	Total	<u>71.7</u>
4. Bajra	Rajasthan	25.5
	Gujarat	25.0
	Uttar Pradesh	15.4
	Total	<u>65.9</u>

contd...

contd...

5.	Barley	Uttar Pradesh	45.92
		Rajasthan	24.48
		Bihar	4.41
		Total	<u>79.31</u>
6.	Maize	Uttar Pradesh	21.2
		Rajasthan	13.4
		Madhya Pradesh	13.3
		Total	<u>47.9</u>
7.	Gram	Madhya Pradesh	28.1
		Uttar Pradesh	27.9
		Rajasthan	21.3
		Total	<u>77.3</u>
8.	Groundnut	Gujarat	23.30
		Andhra Pradesh	19.60
		Tamil Nadu	18.50
		Total	<u>61.40</u>
9.	Sugar (raw)	Uttar Pradesh	40.70
		Maharashtra	15.20
		Tamil Nadu	11.50
		Total	<u>67.40</u>
10.	Cotton	Gujarat	24.50
		Maharashtra	17.40
		Punjab	14.60
		Total	<u>56.50</u>
11.	Jute	West Bengal	55.90
		Bihar	12.70
		Assam	11.00
		Total	<u>79.60</u>

In the wholesale price analysis also, by and large, the choice of states for each crop remained the same as tabulated above, for harvest price analysis. For reasons already mentioned above the exceptions were as follows:

In the case of Bajra, the third State U.P. was replaced by Maharashtra which comes fourth in sequence

of its share in all India total production of Bajra.

In the case of Groundnut, only the first two states were taken while Tamil Nadu was dropped for the same reason as for sugarcane - there were arrivals of this crop in this state all round the year.

In the case of Cotton, none of the top three producing states could be taken because of non-availability of continuous and comparable temporal data for monthly wholesale prices. We had to fall back on a much less satisfactory resort viz. the fourth and fifth states in order of proportion of production, i.e. Andhra Pradesh and Karnataka.

Finally, for Jute only the highest producing state viz. West Bengal, which alone accounted for about 56 per cent of the all India production was considered since wholesale price data was considerably scattered for the other two jute states of Bihar and Assam.

The above may, in fact, be included amongst the limitations of the analysis since they all constitute a compromise in terms of less than best available options.

Methodology:

An attempt has been made to study price variability over three decades, from many angles. For this purpose let us first consider the periodisation scheme adopted for chapter IV on Harvest prices and its underlying logic.

In keeping with hypotheses (1) above, we divide the entire period into two broad eras: the pre-government intervention and the post-intervention era. The former ends roughly an year or two after a crop entered the purview of the APC. To analyse the variability of harvest prices over time, the following were calculated, for each of the pre- and post-government intervention periods:

- i) standard deviation,
- ii) the coefficient of variation,
- iii) average or mean price, and
- iv) the compound annual growth rate.

The above four were calculated both for the (a) original yearly data first, as well as (b) on the basis of three year moving averages obtained from the original data.

- v) After completing the above, an additional exercise was to eliminate excessively abnormal years in each case and re-calculate the S.D. and C.V. for a final review.
- vi) Wherever occasional data gaps occurred, prices were interpolated.
- vii) Graphical representation of the annual compound growth rate against time was obtained both for original data and for moving averages.

In the chapter V on variability of wholesale prices, the following were calculated:

- (i) the average price was for each of the four (Q_1 to Q_4) quarters constituting each year;
- (ii) Percentage price change per month =
$$\frac{Q_4/Q_1 \times 100 - 100}{9}$$
- (iii) Maximum price difference =
$$\frac{\frac{\text{Maximum}}{Q_1} \times 100 - 100}{\text{actual number of months}}$$
- (iv) the normal carrying costs for each period.
- (v) Coefficient of variation for each year.
- (vi) a second-degree parabolic function was fitted to the temporal profile of C.V. using the equation $V_{ij} = a + bT + cT^2$ with the year of reversibility being identified as that when $T = \frac{b}{2c}$.
- (vii) the graph of C.V. against time was obtained in each case.
- (viii) As a final adjunct, the pattern of market arrivals of selected crops was calculated in percentage terms.

As already mentioned, further details of each procedure adopted by us are spelt out at appropriate places in chapters IV and V so that a degree of cohesiveness in our analysis is ensured in both types of variability analysis.

CHAPTER IV

VARIABILITY IN HARVEST PRICES

As suggested earlier in chapter III, variability in prices can be meaningfully studied, on a broad plane, with respect to the temporal movement of either farm harvest prices and/or wholesale prices. Both serve useful purpose and from the point of view of policy perspective, both are important in their own right. The present chapter examines the temporal behaviour of farm harvest prices in respect of eleven major crops, each crop covering, on an average, three major producing states.

The harvest prices are those prices which prevail in the market on the eve of and for about 2-3 months immediately succeeding the harvesting operation. For obvious reasons, the harvest prices for different crops and in different states refer to a different set of months but, in general, these prices do tend to reflect demand and supply position, when the harvest for a crop matures. For a number of economic and social reasons, most of the saleable portion of crop output arrives in the harvest months and the next season's cropping pattern decisions are governed mostly by the behaviour of farm harvest prices during the current season. It may not be an exaggeration to say that the total economic outcome of farm production brings crucially

on the level of harvest prices at which most of the produce is sold. In recent years, the proportion of crop sales at harvest time has increased phenomenally and accordingly the economic importance of these prices has gone up tremendously. In fact, most of the recent agitations for higher farm prices have, at their back, the idea of wresting higher and higher harvest prices.

Year-to-year fluctuations in agricultural prices is a normal phenomenon. Of more serious police concern is the occurrence of violent up- and downswings in harvest prices, on more frequent basis. Since the mid-sixties, the government has been intervening in the marketing process of a number of crops, primarily with the idea of ironing out excessive price increases or excessive price declines. The interests of consumers as well as those of the producers were sought to be safeguarded through government intervention so as to obviate the frequent occurrence of severe price crashes which hit production milieu of farmers or severe price increases that caused undue hardship to the consumers.

For analytical convenience, the time-series data for the period 1950-51 to 1985-86 has been split into two parts. Period I covers the years during which effective intervention by the government was not there, while Period II starts, for each crop under study, from the year during

which the intervention really commenced. Out of the eleven crops covered by us, period I represents the years 1950-51 to mid-sixties for about eight crops while for the remaining three crops, period II commences a little later.

To recapitulate, government intervention has been two major counts. Firstly, for each crop under the purview of the Commission for Agricultural Costs and Prices, procurement price is announced well in advance so as to provide a sort of advance assurance to the prospective producers about the minimum of the price that they are sure to get when their harvest arrives. This aspect of government intervention is in the nature of laying down, on a year-to-year basis, a policy for price management. The other aspect of intervention deals with actual purchase by government so as to implement the policy aspect in an effective manner. Obviously, therefore, the movements in harvest prices in period II are determined by the combined effect of government policy as well as implementation. It is quite conceivable that for a certain crop, the policy component of intervention for a certain year may have been fully observed but implementation aspect may have left something more to be desired, perhaps because the crop output has been too good or too bad, or perhaps to local procurement system failed, or perhaps the producers reacted indifferently for

reasons of political economy, and so on. It would clearly be an abnormal year and one may be tempted to say that government intervention did not succeed for that year. Perhaps, single years of this type may be met quite commonly for some crops, in some states, but these should not negate the positive benefits of government intervention on a long-term basis. In fact, an advisable course would be to take out such isolated years and then see the effect of government intervention. In the present chapter, we have had to do this rectification for some crops.

Although the CACP (then APC) was set up in 1964, yet the process of bringing individual crops under its purview was staggered over a few years. For lack of any other meaningful criterion, we proceed under the assumption that the process of government intervention for a crop commenced during the year that the crop was brought under the purview of the CACP. In other words, we have relied nearly exclusively on the first of the two components of the intervention, namely price fixation policy. It is not difficult to visualize that the stabilization effects of government intervention could not emerge at the same time that the CACP started its deliberations for a particular crop. To say the least, there must be a minimum time requirement for the interventionist policy to show its result; besides time gaps involved for price signals to reach the grassroot

levels in far flung areas, local gearing up of marketing infrastructures and the degree of preparedness of local procurement agencies, etc. would imply that the year of de jure intervention is not the year of de facto intervention. Nevertheless, the time gap between the two should not be very large particularly because a fairly large number of crops is what the CACP had to begin with, since its very inception. The important point that we wish to emphasize is that we should take a long-term view of the interventionist effects, i.e. to see if period II whether shortened by 2-3 years or not, does show an underlying tendency of a relatively less fluctuating price regime. There is a merit in viewing the total behaviour of period II against that of period I; a year-to-year comparison serves no policy purpose.

On the basis of the foregoing discussion, the following hypothesis is proposed for empirical verification:

Government intervention in agricultural pricing has resulted in reducing the variability in farm harvest prices.

In other words, compared with the pre-intervention era, the farmers of India now face much milder year-to-year ups and downs in harvest prices of their produce, and this has instilled greater confidence in future production planning and government's capabilities in preventing severe price crashes.

As pointed out earlier in chapter III, variability in a variable can be seen in absolute terms by measuring the changes in standard deviation (S.D.) or in relative terms through changes in coefficient of variation (C.V.). Both measures of dispersion are important in their own right. However, in a situation where the mean level itself changes, the absolute dispersion does not go beyond pointing out greater or smaller deviations within the series itself; its comparison with another series with an altogether different mean level does not convey much. In our case, the mean price levels for period II are bound to be higher and in some cases substantially higher, since the variable under consideration is annual harvest price. Our conclusive judgement about the degree of variability in period II over that in period I is, therefore, based heavily on the behaviour of the Coefficient of Variation (C.V.).

In the following discussion, the variability in farm harvest prices for each of the chosen eleven crops in period II is compared with that in period I. Following the standard practice, all indicators are worked out once based on original yearly data and then once again based on three-year moving averages obtained from the original data. In order to have a broad comprehension of the changing phenomena, the mean levels as well as the annual compound growth rate, are also given in the statistical

tables, separately for periods I and II. Furthermore, to understand the broad qualitative differences between period I and period II, annual growth rates have also been derived and represented on two separate groups (one based on the original data and the other on the three-year moving averages) for each crop. An indication of the qualitative difference is also available in statistical tables through the number of years for which positive annual growth rates against negative annual growth rates were witnessed, for each of the two periods. In brief, we have tried to look at the phenomenon of price variability in many different ways so that our judgement about the variability-reducing effects of the interventionist policies do not remain clouded. Let us begin with rice.

RICE

Table 1 sets out the details for rice. The three states are West Bengal, Andhra Pradesh and Tamil Nadu. While comparable data were available for West Bengal and Tamil Nadu for the whole period 1950-51 to 1985-86, for Andhra Pradesh, information for paddy alone was available beyond 1970-71 against that for rice for the earlier years. There is no direct way out to switch over from price of paddy to that of rice to make the whole time-series data comparable in the case of Andhra Pradesh. We had, therefore, to fall back upon a much less satisfactory method of converting one set of prices into the other roughly through physical conversion ratio. As we see a little later, this poses its own problems.

As expected, the mean price levels in each of the three states are substantially higher in period II over period I. There is thus a considerable step-up in the annual growth rates, in each of the three states. We have thus a scenario in which period II shows a faster increase in prices compared with period I. But there are periodic ups and downs also. More significant, therefore, is to see the behaviour of dispersion in the two periods. As can be seen from the accompanying six graphs, period II tends to give the impression of greater dispersion. Indeed this is so if we compare standard deviations of the two periods;

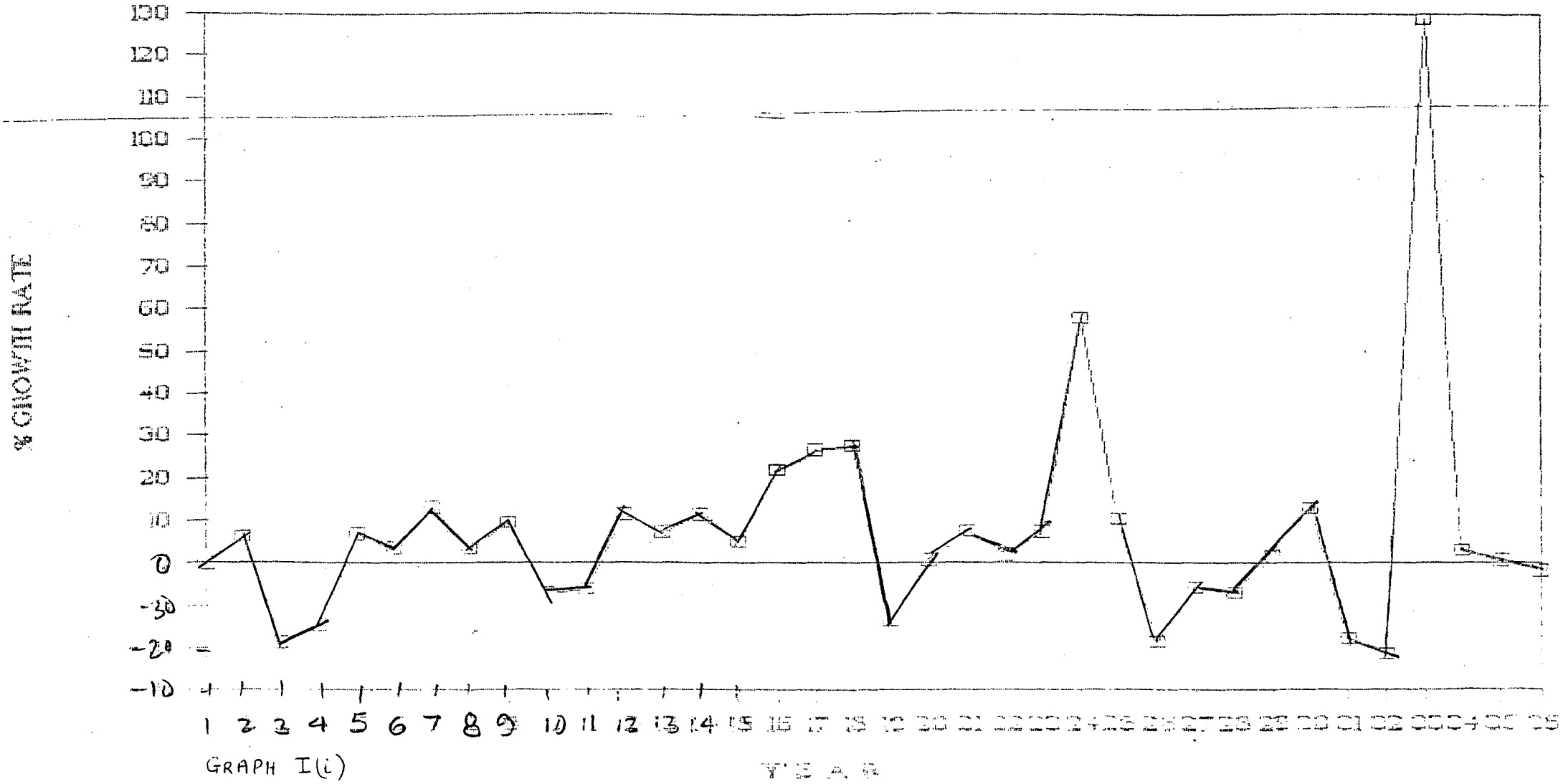
Table I: Growth and Variability in Harvest prices of Rice:
1950-51 to 1985-86

Indicator	Period	West Bengal	Andhra Pradesh	Tamil Nadu
MEAN	Period I	58.34 (59.15)	55.04 (55.90)	51.89 (53.07)
	Period II	196.63 (189.80)	159.54 (155.05)	157.04 (151.06)
STANDARD DEVIATION	Period I	16.25 (17.30)	14.10 (12.17)	10.66 (9.50)
	Period II	67.37 (55.58)	54.22 (49.04)	62.54 (57.88)
COEFFICIENT OF VARIATION	Period I	27.85 (29.25)	25.62 (21.77)	20.54 (17.90)
	Period II	34.26 (29.28)	34.00 (31.63)	39.82 (38.32)
ANNUAL GROWTH RATE (COMPOUND)	Period I	1.61 (1.98)	2.21 (2.07)	1.72 (1.63)
	Period II	2.01 (2.02)	2.72 (2.66)	3.19 (3.21)

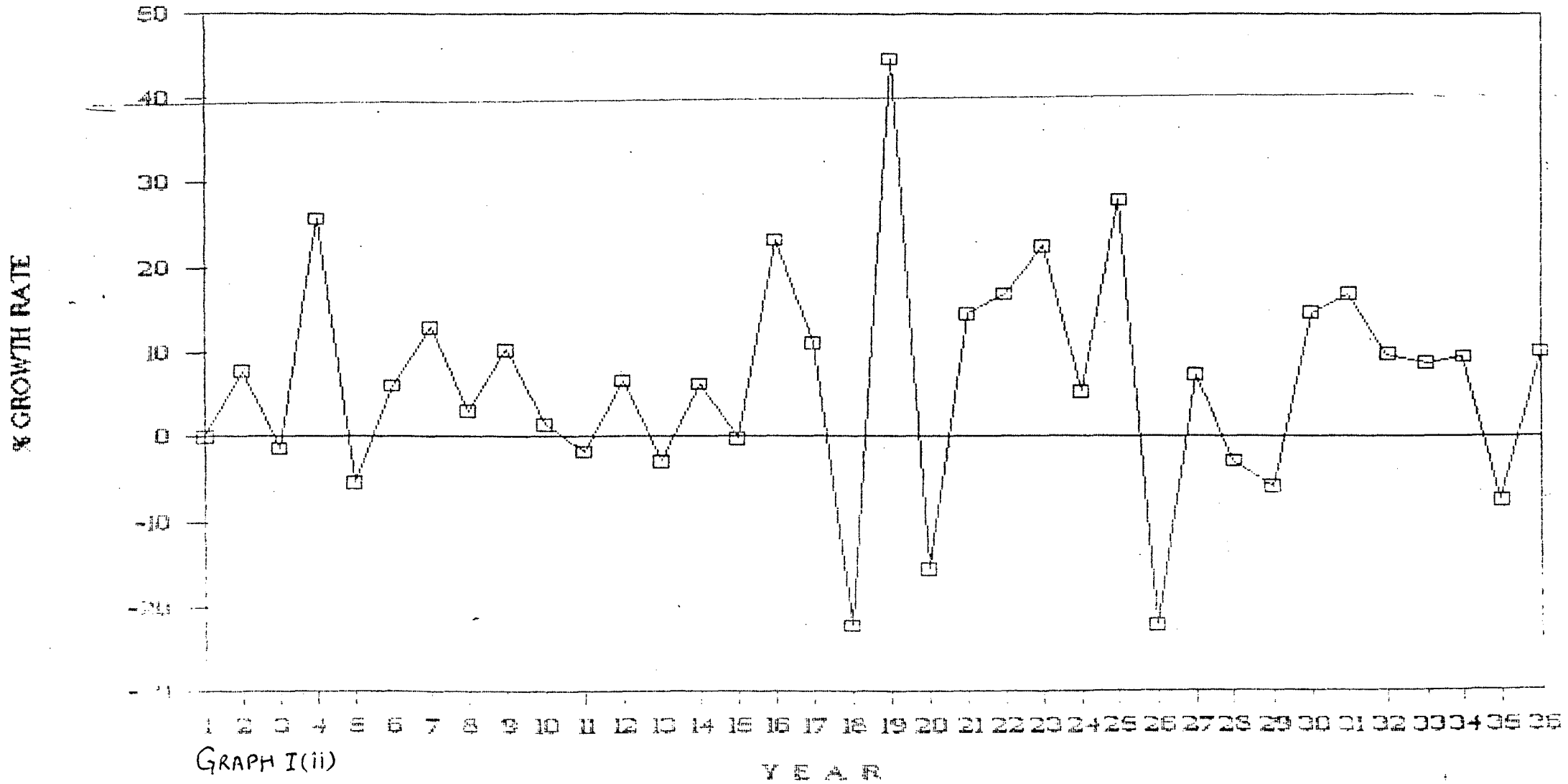
Number of years showing				
(i) Increase in Price	Period I	13	12	13
	Period II	13	14	16
(ii) Decrease in Price	Period I	4	5	4
	Period II	6	5	3

Note: Figures in brackets are estimates based on three-year moving average series.

RICE WEST BENGAL



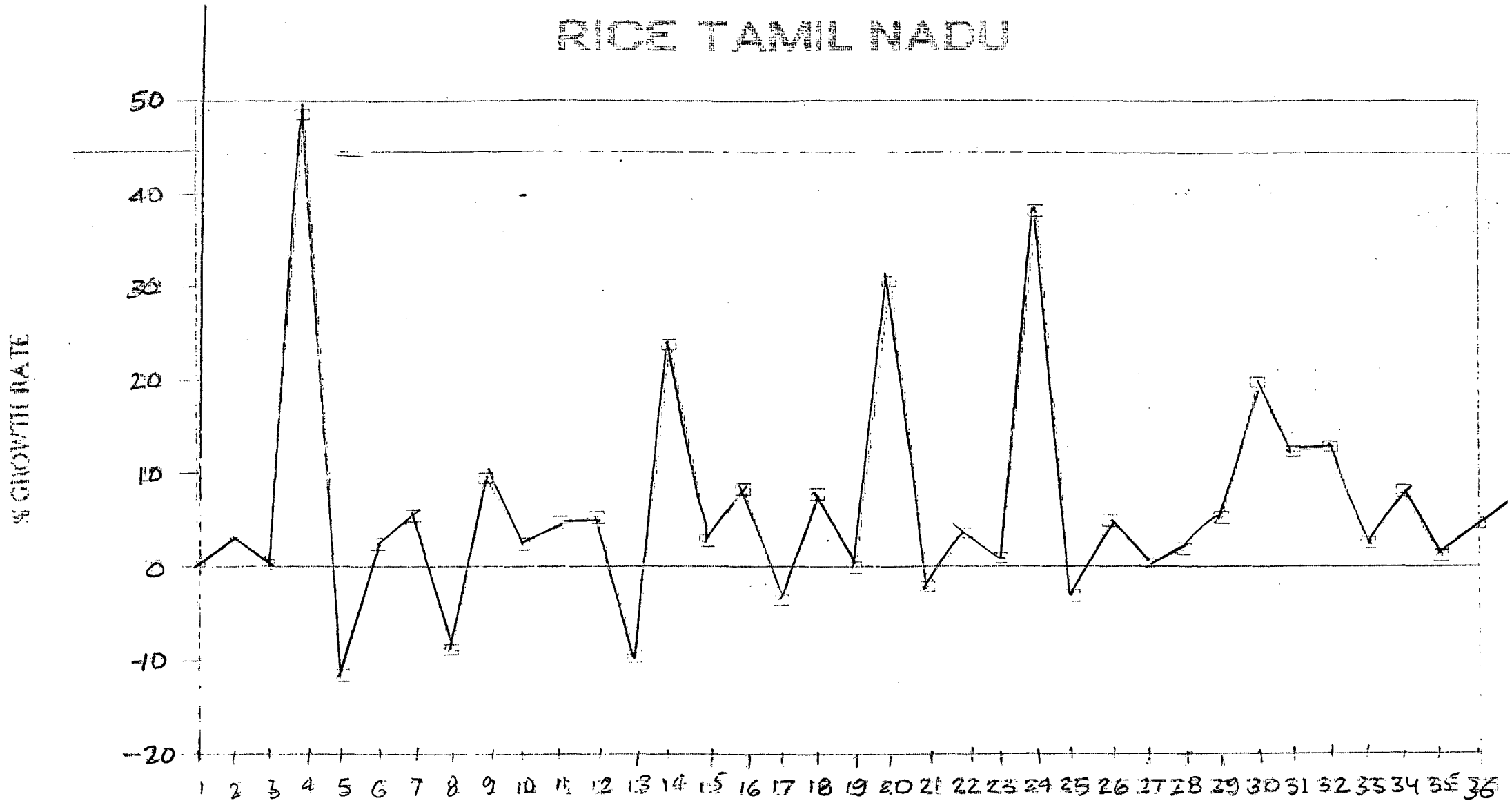
RICE ANDHRA PRADESH



GRAPH I(ii)

Y E A R

ROE TAMIL NADU



GRAPH I (iii)

in West Bengal, S.D. increased from 16.25/17.30* in period I to 67.37/55.58 in period II, in Andhra Pradesh from 14.10/12.17 to 54.22/49.04 and in Tamil Nadu from 10.66/9.50 to 62.54/57.88. Nevertheless, if we take cognizance of the higher levels of mean values in period II over period I, the picture on dispersion gets considerably mollified. Nevertheless, the coefficient of variation in period II stays higher than that in period I and accordingly one is instantly led to believe that the government intervention has not succeeded in reducing the year-to-year variations in harvest prices for rice. West Bengal offers some consolation because the C.V. in this state increased very mildly from 27.85/29.25 in period I to 34.26/29.28 in period II. In fact, the smoothing effects of taking moving averages also do not bring about any improvement.

As is typical of many statistical estimates, one or two excessively abnormal observations throw them off the beam. The instruments of our analysis, viz. the mean, standard deviation and coefficient of variation certainly suffer from this handicap. Moreover, the long-term beneficial effects of government intervention should not be allowed to be obliterated by a single excessively bad year or a single excessively good year. We would like, therefore,

* The first figure is based on original data while the second one on moving average data.

to set aside one or two such abnormal years and rework the estimates of dispersion - S.D. and C.V. It is important to point out that such an exercise has to be done with great caution, and one or two years which are indeed excessively abnormal from the perspective of steep departure from the underlying trend may be deleted. Obviously, in a situation where the annual growth is almost regularly alternating between too high jumps or too high falls, the question of deleting one or two years just does not arise. Elimination of years has been done after carefully studying each individual case separately to ascertain which are the obviously jarring departures so that a single criterion of elimination does not exist for all the thirty two cases under review. Some cases where the Coefficient of Variation shows a clear decline in variability after Government intervention and there does not appear much scope for any further enhancement of the magnitude of decline or vice-versa, have not been re-worked out as such. Only those cases have been re-worked, after eliminating the glaringly divergent years from any period, where we could logically expect some change if not a complete reversal. This exercise has thrown up some improvements while some stubborn variabilities have still not been mollified. We will consider the individual details with each crop respectively.

In the present case, we felt tempted to delete 1967-68 from period I and 1980-81 and 1981-82 from period II in the case of West Bengal; 1967-68 from period I and 1974-75 in the case of Andhra Pradesh, and none in the case of Tamil Nadu. Such deletions did not rectify the earlier results, as is evident from the following table.

Table I-A: Variability in Harvest Prices of Rice: Effect of deleting Excessively Abnormal Years

Indicator	Period	West Bengal		Andhra Pradesh	
		Before Deletion	After Deletion	Before Deletion	After Deletion
STANDARD DEVIATION	Period I	16.25	16.25	14.10	14.10
	Period II	67.37	69.04	54.22	52.36
COEFFICIENT OF VARIATION	Period I	27.85	27.85	25.62	25.62
	Period II	34.26	33.49	34.00	32.05

Note: No deletion was effected for Tamil Nadu, the figures for which remain the same as in Table I and have therefore not been repeated here.

We are thus led by the available evidence, to suggest that the government intervention has not succeeded in ushering in an era of relative stable prices in the case of rice. As we can see, the standard deviation and C.V. has come down in period II after deletion as compared to the original in Andhra Pradesh but not sufficiently to reverse the original trend of increasing variability from period I to II. In West Bengal as well, the trend as borne out by the C.V., remains the same.

We are fully conscious of the fact that our results for rice do not throw up a very neat pattern. Part of the fault essentially lies with our choice of rice rather than paddy. In fact for a conceptually more satisfying and acceptable exercise on price variability paddy should have been chosen instead of rice since we are dealing here with harvest prices. Unluckily however, we cannot always have our choices. Due to some data gaps a continuous time series on farm harvest prices for paddy could not be built without bringing in questionable compromises. Accordingly, we were obliged to opt for a less satisfying exercise and considered time series data for rice. It needs to be emphasized therefore that the results must be treated as simply indicative of the broad underlying tendencies.

WHEAT

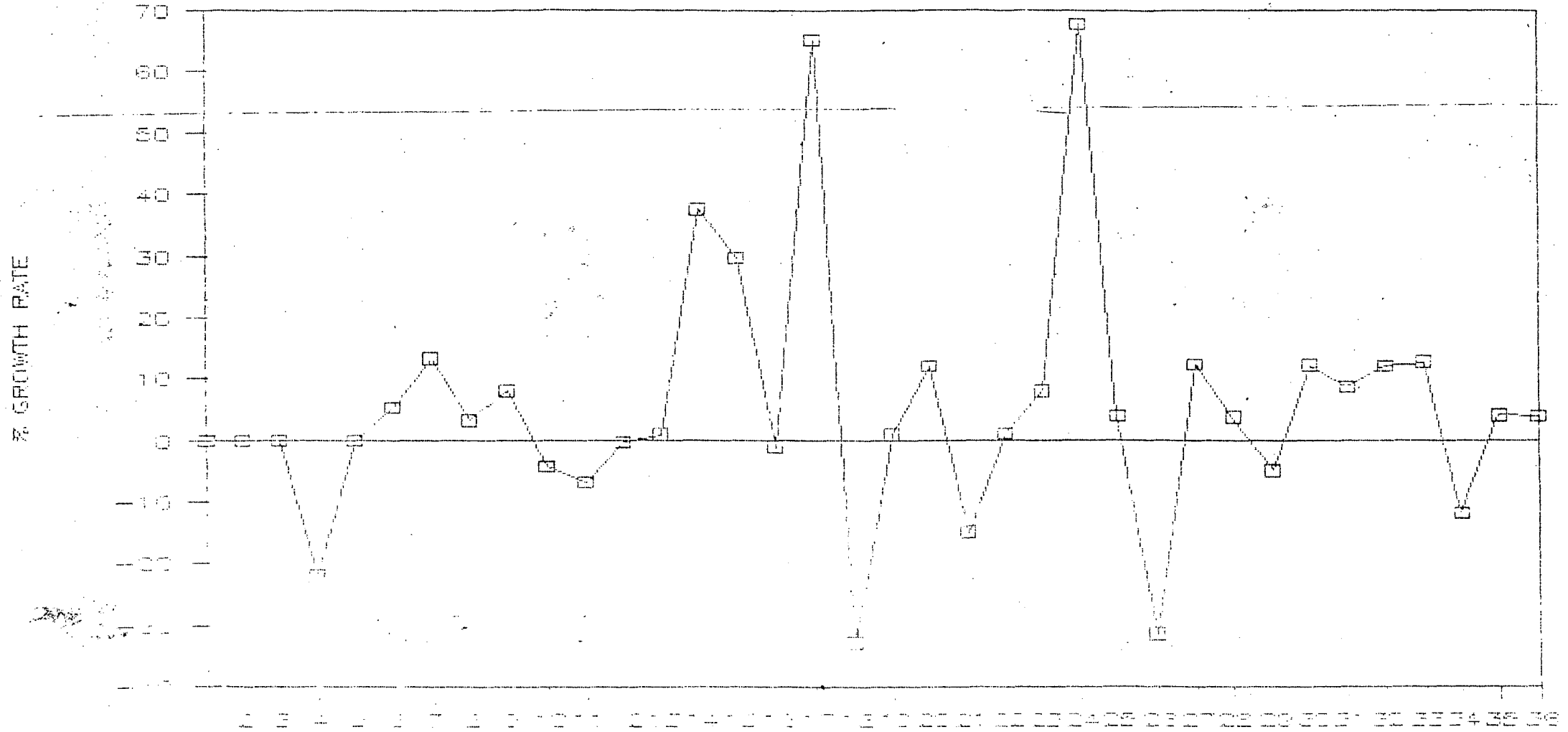
The next most important crop in the context of government intervention policy is wheat. The results of our exercise for this crop are given in Table II. The three states covered are Uttar Pradesh, Punjab and Madhya Pradesh.

Table II: Growth and Variability in Harvest prices of Wheat: 1950-51 to 1985-86

Indicator	Period	Uttar Pradesh	Punjab	Madhya Pradesh
MEAN	Period I	48.91 (48.50)	44.43 (44.82)	45.22 (44.92)
	Period II	117.27 (115.71)	112.68 (109.98)	133.39 (129.86)
STANDARD DEVIATION	Period I	19.95 (16.39)	12.30 (11.72)	9.75 (8.91)
	Period II	30.81 (26.28)	30.16 (27.72)	40.44 (36.54)
COEFFICIENT OF VARIATION	Period I	40.78 (33.79)	27.69 (26.14)	21.57 (19.84)
	Period II	26.27 (22.71)	26.77 (25.20)	30.32 (28.14)
ANNUAL GROWTH RATE (COMPOUND)	Period I	1.92 (2.12)	1.69 (1.85)	0.55 (0.97)
	Period II	1.88 (1.78)	2.10 (2.10)	2.28 (2.36)
Number of Years showing:				
(i) Increase in Price	Period I	12	13	10
	Period II	15	14	12
(ii) Decrease in Price	Period I	5	4	7
	Period II	4	5	7

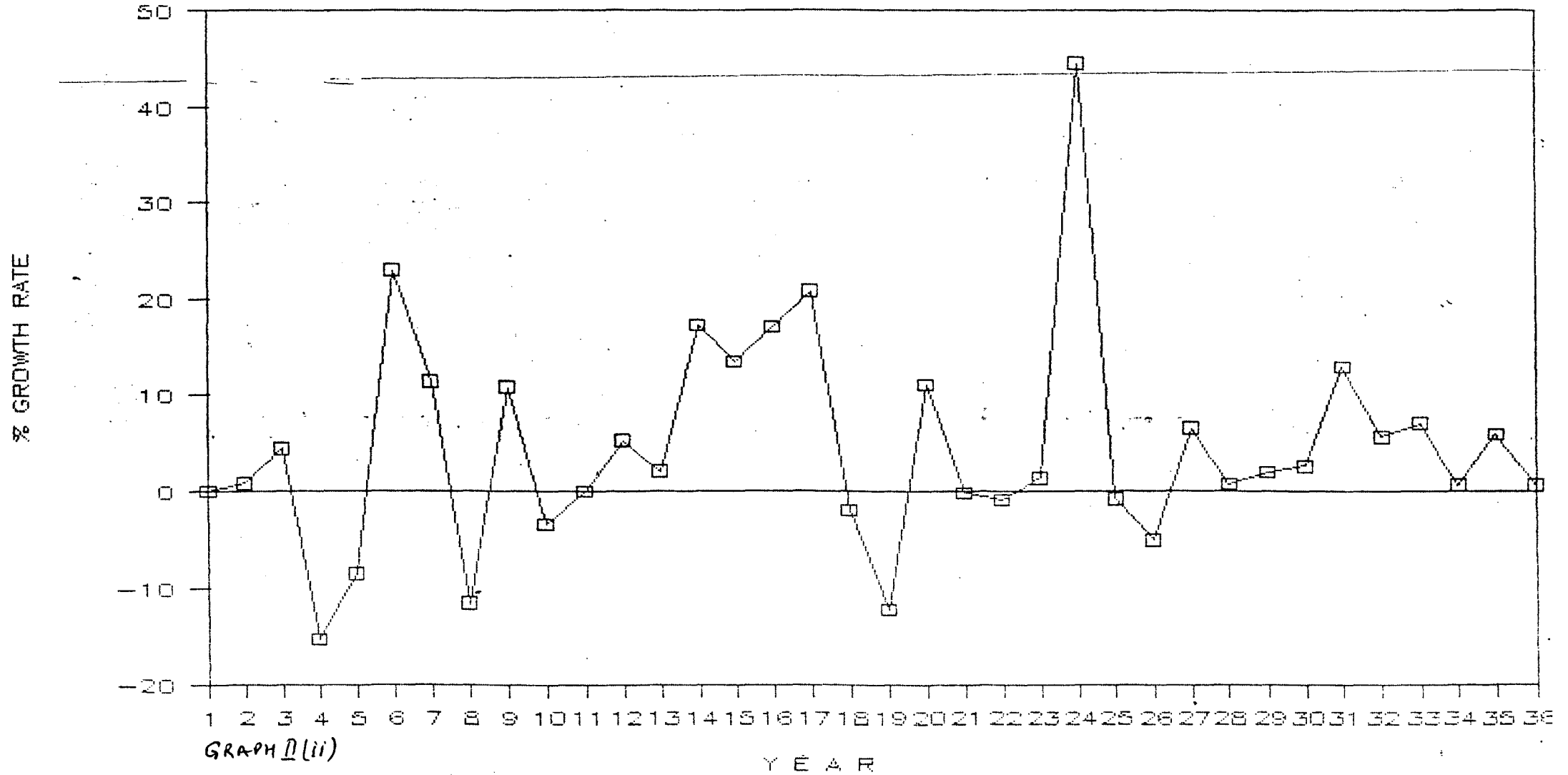
Note: Figures in brackets show indicators based on three-year moving average series.

WHEAT UTTAR PRADESH



GRAPH II (i)

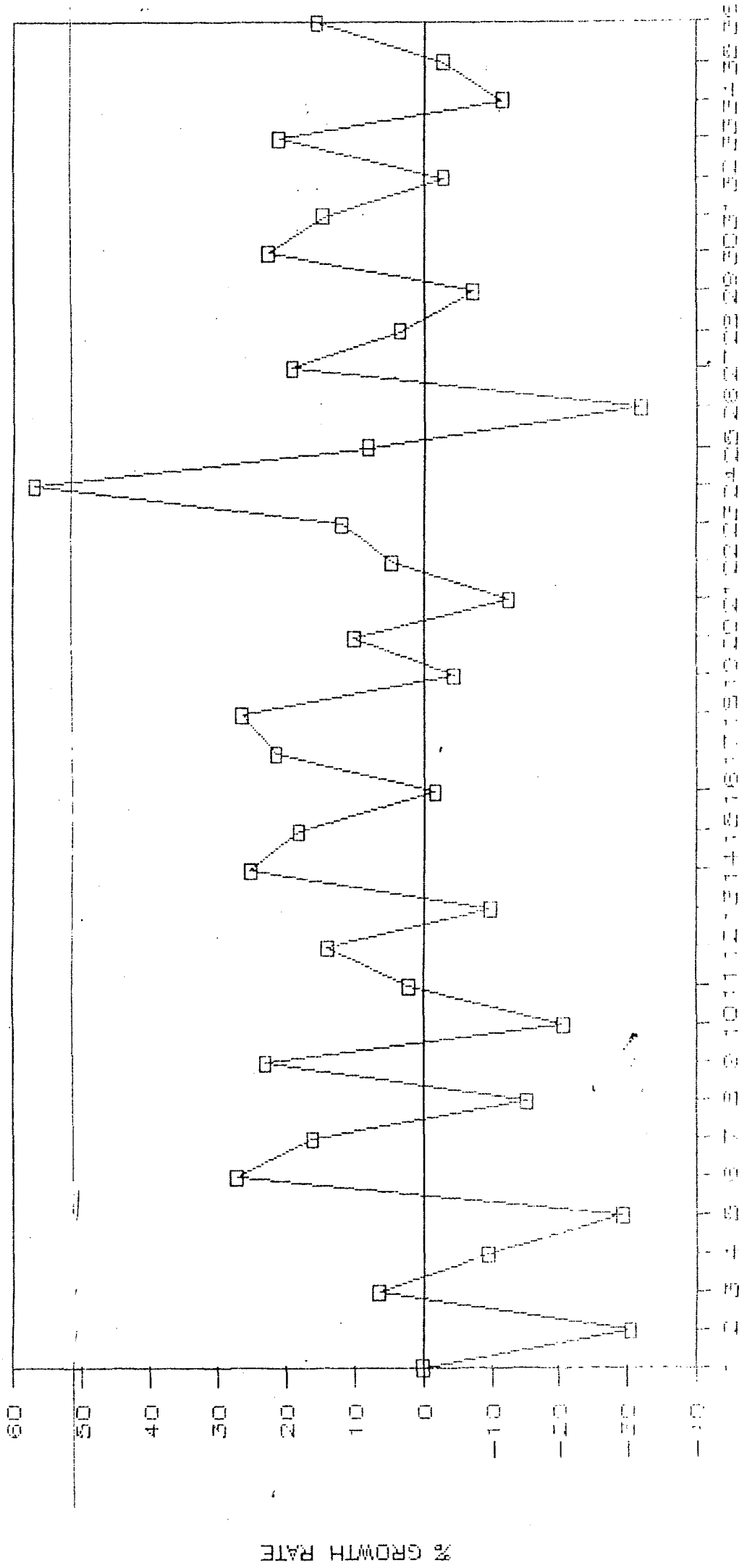
WHEAT PUNJAB



GRAPH D(ii)

Y E A R

WHEAT MADHYA PRADESH



GRAPH II (ii)

The mean price level in table II tells a story similar to that for rice. The average price for all three states during period II for wheat is more than double of that in period I, as is to be expected in a growing economy. The compound annual growth rate, however, fell from 1.92 per cent to 1.88 per cent for U.P. while it rose for the other two states. Moreover, the absolute variability was the highest for U.P. in period I (almost 20) and increased to 30.81 in period II which was less than the increases registered by the other two states, in comparative terms especially Madhya Pradesh where the absolute variability shot up to 40.44 from a mere 9.75. The relative variability, as indicated by the coefficient of variation, however, fell substantially from 40.78 to 26.27 for U.P. and from 27.69 to 26.77 for Punjab - not as distinct a fall, as for U.P., yet a decline in price variability, nonetheless. However, in Madhya Pradesh, the harvest price variability registered an increase from 21.57 to 30.32. It appears from this that Government intervention has not successfully percolated to all levels in Madhya Pradesh which is incidentally, also a state where the marketing, procurement and social systems are not as sophisticated and developed as they are, perhaps, in U.P. and Punjab. It is thus clear that a mere fixation of price and its advance announcement by the Government at the centre does not necessarily ensure the success of price

stabilization policy. In the ultimate analysis the incidence of continuing fluctuations in production, punctuated by severe ups and downs, practically on a regular basis, sets the tone of price behaviour, on an year-to-year basis. In addition, the weak infrastructure and inadequate procurement efforts add their share to price instability.

We may notice, that while in period I, prices in U.P. increased in twelve years out of seventeen years i.e. approximately during 71 per cent of the total number of years and fell during 29 per cent of the total number of years comprising period II, they registered an increase in 79 per cent of the years (i.e. 15 out of 19 years), falling only in 21 per cent of the total number of years.

This shows, that when the Green Revolution struck during the beginning of period II and wheat was one of the foremost beneficiaries in terms of output and yield expansion, then, in the face of expanding supply, the Government was successful in providing an adequate support to the wheat prices and preventing them from crashing.

Historically, it is a major achievement of the government's interventionist policy to have ensured a breakthrough in wheat output; a steady rise in annual harvest prices; and a steady decline in year-to-year variability in harvest prices. In fact, in the states of Uttar Pradesh and Punjab where a very high percentage of wheat cropped area is

irrigated,* the year-to-year fluctuations in production got mollified in period II against period I. For lack of adequate irrigation facilities, Madhya Pradesh, therefore, offers a contrast.

Before we finally declare the failure of government intervention in Madhya Pradesh, it may be advisable to feel convinced that the higher coefficient of variation in period II is not the outcome of just one or two excessively abnormal years. We must not deny the beneficial effects of the government policy for 17 or 18 years of period II just because one or two extreme years inject statistical distortions. A careful perusal of the whole time-series data identifies 1973-74 and 1974-75 as excessively abnormal years, when harvest prices of wheat shot up. As is well-known, the takeover of wholesale trade in wheat in 1973-74, threw the whole business of wheat marketing off the beam; the producers reacted very sharply by withholding supplies.

It may be desirable to see if the behaviour of coefficient of variation undergoes a change by deleting these two extremely abnormal years. Table II-A is based on such an exercise.

* In 1985-86, irrigated portion of wheat cropped area was 84.08 per cent in Uttar Pradesh; 90.20 per cent in Punjab and a mere 31.9 per cent in Madhya Pradesh. See Statistical Abstract of Punjab, 1986, pp.126-27.

**Table II-A: Variability in Harvest Prices of Wheat:
Effect of deleting excessively abnormal years**

Indicator	Period	Madhya Pradesh	
		Before Deletion	After Deletion
Standard Deviation	Period I	9.75	9.75
	Period II	40.44	33.93
Coefficient of Variation	Period I	21.57	21.57
	Period II	30.32	27.56

Note: Since U.P. and Punjab conform to the hypothesis of falling variability no deletion was effected for them.

We can see from table II-A, that deletion of the two excessively abnormal years did lead to a fall in the S.D. and C.V., thereby reducing the magnitude of variability difference between periods I and II but the direction persists. This has not reversed the trend of an increase in C.V. from period I to II. From this, we may conjecture that the result of increased variability could indeed be due to ineffective implementation of Government's price policy, ineffective marketing system, absence of complementary infrastructure. In fact, studies¹ reveal a positive correlation between a backward state and backward agriculture.

Thus, the analysis of wheat crop prices confirms our hypothesis in the two most important states of U.P. and Punjab and does not seem to uphold the same in the case of Madhya Pradesh.

JOWAR

Turning to table III for jowar, we find that, in keeping with our hypothesis once again, the relative variability has distinctly gone down during the period of active Government intervention as compared to the pre-intervention period I. While the C.V. fell from 30.43 to 26.95 in Maharashtra, it came down from 42.42 to 28.14 in Karnataka. In both these states, the annual growth rate of jowar prices fell during period II while the mean price level rose for all three states as usual. Once again the notable exception to our hypothesis is the relatively backward state of Madhya Pradesh.

The parallel observations for moving averages are pointers to the same reality, reinforcing the above analysis but on the whole in a more evened out or less sharp a manner. The Government seems to have successfully arrested price declines during period II in Maharashtra but not quite so in Madhya Pradesh. The percentage of years marking an increase in prices was brought from approximately 65 per cent in period I closer to the vicinity of 80 per cent in period II in Maharashtra which was a commendable achievement.

In our introductory chapter, we had mentioned that complementary forces are needed, for a pricing policy to be successful in bringing about stabilisation. It seems,

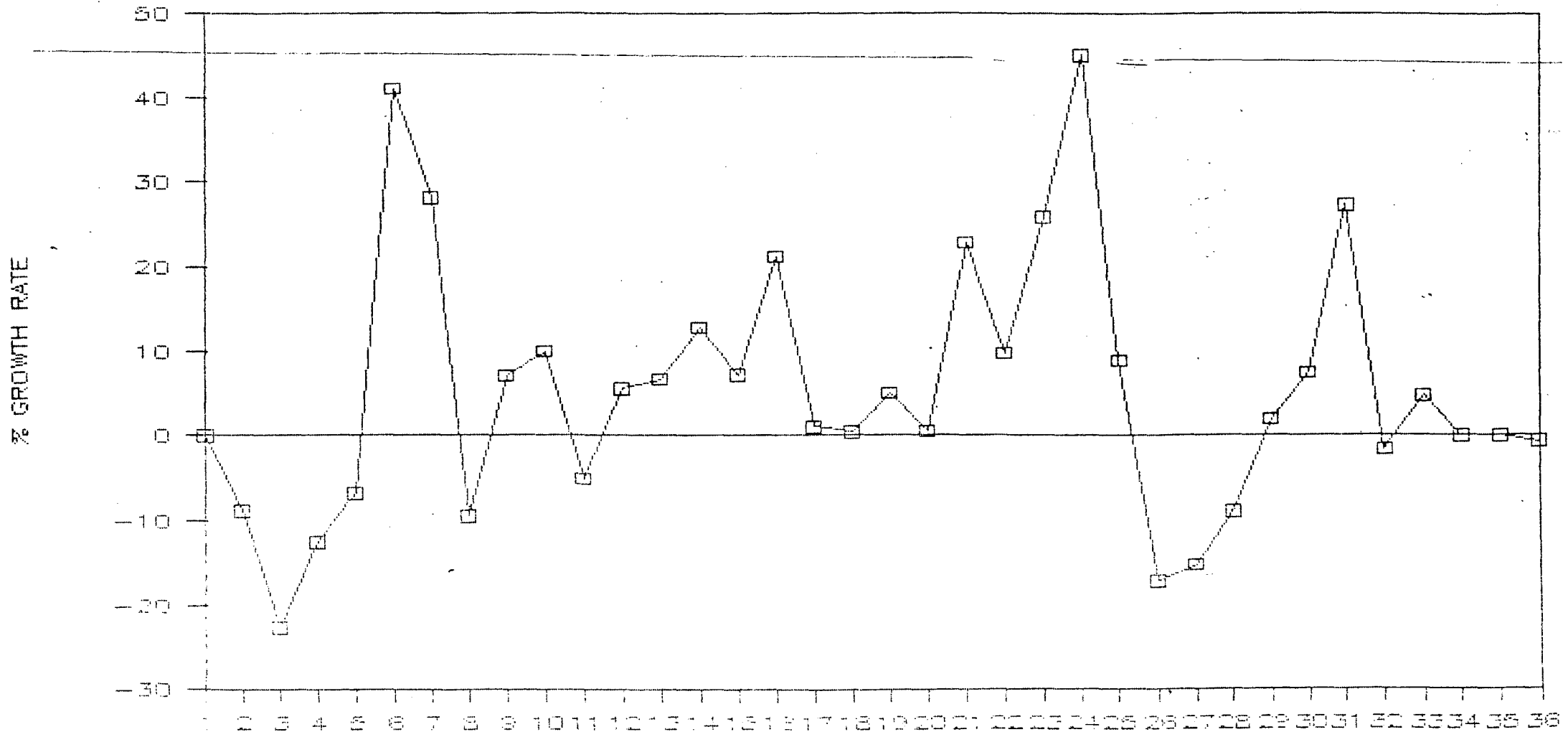
Table III: Growth and Variability in Harvest Prices of Jowar: 1950-51 to 1985-86

Indicator	Period	Maharash- tra	Madhya Pradesh	Karnata- ka
MEAN	Period I	36.67 (36.90)	32.60 (32.44)	37.91 (39.11)
	Period II	121.18 (119.28)	102.89 (100.59)	112.42 (107.48)
STANDARD DEVIATION	Period I	11.16 (10.92)	7.34 (6.64)	16.08 (15.42)
	Period II	35.92 (33.42)	28.62 (24.75)	31.64 (26.42)
COEFFICIENT OF VARIATION	Period I	30.43 (29.59)	22.53 (20.60)	42.42 (39.42)
	Period II	26.95 (28.02)	27.82 (24.61)	28.14 (24.18)
ANNUAL GROWTH RATE (COMPOUND)	Period I	2.25 (2.58)	1.00 (1.44)	3.25 (3.34)
	Period II	2.18 (2.26)	2.00 (2.02)	1.75 (1.68)
Number of Years showing:				
(i) Increase in	Period I	11	11	13
Price during	Period II	15	12	12
(ii) Decrease in	Period I	6	6	4
Price during	Period II	4	7	7

Note: Figures in brackets show indicators based on three-year moving average series.

these very forces have been absent in certain states like Madhya Pradesh thus reducing the effect of Government attempts at price stabilisation. Therefore, once again as in the previous case of wheat, for jowar as well, we

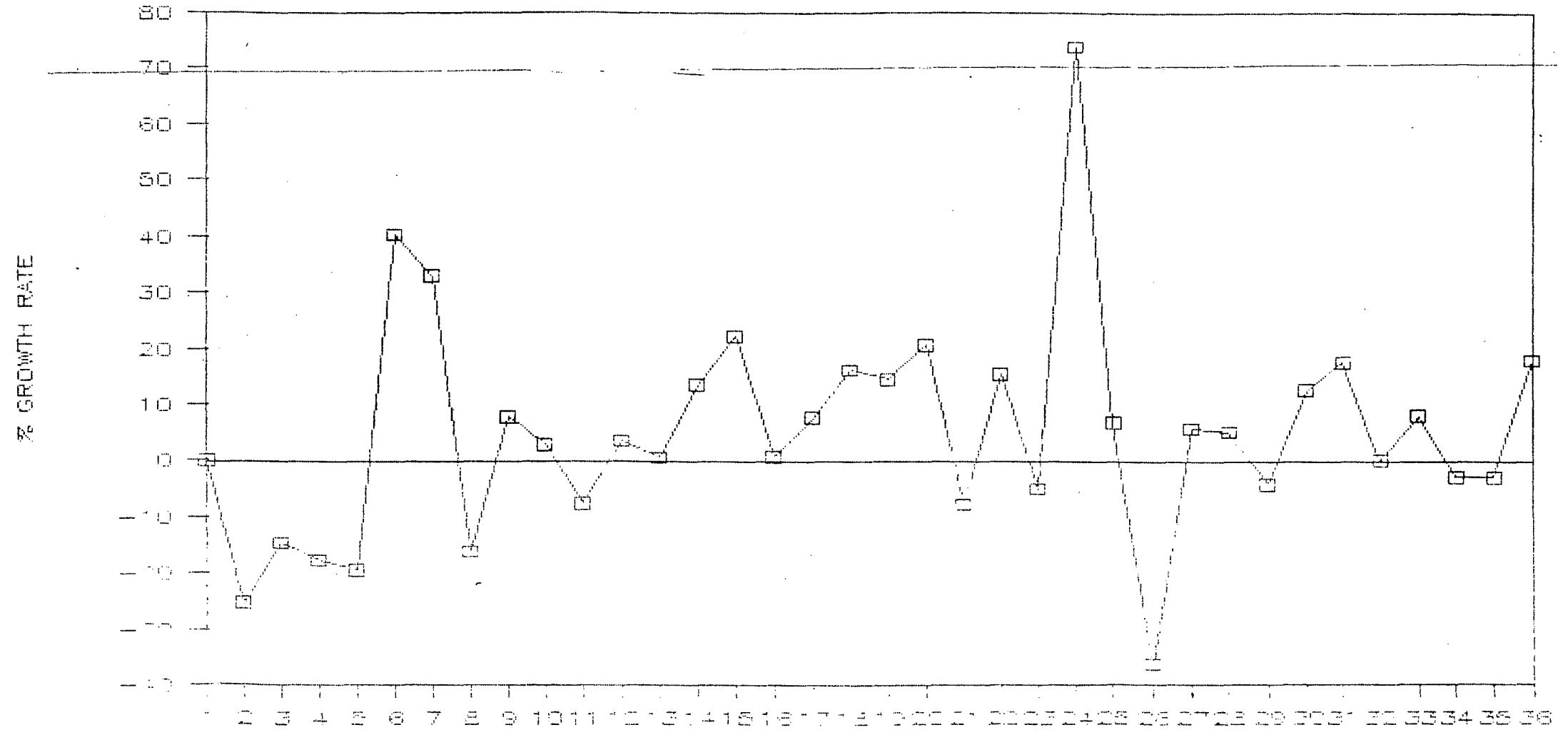
JOWAR MAHARASHTRA



GRAPH III (L)

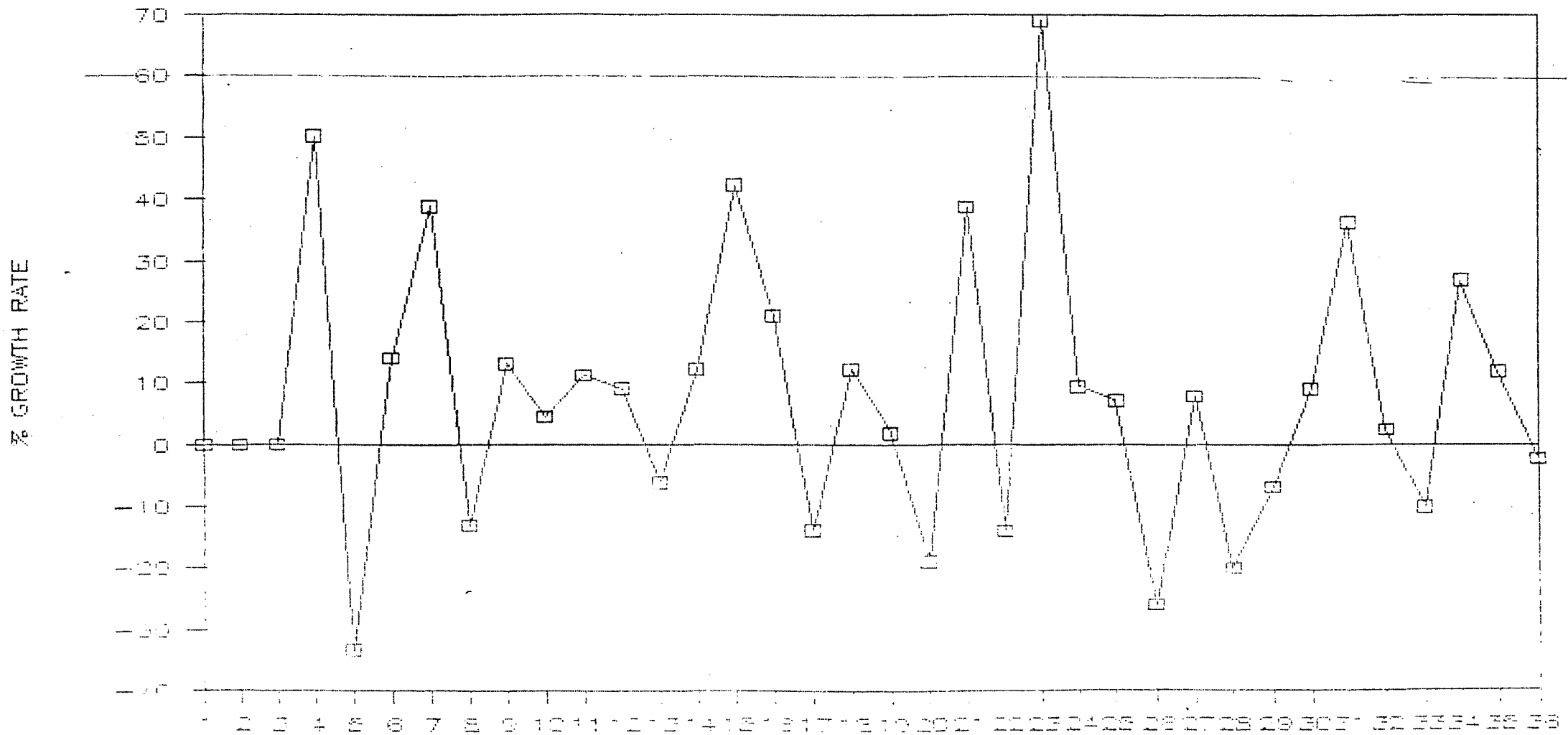
1951-56

JOWAR MADHYA PRADESH



GRAPH III (ii)

JOWAR KARNATAKA



GRAPH III (iii)

5 4 8

conducted the deletion exercise only for Madhya Pradesh, eliminating the two obviously divergent years (in terms of absolute prices) 1973-74 and 1974-75 from period II, as is evident from the Graph as well. The results tabulated in table III-A were obtained.

Table III-A: Variability in Harvest Prices of Jowar:
Effect of deleting excessively abnormal
years

Indicator	Period	Madhya Pradesh	
		Before Deletion	After Deletion
Standard Deviation	Period I	7.34	7.34
	Period II	28.62	27.96
Coefficient of Variation	Period I	22.53	22.53
	Period II	27.82	28.20

Note: No deletions were effected for Maharashtra and Karnataka, their figures remaining the same as in Table III.

Table III-A reveals, once again that the state of Madhya Pradesh has eluded price stabilisation attempts perhaps for the same reasons as already stated in the case of wheat. The elimination of excessively abnormal years has had no impact on bringing down the variability from period II to II, in fact it has gone up slightly.

In a nutshell thus, Jowar appears to conform to our hypothesis, once again with the exception of the backward state of Madhya Pradesh.

BAJRA

Table IV which deals with bajra, further reveals that, in keeping with our expectations, the relative variability declined perceptibly for Gujarat and also (though a little less so) for U.P. while it increased slightly for Rajasthan. While the rate of growth of prices also fell, from period I to II. However, while the mean price level and standard deviation increased in all three states, we find that the S.D. must have increased much more so in Rajasthan thereby leading to a higher coefficient of variation in period II. A glance at the moving averages counterpart, however, shows that if we take 3-year average figures they succeed in smoothening out the excessive ups and downs so as to reveal that the C.V. was almost the same for Rajasthan in period II as in period I (28.79 and 28.42 respectively) and therefore did not increase to the extent indicated by the original figures. If we consider the number of years in which prices fell during period II they outnumber their counterparts during period I, for the states of Gujarat and U.P. but for Rajasthan, there was an increase in the number of years registering price increases and a fall in the number of years showing a decline in prices during period II. Significantly, however, the magnitude of decline in Gujarat and Uttar Pradesh was much less sharp compared with that in Rajasthan. Hence the relative picture on variability.

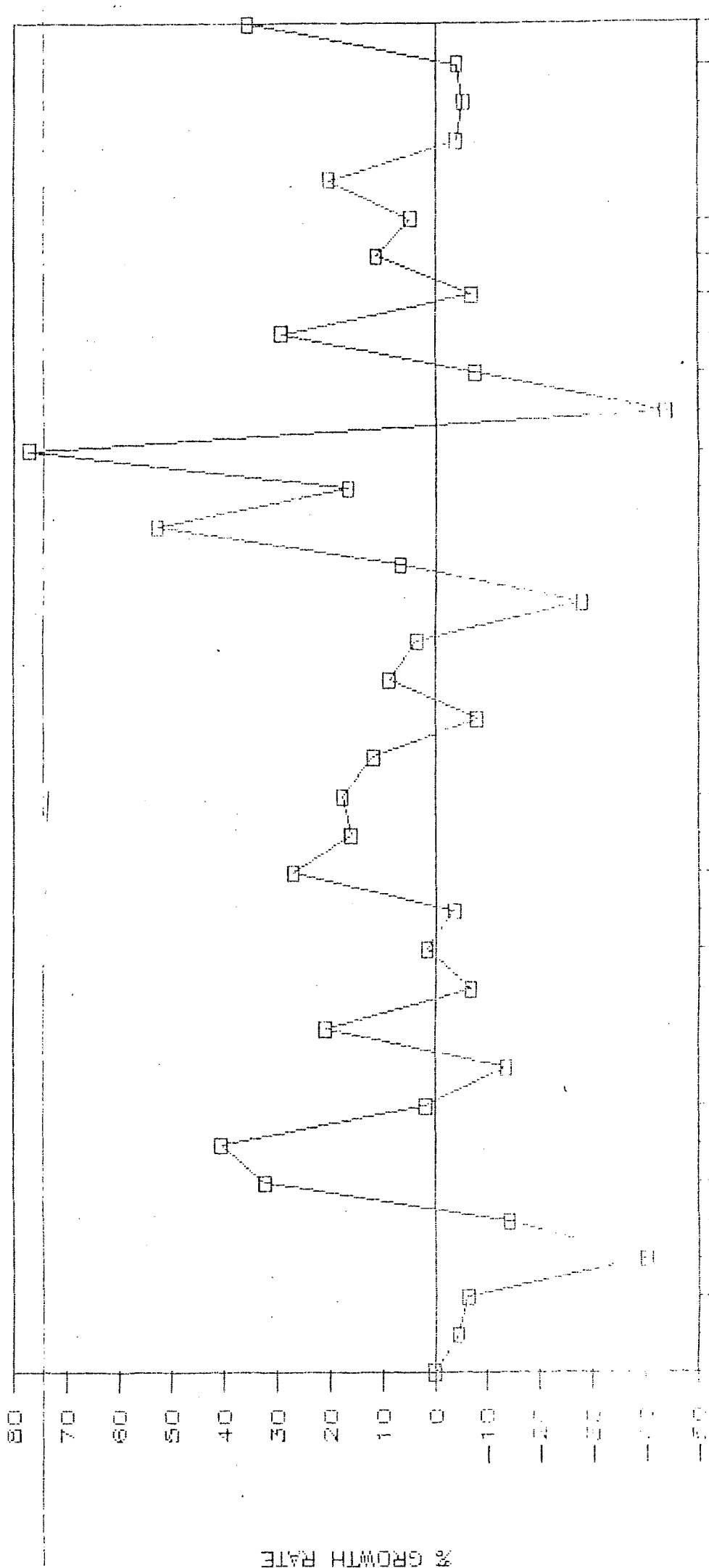
Table IV: Growth and Variability in Harvest Prices of Bajra, 1950-51 to 1985-86

Indicator	Period	Rajasthan	Gujarat	Uttar Pradesh
MEAN	Period I	41.46 (41.16)	42.20 (43.36)	40.25 (41.06)
	Period II	113.75 (110.70)	119.12 (116.76)	100.99 (99.13)
STANDARD DEVIATION	Period I	12.71 (11.70)	18.66 (17.26)	11.93 (11.92)
	Period II	39.06 (31.87)	35.29 (30.42)	29.86 (24.57)
COEFFICIENT OF VARIATION	Period I	30.66 (28.42)	44.21 (39.81)	29.65 (29.04)
	Period II	34.44 (28.79)	29.63 (26.05)	29.57 (24.79)
ANNUAL GROWTH RATE (COMPOUND)	Period I	1.63 (1.97)	3.53 (3.50)	1.77 (1.95)
	Period II	2.43 (2.38)	2.13 (2.11)	1.92 (2.00)
Number of Years showing:				
(i) Increase in Price during				
Period I		10	12	12
Period II		12	12	12
(ii) Decrease in Price during				
Period I		7	5	5
Period II		7	7	7

Note: Figures in brackets show indicators based on three-year moving average series.

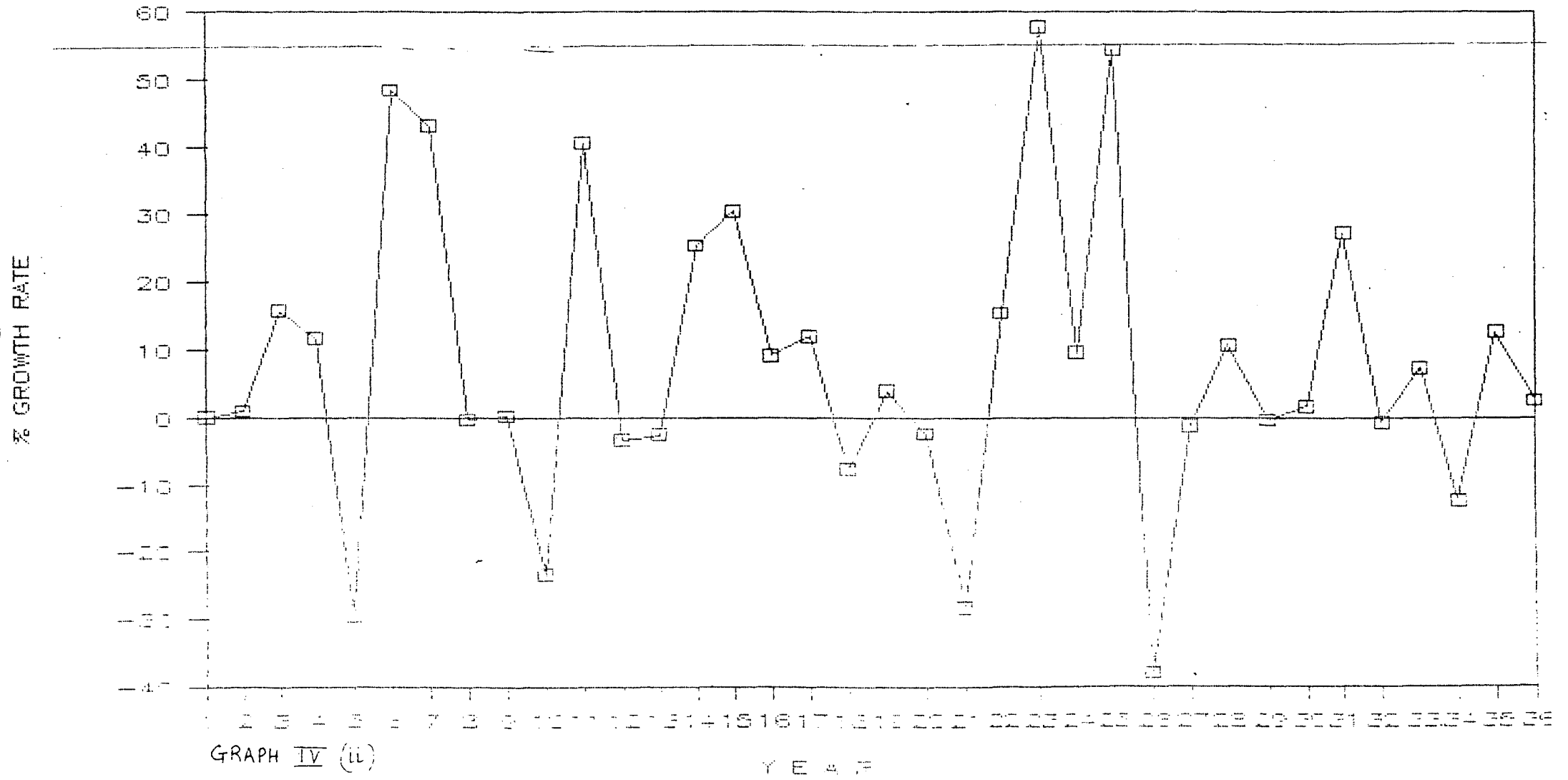
On studying the original absolute price data for the three states, we found that the year 1974-75 was a distinctly notorious one for all the three states. Therefore, in spite of the fact that only one state viz. Rajasthan, showed results contrary to our hypothesis, while Gujarat and U.P.

BAJRA RAJASTHAN



GRAPH IV (1)

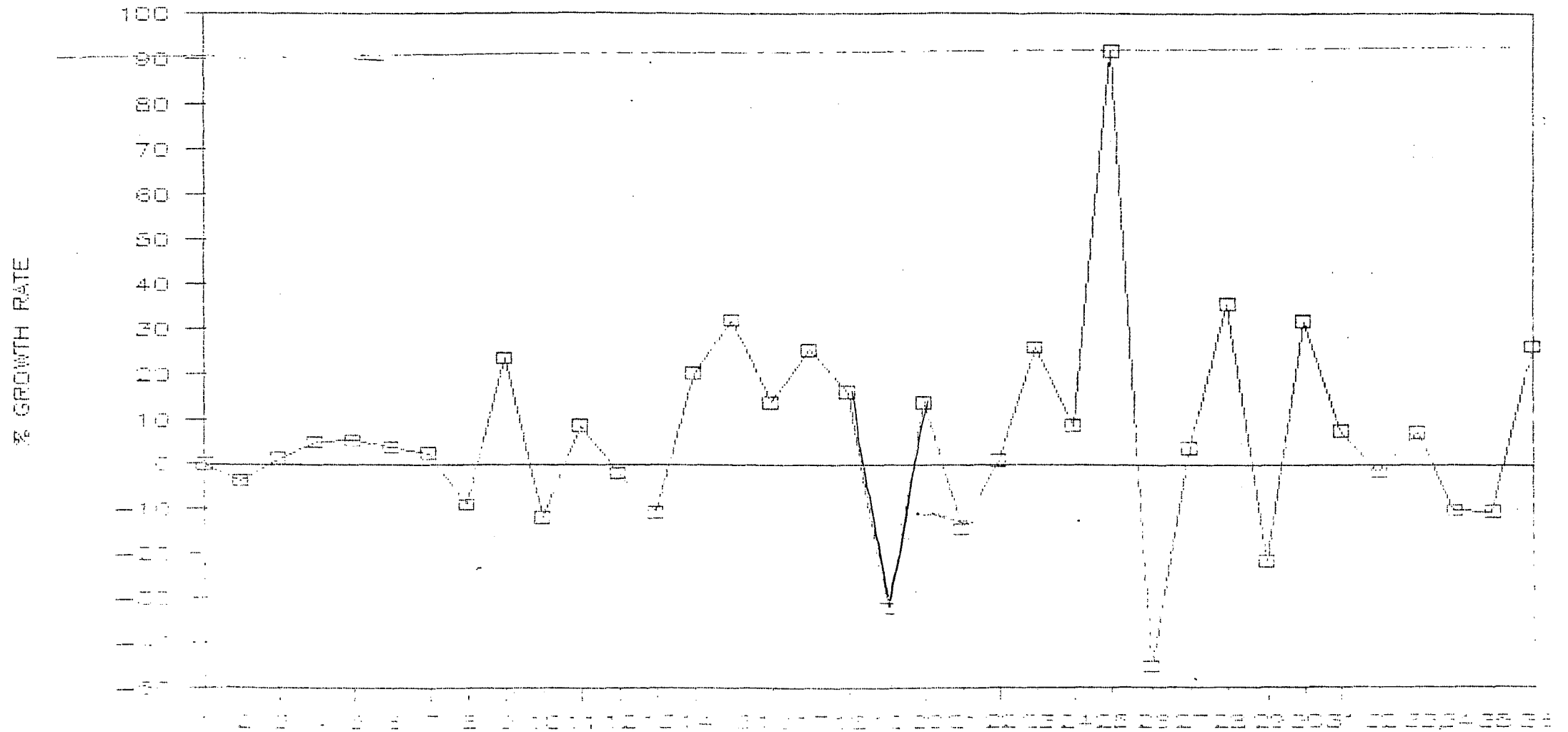
BAJRA, GUJARAT



GRAPH IV (II)

Y E A R

BAJRA UTTAR PRADESH



GRAPH IV (iii)

registered a decline in the relative price variability during the period of Government intervention, we decided to delete the year 1974-75 from all the three states and then compare the results as set out in table IV-A. In the case of Rajasthan only, the year 1985-86 was also deleted.

From table IV-A we can see that by eliminating the glaringly abnormal years, the Coefficient of Variation has reduced in all the three states as compared to its original level in period II. The magnitude of the difference, however, is not very large, as can be seen in Gujarat and U.P., where the basic original trend of a decline in variability from period I to II is only slightly enhanced in degree (direction of course remaining the same). In the case of Rajasthan, however, the C.V. has come down considerably for period II, from its original level of 34.44 before deletion to 30.81 after eliminating the two extreme years of abnormality, thus reversing the earlier trend of a distinct increase in variability in period II over period I. It would perhaps be safe to accept that, by and large, the degree of price variability has remained the same in Rajasthan in spite of government efforts; a decline is not yet in sight.

In sum, our hypothesis about the variability-reducing effect of government intervention is clearly confirmed in

Table IV-A: Variability in Harvest Prices of Bajra: Effect of deleting excessively abnormal years

Indicator	Period	Rajasthan		Gujarat		Uttar Pradesh	
		Before Deletion	After Deletion	Before Deletion	After Deletion	Before Deletion	After Deletion
Standard Deviation	Period I	12.71	12.71	18.66	18.66	11.93	18.66
	Period II	39.06	32.51	35.29	33.65	29.86	27.89
Coefficient of Variation	Period I	30.66	30.66	44.21	44.21	29.65	29.65
	period II	34.44	30.81	29.63	29.00	29.57	28.45

Note: Figures for S.D. and C.V. remain the same before and after deletion in Period I because none of the years in period I were deleted. The deletion of years was only in period II.

in the case of Gujarat and Uttar Pradesh. Although in terms of statistical indicators, Rajasthan shows no positive evidence of a decline in variability in period II over period I, yet the positive effect of government policy cannot be lost sight of, especially because the C.V. in period II is nearly the same as in period I. The conditions under which the crop is grown in Rajasthan are sure to generate rather wild ups and downs in its production graph. The production graph for the whole period 1950-51 to 1985-86 is punctuated by startling dips followed by sudden heights almost on a regular basis. The extremely fluctuating pattern of production owes itself primarily to the vagaries of weather since the crop is grown nearly completely under rainfed conditions. For example, during the (3-year average period) 1966-69, irrigated portion of the cropped area under bajra was 1.45 per cent only in Rajasthan and this percentage witnessed hardly any noticeable increase even upto the mid-eighties. In brief, the message is clear and loud. Government policy on the price front alone cannot be the ultimate answer for improving the production conditions and income earning capabilities of farmers if production instability caused by weather abnormalities continue to operate unabatedly. Production instability is bound to increase in the case of rainfed crops if, beyond a certain time-point, some of the modern

inputs are also applied in their cultivation. This is what seems to be happening for bajra in Rajasthan (and other similar, rainfed crops in some other states). If rains are timely and adequate, yield rates go up tremendously; if rains fail, yield rates go tumbling down. In period II, the amplitude is magnified more because some excessively good years are now discernible on a more frequent basis, than in period I. But then, there are excessively high crop failures also. In any case, on balance, the fluctuations in production and in harvest prices in period II are not reflective of a high order of economic distress. Perhaps, the contrary is the real situation. It is in this context that the bajra story of Rajasthan may not be dubbed as a failure of government policy.

BARLEY

Turning to table V for barley, we find yet another clear support to our hypothesis, the relative variability witnessed a distinct decline from period I to II in all the three representative states, namely, Uttar Pradesh, Rajasthan and Bihar. The Coefficient of variation declined from 42.26 to 30.54 in Uttar Pradesh; from 39.87 to 29.31 in Rajasthan; and from 38.40 to 30.06 in Bihar. The parallel figures were 38.40 to 29.58; 38.85 to 25.19; 35.92 to 28.35 for Uttar Pradesh, Rajasthan and Bihar respectively, in the case of estimates based on moving averages. The two series in this case are very much akin to each other. The other indicators like the absolute dispersion also show such closely related trends for both series. The S.D. roughly doubled in all the three states, while the mean increased by much more than double. The growth rates showed a small increase in the states of U.P. and Bihar but a decline in Rajasthan while those based on the moving averages series differed in direction from the original series, only in the case of U.P. All the three states were successful in distinctly increasing the number of years witnessing price increases from period I to II and consequently reducing the number of years in which harvest prices of Barley fell.

The Government's price policy appears to have been a success for barley in respect of a reduction in price

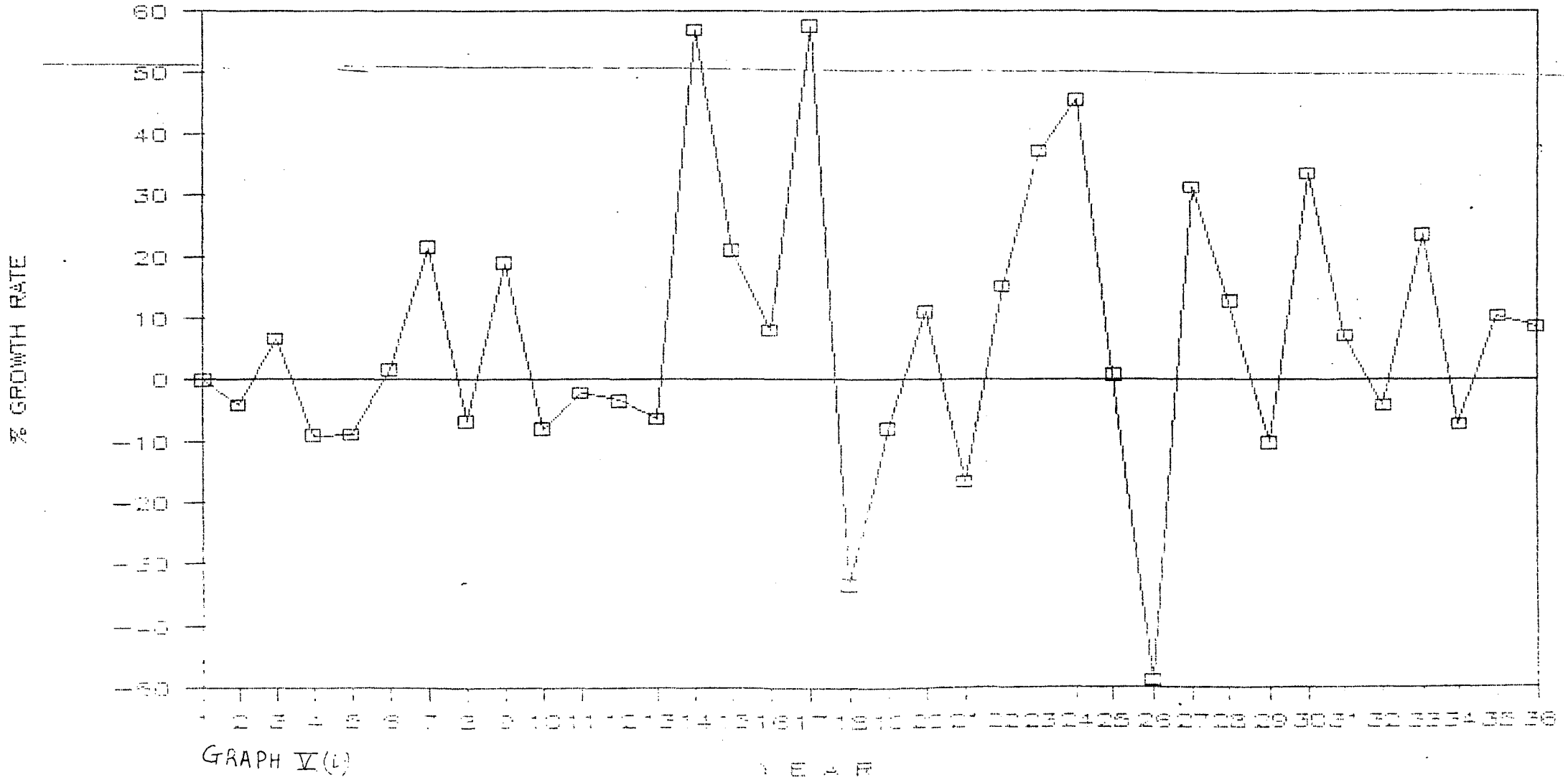
Table V: Growth and Variability in Harvest Prices of Barley: 1950-51 to 1985-86

Indicator	Period	Uttar Pradesh	Rajasthan	Bihar
MEAN	Period I	39.19 (39.84)	39.78 (40.07)	41.64 (41.17)
	Period II	99.65 (96.50)	109.03 (105.92)	118.71 (103.29)
STANDARD DEVIATION	Period I	16.56 (15.30)	15.86 (15.57)	15.99 (14.78)
	Period II	30.43 (25.07)	31.95 (26.68)	35.68 (29.28)
COEFFICIENT OF VARIATION	Period I	42.26 (38.40)	39.87 (38.85)	38.40 (35.92)
	Period II	30.54 (29.58)	29.31 (25.19)	30.06 (28.35)
ANNUAL GROWTH RATE (COMPOUND)	Period I	2.22 (2.49)	2.34 (2.74)	1.63 (2.05)
	Period II	2.36 (2.29)	2.27 (2.19)	2.58 (2.58)
Number of Years showing:				
(i) Increase in				
Price during Period I		9	10	10
Price during Period II		12	13	14
(ii) Decrease in				
Price during Period I		10	9	9
Price during Period II		5	4	3

Note: Figures in brackets indicate estimates based on three-year moving average series.

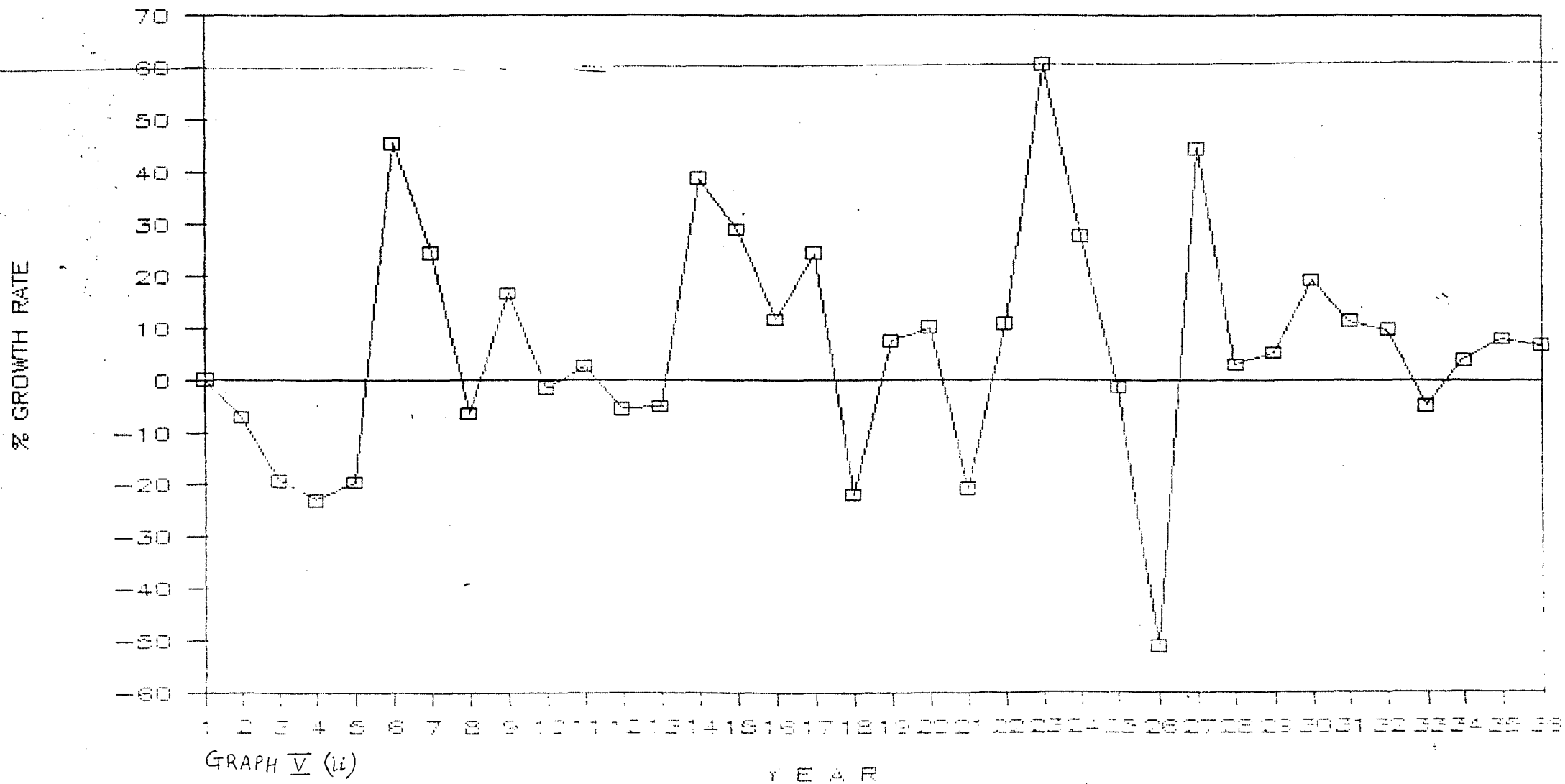
variability, and also reducing the incidence of occasional price falls. It may be said, that the complementary package of forces needed for the effectiveness of agricultural prices may well have been present, thus reinforcing a

BARLEY UTTAR PRADESH



GRAPH V(L)

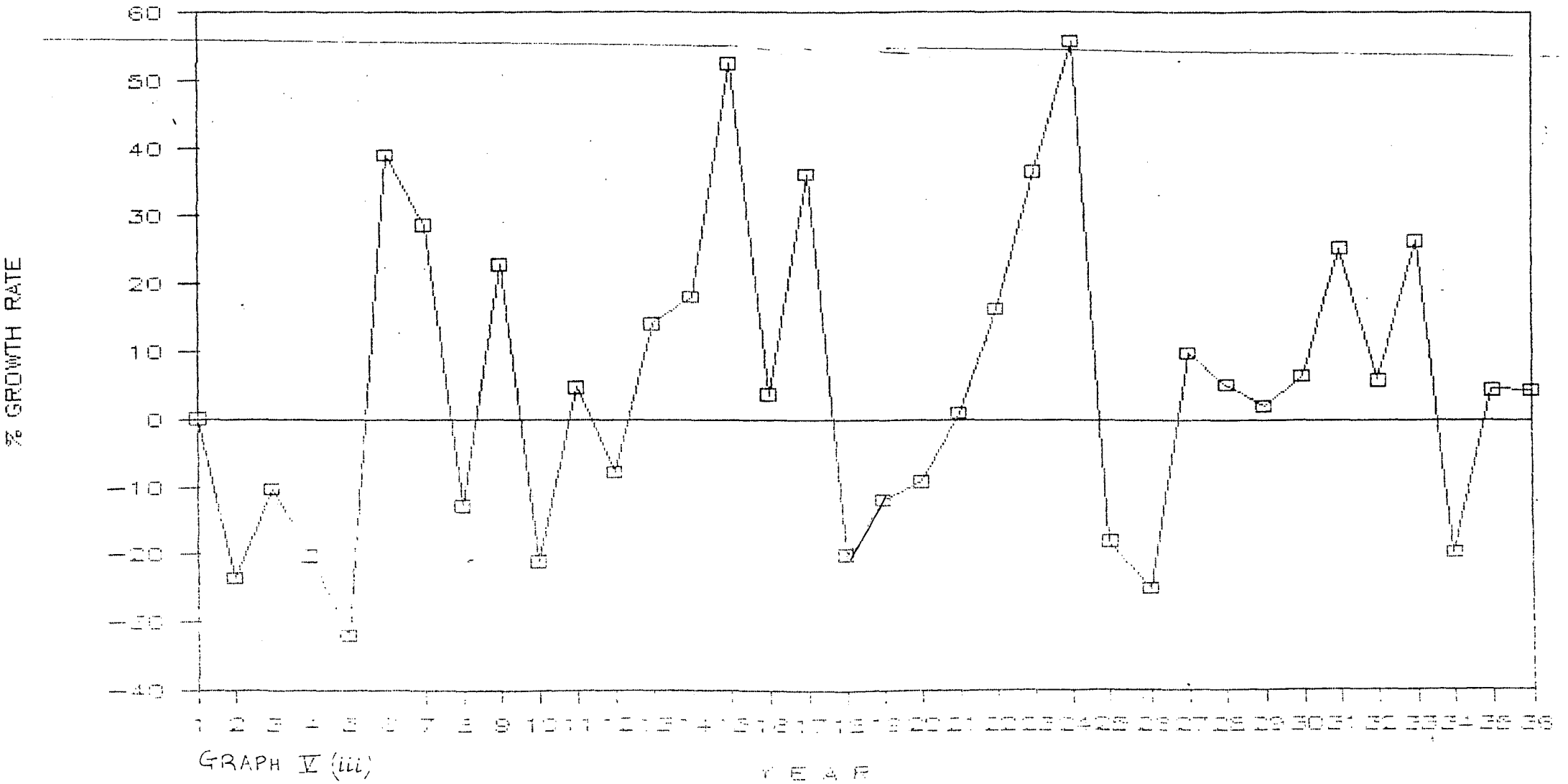
BARLEY RAJASTHAN



GRAPH V (ii)

YEAR

BARLEY BIHAR



GRAPH V (iii)

Y E A R

distinct decline in variability during the period of Government intervention. In any case what is of relevance in our context is that the hypothesis of declining variability in period II has been upheld by yet another crop. Whether and to what extent the complementary factors existed, is another matter.

A glance at the graphs and original price data reveals no scope and logic for deleting any specific years for any of the three states, for Barley.

MAIZE

In the case of maize (table VI), we find that the mean level has gone up for all the three states of Uttar Pradesh, Rajasthan and Madhya Pradesh but to a lesser extent compared with that for some other crops. The Mean alone, however, only serves as an indicator of the average price level prevailing during a given period of time, and only tells us whether the average level is higher during another time period or not. Along with this, the compound annual growth rate tells us at what average rate the prices within a given period grew. The two indicators usually indicate some conformity but it need not always be so, in a statistical sense. This is because the arithmetic average is subject to influence by just one or two excessively high/low values especially when the number of years in the series is not very long. For example, an average may be very high due to one or more excessively high values, but the rate of growth may even show a decline or vice-versa. But in general if the average price level has risen distinctly one would expect the growth rate to have also risen.

The absolute variability has registered an increase but the relative variability has declined, as borne out by the C.V., for Rajasthan as well as Madhya Pradesh. Thus, while the S.D. increased, the mean increased much more thereby giving a lower relative dispersion in period II.

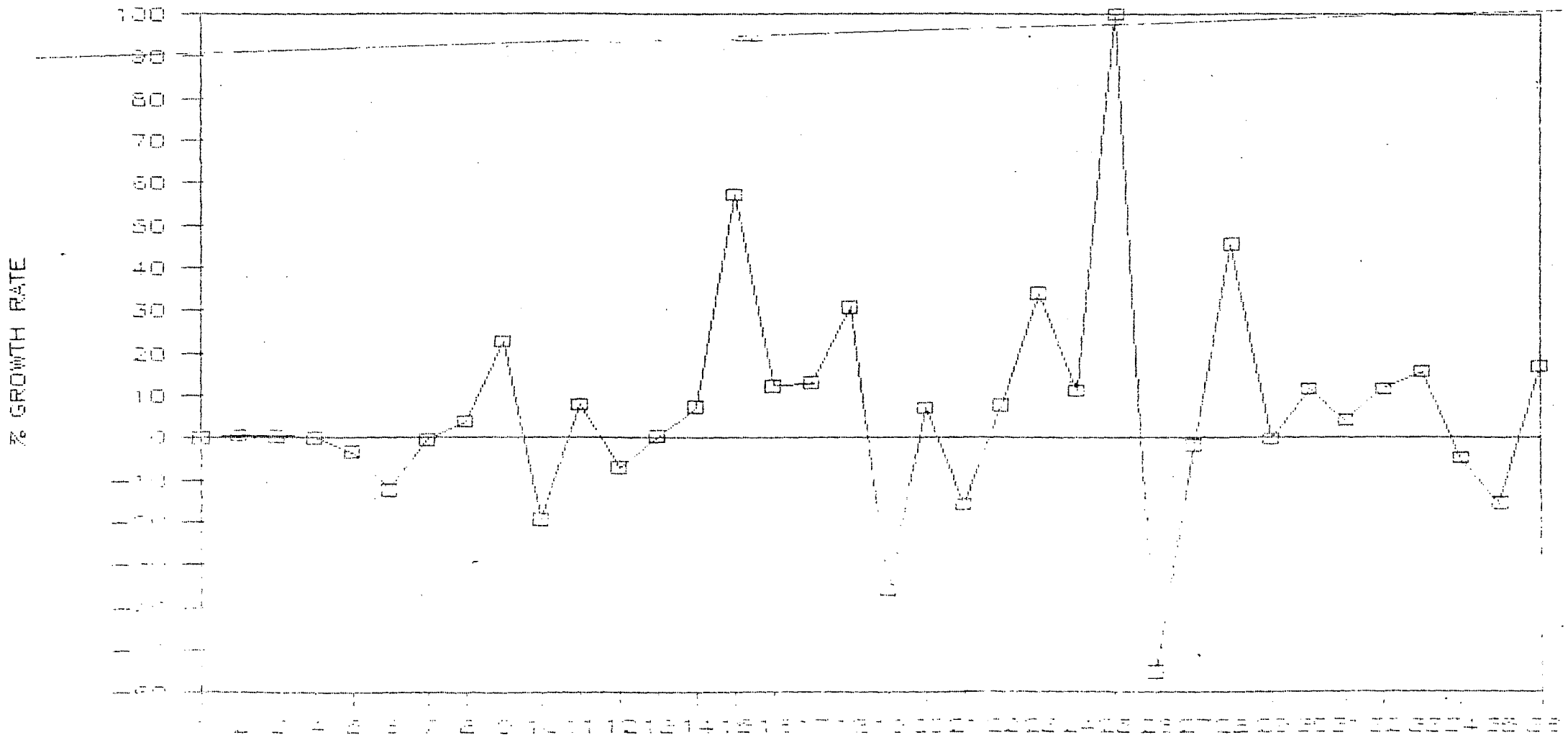
U.P., however, is an exception in this case. However, U.P. is the only one amongst the three states which shows slight increase in the number of positive movements from period I to period II.

Table VI: Growth and Variability in Harvest Prices of Maize:
1950-51 to 1985-86

Indicator	Period	Uttar Pradesh	Rajasthan	Madhya Pradesh
MEAN	Period I	36.07 (36.63)	35.37 (34.87)	28.54 (29.73)
	Period II	95.48 (93.12)	109.11 (105.94)	94.87 (92.33)
STANDARD DEVIATION	Period I	9.95 (10.49)	12.77 (11.22)	10.37 (11.86)
	Period II	34.09 (28.66)	39.36 (31.34)	31.92 (27.24)
COEFFICIENT OF VARIATION	Period I	27.58 (28.65)	36.12 (32.18)	36.34 (39.89)
	Period II	35.70 (30.78)	36.08 (29.58)	33.65 (29.60)
ANNUAL GROWTH RATE (COMPOUND)	Period I	1.11 (1.40)	1.66 (2.00)	2.12 (2.44)
	Period II	2.37 (2.46)	2.52 (2.41)	2.48 (2.47)
Number of years showing:				
(i) Increase in Period I		12	11	10
Price during Period II		12	12	13
(ii) Decrease in Period I		5	6	7
Price during Period II		7	7	6

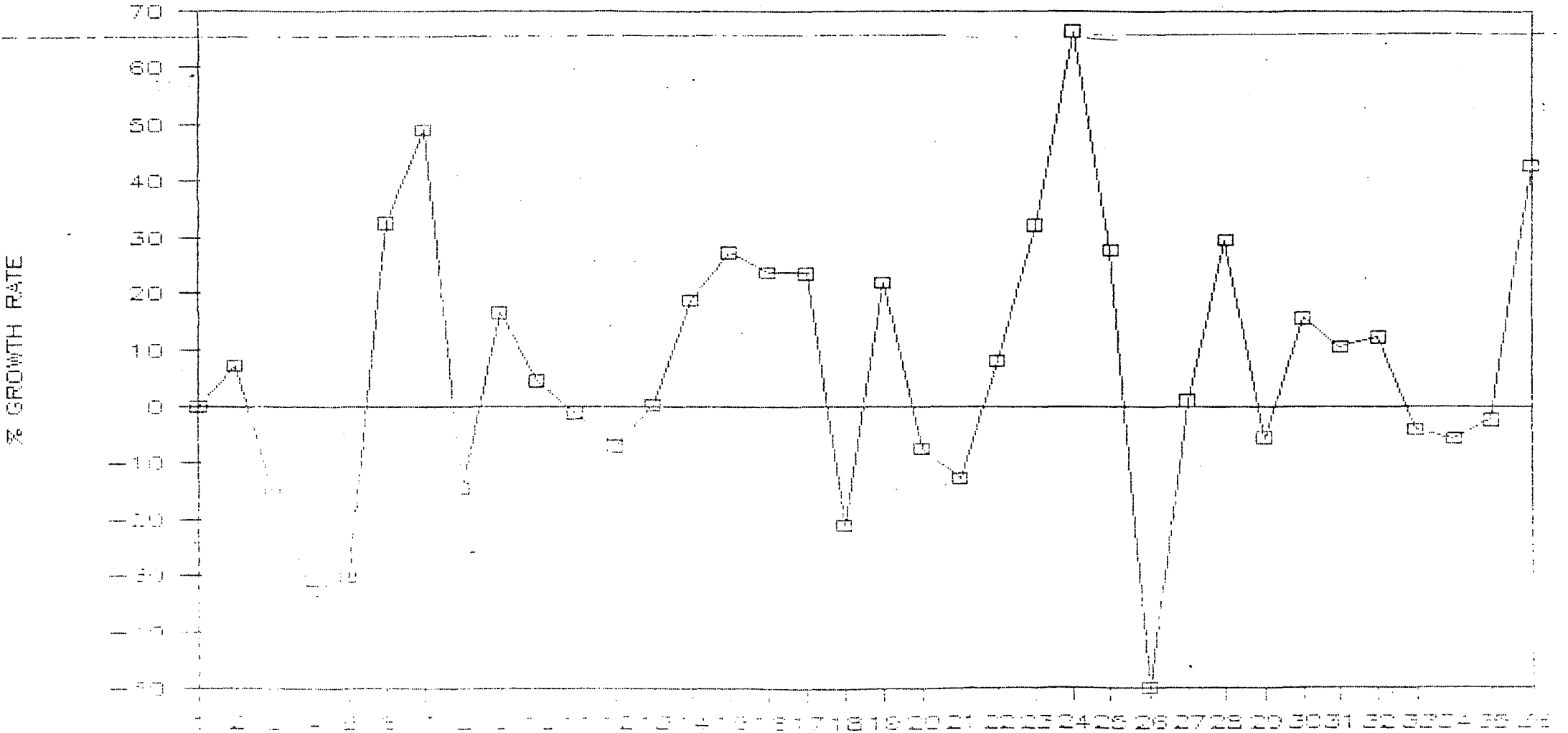
Note: Figures in brackets are estimates based on three-year moving average series.

MAIZE UTTAR PRADESH



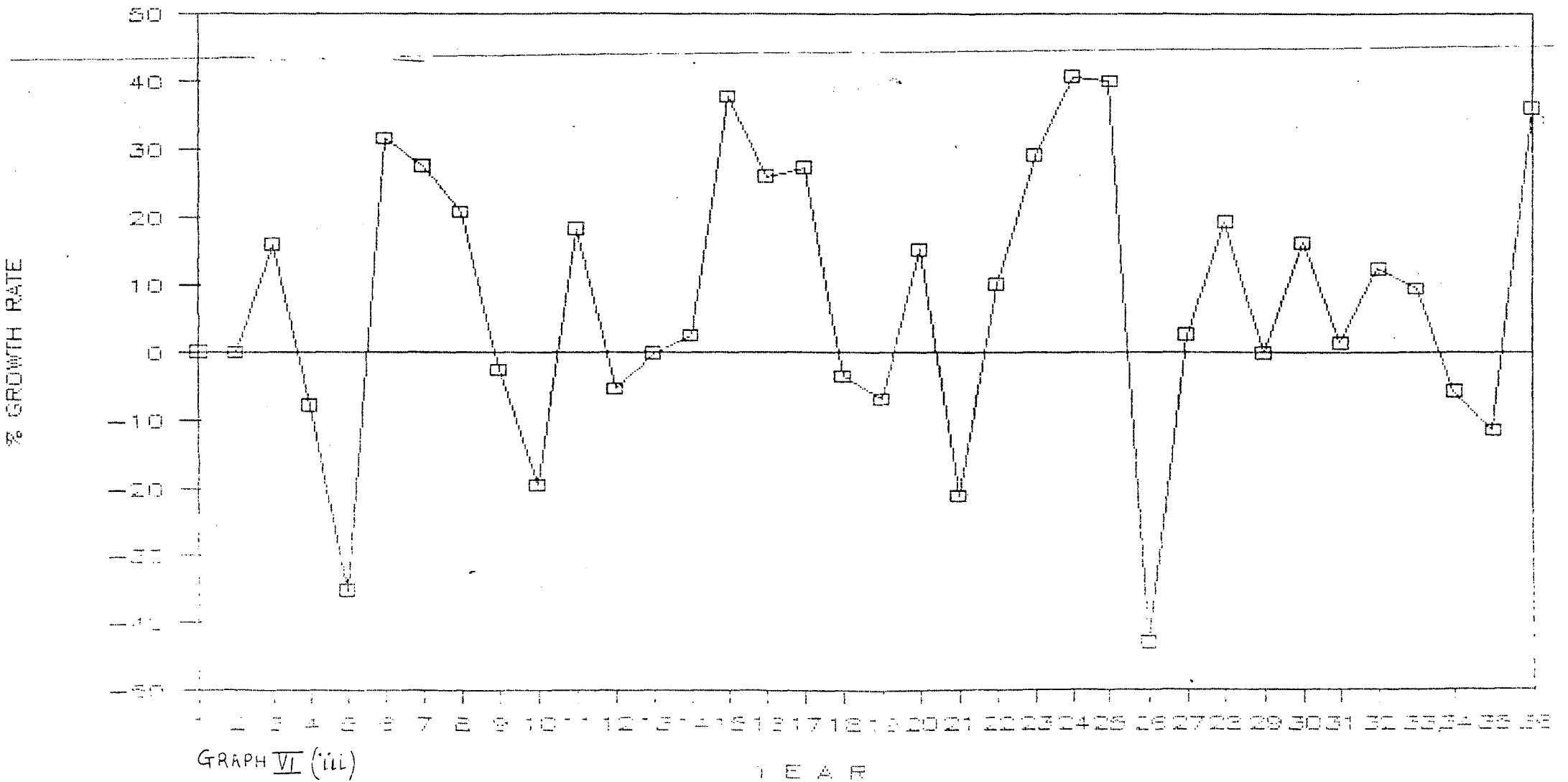
GRAPH VI (L)

MAIZE RAJASTHAN



GRAPH VI (ii)

MAIZE MADHYA PRADESH



GRAPH VI (iii)

Y E A R

An examination of the harvest prices prevailing over the years revealed, that the year 1974-75 registered a distinct divergence from the trend for all the three states. During this year, the price of maize in all the states shot up from the previous years' levels and then again fell during the following year and thereafter it observed the usual fluctuating pattern. Only in the case of Rajasthan, however an year was also deleted from period I (1954-55), and 1973-74 as well as 1985-86 were deleted from period II. 1974-75 was the only year deleted from U.P. and Madhya Pradesh. It was deleted from all three states. Apparently production of maize suffered a severe setback during 1974-75, taking the price levels relatively higher than the trend. This can be seen from the graphs as well. The results tabulated after eliminating the relevant years are given in Table VI-A.

Table VI-A shows that deletion of excessively abnormal values resulted in a decline in variability wherever such deletions occurred. In the two states of Rajasthan and Madhya Pradesh where maize prices had originally also revealed declining variability in period II over period I continued to show further decline. In Rajasthan extremities were deleted from both periods thereby reducing the variability in both, but in spite of this, the variability in period II continued to be less than that of period I by

Table VI-A: Variability in Harvest Prices of Maize:
Effect of deleting excessively abnormal years

Indicator	Period	Uttar Pradesh		Rajasthan		Madhya Pradesh	
		Before deletion	After deletion	Before deletion	After deletion	Before deletion	After deletion
Standard Deviation	Period I	9.95	9.95	12.77	12.20	10.37	10.37
	Period II	34.09	32.13	39.36	32.85	31.92	28.19
Coefficient of Variation	Period I	27.58	27.58	36.12	33.34	36.34	36.34
	Period II	35.70	34.82	36.08	33.20	33.65	31.69

Note: Deletion of years took place in both period I and II for Rajasthan, but only in period II for U.P. and Madhya Pradesh.

a similar degree. In Madhya Pradesh since only period II was relevant for deletion of extremities, the C.V. fell still further, from 33.65 to 31.69 while that of period I remained at 36.34, thereby confirming further the fact of fall in variability. In U.P. although, the magnitude or gap of increasing variability narrowed down slightly, it was, however, insufficient to reverse the trend. The variability in period II for maize, U.P. still continued to be higher than its counterpart in period I.

Thus, once again it is clear that the Government's price policy intervention has borne fruit with reference to maize crop by and large, with the exception of U.P. amongst the states examined by us. Even though U.P. accounts for the highest percentage of maize production in India, it is a bit surprising therefore, that the variability should show a persistent increase. Moreover, because as a state, U.P. has been by and large successful in reducing price variability in the case of other crops. It may perhaps be relevant to point out that maize in comparison with paddy and other competing kharif crops has not been doing well, both yieldwise as well as productionwise. As a matter of fact, the level of production has been rather stagnant for well over two decades, and in terms of resource-allocation priorities, maize has

been a rather declining enterprise. A breakthrough in production technology has not been available for this crop and the total economic calculus of crop enterprises has been responsible for reducing maize to a lower place of importance. As increase in price variability in period II is, therefore, to be interpreted more as an outcome of low degree of concern for this crop in the face of more lucrative alternatives thrown up by wheat-rice breakthroughs and sugar-cane lobbying for higher prices.

GRAM

Turning to our next crop gram whose results are tabulated in table VII, we can see that, this is by far one of the rarities where the relative variability has increased distinctly from period I to II for all three states of Madhya Pradesh, Uttar Pradesh and Rajasthan - which are the three highest producing states for gram. The comparative estimates in terms of moving average series, substantiate the same result, as can be seen from table VII. The growth rates show a marked increase and so also the standard deviation. Thus it is evident that the absolute variation increased so markedly during period II that it far outstripped the increase in mean and thereby produce a rather high increase in the relative variability. Neither does there appear to have been much success in bringing up prices and preventing price falls in period II. It is a point to probe into, that in a state like U.P. where crops like wheat have marvelous success stories, a crop like gram has not had a very happy experience on the price stability front. Also, the fact that in all over representative states the variability has increased for gram, needs further looking into.

As we may see from the price data for all three states for gram, as well as from an examination of the

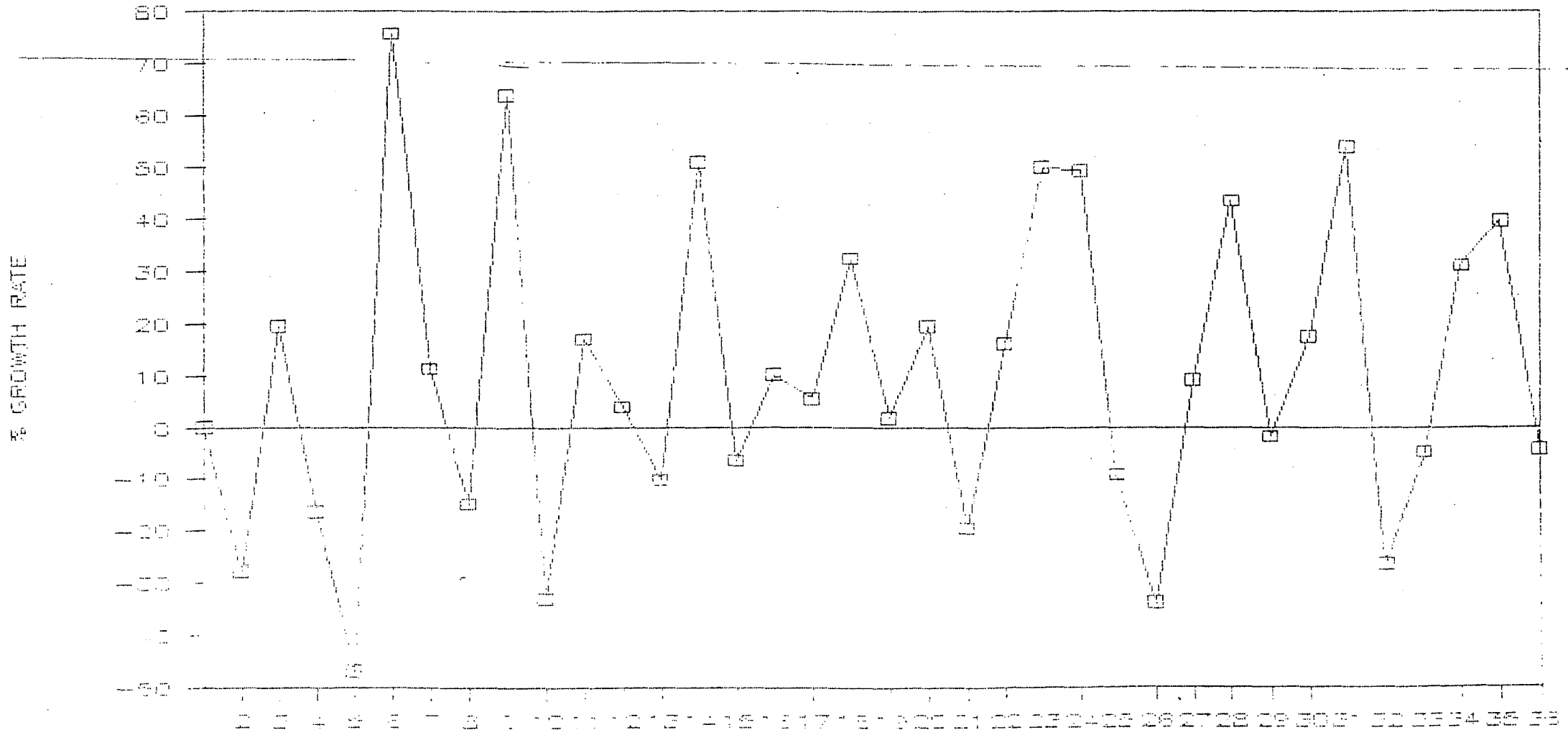
Table VII: Growth and Variability in Harvest Prices of Gram: 1950-51 to 1985-86

Indicator	Period	Madhya Pradesh	Uttar Pradesh	Rajasthan
MEAN	Period I	38.20 (38.44)	42.72 (42.16)	39.39 (39.33)
	Period II	182.53 (170.97)	183.10 (173.12)	191.74 (181.83)
STANDARD DEVIATION	Period I	9.90 (9.18)	19.79 (16.23)	16.11 (15.04)
	Period II	97.60 (80.49)	94.53 (79.05)	98.74 (85.37)
COEFFICIENT OF VARIATION	Period I	25.92 (23.89)	46.32 (38.50)	40.91 (38.24)
	Period II	53.47 (47.08)	51.63 (45.46)	51.50 (46.95)
ANNUAL GROWTH RATE (COMPOUND)	Period I	1.35 (1.72)	1.86 (2.13)	2.06 (2.41)
	Period II	3.98 (3.96)	3.98 (3.81)	4.00 (3.94)
Number of Years showing:				
(i) Increase in Price during	Period I	10	12	13
	Period II	12	11	13
(ii) Decrease in Price during	Period I	7	5	4
	Period II	7	8	6

Note: Figures in brackets indicate estimates based on three-years moving average series.

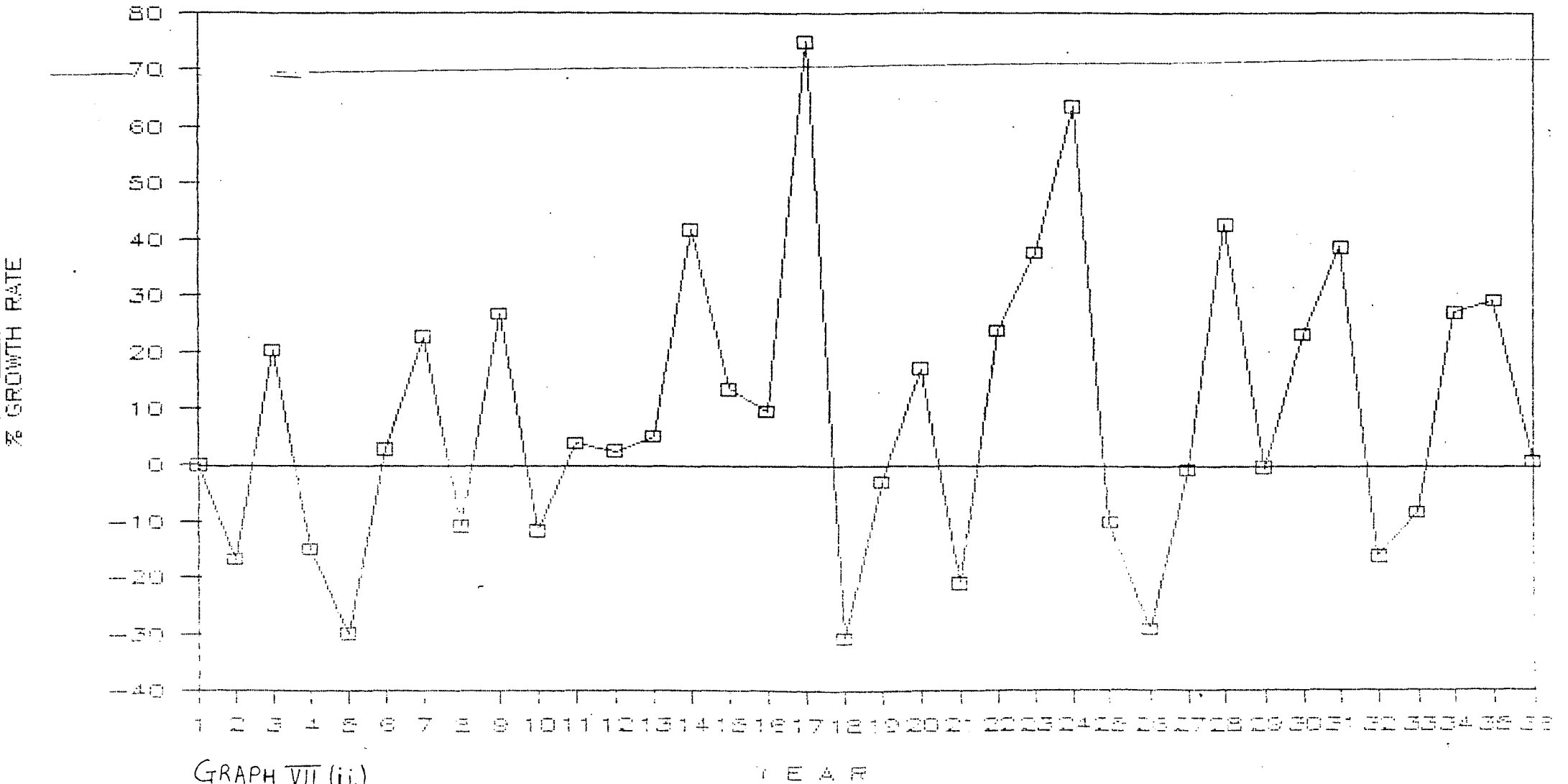
graphs, it is evident that no concrete case for deletions exists. The upswings and downswings appear with a surprising regularity and magnitude. As seen, moving averages also do not succeed in ironing out such fluctuations.

GRAM MADHYA PRADESH



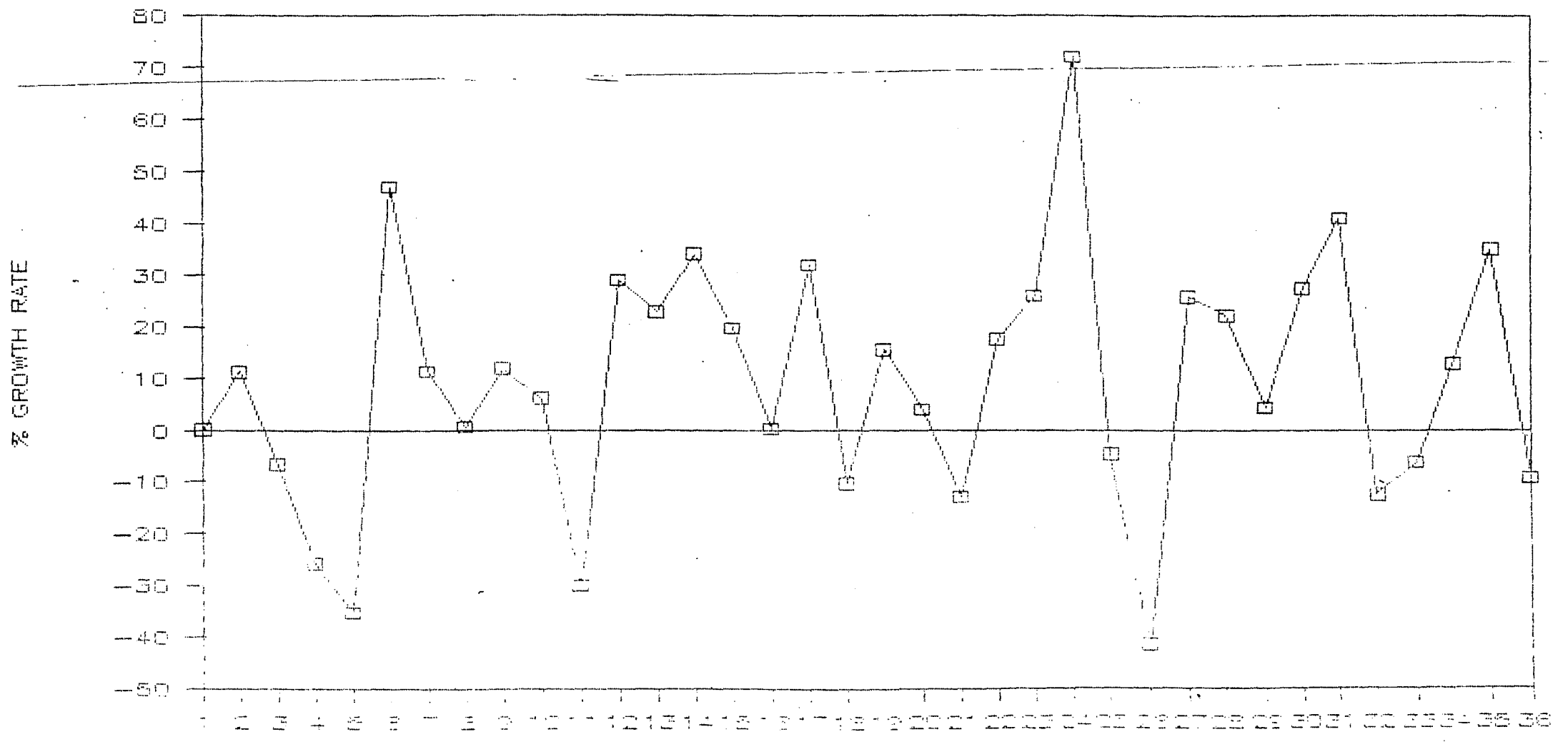
GRAPH VII (L)

GRAM UTTAR PRADESH



GRAPH VII (II)

GRAM RAJASTHAN



GRAPH VII (iii)

5 6 7

Besides, the degree of increase in relative variability is so high, that even if we assume a few years were to be eliminated, there might occur, at best, a marginal decline in magnitude but in any case no change could take place in the direction. While the absolute variability as given by the S.D. shows remarkable increases from 9.90 to 97.60; 19.79 to 94.53; and 16.11 to 98.74 for the three states of Madhya Pradesh, U.P. and Rajasthan respectively, the relative dispersion also shows a substantially higher degree of variability in period II as against period I. The figures are from 25.92 to 53.47; 46.32 to 51.63; 40.91 to 51.50 for the same states in that order. Thus hardly any scope exists for reversal of trend or even a substantial reduction in magnitude. Therefore, logically no deletions can be justified in this kind of a situation.

It is clear, therefore, that the behaviour of gram prices does not support our hypothesis, without any exception amongst the three highest producing states chosen by us.

It is thus evident that the behaviour of harvest prices of gram does not support our hypothesis, in each of the three chosen states. The most plausible explanation seems to be the inability to reduce production instability which, in spite of government interventions in terms of price support announcements and buffer purchases, reflects

itself in greater price variability. A breakthrough on the production front, especially with regard to harmonizing input-use with fluctuating weather condition, is an essential pre-requisite for controlling price variability. Indian agriculture is still to tide over production instability, for a number of crops, grown mostly under rainfed conditions. The challenge of dry land farming technology continues to stare our agricultural scientists in the face.

GROUNDNUT

An examination of table VIII for groundnut, brings out the following results.

The average price prevailing in period II was much greater than in period I, in the states of Gujarat and Andhra Pradesh, but not to such a large extent in the third state, Tamil Nadu. The annual compound growth rates increased by approximately 1 per cent in all three cases - both for the original series, as well as the series based on 3-year moving averages. The standard (absolute) deviation witnessed a considerable increase from period I to period II. The relative variation as given by the coefficient of variation registered a small increase from period I to II in the state of Gujarat and a clear decline in Andhra Pradesh, both as per the original and moving averages price series. In Tamil Nadu, however, the coefficient of variation increased from 38.10 to 39.86 for the original series but fell from 38.97 to 36.53 for the series based on moving averages, from period I to II. This could imply that if the severest of increases and decreases which distort an otherwise comparatively smooth price horizon, could be eliminated then the relative dispersion would reveal a decline rather than an increase.

In all the three states we find that the percentage or the relative number of years showing an increase in

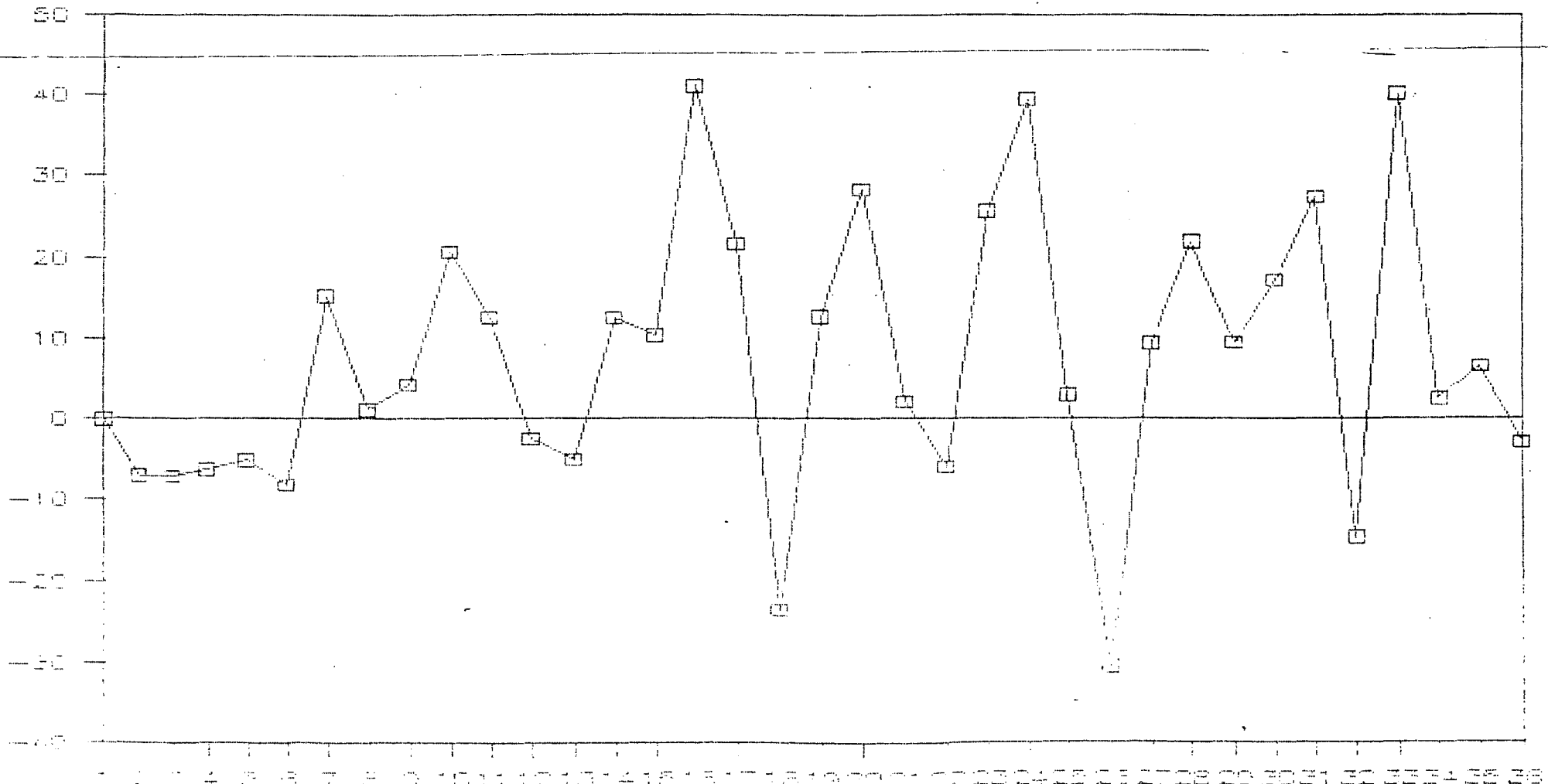
Table VIII: Growth and Variability in Harvest prices of Groundnut: 1950-51 to 1985-86

Indicator	Period	Gujarat	Andhra Pradesh	Tamil Nadu
MEAN	Period I	64.22 (65.40)	63.40 (63.99)	58.77 (59.75)
	Period II	272.02 (259.41)	259.48 (248.38)	260.64 (251.54)
STANDARD DEVIATION	Period I	24.52 (24.67)	29.30 (28.61)	22.39 (23.29)
	Period II	116.78 (105.53)	104.14 (92.92)	103.89 (91.90)
COEFFICIENT OF VARIATION	Period I	38.18 (37.73)	46.21 (44.71)	38.10 (38.97)
	Period II	42.93 (40.68)	40.13 (37.41)	39.86 (36.53)
ANNUAL GROWTH RATE (COMPOUND)	Period I	2.27 (2.64)	2.57 (3.08)	2.19 (2.61)
	Period II	3.61 (3.67)	3.42 (3.43)	3.29 (3.44)
Number of Years showing:				
(i) Increase in Price during				
Period I		11	12	13
Period II		13	13	12
(ii) Decrease in Price during				
Period I		8	7	6
Period II		4	4	5

Note: Figures in brackets indicate estimates based on 3-years moving average series.

price in period II outnumbered the same in period. Thus the number of years which witnessed a dip in prices of groundnut were distinctly controlled during period II even though the relative variability could not be controlled in all states. There is a case for probing into the extraneous factors to find the less apparent reason for this.

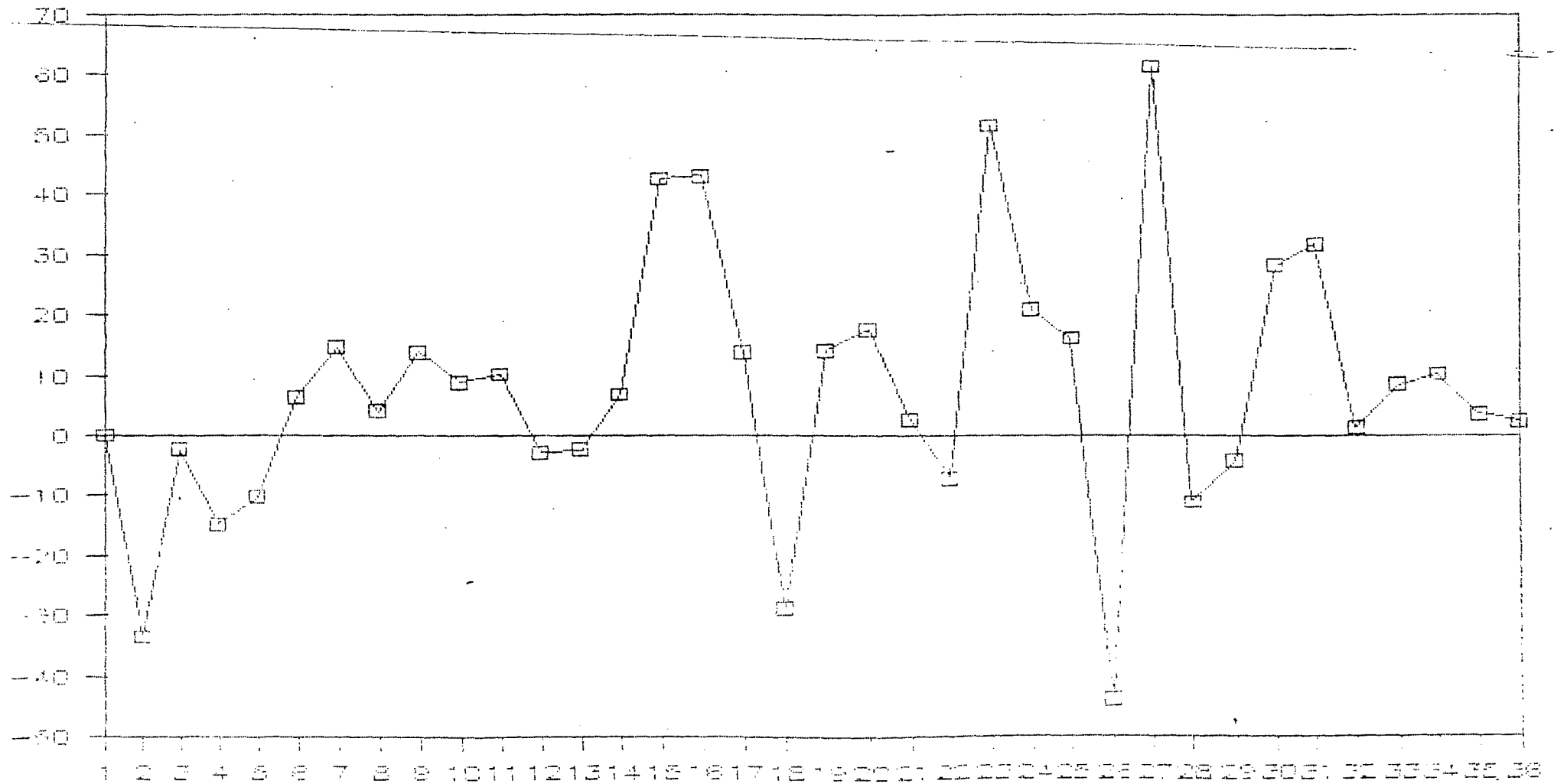
GROUND NUT GUJRAT



GRAPH VIII (L)

Y E A R

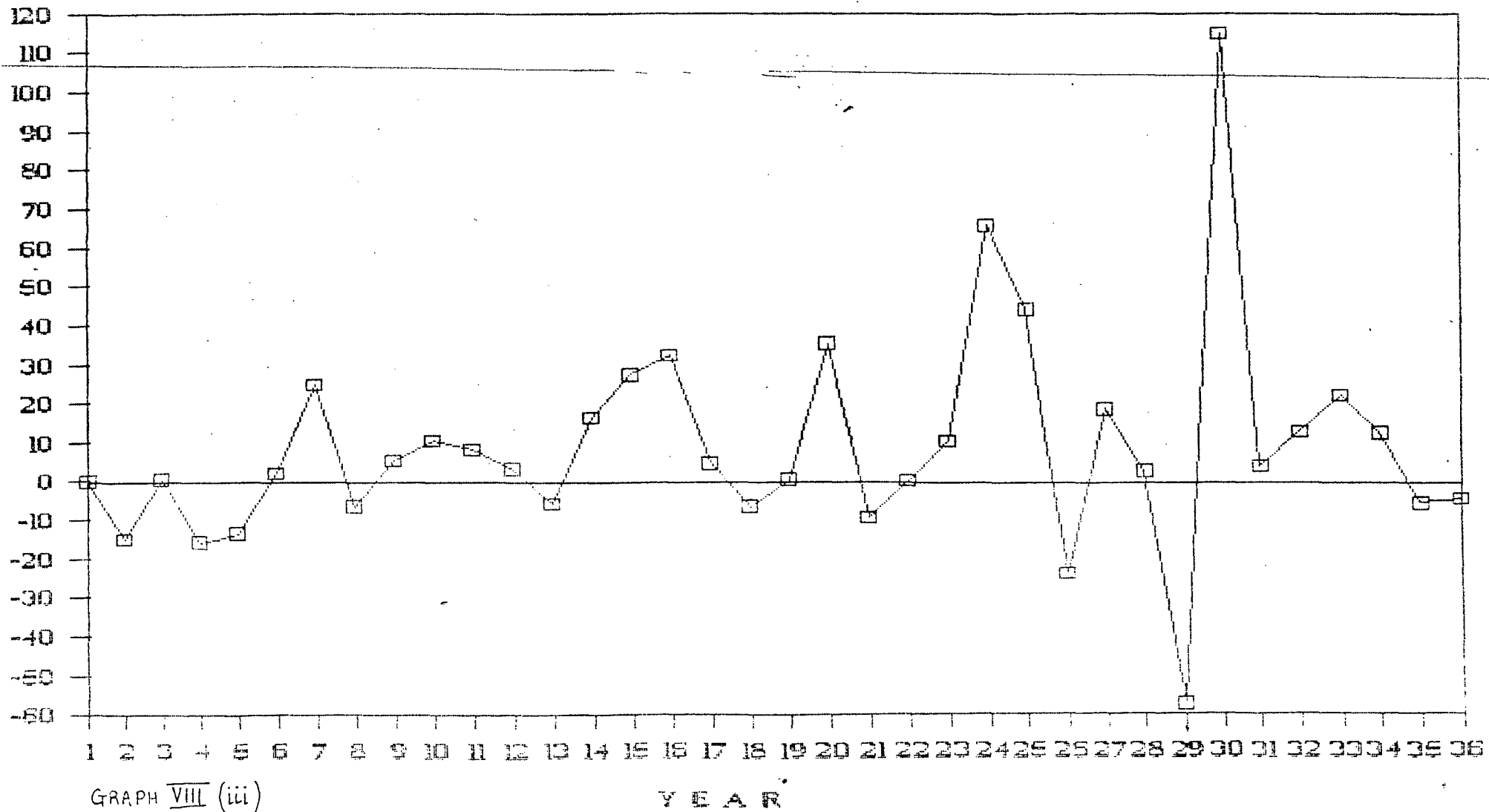
GROUND NUT ANDHRA PRADESH



GRAPH VIII (ii)

1956

GROUND NUT TAMIL NADU



GRAPH VIII (iii)

Y E A R

Some years were deleted in the case of Gujarat and Tamil Nadu but none in the case of Andhra Pradesh which clearly conforms to our expectations for declining variability during period II after the Government intervened. In Gujarat, 1980-81 and 1984-85 were deleted from period II and none from period I; while in Tamil Nadu 1974-75 and 1978-79 were deleted from period II only. The results can be read from Table VIII-A.

Table VIII-A: Variability in Harvest Prices of Groundnut:
Effect of deleting excessively abnormal years

Indicator	Period	Gujarat		Tamil Nadu	
		Before deletion	After deletion	Before deletion	After deletion
Standard Deviation	Period I	24.52	24.52	22.39	22.89
	Period II	116.78	108.67	103.89	103.82
Coefficient of Variation	Period I	38.18	38.18	38.10	38.10
	Period II	42.93	41.88	39.86	38.99

Note: No deletions were effected during period I, therefore figures remain the same there.

Table VIII-A brings out that although the C.V. fell further during period II after deletion, only the degree but not the direction was influenced due to elimination of the odd years. As in the earlier cases, in the case of Groundnut, Gujarat as well as Tamil Nadu, no reversal could be achieved by deletion. Even in Tamil Nadu, where the difference in C.V. during period I and II was rather

small to begin with, a reversal could not be achieved. Stretching it to the most, we may say that after eliminating the extreme dispersions from the trend, the relative variability remained almost the same in period I and II for groundnut in Tamil Nadu.

Apparently the Government's pricing policy has not been too successful on the oilseeds front, the history of which, has been traced in an earlier chapter by us.

In conclusion, the success of government intervention is clearly discernible in the case of Andhra Pradesh, and a little meekly, in the case of Tamil Nadu. Gujarat shows signals of ineffectiveness of government intervention, although the situation is not too bad. In any case in this sense the story for groundnut in Gujarat is practically the same as for bajra in Rajasthan. Jowar in Madhya Pradesh, Maize in U.P. and as we will see later Cotton in Gujarat. Production instability seems to have increased in period II and it has contributed its share to increased variability in harvest prices. Nevertheless, the situation is not so alarming.

SUGARCANE

We now turn to an examination of the prices of raw sugar which had to be resorted to, as proxy for sugarcane due to data deficiencies and non-availability of continuous farm harvest price data for the relevant states. A third state was not chosen for this very reason. From amongst the high producers of sugar continuous comparable data was suitably available only for the two states chosen by us.

Table IX for sugar (raw) shows that the prices registered an increase from an average of Rs.70.41 in period I to an average of Rs.207.01 in period II for the state of Maharashtra, but with the growth rate declining from 2.84 per cent to 2.5 per cent, showing that the excessively high average price level of period II was not due to consistently high and growing prices throughout period II but due to some extreme values during certain years. Tamil Nadu, however, witnessed an increase in the growth rate of harvest prices from 1.93 to 2.93.

The absolute dispersion did register an increase in both states, but the increase in the mean was comparatively more and consequently we find that the coefficient of variation for both states declined from 64.11 to 34.89 for Maharashtra and from 42.39 to 40.37 for Tamil Nadu. The pattern is similarly borne out by the corresponding



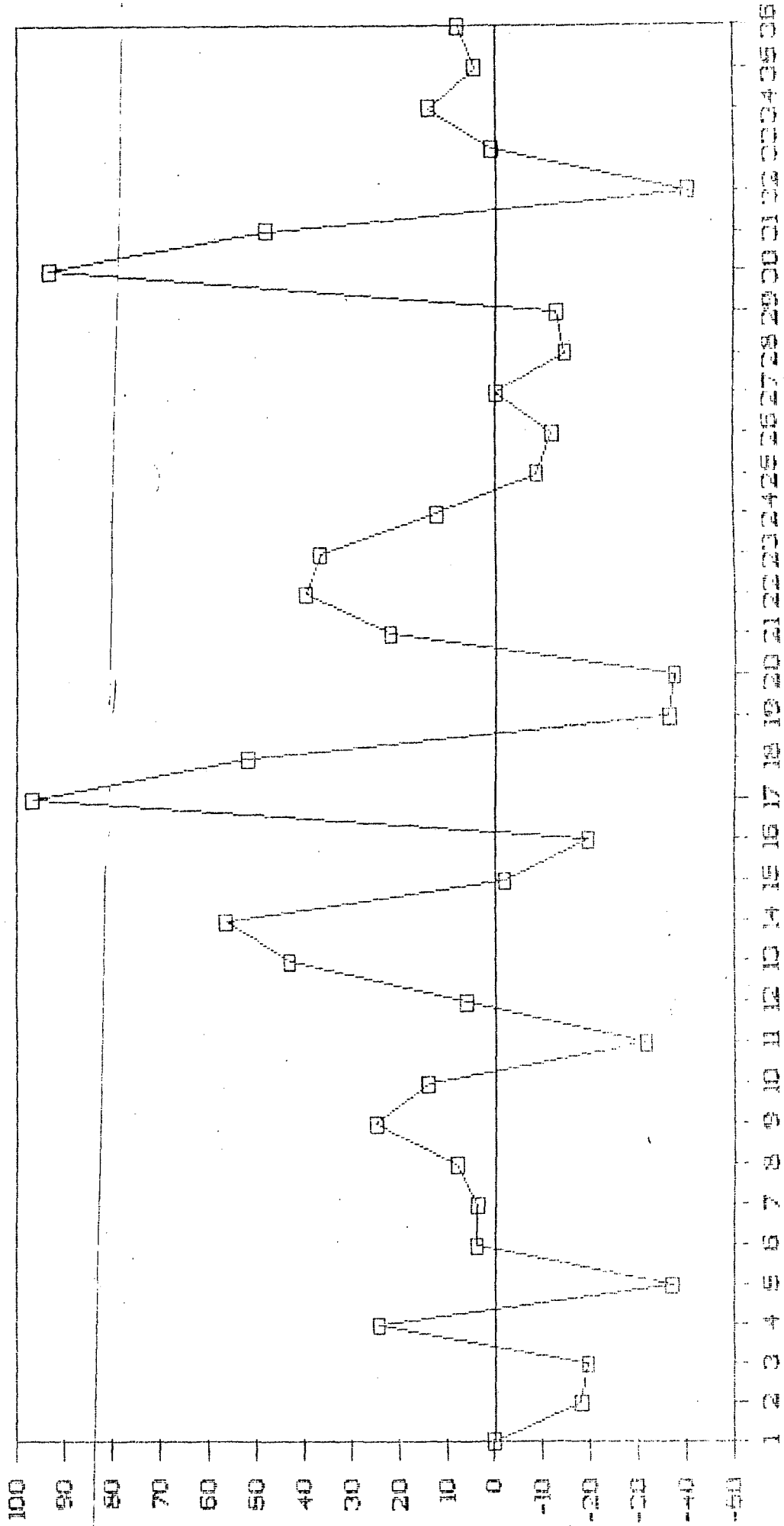
Table IX: Growth and Variation in Harvest Prices of Sugar (raw): 1950-51 to 1985-86

Indicator	Period	Maharashtra	Tamil Nadu
MEAN	Period I	70.41 (69.98)	55.42 (55.46)
	Period II	207.01 (203.06)	162.61 (156.29)
STANDARD DEVIATION	Period I	45.14 (39.37)	23.49 (20.71)
	Period II	72.23 (56.23)	65.65 (50.47)
COEFFICIENT OF VARIATION	Period I	64.11 (56.26)	42.39 (37.34)
	Period II	34.89 (27.69)	40.37 (32.29)
ANNUAL GROWTH RATE (COMPOUND)	Period I	2.84 (3.34)	1.93 (2.27)
	Period II	2.50 (2.37)	2.93 (2.88)
Number of Years showing:			
(i) Increase in Price during	Period I	12	8
	Period II	11	14
(ii) Decrease in Price during	Period I	7	11
		6	3

Note: Figures in brackets indicate estimates based on three-year moving averages series.

moving-averages estimates as well. In Tamil Nadu, while about 58 per cent of the years in a total of 19 years comprising period I saw a decrease in prices of sugar (raw), the second period saw only approximately 18 per cent of the years facing a decline in prices. The

SUGAR MAHARASHTRA



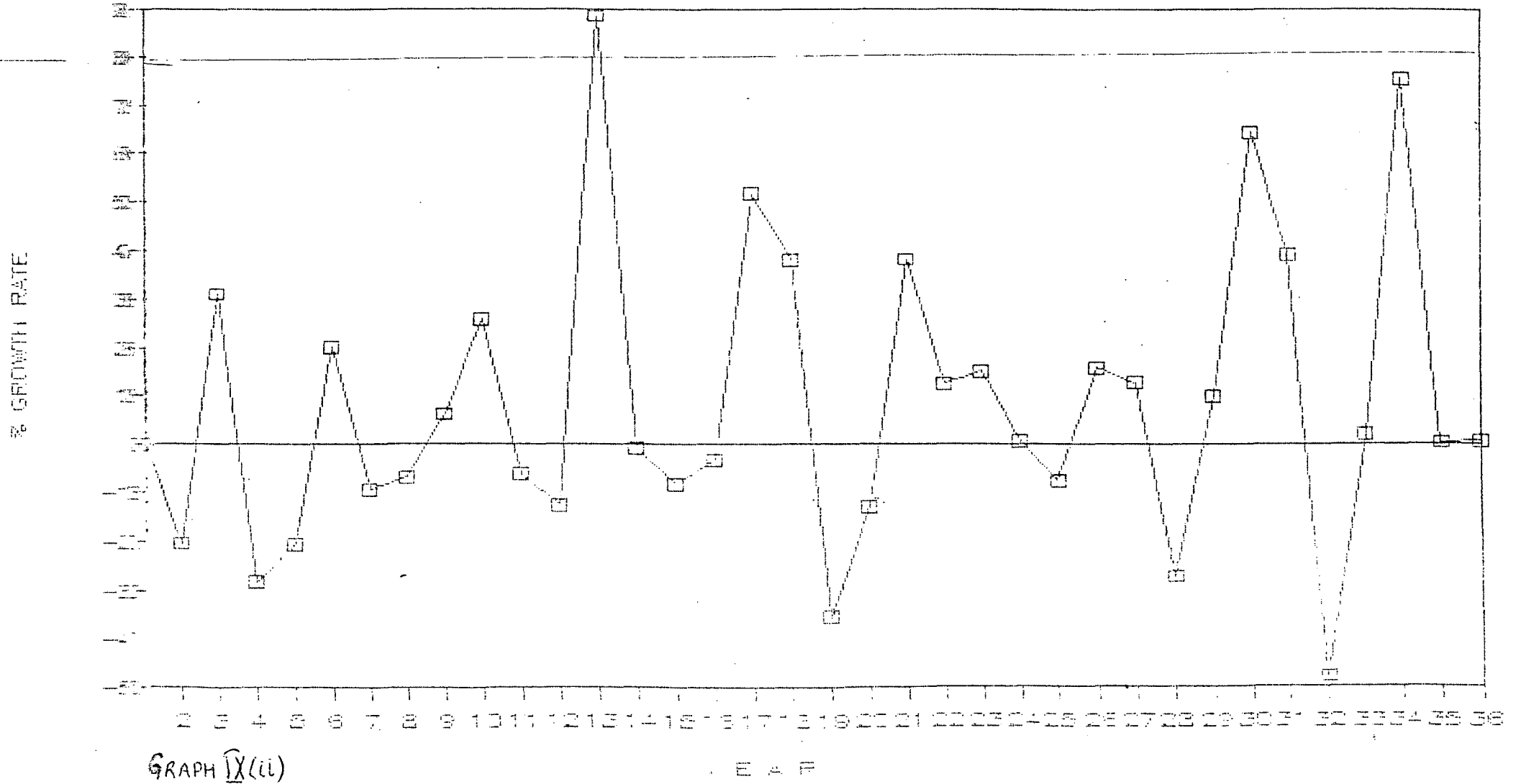
GRAPH IX (U)

Y E A R

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

% GROWTH RATE

SUGAR TAMIL NADU



GRAPH IX(ii)

LEAF

improvement was not so sharp in the case of Maharashtra. We have already mentioned the long and chequered history of sugarcane prices in the Indian agricultural economy, in our initial chapters.

Although both the chosen states Maharashtra and Tamil Nadu for raw sugar conform to our hypothesis of declining relative variability in prices after this crop entered the purview of APC, it would be of interest to note that the C.V. in the case of Maharashtra was as high as 64.11 in period I (and 56.26 based on moving averages). This fell substantially, to a level of 34.89 in period II. An examination of the original price data and the relevant graph reveals that the year 1967-68 ought to be deleted from period I and the year 1980-81 deleted from period II. No strong case for deletion exists for Tamil Nadu, however.

The results in table IX-A show that the abnormally high C.V. of 64.11 during period I fell to 49.90 after deletions while that of period II also fell from 34.89 to 30.30. Thus the result reinforces our original finding, viz. that of a fall in relative price variability. If the differences in the statistical coefficients for the two periods appeared somewhat exaggerated before deletions, there are no longer so. The confirmation of our hypothesis comes out more neat and acceptable.

As a piece of political economy of sugarcane prices, it needs to be underlined that the lobbies of sugarcane producers have been extremely active since mid-seventies. Apart from launching powerful movements for wresting higher procurement price, there has been a marked improvement in the level of production, time and structure of cane marketing including factory-farm alignments especially in Maharashtra. Thanks to a high degree of orderly marketing, a fall in the year-to-year variability in prices is a natural concomitant to follow. We are thus in a comfortable position to suggest that price stability has been a definite gain for the sugarcane growers in India, and to a large extent, government intervention has been responsible for this position.

Table IX-A: Variability in Harvest Prices of Sugar (raw): Effect of deleting excessively abnormal years

Indicator	Period	Maharashtra	
		Before deletion	After deletion
Standard Deviation	Period I	45.14	31.21
	Period II	72.23	59.43
Coefficient of Variation	Period I	64.11	49.90
	Period II	34.89	30.30

COTTON AND JUTE

Moving from food crops towards the realm of commercial crops, cotton and jute (Tables X and XI respectively), we are once again confronted with a scenario of increasing relative variability for all three states both in the case of cotton and jute.

In the case of cotton, we find that the average price levels have shot up substantially from period I to II, by a little over three times. The increase in absolute variability has overtaken this and therefore led to high increases in relative variability. The percentage number of years showing an increase in prices has gone up in all three states for cotton. This also holds for jute.

Regarding the other indicators for jute, we notice the same disturbing trend, in table XI, except that the absolute increase in average price level is not as high as for cotton in all three states, but the growth rates have registered substantial increases. For instance, from a negative growth rate of -0.39 per cent in Bihar in period I, there was a jump to 2.73 per cent in period II while in terms of moving averages it was from 0.08 per cent to 2.58 per cent. In West Bengal also, the growth rate increased from 0.25 per cent in period I to 2.45 per cent in period II for the original price series (and 0.73 per cent to 2.43 per cent for the series based on moving

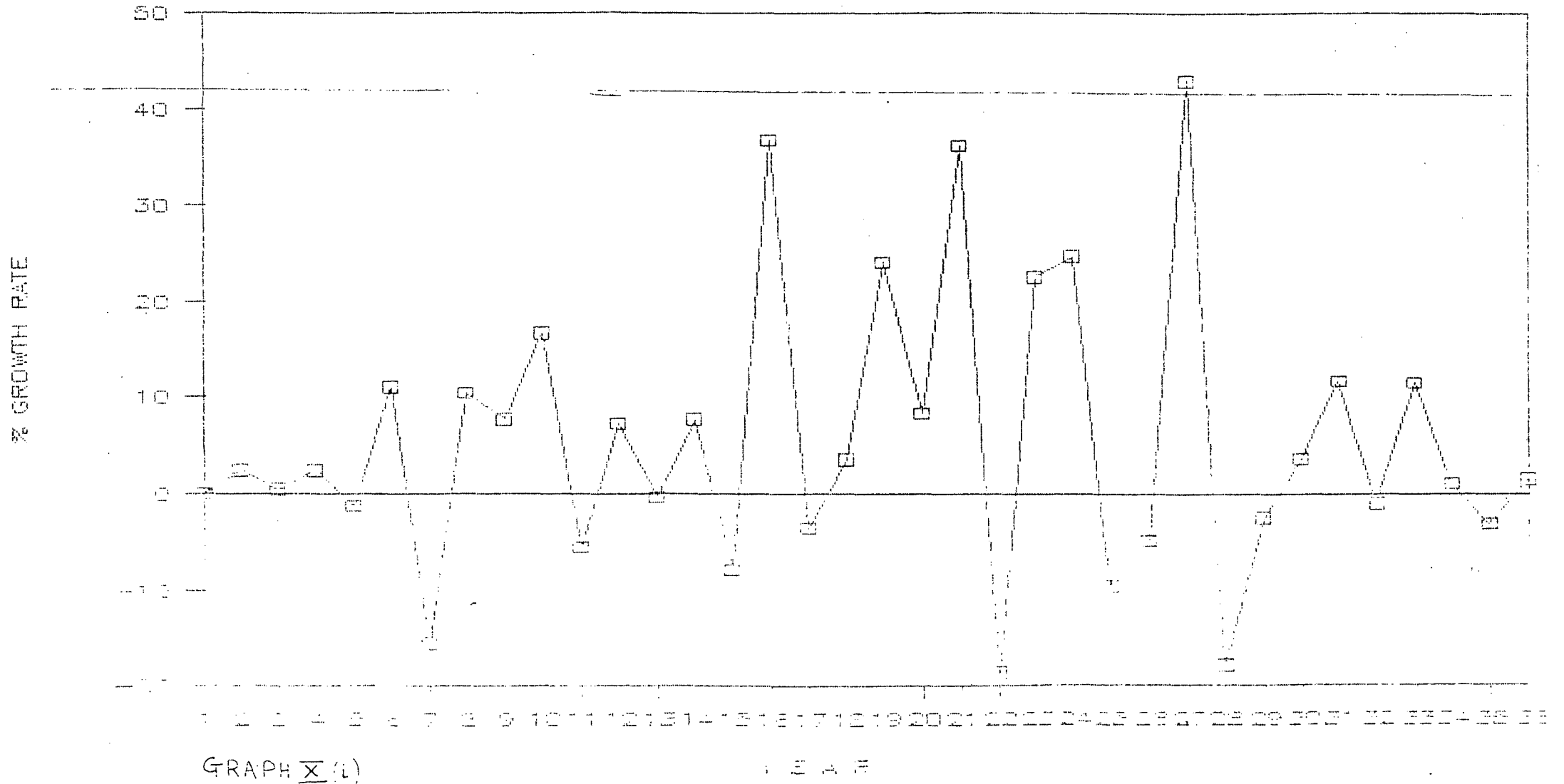
Table X: Growth and Variability in Harvest Prices of Cotton: 1950-51 to 1985-86

Indicator	Period	Gujarat	Maharash- tra	Punjab
MEAN	Period I	107.53 (108.98)	98.23 (97.13)	79.81 (80.71)
	Period II	344.05 (338.08)	313.63 (304.77)	304.57 (293.09)
STANDARD DEVIATION	Period I	21.93 (20.64)	18.87 (16.26)	17.16 (16.12)
	Period II	91.62 (85.03)	145.63 (133.17)	141.06 (122.06)
COEFFICIENT OF VARIATION	Period I	20.40 (18.94)	19.21 (16.74)	21.51 (19.97)
	Period II	26.63 (25.15)	46.50 (43.69)	46.32 (41.64)
ANNUAL GROWTH RATE (COMPOUND)	Period I	1.54 (1.63)	1.23 (1.29)	1.50 (1.63)
	Period II	2.18 (2.25)	4.04 (4.00)	3.53 (3.58)
Number of Years showing:				
(i) Increase in				
Price during Period I		11	11	10
Price during Period II		13	14	13
(ii) Decrease in				
Price during Period I		6	6	7
Price during Period II		7	5	6

Note: Figures in brackets indicate estimates based on three-years moving average series.

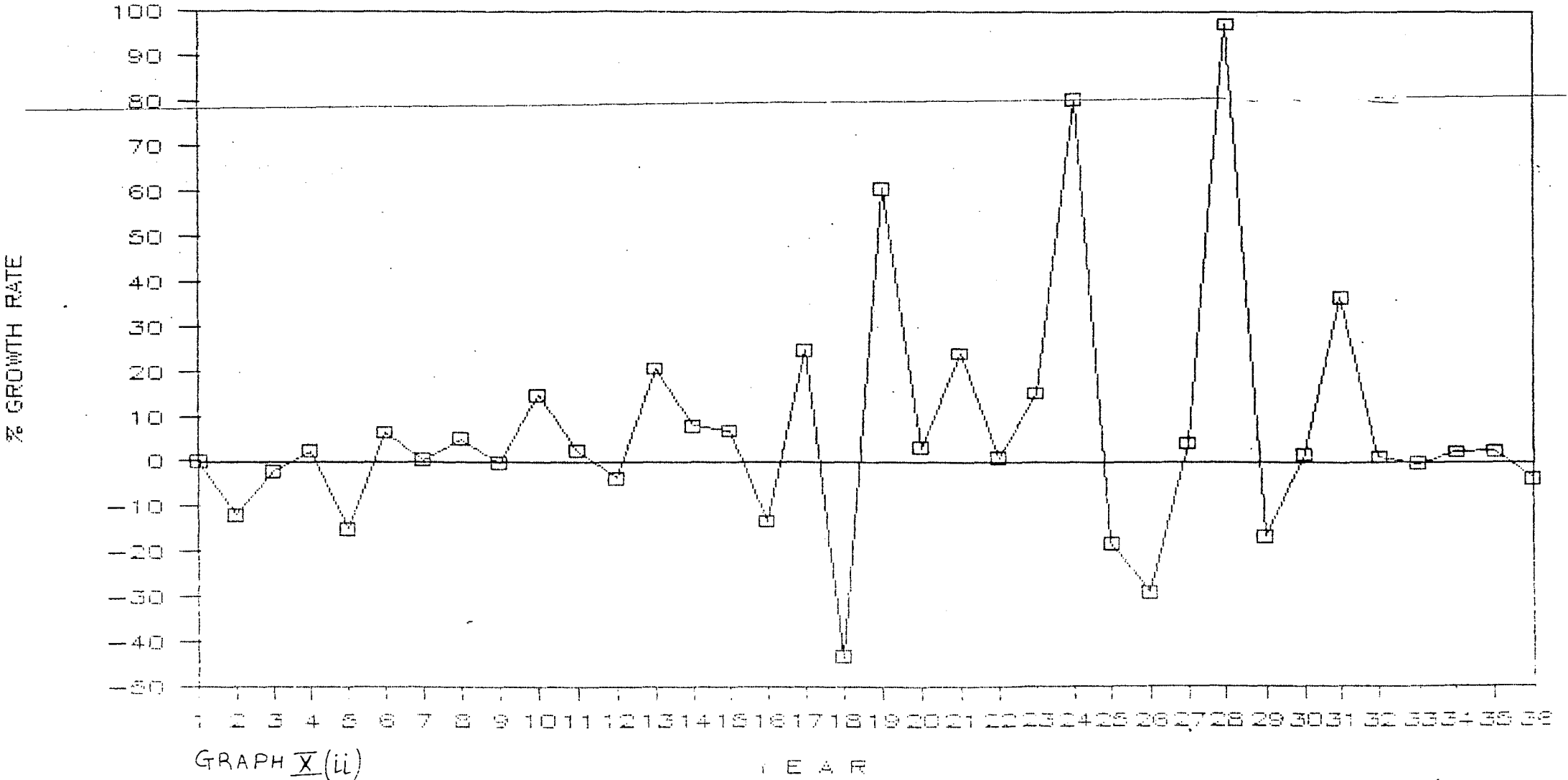
averages). In Assam, however, the increase was comparatively less sharp; it increased from 1.10 per cent to 1.97 per cent. What surprises us, is that in West Bengal which accounts for almost three-fourths of the all-India production of jute, the price variability has not been controlled - in fact it

COTTON GUJRAT



GRAPH X (1)

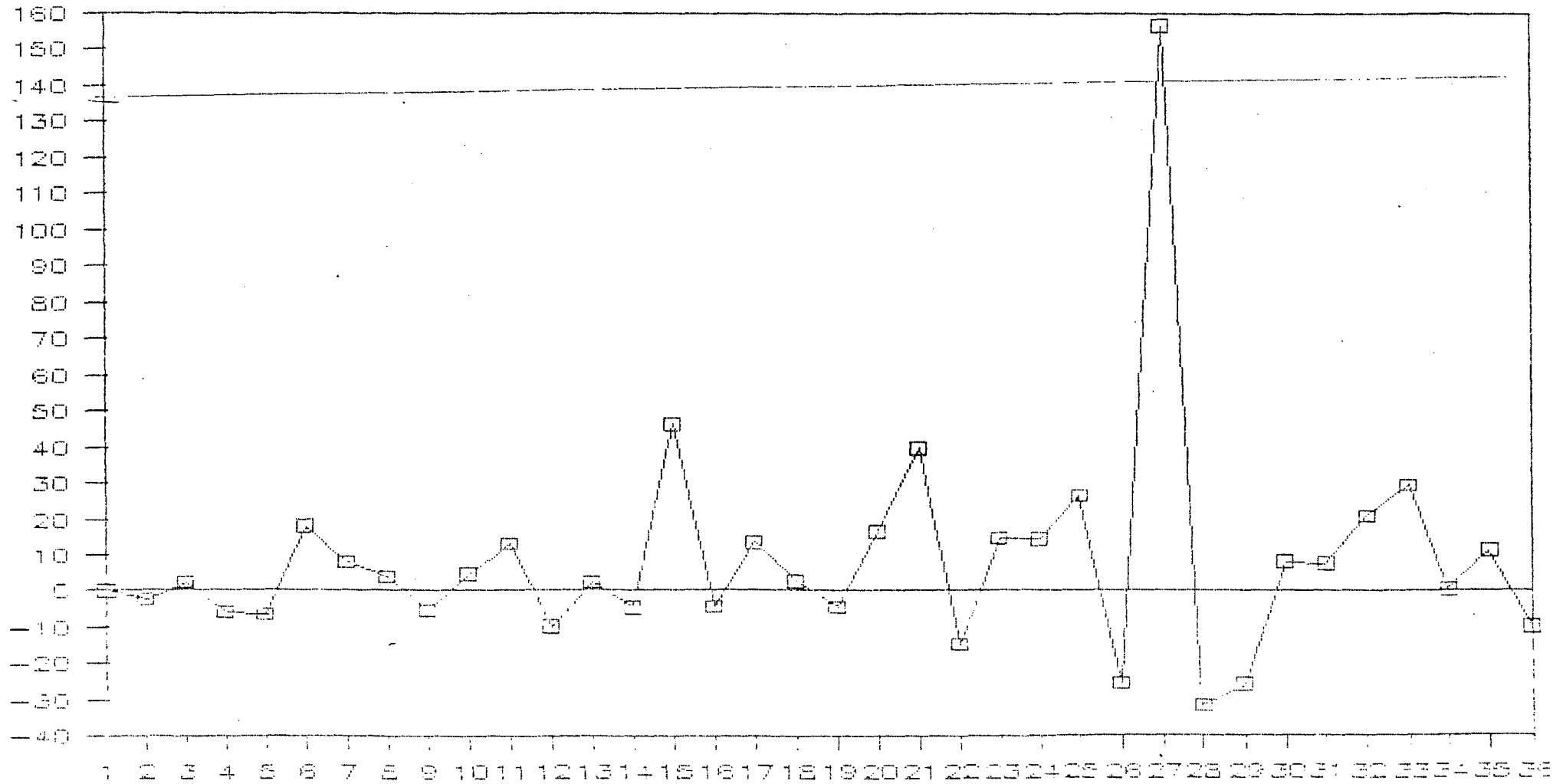
COTTON MAHARASHTRA



GRAPH X (ii)

Y E A R

COTTON PUNJAB



GRAPH X (ill)

Y E A R

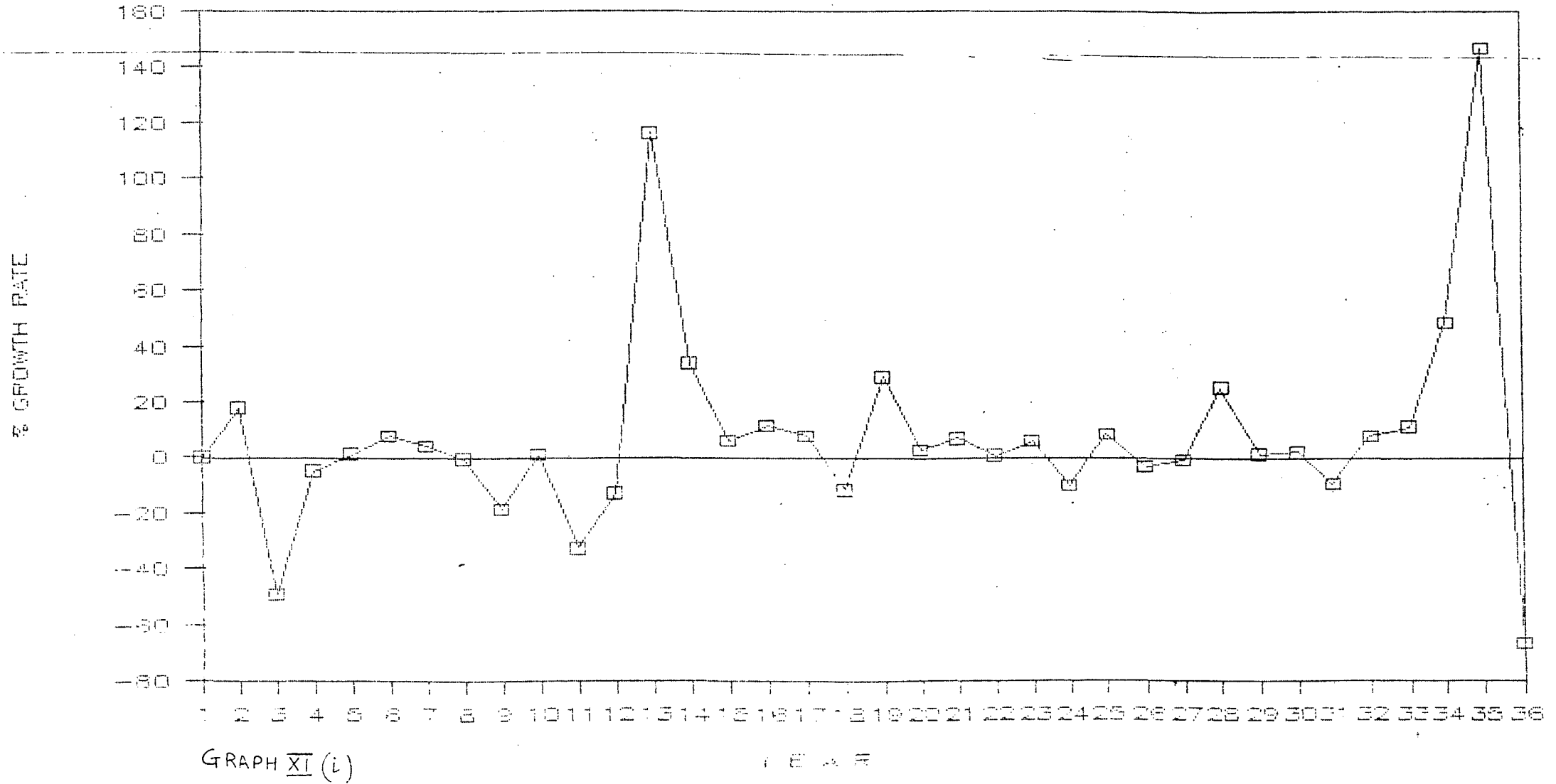
Table XI: Growth and Variability in Harvest Prices of Jute: 1950-51 to 1985-86

Indicator	Period	West Bengal	Bihar	Assam
MEAN	Period I	73.51 (71.09)	60.52 (57.61)	82.80 (81.31)
	Period II	199.89 (188.23)	175.49 (164.00)	153.54 (147.18)
STANDARD DEVIATION	Period I	26.08 (21.05)	23.29 (14.41)	28.14 (20.86)
	Period II	134.78 (86.59)	130.58 (85.95)	55.04 (41.52)
COEFFICIENT OF VARIATION	Period I	35.48 (29.62)	38.48 (25.02)	33.99 (25.65)
	Period II	67.43 (46.00)	74.40 (52.41)	35.85 (28.21)
ANNUAL GROWTH RATE (COMPOUND)	Period I	0.25 (0.73)	-0.39 (0.08)	1.10 (1.55)
	Period II	2.45 (2.43)	2.73 (2.58)	1.97 (1.74)
Number of Years showing:				
(i) Increase in Price during				
Period I		11	8	10
Period II		14	11	12
(ii) Decrease in Price during				
Period I		6	9	7
Period II		5	8	7

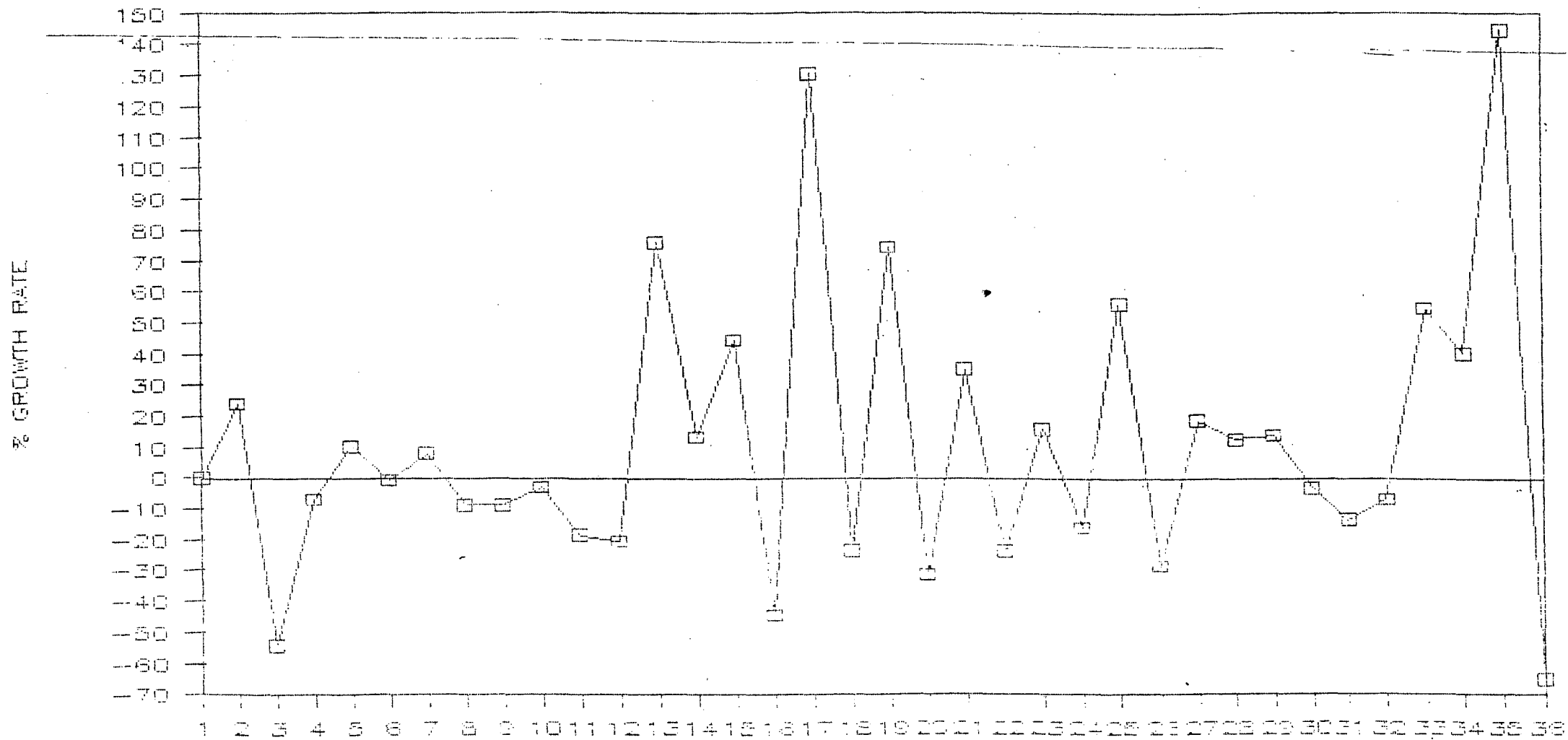
has gone up substantially since the advent of 1970s.

As with other crops, the occurrence of excessively abnormal years must be taken note of so far as these two crops are concerned. Only then can one give a final verdict about increased variability of prices in period II. An

JUTE WEST BENGAL



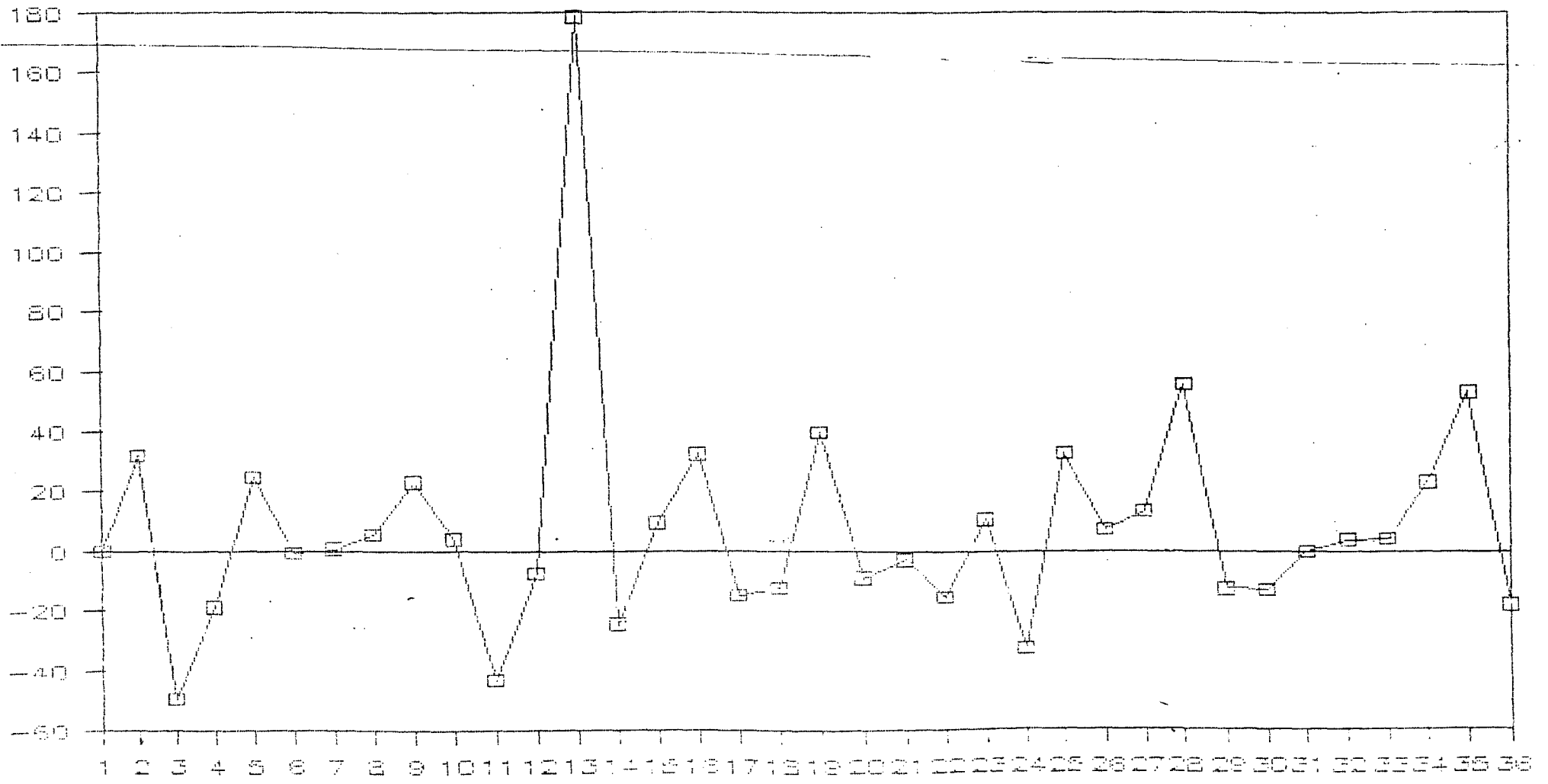
JUTE BIHAR



GRAPH XI (ii)

J E & F

JUTE ASSAM



GRAPH XI (iii)

Y E A R

examination of the absolute price data and graphs for both cotton and jute to find out excessive abnormalities may perhaps reveal a different picture.

In the case of cotton, the figures for period II only needed to be taken note of; period I did not pose any glaring abnormality in the price graph. The resulting changes are tabulated in Table X-A for all three states. In the case of Gujarat, 1970-71 and 1976-77 were deleted; in Maharashtra 1967-68; 1973-74 and 1977-78 were deleted and in the case of Punjab, 1976-77 and 1984-85 were eliminated - all from period II.

The post-deletion results, as set out in table X-A, have nothing different to offer as is evident from the fact that only marginal changes in C.V. took place keeping the directional changes unchanged. In fact, for Gujarat the post-deletion C.V. registered a slight increase after deleting the excessively abnormal years.

However, the results set out in table XI-A for jute after deleting a highly abnormal year, 1984-85 for both West Bengal and Bihar during period II we find interesting results emerging. In addition, 1962-63 was also eliminated from period I in the case of West Bengal.

As can be seen from an examination of table XI-A for jute, we find that after eliminating the year 1984-85 which registered an extremely outlying price level which had by

Table X-A: Variability in Harvest Prices of Cotton: Effect of deleting excessively abnormal years

Indicator	Period	Gujarat		Maharashtra		Punjab	
		Before deletion	After deletion	Before deletion	After deletion	Before deletion	After deletion
Standard Deviation	Period I	20.93	20.93	18.87	18.87	17.16	17.16
	Period II	91.62	92.86	145.83	145.28	141.08	123.01
Coefficient of Variation	Period I	20.40	20.40	19.21	19.21	21.51	21.51
	Period II	26.63	27.20	46.50	45.42	46.32	44.37

Note: No deletions were effected during period I in any state, therefore values remain the same before and after deletion.

far surpassed all other years from West Bengal and Bihar, the C.V. almost crashed down - so much so, as to completely revert the original trend of increasing variability. Both the S.D. and C.V. declined phenomenally but it is the C.V. we wish to discuss in order to compare the relative change from period I to period II. Thus, in West Bengal the C.V. in period II fell from 67.43 before deletion, to 26.37 after deletion and in Bihar from 74.40 to 33.86 before and after deletion respectively. No deletions were effected from Assam.

Table XI-A: Variability in Harvest Prices of Jute: Effect of deleting excessively abnormal years

Indicator	Period	West Bengal		Bihar	
		Before deletion	After deletion	Before deletion	After deletion
Standard Deviation	Period I	26.08	26.85	23.29	23.29
	Period II	134.78	44.49	130.58	49.44
Coefficient of Variation	Period I	35.48	36.36	38.48	38.48
	Period II	67.43	26.37	74.40	33.86

Note: No deletion was effected during period I for Bihar, therefore figures remain the same before and after deletion during the first period only.

Thus we find that in terms of declining price variability from period I to period II, jute appears to have registered a higher degree of success than cotton especially after the deletion of temporal abnormalities.

The broad conclusions emerging in this chapter are as follows:

1. The post-government-intervention period signifies a decisive departure from the pre-intervention period. The interplay of government policies and actions is clearly visible in period II over period I.

2. In each and every state included in our analysis, the average price for each crop has registered an increase in period II over period I. For some crops, period II showed much faster expansion in price level and this expansion varied from one state to the other. Worked in another way, the annual compound growth rates have also been higher in period II. In this respect period II clearly seems to usher in the era of producer-oriented price consciousness on the part of the price-setters, and a transition away from a hitherto consumer-oriented pricing policy.

3. Generally, period II is characterised by a significant expansion in production partly due to the impact of the green revolution for some crops and partly due to the gradually improving institutional supports practically throughout the country. The balance between demand and supply in period II, was different from and perhaps more delicate than in period I. Since, for a number of crops, especially among the food crops supply was now generally more than

demand, in the face of higher and expanding output, it is creditable indeed, that the Government was successful in providing a support to prices and preventing them from crashing. This is borne out by the fact that the number of years recording negative annual growth rates (a fall in prices from year to year) during period II had declined as compared to such instances in period I, in most cases under consideration.

4. (a) The absolute variability in harvest prices, as represented by the value of standard deviation, has increased in the case of all crops in all states. This is bound to be so in a situation of growing production or in situations where higher levels of productions are punctuated by higher levels of year-to-year fluctuations. From policy point of view, we have to rely more on relative variability, in our case, typically represented by the coefficient of variation.

(b) The crops for which the C.V. is observed to have declined in period II over period I, clearly signify the success of government interventionist policies. In this light, the crops which have shown considerable success of policy interventions are wheat, jowar, barley, sugar (raw) and jute. Perhaps, rice would also join these crops if only we had analysed the temporal behaviour of harvest prices in the case of paddy against rice as such.

In the partially successful bracket, we may tentatively place bajra, maize and groundnut; while gram and cotton

appear to belong to the group of the less successful crops in terms of arresting temporal price variability. It may be noted in passing, that this rough categorisation is relevant strictly in the context of the analysis undertaken in this chapter, pertaining to an examination of farm harvest price variability prior to and after government intervention. These crop groups may not mean much for other purposes.

(c) The disruptionist effects of some excessively abnormal years in terms of (farm harvest) price behaviour were sought to be absorbed by deleting such years and then working out our statistical measures again. For obvious reasons, this exercise was done very selectively. Nevertheless, some improvements did emerge. For example, in the case of jute, the C.V. fell down considerably after eliminating just one year's abnormal situation; in the case of rice, wheat, bajra, maize, groundnut and sugarcane, the C.V. did decline to some extent for the states where changes were made. However, for each of these crops not all three states were tampered with, but deletions were carried out for only those states where the logical necessity was felt. Of course, the extent of decline in C.V. was of different degrees in different states, (even negligible in some). There were also crops where it was not felt logically justified to make any deletions at all. In this category come barley and gram. In the case of barley, no deletions were

effected for any of the three chosen states, because the decline in variability was clear enough for all of them and no particular year/years stood out for our deletion exercise. Whereas in the case of gram, the reason for not conducting the elimination and re-calculation exercise was the opposite. In all the three chosen states for gram (the three highest producing states) the year to year price fluctuations were too many and too violent. Therefore not much would have been achieved by way of revealing any further decline in variability due to government intervention even if we had attempted to delete some years.

Mention may also be made in passing of the one or two stray cases like those of jowar (Madhya Pradesh), groundnut (Gujarat) and cotton (Gujarat) where there was a slight increase in the C.V. after deleting the abnormal years.

(d) Thus, we may assert, that by and large, our hypothesis regarding the decline in the year-to-year variability of harvest prices as a result of government intervention, stands empirically validated in most cases analysed in this chapter, with the exception of few crops, most strikingly gram, and to a slightly lesser extent, groundnut.

5. Consistent with the general practice, we worked out all our results on the basis of the three-year moving average series generated from the original annual data. With one or two exceptions, in no case has the direction

of the trends pertaining to relative variability over time, been reversed as a result of this re-working out of indicators on the basis of moving averages. The magnitude of variability has, of course, generally been sobered down as may be expected. Thus in a nutshell, the values which have been re-calculated based on moving averages do not have a different picture to offer.

6. Most notably, the maximum benefit of Government intervention in period II seems to have been cornered by food crops, while commercial crops such as cotton do not show any significant reversal of variability due to government intervention. Oilseeds also do not appear to have fared too well, if we go by the mixed picture presented by groundnut.

7. After having gone into the detailed results of our analysis state-wise, crop-wise and period-wise, we note that in general, overall the post-intervention years do reveal an era of less variability as compared with the pre-intervention period. It should, however, be strongly emphasized here, that a price policy by itself, is not a sufficiently powerful tool to achieve substantial reduction in price variability. The crucial role of the complementary factors (mentioned in earlier chapters) consisting inter alia, of marketing, infrastructural facilities, institutional and technological factors etc. must be underlined for any

sound policy of price to make it a success. This is exactly what was missing in some cases which became posers for further and deeper probing.

8. Finally, as a general observation we mention that those states in which considerable inroads had been made by the Green revolution, were the very states which revealed a relatively higher degree of success in arresting price variability. Incidentally, some states like Madhya Pradesh, which are infrastructurally unsound have simply not succeeded in controlling crop price variations, no matter what crop we consider. Along the same plane, these crops which benefitted most due to the impact of the Green revolution, were also the very crops which appeared to have achieved relatively greater price stability (or considerably reduced price variability) as such.

Reference

- 1 : Rao Hanumantha, Ray and Subbarao - "Unstable agriculture and droughts."

CHAPTER V
INTRA-YEAR VARIABILITY
OF WHOLESALE PRICES

Having examined the inter-year behaviour of harvest prices in the previous chapter, we now turn to the question of price variability within each marketing year. For this purpose, the monthly wholesale prices are the basis of our analysis. We have already established that agricultural output is subject to fluctuations, both inter-year and intra-year. Whereas demand increases at a steady pace (with increasing income and population) supply does not follow the same pattern. For visual clarity the following three figures represent, roughly, the typically expected demand and supply patterns of any agricultural commodity over time:

Fig.5.1: Demand pattern over time

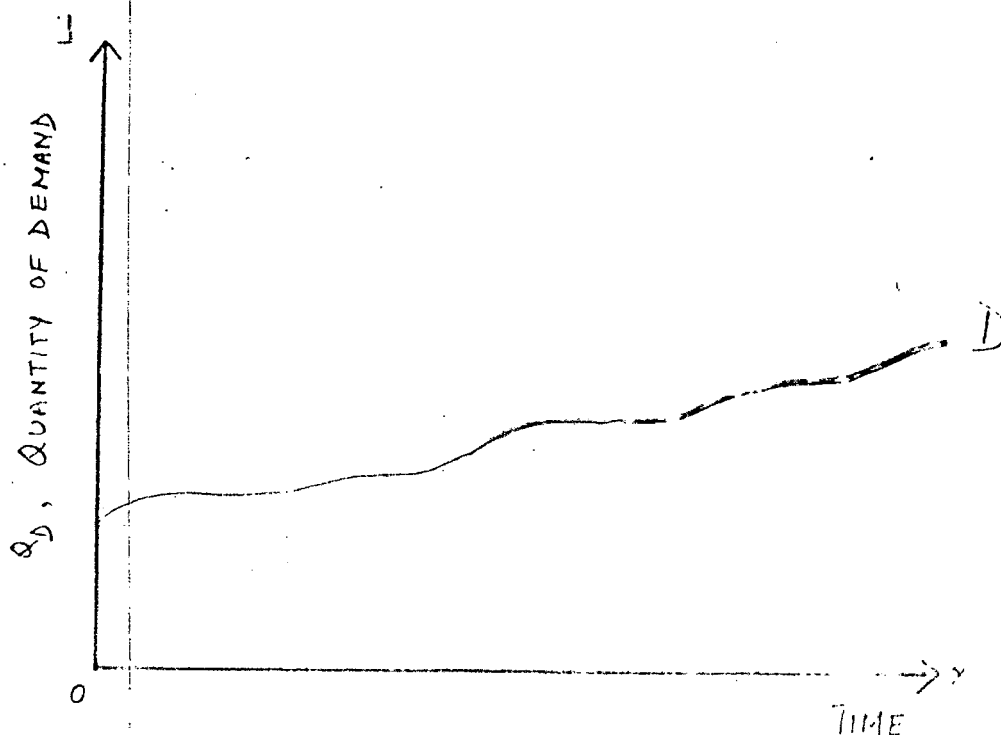
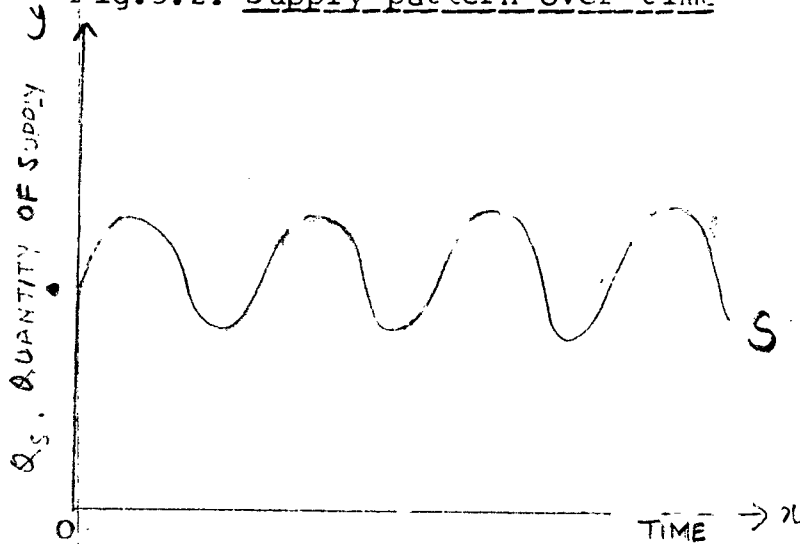
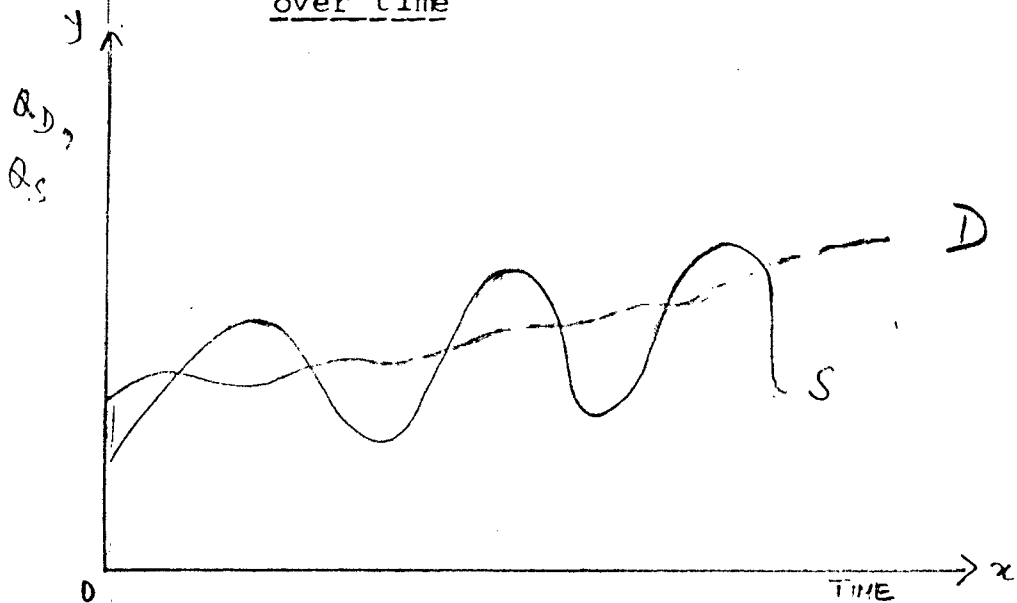


Fig.5.2: Supply pattern over timeFig.5.3: Combined demand and supply patterns over time

Thus, such a zig-zag and in all probability, uncoordinated 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 inter-weekly; monthly; seasonally;

yearly both intertemporally and interregionally.

The Government has attempted price stabilization through an integrated system of support/procurement, buffer stocking 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. Thus, 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 prices can be measured, the quantity available for consumption (due to no records on private stocks) cannot be so precisely measured. Secondly, it is prices which significantly influence production and consumption decisions; and thirdly, if prices are stabilized within reasonable upper limits, consumers will have sufficient real income to purchase the quantities they need.

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 temporal behaviour of such prices. Such detailed

data for a number of crops and a number of states extending over 30 years or so are almost 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 usable and conveniently available data are monthly average wholesale prices, recorded for individual marketing centres covering a wide spectrum of crops. Our choice falls on such monthly data, covering the long stretch of time between 1956-57 to 1984-85. In spite of sporadic gaps one discovers for one crop or another, in one region or the other, and occasional changes in definitions or some other lacunae built into the long time-series covered by us, these data are still the best available information for this type of temporal analysis. In any case, we had to do a few adjustments, including data interpolations for the missing 2-3 intervening months, in particular years, so that the long-run pattern of variability comes up without breaks.

In the analysis set out in this chapter, we have taken ten agricultural commodities and the three (in some cases two) most important producing states of that particular commodity - by and large the commodities and their states are the same as those taken earlier in chapter IV for harvest price analysis.

In some cases, certain stray years have been completely dropped from our calculations, since the monthly wholesale

prices were not available throughout that year or for a major part of the year. In cases where only one or two months' data was missing, interpolations were done in accordance with the standard statistical norms.

Although we are aware of the limitations of taking open-market prices, these limitations notwithstanding, it is important to undertake an analysis of open market prices (wholesale prices) in order to evaluate the effectiveness of administered price policy. It may also be stated at the outset that prices are also affected by other macro policies, like changes in money supply, fiscal and monetary controls, imports of foodgrains, releases from public distribution system, and so on. Hence our analysis should be taken as indicative in nature only.

The intra-year variability, based on monthly average wholesale prices, can be worked out in many different ways. One can see the difference between the prices at the beginning and at the end of each marketing year, and examine the underlying trend in this time-series of differences. Conceptually, this is not so satisfying inasmuch as the first (or the last) month of the marketing year is difficult to identify and fix for each crop when such a long period of time is to be covered. An alternative is to see the time series of range, i.e. the difference between the maximum and the minimum monthly prices, in each year. This

procedure, too, is not free of its blemishes since the data on monthly wholesale prices collected from different markets can suffer from several limitations¹ such as the following: price quotations at different times do not necessarily refer to the same quality of the commodity, thereby making comparisons less reliable. Further, lack of grading and biases in price reporting can also make these quotations less reliable; price quotations may also be very high for some centres for specific reasons like transport bottlenecks and other such market imperfections. Because of such factors, the price range could become exaggerated. Therefore, it is analytically more useful to analyse the data on mean prices prevailing in various markets during the peak harvest months and the lean months.

However, we must also make use of the monthly prices without entering into questionable comparisons. An extremely useful purpose is served if we look at the time series of the coefficient of variation, (C.V.) worked out across the 12-monthly prices, for each year of our study. Each C.V. C.V. shows the intra-year variability when all the 12 months of the marketing year are considered individually.

The above exercise does not provide the ultimate answer to the question of variability before and after the commencement of government intervention. Surely, marketing decisions are not based on monthly calculations. Moreover,

the peak of marketing is done rarely in a single month, for any particular crop in any particular area in India. Generally, peak marketing for most crop is concentrated in 2-3 months following the actual harvest operations. To absorb the effect of such realities, it is in the fitness of things to organize our analysis of intra-year variability in terms of quarterly prices, averaged over three relevant months for each quarter. A meaningful procedure would then be to see the difference between the first quarter of the marketing year (hereafter Q_1 representing the peak marketing operations after the physical process of harvesting is over or is about to be over) and the last quarter (Q_4). Towards the end of the last quarter, the harvesting for the next year commences and then Q_1 of the next year comes in. In brief, we are comparing the price differences between Q_1 and Q_4 and examining their temporal behaviour between 1956-57 and 1984-85. The stepwise procedure followed by us is as under:

(i) Each marketing year has been divided into four quarters, consisting of three months each.

(ii) The basis for such a division is that, quarter one (Q_1) is the harvest-peak marketing quarter in each case; the second and third quarters (Q_2 and Q_3) are the following intermediate quarters; while the last quarter (Q_4) is the quarter preceding the next harvest.

(iii) Having divided the year into four quarters for a more effective analysis and comparison, the average price of the three months constituting a quarter was taken as that quarters' price.

(iv) The next step was, to calculate the percentage price change per month. The following formula was used:

$$\frac{Q_4/Q_1 \times 100 - 100}{9}$$

Since the gap between the peak quarter (Q_1) and the lean quarter (Q_4) is 9 months.

(v) The maximum price difference has also been calculated, since the price prevailing in the fourth quarter (Q_4) need not necessarily always be the highest/maximum price. In which case, the number of months change accordingly as well. Therefore the maximum of Q_2 or Q_3 or Q_4 was taken for computation using the formula:

$$\text{Maximum Price Difference} = \frac{\text{Maximum } (Q_2 \text{ or } Q_3 \text{ or } Q_4) \times 100 - 100}{Q_1 \text{ actual number of months}}$$

This information has been tabulated in column 7 in each table and the actual number of months, i.e. the gap between the price prevailing during Q_1 and the maximum price quarter has been tabulated in column 8. Wherever the maximum price quarter is indeed Q_4 then the number of months remain nine and the maximum percentage change per month as tabulated in column 9 remains the same as in column 6.

(vi) One of the methods (as used by us), of judging the effectiveness of Government's price policy implementation is to observe the range of wholesale prices prevailing during the peak and the lean months/quarter. If the price in lean months ruled at levels justified by normal carrying costs, then it could be said that the implementation was successful with regard to ensuring agricultural commodities to consumers at reasonable prices.² The following criterion has been used:

Assuming that interest rate varied between 18% to 24% per annum upto 1974-75; and 36% per annum after 1974-75; and assuming a risk margin of 10 to 12% a year, one could consider a maximum of 2.5 to 3.0% rise a month as normal upto 1974-75 and 3.5 to 3.75% monthly rise as normal after 1974-75.*

We have taken the upper limits in both cases, viz. 3 per cent and 3.75 per cent respectively and for visual convenience tabulated these normal carrying costs in column 10 in each table.

(vii) To be sure about our judgement on the temporal behaviour of price variability, we computed the coefficient of variation across the 12 months of each year, for each crop. The time series of each C.V. was transferred to a graph so as to develop a broad idea of whether the ups and

* This criterion has been adopted by Dr. D.S. Tyagi as well as by Dr. G.S. Bhalla in their FAO studies for the UN, Rome, 1988.

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

$$V_{ij} = a + bT + cT^2$$

where V_{ij} is the C.V. for the i th crop in the j th state; T is chronological time.

Our a 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, it means there is a time point at which the graph of C.V. attains its maximum; 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 $T = \frac{b}{2c}$. To put it in our context, the intra-year price variability becomes less and less pronounced beyond the $(\frac{b}{2c})$ th year of our series.

While the parabolic function lent fairly sensible results for a number of crops, it failed to click for a few others primarily because of some inherent data problems. We will refer to these difficulties later.

In terms of indicators of variability computed by us, the success of government intervention is established if it is discovered, for any crop and any year, that the average

price hike per month is less than or at the most equal to carrying costs per month. If government can manage to keep price hikes within the limits of carrying costs inherent in keeping back the saleable output, there is really no economic case for surplus producers to hold on with the stocks. If, however, in an excessively abnormal year, the price hike per month is substantially higher than what the carrying costs would absorb, government intervention is to be taken to have failed for that year.

The precise hypotheses therefore, to be tested by us, are:

Since the inception of government intervention, the magnitude of price hike per month, has generally been dwindling, and has gradually become smaller than the magnitude of carrying cost per month.

To lend more empirical content to the above hypothesis, we further hypothesize that a second-degree parabolic function captures the same so that in each case, there is a particular point of time beyond which C.V. starts declining.

The cropwise intra-year variability along the lines suggested above has been discussed in four sections, as under: The first section deals with the major cereals Rice and Wheat; the second section deals with coarse grains - Jowar, Bajra, Maize and Barley; section three deals with pulses and oilseeds - specifically Gram and Groundnut have been taken; and the last section deals with non-foodgrains/commercial crops, namely, Cotton and Jute.

Section I : FOODGRAINS: WHEAT & RICE

For both the crops being analysed in this section, three states each, have been taken as in the previous chapter, the criterion for their selection, therefore, remaining the same. In the case of wheat, Uttar Pradesh, Punjab and Madhya Pradesh have been considered, and for rice the chosen states are West Bengal, Andhra Pradesh and Tamil Nadu. The choice of a centre/market was based upon the availability of continuous and comparable wholesale price data for that centre. The harvest/peak marketing quarter for wheat stood out as April-May-June for all three states, while for rice, there were three different harvesting quarters, viz. Autumn, Summer and Winter, in each state. The production statistics for each harvesting season were therefore obtained and the production of rice crop during each season as a percentage of total production over a few years of the eighties, was calculated for each state, in order to determine which was the predominant harvesting/production season and thereby the peak marketing quarter, when the bulk of the crop was harvested and marketed - which was then taken as Q_1 .

Tables I-a, I-b and I-c give quarterwise wholesale prices for wheat, for three markets on each in Uttar Pradesh (Hathras), Punjab (Ludhiana) and Madhya Pradesh (Sagar) and per month price hikes. The total time span

1956-57 to 1984-85 covered by us can be notionally divided into three periods: period I begins in 1956-57 and ends roughly by 1965/1966 (when wheat and rice came under the purview of the APC). Period I is obviously typical of pre-intervention market conditions. Period II can roughly go from 1966 to 1974-75 when government intervention encompassed an effective feature of price announcements well in advance but a much less effective or lukewarm operation of actual procurements for buffer stock operations. It is somewhere around the mid-seventies that buffer stock procurements were launched in a full-throated manner, and accordingly, our notional periodization puts period III to represent the decade beyond the mid-seventies. It may be useful to keep in mind that the above scheme of periodization cannot, and indeed it does not, connote water-tight time compartments. Our conclusions would take cognizance of the changing intensity of government intervention only in a broad qualitative sense. With such a division we find that in the case of wheat in Uttar Pradesh, there were at least five years during the first period, when the percentage price change per month could not be justified by the normal monthly carrying costs; while after government intervention this number declined to 2 and in the third period when buffer stocking operations were effectively in full swing, there was barely one year when the monthly price change exceeded

Table I-a: WHOLESALE PRICE ANALYSIS CROP WHEAT STATE UTTAR PRADESH

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	33.82	39.06	40.86	43.42	3.15	28.39	9.00	3.15	3.00	9.27
1957-58	38.46	40.35	39.63	37.90	-0.16	4.92	3.00	1.64	3.00	3.33
1958-59	43.26	56.15	61.61	61.85	4.77	42.96	9.00	4.77	3.00	15.83
1959-60	41.53	34.83	34.83	48.67	1.91	17.20	9.00	1.91	3.00	14.39
1960-61	41.08	46.66	45.55	45.54	1.21	13.59	3.00	4.53	3.00	5.51
1961-62	37.73	38.51	39.85	45.11	2.17	19.55	9.00	2.17	3.00	7.51
1962-63	37.18	38.30	37.07	37.53	0.10	3.00	3.00	1.00	3.00	1.89
1963-64	38.86	43.77	47.57	53.82	4.28	38.51	9.00	4.28	3.00	12.84
1964-65	51.35	74.82	93.13	94.36	9.30	83.74	9.00	9.30	3.00	23.90
1965-66	65.88	83.97	77.18	73.59	1.30	27.46	3.00	9.15	3.00	9.13
1966-67	69.23	75.04	92.00	133.11	10.25	92.26	9.00	10.25	3.00	27.76
1967-68	113.44	120.72	107.40	96.54	-1.65	6.42	3.00	2.14	3.00	10.10
1968-69	73.01	79.03	76.35	72.50	-0.08	8.25	3.00	2.75	3.00	5.71
1969-70	73.67	79.02	75.06	74.82	0.17	7.27	3.00	2.42	3.00	4.21
1970-71	74.82	74.33	74.83	80.67	0.87	7.81	9.00	0.87	3.00	3.90
1971-72	75.67	76.33	76.33	87.00	1.66	14.98	9.00	1.66	3.00	6.57
1972-73	76.33	87.67	93.67	102.67	3.83	34.50	9.00	3.83	3.00	12.97
1973-74	80.00	83.33	93.33	98.00	2.50	22.50	9.00	2.50	3.00	9.08
1974-75	131.67	185.67	169.33	202.00	5.94	53.42	9.00	5.94	3.75	21.49
1975-76	122.67	107.67	105.00	105.00	-1.60	-12.23	3.00	-4.08	3.75	7.15
1976-77	105.00	105.00	107.33	127.67	2.40	21.59	9.00	2.40	3.75	9.12
1977-78	110.00	113.33	118.67	126.00	1.62	14.55	9.00	1.62	3.75	6.68
1978-79	112.50	115.17	118.33	127.00	1.43	12.89	9.00	1.43	3.75	5.07
1979-80	115.00	120.33	130.67	130.00	1.45	13.62	6.00	2.27	3.75	6.88
1980-81	122.00	127.00	150.33	164.00	3.83	34.43	9.00	3.83	3.75	13.88
1981-82	130.00	141.33	153.33	157.33	2.34	21.03	9.00	2.34	3.75	8.81
1982-83	148.50	165.00	190.00	236.67	6.60	59.37	9.00	6.60	3.75	18.61
1983-84	163.33	158.33	165.00	162.67	-0.05	1.02	6.00	0.17	3.75	4.63
1984-85	143.33	152.67	152.00	152.60	0.72	6.51	3.00	2.17	3.75	3.29

Table I-b: WHOLESALE PRICE ANALYSIS CROP WHEAT STATE PUNJAB

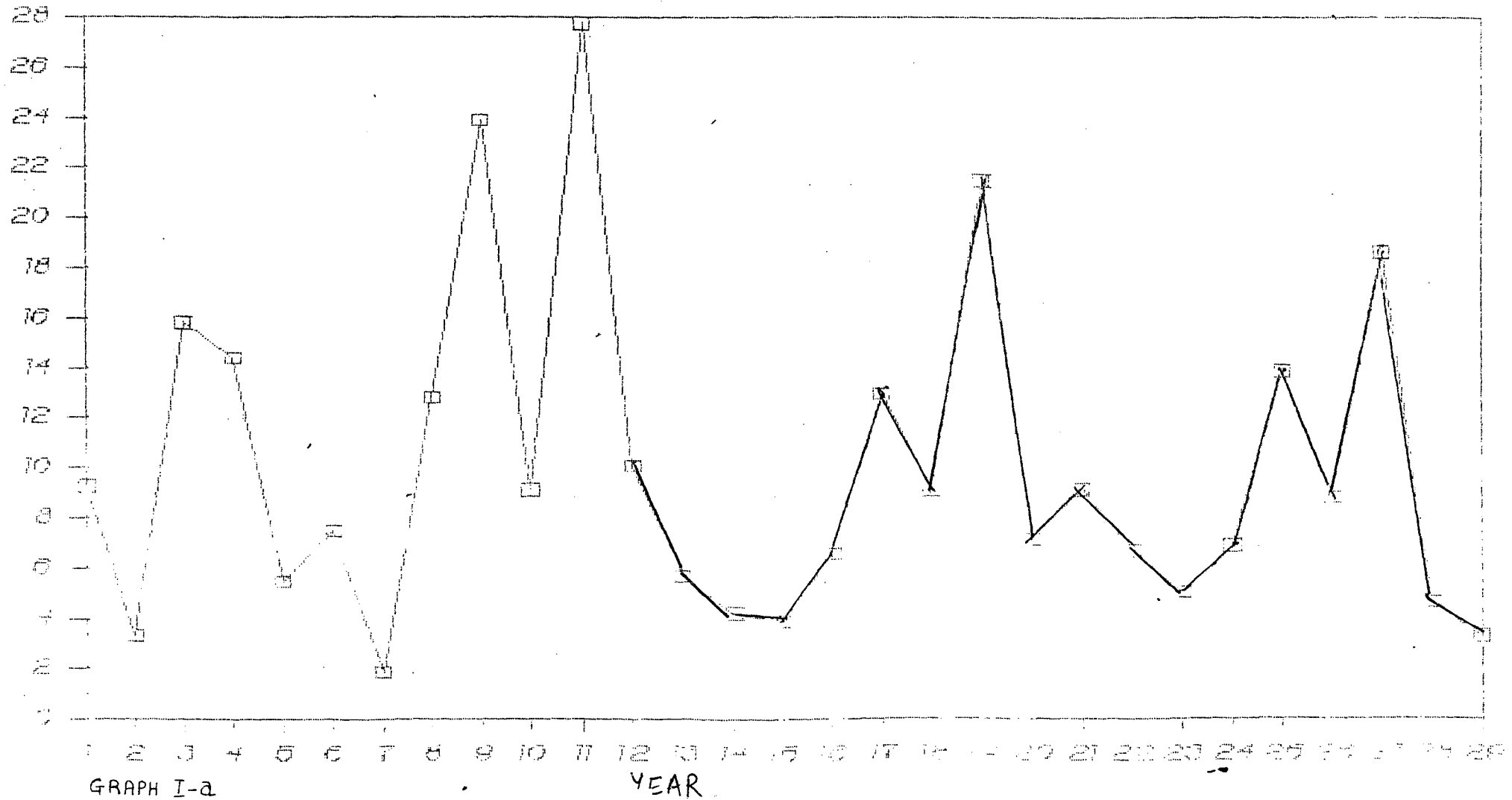
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	35.72	39.07	43.09	44.31	2.67	24.05	9.00	2.67	3.00	8.63
1957-58	39.47	37.96	39.85	37.06	-0.68	0.97	6.00	0.16	3.00	3.91
1958-59	35.72	41.61	45.99	55.54	6.16	55.47	9.00	6.16	3.00	16.45
1959-60	41.75	40.63	40.97	44.04	0.61	5.48	9.00	0.61	3.00	4.59
1960-61	39.30	41.42	43.46	42.95	1.03	10.59	6.00	1.77	3.00	4.45
1961-62	39.63	39.58	41.87	45.47	1.64	14.72	9.00	1.64	3.00	7.21
1962-63	42.33	41.75	41.43	40.25	-0.55	-1.38	3.00	-0.46	3.00	4.63
1963-64	39.90	41.05	47.27	56.77	4.70	42.27	9.00	4.70	3.00	15.86
1964-65	43.88	41.05	47.27	56.77	3.26	29.36	9.00	3.26	3.00	15.83
1965-66	54.93	54.58	53.67	56.23	0.26	2.37	9.00	0.26	3.00	4.49
1966-67	60.83	73.77	82.00	113.67	9.65	86.85	9.00	9.65	3.00	24.21
1967-68	80.00	76.33	74.17	75.00	-0.69	-4.58	3.00	-1.53	3.00	3.39
1968-69	76.00	76.00	76.67	78.33	0.34	3.07	9.00	0.34	3.00	2.33
1969-70	76.00	76.17	77.67	82.33	0.93	8.33	9.00	0.93	3.00	4.22
1970-71	76.00	76.00	76.00	76.00	0.00	0.00	9.00	0.00	3.00	0.00
1971-72	76.00	75.67	80.00	83.00	1.02	9.21	9.00	1.02	3.00	4.29
1972-73	78.00	76.00	76.83	79.33	0.19	1.71	9.00	0.19	3.00	2.66
1973-74	76.00	78.67	88.67	102.91	3.93	35.41	9.00	3.93	3.00	13.67
1974-75	115.17	123.00	120.67	118.00	0.27	6.80	3.00	2.27	3.75	3.45
1975-76	108.00	105.00	122.96	135.17	2.79	25.15	9.00	2.79	3.75	10.72
1976-77	107.77	106.67	118.00	124.67	1.74	15.68	9.00	1.74	3.75	7.32
1977-78	118.67	110.33	121.33	123.87	0.49	4.38	9.00	0.49	3.75	7.18
1978-79	114.33	117.67	127.67	127.67	1.30	11.66	9.00	1.30	3.75	5.11
1979-80	111.00	121.00	134.00	131.00	1.55	16.52	6.00	2.75	3.75	6.56
1980-81	120.33	121.67	137.80	154.00	3.11	27.98	9.00	3.11	3.75	10.70
1981-82	135.67	144.33	158.33	159.67	1.97	17.69	9.00	1.97	3.75	6.98
1982-83	142.67	152.67	163.67	178.00	2.75	24.77	9.00	2.75	3.75	8.56
1983-84	151.00	159.33	169.67	178.33	2.01	18.10	9.00	2.01	3.75	7.18
1984-85	155.33	160.00	176.33	179.00	1.69	15.24	9.00	1.69	3.75	6.40

Table 1-c: WHOLESALE PRICE ANALYSIS CROP WHEAT STATE MADHYA PRADESH

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1957	38.63	40.30	43.41	43.48	1.40	12.58	9.00	1.40	3.00	6.11
1958	35.55	32.82	34.38	35.61	0.02	0.15	9.00	0.02	3.00	5.04
1959	42.53	52.35	59.50	50.01	1.96	39.90	6.00	6.65	3.00	16.66
1960	37.96	39.74	41.30	38.31	0.10	8.82	6.00	1.47	3.00	5.09
1961	35.72	34.82	33.49	35.27	-0.14	-1.28	9.00	-0.14	3.00	3.57
1962	34.06	37.51	39.74	41.53	2.44	21.94	9.00	2.44	3.00	7.93
1963	39.95	41.00	39.00	38.17	-0.50	2.63	3.00	0.88	3.00	4.50
1964	38.33	39.33	45.67	52.00	3.96	35.65	9.00	3.96	3.00	14.46
1965	50.50	63.00	64.33	58.33	1.72	27.39	6.00	4.57	3.00	11.01
1966	58.67	60.83	60.67	61.00	0.44	3.98	9.00	0.44	3.00	3.18
1967	61.00	61.00	59.67	69.00	1.46	13.11	9.00	1.46	3.00	12.75
1968	90.33	137.00	122.67	106.00	1.93	51.66	3.00	17.22	3.00	24.29
1969	91.00	93.33	90.00	86.67	-0.53	2.56	3.00	0.85	3.00	5.80
1970	79.67	93.00	90.00	101.00	2.98	26.78	9.00	2.98	3.00	9.51
1971	82.67	79.33	76.67	81.67	-0.13	-1.21	9.00	-0.13	3.00	3.93
1972	78.33	82.67	87.00	90.67	1.75	15.74	9.00	1.75	3.00	5.97
1973	84.33	82.33	90.00	91.26	0.91	8.21	9.00	0.91	3.00	9.17
1974	83.77	83.77	93.69	98.65	1.97	17.76	9.00	1.97	3.00	8.15
1975	126.83	180.00	200.00	187.33	5.30	57.70	6.00	9.62	3.75	17.46
1976	171.67	162.33	132.67	133.33	-2.48	-5.44	3.00	-1.81	3.75	13.18
1977	123.33	129.67	140.00	151.67	2.55	22.97	9.00	2.55	3.75	8.56
1978	148.33	156.67	170.00	161.67	1.00	14.61	6.00	2.43	3.75	7.12
1979	140.00	133.33	132.67	143.00	0.24	2.14	9.00	0.24	3.75	3.88
1980	128.67	144.33	158.33	150.00	1.84	23.06	6.00	3.84	3.75	7.95
1981	158.33	171.00	212.67	216.67	4.09	36.84	9.00	4.09	3.75	14.14
1982	256.67	213.33	186.67	195.00	-2.67	-16.88	3.00	-5.63	3.75	13.09
1983	163.67	192.67	207.33	221.67	3.94	35.44	9.00	3.94	3.75	12.14
1984	190.00	200.00	208.33	213.33	1.36	12.28	9.00	1.36	3.75	4.97

VARIABILITY OF WHOLESALE PRICES

CROP WHEAT STATE UTTAR PRADESH

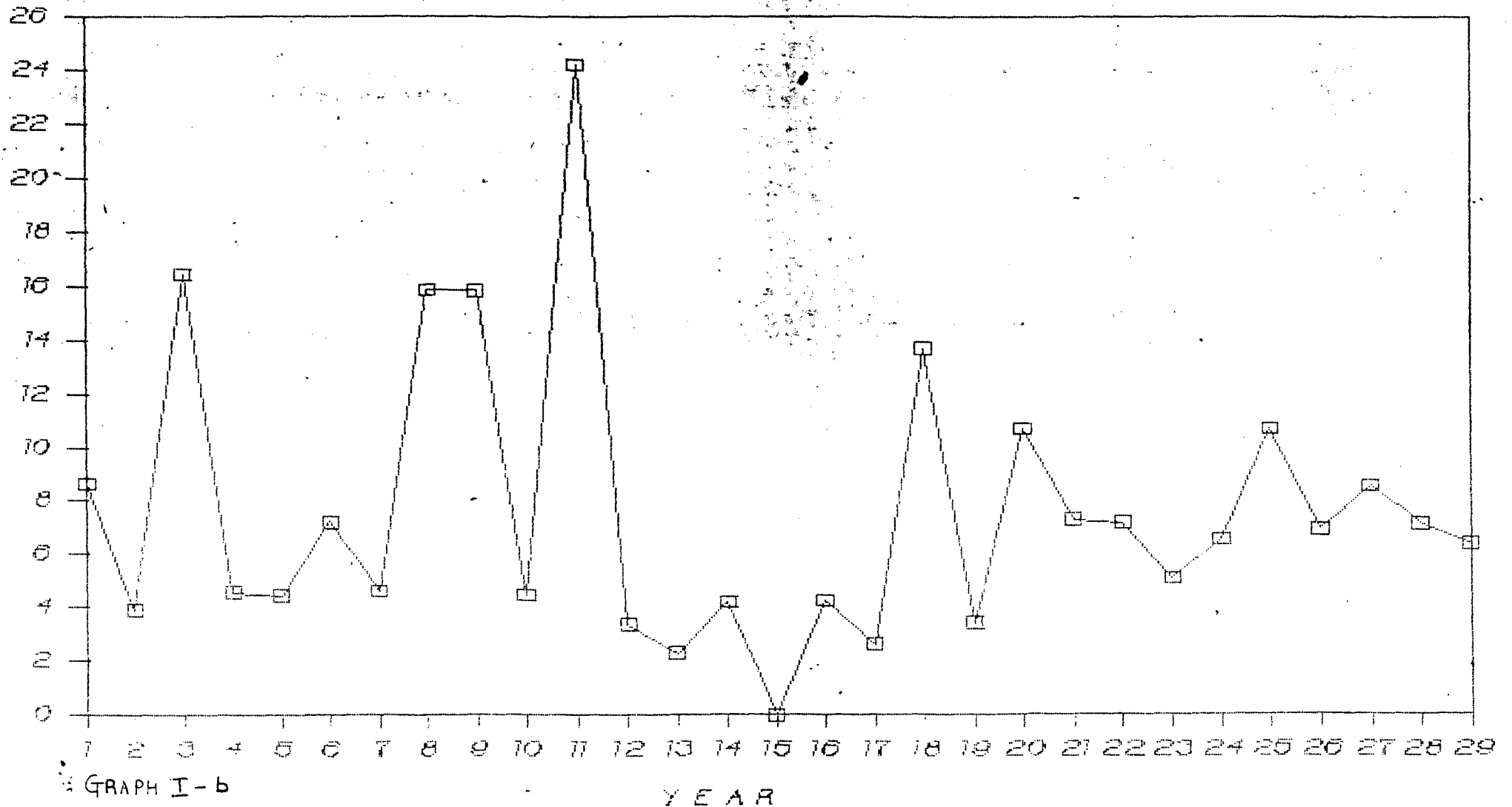


GRAPH I-a

YEAR

VARIABILITY OF WHOLESALE PRICES-

WHEAT PUNJAB

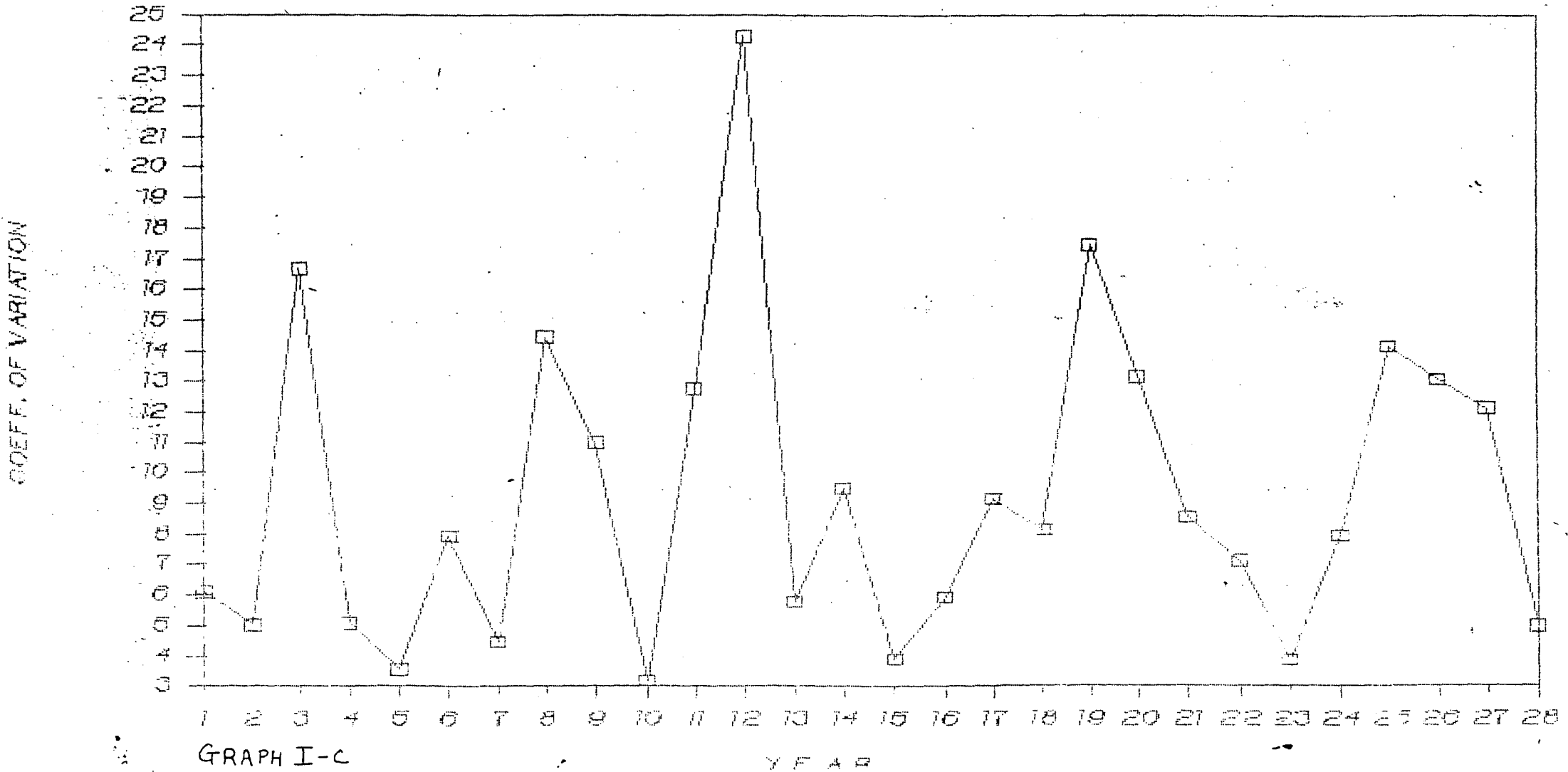


GRAPH I-b

YEAR

VARIABILITY OF WHOLESALE PRICES

CROP WHEAT STATE MADHYA PRADESH



GRAPH I-C

Y E A R

normal carrying costs. Incidentally, these very years also registered a much higher C.V. indicating that during each such year, price variability moved significantly above the trend level. In general, period I shows a very highly fluctuating pattern of year-to-year changes in C.V., punctuated by excessively high values of C.V. for some years. On the whole, the average position for period I reveals a picture of high magnitude of C.V. Period II shows lower variability while period III shows still lower variability. The qualitative changes in the temporal behaviour of C.V. can be visually grasped through Graph 1-a.

The effectiveness of government intervention is discernible more vividly in the case of Punjab. It is not a small feature that since 1974-75, there does not exist a single year when per month price change is higher than the carrying costs. Graph II-b portrays the success stories more tellingly. On an average, the C.V. registers a drastic fall after 1966/1967 in general, and 1974/1975 in particular. The C.Vs. are very close to each other in terms of magnitudes and except for one or two notorious years during the mid-seventies, the post-intervention years reveal a highly smoothed profile.

In Madhya Pradesh, the variability seems to have gone up from period I as a whole to period II but declined during the third period after the mid-seventies. However, the

magnitudes themselves are not very large. Whereas in U.P. and Punjab, the ironing out of the amplitude of fluctuations is visibly more clear, in Madhya Pradesh it is not so. The peaks and troughs are quite sharp, occurring somewhat suddenly, particularly till the onset of the seventies. Moreover, if we consider the percentage change of prices per month, the magnitudes of the price differences on the one hand are not so low and on the other hand even during the eighties, there are at least two such years when the price changes per month are not justified by the normal carrying costs. Thus, the Madhya Pradesh situation is a little less pleasing compared with that in Uttar Pradesh and Punjab.

In sum, in the case of wheat, the effectiveness of government policy reveals itself in two ways. Firstly, the percentage price change per month is much less than the normal carrying costs thereby leaving no incentive for the farmers and traders to hold on with the saleable stocks. Secondly, the C.V. has also shown a tendency to decline in the years of effective intervention.

In totality, in the case of wheat, the effectiveness of government policy reveals itself quite clearly in Uttar Pradesh and Punjab, and a little less in Madhya Pradesh. We are able to say so both on the basis of the comparison between per month price hikes and the normal carrying costs,

as also on the basis of the changing time-profile of the C.V. before and after the inception of intervention.

Before we *conclude* our discussion on wheat, it may be enlightening to look into the results of the second-degree polynomial fitted for the time-series of C.V. In particular, we would like to see if the hypothesis of reversibility from an increasing to a declining trend is discernible; if so, around which point of time. Again, it may be highly useful to see if the time-point of reversibility, more or less, coincides with the beginning of government intervention. This would provide an added confirmation to the conclusions reached by us earlier.

Table-IA: Additional Information on C.V. for Wheat -
Estimated Polynomial ($V=a+bT+cT^2$)

	Uttar Pradesh	Punjab	Madhya Pradesh
b Coefficient	+0.337765	+0.446287	+0.385290
c Coefficient	-0.01362	-0.01702	-0.01071
Reversibility Point ($\frac{b}{-2c}$)	12.39	13.11	18.0

From the above table it is clear that in the case of wheat, for all the three chosen states, the trend of variability is distinctly upward moving till a given time point as borne out by positive b coefficients in each case, and reverses itself into a declining trend after that time

point as is borne out by negative c coefficients. The reversibility point is in conformity with our expectations in U.P. and Punjab viz. the 12th or 13th year (1967-68 or 1968-69) which occurs soon after this crop came under the purview of the APC. In Madhya Pradesh however, the process of reversibility seems to have been delayed by a few years as we can see from the table.

All in all, the above results strengthen our hypothesis further.

In the first case of Rice - viz. that of West Bengal, (table II-a) while there were about three out of eleven years during the pre-intervention era where price change exceeded carrying cost, this number rose to six years out of the 9 years in period 2, and declined to 2 years during the third period. While the C.V. ranged between 3 and 16 for period one, it rose considerably during the early and mid-seventies reaching a level as high as 40.35 in 1971-72 but thereafter started declining relatively after 1974-75.

It is clear also from graph II-a that in West Bengal, the intra-year variability of wholesale prices of rice shot up initially after government intervention but with the effective implementation of buffer stocking and other mechanisms of price policy, the variability started coming down. On an year to year basis, there was not much change in the last period as seen from the graph while the mid-

Table 1-a: WHOLESALE PRICE ANALYSIS CROP RICE STATE WEST BENGAL

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	51.58	60.06	62.07	59.39	1.68	20.35	6.00	3.39	3.00	7.70
1957-58	55.37	65.42	77.70	71.00	3.14	40.32	6.00	6.72	3.00	16.48
1958-59	49.34	47.56	61.40	62.52	2.97	26.70	9.00	2.97	3.00	15.42
1959-60	58.50	62.07	62.96	57.16	-0.25	7.63	6.00	1.27	3.00	5.71
1960-61	52.91	52.25	55.37	62.96	2.11	18.99	9.00	2.11	3.00	8.11
1961-62	57.48	62.71	65.30	72.67	2.94	26.43	9.00	2.94	3.00	8.87
1962-63	64.42	72.51	80.09	84.69	3.50	31.47	9.00	3.50	3.00	11.47
1963-64	64.81	64.38	64.38	64.38	-0.07	-0.66	3.00	-0.22	3.00	0.55
1964-65	69.03	71.35	71.35	71.35	0.37	3.37	3.00	1.12	3.00	2.72
1965-66	72.11	73.64	73.64	89.26	2.64	23.78	9.00	2.64	3.00	16.97
1966-67	99.04	104.27	131.27	135.50	4.09	36.81	9.00	4.09	3.00	15.21
1967-68	118.19	129.67	139.56	127.57	0.88	18.08	6.00	3.01	3.00	8.82
1968-69	110.73	111.92	126.33	149.04	3.84	34.60	9.00	3.84	3.00	13.37
1969-70	112.83	132.24	155.00	155.00	4.15	37.37	6.00	6.23	3.00	14.02
1970-71	111.57	113.06	108.67	109.79	-0.18	1.34	9.00	0.15	3.00	3.15
1971-72	111.33	123.83	207.33	152.00	4.06	86.23	6.00	14.37	3.00	40.35
1972-73	119.46	138.17	171.00	206.67	8.11	73.01	9.00	8.11	3.00	24.34
1973-74	145.33	203.33	231.00	221.67	5.84	58.94	6.00	9.82	3.00	23.36
1974-75	166.67	213.33	220.00	211.67	3.00	32.00	6.00	5.33	3.75	11.88
1975-76	145.00	161.67	200.00	198.33	4.09	37.93	6.00	6.32	3.75	14.28
1976-77	151.67	175.00	193.33	180.00	2.08	27.47	6.00	4.58	3.75	10.43
1977-78	157.67	159.00	185.00	219.00	4.32	38.90	9.00	4.32	3.75	14.06
1978-79	168.33	197.33	240.00	235.00	4.40	42.57	6.00	7.10	3.75	14.57
1979-80	202.00	223.33	244.67	242.67	2.24	21.12	6.00	3.52	3.75	11.78
1980-81	201.33	225.00	243.33	242.67	2.28	20.86	6.00	3.48	3.75	8.97
1981-82	249.67	290.00	340.00	338.33	3.95	36.18	6.00	6.03	3.75	14.60
1982-83	290.67	335.00	358.33	320.00	1.12	23.28	6.00	3.88	3.75	11.17
1983-84	286.00	292.33	291.00	291.00	0.19	2.21	3.00	0.74	3.75	2.03
1984-85	287.00	286.67	321.67	313.33	1.02	12.08	6.00	2.01	3.75	9.01

Table II-b: WHOLESALE PRICE ANALYSIS CROP RICE STATE ANDHRA PRADESH (NELLORE)

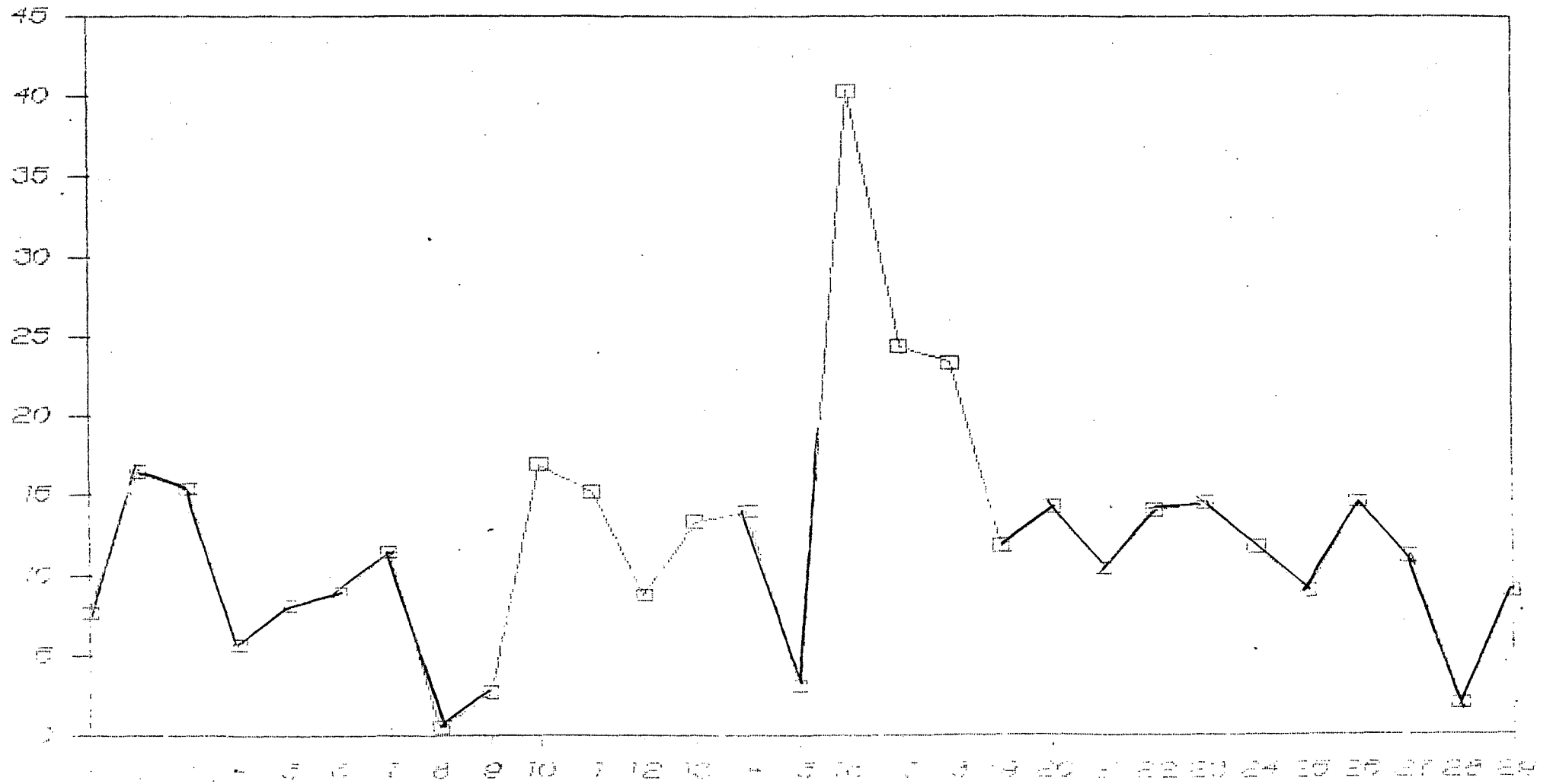
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	51.07	52.24	53.03	50.74	-0.07	3.83	6.00	0.64	3.00	5.80
1957-58	46.66	45.55	45.55	45.74	-0.22	-1.97	9.00	-0.22	3.00	1.39
1958-59	46.89	59.61	62.29	64.30	4.13	37.14	9.00	4.13	3.00	12.51
1959-60	68.99	63.41	62.15	65.19	-0.61	-5.50	9.00	-0.61	3.00	5.97
1960-61	69.66	71.44	72.33	72.34	0.43	3.84	9.00	0.43	3.00	1.77
1961-62	74.11	65.83	63.53	69.14	-0.75	-6.71	9.00	-0.75	3.00	7.94
1962-63	71.00	60.92	65.72	72.17	0.18	1.64	9.00	0.18	3.00	8.14
1963-64	78.38	69.36	71.88	76.81	-0.22	-2.01	6.00	-0.34	3.00	7.80
1964-65	77.00	74.06	74.06	74.06	-0.42	-3.82	3.00	-1.27	3.00	1.70
1965-66	76.03	76.02	76.02	76.02	0.00	-0.02	3.00	-0.01	3.00	0.01
1966-67	78.55	79.81	79.81	79.81	0.18	1.61	3.00	0.54	3.00	1.32
1967-68	79.81	85.54	101.67	115.42	4.96	44.61	9.00	4.96	3.00	15.82
1968-69	123.83	109.75	114.00	124.50	0.06	0.54	9.00	0.06	3.00	7.42
1969-70	129.48	111.00	105.67	117.00	-1.07	-9.64	9.00	-1.07	3.00	9.12
1970-71	123.17	115.50	117.89	131.83	0.78	7.04	9.00	0.78	3.00	6.26
1971-72	158.33	130.00	129.67	137.00	-1.50	-13.47	9.00	-1.50	3.00	10.80
1972-73	145.67	139.00	122.00	143.33	-0.18	-1.60	9.00	-0.18	3.00	8.45
1973-74	150.33	165.67	181.67	210.00	4.41	39.69	9.00	4.41	3.00	13.86
1974-75	237.67	235.00	223.67	191.67	-2.15	-1.12	3.00	-0.37	3.75	12.60
1975-76	187.33	165.00	181.67	150.00	-2.21	-3.02	6.00	-0.50	3.75	11.31
1976-77	183.33	210.00	180.00	195.33	0.73	14.55	3.00	4.85	3.75	10.94
1977-78	220.00	195.00	161.67	186.67	-1.68	-11.36	3.00	-3.79	3.75	12.83
1978-79	197.33	178.33	168.33	199.00	0.09	0.84	9.00	0.09	3.75	10.03
1979-80	210.67	243.33	206.67	226.67	0.84	15.51	3.00	5.17	3.75	8.68
1980-81	261.67	250.00	225.00	272.33	0.45	4.08	9.00	0.45	3.75	8.82
1981-82	286.00	313.33	235.67	265.00	-0.82	9.56	3.00	3.19	3.75	10.72
1982-83	286.00	292.00	247.67	297.83	0.46	4.14	9.00	0.46	3.75	7.49
1983-84	330.00	376.67	355.00	280.00	-1.68	14.14	3.00	4.71	3.75	11.41
1984-85	280.00	290.00	266.67	316.67	1.46	13.10	9.00	1.46	3.75	7.06

Table II-c: WHOLESALE PRICE ANALYSIS CROP RICE STATE TAMIL NADU (MADRAS)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	53.19	48.73	50.86	47.65	-1.16	-4.38	6.00	-0.73	3.00	4.90
1957-58	48.79	51.80	50.91	56.88	1.84	16.58	9.00	1.84	3.00	5.84
1958-59	63.11	45.91	45.10	40.19	-4.04	-27.25	3.00	-9.08	3.00	18.18
1959-60	49.18	54.83	58.11	61.69	2.83	25.44	9.00	2.83	3.00	10.22
1960-61	61.95	55.58	56.28	61.38	-0.10	-0.92	9.00	-0.10	3.00	5.13
1961-62	62.01	62.69	58.92	66.07	0.73	6.55	9.00	0.73	3.00	5.66
1962-63	57.88	53.83	54.26	57.43	-0.09	-0.78	9.00	-0.09	3.00	3.84
1963-64	62.95	62.89	64.11	60.76	1.02	9.22	9.00	1.02	3.00	5.31
1964-65	66.05	67.72	67.72	67.72	0.28	2.52	3.00	0.84	3.00	2.05
1965-66	68.80	69.30	72.69	73.99	0.84	7.53	9.00	0.84	3.00	3.56
1966-67	73.90	73.90	73.90	73.90	0.00	0.00	3.00	0.00	3.00	0.00
1967-68	73.90	63.09	63.09	63.09	-1.63	-14.63	3.00	-4.88	3.00	7.11
1968-69	63.09	63.09	63.09	63.09	0.00	0.00	3.00	0.00	3.00	0.00
1969-70	63.09	63.09	63.09	63.09	0.00	0.00	3.00	0.00	3.00	0.00
1970-71	63.09	63.09	63.09	63.09	0.00	0.00	3.00	0.00	3.00	0.00
1971-72	63.09	63.09	63.09	63.09	0.00	0.00	3.00	0.00	3.00	0.00
1972-73	63.09	63.09	63.09	63.09	0.00	0.00	3.00	0.00	3.00	0.00
1973-74	111.70	136.00	136.00	136.00	2.42	21.76	3.00	7.25	3.00	15.51
1974-75	136.00	185.00	159.00	171.67	2.91	36.03	3.00	12.01	3.75	12.77
1975-76	165.00	165.00	165.00	165.00	0.00	0.00	3.00	0.00	3.75	0.00
1976-77	165.00	154.25	154.25	154.25	-0.72	-6.52	3.00	-2.17	3.75	2.97
1977-78	154.25	154.25	154.25	154.25	0.00	0.00	3.00	0.00	3.75	0.00
1978-79	154.25	154.25	154.25	155.42	0.08	0.76	3.00	0.25	3.75	0.42
1979-80	156.00	156.00	156.00	156.00	0.00	0.00	3.00	0.00	3.75	0.00
1980-81	156.00	166.00	171.00	171.00	1.07	9.62	3.00	3.21	3.75	4.26
1981-82	171.00	171.00	171.00	171.00	0.00	0.00	3.00	0.00	3.75	0.00
1982-83	171.00	171.00	171.00	171.00	0.00	0.00	3.00	0.00	3.75	0.00
1983-84	171.00	172.33	175.00	175.00	0.26	2.34	6.00	0.39	3.75	1.14
1984-85	175.00	175.00	175.00	175.00	0.00	0.00	3.00	0.00	3.75	0.00

VARIABILITY OF WHOLESALE PRICES

CROP RICE STATE WEST BENGAL

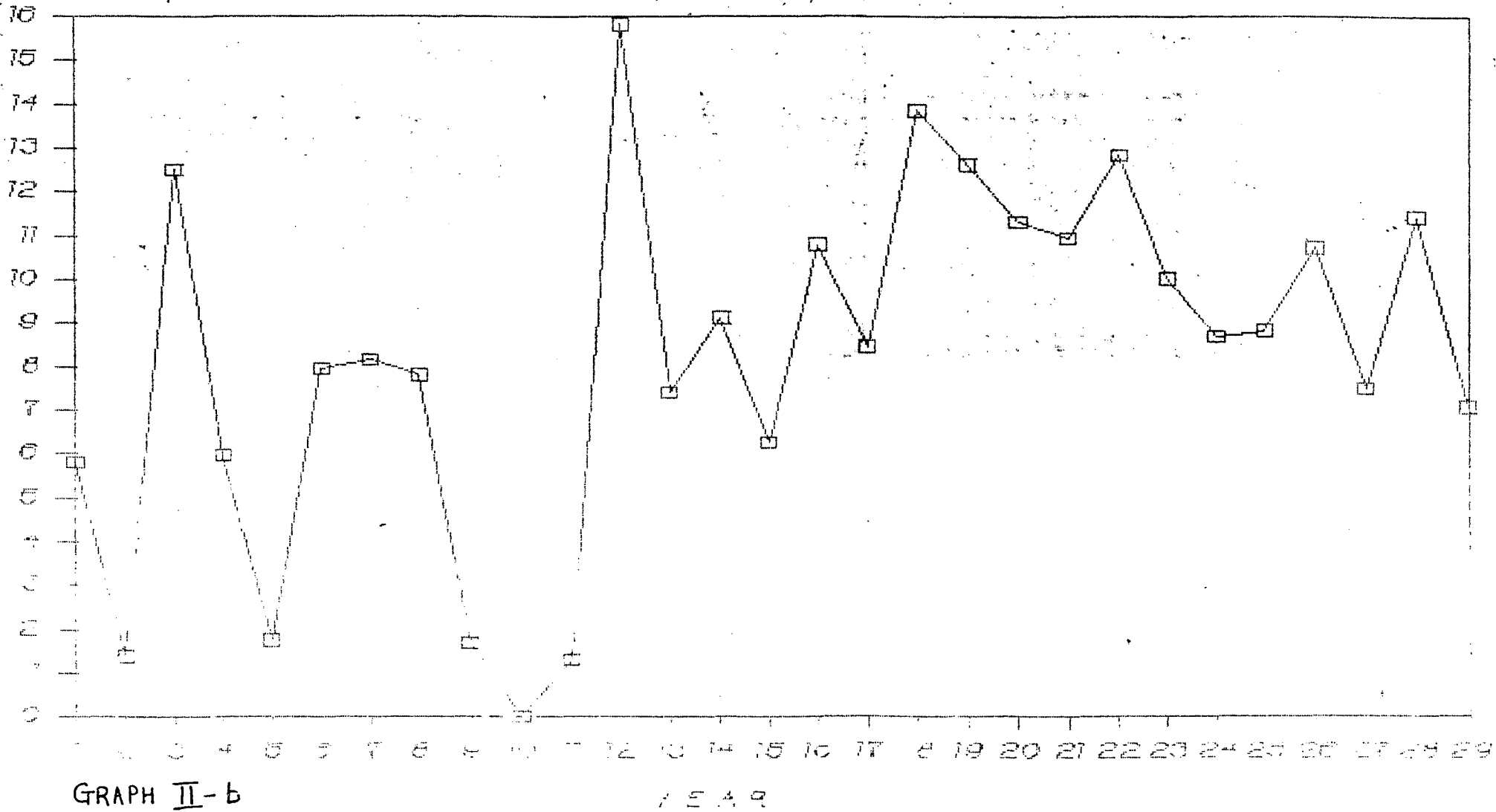


GRAPH II-a

VARIABILITY OF WHOLESALE PRICES

(CROP RICE STATE ANDHRA PRADESH (NELLORE))

COEFF. OF VARIATION



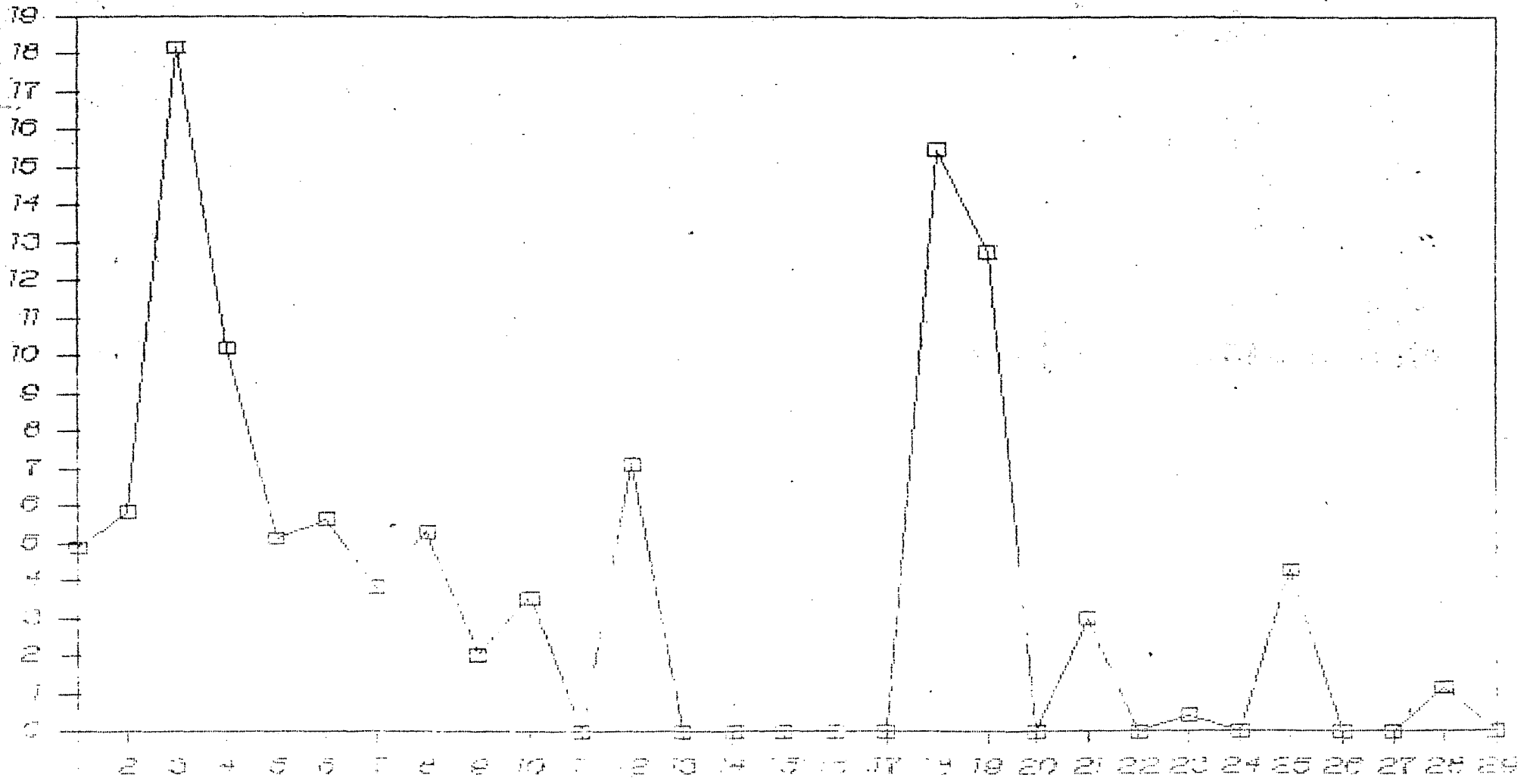
GRAPH II-b

YEAR

VARIABILITY OF WHOLESALE PRICES

CROP PRICE STATE TAMIL NADU (NELLORE)

COEFF. OF VARIATION



GRAPH II-C

YEAR

period (i.e. period 2) stands out as the worst.

Incidentally, a few problems about data may better be pointed out at this stage. As given in the data showing for the year 1959, February to June prices; and for the years 1964-66, all prices pertain to maximum prices as fixed by the state government (and not open-market prices or wholesale prices)

In Andhra Pradesh, we find that the price data from 1965 to 1968 refers to maximum prices fixed by the government and not wholesale prices. Not surprisingly, therefore, for these years the inter-quarter or inter-month variations (see Table II-b) were almost absent and one finds that during half of the first period the percentage change in prices per month was negative with barely one year when the change exceeded normal carrying costs. During the years showing negative percentage change we find the prices higher during the peak season rather than the lowest. During the middle period, the C.V. increased sizeably compared with the first period with half the period registering a decline in the percentage price change. While during two of the nine years the price change exceeded normal carrying costs, during the last period (mid-seventies onwards) there was not a single such year. The C.V. level remained the same as it was during period II.

A glance at Graph II-b, clearly reveals that although the absolute level of C.V. has indeed gone up over the

government intervention period, the amplitude of fluctuations started reducing drastically from year-to-year from the late sixties-early seventies onwards, and the overall trend appears to be in the downward direction.

In Tamil Nadu also the price data available from 1964 to 1965 are not wholesale prices but maximum prices fixed by the government. Besides, from 1968-69 to 1972-73 and the years 1975-76, 1977-78, 1979-80, 1981-82, and 1984-85 all give values of C.V. equal to zero because the prices as given are the same for all the 12 months in each of these years. Corresponding to these years, one may notice a break in the graph of C.V. for rice, Tamil Nadu (refer graph II-c). As is also visible from the graph, except for an odd year here and there, the general level of C.V. has fallen considerably over time. In the era of government intervention only the 18th year i.e. 1973-74 breaks the horizon of an otherwise very-close-to-the-axis level of variability. In other words a very low absolute and relative magnitude of variability started showing up from 1973-74 onwards.

It is clear that although both wheat and rice by and large conform to our hypothesis, the exceptions are noticeable more in the case of rice. Moreover, there are severe data limitations, which we have to bear with, for want of a better alternative in almost all the cases of rice taken by us.

Finally, let us also take a look at the second-degree polynomial fitted to the time-series of C.V. for each of the three states for rice, as we did in the case of wheat to find out whether the trend of initially increasing and later decreasing variability emerges and around which time point of course.

Table II-A: Additional Information on C.V. for Rice - Estimated Polynomial ($V = a+bT+cT^2$)

	West Bengal	Andhra Pradesh	Tamil Nadu
b Coefficient	+1.267929	+0.753603	N.E.
c Coefficient	-0.03991	-0.02018	N.E.
Reversibility Point ($= \frac{b}{2c}$)	15.88	18.66	N.E.

NOTE: N.E. :- NOT ESTIMATED

The results as tabulated in table II-A are certainly not as neat as for wheat (Table I-A). However, both in West Bengal and Andhra Pradesh, the C.V. increased for a few years then started declining. The decline set in during the early-seventies for West Bengal and Andhra Pradesh. This happened later than in the case of wheat. Perhaps, it is understandable if we recall that the breakthrough in rice technology and consequently volume of production commenced only in the early-seventies. The price policy for rice acquired its full vigour including massive purchases on government account only since 1972 or 1973

onwards. The decline in month-to-month variability in wholesale prices was, therefore, more sure to take place only since 1973/1974 onwards.

For Tamil Nadu, we did not consider it advisable to estimate the second-degree polynomial because of some serious gaps and statistical distortions in the price data.

In conclusion thus, by and large, this section on major cereals (wheat and rice) yields satisfactory results in the context of our hypotheses. As between wheat and rice, the results are more precise and neat for the former.

Section II : COARSE GRAINS (JOWAR, BAJRA, MAIZE AND BARLEY)

Amongst the coarse grains being dealt with in this section, jowar, bajra and maize came formally under the purview of the APC during the year 1965-66.

Following the 1975 Technical Group on Buffer Stocks, the Department of Food constituted another Technical Group on Buffer stocks of foodgrains in order to examine the feasibility of the buffer stocking policy of foodgrains for the Vith Plan period.

In the context of this chapter, we may note that amongst the other terms of reference of the Group, one of them was:

"...To suggest the grain mix in the buffer and operational stocks;..."

However, in the context of the above question relating to the grain mix of the foodgrain stocks, 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 therefore these were not considered by them. Moreover, it was only several years after the setting up of the APC, that the NAFED (National Agricultural Co-operative Marketing Federation) was designated as the agency for undertaking support purchases of coarse grains

in collaboration with state co-operative marketing agencies or any other agency nominated by the state, with the assurance that losses, if any, would be re-imbursed fully.³

At the moment, the government fixes minimum support/procurement prices for 20 commodities. These are: rice, wheat, barley, sorgum, pearl millet, maize, ragi, mustard, groundnut, soya-bean, sunflowerseed, safflowerseed, gram, black gram, green gram, red gram (pigeon pea), jute, cotton, sugarcane and VFC tobacco. These crops together account for over 80 per cent of the gross cropped area in the country.⁴

Thus amongst the four coarse cereals being dealt with in this section only maize and barley are included under the commodity coverage for fixation of support/procurement prices while bajra and jowar do not enjoy effective coverage.

The above background suggests that there is hardly any effective buffer stocking policy to speak of, for coarse grains and not all coarse grains are given adequate attention in practice, by the APC in matters of price announcements and their effective implementation. Accordingly, we might discover certain odd problems in the context of price fluctuations and variability as our analysis goes on. Also, it is fairly obvious that for

coarse grains, we need not consider a periodisation scheme similar to the one adopted earlier for wheat and rice in the previous section.

A glance at table III-a for jowar in Maharashtra (Nagpur) shows that the price differences are well within the justifiable range of normal carrying costs, throughout except for 1963-64 when the price difference exceeded the carrying cost substantially. From this it also follows that the inter-quarter range of prices was never very high as in the case of some other crops - i.e. the mean price from one quarter to another did not register any volatile changes. Perhaps this is because the market for coarse grains is not really a breeding ground for hoarders and black marketeers since the demand comes primarily from the economically less well-off sections of the population. Moreover the production of jowar has also not registered any sharp declines. Hence, prices appear to be relatively controlled.

Graph III-a also goes in conformity with the above pattern, revealing a sharp peak during the 8th year (i.e. 1963-64) and another sharp peak in the 19th year (viz. 1974-75). Apart from these distinct departures it is visible that after the mid-seventies, the C.V. did reveal a reduction in price variability in absolute terms as well as in the fluctuations from year to year. If the

Table III-a: WHOLESAL PRICE ANALYSIS CROP JOWAR STATE MAHARASHTRA

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	32.92	34.77	36.89	34.10	0.40	12.07	6.00	2.01	3.00	4.60
1957-58	29.13	29.33	34.28	34.49	2.04	18.39	9.00	2.04	3.00	9.02
1958-59	32.37	32.84	33.66	38.85	2.22	20.00	9.00	2.22	3.00	9.01
1959-60	38.85	35.95	40.41	37.51	-0.38	4.02	6.00	0.67	3.00	5.26
1960-61	29.33	27.00	33.00	31.00	0.63	12.50	6.00	2.08	3.00	8.74
1961-62	34.67	35.67	40.33	41.67	2.24	20.19	9.00	2.24	3.00	10.20
1962-63	37.67	27.00	32.67	33.50	-1.23	-11.06	9.00	-1.23	3.00	11.80
1963-64	40.00	42.67	53.33	69.67	8.24	74.17	9.00	8.24	3.00	23.88
1964-65	53.00	45.00	45.00	47.67	-1.24	-11.18	9.00	-1.24	3.00	15.31
1965-66	53.00	53.00	53.00	54.00	0.21	1.89	9.00	0.21	3.00	1.56
1966-67	64.98	66.67	66.67	66.67	0.29	2.60	3.00	0.87	3.00	2.11
1967-68	66.67	66.67	66.67	66.67	0.00	0.00	3.00	0.00	3.00	0.00
1968-69	66.67	64.89	61.34	56.00	-1.78	-2.66	3.00	-0.89	3.00	6.85
1969-70	56.00	56.00	56.00	56.33	0.07	0.60	9.00	0.07	3.00	0.49
1970-71	57.00	57.00	57.00	57.00	0.00	0.00	3.00	0.00	3.00	0.00
1971-72	58.00	58.00	58.00	58.00	0.00	0.00	3.00	0.00	3.00	0.00
1972-73	58.00	58.00	58.00	62.00	0.77	6.90	9.00	0.77	3.00	5.62
1973-74	70.00	70.00	70.00	70.00	0.00	0.00	3.00	0.00	3.00	0.00
1974-75	118.33	171.67	178.33	135.67	0.19	33.75	6.00	5.63	3.75	20.60
1975-76	118.33	117.33	136.67	112.33	-0.56	15.49	6.00	2.58	3.75	10.69
1976-77	105.00	101.67	110.67	101.67	-0.35	5.40	6.00	0.90	3.75	7.02
1977-78	96.67	98.33	105.00	98.33	0.19	8.62	6.00	1.44	3.75	4.79
1978-79	104.00	101.67	111.67	115.00	1.18	10.58	9.00	1.18	3.75	6.62
1979-80	118.33	118.33	136.67	125.00	0.63	15.49	6.00	2.58	3.75	7.23
1980-81	140.33	170.00	175.00	155.00	1.16	24.70	6.00	4.12	3.75	10.96
1981-82	148.33	146.67	156.67	138.33	-0.75	5.62	6.00	0.94	3.75	7.12
1982-83	133.33	138.33	148.33	136.33	0.25	11.25	6.00	1.88	3.75	5.30
1983-84	148.33	146.67	158.33	143.33	-0.37	6.74	6.00	1.12	3.75	5.61
1984-85	130.00	131.67	136.67	131.67	0.14	5.13	6.00	0.85	3.75	2.44

Table III-b: WHOLESALE PRICE ANALYSIS CROP JOWAR STATE MADHYA PRADESH

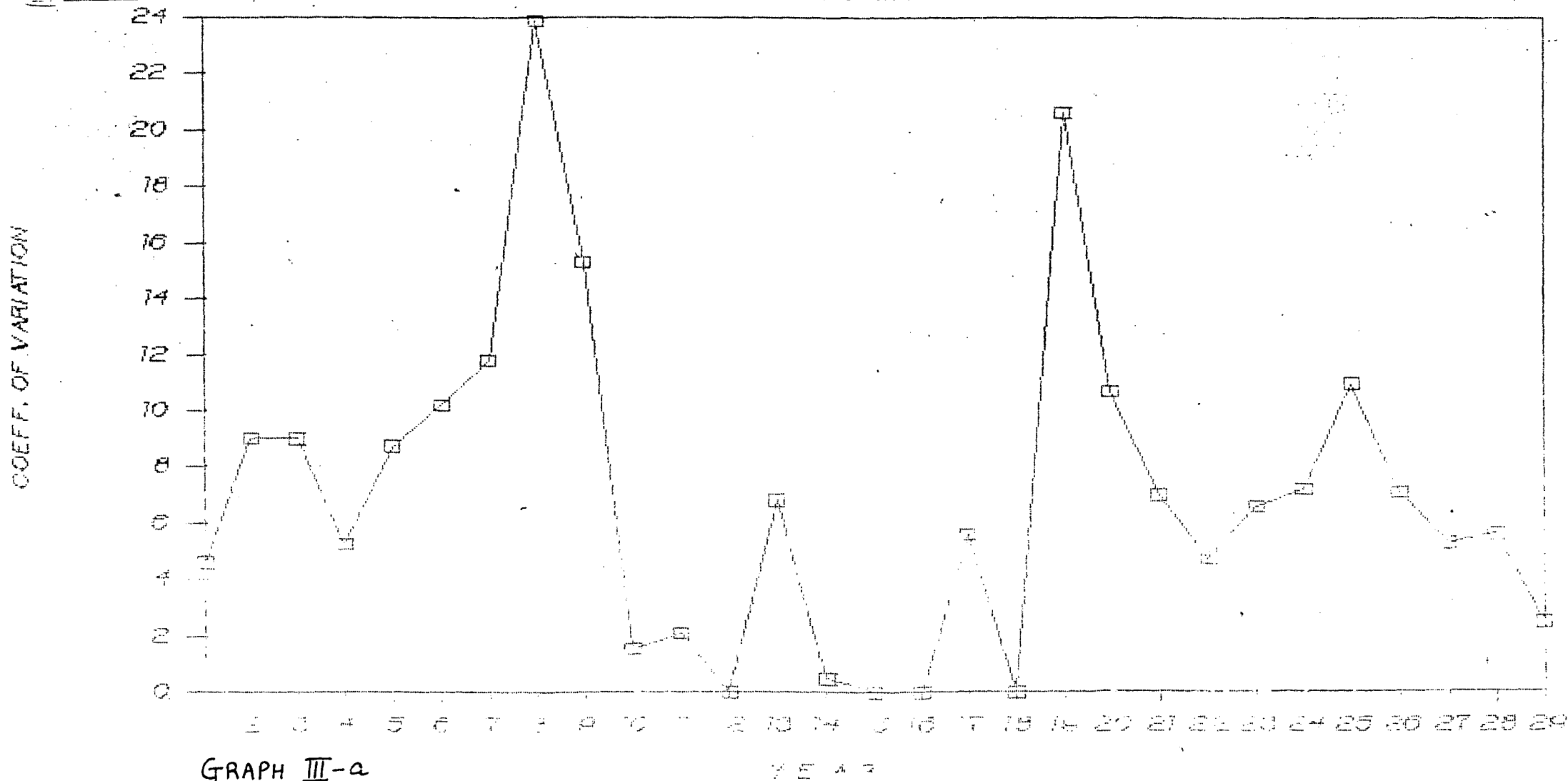
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	35.28	34.71	33.60	30.92	-1.37	-1.59	6.00	-0.27	3.00	7.00
1957-58	25.23	26.57	32.28	32.15	3.05	27.96	6.00	4.66	3.00	12.73
1958-59	35.95	33.66	35.68	37.06	0.35	3.11	9.00	0.35	3.00	6.79
1959-60	34.14	34.29	39.27	36.95	0.91	15.01	6.00	2.50	3.00	6.83
1960-61	31.62	31.37	34.11	31.00	-0.22	7.86	6.00	1.31	3.00	4.75
1961-62	36.17	37.50	39.78	38.50	0.72	10.00	6.00	1.67	3.00	4.57
1962-63	30.17	28.05	31.08	31.33	0.43	3.87	9.00	0.43	3.00	6.03
1963-64	36.67	34.00	43.00	43.00	1.92	17.27	6.00	2.88	3.00	11.69
1964-65	40.17	40.33	40.83	40.50	0.09	1.66	6.00	0.28	3.00	1.98
1965-66	43.83	45.50	45.50	45.50	0.42	3.80	3.00	1.27	3.00	3.07
1966-67	45.00	47.00	96.67	75.00	7.41	114.81	6.00	19.14	3.00	34.51
1967-68	58.33	55.00	62.67	60.00	0.32	7.43	6.00	1.24	3.00	7.26
1968-69	55.67	68.67	76.33	72.67	3.39	37.13	6.00	6.19	3.00	13.12
1969-70	71.00	72.33	70.67	59.00	-1.88	1.88	3.00	0.63	3.00	9.05
1970-71	68.67	70.00	80.07	81.37	2.06	18.50	9.00	2.06	3.00	11.50
1971-72	79.00	82.23	92.17	84.00	0.70	16.67	6.00	2.78	3.00	12.79
1972-73	69.83	75.23	89.00	128.67	9.36	84.25	9.00	9.36	3.00	27.68
1973-74	133.50	141.50	178.50	177.50	3.66	33.71	6.00	5.62	3.00	14.99
1974-75	143.33	144.90	142.67	149.00	0.44	3.95	9.00	0.44	3.75	4.40
1975-76	133.67	110.00	127.83	121.63	-1.00	-4.36	6.00	-0.73	3.75	10.84
1976-77	85.97	83.83	106.67	113.33	3.54	31.83	9.00	3.54	3.75	13.92
1977-78	93.90	89.80	106.67	92.17	-0.21	13.60	6.00	2.27	3.75	9.66
1978-79	90.23	95.67	116.97	118.57	3.49	31.40	9.00	3.49	3.75	13.25
1979-80	108.33	109.63	135.67	119.67	1.16	25.23	6.00	4.21	3.75	10.93
1980-81	128.13	154.23	167.50	149.33	1.84	30.72	6.00	5.12	3.75	12.64
1981-82	124.07	118.73	137.00	128.33	0.38	10.42	6.00	1.74	3.75	7.46
1982-83	128.33	129.23	142.30	126.83	-0.13	10.88	6.00	1.81	3.75	5.89
1983-84	132.90	140.30	141.00	139.00	0.51	6.09	6.00	1.02	3.75	4.29
1984-85	135.40	140.33	150.63	152.07	1.37	12.31	9.00	1.37	3.75	4.92

Table III-c: WHOLESAL PRICE ANALYSIS CROP JOWAR STATE KARNATAKA (GULBARGA)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	48.62	41.99	42.99	44.36	-0.97	-8.76	9.00	-0.97	3.00	8.98
1957-58	35.05	27.46	32.60	33.27	-0.57	-5.10	9.00	-0.57	3.00	11.70
1958-59	32.15	34.38	37.06	42.42	3.55	31.94	9.00	3.55	3.00	10.82
1959-60	41.97	38.85	41.17	43.54	0.41	3.72	9.00	0.41	3.00	5.23
1960-61	40.50	35.72	35.71	37.01	-0.96	-8.62	9.00	-0.96	3.00	6.92
1961-62	39.00	40.83	46.23	53.00	3.99	35.90	9.00	3.99	3.00	12.45
1962-63	50.50	43.00	41.83	41.33	-2.02	-14.85	3.00	-4.95	3.00	12.27
1963-64	44.43	50.47	64.17	78.00	8.39	75.54	9.00	8.39	3.00	22.64
1964-65	80.67	61.17	75.67	80.67	0.00	0.00	9.00	0.00	3.00	14.39
1965-66	78.33	72.67	73.67	68.00	-1.47	-5.96	6.00	-0.99	3.00	7.63
1966-67	62.67	64.33	71.33	84.67	3.90	35.11	9.00	3.90	3.00	12.72
1967-68	80.67	72.00	80.00	85.33	0.64	5.79	9.00	0.64	3.00	10.35
1968-69	75.33	76.67	74.67	70.67	-0.69	1.77	3.00	0.59	3.00	4.47
1969-70	72.33	74.67	79.67	87.00	2.25	20.28	9.00	2.25	3.00	7.87
1970-71	95.00	86.33	95.33	98.00	0.35	3.16	9.00	0.35	3.00	8.31
1971-72	99.67	88.00	103.00	122.00	2.49	22.41	9.00	2.49	3.00	12.74
1972-73	121.00	150.67	174.33	176.67	5.11	46.01	9.00	5.11	3.00	15.52
1973-74	137.00	139.33	157.67	186.00	1.05	9.41	9.00	1.05	3.00	12.51
1974-75	183.33	147.33	147.33	136.67	-2.83	-19.64	3.00	-6.55	3.75	12.59
1975-76	139.33	139.00	156.00	161.67	1.78	16.03	9.00	1.78	3.75	9.50
1976-77	125.00	113.00	121.33	123.67	-0.12	-1.07	9.00	-0.12	3.75	6.86
1977-78	118.00	103.00	99.00	105.67	-1.16	-10.45	9.00	-1.16	3.75	8.52
1978-79	109.67	104.67	122.67	134.67	2.53	22.80	9.00	2.53	3.75	11.16
1979-80	135.00	118.67	128.33	145.00	0.82	7.41	9.00	0.82	3.75	9.55
1980-81	148.33	175.00	189.00	201.67	4.00	35.96	9.00	4.00	3.75	11.68
1981-82	216.00	176.67	172.00	178.33	-1.94	-17.44	9.00	-1.94	3.75	12.15
1982-83	173.33	171.67	176.67	203.33	1.92	17.31	9.00	1.92	3.75	7.65
1983-84	215.67	209.33	216.17	220.50	0.25	2.24	9.00	0.25	3.75	4.81
1984-85	221.17	198.33	186.67	190.00	-1.57	-10.32	3.00	-3.44	3.75	7.96

VARIABILITY OF WHOLESALE PRICES

CROP JOWAR STATE MAHARASHTRA

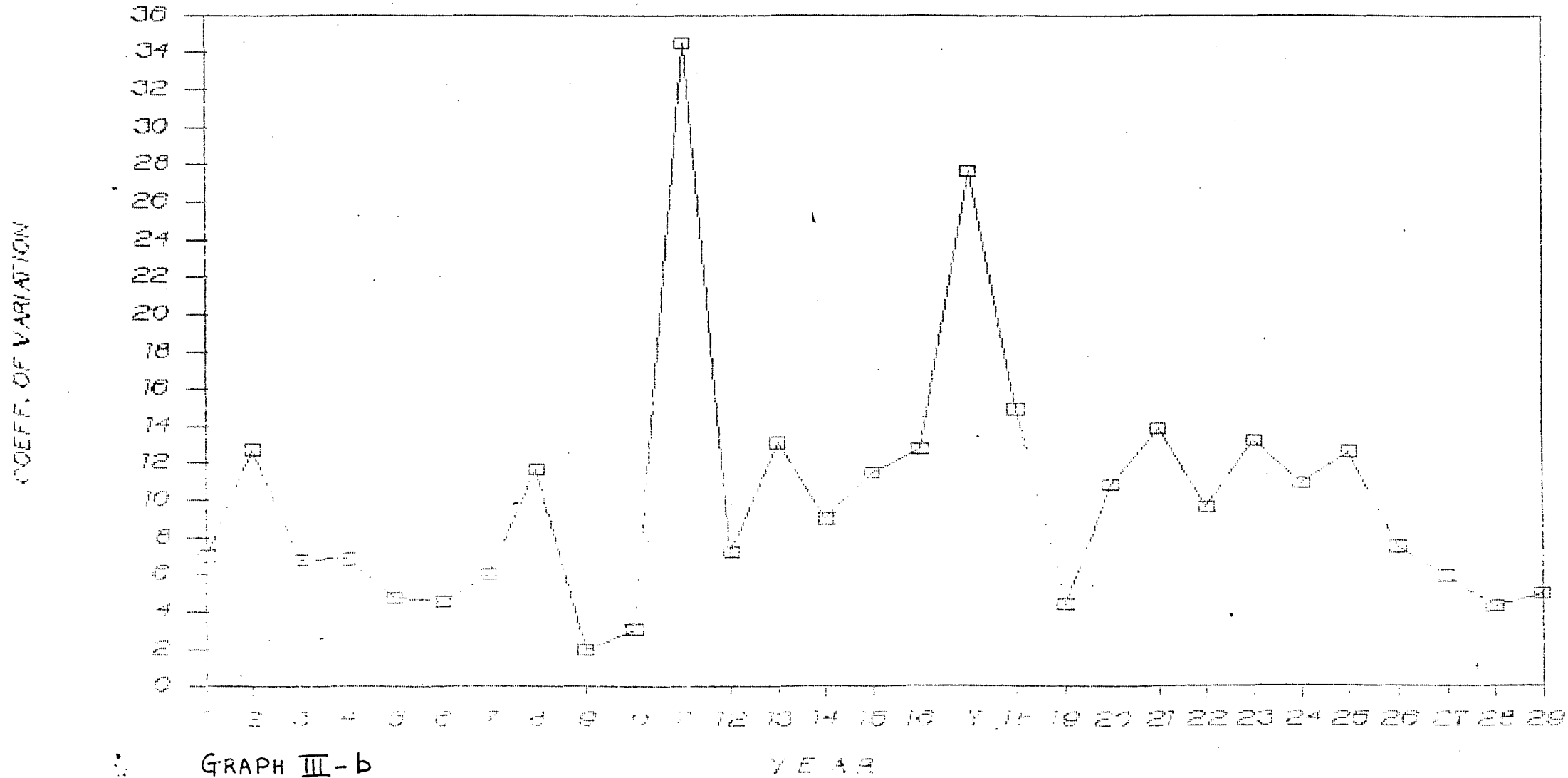


GRAPH III-a

YEAR

VARIABILITY OF WHOLESALE PRICES

CROP JOWAR STATE MADHYA PRADESH

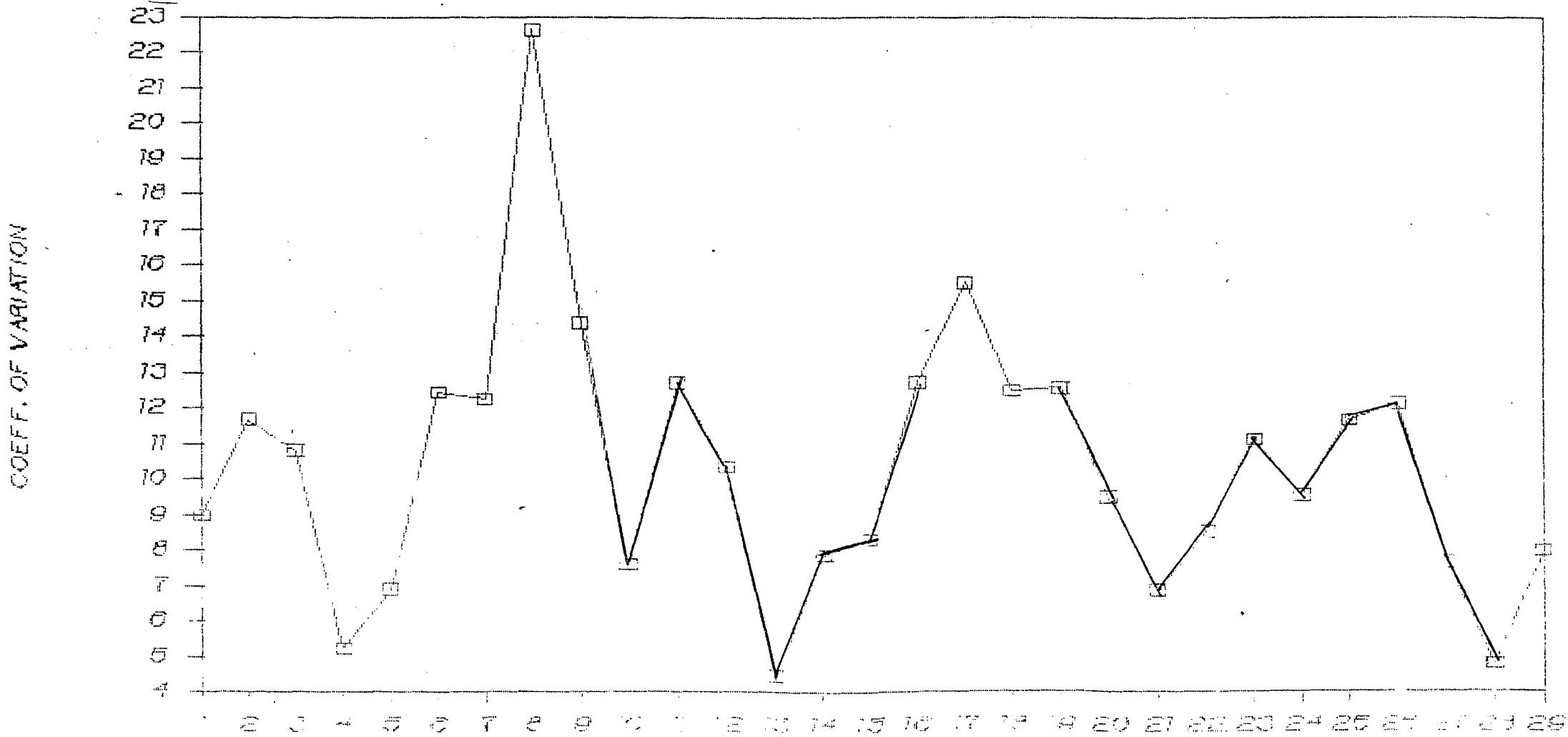


GRAPH III-b

Y E A R

VARIABILITY OF WHOLESALE PRICES

CROP JOWAR STATE KARNATAKA



GRAPH III-C

trend as revealed by the last three years continues it is rather encouraging indeed.

It may be noted that in this analysis, the years from 1965-66 to 1973-74 are not very reliable statistically, because the price data as per the original source, relates to procurement or issue prices since wholesale prices were not recorded or not available during these years.

However, our comparisons of the pre-intervention period (i.e. prior to 1965-66) if done with the post-intervention period (i.e. from 1974 onwards in this case, when prices relate to wholesale prices) do show that the price differences per month had fallen to very low levels and never exceeded the normal carrying costs after the mid-seventies clearly bearing testimonial to the success of government policy.

The other two states taken for jowar, are Madhya Pradesh (Ujjain) and Karnataka (Gulbarga) their results being tabulated in Tables III-b and III-c respectively.

In Madhya Pradesh, till about 1973-74 one can find several years now and then, which record price differences higher than the limits justified by normal carrying costs. However, after the mid-seventies the percentage change in prices per month not only registered a fall, but also never exceeded the permissible limits as set out by the carrying costs. Thus even in a state like Madhya Pradesh

which is generally poorer in terms of marketing infrastructures, compared with many other states, the government succeeded in arresting excessive price fluctuations from the peak to lean quarters and holding them within permissible limits. Occasionally, it may be seen that the highest quarterly price does not occur during the lean quarter (Q_4) but in Q_2 or Q_3 in which case, the corresponding percentage change per month tabulated in column 9 differs from its counterpart in column 6 - at times quite significantly so, for instance, during the year 1966-67. Our first hypothesis stands confirmed in the case of Madhya Pradesh. Graph III-b reveals that the late sixties and early seventies upto the mid-seventies, was the worst period in terms of sharp fluctuations in C.V. from the 19th year onwards (i.e. 1974-75 onwards) the C.V. records a neat, smooth and compact trend. We hope the additional confirmation based on the second degree polynomial we fitted, will strengthen our second hypothesis as well.

An examination of the third state (Karnataka) reveals that the maximum number of years when the open market prices of jowar increased well beyond the carrying costs, occurred before 1966-67. Thereafter the number of such years became less frequent and after 1974-75 there was practically no such year. We may say with considerable confidence, that, by and large, the government policy was

a success for jowar in this state also.

As regards the time trend of the C.V., graph III-c reveals that the C.V. was generally at a high absolute level for several blocks of years, interspersed by some years when the variability level fell in relative terms. Visually the trend is not very eye-catching in the context of our hypothesis but we will examine the results based on the second degree polynomial fitted to the three cases for jowar as a final adjunct to our analysis as follows.

Table III-A: Additional Information on C.V. for Jowar
- Estimated Polynomial ($V = a+bT+cT^2$)

	Mahara- shtra	Madhya Pradesh	Karnataka
b Coefficient	Positive	+1.271796	+0.334348
c Coefficient	Negative	-0.04102	-0.01368
(R.P. Reversibility Point ($= \frac{b}{2c}$))	13.50	15.49	12.21

The results in table III-A certainly add more strength to our second hypothesis, as we can see that in the case of jowar as well, the C.V. registers a positive trend (b=positive in all three cases) prior to intervention and then declines (c = negative in all cases). Moreover the year of reversibility varies from the 12th to the 15th or so (i.e. 1967-68 to 1970-71) which is logical enough in our context.

The next crop considered in this section, is bajra. The three states representing the highest proportion of the All India production of bajra taken here are Rajasthan (centre: Jodhpur), Gujarat (centre: Rajkot) and Maharashtra (centre: Ahmednagar). The results have been tabulated in tables IV-a, IV-b and IV-c respectively and the corresponding graphs plotting C.V. against time are also appended for visual clarity. The harvest-peak marketing quarter (Q_1) in all the three states, turns out to be from October to December.

If we study the trend pertaining to percentage changes in prices per month, we find that in the case of bajra - Rajasthan, during the initial few years of our analysis, the magnitudes of price differences were low, implying that the mean price level from the peak quarter to the lean quarter did not undergo any drastic change. Similarly the intra-year variability as recorded numerically by the C.V. was not of a very high order. However, with the onset of the decade starting 1963-64, the price differences started increasing in magnitude as well as crossing the limits set by normal carrying costs. Also, C.V. registered high magnitudes. This is visually clear from graph IV-a if one studies the graph carefully. After the highest peak attained during the 18th year viz. 1973-74, (which was a bad agricultural year, as is well known)

Table IV-a: WHOLESAL PRICE ANALYSIS CROP BAJRA STATE RAJASTHAN

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	43.31	42.87	44.65	45.55	0.57	5.15	9.00	0.57	3.00	4.55
1957-58	40.19	34.66	36.62	41.97	0.49	4.44	9.00	0.49	3.00	8.48
1958-59	42.87	44.65	39.74	38.07	-1.24	4.17	3.00	1.39	3.00	6.63
1959-60	35.63	39.15	40.11	40.36	1.47	13.26	9.00	1.47	3.00	5.39
1960-61	40.24	39.98	41.01	42.84	0.72	6.46	9.00	0.72	3.00	5.04
1961-62	35.76	34.28	33.74	36.04	0.09	0.77	9.00	0.09	3.00	4.24
1962-63	31.73	31.54	34.33	36.50	1.67	15.06	9.00	1.67	3.00	6.43
1963-64	37.95	43.66	53.87	50.81	3.77	41.97	6.00	7.00	3.00	17.37
1964-65	48.33	48.00	48.58	62.17	3.18	28.62	9.00	3.18	3.00	13.58
1965-66	65.67	63.17	65.67	72.00	1.07	9.64	9.00	1.07	3.00	7.15
1966-67	67.50	72.33	77.50	76.83	1.54	14.81	6.00	2.47	3.00	7.58
1967-68	73.67	63.75	57.92	77.17	0.53	4.75	9.00	0.53	3.00	16.24
1968-69	88.45	78.25	91.75	103.00	1.83	16.45	9.00	1.83	3.00	10.70
1969-70	80.50	83.67	88.67	78.50	-0.28	10.14	6.00	1.69	3.00	8.92
1970-71	58.50	46.17	42.67	47.00	-2.18	-19.66	9.00	-2.18	3.00	14.08
1971-72	55.00	62.33	73.67	85.67	6.20	55.76	9.00	6.20	3.00	17.88
1972-73	96.67	113.33	131.67	125.00	3.26	36.21	6.00	6.03	3.00	14.36
1973-74	90.00	103.33	105.00	151.67	7.61	68.52	9.00	7.61	3.00	24.24
1974-75	191.67	202.00	206.67	139.33	-3.03	7.83	6.00	1.30	3.75	15.69
1975-76	98.33	77.67	79.67	79.67	-2.11	-18.98	9.00	-2.11	3.75	12.26
1976-77	78.00	95.00	96.67	92.33	2.04	23.93	6.00	3.99	3.75	9.34
1977-78	110.00	106.67	106.67	99.33	-1.08	-3.03	6.00	-0.51	3.75	7.57
1978-79	92.33	96.67	91.67	108.33	1.93	17.33	9.00	1.93	3.75	10.28
1979-80	123.33	133.33	140.00	143.33	1.80	16.22	9.00	1.80	3.75	6.93
1980-81	131.67	140.00	160.00	185.67	4.56	41.01	9.00	4.56	3.75	13.87
1981-82	150.00	150.00	158.33	158.33	0.62	5.56	9.00	0.62	3.75	3.20
1982-83	148.33	146.67	175.00	148.33	0.00	17.98	6.00	3.00	3.75	10.35
1983-84	136.00	133.33	123.33	136.67	0.05	0.49	9.00	0.05	3.75	5.67
1984-85	130.00	131.67	145.00	176.67	3.99	35.90	9.00	3.99	3.75	18.13

Table IV-b: WHOLESALE PRICE ANALYSIS CROP BAJRA STATE GUJRAT (RAJKOT)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
956-57	51.58	53.58	56.49	55.82	0.91	9.52	6.00	1.59	3.00	4.92
957-58	49.12	44.53	45.19	49.21	0.02	0.18	9.00	0.02	3.00	5.21
958-59	44.31	45.42	45.87	48.02	0.93	8.36	9.00	0.93	3.00	3.97
959-60	47.12	45.15	46.15	47.98	0.20	1.82	9.00	0.20	3.00	5.03
960-61	50.92	47.51	51.34	54.12	0.70	6.28	9.00	0.70	3.00	5.62
961-62	51.27	50.17	48.72	51.87	0.13	1.16	9.00	0.13	3.00	3.78
962-63	54.77	46.58	43.68	50.92	-0.78	-7.03	9.00	-0.78	3.00	8.87
963-64	47.95	49.58	56.67	61.50	3.14	28.26	9.00	3.14	3.00	11.33
964-65	65.53	71.83	76.25	79.00	2.09	18.80	9.00	2.09	3.00	7.82
965-66	80.55	74.67	81.17	82.33	0.25	2.21	9.00	0.25	3.00	3.84
966-67	91.92	95.00	102.00	112.92	2.54	22.85	9.00	2.54	3.00	10.19
967-68	98.42	85.08	82.17	83.92	-1.64	-13.55	3.00	-4.52	3.00	8.55
968-69	84.70	84.03	95.42	105.92	2.78	25.05	9.00	2.78	3.00	14.20
969-70	82.84	85.25	88.42	78.32	-0.61	6.73	6.00	1.12	3.00	5.63
970-71	70.08	59.77	55.42	63.00	-1.12	-10.11	9.00	-1.12	3.00	12.07
971-72	75.25	81.30	87.20	107.08	4.70	42.30	9.00	4.70	3.00	14.81
972-73	129.17	149.42	163.75	120.03	-0.79	26.77	6.00	4.46	3.00	13.49
973-74	135.37	150.20	162.74	192.84	4.72	42.46	9.00	4.72	3.00	15.33
974-75	157.22	129.32	144.13	142.50	-2.23	-19.13	6.00	-3.19	3.75	15.95
975-76	101.33	85.50	90.62	107.82	0.71	6.40	9.00	0.71	3.75	13.09
976-77	106.92	111.03	111.83	111.55	0.48	4.60	6.00	0.77	3.75	5.11
977-78	146.83	145.00	136.42	112.50	-2.60	-1.25	3.00	-0.42	3.75	12.27
978-79	106.50	107.67	110.00	115.42	0.93	8.37	9.00	0.93	3.75	4.63
979-80	131.08	146.87	145.00	137.25	0.52	12.04	3.00	4.01	3.75	8.62
980-81	144.67	159.42	172.25	178.25	2.58	23.21	9.00	2.58	3.75	8.61
981-82	159.67	164.83	169.58	153.50	-0.43	6.21	6.00	1.04	3.75	5.43
982-83	149.00	156.75	177.08	148.58	-0.03	18.85	6.00	3.14	3.75	9.54
983-84	161.92	177.50	156.67	137.17	-1.70	9.62	3.00	3.21	3.75	11.66
984-85	146.67	151.25	148.53	212.92	5.02	45.17	9.00	5.02	3.75	19.17

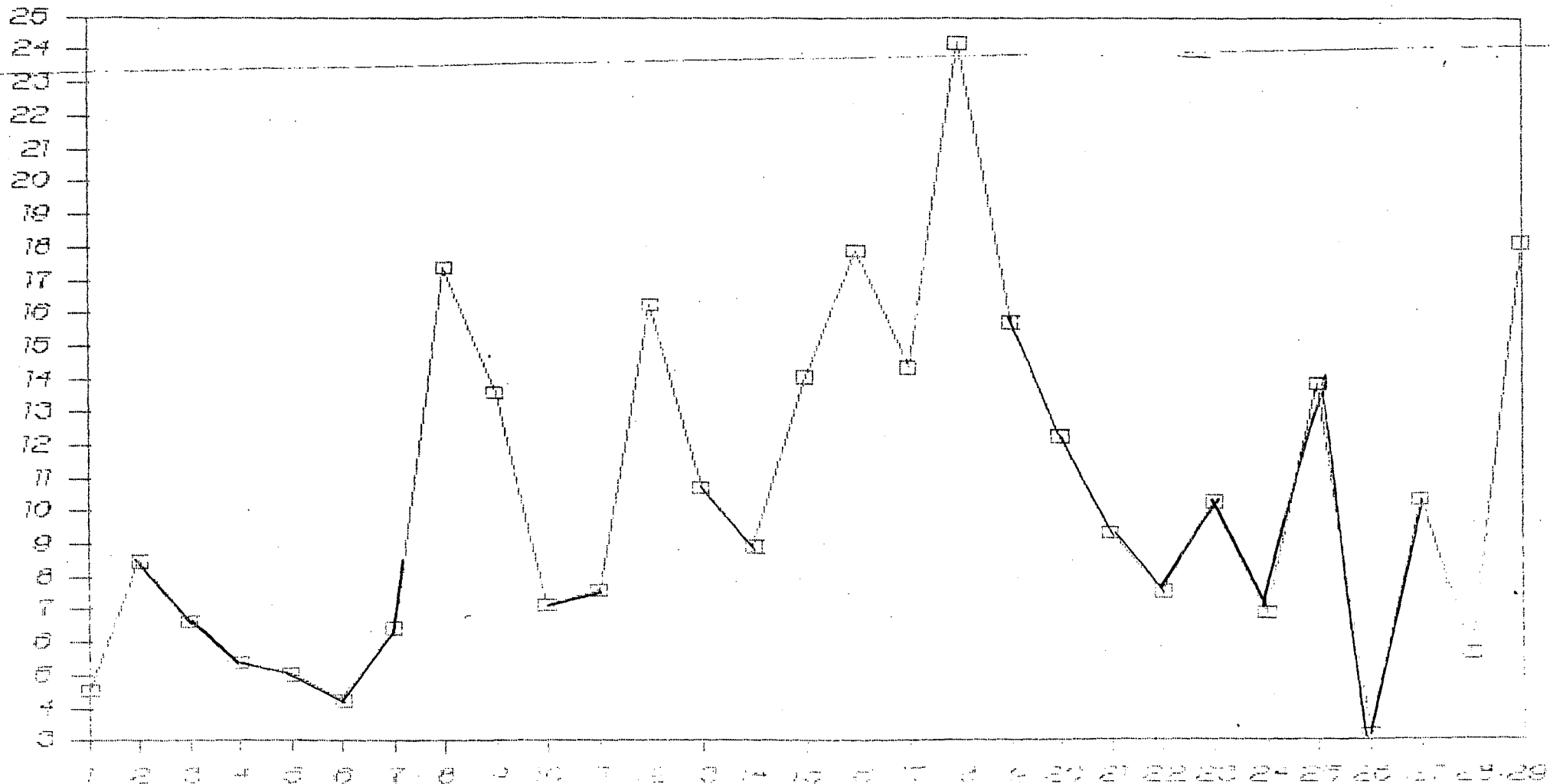
Table IV-c: WHOLESAL PRICE ANALYSIS CROP BAJRA STATE MAHARASHTRA (AHMEDNAGAR)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	49.12	47.33	48.23	48.23	-0.20	-1.82	6.00	-0.30	3.00	5.67
1957-58	39.74	35.72	37.29	40.34	0.17	1.51	9.00	0.17	3.00	7.68
1958-59	40.39	41.35	44.53	44.09	1.02	10.24	6.00	1.71	3.00	5.26
1959-60	41.53	40.58	43.98	47.47	1.59	14.30	9.00	1.59	3.00	6.42
1960-61	47.69	44.77	46.26	45.06	-0.61	-3.01	6.00	-0.50	3.00	3.08
1961-62	44.77	42.99	41.36	48.33	0.88	7.95	9.00	0.88	3.00	6.54
1962-63	45.67	39.32	40.50	38.53	-1.74	-11.31	6.00	-1.89	3.00	8.60
1963-64	42.17	46.33	56.67	75.33	8.74	78.66	9.00	8.74	3.00	25.91
1964-65	74.00	76.33	92.33	109.13	5.28	47.48	9.00	5.28	3.00	17.71
1965-66	98.33	100.00	107.00	89.00	-1.05	8.81	6.00	1.47	3.00	8.92
1966-67	73.33	67.67	81.67	79.67	0.96	11.36	6.00	1.89	3.00	8.51
1967-68	84.67	89.33	95.00	94.00	1.22	12.20	6.00	2.03	3.00	5.15
1968-69	72.00	73.67	90.00	94.33	3.45	31.02	9.00	3.45	3.00	13.69
1969-70	72.00	79.67	90.33	87.33	2.37	25.46	6.00	4.24	3.00	9.71
1970-71	72.33	67.67	67.00	76.33	0.61	5.53	9.00	0.61	3.00	6.98
1971-72	72.67	78.00	89.00	104.00	4.79	43.12	9.00	4.79	3.00	14.34
1972-73	114.67	135.00	194.00	161.67	4.55	69.19	6.00	11.53	3.00	21.93
1973-74	123.33	135.00	141.00	163.33	3.60	32.43	9.00	3.60	3.00	11.42
1974-75	168.33	200.00	201.67	170.00	0.11	19.80	6.00	3.30	3.75	10.92
1975-76	123.33	106.33	111.33	120.00	-0.30	-2.70	9.00	-0.30	3.75	7.27
1976-77	117.00	104.33	115.00	125.00	0.76	6.84	9.00	0.76	3.75	8.15
1977-78	112.67	116.00	117.67	118.33	0.56	5.03	9.00	0.56	3.75	4.48
1978-79	109.67	102.67	103.33	121.67	1.22	10.94	9.00	1.22	3.75	7.58
1979-80	120.00	126.00	143.67	133.00	1.20	19.72	6.00	3.29	3.75	10.41
1980-81	128.00	158.33	186.67	201.67	6.39	57.55	9.00	6.39	3.75	17.28
1981-82	166.67	184.00	168.33	176.67	0.67	10.40	3.00	3.47	3.75	4.88
1982-83	163.33	166.67	188.33	190.00	1.81	16.33	9.00	1.81	3.75	8.19
1983-84	165.00	178.33	171.67	175.00	0.67	8.08	3.00	2.69	3.75	3.24
1984-85	175.00	155.00	156.67	168.33	-0.42	-3.81	3.00	-1.27	3.75	5.86

VARIABILITY OF WHOLESAL E PRICES

CROP BAIRA STATE RAJASTHAN

COEFF. OF VARIATION

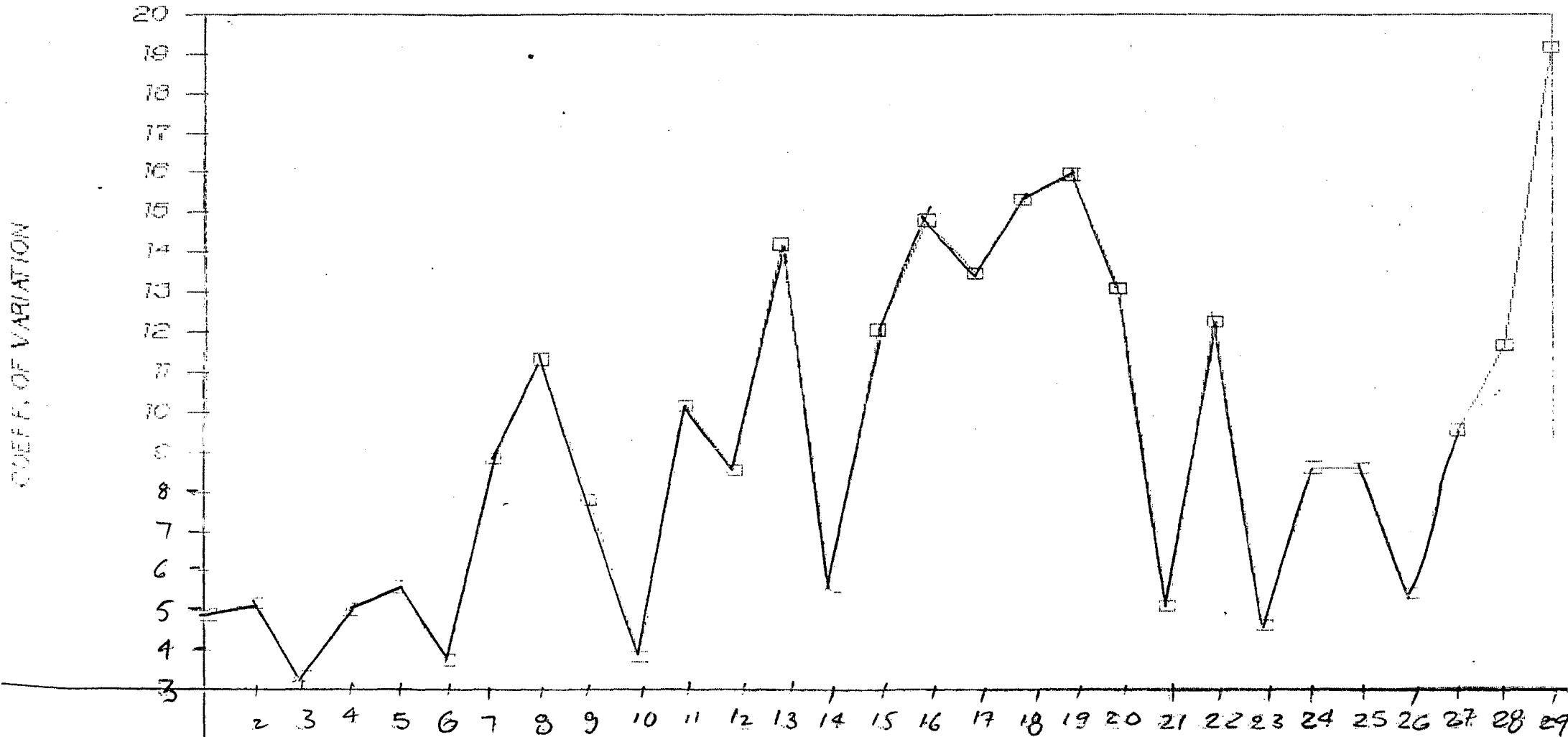


GRAPH IV-a

YEAR

VARIABILITY OF WHOLESALE PRICES

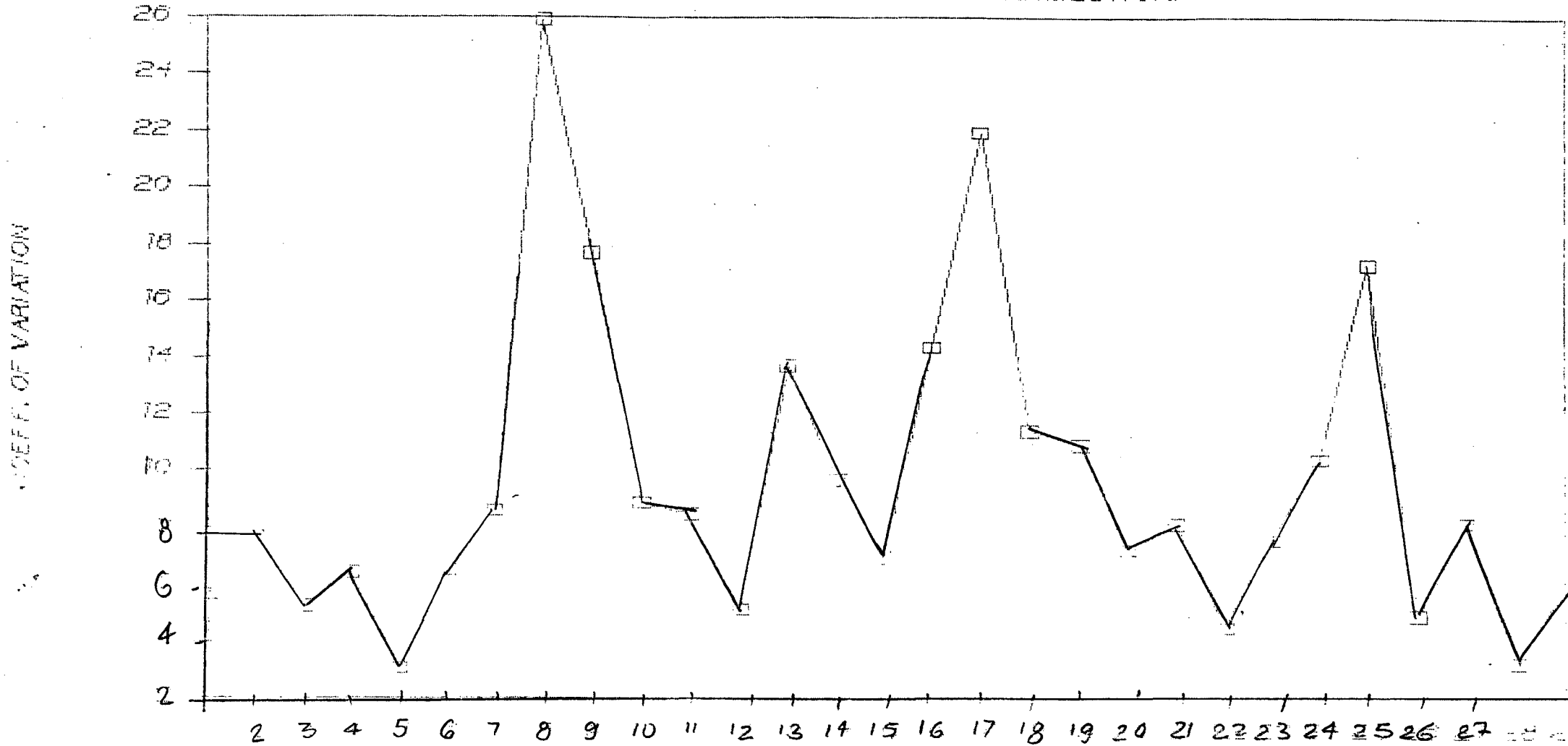
CROP BAJRA STATE GUJRAT (RAJKOT)



GRAPH IV-b

VARIABILITY OF WHOLESALE PRICES

CROP BAIRA STATE MAHARASHTRA(AHMEDNGR)



GRAPH IV - C

the C.V. takes a downhill path for the rest of the period. Though the peaks and troughs are not eliminated, yet the intensity of up- and downswings gets mellowed down. In fact the result given later in Table IV-A shows that the direction of C.V. was first increasing and thereafter decreasing and the reversibility point comes out to be 17.33. It is obvious that the influence of a few bad years nullified perhaps, prior attempts of the Government at reducing price variability.

In Gujarat as well as Maharashtra, the price differences per month although lesser in magnitude, were not completely wiped out even during the eighties as they were, for other crops. While in Rajasthan, both 1980-81 and 1984-85 recorded price increases beyond the normal carrying costs, the corresponding year for Gujarat was 1984-85 (in 1980-81 price difference being high but within permissible limits) and for Maharashtra it was 1980-81. Where price differences exceeded carrying costs these years also recorded a much higher relative variability. A reference to the statistics for bajra reveals that during the year 1979-80 there was a considerable dip in production; after which production picked up, started improving and in fact was at a reasonably high level during 1983-84. This may partially explain the sharp rise in prices and thereby the considerable price differences over and above the normal

carrying costs during the year 1980-81 which followed the low production levels of 1979-80. While in Rajasthan, however, the production of bajra fell steeply from 1147.3 thousand tonnes during 1978-79 to 380.7 thousand tonnes during 1979-80; in Gujarat the fall was not of such a substantial magnitude. Moreover, during the eighties there was no drastic production decline in the case of bajra which could constitute any sufficient explanation for the price rise of the year 1984-85, in Rajasthan and Gujarat.

Overall, in Gujarat there are not very many years when price differences exceed the carrying costs. Of concern to us is that such years though few, do occur as late as the eighties as well. C.V. levels are generally of a high order and visually the graph IV-b is also not very pleasing at first glance.

In Maharashtra, however, the monthly price differences of bajra, are often way above the normal carrying costs in a number of years prior to 1974-75 and thereafter the absolute price differences fall substantially in magnitude and are never beyond the carrying costs range except during 1980-81 when the price difference was of the order of 6.39 per cent month as against the normal carrying costs of 3.75 per cent per month. Also, except for this odd year

out, the C.V. had started falling considerably and recording lesser change on year to year basis. Intra-year variability did appear to be on the decline.

Finally, as an important postscript to the analysis, we must add the results of fitting the parabolic time-trend for C.V.

Table IV-A: Additional information on C.V. for Bajra:
Estimated Polynomial ($v=a+bT+cT^2$)

	Rajasthan	Gujarat	Maharashtra
b Coefficient	+1.177595	0.763058	+1.058605
c Coefficient	-0.03397	-0.01740	-0.03578
Reversibility Point (= $\frac{b}{2c}$)	17.33	21.92	14.79

Table IV-A shows, that for bajra, although the direction of C.V. is indeed from initially increasing (positive) to decreasing (negative) over time, in neither of the three states does the reversal occur before the 15th year i.e. 1970-71. While in Rajasthan the reversibility point is the 17th year; in Maharashtra the 15th year in Gujarat it is a bit too late - the 22nd year i.e. 1977-78. Thus the bajra story reveals a mixed picture. It cannot be deemed as a complete and clear-cut success nor a complete failure. Amongst the coarse grains taken

in this section perhaps it poses some puzzles. In spite of these oddities, the fall in intra-year variability in wholesale prices does seem to be the reality in this case also. Compared to other coarse grains it occupies the lower rung of the ladder of overall success.

MAIZE:

The case of maize differs considerably from that of bajra, especially in the case of the agriculturally progressive state of U.P. but not so much in Rajasthan and Madhya Pradesh. Refer tables V-a, V-b and V-c respectively.

Till the mid-seventies in Uttar Pradesh (centre: Bahraich) there were seven years when the price differences were considerably greater than the normal carrying costs. However beyond 1973-74 there wasn't even a single year when the price difference crossed the permissible range. On the contrary in terms of magnitudes, the percentage differences became very small and maintained themselves at a low level, for well over the last decade. Regarding the C.V., over the years, the year-to-year differences have indeed become considerably compressed over the period ranging from mid-seventies to the mid-eighties. The block of six years between 1963-64 to 1968-69 continuously recorded relatively high levels of C.V. which declined considerably, thereafter but again rose during 1972-73 to 1973-74 after which it more or less consistently declined,

Table V-a: WHOLESALE PRICE ANALYSIS CROP MAIZE STATE UTTAR PRADESH

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	31.70	37.17	37.06	37.06	1.88	17.24	6.00	2.87	3.00	9.12
1957-58	33.04	30.14	35.72	42.20	3.08	27.70	9.00	3.08	3.00	16.45
1958-59	36.39	38.40	39.74	36.17	-0.07	9.20	6.00	1.53	3.00	6.62
1959-60	30.70	29.13	31.70	30.36	-0.12	3.29	6.00	0.55	3.00	6.97
1960-61	30.53	34.61	34.16	34.49	1.44	13.37	3.00	4.46	3.00	6.34
1961-62	31.26	33.62	32.22	29.95	-0.46	7.55	3.00	2.52	3.00	6.44
1962-63	28.14	29.03	32.83	30.37	0.88	16.67	6.00	2.78	3.00	7.41
1963-64	33.61	41.99	53.96	62.09	9.41	84.71	9.00	9.41	3.00	25.57
1964-65	36.50	58.51	64.77	74.59	11.60	104.37	9.00	11.60	3.00	24.32
1965-66	53.60	55.83	61.64	64.32	2.22	20.00	9.00	2.22	3.00	11.48
1966-67	67.00	107.01	118.37	112.24	7.50	76.67	6.00	12.78	3.00	22.71
1967-68	76.61	67.89	63.48	60.30	-2.37	-11.38	3.00	-3.79	3.00	11.78
1968-69	50.03	56.25	66.11	73.25	5.16	46.42	9.00	5.16	3.00	15.69
1969-70	61.63	69.66	72.34	62.98	0.24	17.38	6.00	2.90	3.00	8.07
1970-71	54.03	57.15	55.61	66.54	2.57	23.16	9.00	2.57	3.00	9.92
1971-72	68.76	80.05	80.33	85.00	2.62	23.62	9.00	2.62	3.00	9.91
1972-73	69.33	75.67	79.33	102.33	5.29	47.60	9.00	5.29	3.00	16.69
1973-74	82.33	133.33	145.00	159.33	10.39	93.52	9.00	10.39	3.00	23.35
1974-75	114.00	136.67	131.67	122.00	0.78	19.88	3.00	6.63	3.75	9.41
1975-76	76.33	87.00	81.67	75.33	-0.15	13.97	3.00	4.66	3.75	7.09
1976-77	85.00	107.67	97.67	104.00	2.48	26.67	3.00	8.89	3.75	10.00
1977-78	105.00	113.33	112.00	110.67	0.60	7.94	3.00	2.65	3.75	4.24
1978-79	100.33	107.33	96.67	104.00	0.41	6.98	3.00	2.33	3.75	4.71
1979-80	110.00	129.00	129.67	124.67	1.48	17.88	3.00	5.96	3.75	8.11
1980-81	130.00	146.00	140.00	143.33	1.14	12.31	3.00	4.10	3.75	8.56
1981-82	134.67	135.33	140.00	148.00	1.10	9.90	9.00	1.10	3.75	6.68
1982-83	155.00	213.33	186.67	176.67	1.55	37.63	3.00	12.54	3.75	12.19
1983-84	141.67	145.00	141.33	130.00	-0.92	2.35	3.00	0.78	3.75	11.28
1984-85	133.33	134.67	135.67	141.67	0.69	6.25	9.00	0.69	3.75	3.71

Table V-b: WHOLESALE PRICE ANALYSIS CROP MAIZE STATE RAJASTHAN (JAIPUR)

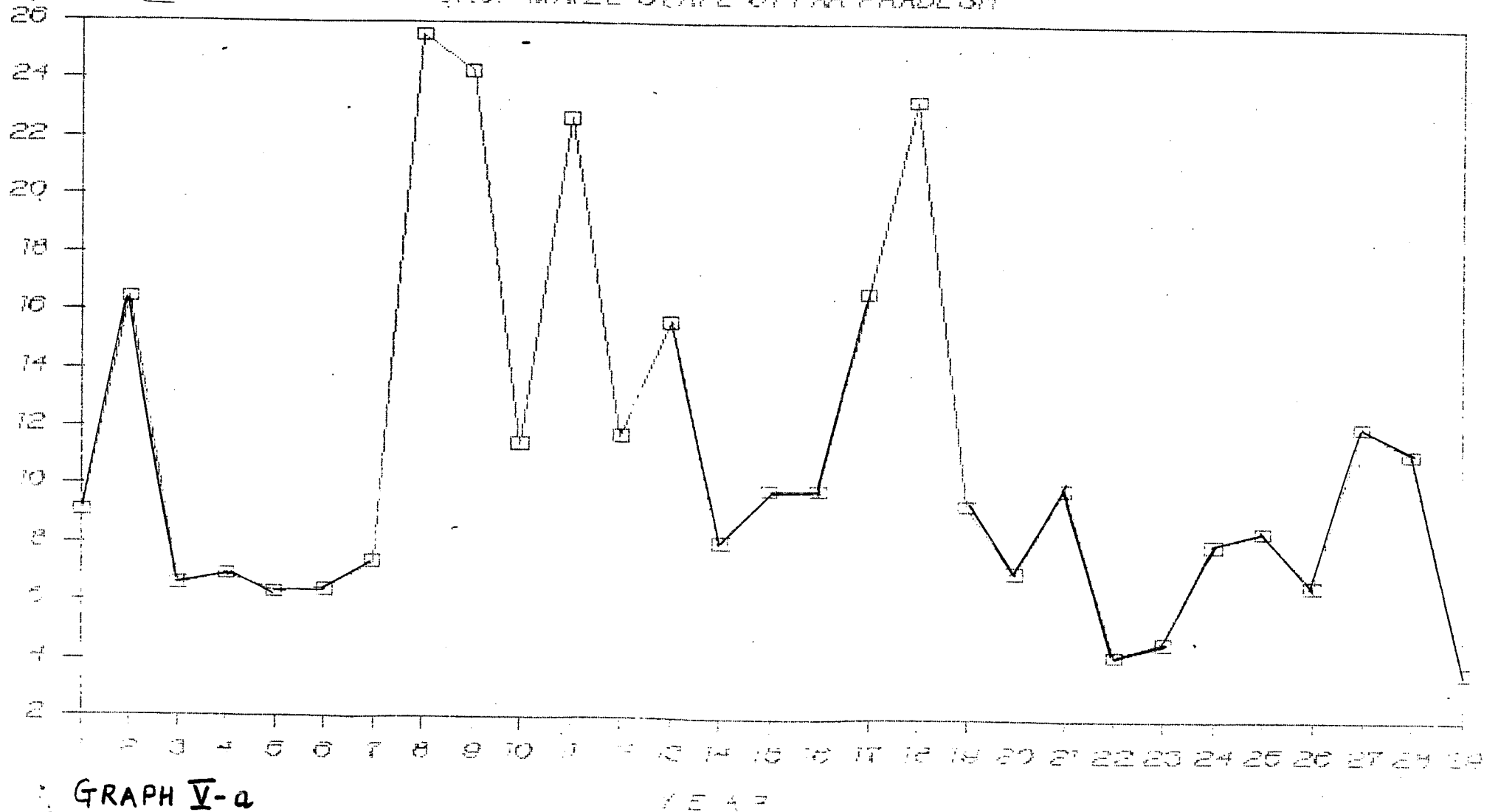
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	36.17	37.73	29.47	41.08	1.51	13.58	6.00	2.26	3.00	16.95
1957-58	31.48	29.02	31.70	39.40	2.80	25.16	9.00	2.80	3.00	16.05
1958-59	36.17	33.49	35.72	35.83	-0.10	-0.94	9.00	-0.10	3.00	5.51
1959-60	31.44	31.12	31.97	34.38	1.04	9.38	9.00	1.04	3.00	5.70
1960-61	33.54	34.50	34.24	34.67	0.37	3.35	9.00	0.37	3.00	3.20
1961-62	31.87	33.67	31.00	31.00	-0.30	5.64	9.00	0.63	3.00	4.81
1962-63	27.83	26.25	27.75	31.67	1.53	13.77	9.00	1.53	3.00	8.32
1964-65	45.17	44.67	40.47	48.50	0.82	7.38	9.00	0.82	3.00	8.93
1965-66	53.70	57.17	65.67	68.00	2.96	26.63	9.00	2.96	3.00	10.50
1966-67	69.33	74.67	87.00	80.00	1.71	25.48	9.00	2.83	3.00	12.36
1967-68	58.67	70.70	79.03	80.33	4.10	36.93	3.00	12.31	3.00	12.79
1970-71	53.00	55.00	57.00	61.67	1.82	16.35	9.00	1.82	3.00	6.92
1971-72	63.67	69.33	75.00	82.67	3.32	29.84	9.00	3.32	3.00	10.09
1972-73	82.00	112.10	110.67	119.00	5.01	45.12	6.00	7.52	3.00	14.32
1973-74	106.67	133.33	147.00	170.33	6.63	59.69	9.00	6.63	3.00	18.11
1974-75	157.67	163.33	159.00	135.00	-1.60	3.59	6.00	0.60	3.75	8.59
1975-76	82.33	76.67	79.67	82.67	0.04	0.40	9.00	0.04	3.75	6.23
1976-77	89.00	105.67	112.00	111.33	2.79	25.84	6.00	4.31	3.75	10.76
1977-78	121.33	121.00	120.33	123.00	0.15	1.37	3.00	0.46	3.75	5.73
1978-79	114.00	96.67	103.00	115.67	0.16	1.46	9.00	0.16	3.75	8.27
1979-80	121.33	120.00	135.00	136.67	1.40	12.64	3.00	4.21	3.75	7.30
1980-81	119.00	131.33	148.67	162.67	4.08	36.69	9.00	4.08	3.75	12.87
1981-82	157.00	160.67	166.33	162.67	0.40	5.94	6.00	0.99	3.75	4.65
1982-83	158.33	173.33	178.33	168.00	0.68	12.63	6.00	2.11	3.75	6.41
1983-84	148.00	149.00	146.00	133.67	-1.08	0.68	3.00	0.23	3.75	5.61
1984-85	130.67	133.33	155.00	200.67	5.95	53.57	9.00	5.95	3.75	18.52

Table V-c: WHOLESALE PRICE ANALYSIS CROP MAIZE STATE MADHYA PRADESH (JHABUA)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	32.82	37.06	41.97	38.40	1.89	27.89	6.00	4.65	6.00	10.59
1957-58	30.36	30.59	34.16	38.18	2.86	25.74	9.00	2.86	9.00	11.26
1958-59	32.60	38.51	38.63	38.06	1.86	18.49	9.00	2.05	6.00	6.92
1959-60	35.72	36.28	39.30	42.42	2.08	18.75	9.00	2.08	9.00	8.44
1960-61	31.26	34.83	38.39	32.82	0.55	22.83	9.00	2.54	6.00	9.12
1961-62	29.92	36.61	37.50	38.83	3.31	29.81	9.00	3.31	9.00	12.24
1962-63	30.67	33.00	36.83	35.17	1.63	20.11	6.00	3.35	3.00	8.29
1963-64	32.33	40.00	46.67	46.67	4.93	44.33	6.00	7.39	3.00	16.09
1964-65	36.67	39.33	44.67	49.33	3.84	34.55	9.00	3.84	3.00	12.80
1965-66	64.00	66.20	72.67	72.00	1.39	13.54	6.00	2.26	3.00	7.82
1966-67	68.83	77.17	106.67	113.33	7.18	64.66	9.00	7.18	3.00	21.60
1967-68	65.00	59.67	60.80	63.67	-0.23	-2.05	9.00	-0.23	3.00	9.07
1968-69	66.00	74.33	86.00	86.67	3.48	31.31	6.00	5.22	3.00	11.84
1969-70	73.00	86.33	91.33	82.00	1.37	25.11	6.00	4.19	3.00	9.36
1970-71	64.00	69.00	72.00	70.33	1.10	12.50	6.00	2.08	3.00	6.67
1971-72	69.33	83.33	87.33	91.67	3.58	32.21	9.00	3.58	3.00	10.56
1972-73	90.00	104.33	126.67	139.67	6.13	55.19	9.00	6.13	3.00	17.50
1973-74	156.67	163.33	189.00	203.33	3.31	29.79	9.00	3.31	3.00	11.00
1974-75	151.67	173.33	172.67	141.67	-0.73	14.29	3.00	4.76	3.75	3.44
1975-76	83.33	91.00	90.33	101.33	2.40	21.60	9.00	2.40	3.75	7.00
1976-77	103.33	112.67	126.00	129.67	2.83	25.48	9.00	2.83	3.75	10.00
1977-78	121.33	128.33	133.33	133.33	1.10	9.89	6.00	1.65	3.75	4.00
1978-79	115.00	114.67	123.00	141.33	2.54	22.90	9.00	2.54	3.75	9.00
1979-80	140.00	140.00	166.67	156.67	1.32	19.05	6.00	3.17	3.75	8.00
1980-81	130.00	141.67	166.00	186.00	4.79	43.08	9.00	4.79	3.75	14.00
1981-82	154.33	168.33	170.00	181.67	1.97	17.71	9.00	1.97	3.75	5.00
1982-83	170.00	178.33	201.67	216.67	3.05	27.45	9.00	3.05	3.75	10.40
1983-84	152.17	163.33	157.00	143.67	-0.62	7.34	3.00	2.45	3.75	4.70
1984-85	125.00	151.67	171.00	223.33	8.74	78.67	9.00	8.74	3.75	22.20

VARIABILITY OF WHOLESALE PRICES

CROP MAIZE STATE UTTAR PRADESH

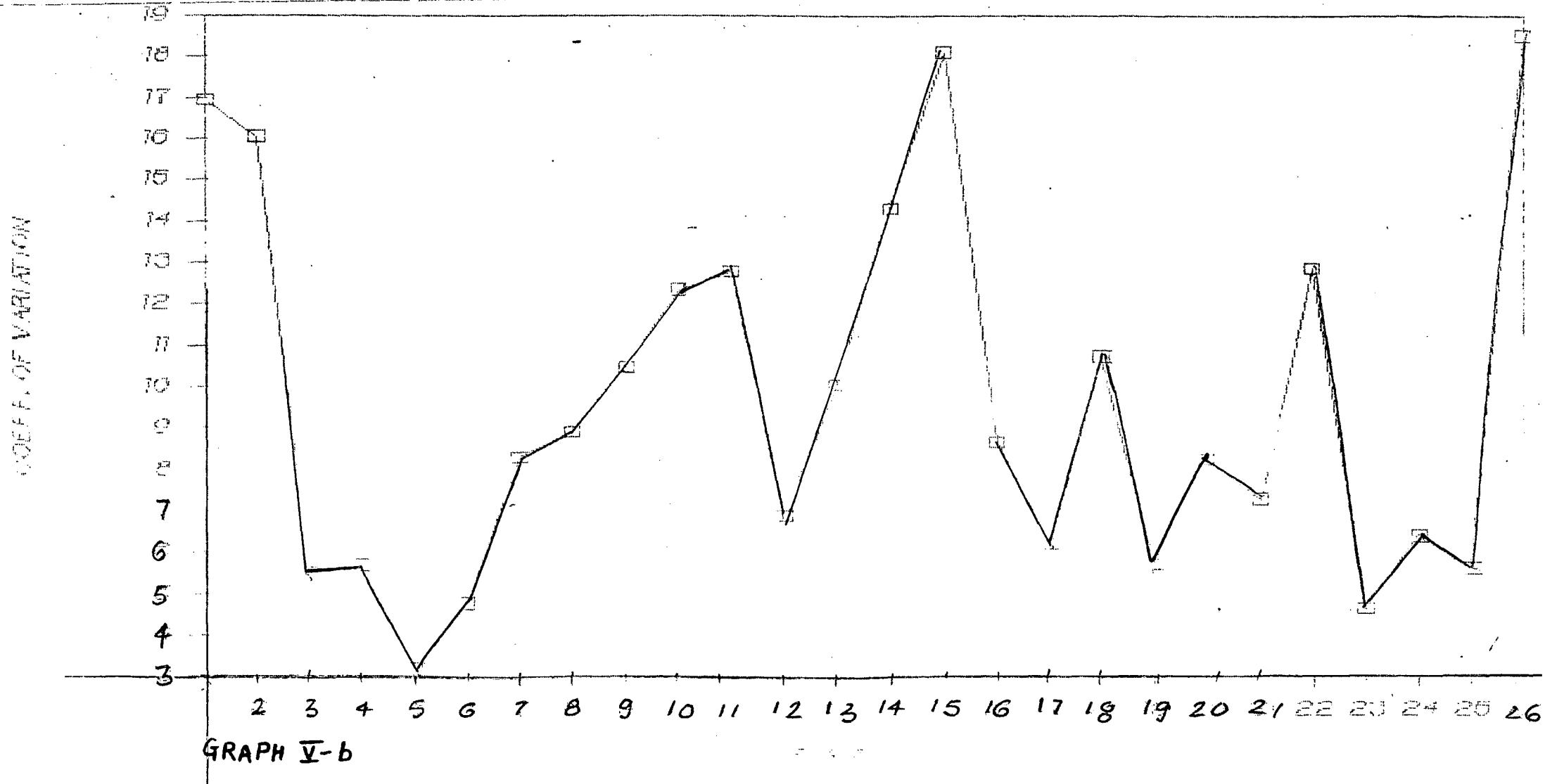


GRAPH V-a

YEAR

VARIABILITY OF WHOLESALE PRICES

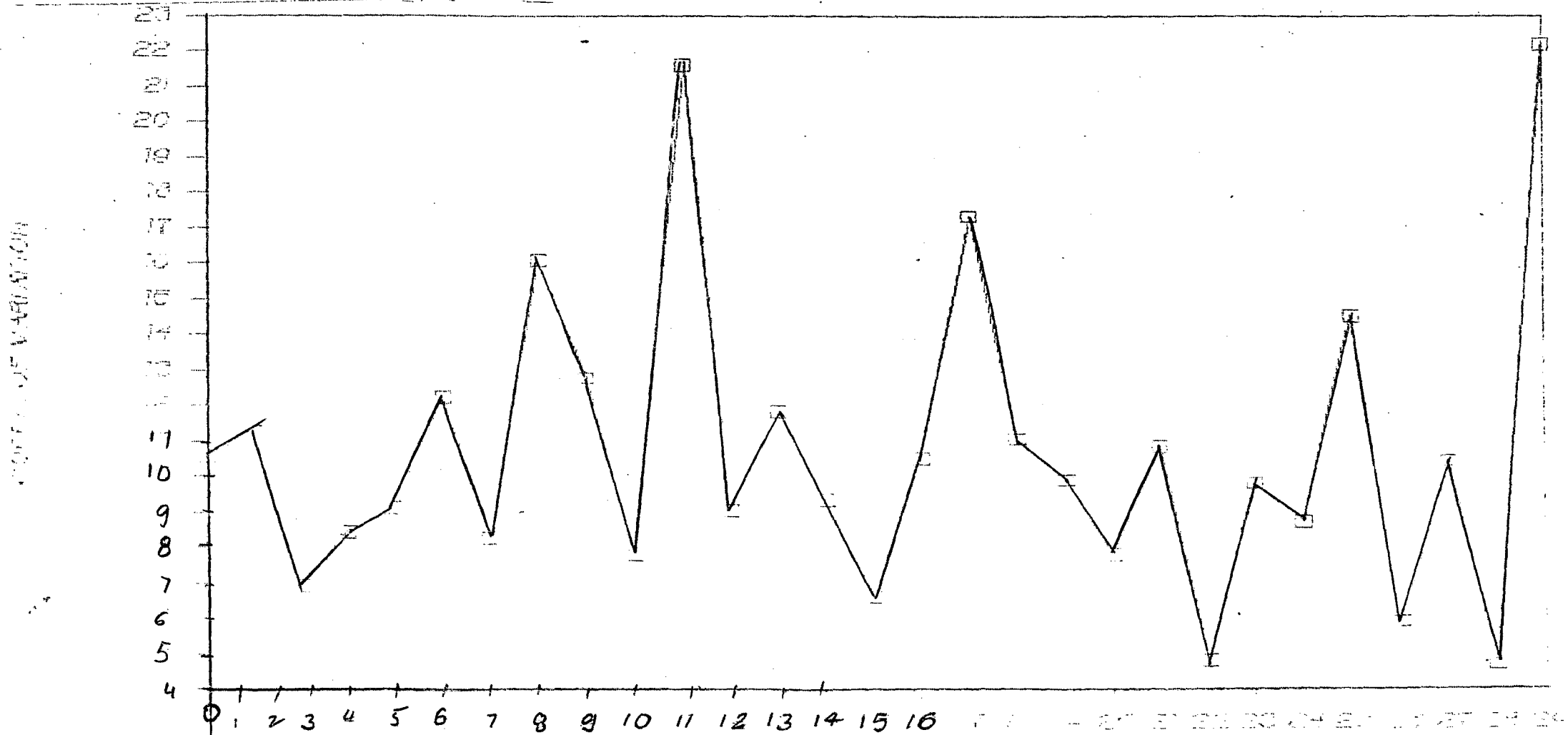
CROP MAIZE STATE RAJASTHAN(AJIPUR)



GRAPH V-b

VARIABILITY OF WHOLESALE PRICES

CROP MAIZE STATE M.P. BHABHA



GRAPH V-C

fluctuating only within a narrow range. Clearly the government's implementation mechanisms appear to have been successful in the case of maize in Uttar Pradesh, eliminating all incentives (if any) to hoarders by reducing price differences to levels below carrying costs and also in ironing out year to year fluctuations considerably. Table IV-a and its corresponding graph IV-a confirm this. After the mid-seventies we can see that there is a marked improvement in the graph. (i.e. beyond the 19th year as recorded on the graph). From 1983-84 to 1984-85 there is a distinct dip in the variability. One hopes this will continue to be sustained in the years that follow in future.

For maize crop again, in Rajasthan (Jaipur) and Madhya Pradesh (Jhabua) we find the trend over time not as clear cut and smooth as it was in U.P. As in the case of bajra (Rajasthan and Maharashtra) we find once again that more or less the same years stand out as troublemakers on what might have been otherwise a smoother horizon. It is for these very years that the percentage price changes from month to month exceeded the monthly normal carrying costs and the C.V. records much higher magnitudes as well. The years are around mid-sixties and the early-to-mid-seventies as is visible from graphs IV-b and IV-c as well

Thus, while for maize in U.P., the variability trend shows considerable fluctuations till the mid-seventies, the fluctuations clearly settle down on a sustained basis thereafter. However, in Rajasthan, till 1960-61 the variability drops, thereafter increasing continuously from year to year till 1966-67, and thereafter following a zig-zag pattern of ups and downs from year to year. Only occasionally the amplitude of the ups and downs appear to be contained within reasonable limits but not on a continuing basis. Besides, the years 1980-81 and 1984-85 record sharp increase in the C.V. for both Rajasthan and Madhya Pradesh (maize) and also price differences well above our permissible level. The graph for Madhya Pradesh is continuously fluctuating with little respite during some years.

In such a situation, therefore, one is led to believe that, since for the same crop, viz. maize, government policy appears to have been very successful in one state (U.P.), (in keeping with both our hypotheses) but not so in the other two states considered here, quite obviously the complementary forces which lead to the success of a policy by way of infrastructural facilities including irrigation, transportation and effective marketing presence of regular government agencies for implementation of stable prices etc. may be missing in varying degree and combination in these two not-so-developed states. This had been noted

by us in the preceding chapter on harvest prices as well.

Let us see how far our results of the second-degree polynomial fitted for the time series of C.V. helps to affirm the second hypothesis postulated by us.

Table V-A: Additional Information on C.V. for Maize:
Estimated Polynomial ($v=a+bT+cT^2$)

	U.P.	Rajasthan	Madhya Pradesh
b Coefficient	+0.786522	N.E.	+0.342927
c Coefficient	-0.03172	N.E.	-0.01562
Reversibility Point ($= \frac{b}{2c}$)	12.39	N.E.	10.97

Note: N.E. stands for not estimated because of data distortions.

From the above table we can see that the results are in perfect harmony with our expectations, in two out of the three states. In both U.P. and Madhya Pradesh the positive b coefficient indicates an increasing C.V. over time till the 12th and 11th years respectively and thereafter a clear reversal of the trend viz. a decreasing C.V. after 1967-68 in U.P. and after 1966-67 in Madhya Pradesh as indicated by both the negative values of c coefficient. It was not considered advisable to carry out the exercise for Rajasthan.

This brings us to the last crop in this section, viz. barley. We may refer to tables VI-a, VI-b and VI-c and

Table VI-a: WHOLESAL PRICE ANALYSIS CROP BARLEY STATE UTTAR PRADESH (VARANASI)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
56-57	29.02	32.37	34.83	35.28	2.39	21.54	9.00	2.39	3.00	8.46
57-58	33.49	34.16	30.59	27.29	-2.06	2.00	3.00	0.67	3.00	9.14
58-59	32.82	42.08	46.22	46.38	4.59	41.31	9.00	4.59	3.00	14.41
59-60	35.66	39.40	34.71	35.11	-0.17	10.49	3.00	3.50	3.00	8.46
60-61	34.78	37.00	36.86	34.53	-0.08	6.39	3.00	2.13	3.00	4.18
61-62	33.00	34.00	33.31	33.28	0.10	3.04	3.00	1.01	3.00	4.86
62-63	29.91	31.19	28.18	26.81	-1.15	4.29	3.00	1.43	3.00	6.60
63-64	32.03	38.59	39.64	45.32	4.61	41.49	9.00	4.61	3.00	13.30
64-65	43.39	69.53	70.30	68.65	6.47	62.00	6.00	10.33	3.00	19.89
65-66	62.15	70.98	70.66	67.79	1.01	14.20	3.00	4.73	3.00	6.83
66-67	66.31	71.41	82.00	104.33	6.37	57.34	9.00	6.37	3.00	18.28
67-68	97.00	109.00	86.67	74.67	-2.56	12.37	3.00	4.12	3.00	16.76
68-69	60.00	56.67	52.00	57.33	-0.49	-4.44	9.00	-0.49	3.00	7.39
69-70	65.33	71.67	70.33	76.00	1.81	16.33	9.00	1.81	3.00	9.06
70-71	59.00	55.00	42.67	51.67	-1.38	-6.78	3.00	-2.26	3.00	12.55
71-72	50.00	57.00	56.67	65.67	3.48	31.33	9.00	3.48	3.00	13.80
72-73	64.67	81.33	81.00	94.00	5.04	45.36	9.00	5.04	3.00	13.91
73-74	97.33	114.00	105.00	126.67	3.35	30.14	9.00	3.35	3.00	11.79
74-75	127.67	154.33	154.00	141.67	1.22	20.89	3.00	6.96	3.75	9.52
75-76	107.00	94.67	73.33	70.00	-3.84	-11.53	3.00	-3.84	3.75	18.19
76-77	67.50	71.67	68.67	95.67	4.64	41.73	9.00	4.64	3.75	16.15
77-78	91.67	98.33	107.00	111.00	2.34	21.09	9.00	2.34	3.75	10.18
78-79	87.67	85.33	89.45	99.00	1.44	12.93	9.00	1.44	2.75	6.44
79-80	83.33	95.67	113.33	128.33	6.00	54.00	9.00	6.00	3.75	17.63
80-81	124.67	125.00	146.67	146.67	1.96	17.65	6.00	2.94	3.75	10.60
81-82	120.00	115.00	108.33	120.00	0.00	0.00	9.00	0.00	3.75	5.24
82-83	126.67	127.67	155.00	181.67	4.82	43.42	9.00	4.82	3.75	15.69
83-84	140.00	158.33	163.33	155.00	1.19	16.67	6.00	2.78	3.75	7.59
84-85	145.00	153.33	151.67	150.00	0.38	5.75	3.00	1.92	3.75	3.38

Table VI-b: WHOLESAL PRICE ANALYSIS CROP BARLEY STATE RAJASTHAN (JAIPUR)

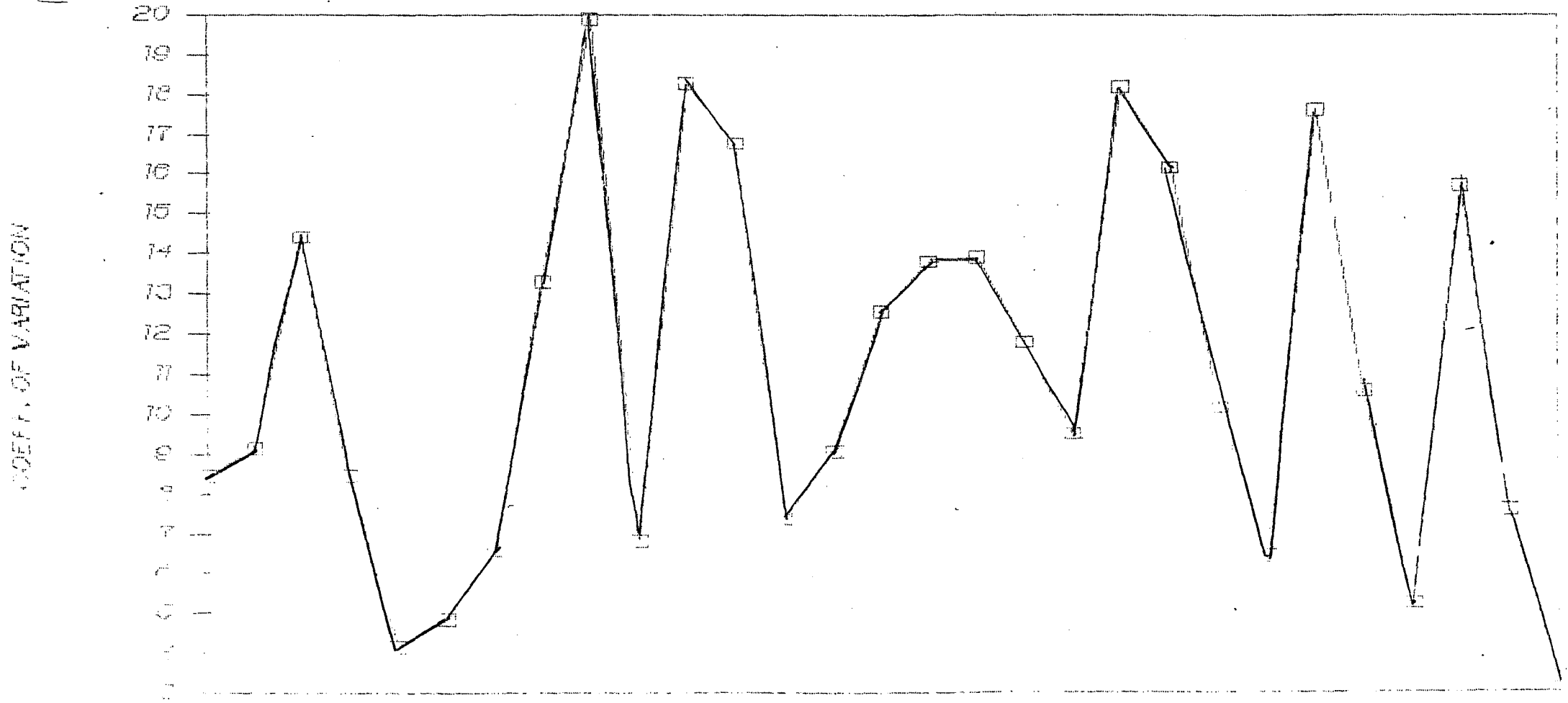
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C: COST	COEFF OF VARIATION
1956-57	28.05	33.77	34.61	37.12	3.59	32.31	9.00	3.59	3.00	10.68
1957-58	31.03	31.26	27.24	21.66	-3.36	0.72	3.00	0.24	3.00	14.81
1958-59	28.80	39.07	39.52	36.40	2.93	37.21	6.00	6.20	3.00	13.14
1959-60	33.94	36.17	34.71	34.83	0.29	6.58	3.00	2.19	3.00	3.84
1960-61	34.20	35.44	35.78	36.22	0.66	5.90	9.00	0.66	3.00	3.30
1961-62	35.05	34.64	33.77	34.93	-0.04	-0.35	9.00	-0.04	3.00	4.28
1962-63	31.06	30.60	26.77	23.42	-2.73	-1.47	3.00	-0.49	3.00	11.52
1963-64	27.82	33.08	38.08	43.45	6.24	56.18	9.00	6.24	3.00	17.00
1964-65	44.00	50.19	56.67	54.17	2.57	28.79	6.00	4.80	3.00	11.22
1965-66	50.50	61.83	66.33	67.83	3.81	34.32	9.00	3.81	3.00	12.27
1966-67	63.17	64.75	69.67	75.42	2.15	19.39	9.00	2.15	3.00	7.39
1967-68	72.42	71.42	72.83	62.77	-1.48	0.58	6.00	0.10	3.00	9.02
1968-69	60.17	66.33	66.17	65.50	0.98	10.25	3.00	3.42	3.00	5.80
1969-70	65.00	76.67	75.00	78.44	2.30	20.68	9.00	2.30	3.00	8.07
1970-71	66.33	59.67	56.00	48.33	-3.02	-10.05	3.00	-3.35	3.00	12.65
1971-72	52.00	52.00	52.00	57.33	1.14	10.26	9.00	1.14	3.00	6.73
1972-73	65.00	78.67	88.67	97.33	5.53	49.74	9.00	5.53	3.00	17.08
1973-74	96.00	129.83	118.33	126.67	3.55	35.24	3.00	11.75	3.00	13.02
1974-75	119.33	159.33	156.67	138.33	1.77	33.52	3.00	11.17	3.75	13.41
1975-76	112.67	101.00	73.33	66.67	-4.54	-10.36	3.00	-3.45	3.75	22.02
1976-77	68.33	72.33	75.00	96.00	4.50	40.49	9.00	4.50	3.75	15.37
1977-78	100.33	110.67	121.33	122.33	2.44	21.93	9.00	2.44	3.75	10.20
1978-79	99.00	101.67	96.33	84.00	-1.68	2.69	3.00	0.90	3.75	8.48
1979-80	83.67	101.33	118.67	125.67	5.58	50.20	9.00	5.58	3.75	16.68
1980-81	127.00	130.67	130.67	135.33	0.73	6.56	9.00	0.73	3.75	3.85
1981-82	134.33	135.33	134.00	132.33	-0.17	0.74	3.00	0.25	3.75	2.49
1982-83	126.67	136.33	137.33	154.67	2.46	22.11	9.00	2.46	3.75	8.66
1983-84	150.00	152.33	154.33	156.00	0.44	4.00	9.00	0.44	3.75	7.40
1984-85	144.67	159.33	164.33	165.33	1.59	14.29	9.00	1.59	3.75	7.44

Table VI-c: WHOLESALÉ PRICE ANALYSIS CROP BARLEY STATE BIHAR (MOTIHARI)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
956-57	25.01	26.35	28.13	29.92	2.18	19.64	9.00	2.18	3.00	8.11
957-58	30.81	34.38	34.83	32.37	0.56	13.04	6.00	2.17	3.00	6.10
958-59	32.15	41.97	47.11	34.83	0.93	46.53	6.00	7.75	3.00	19.27
959-60	30.36	30.59	27.24	27.69	-0.98	0.74	3.00	0.25	3.00	6.88
960-61	29.47	33.27	29.42	26.80	-1.01	12.88	3.00	4.29	3.00	8.25
961-62	27.08	33.74	32.37	31.81	1.94	24.59	3.00	8.20	3.00	9.11
962-63	29.02	30.98	30.81	25.00	-1.54	6.77	3.00	2.26	3.00	9.00
963-64	24.67	25.90	26.34	30.89	2.80	25.21	9.00	2.80	3.00	10.99
964-65	37.05	51.01	53.58	64.60	8.26	74.37	6.00	12.40	3.00	19.48
965-66	51.80	71.45	70.55	67.42	3.35	37.93	3.00	12.64	3.00	16.07
966-67	58.94	66.85	73.23	97.35	7.24	65.16	9.00	7.24	3.00	22.19
967-68	72.34	113.83	111.64	87.07	2.26	57.36	3.00	19.12	3.00	19.31
968-69	65.77	59.86	57.15	47.26	-3.13	-8.99	3.00	-3.00	3.00	13.47
969-70	51.53	62.06	73.33	72.33	4.49	42.32	6.00	7.05	3.00	15.69
970-71	66.44	64.00	66.00	62.67	-0.63	-0.66	6.00	-0.11	3.00	5.47
971-72	56.00	59.67	59.33	66.67	2.12	19.05	9.00	2.12	3.00	8.09
972-73	60.33	75.00	81.00	77.00	3.07	34.25	6.00	5.71	3.00	13.35
973-74	71.33	95.33	110.00	129.00	8.98	80.84	9.00	8.98	3.00	21.89
974-75	113.33	120.00	160.33	162.33	4.80	43.24	9.00	4.80	3.75	16.29
975-76	109.23	81.00	78.33	70.00	-3.99	-25.85	3.00	-8.62	3.75	21.95
977-78	78.33	98.33	105.00	125.00	6.62	59.57	9.00	6.62	3.75	16.97
978-79	91.67	81.67	91.67	93.33	0.20	1.82	3.00	0.61	3.75	7.71
979-80	78.33	75.00	76.67	105.33	3.83	34.47	9.00	3.83	3.75	16.33
980-81	108.33	116.67	123.33	132.33	2.46	22.15	9.00	2.46	3.75	10.29
981-82	113.00	122.67	138.33	145.00	3.15	28.32	3.00	9.44	3.75	10.57
982-83	125.00	128.33	145.00	141.67	1.48	16.00	9.00	1.78	3.75	7.03
983-84	130.33	130.67	132.67	131.33	0.09	1.79	9.00	0.20	3.75	3.17
984-85	124.00	124.00	127.67	131.67	0.69	6.18	9.00	0.69	3.75	2.78

VARIABILITY OF WHOLESALE PRICES

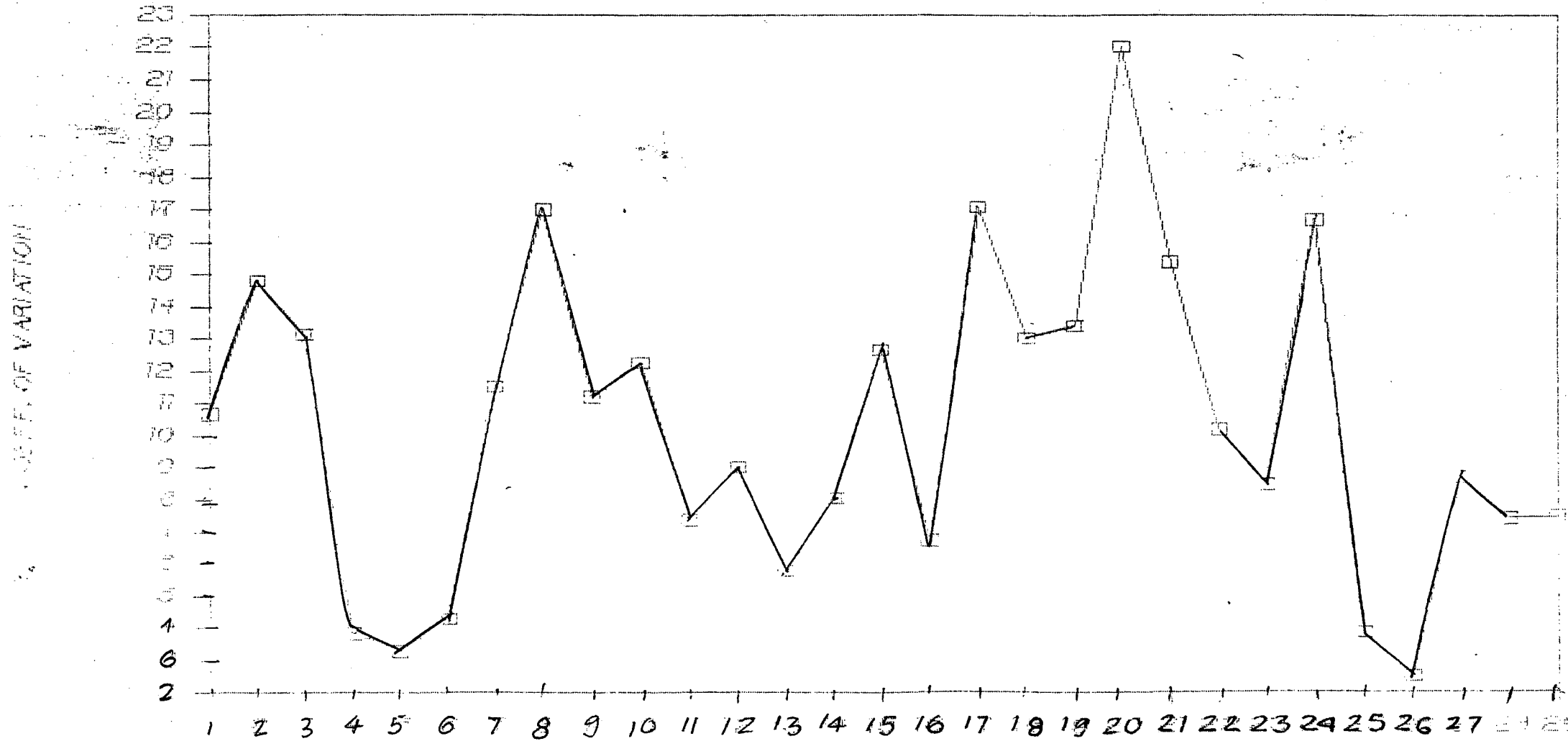
CROP BARLEY STATE UP (IVARANAS)



GRAPH VI-a

VARIABILITY OF WHOLESALE PRICES

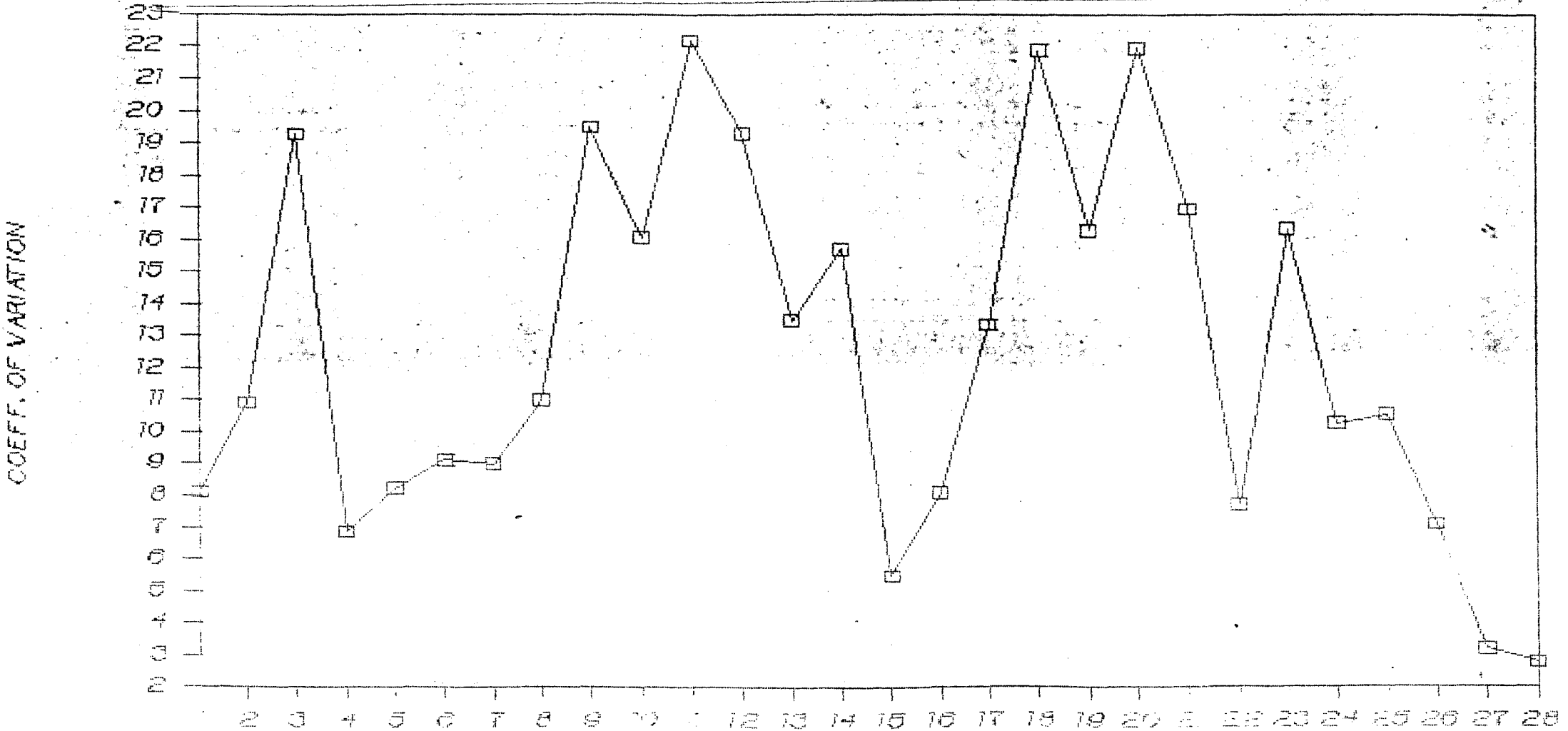
CROP BARLEY STATE RAJASTHAN(JAIPUR)



GRAPH VI - b

VARIABILITY OF WHOLESALE PRICES

CROP BARLEY STATE BIHAR (MOTIHARI)



GRAPH VI-C

YEAR

their corresponding graphs, for the three states of Uttar Pradesh, Rajasthan and Bihar respectively. The markets/centres for these three states are Varanasi, Jaipur and Motihari in that order. Barley entered the purview of the APC during the year 1968-69.

The number of years during which the price differences were more than the carrying costs, appear to be more concentrated and appearing with greater frequency before the mid-seventies in all the three states. However, there are still one or two years thereafter, particularly 1979-80 in all the three states when this occurs. Apart from these odd years the percentage changes were reduced to levels which are considerably below the carrying costs. In earlier years, even where the price differences lie within the permissible range, they are on the higher side, i.e. closer towards the limit of the normal carrying costs, but after the mid-seventies they stand considerably reduced in magnitude particularly during the eighties. The concluding years in each case record declines unlike for bajra as we saw earlier, and for two states for maize. Perhaps the eighties will continue to prove effective in controlling price fluctuations for barley and other crops will follow suit.

A point that arises here is that while the case of maize in U.P. stood out as a clear feather in the cap of

the government, in that very state, the policy has not been as effective for barley. This seems to point out very strongly that unless all factors conjoin, the government policy cannot be successful in curbing price variability. Or else, there is something in the nature of the crop itself, most crucially its extremely fluctuating production profile, which does not let the price variability come down over the years. We find that graph VI-a recording C.V. against time, is sharply fluctuating all through, reaching very high levels and falling down to very low levels only to rise and fall again, continuously. The portion of the graph from the 13th to 18th year (1968-69 to 1974-75) climbs up steadily year after year, falling during the last two years and again reaches a peak thereafter. Even during the eighties, this pattern of considerably fluctuating peaks and troughs has not been arrested. The absolute range of the C.V. itself is very much higher in magnitude than it was for earlier crops. In Bihar also the absolute magnitudes of C.V. are very high but after the year 1978-79 the graph recording C.V. climbs down continuously, falling to very low absolute and relative levels towards the end of the period under study. In the case of Rajasthan, from the graph we can identify four distinct phases which emerge from the behaviour of the C.V. alone. The late fifties was a period of low variability, the sixties to early seventies was a phase of irregular

variability (with regular fluctuations from year to year) but within a definable upper and lower limit; thereafter till the eighties set in, variability levels ranged an absolute high along with regular fluctuation. Only during the eighties does there appear, perhaps, some semblance of a reduction in variability from one year to another along with a fall in the absolute magnitude of the C.V. This is one crop in which, in all the three states, the government has not been able to completely wipe out price differences which are higher than normal carrying costs, even as late as the eighties. However, for our final judgement about the impact of government intervention, we must look at the parabolic time-trend for the C.V. Table VI-A shows the results.

Table VI-A: Additional Information on C.V. for Barley:
Estimated Polynomial ($v=a+bT+cT^2$)

	Uttar Pradesh	Rajasthan	Bihar
b Coefficient	+0.749436	+0.144636	+1.511388
c Coefficient	-0.02638	-0.00682	-0.05251
Reversibility Point ($=\frac{b}{2c}$)	14.19	10.60	14.39

Table VI-A reveals very results in conformity with our second hypothesis. In all the three states there is a clear tendency revealed by the intertemporal behaviour

of the C.V. to increase upto a point (when government intervened) and thereafter start declining. Thus the curve fitted would be an inverted negative. The reversibility time points also work out to be logically consistent with our hypothesis. It may also be mentioned that the tendencies are statistically highly significant in case of U.P. and Bihar and not so strong in the case of Rajasthan.

Thus it is clear that there has been some measure of success of the government's policy in this limited sense, even in the case of barley whose price variability has shown a distinct reversal of the hitherto increasing C.V. after the government intervened. In fact barley came under the purview of the APC during the year 1968-69 and our results show reversal from the 14th-15th year onwards i.e. 1969-70 onwards for U.P. as well as Bihar. For Rajasthan, however, the reversal occurs during the 11th year 1966-67 (an year before this crop entered the purview of APC) - thereby implying that the credit for this reversal may go to certain extraneous factors other than the government. Apart from this, as we have already stated, the level of statistical significance obtained in the case of Rajasthan, is relatively lower, while it is very much higher and stronger for the other two states. Thus, as we had earlier seen in the case of maize, for Rajasthan we do not read too much into the results of the curve fitting exercise but for U.P. and Bihar the success

story is certainly confirmed. Before conducting this statistical exercise as an adjunct to our analysis on inter-quarter price changes, we had been slightly perturbed about the fact that even during the eighties there were one or two years when price differences exceeded the permissible carrying costs, but now it would seem more apt to treat those years as exceptions to an otherwise all round success of government policy and probe into the reasons which led to a persistence of such exceptional occurrences. Looking at the production statistics for barley in the three chosen states, we find that, in all three states the production had maintained a fairly consistent trend level, almost throughout the years prior to 1979-80. However, with the onset of the late seventies the production of barley appears relatively on the decline in each of the states we have considered - more so during the years corresponding to high price difference. This, then, may be one of the explanatory factors for the spurt in price differences during those particular years of the eighties, as can be read from the tables.

Taking the category of coarse grains as a whole, we find that by and large, there are few cases of complete success; The degree of failure seems to have been arrested in some cases and not so much in others. Some years stand out as bad in almost all cases, implying that when

negative extraneous circumstances occur, the government is not well-prepared enough to ward them off completely but does help to absorb part of the shock thereby reducing the intensity of what might otherwise have been worse.

As a category, coarse grains have obviously not received as much attention as wheat and rice, but nonetheless the overall results do appear promising, as far as intra-year variability of wholesale prices is concerned.

Section III : PULSES & OILSEEDS: GRAM AND GROUNDNUT

In this section we have taken one representative crop each from the broad categories of pulses and oilseeds. For our analysis, we have chosen gram and groundnut respectively. Let us begin with gram first.

Tables VII-a, VII-b and VII-c and their corresponding graphs VII-a, VII-b and VII-c may be referred to, for the three states of Madhya Pradesh, Uttar Pradesh and Rajasthan respectively, for the markets of Bhind, Hapur and Sriganaganagar in that order. The harvest peak marketing quarter for gram, works out to be April-May-June for the two states of Madhya Pradesh and U.P. and March-April-May for Rajasthan.

There appears to be a striking similarity amongst all the three highest producing states for gram with reference to the years which recorded the highest price differences beyond the normal carrying costs. Also, there seems to emerge some correlation between the years recording high price variability and the years of production shortfalls, again for all the three states. In fact all three graphs also appear rather similar in that, the C.V. takes a continuously zig-zag route with sharp peaks and depressions throughout the three decade period or so. The similarity is more striking for U.P. and Rajasthan, whereas the amplitude of fluctuations are comparatively less for M.P.

Table VII-a: WHOLESAL PRICE ANALYSIS CROP GRAM STATE MADHYA PRADESH

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	28.80	31.53	32.15	34.77	2.30	20.71	9.00	2.30	3.00	7.40
1957-58	29.59	28.51	26.65	26.45	-1.18	-3.65	3.00	-1.22	3.00	6.37
1958-59	31.36	41.53	48.57	48.61	6.11	55.03	9.00	6.11	3.00	17.89
1959-60	34.12	32.45	31.00	32.09	-0.66	-4.87	3.00	-1.62	3.00	5.13
1960-61	34.00	39.45	41.55	38.44	1.45	22.20	6.00	3.70	3.00	8.08
1961-62	32.71	35.40	37.08	38.12	1.84	16.56	9.00	1.84	3.00	8.06
1962-63	37.37	42.00	39.37	36.66	-0.21	12.39	3.00	4.13	3.00	6.83
1963-64	38.00	40.00	47.91	52.50	4.24	38.17	9.00	4.24	3.00	15.64
1964-65	49.37	62.92	66.87	52.92	0.80	35.44	6.00	5.91	3.00	14.96
1965-66	49.37	60.83	57.75	54.00	1.04	23.21	3.00	7.74	3.00	9.05
1966-67	56.54	57.00	57.00	57.00	0.09	0.81	3.00	0.27	3.00	0.67
1967-68	78.00	129.17	137.67	123.33	6.46	76.50	6.00	12.75	3.00	24.02
1968-69	65.83	80.21	74.17	70.42	0.77	21.83	3.00	7.28	3.00	9.92
1969-70	87.50	105.92	105.83	104.20	2.12	21.05	3.00	7.02	3.00	11.01
1970-71	86.04	81.04	78.33	72.29	-1.78	-5.81	3.00	-1.94	3.00	7.33
1971-72	78.75	88.12	89.91	94.75	2.26	20.32	9.00	2.26	3.00	7.96
1972-73	97.25	114.00	122.79	122.33	2.87	26.26	6.00	4.38	3.00	10.17
1973-74	141.67	175.33	193.67	193.00	4.03	36.71	6.00	6.12	3.00	13.13
1974-75	194.33	224.00	220.33	184.67	-0.55	15.27	3.00	5.09	3.75	9.55
1975-76	174.00	176.33	170.83	131.50	-2.71	1.34	3.00	0.45	3.75	12.44
1976-77	102.58	100.42	103.33	116.67	1.53	13.73	9.00	1.53	3.75	6.86
1977-78	135.83	160.00	194.33	186.50	4.14	43.07	6.00	7.18	3.75	15.79
1978-79	170.00	205.00	196.67	176.46	0.42	20.59	3.00	6.86	3.75	8.92
1979-80	156.67	190.83	193.33	196.67	2.84	25.53	9.00	2.84	3.75	9.18
1980-81	240.00	315.00	360.83	318.33	3.63	50.35	6.00	8.39	3.75	16.54
1981-82	310.83	352.50	294.17	235.00	-2.71	13.40	3.00	4.47	3.75	14.62
1982-83	225.83	263.83	215.83	222.00	-0.19	16.83	3.00	5.61	3.75	9.10
1983-84	235.00	235.00	296.67	312.50	3.66	32.98	9.00	3.66	3.75	16.69
1984-85	325.00	414.58	453.33	407.92	2.83	39.49	6.00	6.58	3.75	13.72

Table VII-b: WHOLESALE PRICE ANALYSIS CROP GRAM STATE UTTAR PRADESH (HAPUR)

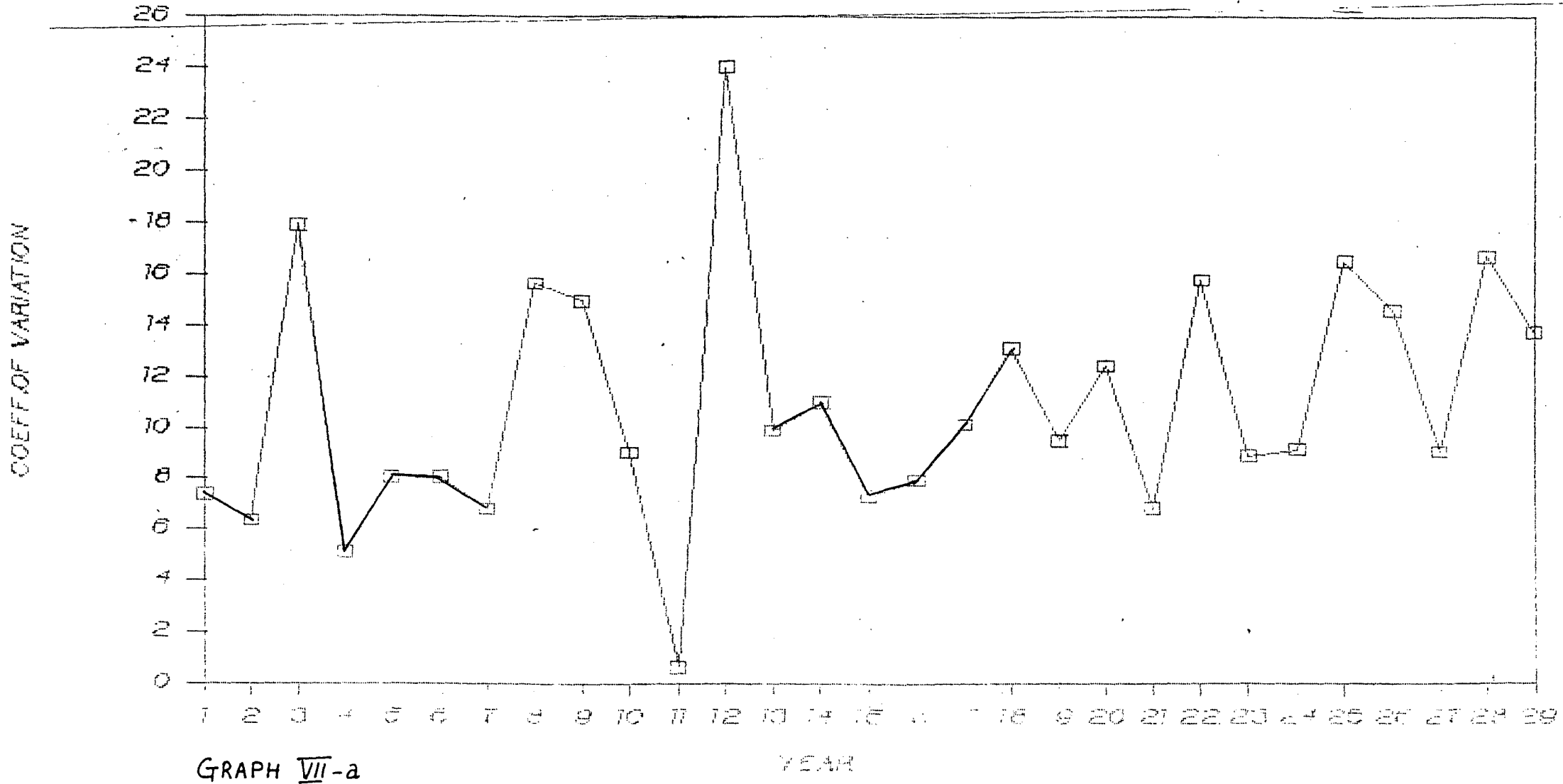
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	28.63	32.87	34.49	35.67	2.73	24.58	9.00	2.73	3.00	8.48
1957-58	31.81	32.31	30.75	29.36	-0.86	1.57	3.00	0.52	3.00	4.23
1958-59	32.26	43.25	51.91	54.75	7.75	69.74	9.00	7.75	3.00	20.83
1959-60	35.50	34.48	34.16	35.28	-0.07	-0.63	9.00	-0.07	3.00	2.41
1960-61	37.51	41.30	44.65	42.53	1.49	19.05	6.00	3.17	3.00	6.64
1961-62	35.61	38.06	40.02	40.63	1.57	14.12	9.00	1.57	3.00	6.64
1962-63	39.74	43.54	41.53	40.91	0.33	9.55	3.00	3.18	3.00	4.21
1963-64	42.87	43.54	49.82	55.51	3.28	29.50	9.00	3.28	3.00	12.16
1964-65	55.67	77.92	89.17	78.12	4.48	60.18	6.00	10.03	3.00	18.60
1965-66	60.42	76.67	73.33	71.04	1.95	26.90	3.00	8.97	3.00	9.00
1966-67	73.33	77.50	95.00	126.67	8.08	72.73	9.00	8.08	3.00	23.10
1967-68	126.25	135.33	129.33	104.17	-1.94	7.19	3.00	2.40	3.00	13.29
1968-69	77.92	86.67	83.33	82.08	0.59	11.23	3.00	3.74	3.00	6.52
1969-70	94.58	104.58	112.50	113.33	2.20	19.82	9.00	2.20	3.00	9.57
1970-71	88.75	85.83	78.33	83.33	-0.68	-3.29	3.00	-1.10	3.00	5.67
1971-72	82.67	91.67	95.00	101.67	2.55	22.98	9.00	2.55	3.00	8.46
1972-73	97.67	115.33	131.67	131.00	3.79	34.81	6.00	5.80	3.00	12.61
1973-74	140.00	170.00	203.33	218.33	6.22	55.95	9.00	6.22	3.00	17.23
1974-75	195.67	226.67	232.33	217.67	1.25	18.74	6.00	3.12	3.75	7.90
1975-76	185.00	178.33	175.67	166.67	-1.10	-3.60	3.00	-1.20	3.75	6.84
1976-77	116.00	117.00	124.00	138.33	2.14	19.25	9.00	2.14	3.75	8.17
1977-78	143.00	174.67	205.00	201.67	4.56	43.36	6.00	7.23	3.75	15.41
1978-79	174.33	209.33	223.33	206.33	2.04	28.11	6.00	4.68	3.75	10.94
1979-80	181.00	206.00	216.67	223.33	2.60	23.39	9.00	2.60	3.75	8.48
1980-81	246.67	311.67	425.00	386.67	6.31	72.30	6.00	12.05	3.75	20.86
1981-82	340.00	368.33	326.67	293.33	-1.53	8.33	3.00	2.78	3.75	8.75
1982-83	269.00	269.33	265.00	257.33	-0.48	0.12	9.00	0.01	3.75	2.60
1983-84	256.00	267.67	315.00	353.33	4.22	38.02	6.00	6.34	3.75	14.15
1984-85	365.67	453.33	482.33	460.33	2.88	31.91	3.00	10.64	3.75	11.99

Table VII-c: WHOLESale PRICE ANALYSIS CROP GRAM STATE RAJASTHAN(SRIGANGANAGAR)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	26.57	31.14	32.03	34.18	3.18	28.64	9.00	3.18	3.00	10.39
1957-58	30.47	28.36	27.91	27.24	-1.18	-6.95	6.00	-1.16	3.00	7.10
1958-59	27.69	28.13	28.13	28.36	0.27	2.42	9.00	0.27	3.00	2.28
1959-60	29.08	31.76	31.76	33.26	1.60	14.37	9.00	1.60	3.00	5.71
1960-61	33.88	38.47	42.70	42.47	2.82	26.01	6.00	4.34	3.00	9.75
1961-62	34.85	35.44	37.06	39.51	1.49	13.37	9.00	1.49	3.00	6.50
1962-63	36.31	40.90	41.31	38.13	0.56	13.75	6.00	2.29	3.00	6.27
1963-64	36.66	38.75	43.87	52.83	4.90	44.10	9.00	4.90	3.00	15.51
1964-65	51.03	59.50	73.75	76.50	5.54	49.90	9.00	5.54	3.00	17.47
1965-66	61.87	66.73	62.85	56.45	-0.97	7.87	3.00	2.62	3.00	7.73
1966-67	54.10	61.00	66.37	74.75	4.24	38.17	9.00	4.24	3.00	12.85
1967-68	66.83	77.00	80.42	71.85	0.83	20.32	6.00	3.39	3.00	9.19
1968-69	75.42	76.32	89.28	81.67	0.92	18.39	6.00	3.06	3.00	9.36
1969-70	86.32	110.78	115.20	122.20	4.62	41.57	9.00	4.62	3.00	14.23
1970-71	98.38	92.95	94.12	85.17	-1.49	-4.34	6.00	-0.72	3.00	9.17
1971-72	77.70	86.40	92.67	95.37	2.53	22.74	9.00	2.53	3.00	8.47
1972-73	99.67	111.55	126.83	128.13	3.17	28.56	9.00	3.17	3.00	11.01
1973-74	113.47	132.68	166.43	195.00	7.98	71.86	9.00	7.98	3.00	21.55
1974-75	201.47	215.72	246.00	209.93	0.47	22.10	6.00	3.68	3.75	9.85
1975-76	188.92	180.67	191.88	169.25	-1.16	1.57	6.00	0.26	3.75	6.37
1976-77	113.82	105.42	106.98	122.17	0.82	7.34	9.00	0.82	3.75	9.60
1977-78	132.67	149.33	196.00	189.00	4.72	47.74	6.00	7.96	3.75	16.96
1978-79	160.00	188.33	216.33	190.67	2.13	35.21	6.00	5.87	3.75	11.77
1979-80	169.67	181.67	193.50	213.00	2.84	25.54	9.00	2.84	3.75	9.88
1980-81	223.00	298.33	355.33	344.00	6.03	59.34	6.00	9.89	3.75	18.01
1981-82	334.67	372.00	351.67	277.67	-1.89	11.16	3.00	3.72	3.75	12.44
1982-83	253.00	255.00	243.33	222.67	-1.33	0.79	3.00	0.26	3.75	7.21
1983-84	228.33	235.00	253.33	323.33	4.62	41.61	9.00	4.62	3.75	14.98
1984-85	321.67	406.67	458.33	440.00	4.09	42.49	6.00	7.08	3.75	13.53

VARIABILITY OF WHOLESALE PRICES

OROR GRAM STATE MADHYA PRADESH

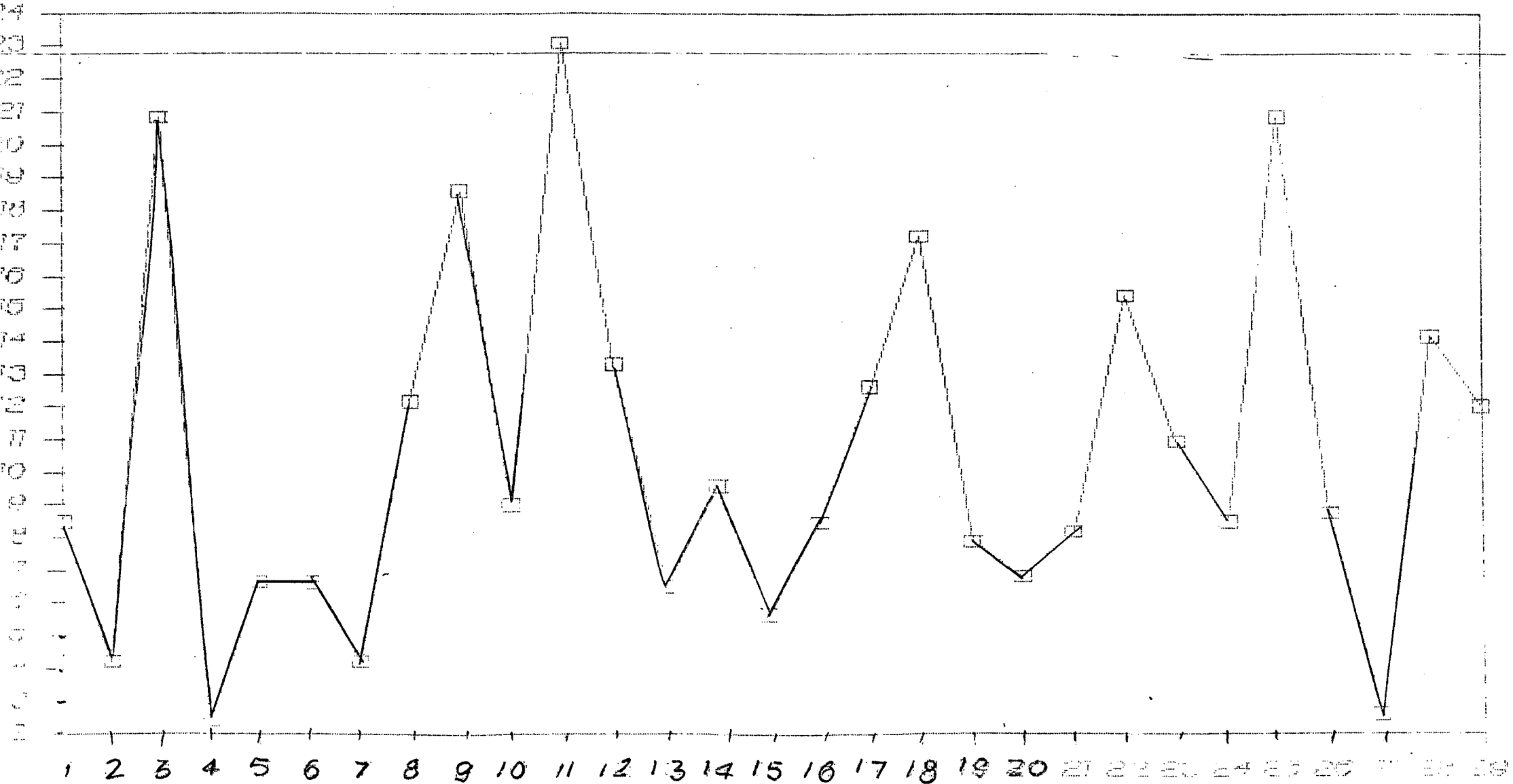


GRAPH VII-a

YEAR

VARIABILITY OF WHOLESALE PRICES

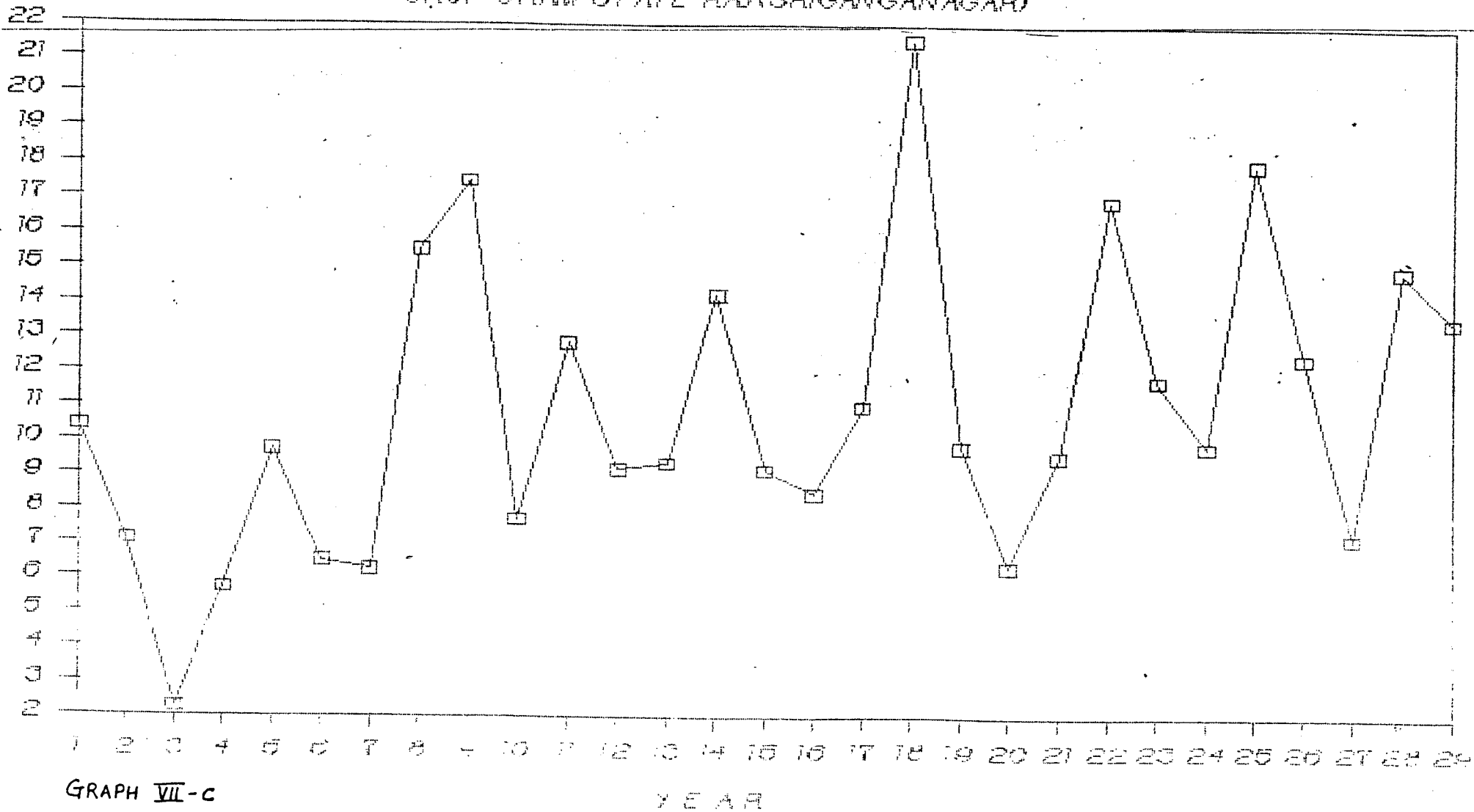
CROP GRAM STATE UTTAR PRADESH



GRAPH VII-b

VARIABILITY OF WHOLESALE PRICES

CROP GRAM STATE RAIS(RIGANGANAGAR)



GRAPH VII-C

Going into the individual details statewise we find that, in Madhya Pradesh the maximum number of years when monthly price differences exceeded the normal carrying costs, occurred during the period prior to 1974-75. It was within this period also, that the C.V. touched the highest peak amongst all the years considered here. This incidentally occurred during 1967-68, following a production decline of about 27.34 per cent from the year 1965-66 to 1966-67. From 1966-67 to 1967-68 this was followed by an increase of about 47 per cent in gram production in Madhya Pradesh, while the following year again witnessed a decline in production. However, the onset of the seventies ushered in an era of stable production relative to the preceding era. This was in fact true of all three states, with the exception of occasional years like 1979-80, when gram production fell in all three states; more so in Rajasthan and U.P. though, than in Madhya Pradesh. In fact in these two states production levels fell to half of the preceding year's production, which could well explain the fact that the price difference registered a considerable increase in magnitude during 1980-81 over and above the normal carrying costs, in U.P. and Rajasthan but not in Madhya Pradesh. However, the unjustified increase in price difference during 1983-84 in both these states cannot be explained in terms of production factors because during the eighties production had more or less

stabilised and neither the years preceding nor succeeding 1983-84 could be deemed to be bad in terms of production. Only in Madhya Pradesh we find in fact, that after 1977-78, there was not even a single year when price differences exceeded normal carrying costs. The eighties were relatively trouble-free in this sense, in Madhya Pradesh. The troubled years which were common to all the three states, stand out as 1963-64, 1973-74 and 1977-78. While the explanation for the sixties could be corroborated by production fluctuations (severe dips in fact), the explanation for the all-round bad years 1973-74 does not lie only in production shortfalls.

Turning to the closely-related states for gram, viz. U.P. and Rajasthan we find that a number of years viz. 1963-64, 1964-65, 1966-67, 1972-73, 1977-78, 1980-81 and 1983-84 distinctly stand out as bad years in terms of high price differences as well as high levels of C.V. in both these states. The price fluctuations of the sixties can be largely explained with reference to production shortfalls but not the price fluctuations of the seventies. During the two years of the eighties when price differences persisted beyond normal carrying costs only the abnormal price change during the year 1980-81 can, to some small extent, be attributed to a fall in gram production during the preceding year but not thereafter. Looking at graphs

VII-b and VII-c as well, one would not feel instantly inclined to state that the government policy has been much of a success for pulses such as gram for the states of U.P. and Rajasthan, though surprisingly, an otherwise backward state like Madhya Pradesh relatively scores over the other two states, for this particular crop.

Let us now turn to our final adjunct to the above analysis, in terms of the second degree polynomial.

Table VII-A: Additional Information on C.V. for Gram:
Estimated Polynomial ($V=a+bT+cT^2$)

	Madhya Pradesh	Uttar Pradesh	Rajasthan
b Coefficient	+0.155688	+0.235513	+0.249218
c Coefficient	-0.00088	-0.00853	-0.00607
Reversibility Point ($= \frac{b}{2c}$)	logically and statistically absurd	13.79	28.75

Surprisingly this additional exercise, the results of which are tabulated in VII-A does not yield satisfactory results for Madhya Pradesh and Rajasthan. In U.P. the year of reversal of C.V. from a positive to a negative trend occurs around the 14th year i.e. 1969-70. In Rajasthan, the reversal is too late to be of any meaning for our analysis.

In a nutshell, even this verification exercise does not lend any concrete support to our hypothesis as it has

done for the crops considered previously. Therefore it may be reasonable to state for the time being, that gram has been one of the crops faced with the lowest relative success of government policy.

Oilseeds: Groundnut

Groundnut was amongst the crops which entered the purview of APC during the late sixties, viz. 1967-68. For the purpose of this analysis, we have dealt only with the two states of Gujarat and Andhra Pradesh. In Tamil Nadu it was found that there were three harvests with regularly substantial market arrivals of groundnut throughout the years and almost six months of peak marketing. It would not have lent itself to a neat intra-year periodisation scheme of the kind attempted by us. Therefore it was decided to drop the third state and undertake analysis only for the two highest producing states only. While the peak marketing quarter (Q_1) for Gujarat is October-November-December, it is November-December and January for Andhra Pradesh. The two centres taken are Rajkot and Nandyal respectively.

Tables VIII-a and VIII-b and the corresponding graphs for groundnut Gujarat and Andhra Pradesh respectively show a rather neat and similar pattern without too many complications. Prior to the beginning of the seventies, there are two-three years in both states, which register price

Table VIII-a: WHOLESAL PRICE ANALYSIS CROP GROUNDNUT STATE GUJRAT

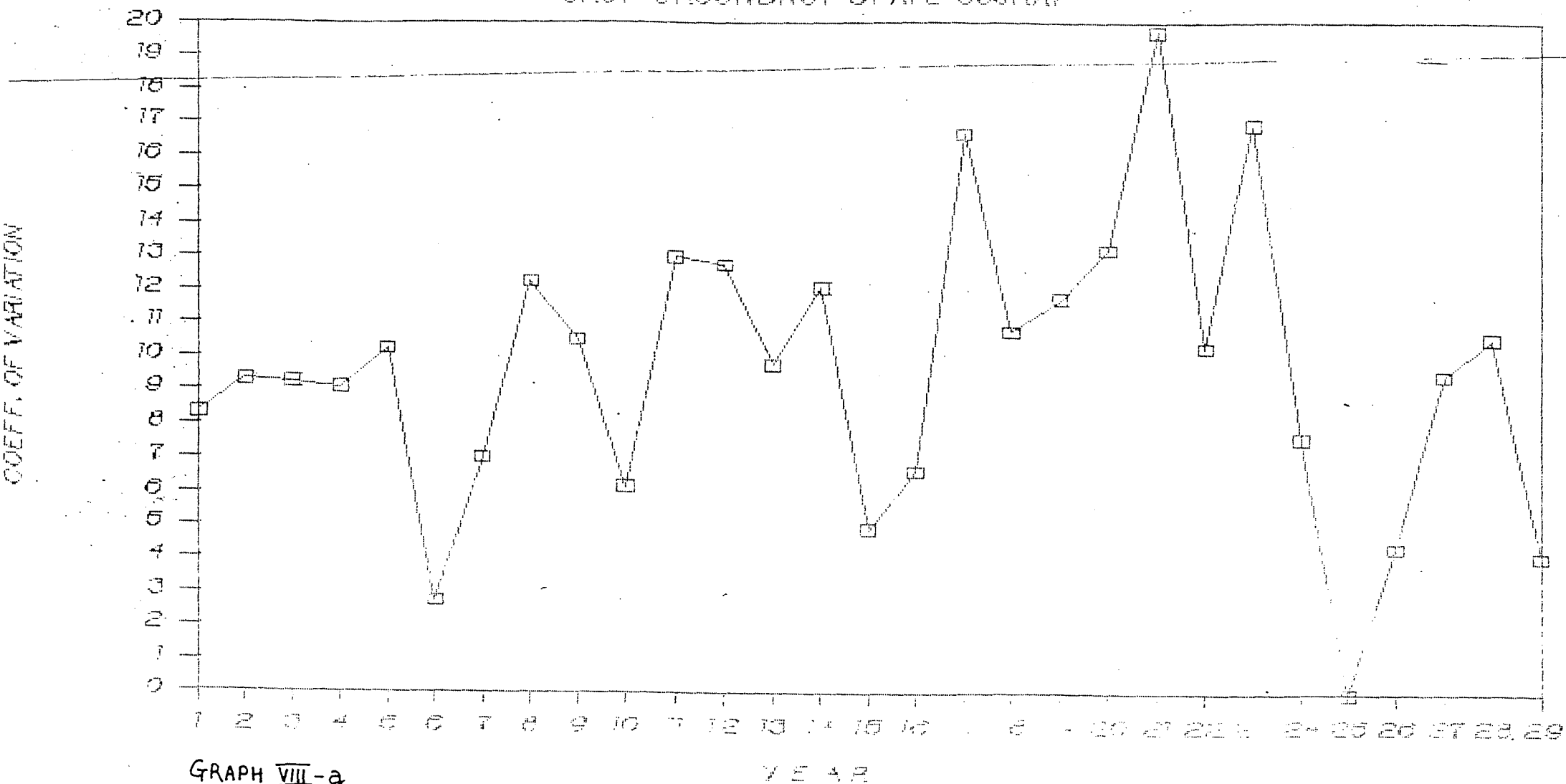
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	44.09	48.78	54.17	51.35	1.83	22.85	6.00	3.81	3.00	8.31
1957-58	47.33	45.53	47.99	56.93	2.25	20.28	9.00	2.25	3.00	9.29
1958-59	48.00	52.10	58.89	58.27	2.38	22.68	6.00	3.78	3.00	9.24
1959-60	52.83	62.32	64.16	63.21	2.18	21.45	6.00	3.58	3.00	9.07
1960-61	63.97	78.42	82.62	80.42	2.86	29.15	6.00	4.86	3.00	10.25
1961-62	66.40	70.25	68.22	70.00	0.60	5.80	3.00	1.93	3.00	2.73
1962-63	60.00	63.26	69.60	68.15	1.51	15.99	6.00	2.67	3.00	7.00
1963-64	64.12	73.33	84.67	77.25	2.27	32.04	6.00	5.34	3.00	12.25
1964-65	74.08	83.00	87.00	97.33	3.49	31.38	9.00	3.49	3.00	10.51
1965-66	97.55	96.33	99.83	111.33	1.57	14.13	9.00	1.57	3.00	6.15
1966-67	125.17	151.13	152.55	113.33	-1.05	21.88	6.00	3.65	3.00	13.00
1967-68	111.25	96.13	90.32	111.88	0.06	0.57	9.00	0.06	3.00	12.77
1968-69	119.17	126.87	140.00	149.17	2.80	25.17	9.00	2.80	3.00	9.75
1969-70	127.17	156.67	162.95	166.25	3.41	30.73	9.00	3.41	3.00	12.07
1970-71	132.00	144.20	132.25	136.87	0.41	9.24	3.00	3.08	3.00	4.87
1971-72	133.75	134.75	132.58	152.92	1.59	14.33	9.00	1.59	3.00	6.59
1972-73	176.67	215.00	249.17	259.17	5.19	46.70	9.00	5.19	3.00	16.65
1973-74	224.58	246.87	273.53	295.92	3.53	31.76	9.00	3.53	3.00	10.76
1974-75	244.58	230.83	228.75	204.25	-1.83	-5.62	3.00	-1.87	3.75	11.75
1975-76	165.40	139.40	174.20	192.28	1.81	16.25	9.00	1.81	3.75	13.22
1976-77	170.32	217.72	286.67	219.58	3.21	68.31	6.00	11.39	3.75	19.73
1977-78	240.73	266.03	252.28	211.25	-1.36	10.51	3.00	3.50	3.75	10.29
1978-79	247.33	249.45	276.08	348.92	4.56	41.07	9.00	4.56	3.75	16.93
1979-80	284.33	325.33	311.88	329.77	1.78	15.98	9.00	1.78	3.75	7.59
1980-81	381.25	381.25	381.25	381.25	0.00	0.00	3.00	0.00	3.75	0.00
1981-82	381.25	398.75	359.58	377.92	-0.10	4.59	3.00	1.53	3.75	4.32
1982-83	401.08	380.50	396.08	459.17	1.61	14.48	9.00	1.61	3.75	9.47
1983-84	423.33	494.17	535.83	492.50	1.82	26.57	6.00	4.43	3.75	10.56
1984-85	451.25	455.00	437.25	468.33	0.42	3.79	9.00	0.42	3.75	4.07

Table VIII-b: WHOLESALE PRICE ANALYSIS CROP GRONNDNUT STATE ANDHRA PRADESH (NANDYAL)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	66.42	66.09	67.20	63.44	-0.50	1.17	6.00	0.19	3.00	8.84
1957-58	63.96	58.39	65.52	70.21	1.09	9.77	9.00	1.09	3.00	7.85
1958-59	66.42	73.22	78.24	72.55	1.03	17.80	6.00	2.97	3.00	7.97
1960-61	66.37	72.83	78.50	67.71	0.22	18.28	6.00	3.05	3.00	8.56
1961-62	67.39	66.67	64.59	68.12	0.12	1.09	9.00	0.12	3.00	2.97
1962-63	60.00	58.23	67.54	69.58	1.77	15.97	9.00	1.77	3.00	8.38
1963-64	66.21	75.21	88.33	90.00	3.99	35.93	9.00	3.99	3.00	16.38
1964-65	87.50	86.25	94.58	109.58	2.80	25.24	9.00	2.80	3.00	11.22
1965-66	119.75	134.50	163.17	152.50	3.04	36.26	6.00	6.04	3.00	14.93
1966-67	147.50	163.33	140.23	115.67	-2.40	10.73	3.00	3.58	3.00	13.67
1967-68	107.83	92.92	89.17	132.98	2.59	23.32	9.00	2.59	3.00	16.75
1968-69	113.17	123.90	160.78	165.11	5.10	45.90	9.00	5.10	3.00	16.28
1970-71	164.00	146.67	139.58	141.67	-1.51	-10.57	3.00	-3.52	3.00	8.50
1971-72	132.92	130.00	140.83	165.42	2.72	24.45	9.00	2.72	3.00	11.39
1972-73	185.67	226.17	296.33	283.00	5.82	59.61	6.00	9.93	3.00	20.10
1973-74	259.00	273.33	281.67	280.00	0.90	8.75	6.00	1.46	3.00	6.25
1974-75	265.83	247.50	230.83	209.17	-2.37	-6.90	3.00	-2.30	3.75	9.74
1975-76	164.17	140.83	175.00	245.83	5.53	49.75	9.00	5.53	3.75	22.96
1976-77	250.83	290.00	314.50	282.50	1.40	25.38	6.00	4.23	3.75	8.91
1977-78	175.00	240.33	216.85	220.00	2.86	37.33	3.00	12.44	3.75	11.28
1978-79	191.67	201.67	246.67	295.83	6.04	54.35	9.00	6.04	3.75	20.66
1979-80	275.83	295.83	320.67	301.67	1.04	16.25	6.00	2.71	3.75	7.76
1980-81	356.67	396.67	432.50	383.33	0.83	21.26	6.00	3.54	3.75	10.08
1981-82	395.00	367.50	400.00	392.50	-0.07	1.27	6.00	0.21	3.75	5.54
1982-83	395.00	389.33	425.83	458.33	1.78	16.03	9.00	1.78	3.75	8.47
1983-84	412.50	428.33	487.50	483.33	1.91	18.18	6.00	3.03	3.75	8.24
1984-85	471.67	430.00	435.00	449.17	-0.53	-4.77	9.00	-0.53	3.75	4.24

VARIABILITY OF WHOLESALE PRICES

CROP GROUNDNUT STATE GUJRAT

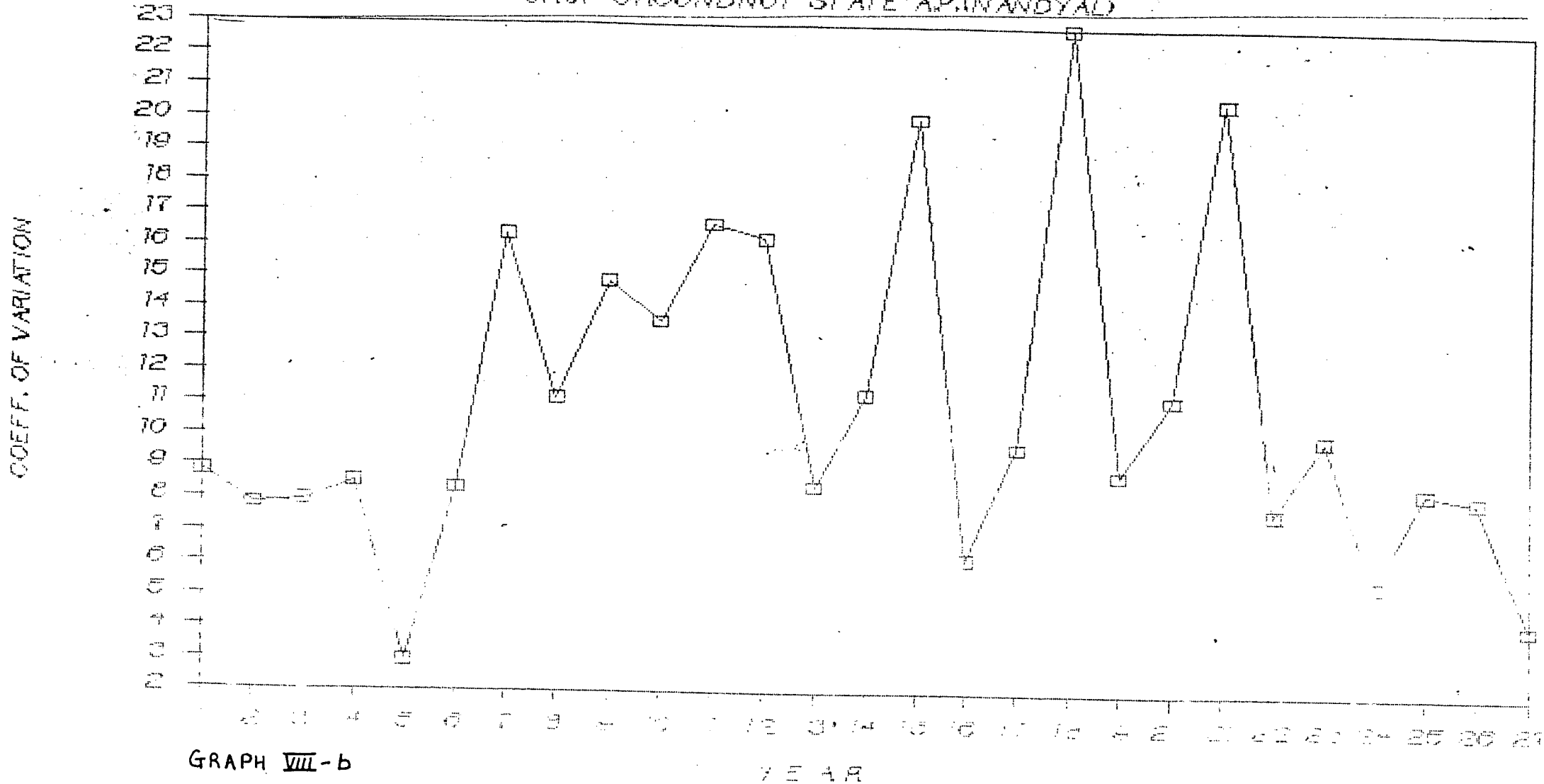


GRAPH VIII-a

Y E A R

VARIABILITY OF WHOLESALE PRICES

CROP GROUNDNUT STATE AP. (IN ANDYAL)



GRAPH VIII-b

YEAR

differences beyond the normal carrying costs. Thereafter, the years 1972-73 and 1978-79 are the only two years which stand out with price differences above the level justified by normal carrying costs. The level of groundnut production, it may be mentioned, declined by over 77 per cent from 1971-72 to 1972-73 in Gujarat and by a somewhat lesser amount in Andhra Pradesh as well. Thereafter, however, there were no such jerks in terms of production. After that, the percentage changes in prices per month fall to substantially low levels, with the C.V. also falling and in fact maintaining a very low fluctuation from year to year. It does appear that the success of government policy in case of oilseeds like groundnut has finally come of age and hopefully will stay on.

The graph VIII-a for Gujarat shows that the C.V. touches zero level during the 25th year. This was in fact due to the same average price being taken throughout due to absence of data. As between the 17th and 23rd year, the C.V. reached the highest peaks in both the states with a much sharper amplitude (of ups and downs) in Andhra Pradesh. In fact simply on visual inspection, one can discern an inverted V-shape of the graphical trend of the C.V. Let us therefore confirm whether indeed and if so, when a reversal of variability occurred by referring to the results tabulated in table VIII-A as follows.

Table VIII-A: Additional Information on C.V. for Groundnut: Estimated Polynomial ($v=a+bT+cT^2$)

	Gujarat	Andhra Pradesh
b Coefficient	+0.620342	+0.754476
c Coefficient	-0.02007	-0.02898
Reversibility Point (= $\frac{b}{2c}$)	15.44	13.01

The above table clearly brings out the fact that not only was there a distinct reversal of the earlier trend of an increasing price variability to a diminishing variability, but the tendency was statistically very much stronger and significant. Moreover, the reversal appears to have occurred at a point of time, which is logically consistent with our analysis, the 13th year (1968-69) in case of Andhra Pradesh, and around the 15th year (i.e. 1970-71) in case of Gujarat. Thus this is an added confirmation of our hypotheses regarding the effectiveness of government intervention in being successful in reversing the trend of increasing month-to-month variability of groundnut prices and also controlling price differences within permissible limits. The C.V. takes on the shape of an inverted V in both states, with reversal occurring soon after government intervention.

In this section, therefore the representative cases of pulses viz. gram and of oilseeds viz. groundnut represent clear contrasts in terms of the successfulness of government policy with reference to our hypothesis.

Section IV : COMMERCIAL CROPS: COTTON AND JUTE

In this final section, we deal with the two most important non-food commercial crops, viz. cotton and jute. Since the behaviour of prices of these commodities is, to a large extent, influenced by the degree of dispersion in their production across regions; the severity of seasonality in their output; and by the nature and pattern of final demand for these commodities, it would be relevant undertake a brief description of such aspects which have a significant bearing on the successful implementation of price policy for cotton and jute.

At the outset we must state that, in India, cotton is grown in almost all the states, but it is the western region, comprising the states of Gujarat, Madhya Pradesh and Maharashtra, that accounts for about 45 per cent of the production of cotton⁵ in India. In the northwest, the states of Punjab, Haryana and Rajasthan predominate, while in the southern region, cotton is primarily grown in the states of Andhra Pradesh, Karnataka and Tamil Nadu. These three states together account for 22.6 per cent of the area under cotton and for 27.4 per cent of production in 1984-85.⁶ It is only in the eastern region that cotton is not grown on an extensive scale. Thus we see that in sharp contrast to jute, the production of cotton is

geographically well dispersed.

At the very outset, we must state a major limitation faced by us with reference to the availability of monthly wholesale price data for cotton, for the states falling in the western and north-western regions. Almost throughout the three-decade period taken by us, practically for each year, the open-market prices for cotton were not available for about six-seven months or even more, for most of the major-producing states.

We were thus obliged to leave the states which were the most important from the point of view of cotton production and settle for Andhra Pradesh and Karnataka, as the two representative states for this crop. While we are aware of the fact that this will render our analysis for cotton not as truly representative of what might have emerged had we taken the most important producing states, our non-resolvable constraint was that cotton statistics being treated as confidential, are not published for all the months of a year much less given out to research scholars. We only had to rest content with what was available.

Almost all varieties of cotton are grown in India, with the southern states producing predominantly long and extra-long staple cotton, though the western region produces more long-staple cotton than elsewhere. Moreover, cotton is largely grown under unirrigated conditions because

only about 27 per cent of the area under cotton is irrigated. It is, therefore, not surprising that yield per hectare of cotton, displays large inter-year variations.

The cotton sowing, harvesting and peak marketing season varies from state to state. In the southern region, the heaviest arrivals of cotton range from January to June. For Andhra Pradesh, our first quarter (Q_1) occurs from January to March, and in Karnataka, from March to May. Adoni was the only centre available for Andhra Pradesh while for Karnataka, Hubli had the most continuous time-series data available. It may be noted that since at the all-India level, the arrivals of cotton are well-dispersed over a fairly long period from October to April, the problem of seasonality is not as acute in the case of cotton as it is in other agricultural commodities.

The demand for cotton originates from three sources: spinning mills, weaving mills and exports. It is the mill sector which accounts for about 90 per cent of the demand for cotton in the country. The demand by mills is derived from that for yarn and cotton fabrics. As regards export of cotton, it is regulated by the government and only in years of excess supply is any significant amount of export undertaken. Moreover, only short-staple cotton, for which there is not much domestic demand, has been exported by India on a regular basis. The distribution of demand is

not confined to any specific region because the distribution of installed capacity is well dispersed all over the country.

We know that, next to cotton, jute is the cheapest and most important of textile fibres. Unlike cotton, the harvesting of jute is done during the same period, in almost all states. The majority of jute cultivators are small and marginal farmers who do not have sufficient storage to hold the stocks for long. Therefore, a large part of the jute gets disposed of as soon as it is ready for sale and one can expect to find the heaviest market arrivals taking place during September-November.

In our analysis, we have taken the one major jute-producing state viz. West Bengal which accounts for well over half of the all-India production of jute. The next two states, Bihar and Assam which follow way behind West Bengal in terms of the proportion of all-India production, did not offer continuous wholesale price data for any centre. The statistics were largely not available, or were scattered irregularly. Therefore, our only choice for jute was the predominant producer, West Bengal (Calcutta). The peak marketing quarter (Q_1) was taken as August-September-October.

As regards the sources of demand for raw jute, they are: (i) jute mills; (ii) villages in jute-growing areas; and (iii) exports. Like cotton, the jute mills in India

are the biggest consumers of jute produced in the country. During 1983-84, nearly 97 per cent of total jute production was consumed by jute mills.⁷ However, unlike that for cotton, the demand for jute is highly localized since jute mills are all concentrated in and around Calcutta only, with very little spinning capacity in other states. The export demand for jute fluctuates in response to the production conditions in other jute-growing countries and other factors such as the development of substitutes for jute in countries abroad.

Finally, it is also well recognised that an efficient market structure can play an important role in the implementation of price policy for agricultural commodities. Therefore, we should also briefly mention about the type of marketing systems prevalent for cotton and jute before analyzing why the implementation was more successful in some cases and less in others.

Most of the major cotton-growing tracts in the country, are covered by regulated markets, where the prices are fixed by auction. In areas not covered by regulated markets, prices are settled through negotiations which may be "open" or "secret". The financing of cotton is done by local merchants, by agents of firms in Bombay and by banking institutions. In the marketing of cotton, co-operatives play an important role, particularly in the southern states that we have chosen.

With a view to "disciplining" cotton prices and ensuring equitable distribution among different manufacturing units, the Cotton Corporation of India (CCI) was set up in July 1978.⁸ Initially, the CCI was to undertake the import of cotton; the purchase and sale of domestic cotton was to follow. Since 1978, an enlarged role has been assigned to the CCI in the domestic market too.

After that, the Jute Corporation of India (JCI) was established in 1971 as a central agency for undertaking *purchases* of raw jute at the minimum support prices.

Let us now turn to our results. Table IX-a and IX-b portray the picture for cotton and X for jute (along with the corresponding graphs). We find that there are hardly any instances when price differences exceeded the normal carrying costs during the entire period, in Andhra Pradesh except for the years 1970-71, and 1976-77. It may be noted from table IX-a that the years 1979-80, 1980-81 and 1981-82 have been deleted from our calculations due to non-availability of data. Therefore in the graph IX-a C.V. touches the x-axis at these three time points. The fluctuations in wholesale monthly prices continue almost throughout, reaching the highest magnitudes during the late seventies. The amplitude of variability from year-to-year seems to be on the decline though. In Karnataka (table IX-b) however, the magnitudes of price differences are

relatively wider than in Andhra Pradesh. During 1966-67 the percentage price change per month recorded in fact, a level as high as 13.12 per cent as against the normal carrying cost of just 3 per cent. During this year, while the Q_1 -price was Rs. 92.25, the price reached an average of Rs. 201.17 for Q_4 (the lean quarter) displaying a difference of Rs. 109.45 in just one year. No doubt the C.V. reached its peak of 33.97 during this very year. A glance at graph IX-b visually verifies this.

Apart from this, the seventies were regularly punctuated by years recording considerable price differences per month as against the permissible limits borne out by carrying costs. Apart from such years the tendency for high monthly price changes appears to get toned down over time and during the eighties considerably low magnitudes of such differences were recorded (with the exception of 1980-81).

Let us now turn to the results of the second degree polynomial fitted as a complementary step in this analysis. These are in table IX-A.

From the below table, it is evident that our exercise in curve fitting does indeed yield a clearly inverted V-shaped curve for the C.V. over time, with reversal taking place during the 15th year in Karnataka (1969-70) and a little later during the 18th year in Andhra Pradesh. It may

Table IX-A: Additional Information on C.V. for Cotton:
Estimated Polynomial ($v=a+bT+cT^2$)

	Andhra Pradesh	Karnataka
b Coefficient	+ 0.431505	+0.798886
c Coefficient	-0.01190	-0.02674
Reversibility Point ($= \frac{b}{2c}$)	18.12	14.94

be mentioned in this context that cotton entered the purview of APC during the year 1965-66. It is reasonable enough to conclude, therefore, that the government policy did encompass some degree of success for cotton. If this is a reasonable indicator of the government's success perhaps it may not be inaccurate to conjecture that if government policy has been somewhat of a success in the southern states it is likely to have been a greater success in the western and north-western major producing states which could not be analysed somehow due to data problems. Overall, one may say that the government has achieved some degree of success with reference to cotton in the context of our hypotheses as far as curtailment of inter-month price fluctuations is concerned.

Finally coming to jute, we find from Table X that all the years when percentage changes in prices per month exceeded the normal carrying costs, were concentrated during

Table IX-a: WHOLESALE PRICE ANALYSIS CROP COTTON (KAPAS) STATE ANDHRA PRADESH

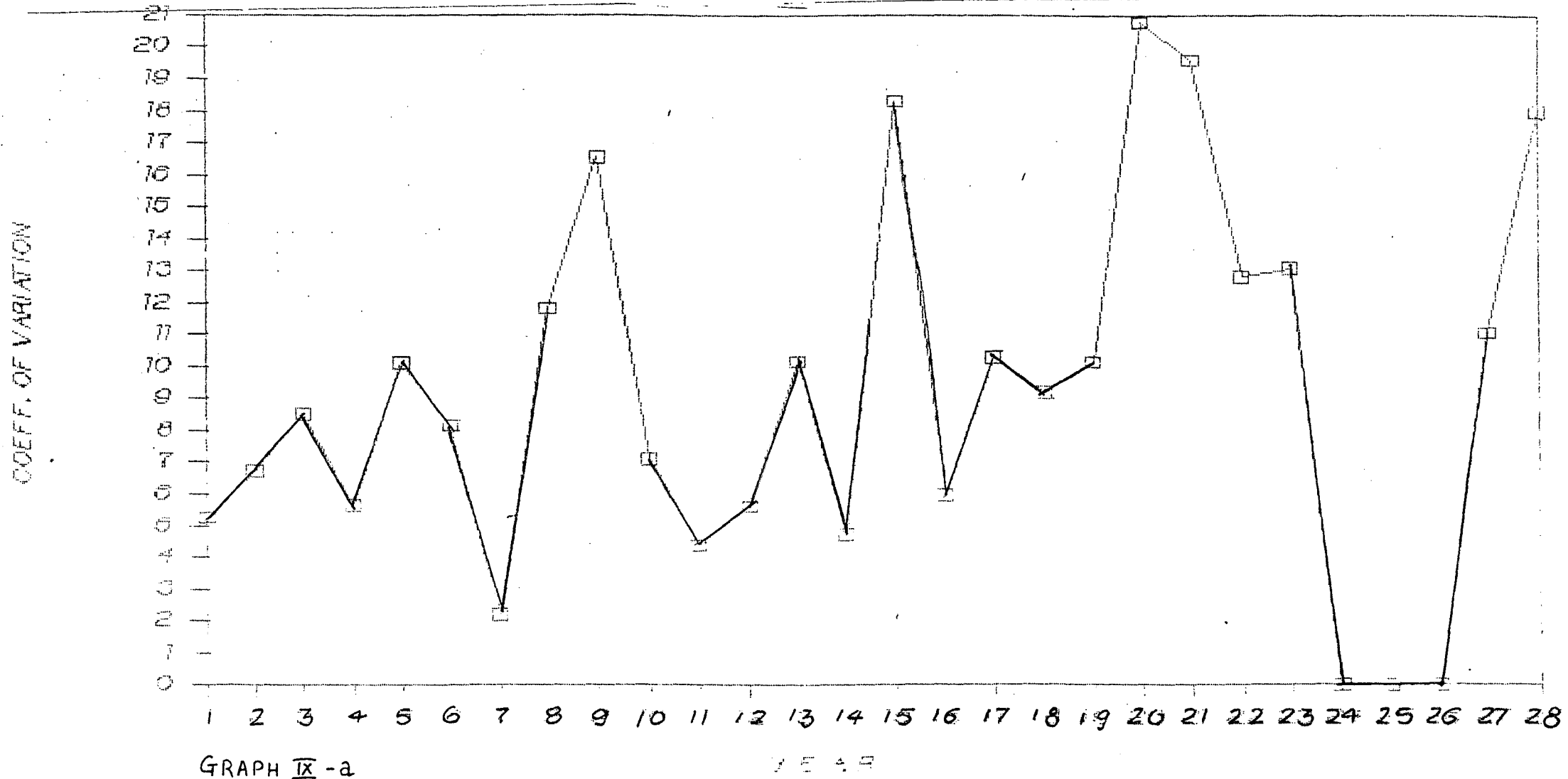
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
956-57	74.71	74.64	76.30	77.59	0.43	3.85	9.00	0.43	3.00	5.26
957-58	89.59	78.47	79.33	70.66	-1.72	-6.12	6.00	-1.02	3.00	6.72
958-59	63.35	65.08	68.27	73.61	1.80	16.18	9.00	1.80	3.00	8.52
959-60	78.77	77.97	77.96	85.52	0.95	8.57	9.00	0.95	3.00	5.66
960-61	95.78	102.66	89.04	94.78	-0.12	-7.18	6.00	-1.20	3.00	10.15
961-62	95.43	87.00	83.00	92.00	-0.40	-3.60	9.00	-0.40	3.00	8.16
962-63	102.25	102.33	105.00	105.00	0.30	2.69	3.00	0.90	3.00	2.22
963-64	96.00	93.00	87.00	115.00	2.20	19.79	9.00	2.20	3.00	11.83
964-65	98.33	93.67	99.33	116.33	2.03	18.31	9.00	2.03	3.00	16.55
965-66	140.83	150.33	145.33	161.08	1.60	14.38	9.00	1.60	3.00	7.13
966-67	160.67	166.33	163.67	172.00	0.78	7.05	9.00	0.78	3.00	4.39
967-68	199.42	182.67	177.33	183.17	-0.91	-8.15	3.00	-2.72	3.00	5.63
968-69	152.00	171.67	183.33	176.33	1.78	20.61	9.00	2.29	3.00	10.16
969-70	194.33	207.00	194.08	194.17	-0.01	6.52	9.00	0.72	3.00	4.74
970-71	226.00	224.00	215.00	292.00	3.24	29.20	9.00	3.24	3.00	18.31
971-72	258.33	283.33	292.00	281.00	0.97	13.03	9.00	1.45	3.00	6.00
972-73	232.00	210.00	214.00	249.00	0.81	7.93	9.00	0.81	3.00	10.30
973-74	260.67	319.67	323.33	309.33	2.07	24.04	9.00	2.67	3.00	9.23
974-75	392.67	336.00	320.33	351.67	-1.16	-10.44	3.00	-3.40	3.75	10.17
975-76	272.33	239.77	215.50	161.73	-4.52	-12.12	9.00	-1.55	3.75	20.78
976-77	286.67	315.37	357.77	428.27	5.49	49.40	9.00	5.49	3.75	19.59
977-78	415.77	377.93	323.97	334.77	-2.16	-9.10	9.00	-1.01	3.75	12.84
978-79	262.40	200.33	221.50	232.30	-1.27	-11.47	9.00	-1.27	3.75	28.51
979-80X	0.00	0.00	0.00	0.00	ERR	ERR	6.00	ERR	3.75	0.00X
980-81X	0.00	0.00	0.00	0.00	ERR	ERR	9.00	ERR	3.75	0.00X
981-82X	0.00	0.00	0.00	0.00	ERR	ERR	9.00	ERR	3.75	0.00X
982-83	464.30	535.93	405.00	450.00	-0.34	15.43	9.00	1.71	3.75	11.08
983-84	471.67	483.00	584.33	578.00	2.50	23.89	9.00	2.66	3.75	18.02
984-85	185.33	160.00	176.33	179.00	1.69	15.24	9.00	1.69	3.75	6.40

Table IX-b: WHOLESALE PRICE ANALYSIS CROP COTTON STATE KARNATAKA (HUBLI)

YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1957-58	75.30	86.76	86.43	95.18	2.93	26.41	9.00	2.93	3.00	12.24
1958-59	95.84	97.28	87.91	95.51	-0.04	1.51	3.00	0.50	3.00	6.62
1959-60	103.60	96.06	102.76	107.05	0.37	3.34	9.00	0.37	3.00	4.39
1960-61	112.13	115.43	109.37	118.66	0.65	5.82	9.00	0.65	3.00	6.80
1961-62	107.50	99.33	105.33	86.50	-2.17	-2.02	6.00	-0.34	3.00	12.99
1962-63	86.00	98.67	105.83	100.79	1.91	23.06	6.00	3.64	3.00	13.83
1963-64	99.59	82.71	91.00	127.42	3.10	27.94	9.00	3.10	3.00	20.50
1964-65	135.50	130.33	141.58	149.08	1.11	10.02	9.00	1.11	3.00	7.24
1965-66	149.00	146.42	156.42	132.58	-1.22	4.98	6.00	0.83	3.00	9.40
1966-67	92.25	147.08	169.67	201.17	13.12	118.07	9.00	13.12	3.00	33.97
1967-68	200.33	176.92	181.25	185.67	-0.81	-7.32	9.00	-0.81	3.00	7.67
1968-69	173.25	161.08	179.33	197.00	1.52	13.71	9.00	1.52	3.00	10.22
1969-70	221.83	172.75	162.75	195.42	-1.32	-11.91	9.00	-1.32	3.00	13.30
1970-71	232.50	227.50	238.50	301.42	3.29	29.64	9.00	3.29	3.00	14.40
1971-72	237.67	244.67	251.25	236.25	-0.07	5.72	3.00	1.91	3.00	9.57
1972-73	189.25	183.83	208.83	238.75	2.91	26.16	9.00	2.91	3.00	13.90
1973-74	236.25	230.00	269.00	339.67	4.86	43.77	9.00	4.86	3.00	18.71
1974-75	396.67	357.33	374.67	327.00	-1.95	-5.55	6.00	-0.92	3.75	11.92
1975-76	265.33	244.33	251.67	256.33	-0.38	-3.39	9.00	-0.38	3.75	4.75
1976-77	306.00	312.67	493.17	496.67	6.92	62.31	9.00	6.92	3.75	24.87
1977-78	445.33	356.67	396.00	315.67	-3.24	-11.08	6.00	-1.85	3.75	17.72
1978-79	298.67	185.33	230.67	238.67	-2.23	-20.09	9.00	-2.23	3.75	21.93
1979-80	240.75	244.33	296.33	280.33	1.83	23.09	6.00	3.85	3.75	10.17
1980-81	273.00	281.00	282.00	412.00	5.66	50.92	9.00	5.66	3.75	20.13
1981-82	504.00	500.33	499.00	436.67	-1.48	-0.73	3.00	-0.24	3.75	6.82
1982-83	269.33	391.33	417.00	303.50	1.41	54.83	6.00	3.14	3.75	ERR.
1983-84	435.33	320.67	405.00	515.00	2.03	18.30	9.00	2.03	3.75	18.47

VARIABILITY OF WHOLESAL E PRICES

CROP COTTON STATE AR. (ADOND)

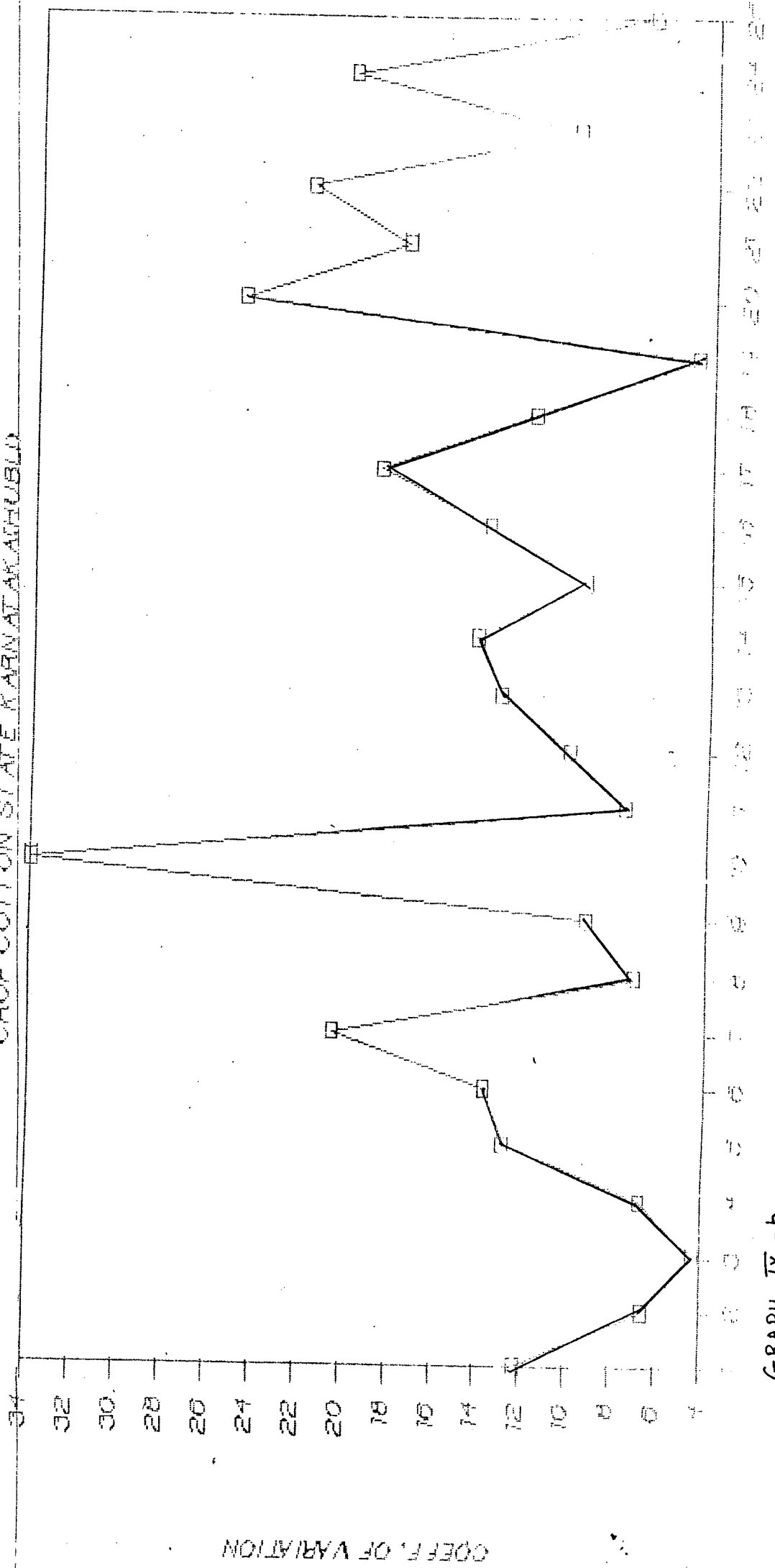


GRAPH IX-a

YEAR

VARIABILITY OF WHOLESALE PRICES

CROP COTTON STATE KARNATAKA HUBLI



GRAPH IX-b

1952

the sixties. Jute came under APC's purview in 1966-67. As the government policy started having an impact, we find the magnitudes of price changes becoming very low indeed. In fact over the entire temporal stretch between 1969-70 and 1981-82 we find not only very low levels of price differences in relation to normal carrying costs, but also very low levels of intra-year variability as borne out by the C.V. with very little fluctuation from year-to-year. The last three years of the analysis disrupted this otherwise continuously smooth pattern particularly the year 1983-84 when price difference shot up to 10.47 per cent per month as against the permissible limit of 3.75 per cent; and C.V. touched an all time peak of 29.83. This is so much discernible in graph X. During this year, the absolute price difference between the peak and lean quarters (Q_1 and Q_4 respectively) was almost Rs. 300 with the Q_4 price touching 615.00 and then continuing higher during the first quarter of the following year 1984-85 (Rs. 780.00 was the mean price of Q_1 during 1984-85) touching Rs. 933.00 during Q_2 falling to Rs. 848 and then Rs. 555 during the third and fourth quarters, and so on. This seems to have been an exceptional price boom over this two year phase, which, in subsequent years, appeared to be settling down anyway.

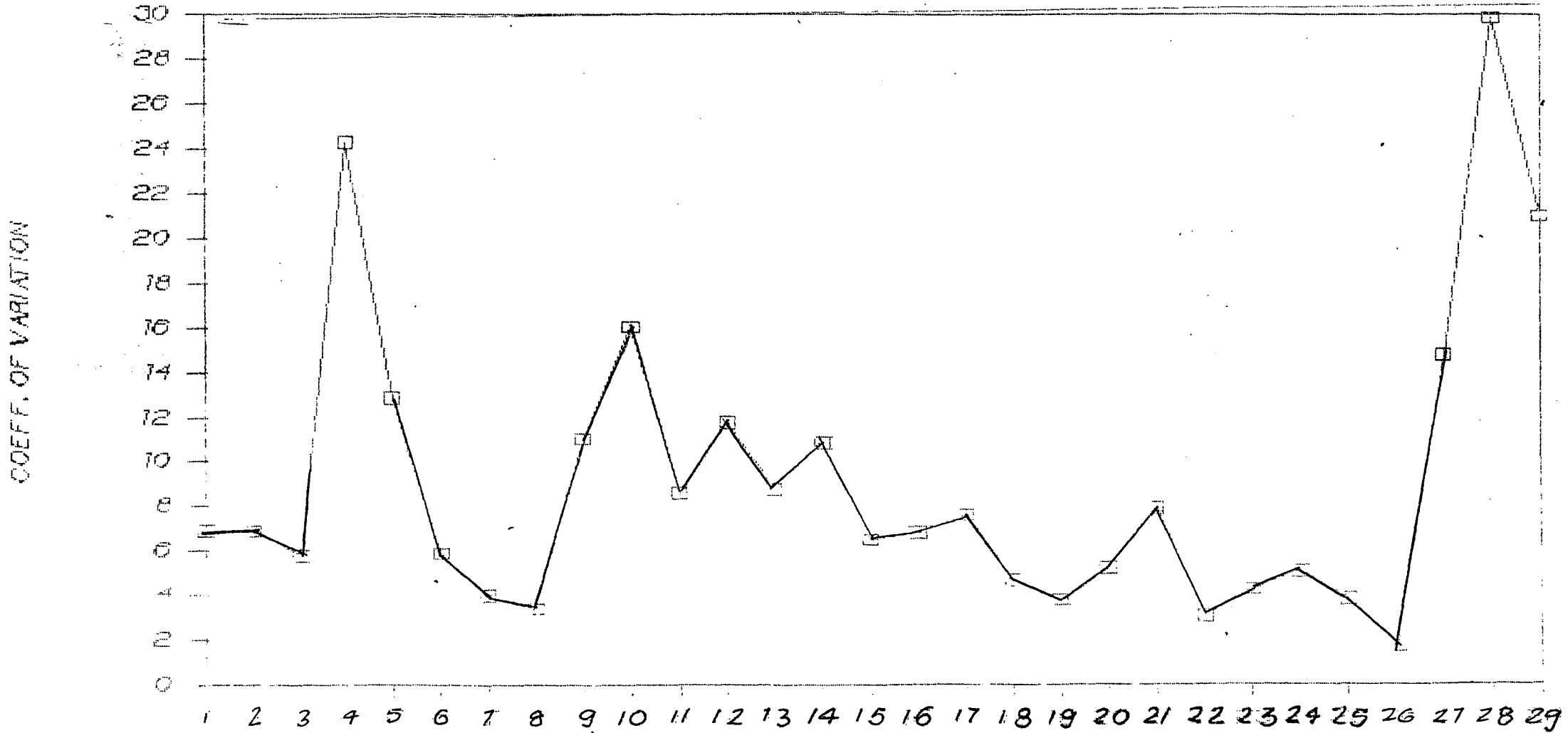
Incidentally, it may be mentioned here, that although jute production did decline relatively during the year 1982-83, the decline was around 16 per cent or so from

Table X: WHOLESALE PRICE ANALYSIS CROP JUTE STATE WEST BENGAL (CALCUTTA)

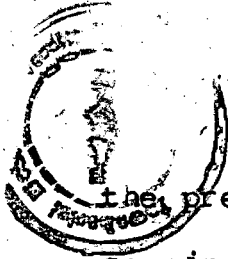
YEAR	QTR1	QTR2	QTR3	QTR4	% CHANGE PER MNTH	MAX PRICE DIFF %	NO. OF MNTHS	% PER MONTH	NORMAL C. COST	COEFF OF VARIATION
1956-57	83.50	87.07	75.91	83.50	0.00	4.28	3.00	1.43	3.00	6.90
1957-58	78.59	71.67	66.53	68.32	-1.45	-8.81	3.00	-2.94	3.00	6.89
1958-59	63.41	57.38	55.82	59.84	-0.63	-5.63	9.00	-0.50	3.00	5.78
1959-60	62.07	79.71	88.41	112.97	9.11	82.01	9.00	9.11	3.00	24.25
1960-61	121.88	146.02	162.04	138.20	1.49	32.95	6.00	5.49	3.00	12.86
1961-62	88.86	80.82	77.25	80.38	-1.06	-9.05	3.00	-3.02	3.00	5.68
1962-63	79.04	73.24	75.02	73.23	-0.82	-5.09	6.00	-0.85	3.00	4.01
1963-64	79.46	80.37	83.06	85.40	0.83	7.47	9.00	0.83	3.00	3.43
1964-65	104.94	95.11	106.71	120.99	1.70	15.30	9.00	1.70	3.00	11.05
1965-66	118.35	139.33	167.45	176.49	5.46	49.12	9.00	5.46	3.00	16.04
1966-67	135.30	146.01	138.88	119.23	-1.32	7.92	3.00	2.64	3.00	8.62
1967-68	103.50	100.92	110.66	131.91	3.04	27.33	9.00	3.04	3.00	11.78
1968-69	167.45	202.28	194.69	187.75	1.35	20.80	3.00	6.93	3.00	8.78
1969-70	121.91	134.41	138.43	159.40	3.42	30.76	9.00	3.42	3.00	10.87
1970-71	158.08	140.23	145.57	159.86	0.13	1.13	9.00	0.13	3.00	6.50
1971-72	151.79	141.55	151.79	160.31	0.62	5.62	9.00	0.62	3.00	6.86
1972-73	150.49	168.79	178.17	158.50	0.59	18.40	3.00	6.13	3.00	7.67
1973-74	142.50	135.70	130.33	141.67	-0.06	-0.58	9.00	-0.06	3.00	4.68
1974-75	172.83	168.67	168.67	175.67	-0.20	-1.77	9.00	-0.20	3.75	3.80
1975-76	178.00	181.33	200.67	187.67	0.60	12.73	6.00	2.12	3.75	5.24
1976-77	181.00	195.00	214.00	219.00	2.33	20.99	9.00	2.33	3.75	7.93
1977-78	217.33	221.00	225.00	225.00	0.39	3.53	6.00	0.59	3.75	3.08
1978-79	211.67	213.00	211.67	227.67	0.84	7.56	9.00	0.84	3.75	4.26
1979-80	220.67	205.67	200.00	203.00	-0.89	-6.80	3.00	-2.27	3.75	5.09
1980-81	209.00	211.83	217.50	225.00	0.85	7.66	3.00	0.85	3.75	3.86
1981-82	240.00	240.00	240.00	245.00	0.23	2.08	9.00	0.23	3.75	1.72
1982-83X	244.50	244.83	286.67	336.67	4.19	37.70	9.00	4.19	3.75	14.77
1983-84X	316.67	340.00	400.00	615.00	10.47	94.21	9.00	10.47	3.75	23.83
1984-85X	700.00	933.33	848.33	555.00	-3.21	19.66	3.00	6.55	3.75	20.99

VARIABILITY OF WHOLESALE PRICES

CROP JUTE STATE WEST BENGAL (CALCUTTA)



GRAPH X



the previous year's level - this may have had its share in causing price to shoot up, as seen above, but to what extent, it is difficult to say. It may also be mentioned that another critical factor that can affect the effectiveness of price-implementing agencies, is the availability of transportation facilities. Most of the jute mills located in Calcutta have their agents operating in the upcountry markets. If transport facilities are inadequate, smooth movement of goods from upcountry markets to main consuming centres cannot take place, and prices in upcountry markets would then tend to decline. Although, the transport and other marketing infrastructure has improved in Calcutta as well as other jute-growing areas during the past few years, yet it is reported, that occasional transport bottlenecks are still common. India has been both an exporter and importer of raw jute and policies relating to the quantity and timing of imports etc. have also tended to influence the wholesale prices of jute accordingly. Thus a number of factors - both natural and man-made influence price behaviour of jute, perhaps much more so than in the case of food crops. It may not be in order, therefore, to attribute the success on the price front entirely to government policy, as far as jute is concerned. The reality is indeed very complex in the case of this crop.

To put the record straight, we have done the complementary statistical exercise on curve fitting for jute as

well as a final confirmation of the degree of success of government policy in the context of controlling and reversing price variability. The single result for jute, West Bengal is recorded in Table X-A below:

Table X-A: Additional Information in C.V. for Jute:
Estimated Polynomial ($v=a+bT+cT^2$)

	West Bengal
b Coefficient	+0.577591
c Coefficient	-0.02810
Reversibility Point ($= \frac{b}{2c}$)	10.28

The positive b coefficient and negative c coefficient bear testimonial to our assertion that after the government intervened, the price variability of jute which was hitherto increasing made an about turn and started declining. The year of reversibility may be taken as 1965-66 or 1966-67 - almost as soon as jute came under the purview of the APC. The last two exceptionally odd years which were completely off the long-term trend were eliminated and the regression output was re-run after which we got this result. Thus in our context we may definitely concede partial success to government policy for jute, with scope for further improvement, over the years to follow.

Section V :

On the basis of the foregoing analysis, it seems the crops fall notionally into three categories in terms of the degree of success of government intervention in reducing intra-year price variability. Category I representing the story of high success consists of wheat, rice and jowar; category II approximately the scenario of medium success if represented by maize, groundnut, cotton and jute; and category III surrogating low success cases is summarized by bajra, gram and barley. Needless to say, the above categorization is highly subjective, representing the relative evidence thrown up by each crop, in an overall sense.

An interesting feature, which provides practical evidence to the claim of success, is to look into the pattern of market arrivals for each category of crops. Our conjecture is that the high degree of success should reflect itself in highly concentrated market arrivals in the post-harvest quarter itself and the low degree of success is characterized by market arrivals scattered well over all the four quarters, and so on.

For this piece of analysis, each individual state and each year for every crop need not be gone into. Our limited purpose in this final section is to seek broad conformity of the pattern of market arrivals with the

degree of success claimed earlier. We have considered a few cases for illustrative purposes. For each case, quarterly market arrivals, averaged over two or three years, in each of the decades of the sixties, seventies and the eighties, were worked out.

For this objective, our data source was various issues of Bulletins on Food Statistics published by the Ministry of Agriculture, Government of India.

From amongst the relatively higher success category, the market arrivals of wheat* illustrate the situation well, as in Table MA:I. It is so very evident that prior to effective intervention in late sixties, approximately one-half per cent of the total market arrivals of wheat came to the market during the peak quarter April to June and during each of the next three quarters, arrivals ranged from about 10.0 per cent to 20.0 per cent of the total. However, by the seventies, after government intervention, the percentage of arrivals during the same peak quarter had recorded a sizeable increase to over 85 per cent of the total and in 1982-85, this percentage had gone still higher at 92.0 per cent.

* Although similar percentages of rice were also worked out by us, they have not been presented in this chapter, because rice has at least two or three harvest seasons during each year and therefore the pattern of market arrivals obviously cannot be expected to show as neat a concentration during the peak quarter as other crops which have only one distinct harvest quarter. However, it may be mentioned in passing that the market arrivals of rice do show a tendency of the highest percentage of market arrivals being concentrated during the dominant harvest quarter.

Table MA:I Quarterly Market Arrivals of Wheat in Selected Markets of Punjab (percentages)

	April -June	July- Sept.	Oct.- Dec.	Jan.- Mar.	Total
1963-66	56.0	19.3	15.0	9.7	100
1971-74	85.8	9.0	3.3	1.9	100
1977-80	90.6	6.5	1.8	7.7	100
1982-85	92.09	5.36	1.46	1.09	100

Let us now review the market arrivals pattern of the crops placed in the medium success category.

Here again, while the pattern of market arrivals was obtained for all four crops we present results only for two cases. The cases chosen are those where our quarterly division corresponds directly to the quarterly division as available in the original source (i.e. Bulletins on food statistics) and the need does not therefore arise, to interchange, add or delete some months from one quarter or another, for temporal comparison.

A reference to table MA:II and MA:III for maize (Uttar Pradesh) and cotton (Andhra Pradesh) respectively, reveals that in keeping with our peak marketing quarter (Q_1) - October to December in the case of maize and January to March in the case of cotton, the percentages of these crops arriving in the market during the peak quarters did show an increase over time but not in as neat a pattern as in our previous category (I). In case of cotton, it was a little late, after the mid-seventies, that the

desired pattern started emerging. Data for the eighties was not available for cotton.

Table MA:II Quarterly Market Arrivals of Maize:
Uttar Pradesh (Percentages)

	Oct.- Dec.	Jan.- Mar.	April -June	July- Sept.	Total
1967-69	44.19	34.69	9.58	11.53	100
1972-74	69.33	17.71	3.26	9.69	100
1977-79	65.78	16.77	4.31	13.14	100
1982-84	71.48	15.72	1.99	10.81	100

Table MA:III Quarterly Market Arrivals of Cotton:
Andhra Pradesh (percentages)

	Oct.- Dec.	Jan.- Mar.	April -June	July- Sept.	Total
1963-66	59.90	36.68	3.39	0.06	100
1969-72	65.00	34.95	0.05	0	100
1976-79	29.88	46.10	21.13	2.91	100

Finally, we come to the third and relatively least successful category of crops. Table MA:IV records the market arrivals pattern of bajra (Gujarat).

In clear contrast with the first and second categories, we find that during the peak quarter i.e. October to December, bajra did not record any sizeable increase in market arrivals over time. In fact, the picture is one of market arrivals continually dispersed throughout the year during all four quarters even as late as the eighties. This holds even if one considers the total of

the two quarters comprising July to September and October to December. Hardly any change appears to have taken place over the years, in this pattern if not in fact, a deterioration - if one considers the drop from the market arrivals of 37.74 per cent during Q₁ of 1972-74 to the market arrival of 31.30 per cent during the same quarter, belonging to the years 1982-84.

Table MA:IV Quarterly Market Arrivals of Bajra:
Gujarat (Percentages)

	Oct.- Dec.	Jan.- Mar.	April -June	July- Sept.	Total
1967-69	34.72	21.56	22.57	21.15	100
1972-74	37.74	18.15	23.96	20.15	100
1977-79	24.91	11.97	26.84	36.28	100
1982-84	31.30	18.52	22.09	28.08	100

Thus in conclusion it needs only be reiterated, that a look into the temporal pattern of market arrivals of different crops, constitutes yet another evidence in support of our hypotheses.

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Note: In order to facilitate at a glance identification of the specific months comprising the first quarter (Q₁) in each of the tables pertaining to wholesale price analysis, the following information has been tabulated:

<u>Table No.</u>	<u>Crop</u>	<u>State</u>	<u>Months comprising peak-marketing quarter (Q₁)</u>
I-a to I-c	Wheat	U.P., Punjab & Madhya Pradesh	April, May & June
II-a	Rice	West Bengal	Dec., Jan. & Feb.
II-b & II-c	Rice	Andhra Pradesh and Tamil Nadu	Oct., Nov. & Dec.
III-a to III-c	Jowar	Maharashtra, Madhya Pradesh & Karnataka	Dec., Jan. & Feb.
IV-a to IV-c	Bajra	Rajasthan, Gujarat & Maharashtra	Oct., Nov. & Dec.
V-a to V-c	Maize	U.P., Rajasthan & Madhya Pradesh	Oct., Nov. & Dec.
VI-a to VI-c	Barley	U.P., Rajasthan & Bihar	April, May & June
VII-a to VII-c	Gram	Madhya Pradesh, U.P. & Rajasthan	April, May & June
VIII-a	Groundnut	Gujarat	Oct., Nov. & Dec.
VIII-b	Groundnut	Andhra Pradesh	Nov., Dec. & Jan.
IX-a	Cotton	Andhra Pradesh	Jan., Feb. & March
IX-b	Cotton	Karnataka	March, April & May
X	Jute	West Bengal	Aug., Sept. & Oct.

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1. Bhalla, G.S., "Administration & implementation of price policy in India - a case study of cereals", FAO Paper, 1988 (unpublished).
2. Ibid.
3. D.S. Tyagi, "Implementation of agricultural price policy in India: a case study of Jute & Cotton", FAO paper (U.N.), Rome, 1988.
4. Ibid.
5. Ibid.
6. Ibid.
7. Ibid.
8. Report of the APC (now called CACP) on price policy for Cotton for the 1973-74 Season, Department of Agriculture, Government of India, 1976.

CHAPTER VI

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

In an aphorism authored by Mrs. Joan Robinson¹, it is claimed that, whatever one may say about India, the opposite of it is also true. Perhaps this maxim is most applicable in Indian agriculture, more than in any other sector, since sharp contrasts render generalizations both difficult and dangerous. It is an indisputable reality that the agricultural sector as such is subject to considerable variations and fluctuations. The variations and fluctuations emanate on various accounts, some exogeneous to the sector and some endogenous, some relating to the pre-production stage; some during the production process itself and some coming up only at the post-production stage. In this study, we have dealt with an extremely important post-production aspect of Indian agriculture. It is about the variability of farm prices.

More specifically, since it was only in 1965 that an exclusive body (viz. APC) was set up to go into and make recommendations in the matter of agricultural price fixation, it was decided to conduct an inquiry into the effect that such intervention has had on agricultural price variability in India.

If indeed variability of prices of various crops studied did register a decline, then government intervention does indicate success in reducing excessive price fluctuations. No doubt the government cannot be expected to completely wipe out fluctuations but a significant reduction in the amplitude of such price fluctuations is what one hopes to discover within the limits of practical constraints under which such policies work.

From amongst the twenty-two crops currently under the purview of the CACP, eleven crops were selected for this study, which were important in terms of cropped area and volume of production in their respective areas of production. For each crop, generally, three major producing states were selected. The analysis to probe into the government's impact on price variability, was conducted both in terms of harvest prices as well as wholesale prices. For the former, the time-series of annual harvest prices was 1950-51 to 1985-86 while for the latter, it was based on monthly data for the period 1956-57 to 1985-86. For analysing the variability of harvest prices, the period 1950-51 to 1985-86, was divided into two sub-periods: 1950-51 to mid-sixties/late sixties, representing pre-intervention situation (period I) and the subsequent years as period II. We calculated the standard deviation; the coefficient of variation; the mean price level and the annual compound

growth rate for the pre-government intervention as well as the post-government intervention periods. This was done once with the original data, and once on the basis of three-year moving average series created from the original annual figures.

To study intra-year price variability, monthly wholesale prices were obtained and each agricultural marketing year was divided into four quarters starting with Q_1 , the harvesting-peak marketing quarter. The subsequent three quarters were designated as Q_2 , Q_3 and Q_4 . The average price level for each quarter was calculated and inter-quarter price variations were worked out and converted into monthly price hikes for each year. These were then compared with the monthly carrying cost over time, as one of the ways of looking into the effectiveness of government's pricing policy. In some cases this was viewed in broad periods or even in three periods wherever relevant. The three periods being, the pre-intervention period; the period of government intervention through price announcements; and the period of effective government intervention through buffer stocking operations (which became effective basically only after the mid-seventies).

The intra-year Coefficient of variation (C.V.) was also calculated for each year and a second-degree parabolic

function was fitted to the temporal profile of C.V. to see the time-point beyond which the variability changed from rising to declining trend.

As a final adjunct, the quarterly pattern of market arrivals of representative crops was obtained in percentage terms to lend yet further authenticity to our analysis pertaining to the degree of success attained by government intervention in arresting price variability.

In both harvest as well as wholesale price analyses, graphs of the percentage annual (compound) growth rate and of the coefficient of variation respectively, have been plotted against time, to offer visual clarity to each analysis.

The study was subject to certain limitations which were mainly in the realm of data deficiencies, more so perhaps in wholesale price analysis where it was found that price data for several months was not available or not recorded for some crops; or issue/procurement prices were the only prices quoted for one year or the other; or price data was rather confidential (e.g. cotton) and therefore not made available publicly. In such instances we had to do certain adjustment including interpolations to fill the minor gaps.

The nature of our wholesale price analysis was such that it did not easily permit such crops under its purview,

which had two or three substantial harvest phases and thereby almost continuous market arrivals throughout the year (e.g. sugarcane); such crops had therefore to be dropped from the analysis.

The study throws up a number of interesting results. Overall, the period of government intervention (notionally taken after the setting up of the APC in 1965), does mark a distinct departure from the pre-intervention period in terms of the variability trend of agricultural prices. This observation is upheld as generally true, no matter from what angle variability is viewed in this study. However, it should be noted that the degree of variability and the extent of reversal, varies from one crop to another. Even for a single crop, the degree of success in terms of reduced price variability varies from one state to another. Moreover, for some crops and states, the decline in variability of prices occurred soon after the government started intervening while for others it occurred somewhat later. However, individual differences (crop-wise, state-wise or time-wise) notwithstanding, an overall assessment of the crop-cases studied by us reveals that on the whole, intervention by the government in the matter of agricultural pricing policy has definitely had the effect of bringing about a reduction in temporal price variability.

By and large, the establishment of the APC in 1965, seems to have ushered in an era of producer-oriented price consciousness, on the part of the price setters. The expansion in average harvest price level, or its annual rate of growth have been higher during the post-intervention period compared to the pre-intervention era. This is not so important in itself since in a growing economy, there is bound to be an all round increase in prices, including prices for agricultural products. What is really important in the Indian situation is that government policy has been effective, on the one hand in pushing up crop production of a wide variety, and on the other, preventing year-to-year fluctuations in prices from getting more wild in the face of expanding output. This clearly demonstrates the gains accruing to farm producers in sharp contrast to what might possibly be expected in a situation of non-intervention by government. In other words, credit needs to be given to government for its success in providing a support to harvest prices from below and preventing them from falling during the post-1965 era, which is generally characterised by a significant expansion in production and thereby a more delicate balance between the greater supply in relation to demand. This is true of a number of crops, especially food crops.

The value of the coefficient of variation for harvest prices is found to be lower, for most crops in most of the states studied, in the post-intervention period compared

with the value of the same during the pre-intervention period. Inasmuch as these prices influence the total net earnings and hence the welfare of the farm producers much more intimately than any other set of prices, it implies that the government has been successful in insulating the farmers against the hitherto unwarranted ups and downs in prices from year to year.

Our analysis of harvest as well as wholesale prices behaviour shows that all-round greater efforts of government intervention and consequently more effective results of government policy are more apparent for foodgrains, than for other crop categories.

In terms of policy emphasis, coarse grains do not appear to have enjoyed much attention till very recently (the results of which emerge in the near future). It is found that, the fluctuations of wholesale prices for most 'inferior' crops, have not been as effectively controlled as those of 'superior' foodgrains (rice and wheat analysed here). Since it is the poorer people who consume the inferior grains and since wholesale prices are of greater significance/relevance for consumers than for producers, the following implication emerges:

Whatever might have been the pronouncements in theory, in practice, the interests of the poorer sections of consumers, have not been effectively protected, even as late as the early eighties.

Another finding emerging from our study is that whenever negative or unfavourable extraneous factors such as excessively bad production levels have come up occasionally, the government has not shown adequate preparedness to ward off their effects on agricultural price fluctuations. At best, it may be conceded that the quantum of shock generated by such forces is somewhat reduced through government intervention; it is not completely absorbed. A corollary to the above finding is that although pricing policy is an important tool in the hands of Indian policy makers, by itself it is not often successful in curbing excessive price fluctuations and stabilising prices, unless accompanied by a complementary package of other factors including infrastructural and institutional support; an effective technology package and efficient delivery services. In this context, it may be noted, that the crops/states recording a relatively low degree of success in our analyses, were mostly bereft of all or some of the complementary supports needed for the price policy to succeed.

Still one more off-shoot of the above finding is that the states with poor or inadequate infrastructural facilities, particularly weak extension services, market intelligence, road networks, regulated market-cum-trading centres, etc. surrogated roughly by the conditions of states such as Madhya Pradesh or Rajasthan, cannot fully

succeed in arresting price fluctuations, no matter what crop is considered, vis-a-vis the more developed states like for example U.P. or Punjab. This is borne out by the results obtained both for harvest as well as for wholesale price variabilities.

In other instances, it is in the very nature of a crop and in its undulating production milieu, that no matter what state is considered, (including a relatively advanced one) we find that the variability in its prices tends to persist over time and across regions. Bajra, gram and to some extent barley conform to this reality for both harvest and wholesale price analyses.

The above were the findings of this study emerging in a general, overall way. We have a number of conclusions for individual crops as well. In particular, the relative edge that some particular crops have shown over others must be brought out in bold relief.

From the policy point of view, we have to rely more on relative variability, as represented most typically by the coefficient of variation in our study. We find that notionally the crops falling into a relatively high degree of success category, are wheat, rice and to a lesser extent jowar. This comes up again and again whether we view price variability from one angle or the other. To exemplify, in terms of both inter-year (harvest price analysis) and

intra-year variability (wholesale price analysis); the percentage monthly price differences vis-a-vis monthly normal carrying costs; results of the second-degree parabolic trend fitted; and the pattern of quarterly market arrivals, the above three crops have revealed considerable success of government policy intervention.

Again, keeping in mind all the dimensions of variability discussed earlier, in an overall sense, maize and groundnut seem to fit into the category of medium degree of success while gram and bajra find a place in the relatively lower success category. The remaining crops it is found, need to be considered as per the relative merits of each case. For example, in the case of barley, we find that it attained considerable success by way of reduced inter-year variability and also conformed to a timely "inverted-V" pattern of intra-year variability, after government intervention ensued. However, it did not achieve the same degree of success with reference to a reduction in price differences in relation to normal carrying costs. Its pattern of market arrivals also showed a scattered trend throughout the time period studied. Therefore, in the light of the above findings, barley may be at best be placed in the partial success category. On the basis of all the evidence, the commercial crops, viz. cotton and jute analysed in this study, seem appropriately suited for placement in the broad category

of partial success as well, with jute showing a slight edge over cotton, an inter-play of several factors is involved, more in the case of jute than for cotton and therefore the complete credit for the relatively greater success of jute cannot be solely attributed to the government policy alone. It may be re-iterated here, that due to severe data limitations for wholesale prices of cotton, the predominant states of the north and north-west could not be taken, and therefore the wholesale price analysis pertains to the next best alternative i.e. the southern states. It is our conjecture that if these states displayed some success in the contexts of the hypotheses pertaining to reduced variability as a result of government intervention, then perhaps a relatively greater degree of success might be expected to be displayed by the more dominant cotton producing states. However, as a whole it is stated that the success story of cotton has yet to gather full momentum.

For sugarcane, we have very limited overall evidence, because raw sugar has been used as a proxy for sugarcane, in harvest price analysis and due to data deficiencies this crop has been dropped altogether from wholesale price analysis. Although inhibited by the data gaps pointed out above we still venture to guess that a declining trend for harvest price variability was in evidence after government intervention took place.

To comprehend the long-term effects of government policy, it was considered advisable to delete one or two excessively abnormal years from the time-series of harvest prices and rework the statistical measures of variability. As was anticipated by us, this deletion yielded a complete reversal of the original trend in the case of a few crops, most notably in jute. Further, the coefficient of variation of barley showed a distinct reversal during the post-intervention era in all three states, thereby not warranting any deletions. In other instances, like those of rice, wheat, bajra, maize, groundnut and sugarcane, the new results did not inject striking improvements. In brief, it does seem that the hypothesis regarding a fall in the year-to-year variability of harvest prices as an outcome of government intervention, stands empirically validated in most cases.

In wholesale price analysis it is found that the attempt at fitting a second-degree polynomial function to the time-series of (intra-year) coefficient of variation for each crop and state tend further support to the result that the graph recording the temporal behaviour of the coefficient of variation for most crops conforms to an "inverted-V" pattern. In other words, for each crop, the coefficient of variation shows an increasing trend upto a time-point beyond which the trend reverses itself. The

point of reversibility shows the presence of beneficial effect of government policy and it naturally varies from crop to crop. To cite a few specific cases, reversal occurred slightly late in the case of rice in Andhra Pradesh, bajra in Rajasthan and Gujarat, gram in Rajasthan, cotton in Andhra Pradesh and so on.

Finally it is found that yet another practical evidence which re-inforces the results of our analysis on wholesale prices, is the observed quarterly pattern of market arrivals of sample crops, representing the broad categories of relatively high, medium and low success. It is observed, that greater the degree of success recorded for any crop, greater is the tendency for the concentration of market arrivals during the peak harvest/marketing quarter, with a diminishing percentage of arrivals during the remainder of the year; and lower the degree of success attained by government policy for a crop, more scattered the market arrivals throughout the year. To be sure, looking at the pattern of market arrival provides another way of re-confirming the hypotheses analysed by us.

Policy suggestions:

The objectives of agricultural price policy differ from country to country, depending upon the specific situation in a country. It has therefore to be moulded and

geared in such directions as may suit our economic conditions and help achieve the basic objectives.

The focus of this study is on the issue of price variability and in this context, it is advisable for advocating a conscious policy to (i) eliminate wide swings in prices in either direction, to soften the process of long-term adjustment in demand and supply; and (ii) to reduce the amplitude of seasonal variations in prices. Since price policy in a country such as India is significant in inducing cultivators to adopt new techniques of production and to generate surpluses for sustaining growth and development, it is important that the price policy should maintain a certain degree of stability. Linked to price stability is the need to achieve a stable production milieu emerging from a reasonably stable and rising levels of productivity. The real test of success, comes when there is an excessively bad or excessively good production level and our analysis shows that government intervention in India, has succeeded in many of these 'abnormal' years and yet, much more needs to be done to neutralize the abnormalities generated by such developments. The variability is excessively hostile in backward areas, since marketing and other infrastructural supports are fairly poor in those areas. More focus needs to be placed upon the relatively backward states which are still bereft of such complementary factors.

A comprehensive package of stabilization policies is required, which should act both through the production as well as distribution channel. Although agricultural price policy should be positive and production-expansion oriented, yet the objective should be, to fix neither too high prices in an effort to boost the producer, to the detriment of the consumer, nor too low prices to please the consumers, thus rendering cultivation uneconomic.

More concerted efforts need to be made in the direction of protecting the interests of the vulnerable sections of the population - the poorer consumers from undue price fluctuations of those crops (inferior and coarse grains) which dominate their consumption basket. So far not enough attention has been directed here. Maintenance of a sizeable stock along with an effective buffer stocking policy would further help to even out the amplitude of fluctuations. Many past reversals have been due to frequent changes made in policy, often prompted by "inbuilt normative dialectics" e.g. the existence of conflict between the hypothesis of distributive justice and price response of production. Such conflicting norms must be resolved if we are to follow any long-term objectives with determination, especially one as vital as stability.

Thus a humble attempt has been made in this study, to throw up several issues pertaining to the effect of government intervention on variability of agricultural prices over a

period of more than three decades. Several findings have emerged from the study but ground has also been prepared for further probe in certain areas which could not be adequately looked into for want of time and resources. Hopefully, some of the missing issues and other related aspects will be taken up by us some time in the near future so as to give a complete account of the government intervention effects.

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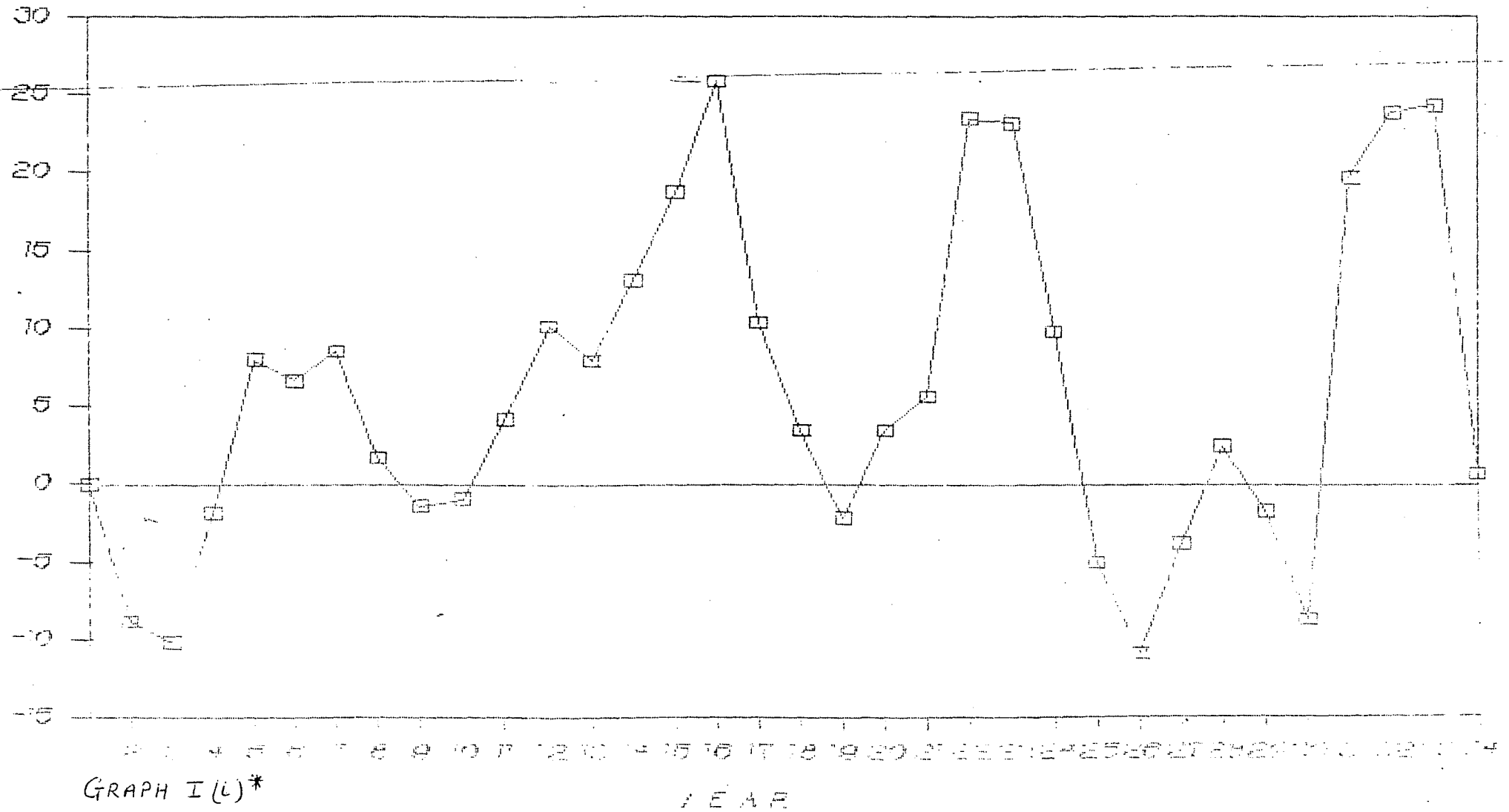
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of Agriculture & Co-operation,
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long term perspective",

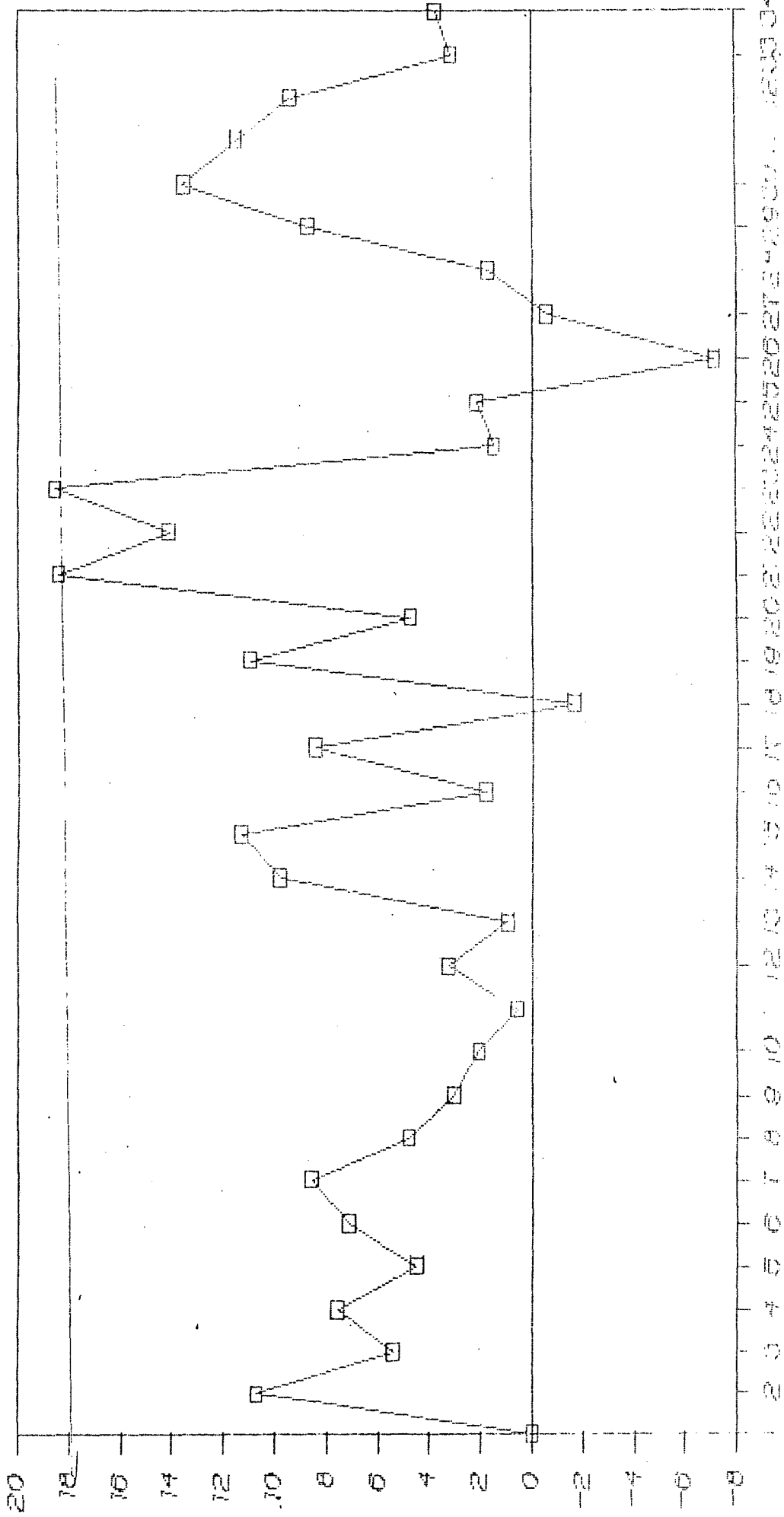
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APPENDIX

RICE WEST BENGAL - MVNG AVGS



RICE ANDHRA PRADESH - MVNG AVGS

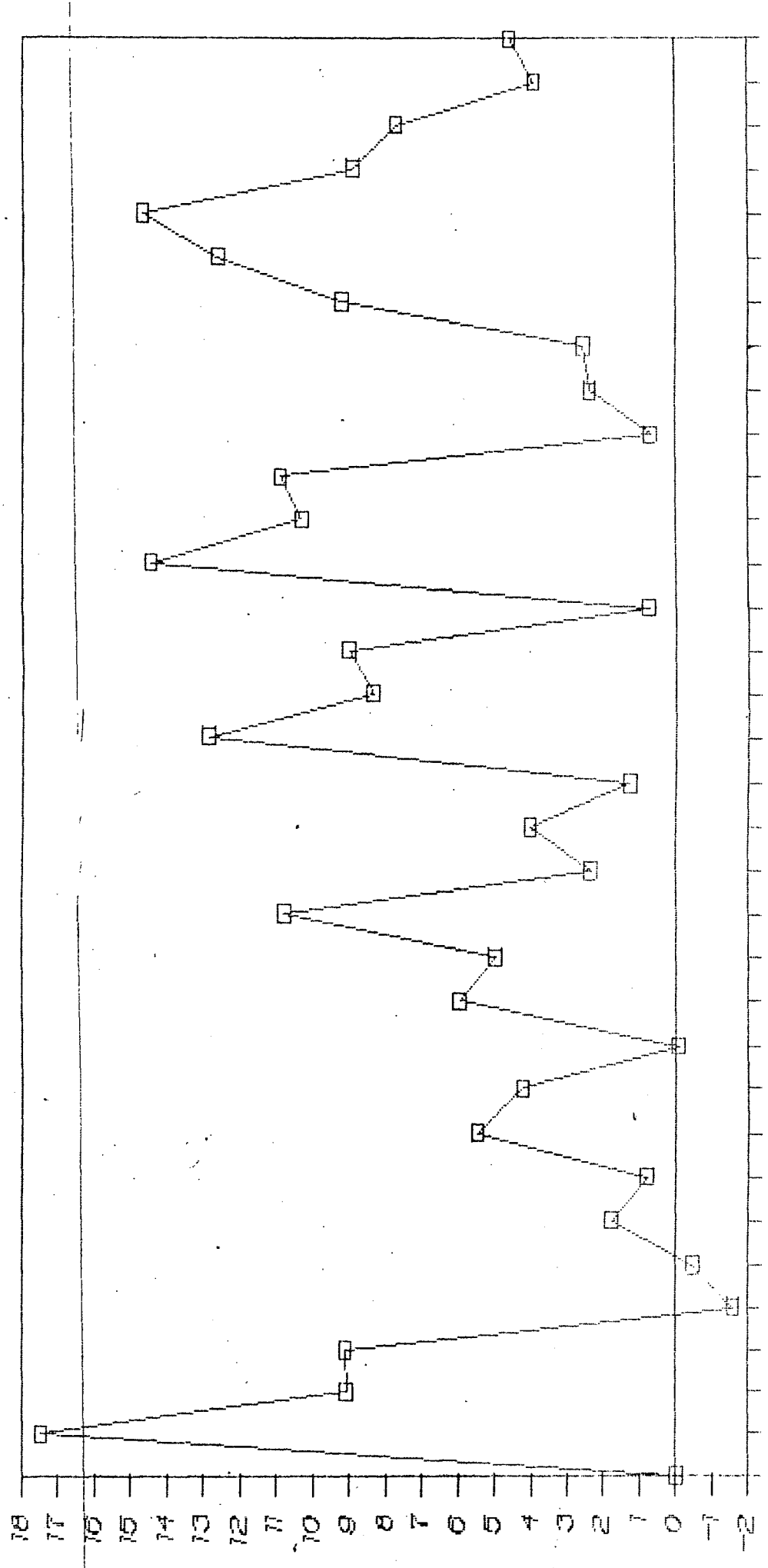


GRAPH I (ii)*

YEAR

1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964

RICE TAMIL NADU - MVNG AVGS

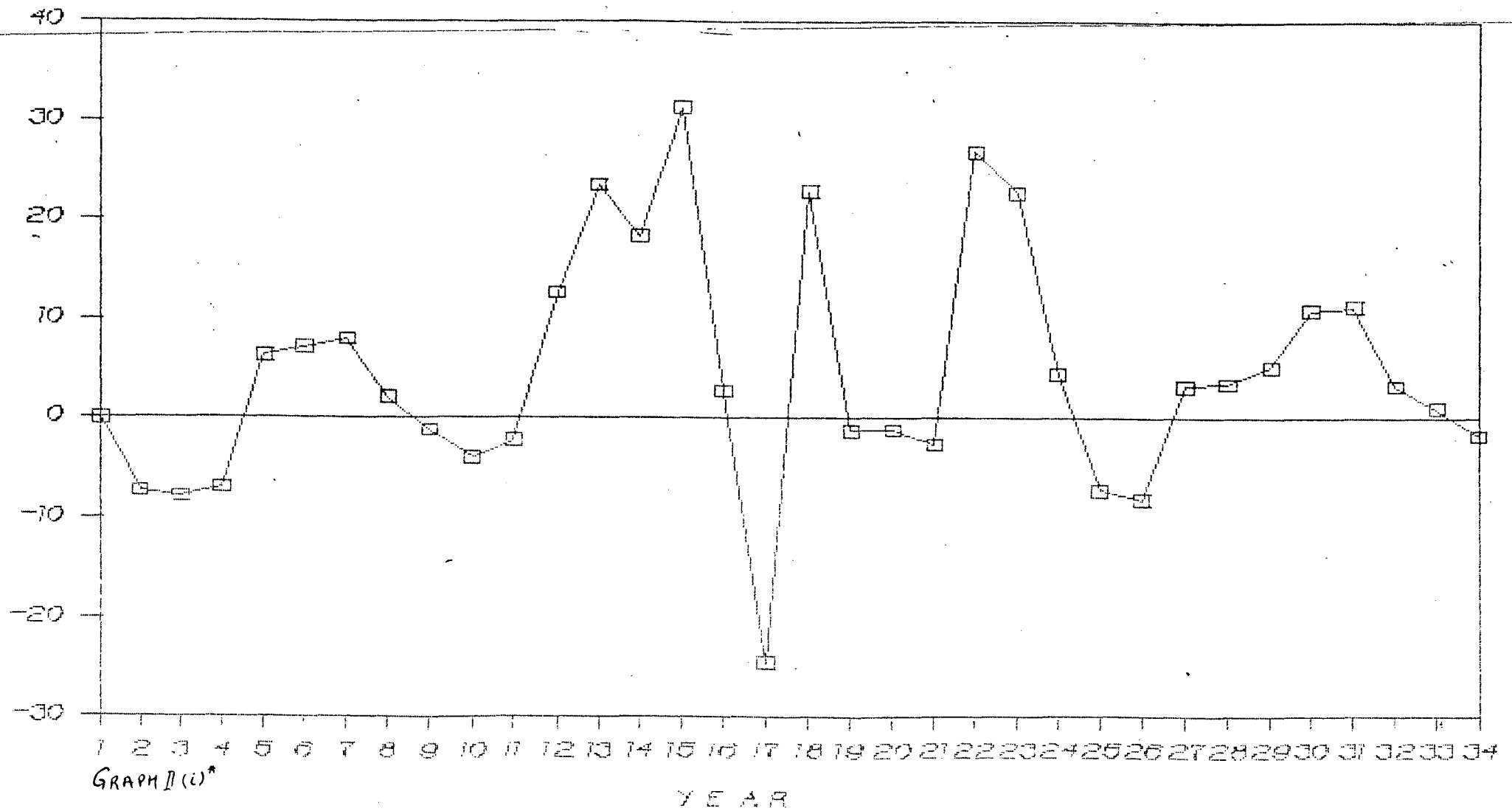


GRAPH I (iii)*

Y E A R

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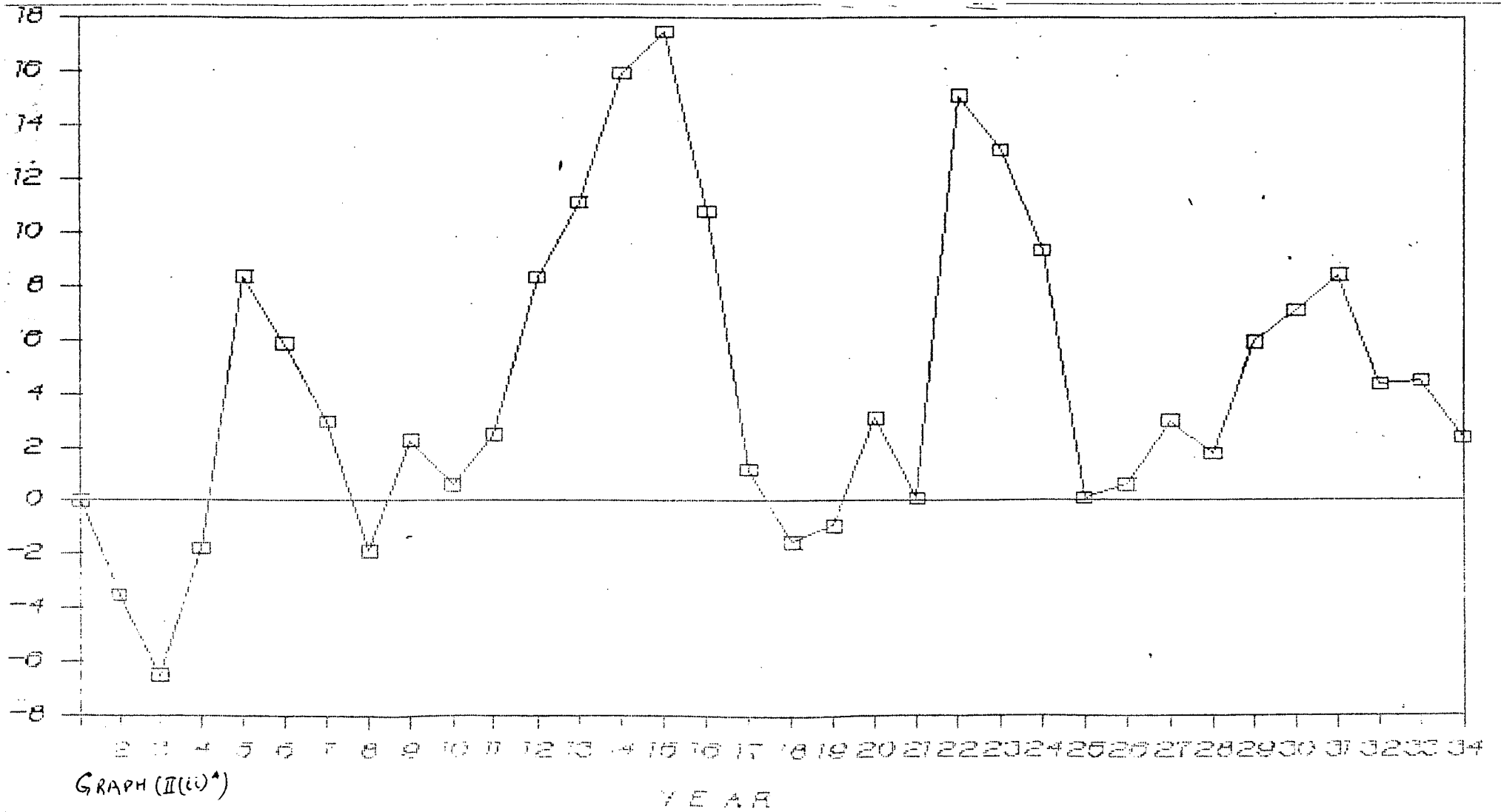
WHEAT UTTAR PRADESH—MOVING AVGS



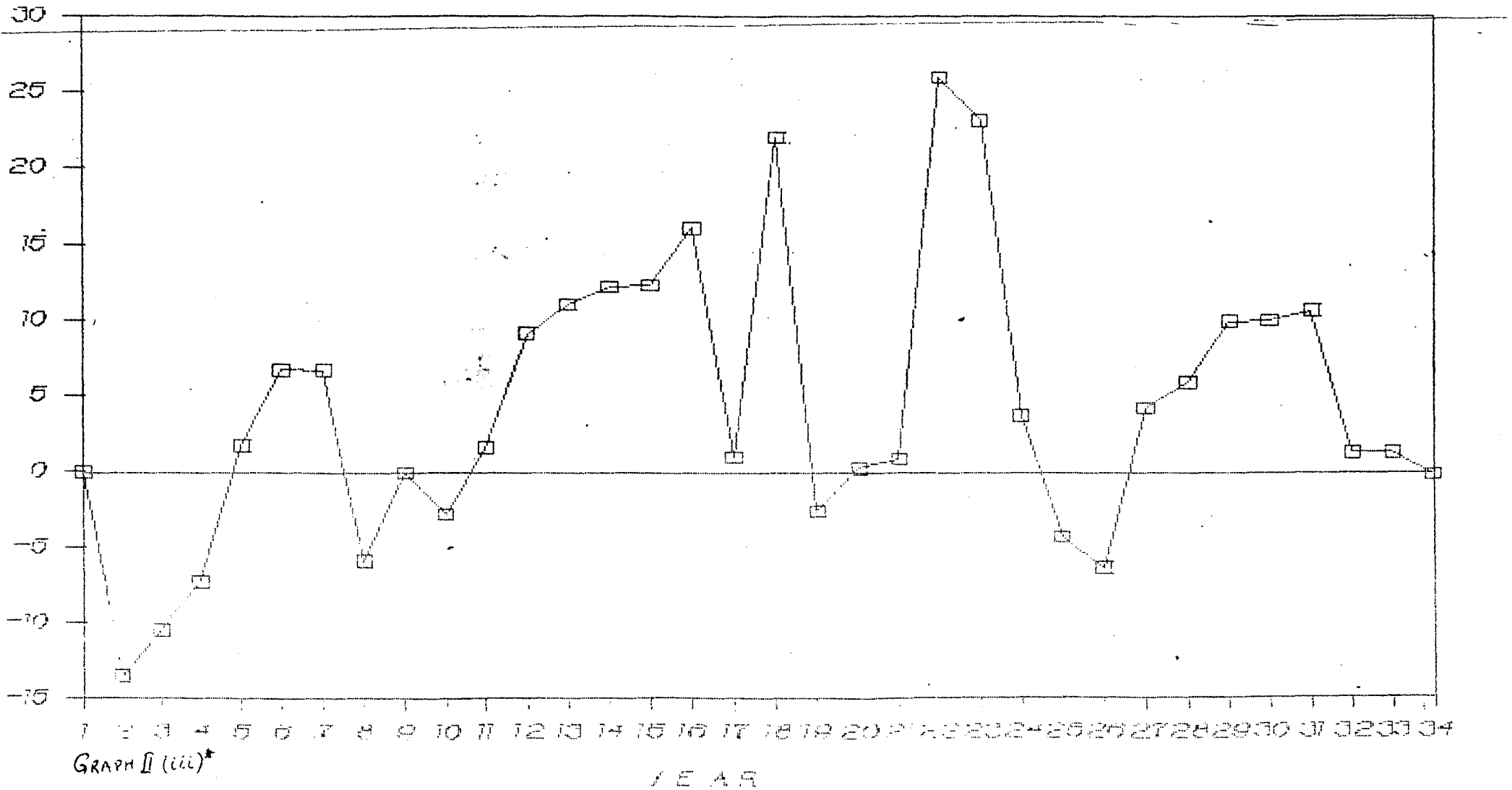
GRAPH II (U)*

YEAR

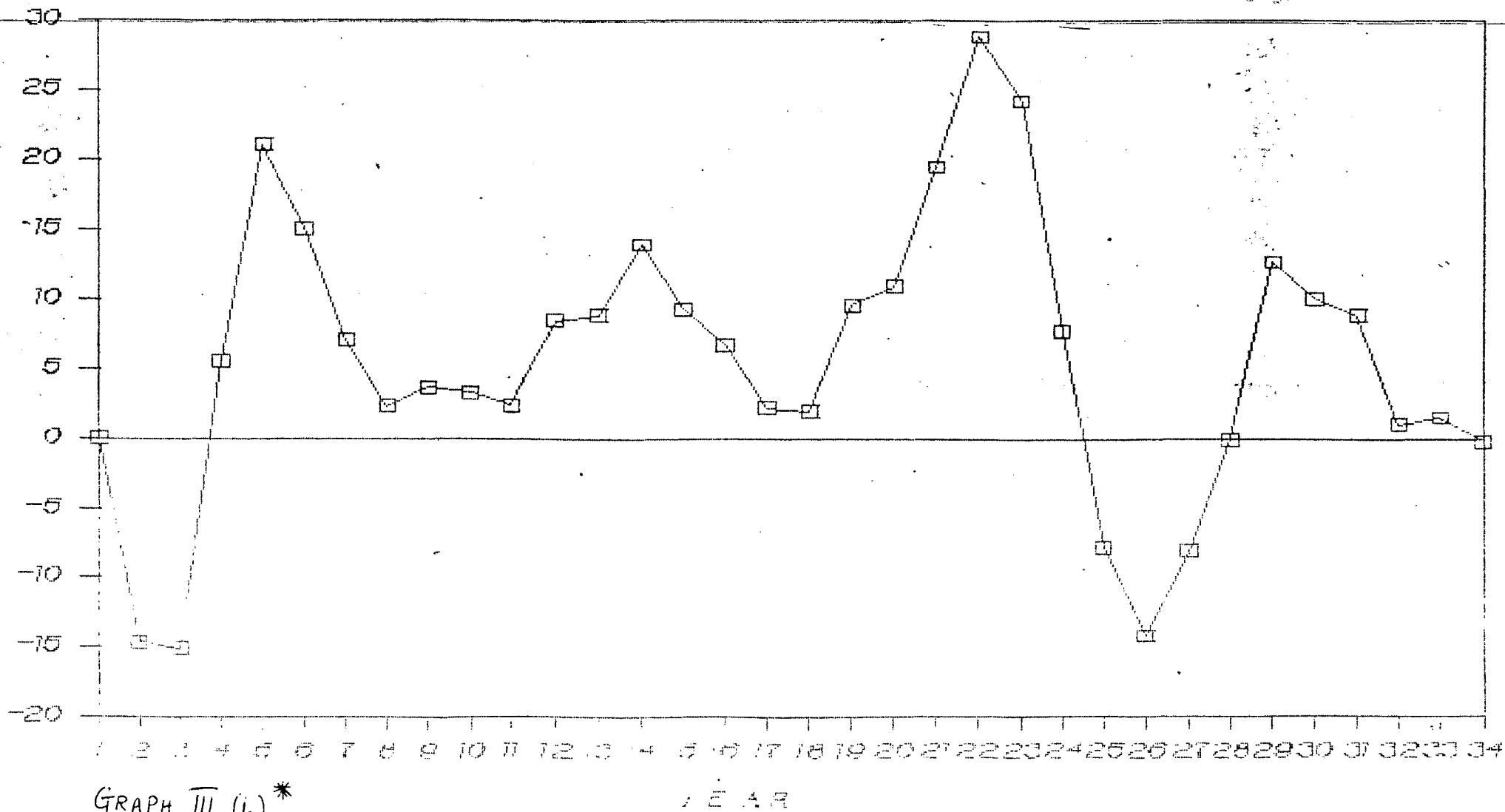
WHEAT PUNJAB - MVNG AVGS



WHEAT MADHYA PRADESH - MVNG AVGS

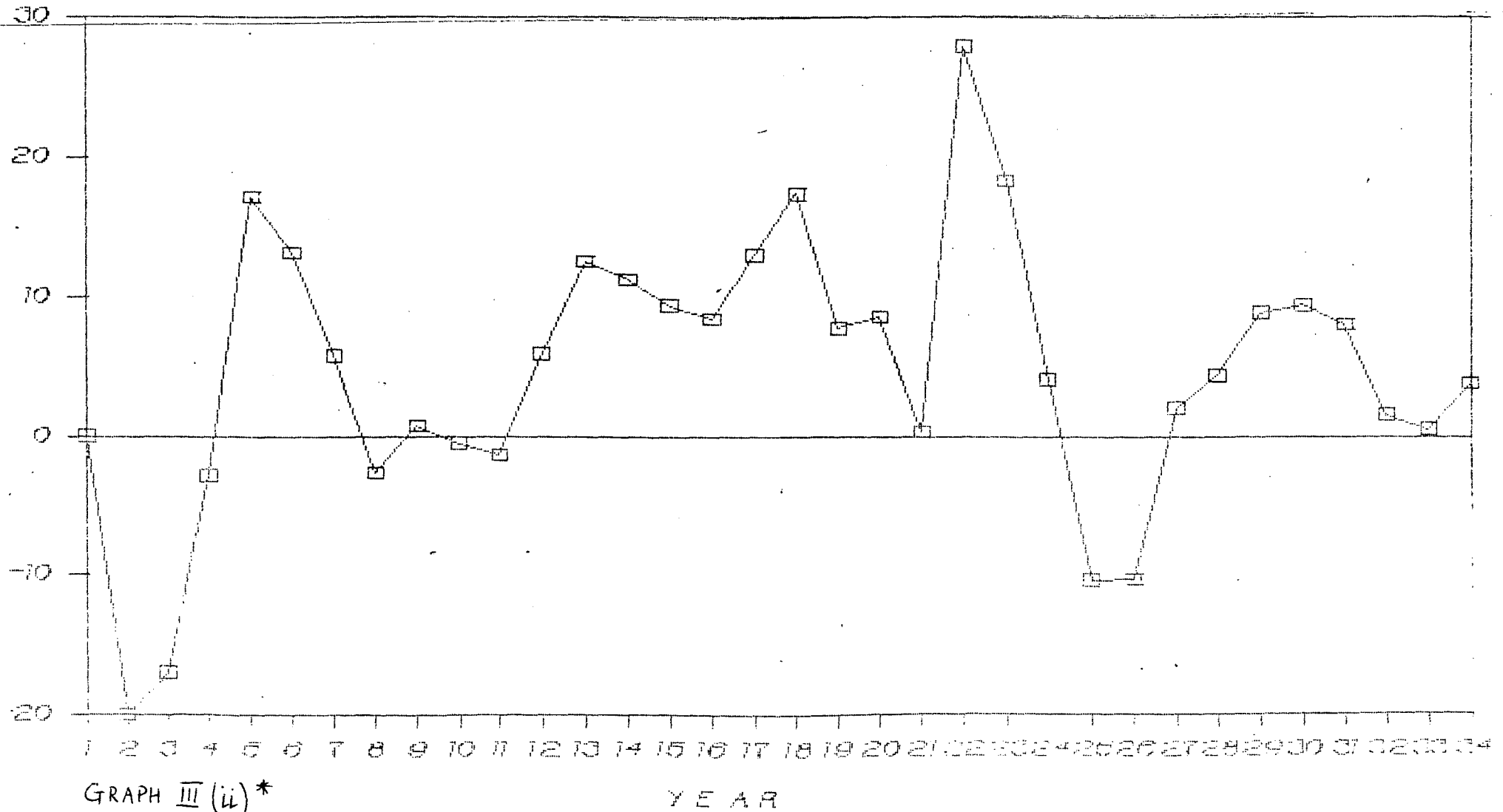


JOWAR MAHARASHTRA - MVNG AVGS

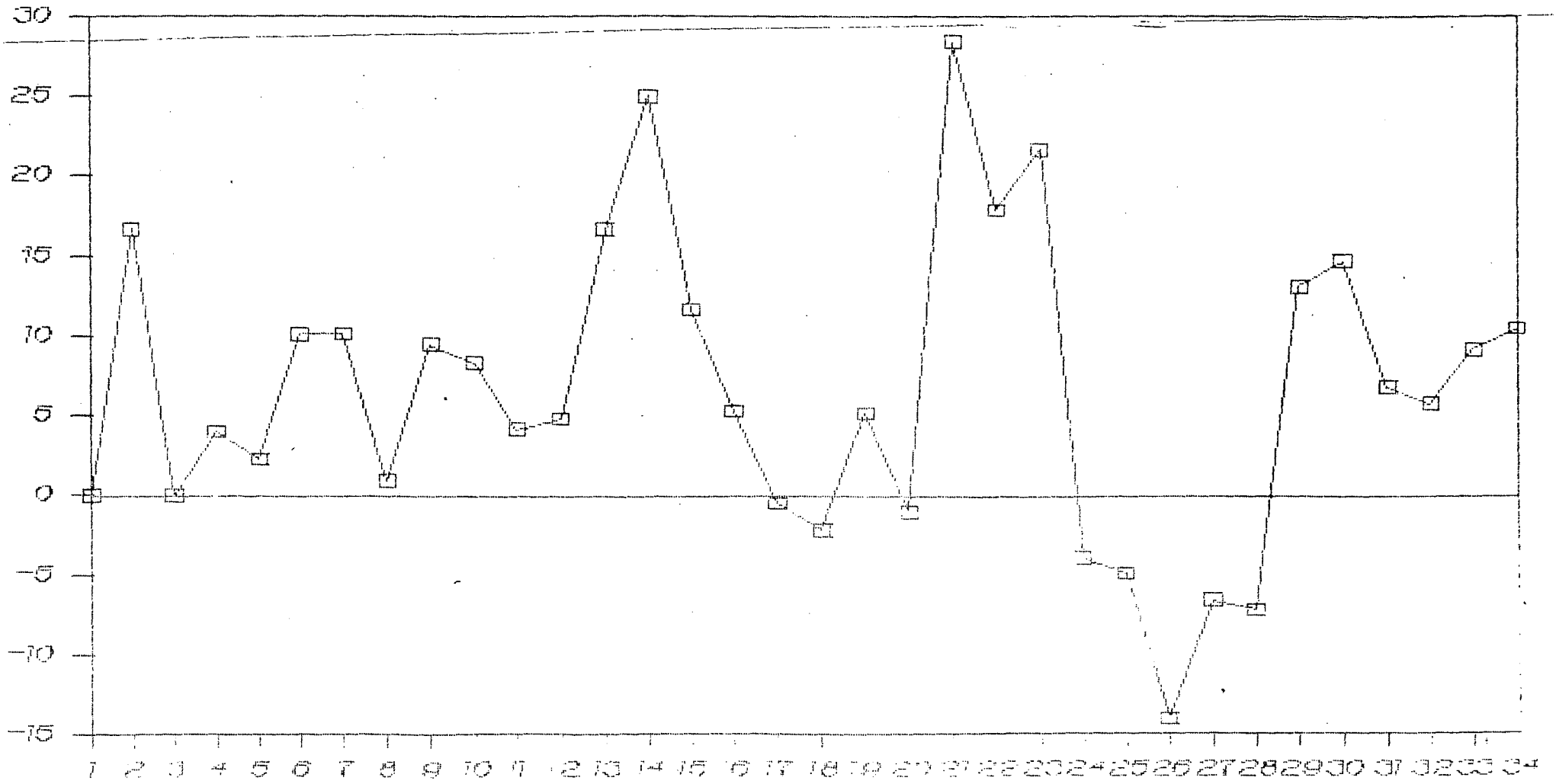


GRAPH III (L) *

JOWAR MADHYA PRADESH - MVNG AVGS



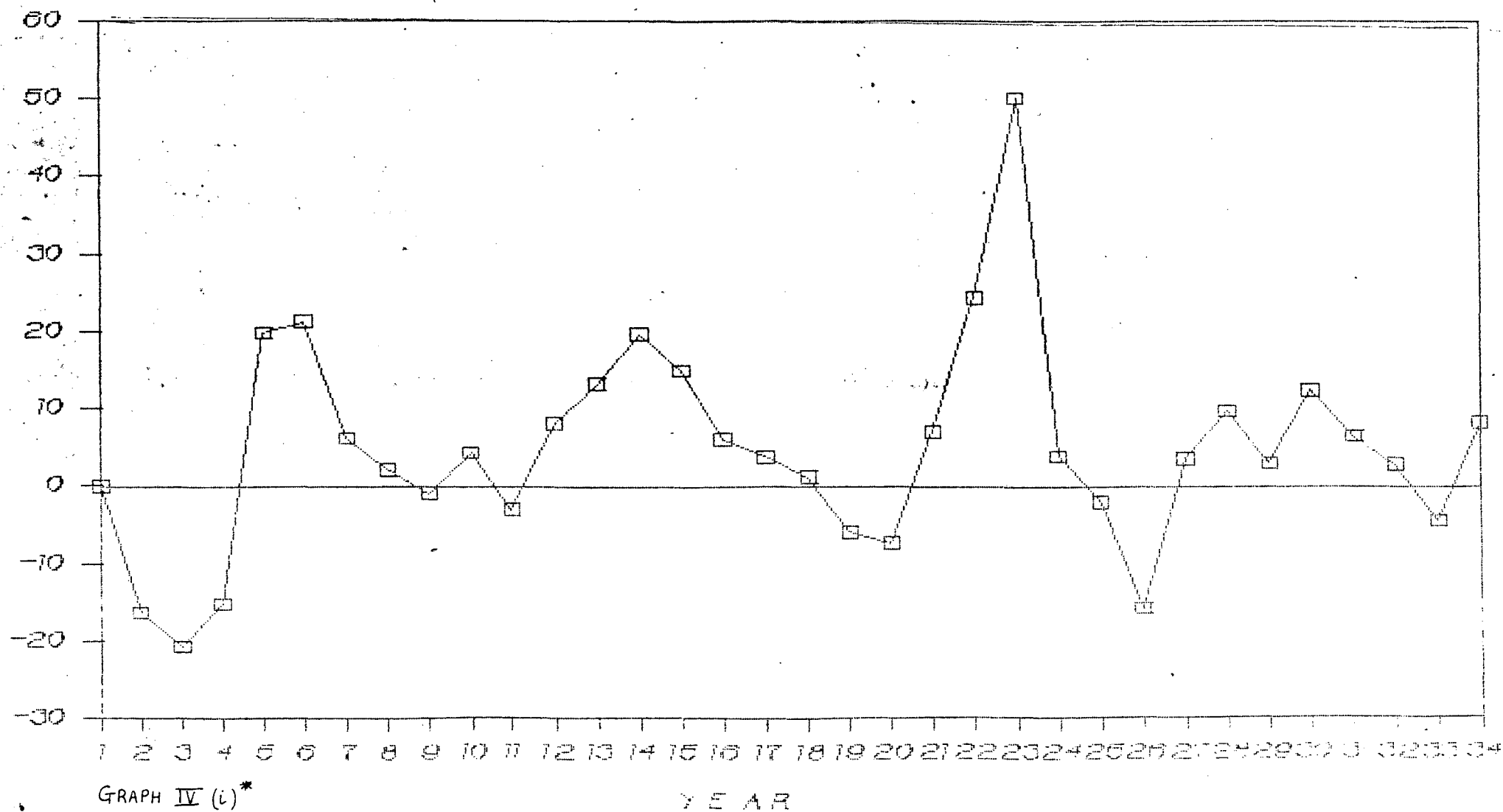
JOWAR KARNATAKA - MVNG AVGS



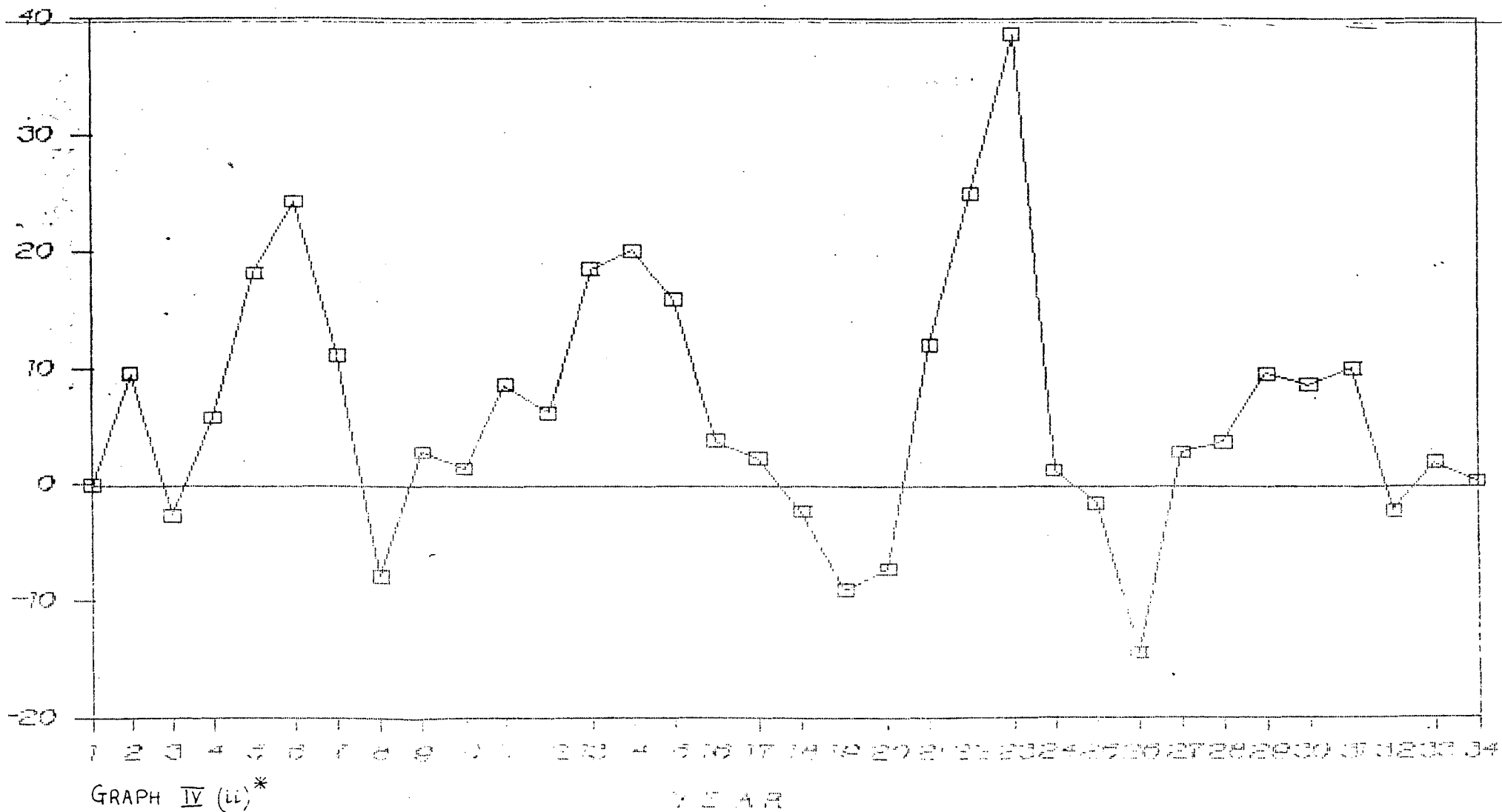
GRAPH III (iii)*

YEAR

BAJRA RAJASTHAN - MVNG AVG



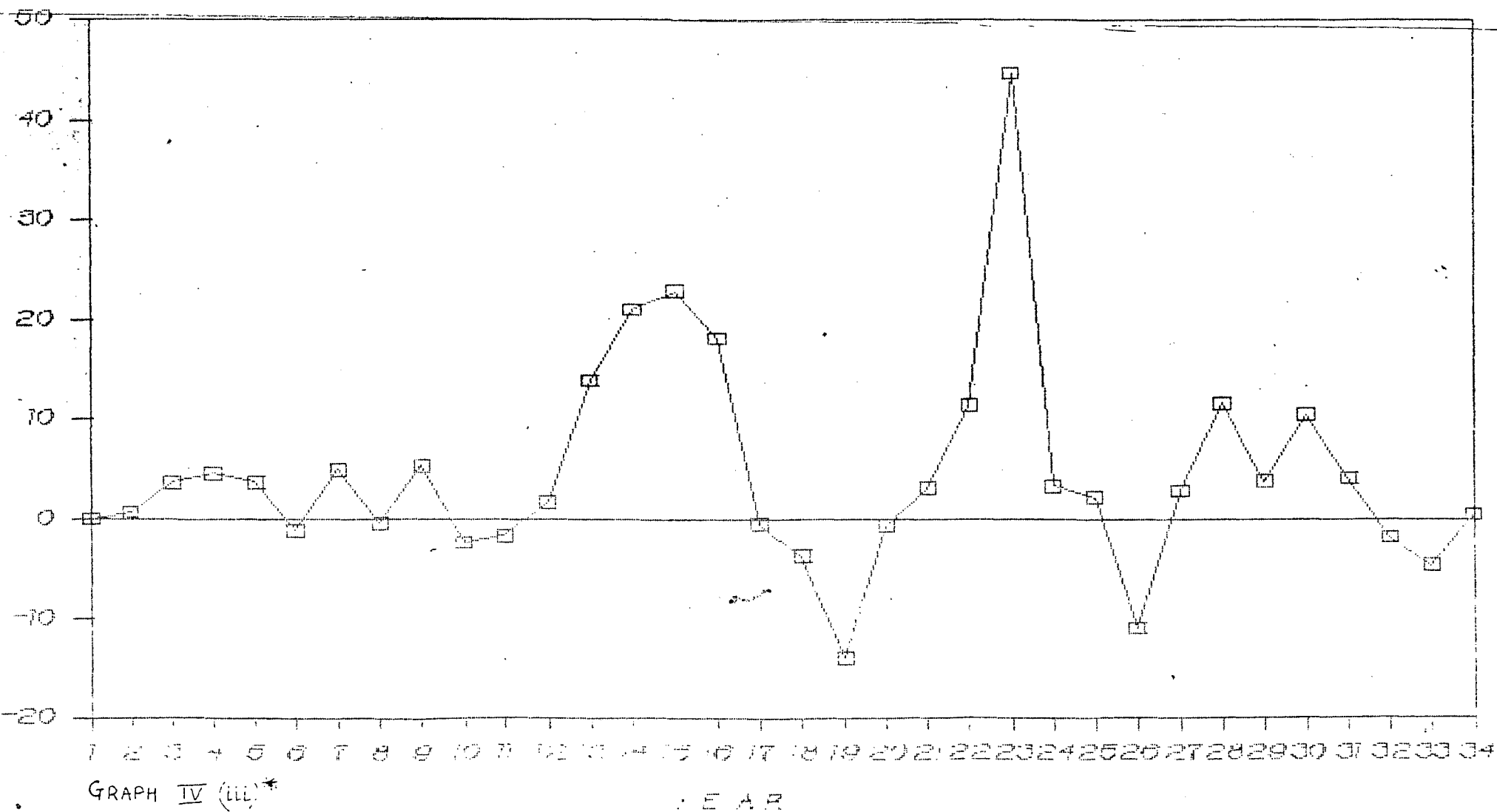
BAJRA GUJRAT - MVNG AVG



GRAPH IV (L)*

Y E A R

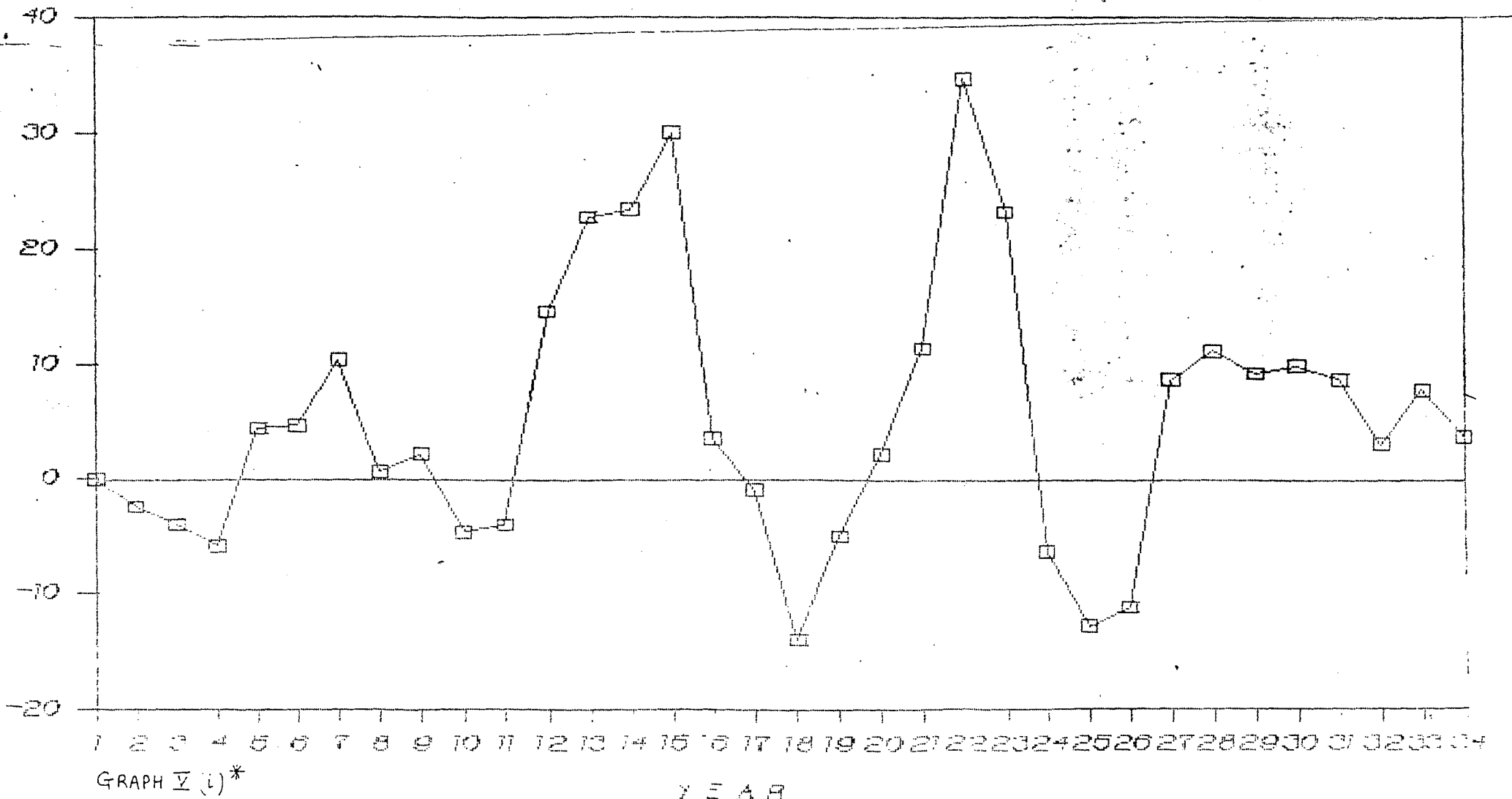
BAJRA UTTAR PRADESH - MVNG AVG



GRAPH IV (III)*

YEAR

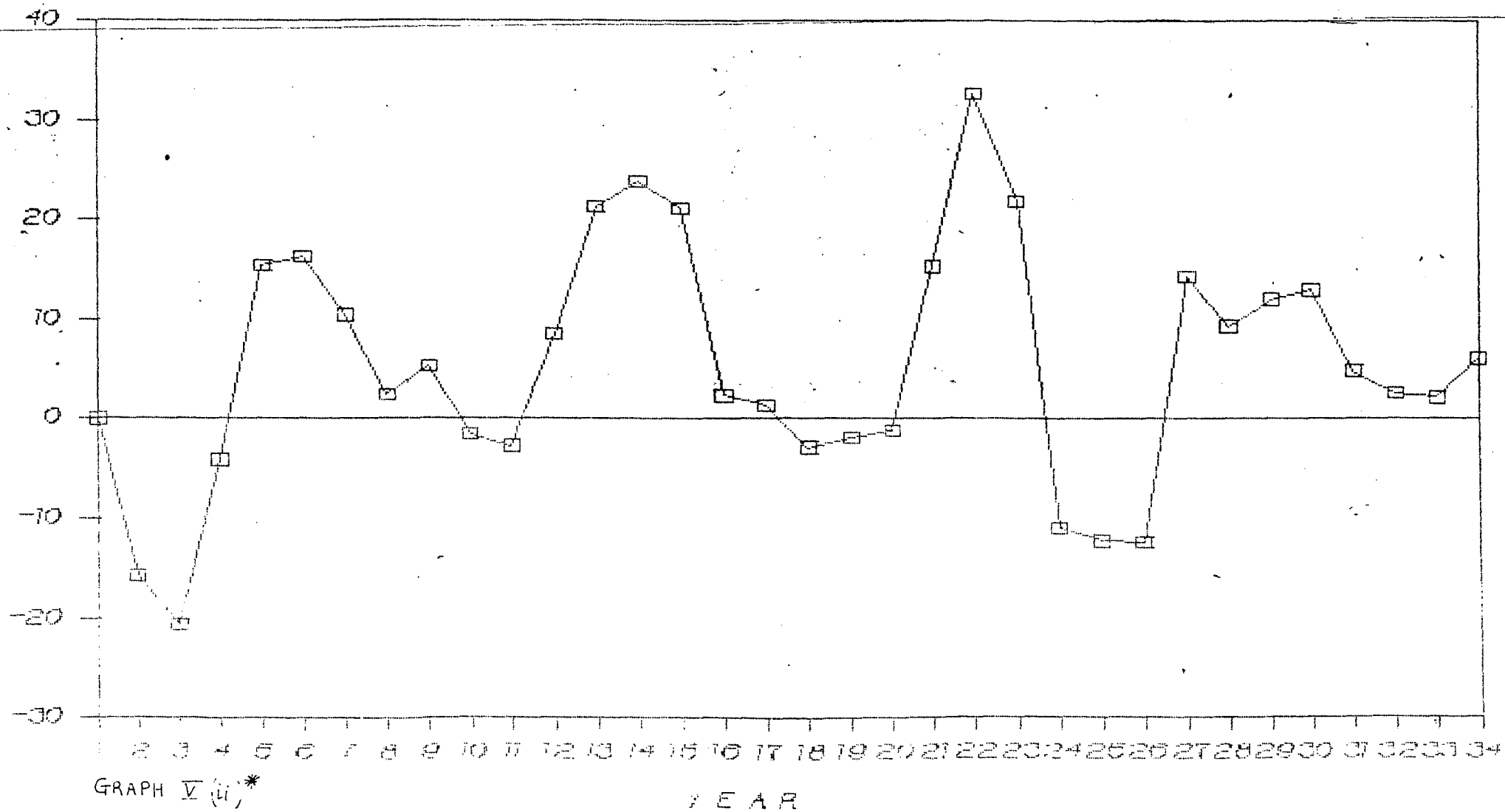
BARLEY UTTAR PRADESH - MVNG AVGS



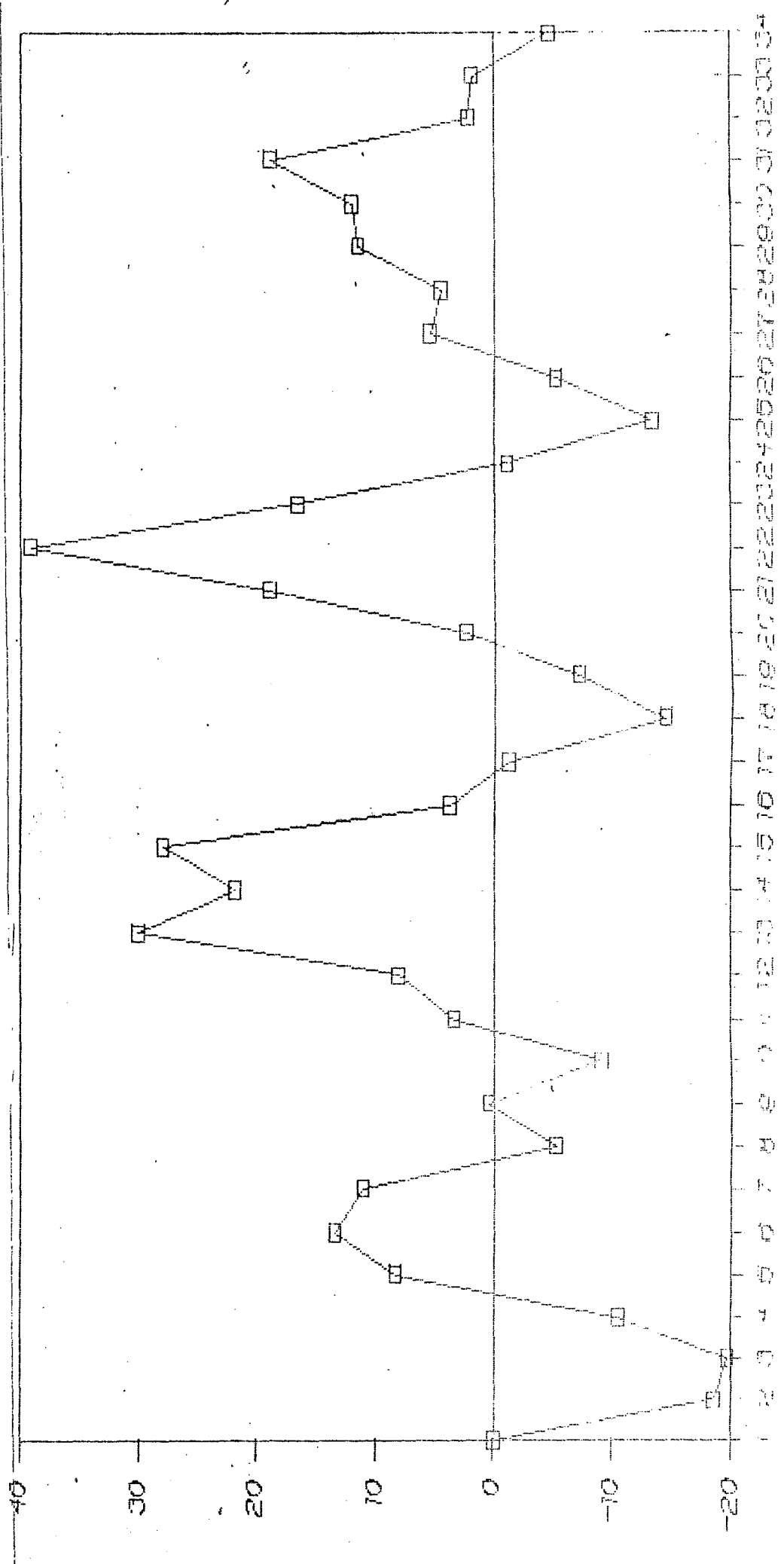
GRAPH V (i)*

Y E A R

BARLEY RAJASTHAN - MVNG AVGS



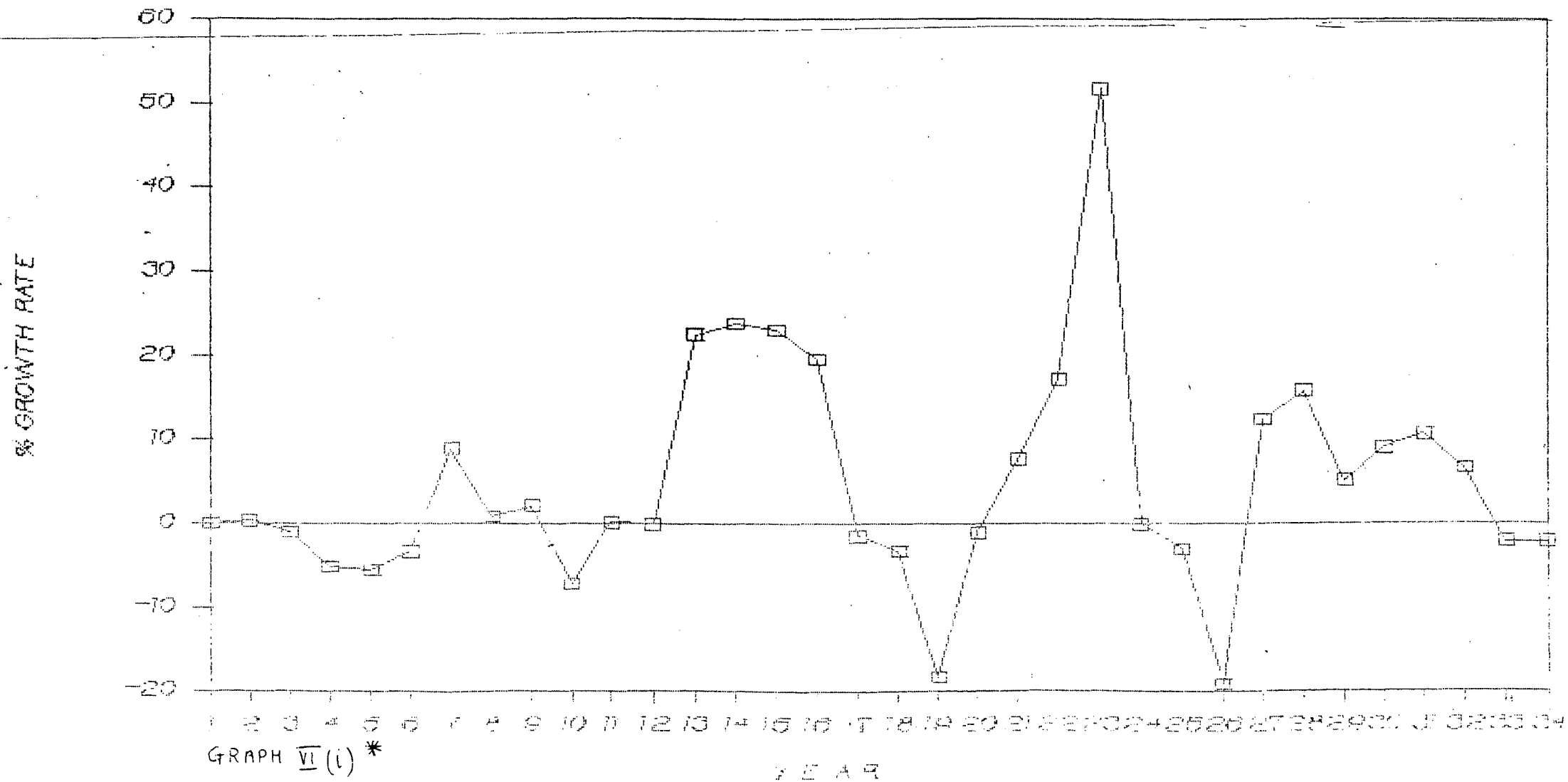
BARLEY BIHAR - MVING AVGS



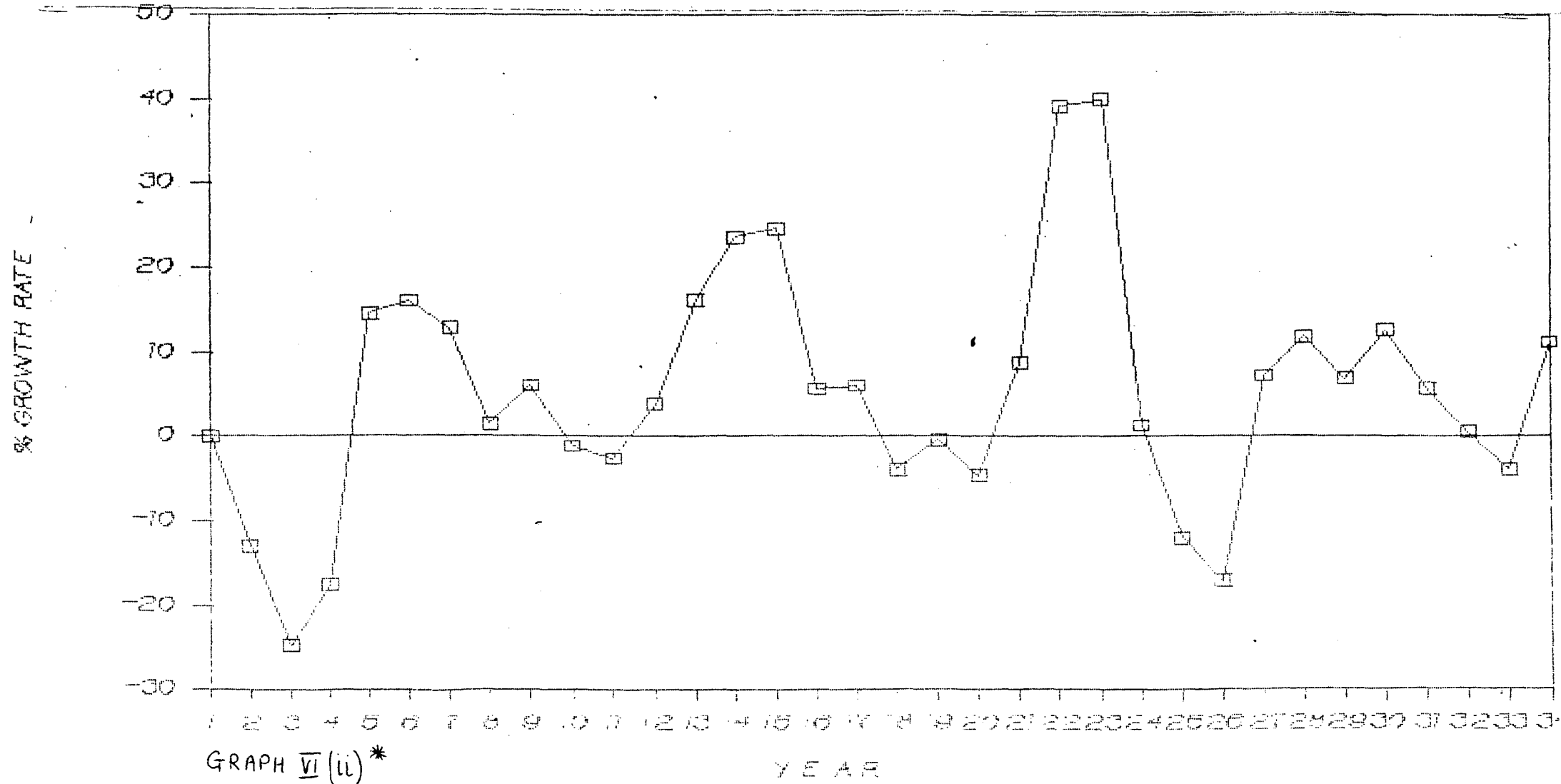
GRAPH V (iii) *

Y E A R

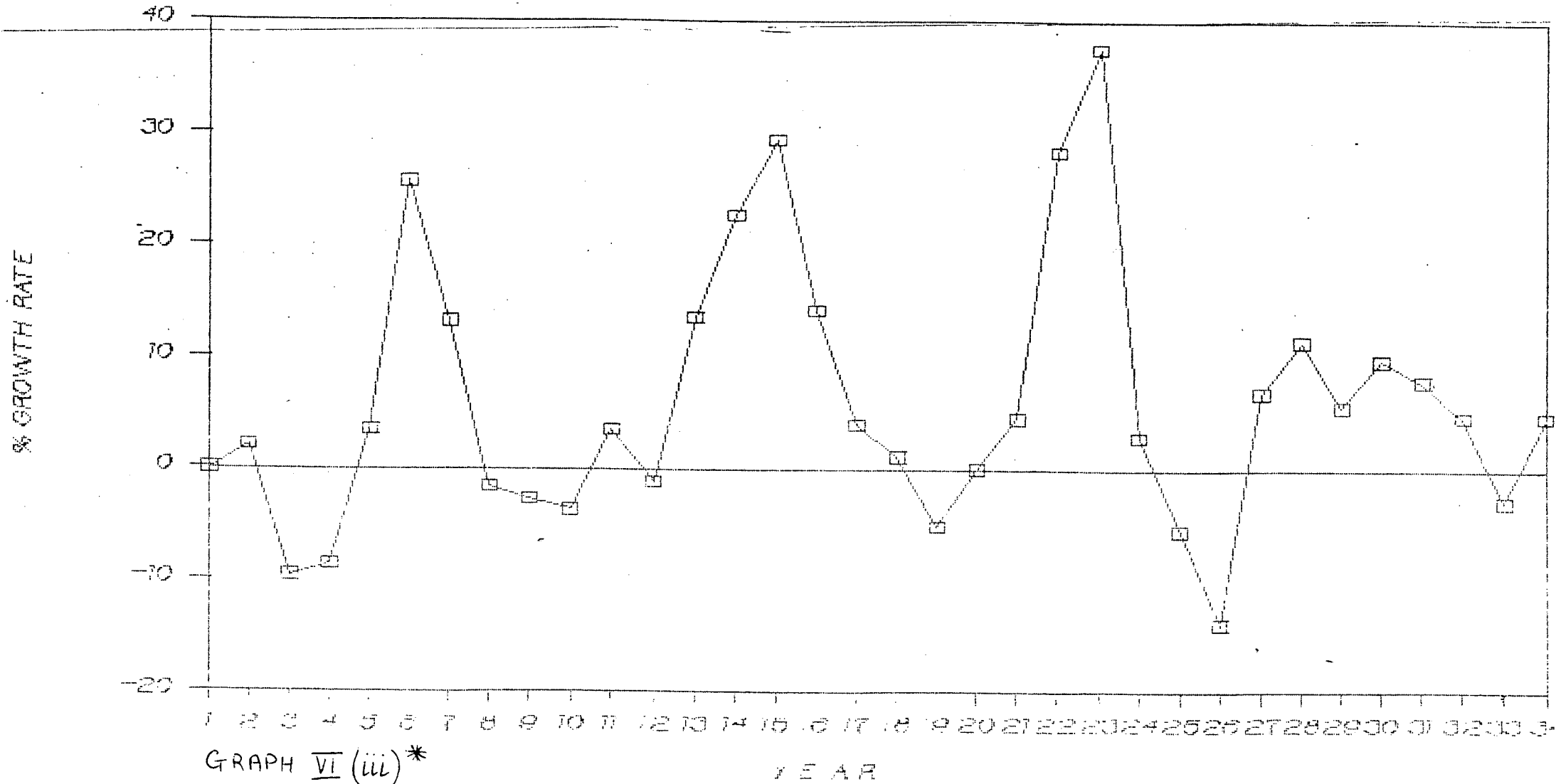
MAIZE UTTAR PRADESH - MVNG AVGS



MAIZE RAJASTHAN - MVNG AVGS



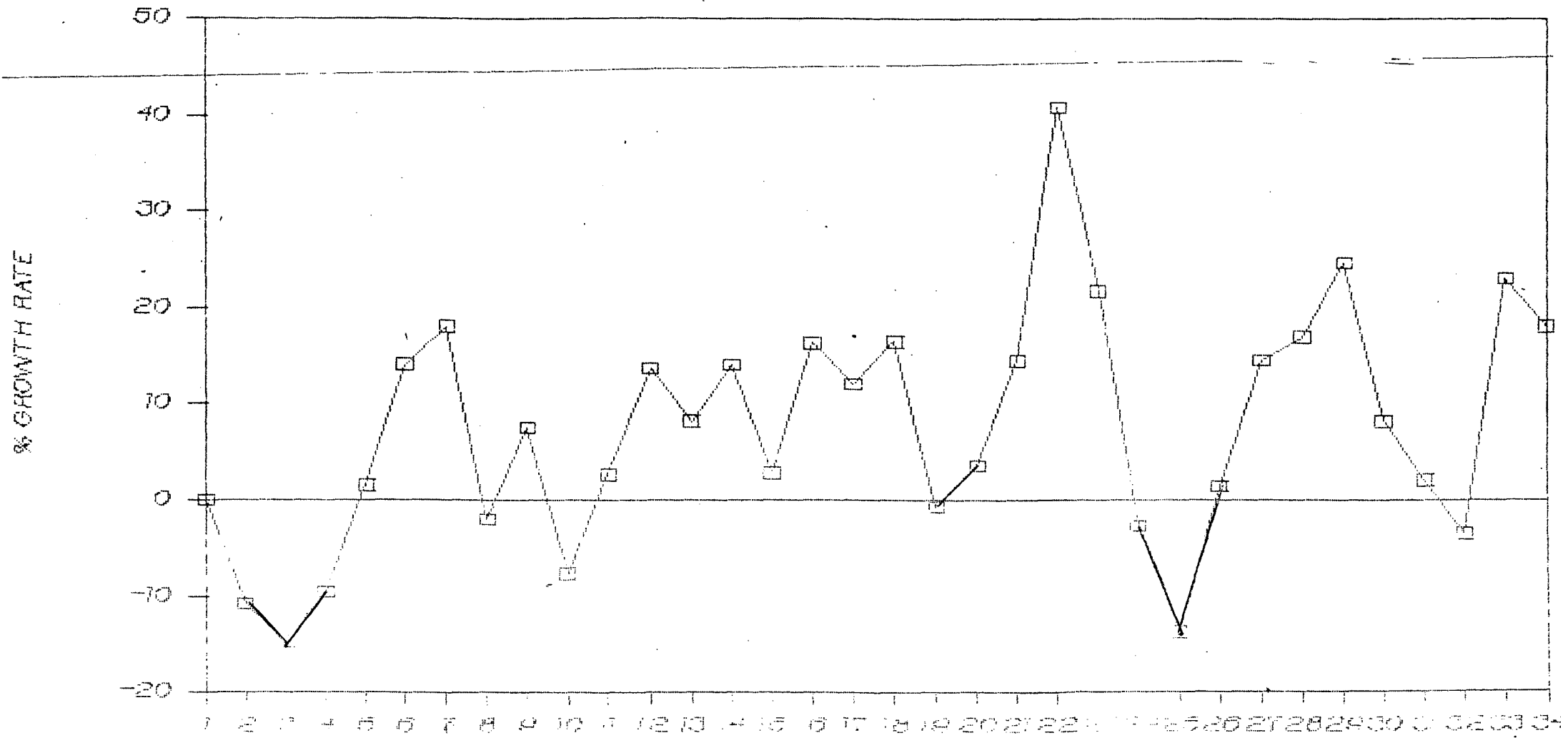
MAIZE MADHYA PRADESH - MVNG AVGS



GRAPH VI (iii)*

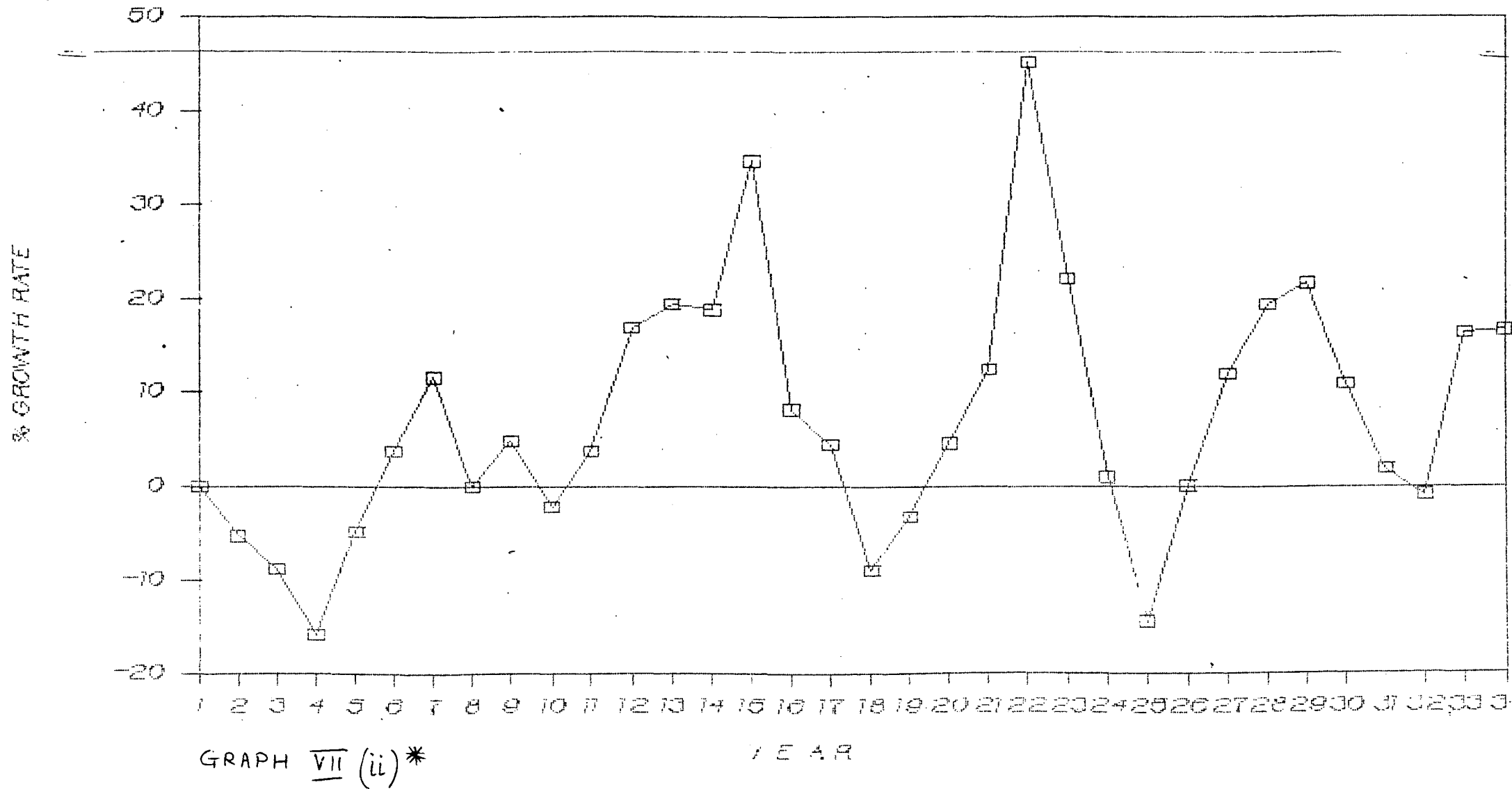
YEAR

GRAM MADHYA PRADESH - MVNG AVGS

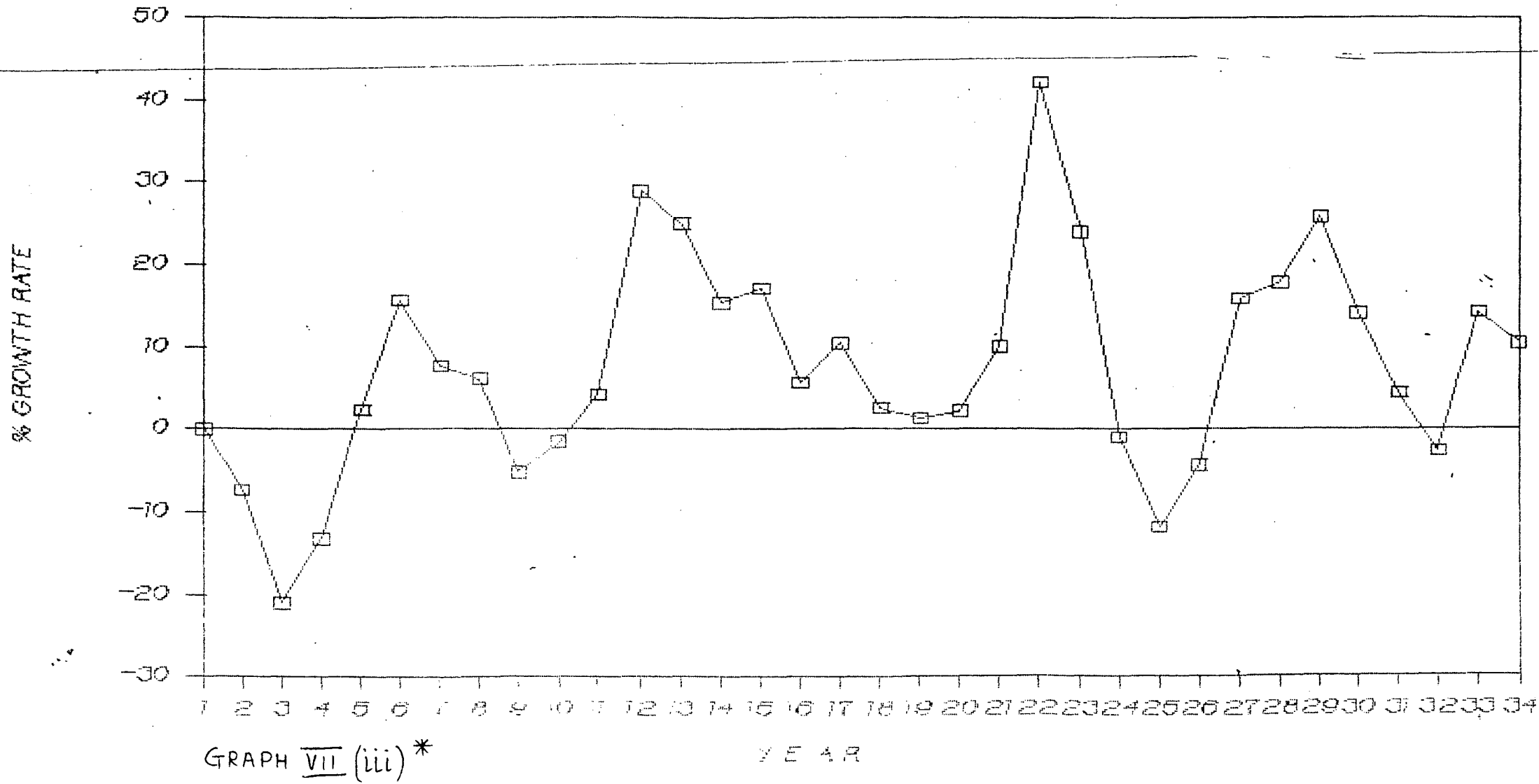


GRAPH VII (i)*

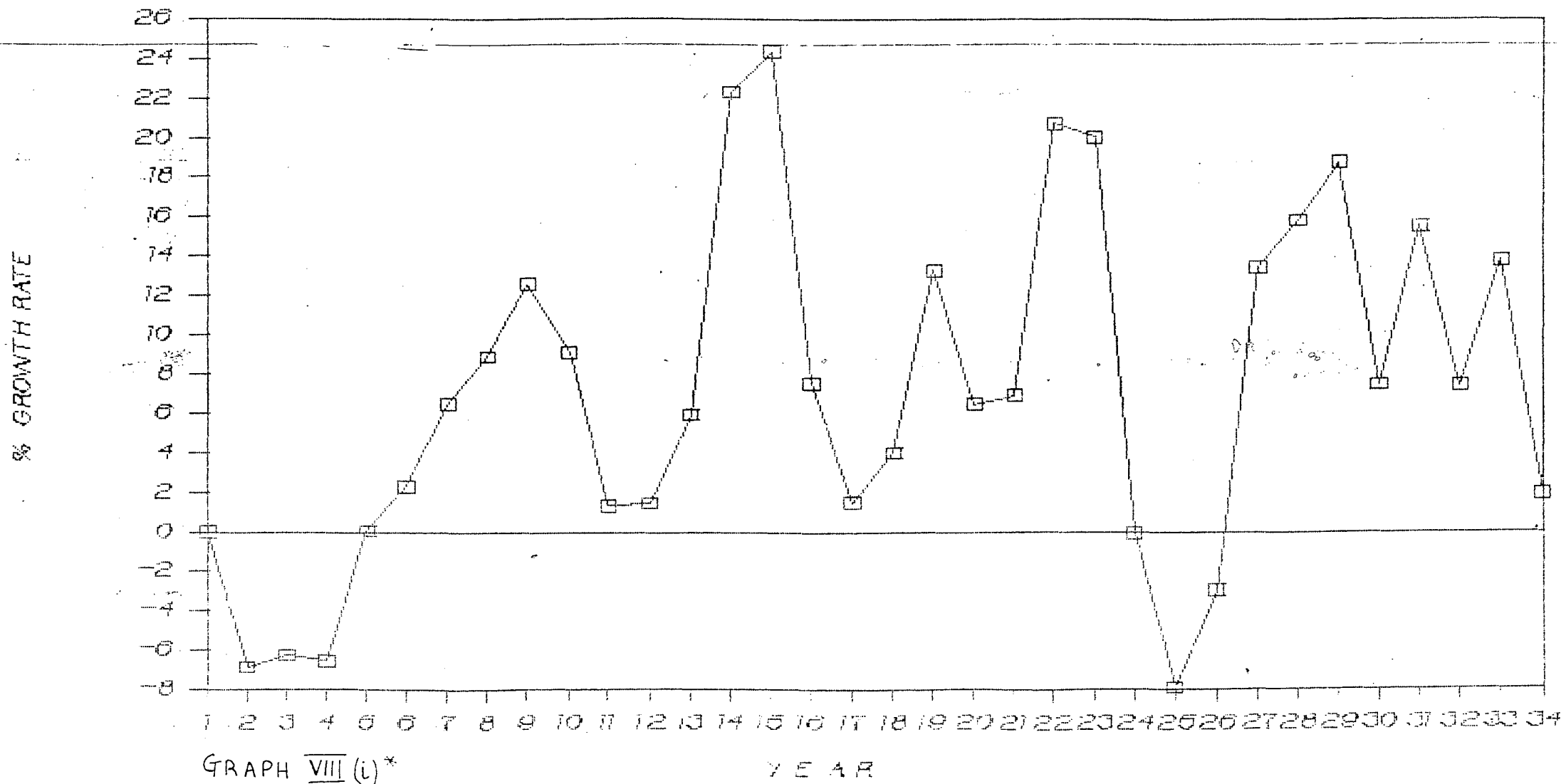
GRAM UTTAR PRADESH - MVNG AVGS



GRAM RAJASTHAN - MVNG AVGS



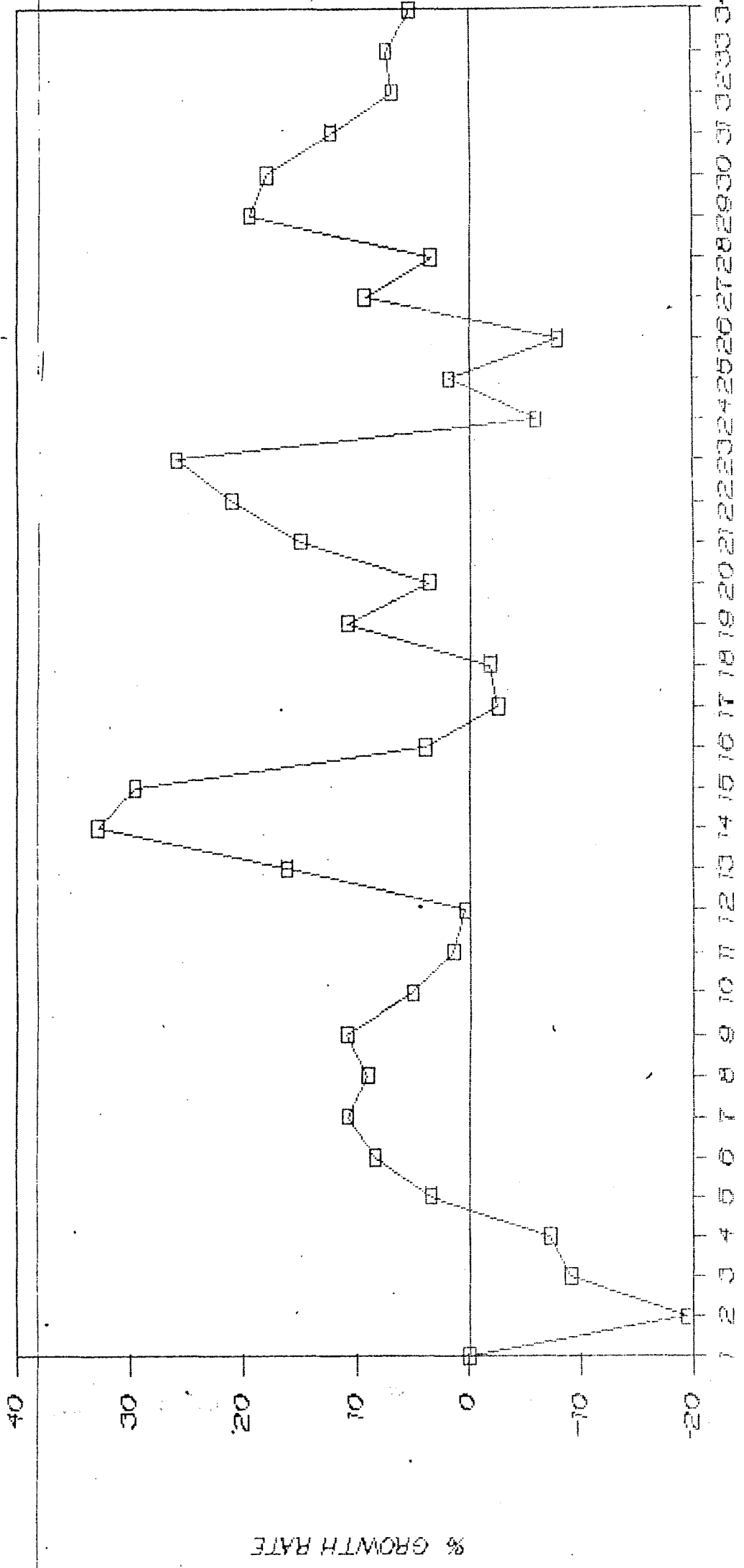
GROUNDNUT GUJRAT MVNG AVG



GRAPH VIII (i)*

YEAR

GROUNDNUT ANDHRA PRADESH MVNG AVG



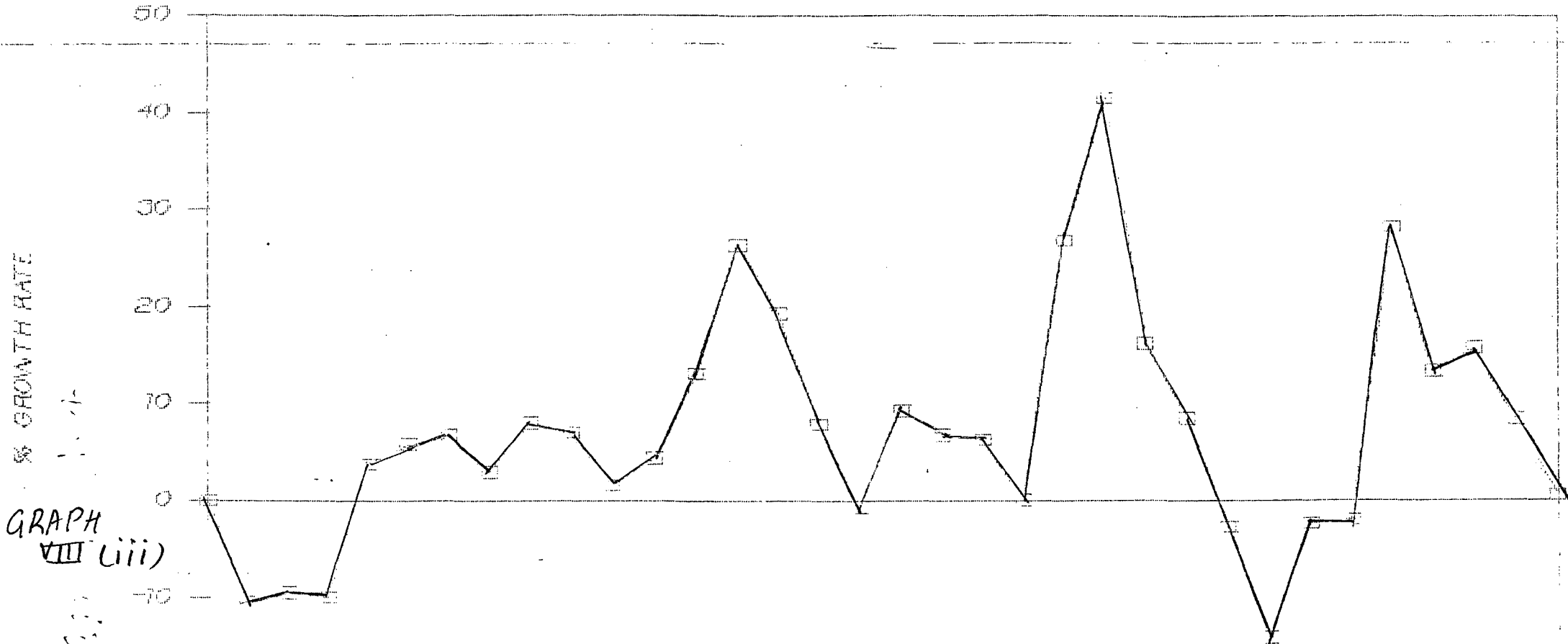
GRAPH VIII (ii) *

Y E A R

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

% GROWTH RATE

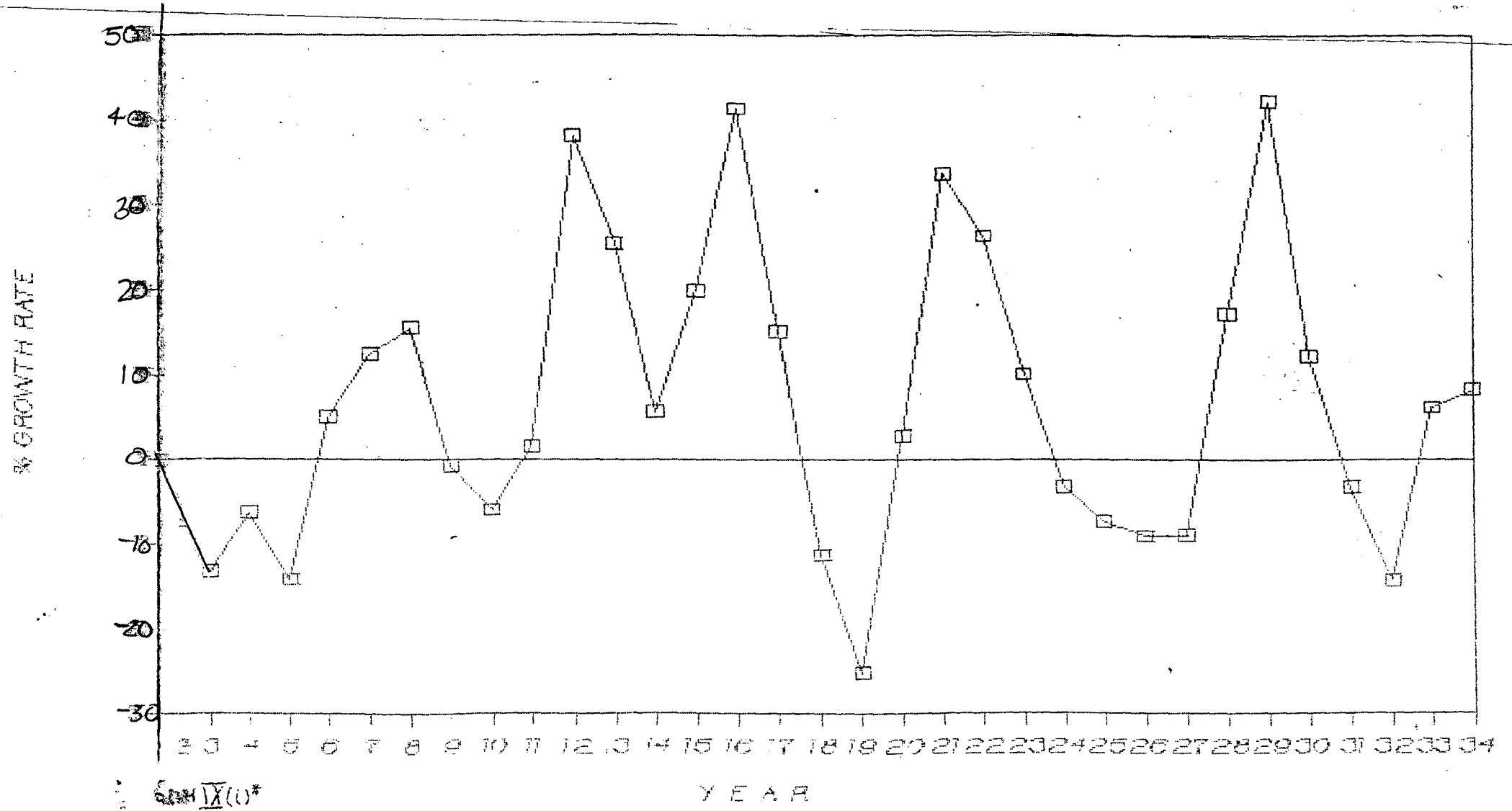
GROUNDNUT TAMIL NADU - MYNG AVG



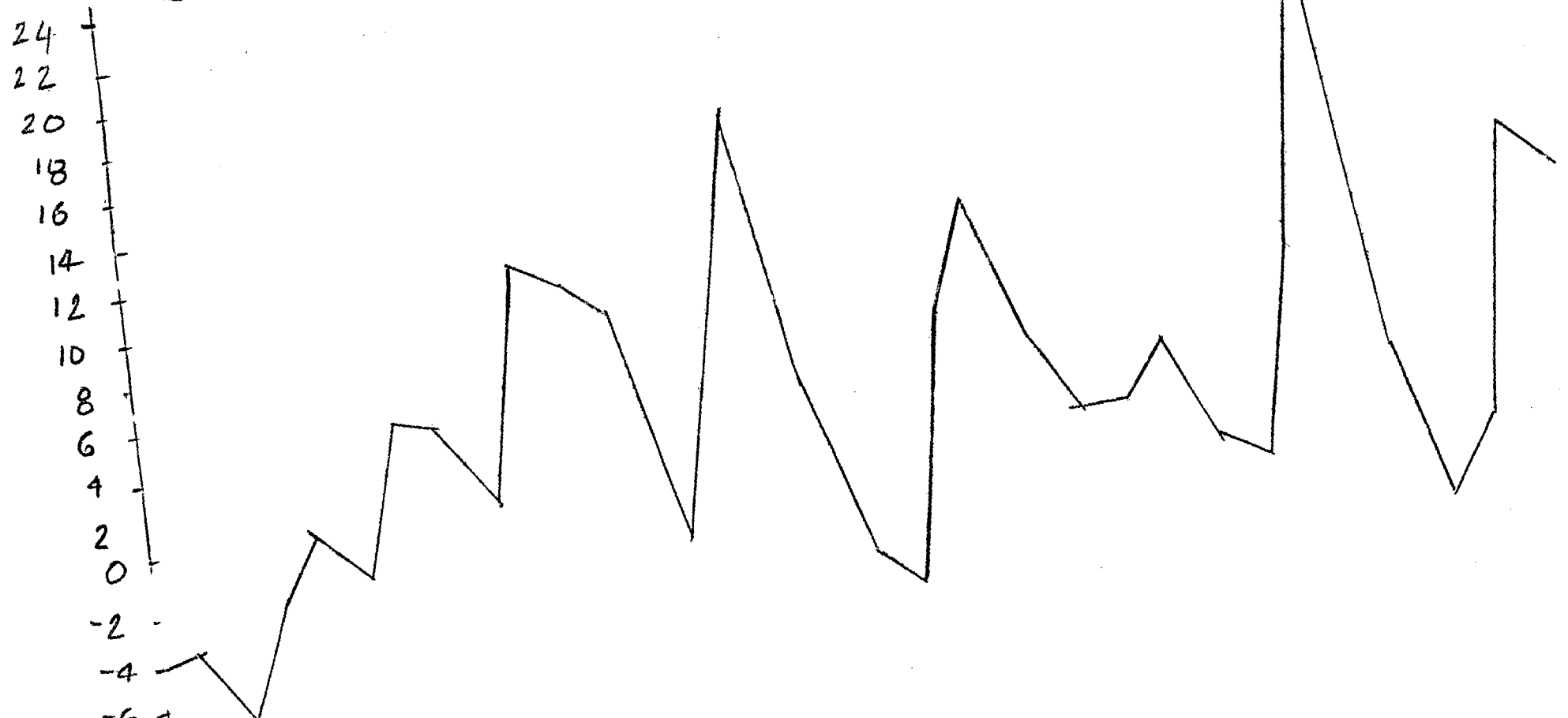
GRAPH VIII (iii)

C.

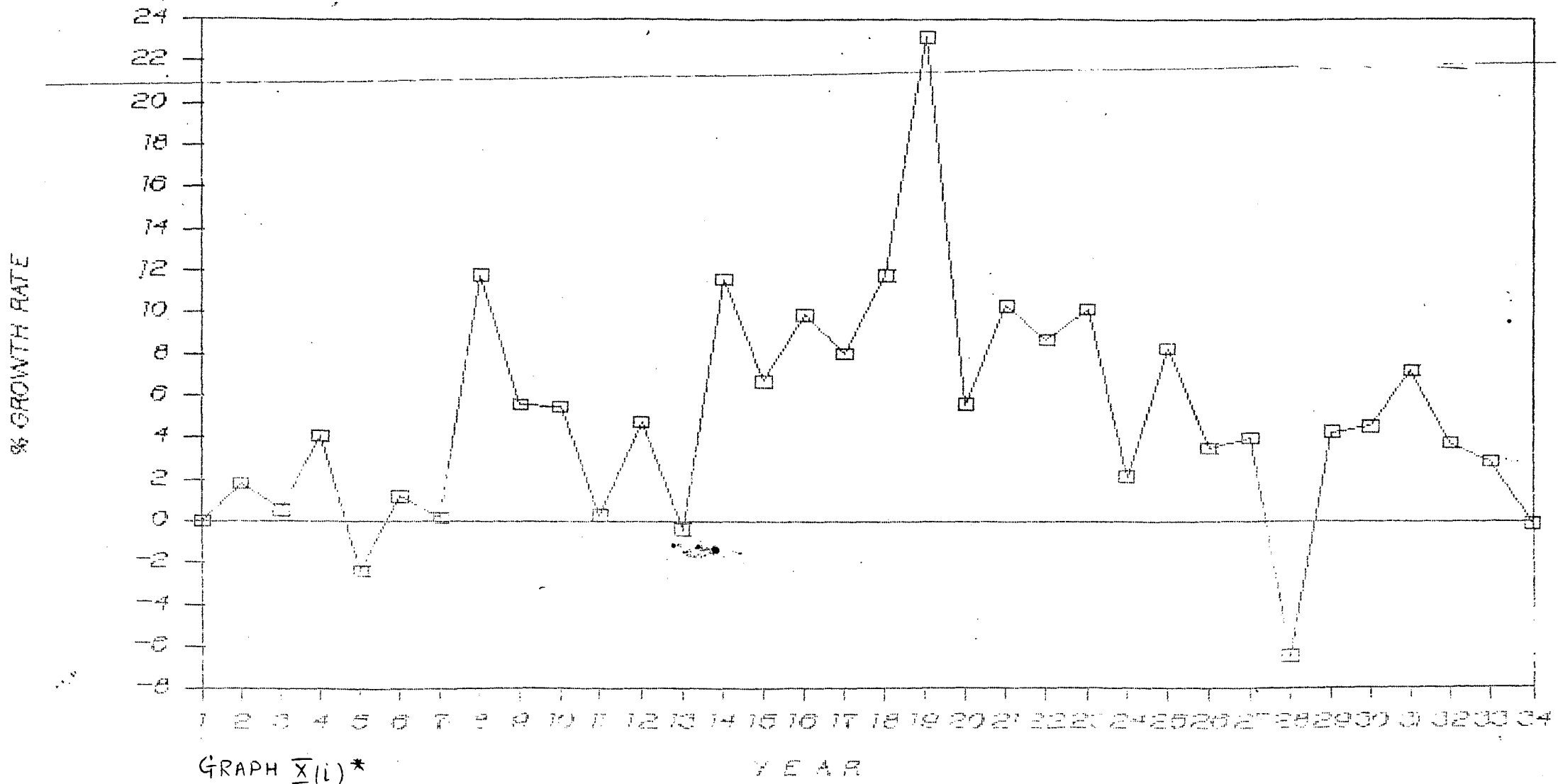
SUGAR MAHARASHTRA - MVNG AVGS



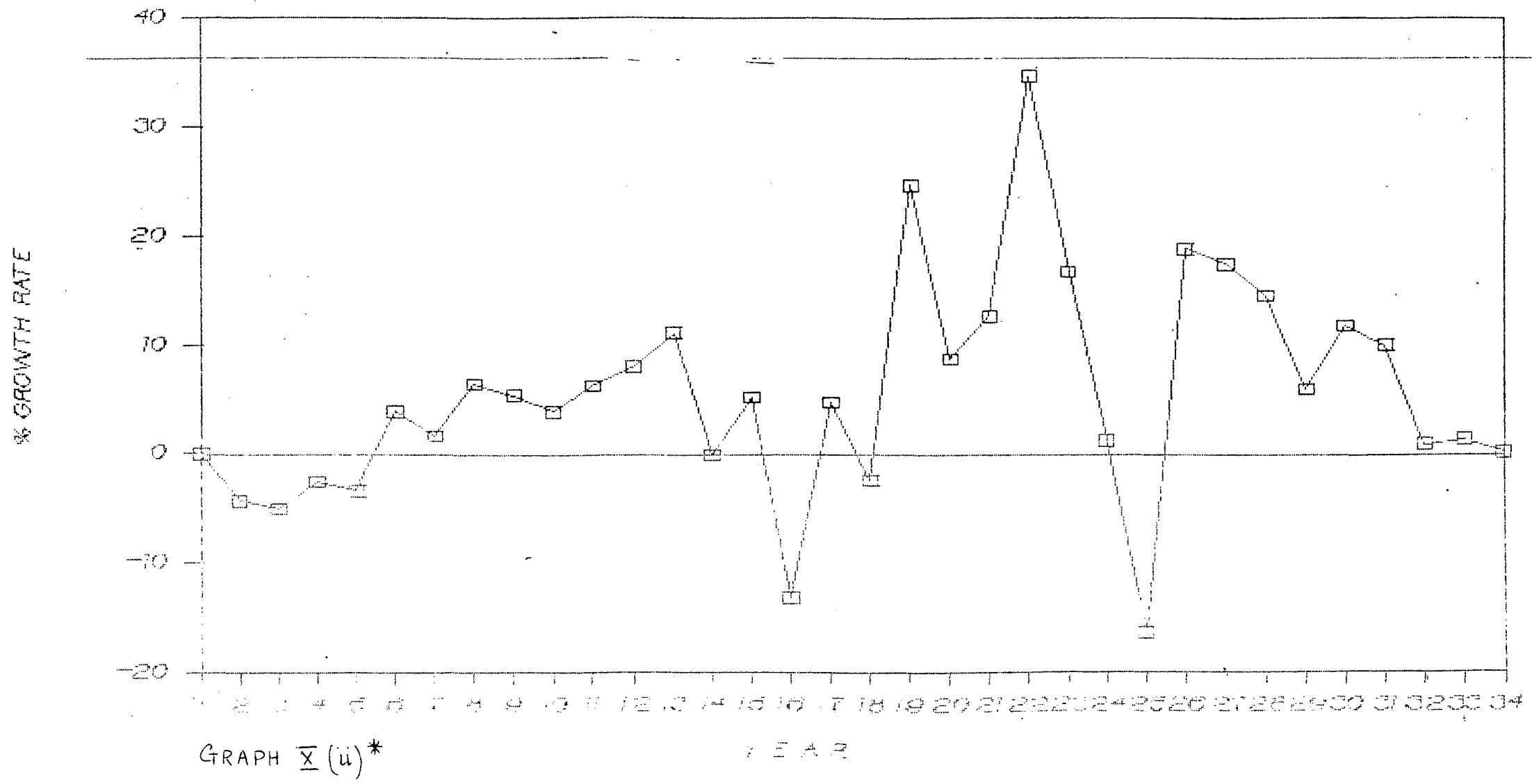
SUGAR TAMIL NADU - MVNG AVGS



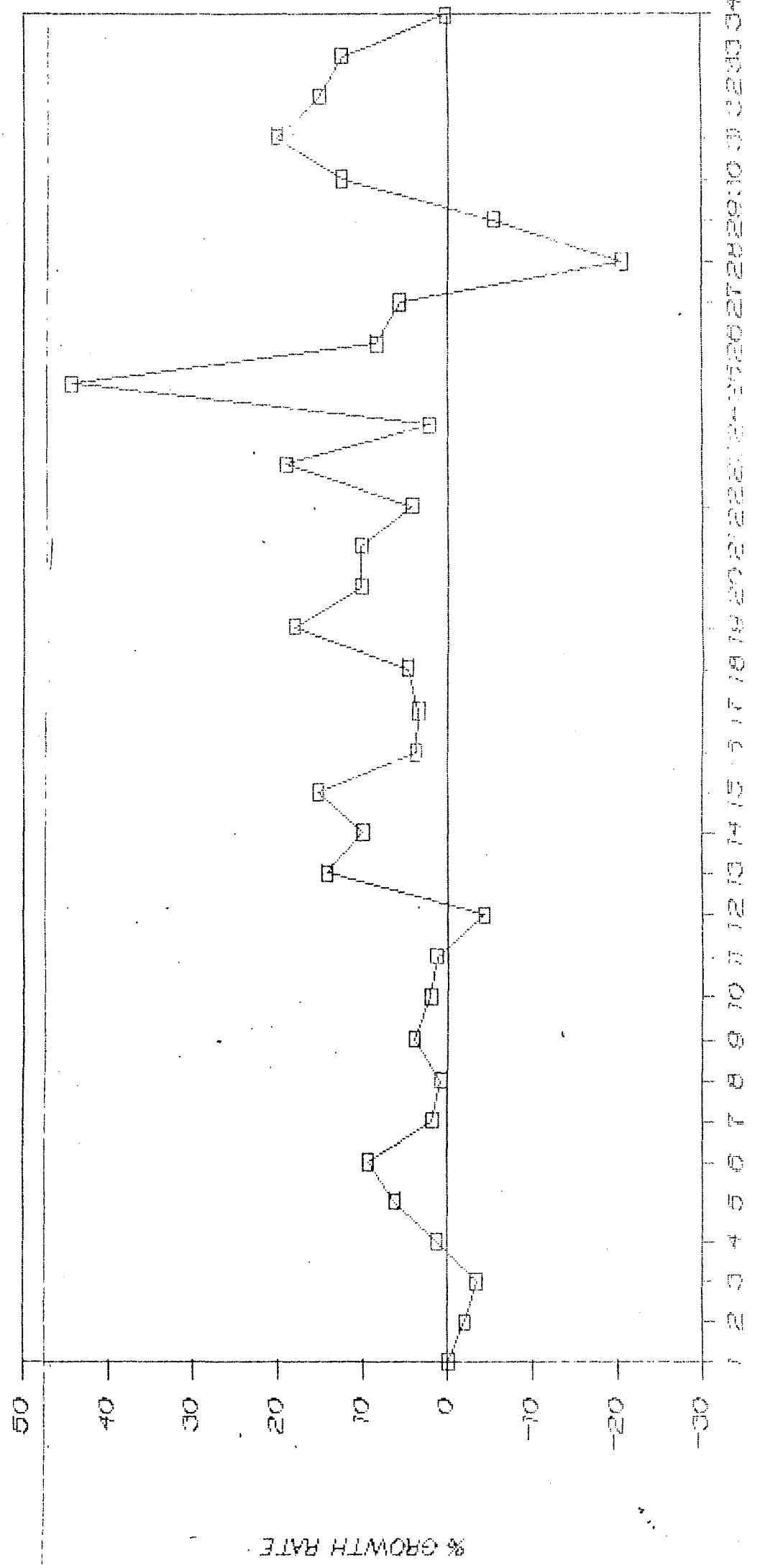
COTTON GUJRAT - MVNG AVGS



COTTON MAHARASHTRA - MVNG AVGS



COTTON PUNJAB - MOVING AVGS

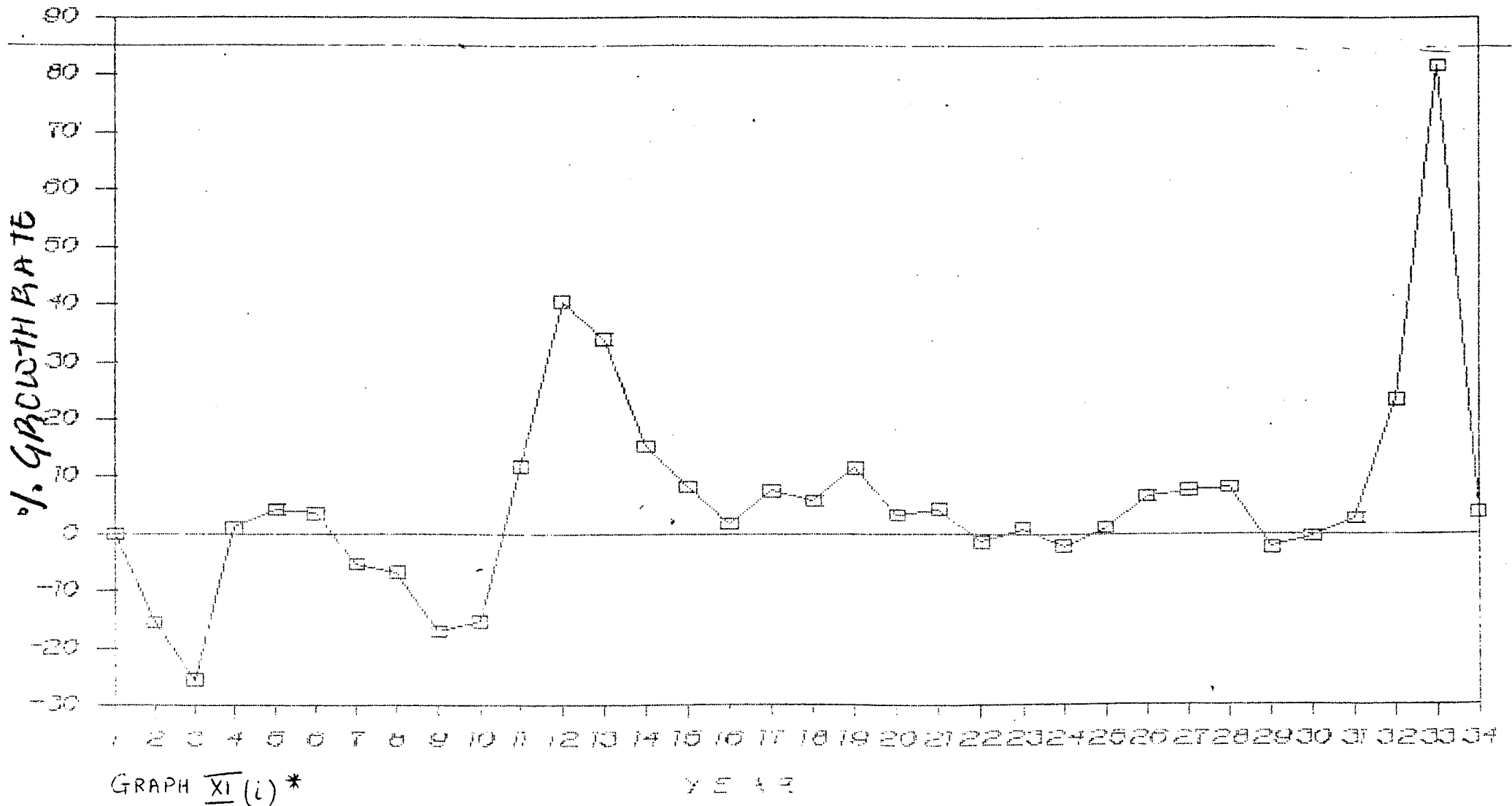


GRAPH X (iii) *

7 5 4 3

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34

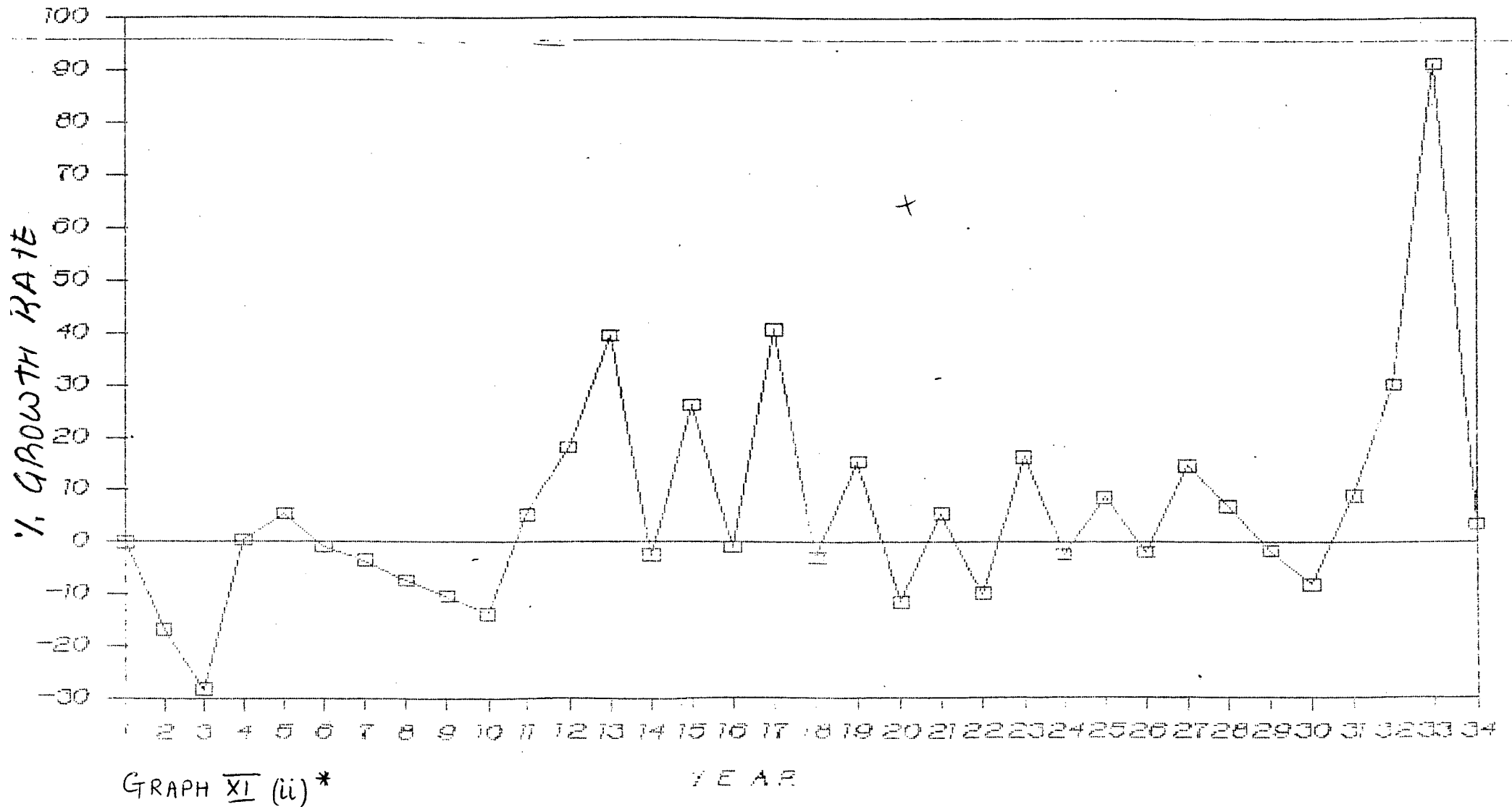
JUTE WEST BENGAL - MVNG AVGS



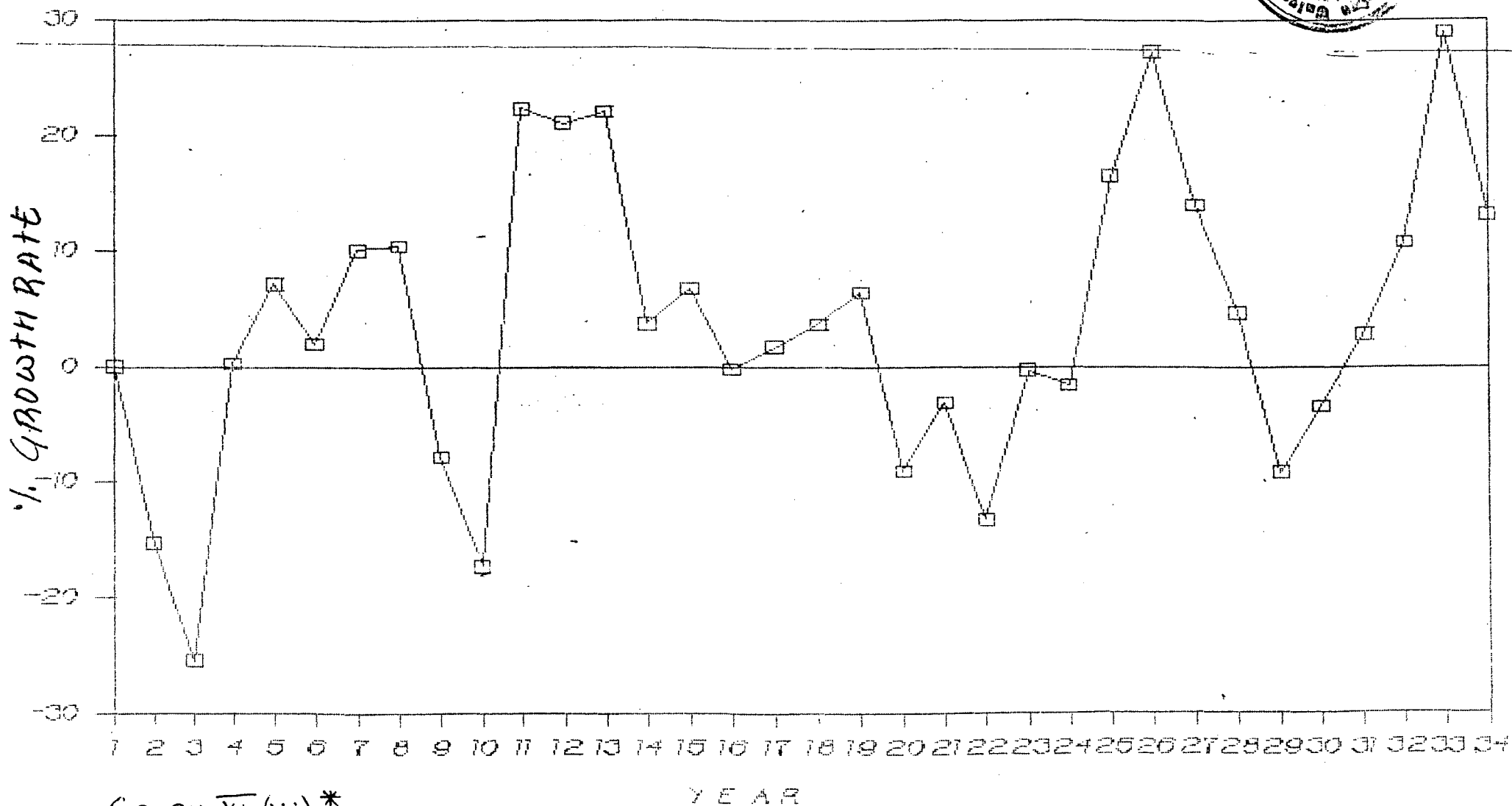
GRAPH XI (i) *

Y E A R

JUTE BIHAR - MVNG AVGS



JUTE ASSAM - MOVING AVGS



GRAPH XI (iii) *

YEAR