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# South Asia Initiative

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### Analysis of Market Reforms and Food Security in South Asia

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Mumbai, India  
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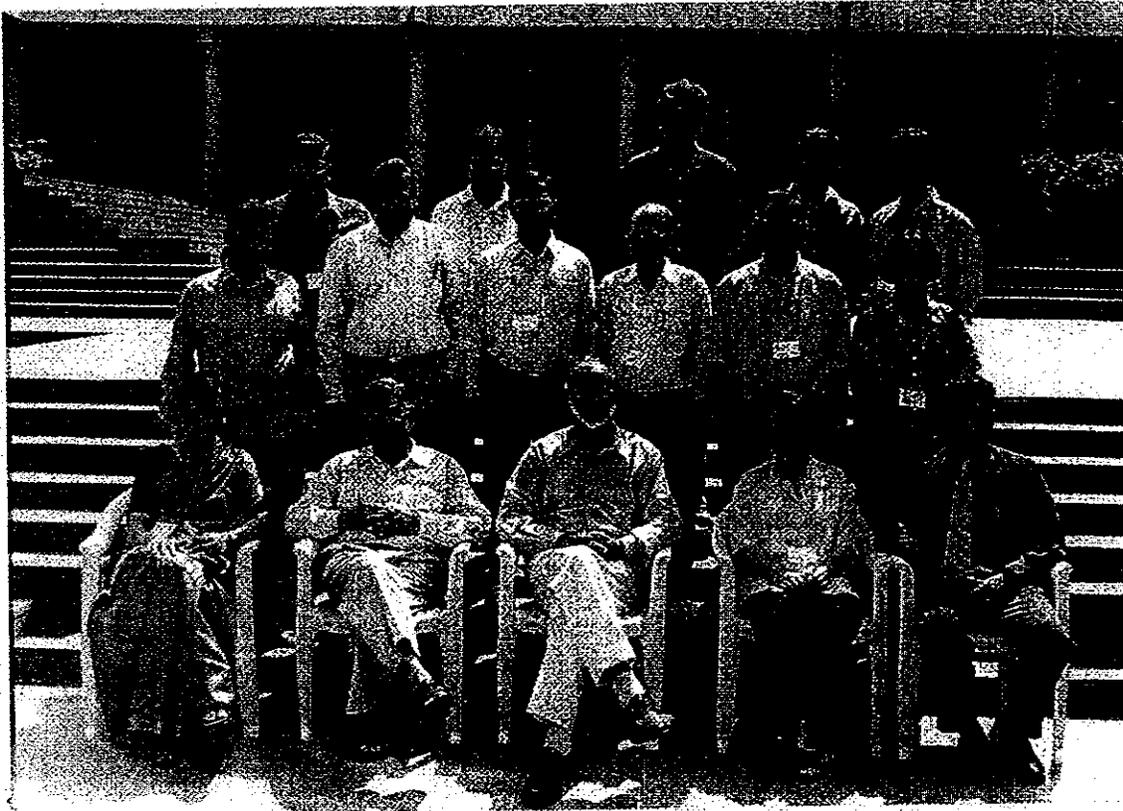
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**Collaborative IGIDR-IFPRI Methodological Workshop on  
"Analysis of Market Reforms and Food Security"**  
IGIDR, Mumbai, India  
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## INTRODUCTION

### ANALYSIS OF MARKET REFORMS IN SOUTH ASIA – A NEED FOR REVIEW OF METHODS

**Suresh Babu, Ashok Gulati, Ashwin Bhouraskar**

Ensuring food security remains a key issue for the governments of South Asia. While sufficient food supply has existed at the national level in each country since they have either achieved or will soon achieve food self-sufficiency, the lack of a large percentage of the population's economic access to food continues to be a problem. In India, for example, 56 percent of the population experiences chronic hunger and 55 percent of children are malnourished. Policies that address problems at the macro, meso and micro levels will be required to make food affordable accessible to the poor. The July 2002 workshop of the South Asia Initiative on the Methods of Food Policy Analysis was an important step for researchers, policymakers and other stakeholders to determine how we can gain a better understanding of these obstacles to food security in the region and thus take the appropriate policy measures.

The liberalization of the economies of South Asia since the mid 1980s, which accelerated with macroeconomic reforms from the mid 1990s onwards, has significantly improved the incentive framework for agriculture development in the region. As a result of the reforms, India, for example, has been a net exporter of food grains for the last six years. Yet there are indications that India and other countries in the region are not responding to this favorable environment in a manner that would allow them to obtain the greatest benefit possible. What accounts for this failure in response, some researchers suggest, is inadequate public investment in agricultural growth and diversification. Indian agriculture is in need of substantial government investments in research and development, power, infrastructure and sustainable irrigation. Investments in all of these areas have declined in recent years. Consequently, in the post-reform period, average annual GDP growth in agriculture, including food grain output, and allied sectors slowed compared to the previous decade.

Additionally, protection of domestic agriculture from certain food imports may be having an adverse effect on the poor in the case where these goods are produced more efficiently by other

countries. Protection has been reduced to less than half of its former level and agriculture has been a major beneficiary of this move. However, further tariff reductions on such goods could contribute to meeting the food needs of the poor. A third problem at the macro-level is that currently India's poor are facing grain prices out of their reach. Some believe that the rise in exports has been responsible for this. But the cause has likely been the steep rise in the procurement and issue prices in the government's program for grain price stabilization. As most of the South Asian nations have become WTO members, the viability of South Asian agriculture in the new international trade regime will have to be seen as emerging out of economic liberalization. Sri Lanka may be regarded as a model here, though it too would benefit from steps that diversified its agriculture. The question then for researchers and policymakers of the region is how should the countries prepare to meet WTO requirements and use trade to meet food security needs.

At the meso level, government policies to meet the food needs of the poor have been inefficient, wasteful, poorly directed at the needy, and have produced distortions in other sectors of the economy. For example, the Government of India's (GOI) effort to stabilize staple grain prices and make these goods affordable to the poor, through procuring staple grains with price support to farmers, and maintaining buffer stocks and extensive controls on private trade, has been extremely costly and inefficient. The food subsidy alone reached \$2.1 billion in 1998/99 and the fiscal cost of food grain policies has nearly tripled in real terms from Rs. 29.4 billion in 1980/81 to Rs. 90 billion in 1998/99. While management and storage are the main expenses, physical losses of grain have also been high. Furthermore, due to poor targeting and other characteristics of the program, the benefits that the system provides to food insecure households are negligible. Considerable leakage because of large inclusion and exclusion errors, and fraud also occurs. Consequently, many of the poorest households, particularly in the northern and eastern states, do not purchase grains from the program. In fact, a large number of poor rely on private markets as much as they do on the PDS, if not more.

The effect that the controls on private trade, the government's power to intervene in markets and the uncertainty of the system produce for the private sector is a disincentive to participate in grain marketing and distribution. The near-exclusion of the private sector from the food distribution system has, moreover, generated inefficiencies in this sector that in turn cause higher

prices for the poor who are forced to depend on it. The cost of the system's delivery of benefits to the poor is high even by international standards and is much higher than what it would be under private management. A vicious cycle is causing the accumulation of grain stocks and unaffordable prices for the poor: higher procurement price, higher procurement, higher issue price, lower stock offtakes, larger stock, higher market price, higher procurement price. At end of the 2001 wheat procurement season, stock amounted to 65 million tons, the equivalent of the rice and wheat output in 1971. The policy of supporting producer prices and stabilizing grain prices is becoming unsustainable. Some observers have argued that the GOI's policy has been preventing food security in the long term by stifling growth and the modernization of grain markets.

Recommendations to improve the system's efficiency and targeting, and create an enabling environment for increased private sector involvement, have been proposed. Some alternatives are the adoption of a food coupon or food stamp program where the private sector handles all phases of distribution and public costs are minimized, and the system's decentralization whereby the program in each state is designed to suit the local characteristics in terms of poverty, staple grains consumed and production.

In Sri Lanka as well, parastatal organizations dealing in food staples could quite possibly be unnecessary, as the private sector is efficient in marketing staple grains. Trade policy instruments—a combination of tariffs, import controls and food security reserves, which help to keep food markets in balance—may be able on their own to ensure supplies for achieving food security objectives. Issues concerning the scope and function of government food security policies are also rising in Bangladesh as its degree of rice self-sufficiency increases.

As the weaknesses in the GOI's food targeting system suggest, the food needs of a large number of poor households in India are going unmet. Between 1973 and 2000 the average calorie intake declined in India's rural areas where the majority of the poor live. About 80 percent of the rural population and 70 percent of the urban population consume less than the necessary amount of calories. The situation in the other South Asian countries is not markedly different. In fact, even in Sri Lanka where food security has been achieved at the macro-level through liberalized trade,

households may not be able to afford the food they need. Achieving food security at the household level will depend on well-designed safety net programs.

However, even if poor households were to receive a nutritionally adequate supply of food, this would likely not guarantee that the food needs of all the member of a household would be met. Due to the power that men hold in the household and gender bias, the intra-household distribution of food is frequently uneven. Women, particularly those who are pregnant and lactating, children and the elderly experience more severe malnutrition in poor households. Over 53 percent of children under four in India are malnourished and underweight for their age. The child malnutrition rate in Bangladesh is higher. A high percentage of pregnant women in India suffer from anemia. In addition to programs targeting staple foods to poor households, effective schemes are needed to promote disadvantaged members' access to food and to target nutritional supplements to them.

To address these obstacles to food security in South Asia the development of appropriate analytical methods and research are essential. In-depth research on each of the problems described above would aid in providing us with an exact understanding of their causes and their impacts on the food situation and economy as a whole. The research studies would also look into the following questions: to what extent can trade within the WTO system meet the food needs of South Asian countries and what role, specifically, should public investments play? How can alternative food distribution systems be structured so that they can involve the private sector, be more efficient and better target the poor? And what would be the benefits and costs of such systems? Finally, how can nutritional programs effectively reach disadvantaged household members? To answer these and other related questions, well-developed analytical methods are a prerequisite. The methods to address a problem at a particular level will, of course, vary depending on the country context and the specific nature of the issue.

To gain a precise understanding of the issues, there is a need for bringing together the key players in the research and policy fields to discuss the issues, the information necessary to engage with them, the research methods to be employed and the specific data requirements. The objective of the workshop on Methods of Food Policy Analysis is to create such a forum. The priority policy research issues were identified in two earlier South Asia Initiative events, the First

Consultative Meeting of the Indian PAANSA members in New Delhi in January 2002, and the Conference on Economic Reforms and Food Security, in April of the same year.

About 20 participants attended the workshop at the Indira Gandhi Institute for Development Research (IGIDR), Mumbai, on July 8-9, 2002. The International Food Policy Research Institute and the IGIDR hosted the event. The workshop consisted of four methodological presentations made by collaborators of the South Asia Initiative. Dr. P.V. Srinivasan, of IGIDR, presented a methodological presentation strengthened the methodological capacity of the participants on determining the implications of trade liberalization on food self-sufficiency, food security, and price volatility. After Dr. Srinivasan's review of issues and methods related to price volatility, Dr. Shikha Jha of IGIDR focused on methods used for determining sector level policies on food security. She specifically dealt with methodologies relevant to price stabilisation, particularly food stocks and private sector food trade. The third presenter, Dr. S. Mahendra Dev of the Center for Economic and Social Studies in India, narrowed the scope by looking at methods of procurement, distribution and public works that assist in securing household food security. The last session by Dr. Brinda Viswanathan of Madras School of Economics in India and Dr. Suresh Babu of the International Food Policy Research Institute, focused on intrahousehold food security issues as they relate to market reform and trade liberalization policies.

This proceedings compiles these presentations and the summary of discussions that followed. We hope the issues, both thematic and methodological raised here are useful for those who are conducting research and policy analysis on the problems facing the food economies of South Asia.

## OPENING REMARKS

**R. Radhakrishna**

Professor R. Radhakrishna, Director of IGIDR, Mumbai, opened the workshop by highlighting the key issues that face the food economies of South Asia. The following are excerpts from his speech. For South Asia, market reforms are not an option. It is important to understand the implications of internal and external market reforms and how to prepare the participants, both small-scale producers and poor consumers to face the consequences of market reforms. Compensating the losers in the short term is critical for the success of market reforms. Furthermore, capacity strengthening of policymakers and policy analysts in understanding the implications of policy reforms is essential for further reforms. It is clear that the SAARC countries should cooperate on the issues related to trade and have negotiating power on world trade issues. In this context, the present workshop on “Analysis of Market Reforms and Food Security in South Asia” is highly timely and IGIDR is pleased to collaborate with IFPRI in conducting the workshop.

The policy instruments that we use should be neutral to the markets. Vulnerable participants, such as the small-scale farmers and poor consumers must be protected in the short run from the negative consequences of market reforms. Several programs are already in place to support the small-scale farmers such as the minimum support price program and the insurance market that protects farmers from price and yield uncertainty. However, the evaluation of the pros and cons of these programs are still at the preliminary levels. The policy research community should explore various programs and policies that ought to be in place during the transition from a protected market economy to an open economy. It is also important to explore the policy instruments and various timeframes in which they should be implemented and phased out.

Several methodological issues face policy researchers while addressing the impact of reforms and trade liberalization on the smallholder farmers. To take an example of India, three major policy concerns are relevant in the context of market reforms. First, the foodgrain stocks are at an unmanageable level of 74 million tons. Although export of foodgrains is increasing, the

procurement of foodgrains still remains an open-ended operation. Recent export subsidies have enabled the export of wheat by 3 million tons. But price is a poor instrument to manage the food economy. Increasing the purchasing power of the consumers is important in order to use the excess production for solving the problem of hunger. In spite of spending 3 billion rupees on food subsidies, the problem of hunger remains high in India.

The second major issue is the stabilization crisis in the foodgrain market. The minimum support price has risen in recent years, which is currently higher than the international market price. The only option to the producers is to sell to the Food Corporation of India at this level of prices. One way to reduce the impact of procurement and the large stocks on the fiscal budget is to encourage farmers to diversify their land. It may be cheaper to provide income support, perhaps 10,000 rupees per acre to farmers than to provide blanket minimum support price. By reducing the subsidies, saved resources can be invested in building rural infrastructure. Prices generally give inaccurate signals to the farmers. In spite of the increased minimum support price the total fact of productivity has been declining in several high potential areas. Furthermore, environmental degradation of the natural resource base has been increasing. Thus, it is important to revisit the minimum support price policy and explore diversification of agricultural lands away from foodgrains as a policy option for sustaining the food production systems.

Diet diversification is also important given the changes that are taking place in terms of taste and income. Food security should not be construed as cereal security. The role of processed foods in both rural and urban areas have to be explored that can provide opportunities for nonfarm income activities as well as processing of primary agricultural commodities.

The third issue that faces trade liberalization and market reforms is the fluctuations of food prices at the international level. The recent farm bill enacted in the US has implications for agricultural trade between developing countries and the US. How do we protect farmers from the fluctuations of international prices? Should we opt for a price band and use variable tariff in order to manage the food trade? What should be the anchor price? Should it be around equilibrium price or should it be the minimum support price? If it is the equilibrium price, what should be the equilibrium price and are there any other alternatives?

Farm and nonfarm sectors should play an important role in increasing the income of the farmers. It is better to operate with improving farm income than to play with the prices of farm commodities. The rate of growth of the rural nonfarm sector has actually declined during the 1990s. In other Asian countries such as Vietnam, the rural nonfarm systems are becoming extremely important in exporting agricultural commodities through contract systems. The gains are passed on to the farmers and the legal systems are in place. It is important to assess the lessons that we learn from these economies and use them in transforming rural South Asia. Changing income basket of the rural household can act as a stabilization mechanism in the event of price fluctuations. Finally, the status of malnutrition as an outcome measure of welfare should be taken seriously in the context of South Asia. South Asian countries face a high level of child malnutrition due to poor accessibility to adequate food, water, health, and sanitation. The impact of market reforms and trade liberalization should be evaluated in the context of such welfare measures.

## OPENING REMARKS

### Ashok Gulati

Ashok Gulati, Director of Markets and Structural Studies at IFPRI gave a presentation on IFPRI and its mandate. He elaborated on the major objective of the workshop which is to critically evaluate various methods that are available for evaluating the impact of market reforms and trade liberalization on the food economy of South Asian countries. Four different sets of issues and methods will be covered during this workshop. First, the issues of trade liberalization of the agricultural sector and its implication on the volatility of commodity prices. Second, market liberalization of the food sector and its implication for procurement and storage of food commodities. Third, the public distribution of foodgrains and targeting the households for increasing the accessibility of food. Fourth, the intrahousehold issues related to increasing food availability and protecting the vulnerable groups from the consequences of trade and market liberalization. Ashok Gulati also gave a presentation on how the South Asia Initiative is organized and provided an overview of the activities that have been implemented. The first meeting of the South Asia Initiative was held in January 2002 in New Delhi for India. The members of the Indian group of the Policy Analysis and Advisory Network of South Asia (PAANSA) came together in Delhi to discuss the policy priorities that are facing the food, agriculture, and natural resource sectors in India. The meeting provided a set of policy issues as priorities for enabling further reforms in the food and agricultural sector. Following this meeting the members of PAANSA from all of the South Asian countries came together in New Delhi in April 2002 to discuss the role of technology and trade in achieving food security in South Asia. Several issues, challenges, and constraints toward achieving food security in South Asia were discussed. The present methodological workshop is a followup to pull together researchers who are working on issues related to market reform and food security and discuss potential methods to conduct policy research in their respective countries.

Ashok Gulati welcomed the participants and suggested that the participants be open- minded and critical in evaluating various methods that are presented so that at the end of the workshop a clear set of methods could be agreed upon to initiate research studies.

## NATIONAL FOOD SECURITY POLICIES

### TRADE LIBERALIZATION: IMPLICATIONS FOR FOOD SELF-SUFFICIENCY, FOOD SECURITY, AND PRICE VOLATILITY

P.V. Srinivasan

Growing integration of the world economy and increasing trade liberalization has implications for domestic food policy. One implication is that food self-sufficiency may no longer be a necessary condition for achieving national food security. Another implication revolves around the government's role in providing food security and protection to consumers/producers, which may change because domestic markets are being exposed to international commodity price fluctuations. However, the instruments that are used to provide food and protect the various clients may be constrained because they need to be consistent with India's commitments under the multilateral trade Agreement on Agriculture (AoA).

Currently, the Central Government of India fixes minimum support prices (MSP) for major agricultural commodities in order to ensure remunerative prices to farmers and prevent distress sales by farmers. The MSP is linked to several factors, including production cost, which is estimated periodically by the Commission on Agricultural Costs & Prices (CACP). These prices are administered through public and cooperative marketing agencies. With the economy opening up to external markets, the role of domestic cost production in determining the MSP level is likely to decline while international prices are likely to increase its impact. However, aligning the domestic MSP with world prices poses several challenges, particularly, the high volatility of world prices. Adjustment costs are often much higher for small and marginal farmers, small-scale processors, and vulnerable consumers. Therefore, price stabilization policies that are implemented to assist in transition from an autarkic economy to an open economy need to be smooth as well as minimize adjustment costs. Cropping patterns would then adjust gradually to reflect the country's comparative advantage in a globalizing world.

Food policy in India has been guided mainly by the following three factors:

1. To reduce production instability as a result of weather fluctuations;
2. To distribute foodgrains from regions that have a surplus to deficit regions; and

3. To reduce the increasing dependence on imports.

In order to maintain steady growth in per capita food consumption in the face of fluctuating domestic supply, the government has played a major role through internal procurement of food foodgrains, canalized imports, and subsidized distribution of grain through fair price shops. A policy providing incentives to farmers to adopt improved technology, remunerative prices through price support, and investments in irrigation have gradually reduced dependence on imports.

The establishment of the World Trade Organization (WTO) has changed the scenario by increasing the emphasis given to rule-based trading, replacing quantitative restrictions with tariffs, and progressively reducing tariffs. Key issues that have emerged under this new situation are: How relevant is the objective of self-sufficiency? What happens to domestic price stability if world price volatility happens to be high? Will buffer stocks be effective in containing price volatility? What are the alternative instruments and how efficient are they?

Various models have been used to analyze government price stabilization policies (Newbery and Stiglitz, 1981). Models of alternative price stabilization mechanism, measurement of gains, assumptions, required data for various models as well as issues revolving around open and closed economies, net exporting and net importing countries, and almost self-sufficient countries are describe for each model that is presented

We assume that price stabilization is a desirable objective. Price stabilization can be either carried out by simple administrative rules as in a minimum support policy where a floor price is fixed by the government with a promise to buy any amount of grain from farmers at that price or alternative policy is to specify both the floor and ceiling price, which market prices are allowed to vary.

## The Models

### *Optimal storage rule (Dynamic programming approach)*

Under this approach, each year the government chooses the level of storage that will achieve its objective, i.e. to maximize the sum of present and expected future consumers' surplus (Gardner, 1979).

In its simplest form, the problem can be written as

$$V_t = \sum_{j=t}^T E_t \left[ \int_0^{A_j - S_j} P[q] dq - kS_j \right] / (1+r)^{j-t}$$

subject to  $S_j = 0$

When it is maximized with respect to  $S_t$ , the commodity available in period  $t$  is  $A_t = X_t + S_{t-1}$  where  $X_t$  is realized production in period  $t$  and  $S_{t-1}$  is stocks carried over from period  $t-1$  (Williams and Wright, 1991).

The approach has one major problem, which is the measure of consumer surplus is highly sensitive to the functional form of the demand function. Therefore, Pinckney (1988) uses a different objective function. He minimizes a weighted sum of three different items: government's costs of its buffer stock operation, imports, and squared deviations of market price from a normal-weather-year price.

This problem is stated as follows

$$GC = \sum_t [cost_t + a(P_t - P^*)^2 + bM_t] / (1+r)^{t-1}$$

Government costs ( $cost_t$ ) includes costs of storage and trade operations,  $M$  denotes imports,  $P$  the price, and  $P^*$  the target price. The state variables are opening stocks, realizations of world price, and domestic output. The control variables chosen to minimize the expression  $GC$  are net stock purchases, exports, and imports. This approach, a multiple attribute weighted utility function, allows us to analyze the trade-offs between different objectives by varying the weights and solving the problem.

### **Price band decision rule approach**

The main difference between the optimal storage rule and price band rule is that the former is determined endogenously by solving the optimization problem whereas in the latter the government sets the rules exogenously. A price band scheme attempts to limit domestic price variation by setting an upper and lower bound on the level of domestic prices. This boundary is either achieved through buffer stocks or varying tariff/ subsidy rates on imports/exports. When prices tend to fall below the lower bound, the net addition to government stocks is positive, and when price tends to exceed the upper bound, net addition to stocks is negative.

In a case of variable levy, when the international price falls below the lower band a tariff is levied to raise import price to the lower band level. Similarly, when international price exceeds the upper bound, subsidy payments are made to bring the import price down to the upper bound level.

In a closed economy, the price band can be based on production cost or market price corresponding to a normal-weather-year. In an open economy, domestic prices are linked to *international prices*. A *reference price* can be chosen e.g. as a five year moving average of past world prices. The upper and lower bounds of the price band are set as a certain percentage deviation from this reference price (Is this reference price suppose to represent the international price).

### **Analyzing price stabilization under trade liberalization**

The methodology developed for analyzing price stability under free trade should be capable of determining the magnitude and direction of trade endogenously. It should also be suitable to evaluate various alternatives that are potentially available to the government in stabilizing prices/ farmers' revenue. Price bands restrict this analysis, where domestic price levels are maintained between a floor and ceiling level, which is done alternatively either through buffer stocks or variable levies on imports/exports.

The suitability of any particular alternative depends on the trade status of the commodity and the consistency of the country as a net importer or net exporter (e.g India is likely to be consistently a net importer of edible oils). It is also important that the instruments used are consistent with the commitments made under the AOA. The AOA and general WTO provisions contain a number of options that a developing country may use to address their concerns regarding any adverse effect that a more open trade regime might have on domestic price stability. These options include the special safeguard clause of the AOA, variation of tariffs within set bounds, use of food security stocks, and use of risk management instruments.

### **Modeling Consumer, Producer, and Government Behavior**

#### *Demand*

The demand for the commodity in each period is specified by either a linear or log-linear function of price and income. Aggregate income is assumed constant and consumption demand non-stochastic. In the simulation exercises, income is given exogenously so that consumption demand is essentially a function of prices.

#### *Supply*

Farmers will only produce (supply) output at which the marginal expected revenue is equal to the marginal cost incurred. This decision process is captured by a supply function that relates production to expected future price, where producers are assumed to have rational price expectations. The expected price,  $[E_t(p_{t+1})]$ , used in the estimation of the supply equations is approximated by a one-year-ahead forecasts obtained from an ARIMA model fitted to the price series. This has been termed as 'quasi-rational expectations' approach (Marc Nerlove, year).

#### *Storage Agents*

Storage agents are assumed risk neutral and their inter-year storage decisions are based on rational price expectations. A Dynamic Programming Approach determines the amount stored by calculating the expected profit maximization from carryover of foodgrains. Optimal private storage thus satisfies the following arbitrage conditions:

$$p_t + k > (1+\rho)^{-1} E_t ( p_{t+1} ), S_t = 0$$

$$p_t + k = (1+\rho)^{-1} E_t ( p_{t+1} ), S_t > 0$$

where  $p_t$  is the current price,  $k$  the marginal storage cost (assumed constant),  $\rho$  the discount rate, and  $S$  the amount of private storage. These complementarity conditions imply that storage will be zero as long as the expected gain from holding an additional unit of grain stock falls short of the cost of holding it. Storage is positive, only when the expected gain exceeds or equals the cost. Competitive market conditions, however, ensure that profits are not positive. The basic storage model is a part of the larger model where prices and other endogenous variables are determined to clear the markets. Since it is a stochastic dynamic programming problem, the solution is not just one value for the carryover of stocks, but an equilibrium storage rule which expresses the relationship between storage and current availability of grain (harvest plus previous year's storage). It is generally impossible to analytically obtain the reduced form equation for this rule, and hence, numeric procedures are used.

### *Government*

The government is assumed to be keeping prices within a band consisting of a floor and a ceiling price. This analysis assumes that storage capacity is given. The use of buffer stocks implies that the government prevents price from falling below a floor level by buying grain from the market and adding to its stocks. If the price goes beyond the ceiling price, then the government sells grain in the market by depleting its stocks until the price is driven down to the ceiling level. The scenario where private external trade is restricted and trade takes place only through public agencies is referred to as the case of canalized trade. In this case, government agencies import foodgrains when price tends to go above the ceiling price and export foodgrains price tends to fall below the floor level. In the case where private external trade is permitted, variable trade levies (taxes/subsidies) can be used for the same purpose. Prices are prevented from going above the ceiling level by either subsidizing imports or taxing exports depending on the trade status. Similarly, prices are stopped from falling below the floor level by either taxing imports or subsidizing exports depending on whether net imports are positive or negative.

The implicit assumption behind the government's attempt to stabilize prices, irrespective of the method adopted, is that private agents store sub-optimal levels of grain due to market failures of different kinds. For example, certain positive externalities from increased price stability do not get reflected in the private agents' profits. These externalities include distributional and social benefits in the form of prevention of undernourishment among the poor and avoidance of national emergencies (famines, etc.). There can also be disincentives to adequate private storage such as government price controls that prevent the storage agents from reaping 'windfall' profits during extreme shortages. A detailed discussion of various possible reasons for sub-optimality of private storage is provided in Gardner (1979).

Trade-off between price stability and fiscal costs to government can be obtained by varying the width of the price band to achieve various degrees of price stability. Bigman, for example, generates trade-offs by varying the maximum capacity for storage.

### *External Trade*

A country can either be a regular importer, exporter, or mainly self-sufficient in a commodity. For example, during normal weather years with no crop failures, production levels of both rice and wheat are sufficient to meet domestic demand in India, thus, India is likely to be an irregular participant in world trade when trade is liberalized. However, in recent years, India has been a regular net importer of rice. For such cases, the direction of trade therefore needs to be determined endogenously.

Again for all countries and commodities, a small open economy is assumed; therefore, world prices are taken exogenous and are unaffected by the quantum of trade by the home country is not valid. In the case of rice, Indian exports are substantial compared to world rice trade, and therefore, would affect world prices since the world rice market is thin. The short-run elasticity of the world price with respect to increases in India's exports/ imports could either be estimated econometrically or obtained from simulations from multi-country trade models. For example, Jha and Srinivasan (1999) use the elasticity estimate for rice based on IFPRI's IMPACT model.

When private external trade is permitted, exporting occurs whenever domestic price  $p$  falls below the export trigger price  $p^x$ , which is obtained by deducting export margins (port charges, etc.) from the border price. Similarly, importing of goods occur if domestic price rises above the import trigger price  $p^m$ , which is obtained by adding import margins to border price. At the export trigger price, the trader is indifferent between selling the marginal unit in the domestic or world market. If the domestic price is lower than this level, then grain is sold in the world market. Similarly, at the import trigger price, the trader is indifferent between buying from domestic and international markets. If domestic price is higher than this level, then grain is imported.

### *Commodity Balance*

At equilibrium, the supply of grain in any period should meet the demand for grain in that period. The available supply in any period  $t$  is composed of production ( $y$ ) in that period plus carryover of private ( $PS_{t-1}$ ) and public ( $GS_{t-1}$ ) stocks from the previous period and imports ( $m$ ) of foodgrains from the rest of the world in that period. Total demand for grain in period  $t$  consists of consumption ( $c$ ), storage ( $PS_t + GS_t$ ), and exports ( $x$ ). Commodity balance therefore implies

$$y_t + PS_{t-1} + GS_{t-1} + m_t = c_t + PS_t + GS_t + x_t$$

Equilibrium prices and quantities are thus obtained by matching current availability with domestic consumption and storage demand (public and private) plus export demand.

### **Model Implementation**

In practice, there is no explicit price band specified by the government, but there are policies aimed at stabilizing prices. The choice of price bands in the model should be such that the magnitudes of prices and quantities that the model generates should be close to reality. Thus, the model needs to be tuned by a 'trial and error' process so that the outcomes including trade are close to actual values observed.

Equilibrium outcomes are computed for several different random realizations of domestic yields and world market prices. Given the estimated frequency distribution of different states of nature, random realizations are obtained using a random number generator. Planned or expected output

(supply equation) for the base period is obtained as a function of the price expected for that period. The realized production is obtained by adding the randomly generated deviation to the expected output. Similarly, given the trend value of the border price for the base year, the realized border price is obtained by applying the randomly realized percentage deviation from the trend value.

#### *Rational expectations equilibria*

Producers and private storage agents are said to have rational price expectations if their price forecasts are consistent with those underlying the given economic model. This implies that they use all available information efficiently in making decisions and do not make systematic errors. In our simulation model, no inherent growth or seasonality in either supply or demand for foodgrains is assumed. This assumption implies that in an infinite horizon setting, the relationship between storage  $PS_t$  and availability  $A_t$  of grain in that period is stationary. Once this relationship is derived, the relationships between availability and other endogenous variables are determined indirectly.

A numerical procedure is used to obtain the relationship between expected future price  $E_t(p_{t+1})$  and current storage  $PS_t$ , because the relation between  $A_t$  and  $PS_t$  is non-linear (kinked) whereas that between  $PS_t$  and  $E_t(p_{t+1})$  is smooth. The numerical procedure approximates this relationship by a polynomial, and then chooses parameters in such a way that storage agents' expectations are self-fulfilling ('rational') (Williams and Wright, 1991). The solution for competitive market equilibrium is obtained using a fixed-point sub-routine. The computational process is repeated several times for each of the model scenarios. The outcomes are compared based on the mean values and coefficients of variation generated from these Monte Carlo simulations.

#### *Determination of equilibrium prices*

Equilibrium prices and quantities are defined as those at which excess demands are zero or the equilibrium prices of the commodity balances, as defined in equation (7). Excess demands  $z_i$  ( $i =$  rice, wheat) are obtained as total demand (consumption + net exports + net addition to government stocks + net additions to private stocks) less production. Equilibrium prices are determined by solving for the fixed point of the following map for prices.

$$p_i \rightarrow \text{Min} \{ \text{Max} [(p_i + z_i), p_i], \bar{p}_i \} \quad (8)$$

where  $p_i$  and  $\bar{p}_i$  are respectively the lower and upper bounds on prices so that the fixed point of this map is in the interior. It can be seen easily that when  $z_i$  is zero we obtain a fixed point for the above map. Note that the price bounds above are different from the floor and ceiling prices of the government's price stabilization scheme,  $\bar{p}_i$  being much higher than the ceiling price and  $p_i$  being much lower than the floor price.

There are several steps needed to determine the components of the excess demand function. Given a random realization of the deviation  $\xi$  from expected or planned output  $\hat{y}$ , the realized output  $y$  is given as  $y = \hat{y} + \xi$  where expected output is a function of the expected price. Consumption demand,  $c$ , is obtained from the demand equations. Since income is given, consumption is essentially a function of prices alone. Private stock carry out is determined as a part of the implementation of the Rational Expectations Equilibrium. The mechanisms used to determine change in government stocks, amount of exports and imports, and variable levies are described below.

#### *Determination of changes in government stocks*

The magnitude of addition to or depletion of stocks is determined by an iterative procedure.

1. Set the additions to government stocks,  $\Delta GS^+ = 0$  and depletion from stocks,  $\Delta GS^- = 0$  [so that net additions to stocks,  $(\Delta GS^+ - \Delta GS^-) = 0$ ] and obtain a set of equilibrium prices using map (8).
2. Check if these prices are within the price bands (i.e. between the floor and ceiling prices). If any of the prices is greater than its respective ceiling price, then increment the corresponding  $\Delta GS^-$  by a small amount  $\delta^-$  (similarly, if any of the prices is lower than its respective floor price then increment  $\Delta GS^+$  by a small amount  $\delta^+$ ) and compute the equilibrium prices again.
3. Repeat step 2 until one of the following conditions hold: a) All the prices are within the relevant price bands, b) the stocks are exhausted for the relevant commodity (i.e. government stocks at the beginning of the period less  $\Delta GS^-$  is non-positive), c) the total storage capacity is exceeded (i.e. the sum total of government stocks at the beginning of the

period for both the commodities plus  $\Delta GS^+$  for both commodities exceeds the maximum combined storage capacity).

### **Determination of exports/imports under liberalized private trade**

Given the random realization of the percentage deviation  $\gamma$  from the trend value of the border price, the realized border price is given by  $p^b = p^{bo} (1 + \gamma/100)$ , where  $p^{bo}$  is the trend value for the base year. The discrete probability distribution used to generate these random deviations from trend values is given in Table 2. The import and export trigger prices  $\hat{p}_i^m$  and  $\hat{p}_i^x$  are obtained as:

$$\begin{aligned}\hat{p}_i^m &= p_i^b (1 + \text{import margins}) \\ \hat{p}_i^x &= p_i^b (1 - \text{export margins}).\end{aligned}$$

The quantities of exports and imports at equilibrium are determined by comparing the market price  $p$  with the export and import trigger prices. If  $p \leq \hat{p}^m$  then  $m = 0$ , otherwise  $m = (p - \beta_1)/\beta_2$ . Similarly, if  $p \geq \hat{p}^x$ , then  $x = 0$ , otherwise  $x = (p - \alpha_1)/\alpha_2$ .

### **Determination of variable levies**

In scenarios where variable levies/subsidies are used to keep prices within a price band, the equilibrium levels of these are determined using the following maps:

$$s_i \rightarrow \text{Max} \{ \text{Min} [(s_i + (p_i - p_i^{\text{high}})), \bar{s}_i], 0 \}$$

$$t_i \rightarrow \text{Max} \{ \text{Min} [(t_i + (p_i^{\text{low}} - p_i)), \bar{t}_i], 0 \}.$$

Where  $s$  denotes either import subsidy or export tax, depending on whether  $p > \hat{p}^m$  or  $p < \hat{p}^x$  and  $t$  denotes either import tax or export subsidy depending on whether  $p > \hat{p}^m$  or  $p < \hat{p}^x$ .

Equilibrium levels of trade levies and prices are determined simultaneously as fixed points of the maps defined in equation 10 and 8, respectively.  $\bar{s}_i$  and  $\bar{t}_i$  are chosen suitably high so that the equilibrium levels of  $s$  and  $t$  are below these levels. The effective trigger prices with levies are defined as follows.

$$\hat{p}^m = \hat{p}^m (1 + (t-s)/100)$$

$$\hat{p}^x = \hat{p}^x (1 + (t-s)/100)$$

Thus, when the equilibrium price,  $p$ , is not greater than  $\hat{p}^m$  and not lower than  $\hat{p}^x$  there is no trade and the levies are set to zero (note that  $\hat{p}^x < \hat{p}^m$ ). If  $p$  is greater than  $\hat{p}^m$ , then net tax on import of the concerned commodity is given as  $t^m = (t-s)/100$  and the tax exclusive import price is given as  $p/(1+t^m)$ . Similarly, if  $p$  is less than  $\hat{p}^x$ , net tax on export of the relevant commodity is given as  $t^x = (s-t)/100$  and the tax exclusive export price is given as  $p/(1-t^x)$ .

### Measures used to evaluate the stabilization policies

There are several measures used to evaluate stabilization policies. The measures are:

1. Level of food security: the probability that the quantity available for consumption by 'poor' consumers does not fall below 'subsistence' level.
2. Price variability: Coefficient of variation of food price.
3. Income security: Security of farmers' income measured by the probability that farmers' income does not fall below a critical level where their survival is threatened and the prospects for future production weakened.
4. Welfare measure: Sum of producer and consumer surpluses and government costs

### Calculation of surplus measures

Consumer surplus of a commodity is measured as the area under the inverse demand curve less the actual expenditure incurred on its consumption. If the inverse demand curve is given as  $p = a - bq$ , where  $p$  is the price and  $q$  the total quantity consumed,  $a$  and  $b$  being the parameters of the inverse demand equation, then the expression for consumer surplus will be

$$ax - bx^2/2 - px.$$

Producer surplus is measured as the revenue from the actual output less the area under the inverse supply curve. If  $q^*$  denotes the planned output and  $p^e$  the expected price, then the inverse supply curve is expressed as  $p^e = a + \beta q^*$ . The expression for producer surplus is then given as

$$pq - (aq^* + \beta(q^*)^2/2)$$

where  $p$  is the market price and  $q$  the realized output.

Surplus to private storage agents is obtained as the net profits realized from holding stocks for one period. The expression for this surplus is given as  $(p_t - p_{t-1})s_{t-1} - ks_{t-1}$ , where  $s_{t-1}$  denotes the stock carried from period  $t-1$  to period  $t$ ,  $k$  the unit storage cost, and  $p$  the market price.

Surplus to the government is taken to be the negative of the costs incurred by it.

### **Price band policies in practice**

#### *Policy functions*

In the discussion of the methodology above, we have seen how for a given price band the extent of stock release by government needed to defend the ceiling price is derived. Or, for example, the exact import tariff needed to defend the floor price. For administrative purposes, however, we may need the policy to be rule based. For example, Nicaragua, Guatemala implemented a price band mechanism for yellow corn, sorghum, rice, and soybeans in 1992. Similar to the price band practices of other countries in the region, these Governments calculate the price band from a time series built on international prices for the prior 60 months on a given product. The 15 highest and lowest prices are eliminated, with the remaining highs and lows establishing the price band. Imports entering with values within the defined band, are assessed a 20 percent tariff. Imports entering with prices above the band are assessed lower duties, according to a predetermined schedule; those imports priced below the band are assessed a higher tariff.

In order to facilitate the implementation of price band policies based on such rules policy functions can be derived from the simulation results. For example, the magnitude of government stocks that need to be depleted can be decided on the basis of the extent of shortfall in production from the 'desired' levels (i.e. the production level at which prices are not expected to exceed the ceiling price). Similarly, in the case of variable levies, the level of import tariff (subsidy) for

example can be fixed on the basis of the extent to which domestic production exceeds (falls short of) a 'desired' level. These policy functions can be derived by fitted a regression curve to the data generated from the random simulations using the price band model.

Storm (1999) used the following rule in his analysis of variable levies. If the target price is denoted by  $p^*$  and the variable levy by  $t$ , then  $t = (p^*/p)^2 - 1$  where  $|p^* - p| > d$ .  $2d$  being the width of the price band. This policy function is quadratic implying that as deviation from target price increases, variable levy is raised relatively more.

## DISCUSSION

### Comments on P. V. Srinivasan “Trade Liberalization: Implications for food self-sufficiency, food security and price volatility”

**Bharat Ramaswami**

The question is how stabilization policies can be analysed in the context of WTO. Under WTO, quantitative restrictions have to be replaced with tariffs. This means domestic prices will be affected by external shocks. Will this increase domestic price volatility? What does it imply for traditional instruments of stabilization such as buffer stocks? Do we need alternative instruments and what are they?

P. V. Srinivasan’s paper presents a numerical model that can be used to answer these questions. His model draws on the work done by Shikha Jha and himself. In the Indian context, the work is pioneering. Their model can potentially answer the several pressing issues in food and agricultural policy in a theoretically coherent and yet policy relevant manner. I therefore believe that there can be large payoffs from their investment. Their work is also a complex piece of modelling. I cannot claim that I understand every aspect of it. I will therefore restrict my comments to certain conceptual questions.

#### **The Model**

The model specification consists of 3 components: private agents, government and external trade.

There are three kinds of private agents: consumers, producers and storage agents. The behaviour of the first two agents is captured by demand and supply functions. It is much harder to model private storage in a tractable manner. Private storage is determined by no-arbitrage conditions between successive dates that extend indefinitely into the future. As these are also the conditions of a social planner’s problem, the optimal private storage can be solved by the solution to the social planner’s problem which in turn is solved by a dynamic programming approach. This approach yields optimal storage as a function of current availability.

Govt. behaviour is modeled by the choice of price bands and variable trade levies. External trade is specified by margins between cif and fob prices and by elasticities of world price to India's exports/imports.

The sources of volatility in this model are domestic yields (in supply) and world prices. Using a random number generator, *different realizations are obtained and the model is solved for each realization.*

### Questions

1. What's the relationship between expected prices of producers and expected prices of private storage agents? The former is obtained on the basis of extrapolating past data while the latter is forward looking and obtained by solving the functional equations of rational expectations equilibrium.
2. The rational expectations equilibrium yields private storage to be a function of availability. But should it also not depend on future government action? The paper suggests that first private storage is determined and then govt. stocks are determined depending on whether the equilibrium price (with zero govt. stocks) falls within or outside the price band. But private agents will take the govt. action into account in formulating their storage. In general, some private storage will be substituted by public storage. It would be interesting to investigate this relationship.
3. Related to above comment is the issue of speculative attacks which is an extreme form of reaction of private agents to anticipation of public stocks. The Williams and Wright model extends to these cases – so it would be interesting if the models by Jha and Srinivasan took this into account as well.
4. Speculative attacks do happen. For instance, in the last wheat marketing year, virtually all wheat was bought by the government because the private players withdrew from the market. Essentially, the level of price and the level of stocks with the govt. make it very risky for private players – the threat of future dumping by govt. The opposite case can also happen. If stock levels with the govt. are low enough, private players will buy most of the crop unless the govt. is

willing to pay a very high price. As a result, the relation between procurement price and procurement is non-linear. This model can be used to estimate such a relationship.

5. Because govt. storage substitutes private storage it is more costly and less effective than if private storage is absent. It would be valuable if Jha and Srinivasan provide insights on this issue.

6. In their investigation, Jha and Srinivasan (2001) conclude that liberalization decreases price volatility. Why does this happen. Before trade liberalization, volatility is a function of demand and supply shocks. After trade liberalization, in a large economy, volatility is a function of demand, supply and world price shocks. So it seems that the result must be driven by some kind of negative correlation between world price shocks and domestic shocks.

7. This leads to the following conjecture: for stabilization in a small open economy, storage is not necessary – variable levies are good enough. But in large open economy, variable levies by themselves are not sufficient for stabilization.

8. If markets are complete, private storage is optimal and there are no gains from public storage. Public storage is over and above this – its justification must lie in the fact that markets are incomplete. In particular, if risk markets are absent, there are gains from risk reduction which could be included in the cost-benefit calculations.

9. In this model, all volatility is exogenous – domestic yields and world prices. This is an idealised situation. Forecasting errors is an important source of endogenous uncertainty. The rational expectations assumption is very strong as it requires an individual producer to forecast the actions of all others – but in our markets coordination problems are rampant as a result of which backward looking expectations can be sustained (Ramaswami, RDE, 2000). Coordination problems could be more acute with global markets. What are the appropriate market institutions to deal with these uncertainties?

## **Concluding Remarks**

The work presented by Srinivasan has lot of potential. Here I have posed several questions which could be answered by the model of Jha and Srinivasan. Let me also take the liberty of suggesting some extensions. It might be useful to make the distinction between annual and seasonal storage. Typically, private storage is more active in seasonal storage and there is a stronger case of public involvement in annual storage. Second, it might also be useful to consider the case of rice and wheat separately (even though the overall framework can continue to be multi-market). The reason is that in external markets, India is placed differently with respect to rice and wheat and for that reason, the optimal instruments might differ between these commodities.

## **OPEN DISCUSSION**

Following the presentation by Bharat Ramaswamy the participants of the workshop raised several issues during the open discussion. Dr. Jaim, of Bangladesh shared the experiences of Bangladesh and its involvement in foodgrain marketing. He emphasized the need to open grain marketing to the private sector and the importance of the private sector in solving short-term food crises. The cost of public storage of foodgrains in Bangladesh has been very high during the 1980s and in the 1990s, which has resulted in opening of the markets for private traders. A clear example of the benefit of private traders was the prevention of famine conditions in Bangladesh during the floods of 1998 when a majority of the crop failed. The role of the private traders in bringing in food from India proved that encouraging private traders in foodgrain marketing will enable the governments to meet the food shortages with high efficiency.

Bishwamber Pyakural said that about of 20 percent of the development districts in Nepal have been identified as food deficit districts in any particular year. Due to the Maoist insurgency in Nepal these districts have to be supplied with subsidized food to protect the vulnerable groups and the consumers. Thus, food subsidy will remain for some time in Nepal even if the markets are liberalized.

Ramesh Chand intervened and said that it is important to recommend a new kind of mechanism for dealing with price fluctuations. Variable tariff and the price band alone may not be enough to protect the farmers and consumers.

Mahendra Dev said that there is a need to demonstrate how trade liberalization leads to reduced price volatility in the domestic markets. This will convince the policymakers to take trade liberalization as a serious policy intervention as part of the economic reforms.

Manoj Panda suggested that income and price stability measures must go together in protecting the farmers and the consumers. We need to examine the relative prices of food commodities in studying the impact of trade liberalization.

P. V. Srinivasan in his reply said that in analyzing the price fluctuations it is not only important to use the data on past price fluctuations but incorporating projections of future fluctuations is important. Due to trade liberalization, farmers who are producing commodities that can be imported face a risky business opportunity; however, if the supply of an agricultural commodity is inelastic, price stability will lead to income stability. Direct payments to farmers would be better if the correct type of farmers are identified. However, in the South Asian context it may be difficult to identify the farmers and provide income support due to heterogeneity of the farmers. It is important to understand the implications of trade liberalization in the event that there is no intervention. This will be treated as a benchmark scenario in the analysis of price fluctuations. The research will also shed light on why it is important to trade processed agricultural commodities. It is important to understand the need for developing processing industries and the role they play in adjusting the impact of price fluctuations of raw agricultural commodities.

## **SECTOR-WIDE LAND POLICIES OF FOOD SECURITY**

### **METHODOLOGIES FOR PRICE STABILIZATION: FOOD STOCKS AND PRIVATE FOOD TRADE**

**Shikha Jha**

Food price instability affects both producers and consumers. Producers and consumers desire food price stabilization because it affects their welfare (Newbery and Stiglitz, 1981). To hedge against variations in their incomes and prices, producers can use futures and forward contracts, and consumers can borrow or lend money or store goods to their smooth their consumption. However, these inter-temporal smoothing strategies may not work in the absence of well-developed credit and capital markets. It is thus observed that many governments follow policies to stabilize domestic grain prices using various methods, with the most popular method being buffer stocks.

An implicit assumption behind the government's attempt to hold buffer stocks as a means to stabilize prices is that private agents store sub-optimal levels of grain due to different types of market failures. For example, increased price stability generates positive externalities, but not all of these externalities such as distributional and social benefits in preventing undernourishment among the poor and the avoidance of national emergencies (famines, etc.) are reflected in the private agents' profits. There can also be disincentives such as sub-optimality of private storage (Gardner, 1979). For example, government price controls can prevent storage agents from reaping 'windfall' profits during extreme shortages. Therefore, government intervention for price stabilization is desirable for either satisfying redistributive objectives or restoring efficiency due to breakdown of the conditions. An alternative to the government's direct intervention in stabilizing process is to subsidize private storage (Jha and Srinivasan, 1997).

Food policy normally serves two objectives: to smooth foodgrain supplies over time by implementing stock policies and to improve access to foodgrains across regions or within regions by procuring foodgrains from surplus areas and supplying foodgrains to deficit areas. Price stabilisation with narrow price bands or pan-seasonal and pan-territorial pricing reduces the incentives of private sector operators for inter-temporal storage and spatial arbitrage activities

argued Smith (1997). Similarly, Balakrishnan and Ramaswami (1993) showed that when government prevents prices from becoming excessively high by resorting to imports, the speculative expectations of private traders remain stable. Despite such studies, little is known about the reaction of foodgrain markets to public price stabilisation policy. Indeed, many supporters of public buffer stocks seem to ignore the very existence of private storage, which does not necessarily destabilize prices. On the contrary, to take advantage of arbitrage benefits, private agents buy foodgrains at low prices in peak season or from surplus areas, thereby, lifting up the prices. Then they sell them when prices are high during the lean season or in deficit areas, thereby, bringing down the high prices. Thus, they play a stabilizing role while pursuing their own goals of profit maximisation.<sup>1</sup> This is a crucial factor in determining the food policy choices for governments.

There is a general consensus that stabilizing foodgrain prices is desirable, but what method should be used to stabilize prices. To better grasp the benefits and costs of the various methods, this presentation reviewed various method that analyse policies relating to food stocks for price stabilisation and inter-regional trade within a country. First, the background to the roles of public and private food operations is explored. Then methods for analysing cases of inter-temporal price stabilisation through stockholding policies are reviewed. In particular, alternative models to government's buffer stock policy in the presence of private storage and their inter-linkages are examined. Then methods for regional price stabilisation through domestic trade are investigated.

### **Background to Public and Private Food Operations**

Governments in many countries undertake food inventory and trade operations to stabilize domestic prices over time and across regions. Under price support programs, public agencies buy surplus food from producers/ suppliers at the announced price in order to support the price. This approach serves several objectives:

1. Market prices are maintained at the legislated support level through the holding of stocks;
2. Producers are supported through price support programs

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<sup>1</sup> Of course, spatial private trade can reduce price differentials across regions only if these differentials are higher than transport costs.

3. Hunger relief is provided through subsidised public distribution programs such as mid-day school schemes, food for work programs, schemes for nursing mothers, etc.; and
4. Part of the stored commodities is returned to private trade channels.

Different types of food can be stored, processed, or manufactured into foods and feeds. However, during this process, the food can be contaminated or quality loss due to many factors such as insects, mites, fungi, toxins, rodents, and allergens. Given the complexity of the food chain, it requires a combination of skills and expertise in a range of areas such as milling, processing, baking, and retailing. Moreover, specialists need to be able to identify likely problems and devise practical and cost-effective solutions through detection and monitoring, analysis, physical and chemical controls, and general food chain expertise. Not all of these skills may be available with the public sector agencies and some of them may not even be desirable if their costs are prohibitive. It is for such reasons that the private sector often works more efficiently and at lower costs.

Presence of the government in food storage and trading activities is a common phenomenon in many countries in Asia and Africa (Drèze and Sen, 1993; Gulati et al, 1996). There may be a genuine case for such government intervention under market failure such as famines, limited private opportunities to exploit spatial arbitrage, and distributional consideration (Ravallion, 1987). Private trade will iron out spatial price differentials over time, but markets may take much longer than usual to do so during a famine.<sup>2</sup> While public intervention in such cases may be justified, in general, it is based on various beliefs. It is often believed that speculative activities by private operators can be destabilising due to lack of knowledge about future prices and that the government can control such manipulative practices by actively participating in storage and trading activities, which will allay fears of future scarcity. There is also a fear that private traders follow collusive practices and the legal restrictions to counteract them may not succeed. In line with such arguments, several interventions including storage and movement controls may be used in foodgrain markets.<sup>3</sup> There is, however, no unanimity on this line of

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<sup>2</sup> Under normal circumstances, slow response of trade to local shortages could be attributed to constraints imposed by long-term contracts devised to avoid risk.

<sup>3</sup> For example, in India this is done through policies such as the Essential Commodities Act and *zoning* that prohibits private trade in food foodgrains across broad zones. With a recent initiative taken by the central government, the

reasoning. Drèze (1990) argues that “there is little evidence that food markets in India easily lend themselves to collusion and manipulation. ... If anything, zoning is likely to facilitate such (collusive) practices”. Drèze and Sen (1993) gives a clear warning against falling into the trap of treating private traders as only being speculative hoarders in the quote “in most countries of Africa and Asia the ‘traders’ are not all portly merchants sitting on heaps of grain, but also include millions of poor buyers and sellers (many of them women) who are willing to travel long distances, on foot if necessary, in order to transact food at more advantageous prices”. They cite examples where people travel as far as 60 kilometres from drought zones to carry back as much as 50 kg of foodgrains during the Ethiopian famine of 1984.

## Methods of Price Stabilisation

### *Formation of Price Expectations*

Since the basic premise behind price stabilisation is that prices are uncertain, how do farmers and traders form price expectations? The types of expectation formation used in analysis of price stabilization are given in Box 1.

Box 1. Alternative forms of Expectation Formation

<i>Rational expectations</i>	Producers expect the mean price	$E(p_t) = p^*$
<i>Perfect foresight</i>	Expected price equals actual spot price	$E(p_t) = p_t$
<i>Adaptively rational expectations</i>	Next year's price predicted on the basis of past prices	$E(p_t) = \{\sum_{j=1, n} (p_{t-j})\} / n$
<i>Adaptive expectations</i>	Expected price partially updated with new realised price	$E(p_{t+1}) - E(p_t) = ? \{p_t - E(p_t)\}$ with the speed of adjustment: $0 < ? \leq 1$
<i>Static expectations</i>	This year's price is expected next year	$E(p_t) = p_{t-1}$

Price stabilisation can be carried out either through price band policies or an optimal choice of policy variables. In the former, the government is interested in maintaining food prices within a floor and ceiling price, and public storage is determined simply by an *administrative rule*. An optimization exercise is superior to a price band policy in the sense that it minimizes a well-

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state governments are expected to introduce appropriate laws to remove restrictions to enable farmers and companies to jointly promote both domestic and foreign trade.

defined objective function such as price *variability* (rather than price *levels*) or government costs or maximizes welfare or growth taking into account all the constraints in the system. By design optimal policies cost fiscally less than price band policies.

### *Perfect Price Stabilisation*

Assume that demand  $x$  depends on current price  $p_t$  and supply  $y$  depends on expected price. Further, assume rational expectations, which is when the price expected by producers equals the mean (or long-run) equilibrium price  $p^*$ . Consider linear equations for simplicity.

$$x = c - d p_t$$

$$y = a + b p^* + u_t$$

where  $p_t$  is the short run equilibrium price and  $p^*$  is the long-run average market clearing price at which the government buys and sells grain and is also the target price for perfect price stabilisation.  $u_t$  is the stochastic disturbance in supply which is symmetrically distributed with mean zero and variance  $\sigma^2$ .

In the absence of price stabilisation, market clearing equilibrium price is determined by equating  $x$  and  $y$ .

$$a + b p^* + u_t = c - d p_t$$

or,

$$p_t = \frac{c-a}{d} - \frac{b}{d} p^* - \frac{u_t}{d} = p^* - \frac{u_t}{d}$$

Is the 2<sup>nd</sup> half of the previous equation correct? Shouldn't it be

or,

$$E(p_t) = p^*$$

Since the disturbance term captures the difference between the current and the target prices, perfect price stabilisation implies that the government storage should buffer any random disturbance in supply by buying and selling the commodity at the target price. The buffer stock will be self-liquidating in the long run as its expected value will be zero. This is illustrated in Figure 1. When the supply is  $q_1$  and price  $p_1 > p^*$  the government depletes its stock and sells  $q^* - q_1$  to bring the price down to the target level  $p^*$ . Similarly it buys and stocks  $q_2 - q^*$  to meet

the target when market price falls to  $p_2$  at supply  $q_2$ . In the presence of private storage, this exercise can be extended by considering total demand to be consumption plus storage demand. For the effects that private storage can have on public storage, see among others Newbery and Stiglitz (1981, Chapter 14).

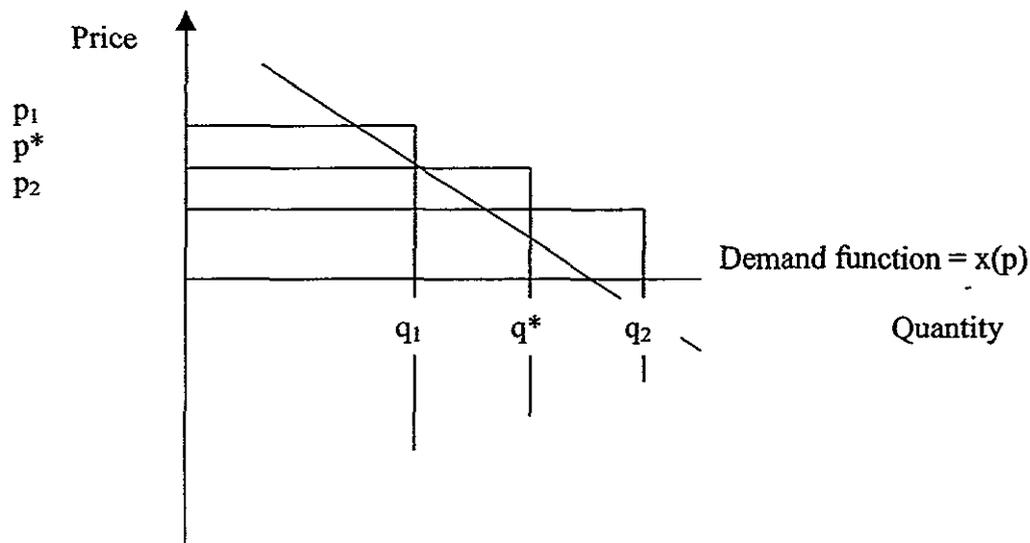


Figure 1

### Partial Price Stabilisation with Price Band Policy

The case of perfect price stabilisation is ideal, as it requires prices to be completely stabilised. This is possible if the government can store or release from storage as much of food foodgrains as is necessary to offset *any* random fluctuations in supply, which means it should have large (theoretically infinite) storage space. In practice therefore governments follow only partial stabilisation of prices. In its simplest form, this is done by stabilising prices within a specified price band ( $p, \bar{p}$ ) around some specified target price (e.g., long run equilibrium price). In other words, prices are allowed to fluctuate freely within this range so that  $p \leq p_t \leq \bar{p}$ . The limits  $p$  and  $\bar{p}$  are also known as trigger prices, i.e., the price at which storage policy is activated. See Figure 2 for an illustration. When price falls below  $p$  to, say  $p_2$  with supply at  $q_2$ , the government buys and stocks the amount  $q_2 - q$  so that the price rises up to the lower price limit of  $p$ . And when it rises above  $\bar{p}$  with market price  $p_1$  with supply at  $q_1$ , it depletes the stock by  $\bar{q} - q_1$  and sells this quantity in the market to bring the price down to  $\bar{p}$ . If the government can correctly predict the mean price  $p^*$ , then the consumption demand function will intersect the consumption plus storage demand function at this price because at  $p^*$  the demand for storage is zero. The equilibrium is now defined by equating total demand (consumption  $x$  plus net addition to public stocks, ? sg) to supply.

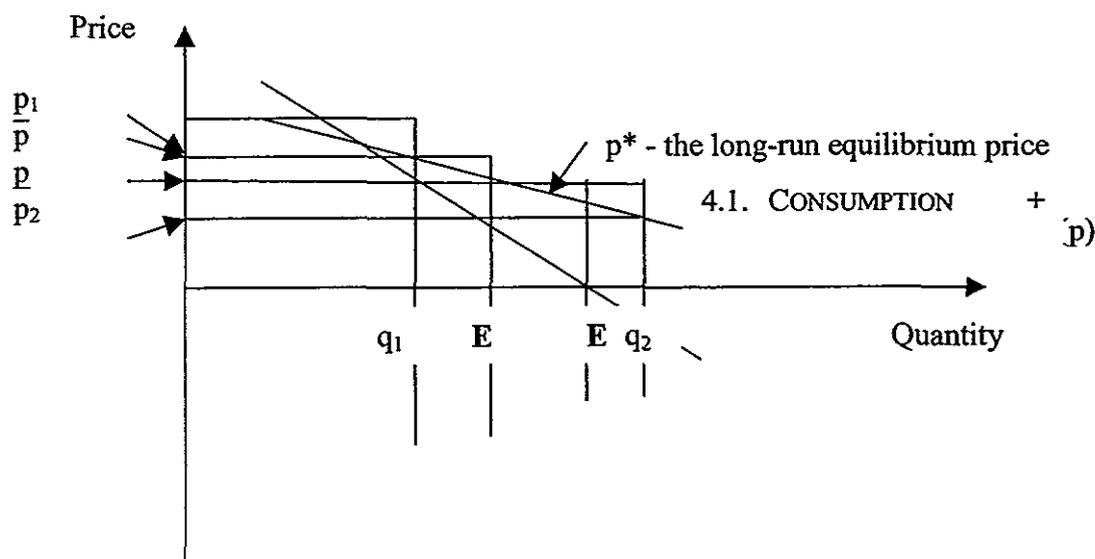


Figure 2

For the purpose of computations, in the single commodity case it is easy to compute the quantities corresponding to the upper and lower ends of the price band using the demand curve. The difference between the actual availability of grain and these computed quantities is then treated as net additions to stocks or net imports. In the multi commodity case we have to work with the price bands directly since the quantities corresponding to the price band for a particular commodity depend on the prices of other commodities also.

Availability of foodgrains in any period  $t$  is taken as the realized production in period  $t$  plus the private and government stocks carried over from the preceding period  $t-1$  less the minimum levels of stocks held for convenience by the government agencies in each period. Given the availability of different foodgrains for the initial period and their estimated demand equations, the equilibrium prices and private storage levels are computed simultaneously, using a fixed point algorithm, taking into account the interdependence between private storage and market prices. The fixed point of the specified price mapping is the equilibrium price. This price will be equal to the floor price when the excess demand at this price is negative and similarly it will be equal to the ceiling price when the excess demand at the ceiling price is positive. Markets clear at the equilibrium price (that is total demand including the net storage demand by the government is equal to the total supply net of private storage). Since private storage is a function of current equilibrium prices as well as future expected prices, the private storage levels of foodgrains are endogenously determined simultaneously along with the equilibrium prices. Such calculations are

repeated for several sequences of rainfall indices to obtain the equilibrium prices and the corresponding government and private stocks and other variables over time.

### *Optimal Price Stabilisation*

Price band rules require exogenously specifying price bands, which can be arbitrary though administratively simpler. A more ideal alternative is optimal price stabilisation. It can be shown theoretically that if agents are risk-neutral and hold rational expectations, then competitive equilibrium will be Pareto efficient (see Glossary). This means that under conditions, which ensure Pareto efficiency, the optimal price stabilization rule is to reproduce the storage levels obtained from competitive, speculative storage equilibrium. This implies that public storage will supplement private storage on a one-to-one basis. See Newbery and Stiglitz (1981, 1982) for a survey of such results. In the case of simplistic models dealing with a single commodity, analytical results are easy to obtain. Use of stochastic simulation models is required to study stabilization policies in more realistic models dealing with multiple commodities.

In an early study of the Indian wheat economy, Krishna and Chibber (1983) carried out an optimisation exercise to obtain optimal levels of wheat procurement and storage over a period of 15 years. For this purpose, they estimated an econometric model and used it to obtain projections of demand and supply and also the prices for future periods. Their objective was to minimise the cost of trading and buffer stocking-cum-distribution in a dynamic programming framework. An important limitation of this study was that the interaction of wheat with other foodgrain markets both on the demand and supply sides was completely ignored. Also, by definition of consumption, private stocks were assumed away.

Among studies that followed, Pinckney (1988, 1989) and Pinckney and Valdés (1988) obtained optimal policies to satisfy various combinations of objectives such as price stabilisation, (fiscal) cost minimisation and import minimisation. Through simulations, they generated trade-offs between these objectives for Kenya and Pakistan. These studies used an equilibrium framework where prices clear markets as opposed to the econometric model used previously by Krishna and Chibber (1983). Pinckney (1989) introduced private stocks into his earlier model. But again, all these studies dealt with a single grain market thereby ignoring the interactions with other (grain) markets. It is important to consider different commodities simultaneously since this captures the spread of risk spread and can reduce costs of operation.

Goletti et al (1991) incorporated interconnected markets for two foodgrains in Bangladesh to obtain the optimal mix of trade and buffer stocks of these goods for price stabilisation and cost minimisation. Their model is based on econometrically estimated equilibrium price equations, which are derived under the assumption that private storage takes place under rational expectations of prices. However, their model has certain limitations. For example, they assume that public storage capacity is separately given for each of the foodgrains. This does not allow an optimal mix of the foodgrains to be stocked with a given *total* capacity. Also this means that the mix can not change from year to year in the best possible way. Goloetti et al also specify an import demand function to determine the amount of imports at every time point. Such an assumption constrains the choice of an optimal mix of procurement, imports, free market purchases and depletion of stocks by the government to stabilise prices at the least cost of these operations. These limitations can be overcome by appropriately specifying the model in a multimarket equilibrium framework.

A model for optimal price stabilisation through public storage should take into account 1) consumption patterns given by the aggregate demand equations for foodgrains, 2) supply response to prices of individual foodgrains as depicted by the aggregate supply equations and 3) private storage activity. Buffer stocking should be treated as an integral part of the government's foodgrain policy.

### *Private Storage*

The main costs for private storage agents are those incurred in physical holding of stocks (handling costs, rental value of storage space, etc.) and the foregone interest earnings on the funds invested in them. Thus, subsidy can be administered directly on the per unit storage cost or through a subsidy on interest rate. We consider the former type of subsidy in our simulations.

Private storage agents can be assumed to maximise the present value of returns from sale of their stocks ( $sp_t$ ) in the future period less their current expenses on storage and purchase of stocks and the opportunity cost of holding stocks.

Let  $c(sp_t)$  = cost of storage services  
 $p_t sp_t$  the cost of purchase of  $sp_t$  at price  $p_t$   
 $r$  = rate of interest

Then  $r\{c(sp_t) + p_t sp_t\}$  = opportunity cost of capital tied up in storage activity

$$\Rightarrow \{c(sp_t) + p_t sp_t\} (1+r) = \text{total cost of storing } sp_t \text{ from period } t \text{ to period } t+1$$

$p_{t+1} sp_t$  = expected revenue from selling  $sp_t$  in period  $t+1$

The private storage agent's problem is to choose  $sp_t$  to maximize expected profit, i.e.,

$$\text{Max}_{sp_t} sp_t E(p_{t+1}) - [c(sp_t) + p_t sp_t] (1+r)$$

where  $E(p_{t+1})$  is the expected price.

Assuming a constant marginal cost,  $c'(sp_t) = k$ , the first order conditions for this problem are given as

$$p_t + k > (1+r)^{-1} E_t(p_{t+1}), S_t = 0 \quad (1a)$$

$$p_t + k = (1+r)^{-1} E_t(p_{t+1}), S_t > 0 \quad (1b)$$

Thus when  $sp_t > 0$ , it's value is obtained from solving the equation

$$c'(sp_t) = \frac{p_{t+1}^e}{1+r} - p_t \quad (2)$$

Assuming a fixed marginal storage cost, i.e.,  $c'(sp_t) = k_t$ , the private arbitrage conditions become

$$sp_t (p_t + k_t - \beta p_{t+1}) = 0 \quad (3a)$$

$$\text{and } p_t + k_t \geq \beta p_{t+1} \quad (3b)$$

where  $\beta = 1/(1+r)$  is the discount factor.

These complementarity conditions imply that storage will be zero so long as the expected gain from holding an additional unit of grain stock falls short of the cost of holding it. Storage is positive only when the expected gain exceeds or equals the cost. Competitive market conditions, however, ensure that profits are not positive.

The basic storage model is a part of the larger model where prices and other endogenous variables are determined to clear the markets. Since it is a stochastic dynamic programming problem the solution is not just one value for the carryover of stocks but an equilibrium storage rule which expresses the relationship between storage and current availability of grain (harvest plus previous year's storage). It is generally impossible to analytically obtain the reduced form equation for this rule and hence numerical procedures are used.

### *Public Storage*

In order to choose the optimal level of its buffer stocks, the government can be assumed to minimize price variability defined as the sum of squared deviation of free market price from target price for all goods summed over all the periods. This is done subject to commodity balances, private arbitrage conditions, constraint on public storage capacity and discounted annual public cost constraint. The cost constraint implies that the discounted annual public cost does not exceed an exogenously specified bound. Depending on the context of the specific country, public cost can consist of, *inter-alia*, cost of procurement, distribution, storage and net imports less revenue from sale of cereals in ration shops and free market. The choice variable is net addition to public stocks (and, in the presence of trade, exports and imports, if all trade in foodgrains is carried out by the government). See Gardner (1979, Chapter 5), Williams and Wright (1991, Chapters 2 and 3) and Figure 3 for optimal storage rules.

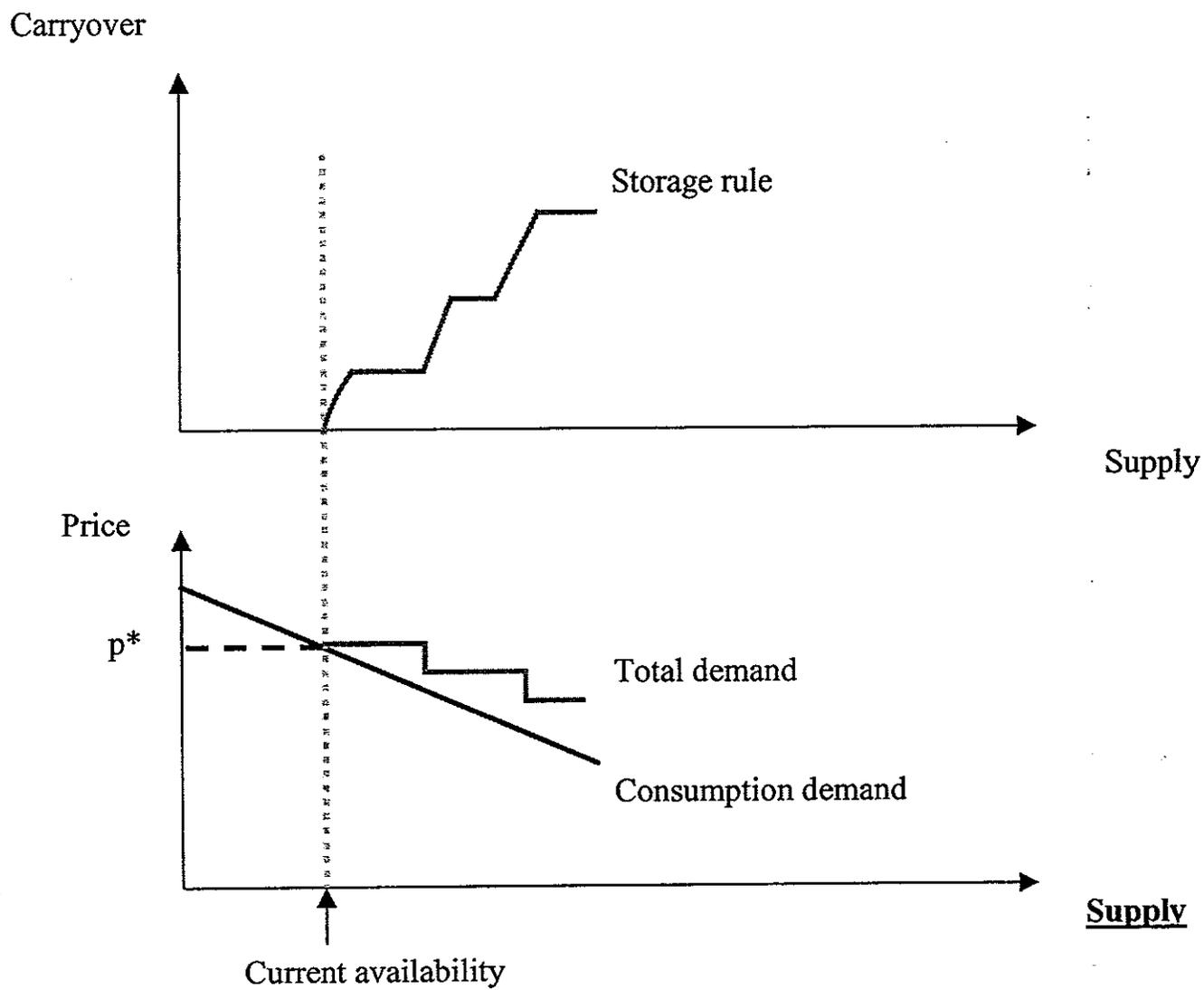


Figure 3

The model can be run and results obtained for different simulations of rainfall or other production uncertainty parameters. Alternative scenarios can be used to generate simple policy rules for government storage similar to 'approximate feedback rules' as in Goletti et al (1991). That is, the data generated from the solution values can be used to estimate regression equations with government storage as a function of domestic output, prices, etc. In other words, these equations give control/ policy variables as implementable continuous functions of certain state variables, called the *optimal policy functions*. These can be used to choose optimal policies corresponding to observed values of exogenous variables such as outputs, prices and other relevant variables. Use of such optimal choice functions would stabilise domestic foodgrains prices at the least cost to the government.

### *Single-Market Model*

Assuming no public stocks, to begin with, total supply or availability ( $Y$ ) is given by the sum of production ( $y_t$ ) and opening or carry-in of private and public stocks ( $sp_t$  and  $sg_t$ ).

$$Y_t = y_t + sp_t + sg_t$$

This supply is used for consumption ( $x_t$ ) and net additions to private and public stocks,  $\Delta sp_t$  and  $\Delta sg_t$  respectively

$$Y_t = x_t + \Delta sp_t + \Delta sg_t$$

where  $x_t$  is a function of current price  $p_t$ ,  $\Delta sp_t = sp_{t+1} - sp_t$  and  $\Delta sg_t = sg_{t+1} - sg_t$  with  $sp_{t+1}$  and  $sg_{t+1}$  being their respective stock carry-outs.

The fiscal cost of price stabilisation  $C_t$  is a function of opening stocks and, as the case may be, imports, exports, procurement, distribution and domestic and world prices.

Price variability is a function of the domestic market and target prices and this is what the government minimises.

$$\text{Min}_{\{E_t, M_t, \Delta sg_t\}} \sum_{t=1}^T (p_t - p_t^*)^2$$

subject to:

- (a) market clearing conditions  $Y_t - x_t - \theta sp_t - \theta sg_t = 0$
- (b) private arbitrage conditions  $p_t + k > (1+r)^{-1} E_t(p_{t+1}), S_t = 0$   
 $p_t + k = (1+r)^{-1} E_t(p_{t+1}), S_t > 0$
- (c) public storage capacity  $sg_t \leq CAP_t$
- (d) discounted annual cost constraint  $\sum_t \{C_t / (1+d)^{t-1}\} / T \leq C$

where  $d$  is the discount factor and  $CAP_t$  the public storage capacity constraint.

Once the model is solved, the fiscal cost  $C_t$  can be calculated. Similarly benefits to consumers, producers and private storage agents can be computed. For applications of such models to country case studies see, e.g., Pinckney (1988) and Ghosh et al (1987).

### Market Integration, Zone Restrictions and Spatial Price Movements

It is well known that market equilibrium under competitive conditions is Pareto efficient. This result extends to spatial market equilibrium when regional trade takes place at fixed transport costs. Such equilibrium is characterised by a single price; i.e., the price in the importing market equals that in the exporting market plus transport costs. If this happens, the markets are said to be spatially integrated. The policy of getting prices right will fail when foreign trade is liberalised but domestic markets are not integrated. Farmers in these circumstances will not be able to specialise according to comparative advantage, as correct price signals will not reach them, and thus not realise the gains from trade. In other words, market integration is a necessary condition for an efficient allocation of resources.

Let us denote the price in time period  $t$  in market 1 by  $p_{1t}$  and in market 2 by  $p_{2t}$ . Let  $c_t$  denote the unit transport cost between the two markets.

Definition:

Spatial market integration:  $|p_{1t} - p_{2t}| \geq c_t$

Case-I:  $p_{1t} = p_{2t} + c_t$  Law of One Price (LOP)

In this case, there is no incentive to trade. That is, even if markets are integrated, trade may not take place when transport costs are sufficiently high to equal the difference between the two prices.

Case II:  $|p_{1t} - p_{2t}| > c_t$

In this case, arbitrage occurs and there is incentive to trade. That is, trade may be discontinuous depending on the size of transport costs.

Measurement of spatial price linkages between regional commodity markets has been a much-studied subject. Various approaches are used to analyze historical data using econometric time series techniques to examine if markets are integrated. The simplest method is to consider *correlation of price series in different markets to see if prices move together in different markets*. More advanced approaches use cointegration techniques with single-equation models to examine pair-wise price relationships across local/ regional markets and to obtain the direction of causality between markets. Another method is to use error correction models to see if contemporaneous price in one market is related to its past prices and to contemporaneous and past prices in other markets, one at a time. These methods can be summarised as follows.

### **Econometric methods to test for market integration**

#### *Test of market integration (LOP) in period t*

In this approach, market integration is assumed to mean interdependence of price changes in different markets. Taking first differences in prices would remove trends that lead to spurious correlations.

$$\Delta p_{1t} = \beta_1 + \beta_2 \Delta p_{2t} + u_t \quad t = 1, \dots, n$$

where  $\beta_1$  and  $\beta_2$  are parameters,  $\Delta$  depicts the first differences, e.g.,  $\Delta p_{1t} = p_{1t} - p_{1t-1}$ , and  $u_t$  is the error term

To test for LOP, the hypothesis  $H_0: \beta_1 = 0, \beta_2 = 1$  is tested. LOP holds if  $H_0$  is not rejected. If  $\beta_2 = 1$ , i.e., if price changes are the same in the two markets, then perfect market integration is said to occur.

### *Test of long-run spatial market integration (co-integration approach)*

Presence of cointegration implies strong market interdependence and its absence market segmentation.

$$p_{1t} = \beta_1 + \beta_2 p_{2t} + u_t \quad t = 1, \dots, n$$

To test for long-run integration, the stationarity of the residuals  $u_t$  is tested. Using such methods, analysis of market integration are carried out by, among others, Ravallion (1987) and Dawson and Dey (2002) for Bangladesh and Minot and Goletti (2000) for Vietnam. The general finding in these studies is that markets are moderately integrated due to restricted food grain movement. Such findings about market integration can help to analyse its impacts on food security, price stability, welfare of consumers and producers in different regions, agricultural growth, crop-mix and resource use efficiency in agriculture.

### **Zone Restrictions and Spatial Market Equilibrium**

Government food policies are aimed at price support to farmers and food subsidy to consumers. In order to achieve these goals governments often place various restrictions on private trade, which have not proved to be very effective in meeting the objectives. The controls or restrictions on private sector activities to curb "speculative" hoarding and trade result in distorted inter-regional and inter-temporal prices and market disintegration. If restrictions on private movement and trade through imposition of trading zones for agricultural outputs hinder markets from functioning, the suggested policy action would be to decrease or abolish existing controls and allow private participation in distribution and marketing. Greater role for markets and private trade/ storage can be attained if the governments discontinue their policy of pan seasonal/ pan territorial pricing and other controls. It is also of interest to empirically obtain the magnitude of efficiency gains that are likely to accrue from deregulation. Towards this end, one needs to know the appropriate methodology to assess the performance of private trade.

Economists, operations researchers and geographers have been intrigued for years by the problem of interregional commodity movements and their regional prices. Among the earliest methodologies developed to find out the equilibrium in such a set up was by Cournot (1838) who showed how equilibrium prices depended on transport costs for trading between New York and

Paris. More than a century later, Samuelson (1952) formulated the problem of spatial price equilibrium in a non-linear optimisation framework. Since then the theory has developed substantially and is applied to real-life cases of various countries.

There is evidence to suggest that private trade can reduce spatial dispersion of prices by much more than what zoning policy can achieve [see e.g., Krishna and Raychaudhuri (1980) for India and Ellis et al (1997) for Sri Lanka]. See also Jha (2002) for a survey of such policies for India. Krishna and Raychaudhuri (1980), using data from 1951-52 to 1974-75, captured interstate food price dispersion by estimating a relationship between coefficient of variation of state prices on the one hand and total availability, a production concentration index and a zone system dummy on the other. They showed that zoning policies considerably and systematically increased the dispersion in India thereby worsening the situation of hardship for deficit households in deficit states. In particular, this dispersion reached the highest level during the drought years of 1965-67. They estimated that with no zonal restrictions, price dispersion was 12%. It increased to 15% when large zones, comprising contiguous states, were created and further to 19% with single-state zones. This implies that the transfers made by the government were not as high as would have been through private channel, had free trade been permitted across zones. That is, exports from surplus states and imports into deficit states were lower than would have occurred in the absence of movement restrictions. Consequently, with zoning restrictions, surplus area producers earn less and deficit area consumers pay more than they would with free movement. In other words, the policy reduces both consumer and producer welfare.

Jha and Srinivasan (2000) carry out an exercise relating to deregulation of internal trade in food foodgrains in India using a price band policy. They model the removal of restrictions in terms of no intervention by the government in the form of levy procurement and no controls on private trade and storage. That is the government procures foodgrains at market rather than at lower procurement prices, from surplus areas through imposition of zones. They find that this policy change leads to more stable consumption and prices and higher average revenue to the producers. The results of Jha and Srinivasan crucially depend on retail margins of private traders being much lower than the post-procurement costs incurred by the public agencies.

More recently Minot and Goletti (2000) developed a methodology to analyse the implications of liberalising domestic trade for Vietnam. Their model spans 4 staple foods – rice, maize, sweet

potatoes and cassava – over 7 regions or agroclimatic zones of the country. It is solved using General Algebraic Modelling System (GAMS) software, which allows for non-linear demand and supply equations and quantitative restrictions on trade. Minot and Goletti model the removal of domestic trade restrictions by redefining the maximum price differential between two regions as being equal to the transportation cost between them. They find that although rice and paddy prices, consumption and production fall slightly due to this policy change, the total income rises. The fall in prices arises from lower transportation costs as a result of free domestic trade. Moreover, there are strong regional patterns in terms of prices and distributional effects that can not be observed using a national model.

We can summarise the findings from this paper to say that it pays to encourage private storage and trade provided safety nets are in place to counter any negative effects on income distribution. Minot and Goletti (2000): Sketch of the spatial model

<i>Supply of each crop</i>	f(producer prices of all 4 commodities)
<i>Demand system (AIDS)</i>	f(consumer prices, per capita expenditure, a price index)
<i>Transfer cost</i>	full cost of transporting and marketing goods from one region to the other
<i>Spatial arbitrage</i>	Price difference between two regions $\geq$ transfer cost $\Rightarrow$ regional trade occurs $<$ transfer cost $\Rightarrow$ no regional trade
<i>Regional import</i>	if wholesale price in the region $\geq$ import parity price
<i>Regional export</i>	if wholesale price in the region $\leq$ export parity price
<i>Simulations: removal of restrictions on internal and external trade</i>	impact on supply, demand, prices, incomes in each region

## **DISCUSSION**

### **Comments on Shika Jha's "Methodologies for Price Stabilisation Food Stocks and Private Sector Food Trade"**

**Ramesh Chand**

In the Indian context, price stabilization of food grain has been an Integral part of broad food management policy and strategy. Besides price stabilization, this policy has two other important objectives (a) ensuring remunerative price environment for food production and (b) providing food to consumers, particularly to vulnerable sections, at a reasonable price. Both these objectives involved storage, buffer stock and operational stock, which are also basic to achieve the goal of stability in food prices. Therefore, merits and demerits of price stability can't be viewed in isolation; the price stabilization function needs to be seen along with the other two goals of food management policy. It is pertinent to see under what circumstances price stability would also ensure remunerative prices to producers and reasonable price to consumers and when it would not lead to achieving the other two goals.

If we look at India's food situation in the recent years, prices have remained relatively more stable compared to the past. However, other aspects of food management have caused serious concerns. Country has accumulated huge grain surplus which neither has scope for selling in international market at the ruling price nor it can be absorbed in the domestic market. Desperate attempts are being made to get rid of these surpluses through export by providing large subsidy. At the current opportunity cost of India's grain, there is a huge food tax on Indian consumers rather than subsidy due to government intervention. Management of surplus, rather than price, is surely the most important issue in food policy in India at present. Moreover, accumulation of these stocks is not found to have reduced incidence of food insecurity at household level.

While price stability can remain main focus of the proposed study, there is a need to evaluate policy of government intervention along with what went wrong with this policy which caused accumulation of stock at times exceeding forty percent of the total production. When accumulation of these stocks could not ensure food security to vulnerable sections then why not

change the policy. These stocks are a result of very serious price distortions which is taking heavy toll on the state exchequer. The beginning point could be concept of "Minimum Support Price". Is the criteria, on which MSP is based, justified? The next important issue is which regions and commodities now deserve support? In what form this support be given?

The second aspect of food policy relates to procurements. There is a need to examine various options for procurement rather than blurring procurement with implementation of support price in select regions.

The third aspect is distribution and PDS. Would maintaining stable prices through increased participation of private trade mitigate the need for procurement and costly PDS?

For policy purpose it is important to know optimal stock and conditions for participation of private trade. It is equally important to know what are various other factors that affect inter-regional, inter-year and intra-year price dispersion.

### **OPEN DISCUSSION**

Following the presentation of Ramesh Chand, the participants discussed issues related to sector-wide policies of food security. Dr. Jaim, of Bangladesh said that food self sufficiency is still an issue in Bangladesh. In 2002-03 crop season Bangladesh will have a food deficit and may import rice. However, given the role of the private sector in managing the food economy there is no need to worry about food self sufficiency. The markets are fairly integrated in Bangladesh due to the role of private traders. Without the interventions that enable private traders to operate in remote areas, the prices may have wider fluctuations in Bangladesh. However, private traders only play the role of short-term storage. This is partly due to the inefficient information system that is available for the private traders. Furthermore, Bangladesh is fortunate to have surplus rice production in the Indian states adjacent to Bangladesh. Long-term storage is not profitable for wholesale traders because there are three harvests per year and the transactions are done very quickly. Due to this situation small scale producers tend to be efficient market operators in Bangladesh. Thus, it may be asked in other South Asian countries what will happen if private

traders are introduced and the food economy is privatized. This may involve asking several questions. How to prove that the private sector is more efficient in procurement and distribution? What is the optimal combination of stocks and storage between the private and public sector? Can the private sector handle the risk of fluctuating international prices in foodgrain markets? What is the gain in efficiency of the distribution of food to consumers by the private sector versus the public sector needs to be understood. Finally, the bottom line question is “can the private sector provide better security at a lower cost?”

Deki Pema from Bhutan said that it is important to understand the implications of trade liberalization and market reforms on the farmers’ income. The Food Corporation of Bhutan plays a critical role in procurement and distribution of foodgrain in Bhutan and in price stabilization. When the import price is much less the Food Corporation of Bhutan imports food and stores; when the price is high it releases food into the market. Thus, for a country such as Bhutan, which is landlocked there may be a continued role of public sector in procurement and distribution of foodgrains.

Manoj Pande said that in a closed economy buffer stocks become a major policy tool for foodgrain prices stabilization. However, in the open economy situation when the trade liberalization and market reforms are implemented it may be possible to reduce the role of buffer stock and increase the role of pricing mechanisms, such as variable tariff, to manage the food economy. In this context, the experience of Bangladesh in managing the food economy through allowing the private sector to operate is important.

Abusaleh Shariff said it is important to consider the intrayear fluctuations of food prices in addressing the impact of market reforms. Due to changes in seasonal patterns of production in various parts of South Asia it may be useful to examine the surplus production areas and how they can supply foodgrains to areas that are deficit in production thereby reducing the food price in the deficit areas. Ashok Gulati, in his comments, summarized the issues related to food economy-wide policies. The key issue is how the procurement, stocking, and distribution of food is affected by the globalization, trade liberalization, and market reforms. How do we measure the costs and benefits of such measures? For example, in India the policies of the government and the inconsistencies within the policies prevented the entry of the private sector

in handling foodgrains. There is no single grain handling company that has a bulk handling facility in India. The Food Corporation of India is functioning very inefficiently with 80 percent of its labor force unskilled and unionized. How do we reduce the inefficiency of the public storage system and increase the effectiveness of procurement, storage, and distribution through liberalization of the food market?

## HOUSEHOLD FOOD SECURITY POLICIES

### INDIA: MARKET REFORMS AND FOOD SECURITY AT HOUSEHOLD LEVEL

*Mahendra Dev*

Food security issue can be considered at two levels: national and household. At national level there is no major problem because India is self reliant. It has sufficient foreign exchange reserves. In an open economy, there is no need for a country to be self sufficient in foodgrains if it has sufficient foreign exchange reserves. Main problem for India is food security at the household level because around 30 per cent of population is still below the poverty line. Enhancing food security at the household level is an issue of great importance for a developing country like India where millions of poor suffer from lack of purchasing power and malnutrition. *“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”*. Economic access (purchasing power) is the main problem for achieving food security at the household level. The purchasing power of the poor to buy food can be ensured in two ways. One way is supplying foodgrains at subsidised prices similar to public distribution system (PDS). Another way is to raise the incomes of the poor through employment. The employment can be created in two ways viz., through economic growth and direct poverty alleviation programmes.

There have been many studies on food security at the household level in India. What is new in the proposed study? Since 1991, India has been following new economic policies with emphasis on market reforms including trade liberalization. WTO is the one of the new contexts in the trade liberalization. There is a need to look at the procurement, storage and distribution issues at the macro level in the changing context, which is being done by IGIDR team, Mumbai. The present study looks at the issue of food security at the household level in the changing context of market reforms and trade liberalization.

The study will start with the need to look at food security at the household level in the changing context of market reforms and trade liberalization. The basic objective of the study is to (a)

examine the impact of market reforms on different sections of the population and (b) look at effectiveness of different safety net programmes such as public distribution system (PDS), National Programme for Nutritional Support to Primary Education (NPNSPE), Employment programmes (Jawahar gram samridhi Yojana (JGSY), Employment Assurance Schemes (EAS)) and Integrated Child Development Scheme (ICDS) and (c) examine the need for promotion of rural non-farm sector as an insurance and escape route for agricultural workers (d) suggest cost effective, sustainable and effective food security system at the household level.

We also make use of international best practices (e.g. Bangladesh experience) in examining the food security at the household level. Most of the analysis in the study is going to be at state level.

The study is organized as follows. Chapter 2 examines consumption patterns of different sections of the population during the reform period as compared to earlier periods while Chapter 3 looks at the working of PDS. It also examines the experience of food coupons in Andhra Pradesh state of India. Chapter 3 analyses the food for education programme (NPNSPE) and employment programmes (JGSY and EAS) while Chapter 4 looks at the working of ICDS. Chapter 5 suggests the need for promotion of rural non-farm employment. The last Chapter provides summary and conclusions. This also includes recommendations for cost effective, sustainable, effective food security system at the household level.

### **Consumption Patterns At The Household Level**

With market reforms and trade liberalization, one expects changes in consumption patterns. Here we look at the consumption patterns of different sections of population. Who benefited from the market reforms? One expects diversified food basket, increase in the consumption of milk and milk products, fruits and vegetables, eggs and fish.

Here we make use of NSS unit level data at household level (data contained in CDs or tapes ) for the years in 1980s and 1990s. We also examine price and income effects on the demand for foodgrains. Also we will look and price and income elasticities of different sections of policies.

If possible, we will also examine whether NSS is capturing the real changes in diet patterns due to market reforms.

### **Public Distribution System**

PDS is one of the instruments for improving food security at the household level in India. Earlier studies have examined the impact of PDS on poverty and calories in the late 1980s. Targeting errors are also estimated. In this study, we estimate the impact of PDS on poverty and PDS for the year 1999-00. Also, targeting errors will be estimated. This is important for two reasons. First, targeted PDS (TPDS) was introduced in 1997. Second, we can capture the impact of PDS during market reforms.

Apart from the above, the following questions will be addressed here. How to improve the targeting of the PDS through innovative methods? How to improve the delivery system under PDS? Should the states take over the responsibility of PDS? Does the involvement of Panchayats improve the performance of PDS? How to improve the quality of the foodgrains under PDS? Should we introduce food coupon/ food credit card system to improve the performance of PDS? What are the international best practices in targeting food subsidies to the poor?

We will also undertake a field study of food coupons in Andhra Pradesh.

The National Programme for Nutritional Support to Primary Education (NPNSPE): It started as a mid-day meal programme. But, in majority of states, support comes as a foodgrain ration (3 kgs. Per month). We will look at the evaluations of this programme and see whether some of the features of Bangladesh Food for education programme can be introduced in India.

### **Direct Employment Programmes**

Here basically we look at the programmes as JGRY (Jawahar Gram Rojgar Yojana) and EAS (Employment Assurance Scheme) and Food for work programme (FFW). The objective is to evaluate the working of public work programmes in general and food-for-work programmes in particular and suggest measures for improving the performance of these programmes. Some of the questions are: How to use the excess buffer stock productively? Is the food-for-work

programme best alternative for using the food stocks? How to ensure that the workers accept the foodgrains supplied by FCI as wages? What is the coverage under FFW and Cash for work programmes? How are they contributing to the food security of the poor? What are the direct and indirect benefits of the programmes? How to improve the effectiveness of these programmes? How do we link PDS to FFW?

### **Integrated Child Development Scheme (ICDS)**

This section of the study looks at the working of ICDS (may be with a field work in Tamil Nadu). This is proposed to be done by Brinda Viswanathan. It also analyses intra-household distribution of food.

### ***Rural Non-farm Employment***

The objective here is to examine the role of rural non-farm employment (RNFE) in improving the economic access to food security. An important agenda for change is to shift a huge amount of labour force trapped in agriculture to productive rural non-farm sectors. What factors are responsible for growth in RNFE? What kind of policies (e.g. facilitating private sector for investment and infrastructure), are needed to promote? How to avoid push factors and promote pull factor-led growth in rural non-farm sector?

Under IFPRI many studies are being undertaken on diversification and agro-processing. This chapter differs from other studies. It looks at the employment in all aspects of rural employment instead of concentrating on agro-processing. For example, rural services (retail trade, hotels and restaurants) may increase significantly with market reforms. These activities become an insurance for agricultural workers if they are adversely affected by the reforms.

### ***Summary And Conclusions Including Recommendations***

This chapter summarises the conclusions and also provides recommendations for effective, cost effective and sustainable food security system in the context of open economy framework (market reforms and trade liberalization).

*Time Frame and Activities*

(a) We have already appointed one research assistant (Chandrasekhar) to collect the data. Ravi will start working once the NSS tapes are available. I will have to contact Brinda Viswanathan after getting approval from you and Suresh

(b) Most of the data work should be over by November first week (most of the work will be done during July end to November first week).

## DISCUSSION

### Comments on Mahendra Dev's "Market Reforms and Food Security at the Household Level"

Abusaleh Shariff

This paper addresses various issues that are related to procurement, distribution, and public works programs and policies that are intended to increase the availability and accessibility of foodgrains to a wider section of the population. National food security has been achieved in India, which is indicated by the food production levels that are enough to feed the population. However, household food security of increasing the availability, accessibility, and the utilization of food by individual members of the population has not been achieved. To some extent, physical accessibility has been insured by the distribution of food by public distribution systems to the most part of the country although selected pockets of the country, particularly in eastern and northeastern states are yet to be fully covered. The major problem, however, is the economic accessibility of food by more than 40 percent of the population. About 260 million people remain poor and their economic accessibility to food remains vulnerable most of the time. There is also an intrastate variation in the level of food insecure population.

The paper addresses key methodologies that could be useful in examining alternative methods of distributing food in order to increase the physical access of food. Yet, the paper falls short of looking at the policies and programs that increases economic access of food although mention has been made about the employment guarantee scheme and the potential of food stamp programs. It is clear that the public distribution system has failed in the context of India to reach the needed population. Food-for-Work programs have fared better in terms of increasing the economic access of food to the population. Nutrition programs such as Integrated Child Development Services have done much better in terms of reaching the population but still the level of support remains low through these intervention programs. For example, through ICDS food distribution, 187.8 million people are covered of which 30 million are pregnant women. Looking at the cost of the ICDS program this translates into Rs. 78 per person per year or Rs. 0.26 per person per day. Due to resource limitations the coverage of ICDS remains much lower than what is needed at the country level. It is important that the research that is intended to

identify alternative ways of increasing food accessibility to the poor looks at the existing mechanisms for increasing food security including ICDS and investigates the costs and benefits of such programs in reaching the poor.

### OPEN DISCUSSION

Following the presentation of Abusaleh Shariff participants discussed the issues related to procurement, distribution, and public works. Bharat Ramasamy said that the procurement function is a function of private storage; however, private storage has been minimal in the context of India. Thus, the issue is how to decompose the subsidy into the actual transfer to the population, the inefficiency of the Food Corporation of India, and the leakages in the system. An issue that is important for policymakers is the impact of the public distribution system in reducing the poverty of households. If poverty alleviation is the key objective of the public distribution system it may be possible to redesign the system in order to just address that particular objective. One needs to study the income transfer benefits of the public distribution system both in terms of depth and severity of poverty. The role of center-state relationship in designing and implementing intervention programs should be clearly understood.

Bishwamber Pyakural said that income earning opportunities for rural masses? should be enhanced. Women are clearly the players in food consumption and increasing the accessibility of food at the household level.

W. M. H. Jaim of Bangladesh explained that the role of Food for Education in Bangladesh in improving food accessibility to the vulnerable population. Although discontinued by the government the Food for Education program has shown lessons for other countries in the region in order to address the food insecurity of the vulnerable population.

Amarender Reddy said that the health aspects of the rural population should be integrated into the public distribution system.

Ashok Gulati, in his summary statement, said that the issues addressed by the paper should be in sync with the trade liberalization issues. At the background we to have the theme of trade

liberalization of foodgrain market. National food self sufficiency continues to be the policy objective of the government. The distribution of food through the public sector agencies continues to result in high inefficiency and fiscal costs. There are regional differences in the level of food insecurity and in the level of operation of the public distribution system. The major question is “What are the alternative methodologies for protecting the vulnerable and the poor particularly where the public distribution system is not operating well? What are the new dimensions of the methodology proposed in this paper? There is a great need for information about how various programs have worked in other countries in the South Asia region. For example, what is the impact of the food coupons program in Sri Lanka in reducing poverty? What is the impact of the Food for Education program in reducing to poverty? What are the other programs that are implemented in Pakistan, Bhutan, and Nepal? How are the target groups chosen and how different are they? What programs need to be implemented differently to address these target groups? How do we compare the efficiency of the programs that use food as a mechanism for reducing poverty?

Mahendra Dev, in his response to the comments, said that the methodology paper is a work in progress and that he will take into consideration all of the comments made by the participants and incorporate them in developing a new methodology paper.

## **POLICIES FOR INTRAHOUSEHOLD FOOD SECURITY**

### **ACHIEVING HOUSEHOLD FOOD SECURITY IN SOUTH ASIA: ARE THE INTERVENTION PROGRAMS EFFECTIVE?**

**Brinda Viswanathan**

#### **Context and Issues:**

The balance of payment crisis in 1991 set about an agenda for economic reforms in India. The short to medium term measures of the reform process included very stringent fiscal and monetary policies involving sharp income deflation, devaluation, removal of protection on trade and administered price policies as well as reduction in public expenditure affecting in particular the social sector spending. The likely impact of the stabilization phase followed by the adjustment process on the poor has been the main focus of the critics of economic reforms world over.

The trade liberalization as part of the reform process could affect the livelihoods of poor farmers and also expose the rural and the urban poor to large fluctuations in food prices. Since a large proportion of Indian population is dependent on agricultural incomes and food consumption still forms about 60 to 70 per cent of the total consumption expenditure, changes in trade policies could have adverse effects on the well being of households as well as the intra-household resource allocation. At the same time trade liberalization could also have positive impacts on the welfare of the people in general. Hence it is important to analyze the net effects of the reforms on different economic units. This would in turn help in devising 'safety measures' to protect different sections of the population, so that the adverse effects if any could be corrected by appropriate measures and not allow them to persist in the long run. However, the reform measures also affect the social sector expenditure leaving lesser resources for devising the 'safety nets' which would mean that the social spending should not only be effective but also efficient and well targeted to reach the adversely affected population.

One of the ways of assessing the welfare of the households (or of the individuals within) is to look at their nutritional status. In recent studies it has been observed that though the growth in real income and reduction in poverty have been observed in the past two decades in India corresponding changes in nutritional status have not been reported. The National Sample Survey

data shows that the nutritional status as measured by the average calorie intakes have decreased since mid 1970s across all the states as well as both the rural and urban sectors. These changes can be attributed mainly to decrease in budget share of food items (Engel's law) as well as a marginal reduction in the share of cereals as the source of calories, substituted by milk and milk products, edible oils and fats, and processed food (Bennet's law). The results for protein are broadly the same and studies on intakes of other nutrients are very few.

If one were to look at the nutritional outcomes then India still reports 56 per cent of the pre-school children as stunted. Even states like Maharashtra and Tamil Nadu whose per capita (real) state domestic product has grown significantly in the last two decades have not shown dramatic improvements in measures of nutritional status when compared to Kerala, which ranks top among the states in health status. Also, in these two states a large percentage of children in the age group of 1-5 years are under-nourished, infant and child mortality rates are high, and large percentage of women are with low body mass index. It is important to note that these high levels of under nutrition are persisting despite existence of many direct/indirect intervention programs by both central and state governments. This raises concern about the intervention programs in the context of market reforms and trade liberalization in the following aspects:

- Efficiency – for a rupee spent per person, how much eventually reaches the individual?
- Effectiveness – does the program bring about the anticipated results?
- Targeting – whether universal coverage or specific group targeting would make the intervention programs more effective?

Also at the same time the low nutrition indicators bring into focus the following two important issues relating to standard of living of the individuals:

- Poverty Measurement – the linkage between income poverty and nutrition poverty to identify the target groups.
- Intra-household resource allocation - are there systematic biases favoring some members within a household?

Given this background the study proposes to look at the possible impact of protecting the vulnerable groups who may lose out in the process of market reforms and trade liberalization. As A case study it will examine a particular intervention program in India - Integrated Child Development Services (ICDS) with special focus on its operation in the state of Tamil Nadu. ICDS is one among many schemes to promote nutritional status of the children in the age group 0-6 years and was started in 1975 by the central government in all the sates of India. The cost of nutritional supplement alone is borne by the state governments and rest is provided by the central government. Over time the scope of the scheme was broadened to include non-formal pre-school education in the age group of 2-5 years, immunization, health check-up, referral services, education of adolescent girls on health, nutrition and legal system. Though the scheme was meant for any child, the beneficiaries were mainly children from poorer sections of the population.

Though the nutritional status of children has improved all over India since the mid 1970s the pace is clearly faster in Tamil Nadu attributing some success to the scheme. However, there is further scope for improvement in its functioning as these achievements do not compare with that of the best performing state Kerala and also regional inequalities persist within Tamil Nadu. At the same time it is also not well documented whether the food provided under such schemes are a supplement as they are supposed to be or a substitute. As for its operation there is no clear estimate on the number of beneficiaries as well as the cost of the program though it is in place in all rural blocks and most urban areas.

### **Objectives**

In the context of market reforms and trade liberalization, the specific questions to be addressed by the study are:

- How to measure the efficiency and effectiveness of the intervention programs?
- Are the intervention programs well targeted? If not, how to improve?
- Are there overlaps between various intervention programs?

- Are the data being collected through various statistical surveys adequate (both in quantity and quality) to answer the above questions?
- Do different data sources show similar trends and variations over space and time? If not, how to reconcile the differences?
- What can we learn from the political economy of food security and nutrition intervention programs?

### **Methodology**

The impact of the intervention program could be analysed using some of the following methodologies:

- (a) Assess the nutritional status of the *beneficiaries* and *non-beneficiaries*
- (b) Assess the nutritional status before and after the program is introduced
- (c) Use an econometric framework with the dependent variable as any nutritional status indicator (weight for age or height for age) or an indicator variable -whether the household is above or below the poverty line and the independent variables as household and socio-demographic characteristics along with the program variables to assess the impact.
- (d) Cost-Benefit Analysis for measuring efficiency

### **Data Needs**

The study would first analyse the National Sample Survey (NSS) data to understand the linkage between household characteristics like occupational characteristics, economic status (as measured by total expenditure), food expenditure, unit prices of specific commodities, and nutritional intake over time. However, this data source does not have information on intra-household distribution of food intakes or on the outcomes of nutritional status like weight or height or the health status of an individual. Some evidence of this can be obtained from the two recent National Family Health Surveys (NFHS) which collect information on women and children. Further inputs on nutritional status could also be obtained from National Nutrition Monitoring Bureau (NNMB). These information would be helpful in identifying the scope of the primary survey in terms of regions and issues. The survey would cover select villages and urban

areas with varying degrees of access to interventions, households with full, partial and poor participation and government officials and other agencies involved in conducting the program.

### **Outcome**

It is envisaged that the study would be helpful to understand the role of intervention programs for the poor and the vulnerable sections of the population particularly when there are major changes in the economic policies affecting the standard of living of the people. The analysis based on the secondary data is expected to provide an understanding of the changing consumption patterns and health status of different sections of the population. On the other hand the outcome of the primary survey could capture specific perceptions by the beneficiaries and program coordinators of the performance of the intervention programs such as ICDS in the changing economic scenario due to market reforms and trade liberalization. Other outcomes would be in terms of designing efficient and effective intervention programs to improve the welfare of the poor, identify the role of community participation in improving the effectiveness and efficiency of the program as well as the data needs and methodological issues required to monitor and evaluate such programs.

## DISCUSSION

### **Comments on Brinda Vaswanathan's "Achieving Household Food Security in South Asia-Are Intervention Programs Effective?"**

**Aldas Janaiah**

This paper-seems is a concept note of the proposed study and was presented jointly by Dr. Suresh Babu of IFPRI, Washington D.C., and Dr. Brinda Viswanathan of Madras School of Economics, Chennai. The study primarily focuses at evaluating the impacts of government intervention program of Integrated Child Development Scheme (ICDS) on household food and nutrition security in Tamilnadu, India.

Before furnishing a few comments on this presentation, I would like to remind us the today's relevance of the entitlement approach of the Noble laureate Prof. Amartya Sen to the household food and nutrition security and for poverty elimination. This approach argues that entitlement of food to the poor could be improved through two ways. Firstly, making prices of 'staple foods' affordable to the poor (price stabilization) by increasing the domestic supplies. This would improve the accessibility of food to the vulnerable with limited incomes. This is exactly what India followed through price stabilization policy until recently. Our policies and technologies were directed towards this objective over the last three decades to achieving food security. Once we succeed in improving food entitlement through price stabilization policy, Sen's approach next focuses on increasing the income levels of poor to sustain or improve the food entitlement through food security at household level. This is nearly similar to the focus of 'new economic and trade regime' moving away from 'price stabilization policies' to 'income generation policies' through diversified economy. There is a demand-driven need to move from traditional crops to high value crops to improve income levels of agricultural laborers as well as farmers. At this stage, policy focus should be diverted away from traditional food crops and promote agricultural diversification for sustaining the food entitlement and food security. Therefore, one way or other Sen's entitlement point of view remains relevant both in pre-reform and post-reform periods.

A few specific comments-that were drawn from the authors' presentation and followed discussion on it-are furnished below:

- Both authors have presented the proposed study very clearly on 'what' they want to do (objectives), 'why' they want to do (rationale), 'how' they want to do (methodology) and 'what' they want to achieve at the end of the study (output).
- In her introductory remarks while stating the problem, Dr. Brinda emphasized on 'decline of per capita calorie intake amidst substantial progress in poverty reduction over the period' citing NSS data source. However, it is well known fact that 'poverty reduction is likely to be strongly associated with the improvement of overall livelihood including nutritional status'. One possible reason for Dr. Brinda's observation on this issue is data source itself and reference years. Many times, NSS data provides calorie intake data largely from traditional food items (cereal consumption). Over the period however, cereal consumption has decreased substantially while the consumption of high value food items like milk, meat, egg, vegetables, and fisheries has tremendously improved. According to NSSO survey-1993, 99.7% of urban people and 93.8% of rural people are having two-square meals a day through out the year. Similarly, repeat surveys of National Nutrition Monitoring Bureau-NNMB (1997) further shows that average calorie consumption of rural households has increased from 2070 kcal/day in the sixties to 2350 kcal by 1990. Therefore, it is appropriate to look at various data sources and different time periods on consumption of 'food basket' to address this issue more empirically.
- Objectives are very clear to address the key issues of efficiency, effectiveness and targeting approach of the ICDS and its impact on nutritional status and poverty.
- The study uses both secondary and primary data. For primary data, it is proposed to cover "beneficiaries' and non-beneficiaries' of ICDS program and Pre and Post ICDS program. However, it is not clear how authors are going to get Primary data on "Pre-ICDS program"-that was initiated in 1975-in the same sample areas where post-ICDS evaluation is to be carried out.

- Impact indicators to be measured are very clear and quantifiable through econometric modeling. While estimating poverty indices poverty measures ought to be worked out separately for male, female, children and aged members of the household. Similarly for poverty determinant function, it is appropriate to fit poverty determinant functions (nutrition poverty functions, not income poverty functions) separately for male, female, children and aged members of household. Such analysis would throw a light on the magnitude of nutritional poverty among various members of the household and factors affecting the intrahousehold nutrition security more empirically.
- The study is expected to bring out important policy implications on 'reorientation' of government intervention programs such as ICDS for achieving its ultimate goals (poverty reduction and removal of malnutrition) more effectively and efficiently.

## OPEN DISCUSSION

Deki Pema, who chaired the session on “Policies for Intrahousehold Security” said that in the case of Bhutan intrahousehold level issues are important. The food security in renewable natural resources sector has become top development agenda for the Bhutanese government.

Furthermore, the health issues related to food security are also given an increasingly important place in the policy discussions at the government level.

Bishwamber said that the targeted interventions are usually designed to protect the poor. However, the evaluations of these programs fall short of investigating the household allocation process and the differential benefits that the household members get out of this intervention program. The macro policies that are designed in South Asian do not usually take into account the gender equity issue. Thus, it is important when designing programs and policies that address food security careful attention is paid to address the impact of the program on vulnerable groups such as pregnant women and children.

Ramesh Chand said it is important to study the impact of agricultural growth on nutrition security. Agricultural growth may have resulted in income increase but may not have resulted in better nutrition. Thus, it is important to study the role of agricultural price policy and its impact on nutritional development. Furthermore, reduction in poverty due to agricultural growth does not directly translate into nutritional benefits of the poor. There is also a need to address population issues related to sharing of increases in food production among the population. The population policies are rarely given the needed attention in the policy agenda of the government.

Mahendra Dev said it is important to understand the role of relative prices in achieving nutritional improvement in rural areas. Furthermore, it is essential to study the role of nonfarm employment in contributing to increased income and nutritional status. In addressing the impact of trade liberalization and market reforms on the vulnerable groups it is important to identify and classify the programs that will have an impact on nutritional status. For example, it is important to understand how the integrated child development services will be influenced by market reform. How will the public distribution system be changed or modified due to market reform and what impact such change will bring about in the nutritional status of the population. It is

also important to define poverty line in order to understand the impact of the intervention programs.

In his summary statement Ashok Gulati said that the presentation remains a stand alone presentation that examines the impact of intervention programs such as the integrated child development services (ICDS) and does not adequately relate to market reforms and trade liberalization which will affect the target groups. The major question that the paper should be addressing is how does the policies and programs that result in market reforms and trade liberalization affect vulnerable groups and the members of the household? It is important that we get good estimates of price elasticities of demand for various commodities and understand the changing consumption pattern due to changes in policies and programs. Thus, the fundamental question is how to design policies and programs that protect the vulnerable groups during the period of transition from protected markets to open food trade?

In response to the comments received on the paper by Brinda Viswanathan responded that there is a need to examine the impact of economic reforms in general on the nutritional status of the population. Trade liberalization and market reforms could form a subset of these policies. It is important to look at the changes in the diet diversification of the households including the intake of micronutrients at the household level. It also important to look at the changes in the livelihood strategies of the population. She agreed that the methodologies of the paper should be focused to address the impact of market reforms and trade liberalization on the vulnerable groups of the population. It is important to understand who is affected by the market reforms and how they are affected.

## CONCLUDING REMARKS

Ashok Gulati,

The workshop ended with the summary presentation by Dr. Ashok Gulati. In his concluding statement Dr. Gulati said the major objective of the research program is to address the question of whether market reforms have resulted in decreased or increased poverty, food security, and natural resource degradation. Is trade liberalization in agriculture responsible for a reduction in the poverty levels? The public investment in agricultural reform has increased, yet, there has been a wide range of controls in terms of export/imports of wheat, cotton, and onion in response to changes in the world market prices. The real wages have been going up in rural areas which is one of the key indicators of the welfare of the rural population. However, the rate of employment growth has decreased in the last 20 years. What does this mean for the living standards of the rural population? Also, the production of milk, fish, and fruits and vegetables have increased in the last 20 years. What implication has it had on the nutritional status as well as welfare of the population. It is important to revisit old laws and policies such as the Essential Commodity Act and address the scarcity phobia that has kept this policy in place. However, it is clear due to unsustainable policies and inefficient system of public storage and distribution the system is caving in. It is important now that the research program addresses the alternative forms of procurements and distribution of food commodities. The role of the private sector in providing the right signal to the private sector is important for increasing the efficiency of foodgrain economy. Thus, it is important to understand the impact of market reforms on the bottom 30 percent of the population. How relative price changes due to market reforms have affected the poor segment of society and how the consumption pattern of this section of people have changed in the last 10 years.

Dr. Gulati concluded that overall the two-day workshop has provided pointers that are relevant for addressing the fundamental question on the impact of market reforms and trade liberalization on food security of the South Asian population. He emphasized the need to define the methods to generate information for addressing the emerging policy issues that will further enhance the reform process in South Asian countries.

## APPENDIX A



### Evaluation Form Analysis of Market Reforms and Food Security: A Methodology Workshop

Please circle one.

#### 1. Objectives

- |  |   |   |   |   |    |
|--|---|---|---|---|----|
| a. The objectives of the workshop are well defined.    | 1 | 2 | 3 | 4 | 5* |
| b. The objectives met my capacity needs.               | 1 | 2 | 3 | 4 | 5  |
| c. Two days were sufficient to achieve the objectives. | 1 | 2 | 3 | 4 | 5  |

If not, how many days would you suggest?

#### 2. Materials/Reading

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| a. The training materials cover the objectives set for the workshop. | 1 | 2 | 3 | 4 | 5 |
| b. The reading materials are highly useful as resources.             | 1 | 2 | 3 | 4 | 5 |
| c. The examples used were relevant and useful.                       | 1 | 2 | 3 | 4 | 5 |

#### 3. Presentation

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| a. The presentations were clear and well articulated.                      | 1 | 2 | 3 | 4 | 5 |
| b. Enough time was spent on discussing various topics.                     | 1 | 2 | 3 | 4 | 5 |
| c. The presenters were helpful in engaging the participants in discussion. | 1 | 2 | 3 | 4 | 5 |

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\* 1-Strongly Disagree, 2-Disagree, 3-Independent, 4-Agree, 5-Strongly Agree

#### **4. Facility**

- |   |   |   |   |   |    |
|---|---|---|---|---|----|
| a. The workshop facility was conducive to learning. | 1 | 2 | 3 | 4 | 5* |
| b. The presentation equipment was good.             | 1 | 2 | 3 | 4 | 5  |
| c. The equipment added value to the presentations.  | 1 | 2 | 3 | 4 | 5  |

#### **5. Practical Exercises**

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| a. Relevant practical examples were used to explain the details.   | 1 | 2 | 3 | 4 | 5 |
| b. Enough time was allocated to do practical exercises.            | 1 | 2 | 3 | 4 | 5 |
| c. The workshop provided pointers for developing practical skills. | 1 | 2 | 3 | 4 | 5 |

#### **6. Overall Rating**

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| a. On a scale of 1 to 5, 5 being the highest, I would rate the workshop above __. | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|

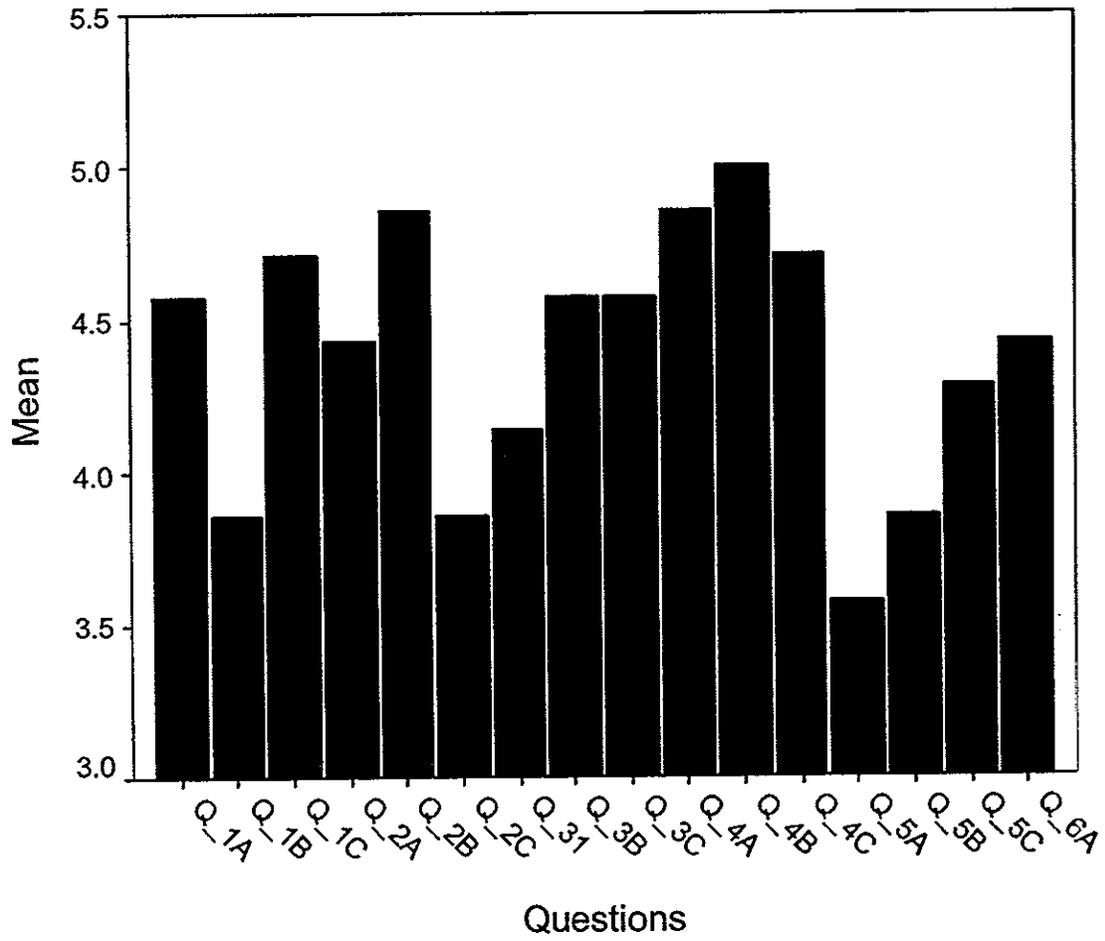
#### **7. Feedback**

- a. Please give us your feedback on the following:
- a1. Contents of the workshop
  - a2. How to improve the organization of the lectures.
  - a3. How to improve the presentation of the lectures.
- b. Indicate how the skills learned will be useful to you as a researcher in the near future.

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\*1-Strongly Disagree, 2-Disagree, 3-Independent, 4-Agree, 5-Strongly Agree

**South Asia Initiative  
Analysis of Marker Reforms and Food Security:  
A Methodological Workshop**



**South Asia Initiative**  
**Analysis of Market Reforms and Food Security: A Methodological Workshop**  
**Mumbai, India**  
*July 8-9, 2002*

**Evaluation**

**Question 7: A1 Feedback on the contents of the workshop**

1. Very planned and organized properly
2. Good and relevant
3. Papers from other countries would have been useful
4. Rich in content but focus in some cases deviates from objectives/goals

**Question 7: A2 Feedback on how to improve the organization of the lectures**

1. By supplying papers to the participants well in advance

**Question 7: A3 Feedback on how to improve the presentation of the lectures**

1. By asking them to remain focused on the topic

Question 7: B Indicate how the skills learned will be useful to you as a researcher in the near future

1. Will be useful
2. Skills learned will help maintain uniformity in quality and content
3. To make improvements in my presentation.

Question 7: C Indicate how the skills learned will be useful to you as a researcher in the near future

1. At least 1 presentation of the completed study in next shop is recommended
2. Would have been better to have received at least the presentations earlier

## APPENDIX B

### Participants

#### Bangladesh

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**APPENDIX C**  
Agenda

**July 8, 2002**

- 8:00 AM**                    **Registration**
- 9:00 - 9:15**                **Welcome and Opening Remarks**  
*R.Radhakrishna, Director, Indira Gandhi Institute of Development Research (IGIDR), India*
- 9:15-9:30**                 **Opening Remarks**  
*Ashok Gulati, Director, Markets and Structural Studies Division, International Food Policy Research Institute (IFPRI), USA*
- 9:30 - 12:30**              **National Food Security Policies**  
*Chairperson: R.Radhakrishna, Director, IGIDR, India*
- 9:30 - 10:30**              Trade liberalization: Implications for food self-sufficiency, food security, and price volatility *P.V. Srinivasan, Professor, IGIDR, India*
- 10:30 - 11:00**             Coffee Break
- 11:00 - 11:30**             Discussant  
*Bharat Ramaswami, Professor, Indian Statistical Institute, India*
- 11:30 - 1:00**              Open Discussion
- 1:00 - 2:00**                Lunch
- 2:00 - 5:30**                Sector Level Policies of Food Security  
*Chairperson: Bishwambher Pyakuryal, Professor, Tribhuvan University, Nepal*
- 2:00 - 3:00**                Methodologies for price stabilisation: Food stocks and private sector food trade *Shikha Jha, Professor, IGIDR, India*
- 3:00 - 3:30**                Coffee Break
- 3:30 - 4:00**                Discussant  
*Ramesh Chand, Principal Scientist, National Centre for Agricultural Economics and Policy Research (NCAP)*
- 4:00-5:30**                Open Discussion
- 7:30 - 10:00 PM**        Dinner Reception – Royal Challenge Restaurant

July 9, 2002

- 9:30 - 12:30 Household Food Security Policies  
*Chairperson: Ashok Gulati, Director, Markets and Structural Studies Division IFPRI, USA*
- 9:30 - 10:30 Procurement, distribution and public works: PDS, FFW, EGS  
*S. Mahendra Dev, Director, Center for Economic and Social Studies, India*
- 10:30 - 11:00 Coffee Break
- 11:00 – 11:30 Discussant  
*Abusaleh Shariff, Economist, National Council of Applied Economic Research (NCAER), India*
- 11:30-1:00 Open Discussion
- 1:00 - 2:00 Lunch
- 2:00 - 5:30 Policies for Intrahousehold Food Security  
*Chairperson: TBA*
- 2:00 - 3:00 Intrahousehold issues: Policies and programs for increasing the food security of the vulnerable  
*Brinda Viswanathan, Professor, Madras School of Economics, India and Suresh Babu, Senior Research Fellow, IFPRI, USA*
- 3:00 - 3:30 Coffee Break
- 3:30 – 4:00 Discussants  
*Deki Pema, Planning Officer, Policy and Planning Division, Ministry of Agriculture, Bhutan and Indra Tudawe, Research Fellow, Institute of Policy Studies, Sri Lanka*
- 4:00 -5:00 Open Discussion
- 5:00 - 5:30 Closing Remarks
- 5:00-5:15 *R. Radhakrishna, Director, IGIDR, India*
- 5:15-5:30 *Ashok Gulati, Director, Markets and Structural Studies Division IFPRI, USA*

## APPENDIX D

### Table of Contents of Reader

National food security policies: Trade liberalization, food self sufficiency vs. food security, and price volatility

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