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The Allama Iqbal Memorial Lecture

Agricultural Development and Food Security

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Sweet is a little dew gathered by one's own hand.
Be a man of honour, and like the bubble.
Keep the cup inverted ever in the midst of the sea!

I. INTRODUCTION

It is always a pleasure for me to participate in these annual meetings. The knowledge and the talent displayed are immense. The quality of discussion is high. I had never thought however that I would have the honor of delivering the Aalama Iqbal lecture. To prepare for this lecture I read extensively from Iqbal's poetry. Of course I read in translation, but even so I was overwhelmed by the beauty of the ideas and the expression. My search for an apt couplet or set of lines for this paper was in vain. Iqbal was speaking to his people and although he was expansive in his view of society, it is still not meant for me to carry the word of Iqbal to you. Nevertheless I do display at the beginning of this paper three lines from Iqbal. He is clear on the importance of doing for oneself and for one's country. At least in the modern world one's efforts are so much more productive if government provides a favourable environment for individual effort. And he would embrace the brotherhood of mankind, leaving some potential for us to help each other. He was very clear that learning from the West was desirable, and he was very selective about that—science and technology in particular. My paper is about what government must do, and specifically the government of Pakistan must do, to create an environment in which not just a few gather dew but in which all people gather dew. As soon as one's concern encompasses the bulk of the population food security comes to the fore. My paper can be seen as addressing how all rural people can gather the dew. It has a prominent place for science and technology.

II. BASIC THEME

The basic theme of this paper is simple. The path to food security leads from growth in agricultural production. More fully, the path is from agricultural production to increased farm incomes to reduced poverty to food security. It is the sequence that breaks the back of poverty and provides food security for most of the population. It is an odd sequence because it starts with raising the incomes of the not so poor that then drive large

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employment multipliers to lift the poor. In that context direct action programmes to deal with the still significant residual food insecurity and poverty become manageable.

Why has agricultural growth been so neglected given these powerful relations? Background to the explanation is the urban orientation of most governments in Asia, Africa and Latin America—a tendency countered by foreign aid prior to and including the green revolution period—but strongly reinforced by foreign aid in more recent decades.

Two powerful intellectual forces backed the turn away from agriculture. Amartya Sen (1983) presented a powerful argument that famines (and presumably food insecurity more broadly) are phenomena of lack of purchasing power of the poor not a lack of food. It took little simplification to direct attention to means of directly increasing incomes of the poor rather than increasing the supply of food. The discovery that the poor are largely rural but in rural non-farm occupations led to looking for ways of increasing their incomes directly through small and medium non farm enterprises and a turn from agricultural production.

Concurrently, the World Bank has provided empirically based paper after paper substantiating that it is growth that reduces poverty. When those papers were placed in the context of emphasis on unfettered markets as the foundation of growth and hence a very limited role for government, the result was lack of support for the massive provision of public goods that are essential to agricultural growth. The response to the view that it is not growth *per se* but the right structure of growth that reduces poverty was that if agriculture was important the market would see that agriculture grew. Once a country reaches middle income status agriculture is of only modest importance to GDP growth but still dominates employment and poverty reduction. In that context, agriculture has virtually disappeared from foreign aid budgets and encouraged governments of low and middle income countries to minimise provision of the public goods so critical to small farmer agriculture.

The paper proceeds along five lines. First it examines the statistical evidence on relationships to poverty decline and the evidence explaining those relationships. Second, it examines the contemporary global food situation and its relation to food security. Third, it prescribes short run measures for dealing with a global circumstance of high food prices and concludes that most low income countries, specifically those of Sub-Saharan Africa, will not be protected and that the brunt of the problem will fall on the poor of those countries. Fourth, the key elements for increasing food production are outlined. The paper ends with a set of conclusions specific to Pakistan. As the paper unfolds, and much seems common sense, it must be remembered that we are in a mess with respect to food security because this common sense is consistently ignored.

III. THE RELATION BETWEEN AGRICULTURAL PRODUCTION AND FOOD SECURITY

The following brief review is to achieve three purposes. First, is to show the long history of evidence of the close association between agricultural growth and poverty reduction and hence food security. Second is to show the breadth of evidence across countries. Third, is to explain those relationships. That will lead to policy conclusions for reducing poverty and increasing food security.

The Statistical Association of Agricultural Growth and Poverty Reduction

Prior to the 1970's, the agricultural production growth rate in India did not trend upwards. It did fluctuate considerably from year to year with fluctuations in weather. Ahluwalia (1978) showed a close correlation between agricultural production fluctuations and poverty. When the weather was good agricultural production increased and poverty declined and conversely. The association was very strong. Dharm Narian (published in Mellor and Desai 1985) pursued those relationships and provided additional detail, confirming the basic relationship.

More recently, a substantial number of statistical studies analysed these relationships across countries or regions of countries and over time. Ravallion and Datt (2002) in a cross section of Indian states showed that agricultural growth sharply reduced poverty and manufacturing growth had only a small impact. They also showed a substantial lag in the full effect. Timmer (1997) in a cross section of countries showed a similar relationship, but manufacturing growth showed no impact on poverty. Timmer showed that large farms had little impact on poverty reduction. Thirtle (2001) showed the same relationships. Ravallion and various colleagues showed similar results for several Asian countries. These results require modification of the simplistic position that economic growth reduces poverty. Yes growth matters, but the structure of that growth matters more.

Explanations of the Relation between Agricultural Growth and Poverty Reduction

Explanation of the relationship between agricultural growth and poverty reduction takes two courses. One has to do with food prices and wage rates and the other with employment and wage rates. The first tends to dominate in closed economies, the latter in open economies. In an open economy changes in domestic production and consumption have their impact on prices muted by trade—it is global prices that rule the domestic scene, not the product of domestic changes in supply and demand. However, even with open economies, transaction costs provide a substantial gap between import parity and export parity prices, allowing domestic forces to influence prices within that often wide range. The poorer transportation infrastructure and the poorer the working of domestic markets the stronger the price effect.

Price Effects

The food price effect on poverty is obvious. The poor spend a high proportion of their income on food and so high (rising) food prices are deleterious to the poor [Mellor (1978)]. Simplistically, a 50 percent increase in the price of food causes a 40 percent decline in real income of the poor and a roughly 40 percent decline in food consumption. There is no escape. For the poor, non-food expenditure is small and probably as essential to survival as food. The diet is already dominated by low cost calories and so that shift is modest also. But, it is worse. High income people collectively do reduce livestock consumption somewhat in response to higher prices and that provides a modest reduction in demand for grain. But globally the forces reducing consumption by the poor are the main drivers of global adjustment of supply and demand for food. The paper will return to this theme later.

Of course a significant proportion of the rural poor have a small plot of land, but the poor are net buyers of food. Most of their production is consumed at home but even if they sell some at harvest they buy back a larger quantity.

The relation is a little more complex because higher prices to the farmers who produce the surplus, while they reduce the real incomes of the poor through the direct effect on their real income, the higher incomes of farmers provide more employment through increased purchases of goods and services produced by the poor [Lele and Mellor (1981)]. However, far better for the poor is raising farm incomes through cost reducing technological change that lowers costs and increases the quantity produced. Then the poor benefit from some combination of lower prices and higher employment (see the next section for the employment impact.)

One other price relationship is important. When food prices decline that tends to reduce the real price of labour and thereby increases employment and conversely when food prices rise. Thus, the poor benefit from lower food prices either directly in their cost of living or indirectly through increased employment and conversely they lose from rising food prices. These complex relationships are spelled out in Lele and Mellor (1981).

Employment/Wage Rate Effects

In a fully open economy food prices are determined by global supply and demand. In that case increased agricultural production in a specific country does not depress prices and farm income rises. In agricultures dominated by small commercial farmers their spending in the local economy drives employment growth, poverty declines and food security increases. [Mellor and Ranade (2008); Mellor and Lele (1973); Mellor (1985, 1992)]. The rural population is conveniently divided into small commercial farmers and rural non-farm population.

Small commercial farmers typically comprise somewhat less than half the rural population but control about 80 percent of the land and hence of agricultural income [Mellor (2002); Mellor and Gavian (1999); Mellor and Usman (2006); Barrios and Mellor (2006)]. They have incomes well above the poverty level, spend half or less of income on food and so produce more than twice the amount of output to satisfy their food needs, the rest being sold to provide the other components of consumption. They buy inputs, sell output, take up new technology and require credit (see below). Farmers typically spend on the order of half their incremental income on locally produced non-farm goods and services [Bell, Hazell, and Slade (1982); Bouis (1999); Delgado, *et al.* (1989); Hazell and Ramaswamy (1991)]. About one quarter goes to increased food consumption (higher value food) and one quarter to purchases from urban areas including imports. It is the half of increments spent on the local rural non-farm sector that drives the statistical relation between increased agricultural production and poverty. Note that agricultural production increase is largely associated with technological change that increases yields per hectare, but also increases labour productivity substantially [e.g. Rao (1975)]. Thus it is the multipliers to the labour intensive rural non-farm sector that has the big impact on employment, poverty reduction and food security.

Timmer (1997) shows that in agricultures dominated by large, often absentee, landowners poverty is not reduced by agricultural growth. That is because rich farmers do not spend a high proportion of increments to income on rural non-farm goods and

services. The large holdings in Sindh would fit this pattern. They spend largely on capital and import intensive goods. Thus the focus for poverty reduction is on the small commercial farmer.

Somewhat more than half the rural population is comprised of rural non-farm families. Most of the poor fall in this category [Bhalla (2004)]. It includes those with land areas too small to provide a poverty level of income—those families typically earn over half their income from the rural non-farm sector. The poor are labourers, their nominal income determined by the amount of employment and the wage rate in the rural non-farm sector. They produce almost entirely non-tradables [Delgado, *et al.* (1998); Liedholm and Meade (1987); Meade and Liedholm (1998)] Thus, the amount of employment is determined by local demand and the primary source of that local demand is small commercial farmers. That is why efforts to increase income in the rural non-farm sector are doomed to failure unless farm incomes are increasing to provide growth in effective demand for local non-tradables.

The reason why manufacturing growth has so little impact on employment growth lies with its integration into the competitive global economy. It is essential to continually reduce cost of production and in labour intensive industries that will mostly be achieved by increasing labour productivity. Thus, it is all too common to find the elasticity of employment with respect to manufacturing to be zero.

There is a large literature supporting these relationships. Bell, Hazell and Slade (1982); Hazell and his colleagues (1991, 1983); Delgado, *et al.* (1998); Fan and colleagues (2005, 2002) and Haggblade and colleagues (2008, 1989, 1991) have contributed a large data based literature. Rangarajan (1982) approaches the same issues from a macro economic modeling point of view with the same conclusions. Mellor and his colleagues provide data for several countries showing the dominance of farm incomes in driving the rural non-farm sector [Mellor (2002); Mellor and Ranade (2006); Mellor and Usman (2006); Mellor and Gavian (1999); Gavian, *et al.* (2002); Barrios and Mellor (2006)] These studies show that with rapid agricultural and non-agricultural growth 80 percent of employment growth is driven by agriculture and its multipliers. Johnston and Kilby (1975) provide data for the production linkages of agriculture with the rural non-farm sector.

The World Bank Development Review (2008) and the Haggblade, *et al.* (2008) review are clear on these relationships. They mention that there are other income sources driving the rural non-tradable sector besides farm incomes, such as remittances, tourism, nearby urban areas. They do not quantify these relationships. Mellor and his colleagues show that even in remittance strong areas they are very small e.g., less than 10 percent as important as farm incomes in driving the rural non-farm sector. Tourism is minuscule in aggregate. Urban demand seems to have links only with very close areas. Thus, it is farm incomes that drive the process, consistent with the overwhelming data stated earlier. It is unfortunate that the recent reviews do not underline this point.

Circumstances of Famine with Ample Supplies of Food

There are a few circumstances in which famine strikes with an abundance of food. They both involve sharp decline in purchasing power of the poor. The usually cited example is drought in the famine prone areas of Ethiopia. In that case the drought forced

divestment of livestock, depressing prices and greatly lowering incomes. At the same time cereals production in the less drought prone areas held up and of course livestock demand for cereals declined. There is an abundance of food but lack of purchasing power. Similarly the dislocations of war may remove the poor from their sources of livelihood. These are exceptions to the powerful role of food production discussed here.

IV. THE CONTEMPORARY GLOBAL FOOD SITUATION

The contemporary global food situation is effectively analysed in the context of the preceding analysis. Recently food prices spiked at very high levels which brought a sense of crisis to concerns for the poor. No one disagreed that the problem of the poor was driven by high prices of food. The spike in prices was due to export restrictions placed by several major exporters, particularly of rice, and by speculative forces. However, the underlying problem is a higher rate of increase in demand for food relative to increase in the supply of food. That imbalance will become more pressing when the world economy recovers. Even now, food prices have come down less than most other commodity prices (FAO-Stat.)

The driving force is the rapid growth in income for large numbers of people, particularly including China and India, in the context in which global food production had slowed, again particularly in Asia (FAO-Stat). The result was demand growing faster than supply over large geographic areas with resultant strong upward pressure on prices. That circumstance can be expected to resume and continue for some time.

V. HOW DOES THE WORLD ADJUST TO DEMAND FOR BASIC FOOD STAPLES SHIFTING FASTER THAN SUPPLY?

As analysed above, the adjustment to food scarcity is made almost entirely by poor people. The poor have the most elastic demand for basic food staples, not out of preference, but out of necessity. Because the adjustment is made by the poor protective measures for some concentrate the problem on the unprotected. The more are protected, the more the leverage in disadvantaging the remaining poor. Measures to reduce the misery of some increases the misery of others. Within countries the “remaining poor” are the most politically disenfranchised—that is the most silent. Across countries it is again the most silent countries that absorb the pain.

The following discusses measures that individual countries may follow to protect their poor from high food prices. That will be followed by discussion of the impact on those not protected, why they are not protected, and what can be done.

How to Protect Some of the Poor at the Expense of Other Poor

Given that the adjustment to higher prices due to a global imbalance between food supply and demand is by the poor, measures to protect the poor simply drive up food prices unless supply is increased. In the short run, that can only occur through decreased exports or increased imports, tightening the supply demand balance in other countries. It is reasonable for individual countries to try to protect their poor even at the expense of the poor in other countries. Rich countries may assist in that effort, either for strategic reasons or in ignorance of the consequences in other countries of their actions.

Food stock management can smooth the adjustment of food consumption by the poor—less up in good crop years and less down in the poor crop years. However the random nature of food shortfalls makes carryover stocks commercially unprofitable. Governments do stock and of course private individuals, farmers and to some extent consumers, do stock. In these cases stocks may buffer the first year's shortfall, but run out before a second year. That is why a second year of drought is far more deleterious for the poor than the first year.

A theoretical exception to the above is rationing food to the more well to do. It is common in wartime to ration food to all, in effect preserving consumption by the poor at the expense of reduced consumption by the rich and taking the upward pressure off prices. Rationing is a clear recognition that measures to protect the poor do not work unless supply is increased or consumption by the more well to do reduced by non market forces. Is explained in terms of a general shortage in a period of national crisis, usually war related, and a sharing in the pain of that crisis.

In the context of high food prices, protective measures are different for the urban and the rural poor. For food exporting countries, of which there are very few with large populations of poor people, restriction on exports increases local supply relative to demand and dampens price increases. It is also common to try to recoup or minimise costs of distribution to the poor by compulsory procurement from farmers at below free market prices. That is often facilitated by preventing shipments from surplus areas driving down the local price, then buying at that price for shipment to other areas. Note that consumption is increased in the cordoned off areas because of lower prices to all consumers and in the other areas by reducing the price of food to the poor. The consequent reduction in farm prices has two consequences.

First, it is a disincentive to production—which could be but rarely is more than matched by efforts to reduce cost of production by agricultural growth policies. Second, it reduces farm incomes and hence the purchasing power to the rural non-farm sector, reducing income of the poor rural non-farm population in those areas. Thus part of what the poor gain from lower prices is taken away by lower employment—with a lag in the latter. In other parts of the country market food prices are higher than they would otherwise be because of the lesser supply on the market. The poor who receive the procured food at a low price are protected, the silent poor are not—the burden falls on them.

The urban poor are more easily protected than the rural poor because they are concentrated in small areas. For the urban poor the usual approach is to provide subsidised food—usually through some type of subsidised food availability normally with a rationing system for the subsidised food. In practice the difficult problem of restricting access to the poor is at best imperfectly solved and at worst the allocations go largely to those whose diets were not being substantially restricted. A substantial literature reviews the many variants of this approach and the details of the more likely to succeed approaches.

As for rural areas, urban public works programmes could be instituted with the advantage of the self selection of the poor to participate. This is rarely done, probably because of the likelihood that the urban poor have some occupation, even though low paying and are suffering more directly from the price escalation.

The principal caveat, often ignored, for urban programmes is that protection of the urban poor should not widen the real income gap between the urban poor and rural poor. If that gap widens it will encourage additional migration to the urban areas thereby greatly increasing the total costs of the programme.

For rural areas the problem of restricting access to the poor, the preferred approach is employment guarantees that produces public works such as roads that provide the basis for increased future agricultural production. That may be a food for work programme, which ensures that the supply matches the increment to income. It may also be a cash programme which has efficiencies in delivery but may encounter imperfectly working food markets. The IFPRI studies in Bangladesh show that recipients prefer a mix of cash and food suggesting that they see some problem of market failure. The advantage of rural public works is that the programme is naturally self selecting towards the poor—non poor would not opt for such menial, low paid work.

In addition to self selection, works programme have the advantage of encouraging increased food production by improving physical infrastructure. For that to occur however the food must be supplemented, normally on at least a one to one basis with cash to purchase the essential non-labour based inputs of the works. That of course requires cash supplements to the food or equivalent cash provided to the poor that as a rule of thumb will be roughly equal to or somewhat larger than the food cost.

A second measure in rural areas, not normally practiced, but with large potential, should be special programmes to increase production of the basic subsistence crops on the land operated by the poor. Because the poor do not produce enough to have net sales their agricultural production is not commercial. They derive so much income from off their farms that they are more difficult to reach with technology and they have a poor financial basis for borrowing and repaying. And so they require a specialised approach. A pro-poor agricultural production approach will require intensive extension, emphasis on low cash cost methods and requiring little or no credit. This is very different to the approach for the small commercial farmer (see below.) Therefore, extension agents might best be specialised to this function or at least have special training.

Poor resource agricultural areas have a special problem. First they tend to have crises more frequently than the better resource areas because poor agricultural resources are usually associated with low rainfall and hence fluctuations around a mean close to the margin for covering the costs of harvest. Second, because of the poor resources they tend to have low population densities and hence poorer infrastructure and higher costs to reach the poor. Third, most families are poor. Fourth infrastructure investment is lower rate of return because of the low population densities and low productivity of agricultural resources. Relief in such areas will tend to be simply food distribution, and encouragement to migrate. Often extreme privation occurs in such areas when supply demand balances in the rest of the country have changed but little. In that case relief measures transfer largely from the poor in areas in which their poverty has not increased to the poor in areas where the increase in poverty is large. That is generally considered welfare increasing.

Global Implications

The preceding discussion has profound international implications. Countries that have the resources, either domestic (because they are prosperous), or by drawing on

foreign borrowing, or foreign aid will be able to protect their poor. That almost certainly requires increased imports or decreased exports, further tightening the global food situation. The more countries that have not increased domestic production sufficiently to protect their poor from domestic production and hence the more come on the international market the higher prices will be driven and the greater the burden on the poor in remaining poor countries. In this context exporting countries that restrict exports in order to increase domestic supply are no different to importing countries that import for subsidised programmes either with their own resources or with foreign aid or borrowings. Protecting the poor in both cases concentrates the burden on the poor who are not being protected. Inevitably enough poor will not be protected to equate supply and demand.

If the problem of the poor was simply one of income and not one of food supplies, then the problem stated would not exist. All that would be needed is transfer of income to the poor who would then purchase food to meet their needs. In practice, however food is limiting—that is what drove up the prices in the first place.

What countries will not be able to stay in the game? Obviously the poorest ones. In practice that is Sub-Saharan Africa and perhaps a few Asian countries such as Nepal. These countries are generally still very poor. They are highly dependent on foreign aid, especially to avert famine. And, when global prices are up, indicating a general problem, food aid, the principal means of financing the food insecure, is sharply down because of budgetary constraints in the face of higher food prices, and also decreased political will in the high income aid supplying countries. Thus, shifting the burden to African countries occurs relatively easily relieving the upward pressure on food prices.

All this discussion indicates is simply that food security (and poverty) requires increased food production. Some countries may have a comparative advantage in producing non-food agricultural commodities, particularly including tropical export commodities. They can generate the purchasing power to buy food, but some countries must produce that food to export. Specialising is efficient with some countries producing a large surplus of food and others producing non-food agricultural exports to pay for food imports. But the food production increase must be there.

Where will the increased global food production occur? The high income countries do produce increasing exportable surpluses and will continue to do so at a modest and predictable rate. Those countries are at least moderately price responsive, so as prices rise they will increase exports—but at increasing privation to the poor. Perhaps the most important source of the contemporary imbalances is the retarded growth in the agriculture of the fast growth Asian countries, particularly India. Those countries have built moderately effective agricultural technology systems and much of the institutional structure for rapid agricultural growth. In the case of India rural infrastructure is undoubtedly a major constraint.

Perhaps most important once middle income status is achieved and agriculture has declined to 20 percent or less of the GDP, it still remains the principle driver of employment growth and poverty reduction. Note the skewing of income distribution in the fast growth Asian countries in which agriculture has lagged. However agriculture is only a modest contributor to GDP growth. Egypt is an example of a middle income country which with fast growth in all sectors, agriculture with its multipliers accounts for

some 60 percent of employment growth, but only 25 percent of GDP growth. It is not surprising if governments in those circumstances focus on GDP growth, and seeing the institutional complexity of accelerating agricultural growth simply opt out of those measures—although perhaps at a political cost of increasing disaffection amongst rural people in general and the rural poor specifically. However from the point of view of the global poor it is important that those rapid growth countries get back to accelerating their agricultural growth.

It is now fashionable to tout local procurement of food to meet the needs of the poor. However, if the local food supply is ample then simply providing income to the poor is an effective way to meet the problem. It is the type of situation described by Amartya Sen. If however the supply has declined locally food has to be brought from outside. Perhaps there is a nearby area in which supply has increased faster than demand. Then local procurement makes sense, but that is not the normal situation. Local procurement presumes that the problem is not one of food supply. Normally that is not the case.

VI. HOW TO INCREASE AGRICULTURAL PRODUCTION

Increased agricultural production in virtually all low and middle income countries comes from the small commercial farmer. That farmer has enough land to produce an above poverty level of living which means that at least half the output is sold off the farm, providing scope to finance purchased inputs and allowing specialisation in production. Those poor who own land in aggregate represent half of the rural poor and a quarter of the rural population but command only 10 percent or so of the land. They are not important to the agricultural growth rate.

Production growth occurs through resource productivity increasing processes. Increasingly world markets allow specialisation in high value commodities which allow large increase in incomes. Reducing cost of production through technological change is always preferred to raising prices.

However the critical distinguishing characteristic of rapid growth in agriculture is that it requires several major public goods that are not provided in the context of traditional slow growth agriculture. The small commercial farmer requires public goods because the small scale of operation does not allow the scale economies that are characteristic of the key inputs of technological change. The same is true of much of the private sector supporting farmers.

Sets of public goods are essential to rapid agricultural growth. They are stated briefly here to emphasise their public goods characteristics and the fact that a major effort is needed to build the institutions on a national scale for each of these categories.

Rapid agricultural growth requires facilitative policies and as growth occurs new policy issues constantly arise. There must be an institutional structure for setting strategy, priorities and sequences within that strategy and providing a base for monitoring progress and making modifications.

Agriculture grows, more than any other sector, on improved technology. Institutions are needed to provide a constant flow of cost reducing technology and massive extension systems are required to promulgate that knowledge. They must be linked so that the technical capacity of extension agents is constantly upgraded. As

development proceeds some extension and some research will be taken over by the private sector, but even in the most developed countries the public sector is critical to agricultural growth and a complement to the growing private sector research and extension. Most countries under invest in research [IFPRI (2007); Mellor Associates (1994); Beinterna, *et al.* (2007); Fuglie, *et al.* (2007); Pray, *et al.* (2001)].

As farmers commercialise they need increasing amounts of credit. Credit needs fluctuate greatly overtime and regions so a national system linked to global credit markets is essential. The private sector never meets these needs in early stage of development and over the long term a system developed initially under government auspices is an important part of a competitive rural finance system [Desai and Mellor (1988)]. On average farmers are net savers and so deposit mobilisation is a critical part of the process.

As agriculture commercialises, physical infrastructure, of course roads, but also rural electric distribution lines increase in important [Ahmed (1987)]. They are also vital to education and health (teachers and doctors live on all weather roads and commute, perhaps infrequently, to village not on such roads).

Particularly as perishables increase in importance farmer's organisations become crucial to all farmers competing in increasingly quantity and quality conscious marketing agencies (Reardon). They are essential to rural distribution of electricity and to a competitive rural financial system. Government initially plays an important role in achieving the near national coverage required for rapid growth.

Why have I emphasised the obvious on the importance of public goods to agricultural growth? Because foreign aid donors and to some extent nationals have become so private sector oriented that they have turned away from the only rural credit systems that work for small commercial farmers (micro credit is too expensive with loans too small and inadequate for this purpose) and from nationwide extension systems and to some extent even from national agricultural research systems.

Having emphasised the importance of public goods it is important to recognise that farming is a private sector business. Farmers are of course private sector. They are effectively served by a host of private enterprises, for input supply (fertiliser and pesticides), marketing of output, that are private sector and generally also relatively small. Thus they are unlikely to provide the public goods in a low income country even though in high income country such firms may be much larger and render some of the services stated here as public goods. But that comes later in the development process. The public goods must always be seen in the context of providing services to private sector enterprises.

VII. CONCLUSIONS FOR PAKISTAN¹

Pakistan has not been doing well in agricultural growth in recent years and as a result poverty reduction has more or less ceased. That is in the context of lengthy past periods of rapid growth, an extraordinarily favourable natural resource base, and

¹This section is based on several lengthy missions to Pakistan for the World Bank, Asian Development Bank, and USAID. I was fortunate to be part of a recent mission to Pakistan in November 2008 which allowed me to meet with a large number of senior academics, government officials, and private sector operatives both individually and in seminars and focus groups. Thus, this exposition represents in substantial part a consensus from those meetings.

considerable institutional development [World Bank (2002); Pakistan (2006); Punjab (2006); Punjab (2004); Punjab (2007); Naqvi, *et al.* (1989)]. Given that record it may be useful for an outsider experienced in a wide range of countries to make some observations. I start from the position that the successful high agricultural growth countries have achieved a four to six percent growth rate in agricultural production—perhaps a doubling from the present level in Pakistan [Mellor (1992)]. I single out four areas for immediate emphasis, policy, technology, farmer organisations, and infrastructure.

To act on these priorities the government of Pakistan must focus on the aggregate growth rate with small commercial farmers playing the central role and focus on the public goods and institutions essential to continuous cost reduction of both farmers and the successful private sector serving them.

Policy

Once one has a highly sophisticated agriculture as is the case for Pakistan, it is essential to have a critical mass of policy analysis focused on the agricultural sector. An institute capable of providing this needs to be autonomous but linked to where the action is—the Ministry of Agriculture. It could benefit from integrated technical assistance to help preserve its independence, to strengthen weak areas in national capacity, and to bring in the wealth of outside experience. There are enumerable problems that require analysis.

I have the impression that there is not a clear strategy, with priorities and sequences, focused on the quantitative acceleration of the agricultural growth that is needed to guide projects that take time in institutional development and commodity growth. Much of policy and on farm decisions are commodity specific. Thus their need to be commodity priorities to guide the sequences in the development of institutional capacity much of which has substantial commodity specificity. Those priorities must be determined by the contribution to aggregate growth that is the product of the base weight of the commodity set and the expected growth rate for that commodity set.

Then there are price policy problems, trade policy issues, and technical problems such as biotechnologies place (I believe Pakistan is the only major cotton exporter without a clear Bt cotton policy and hence lower yields and higher costs than competitors, hurting exports not only of cotton but also cotton products). There is need for monitoring and evaluation of a myriad of programmes to ascertain best practices. Experience is clear that agricultural policy research does not prosper when contained in multi-purpose research institutions. It needs a specialised institute. In all the meetings I attended nothing came through more clearly than the need for and the feasibility of such an institute, and the desirability of a foreign input. That is the centerpiece recommendation that comes from such analysis. It is worth underlining the impact of such an institute on employment with a somewhat artificial calculation.

If policy is universally seen as so important and one is trying to obtain an incremental three percentage points to the agricultural growth rate shouldn't one think of getting one percentage point of that from improved policy? Following the same methodology as in the country studies cited by Mellor and colleagues one estimates that would through the multipliers add one million jobs per year—providing for half of the

increments to the labour force. A final comment, some in the foreign aid community believe they know the answers to all the policy problems that matter and so the problem is simply one of political will. Note that the World Bank and Asian Development Bank have placed huge pressure, including making funds contingent on change in policy issues with little long term effect. Note that the international record in trying to change policy through withholding foreign aid have been ineffectual [Easterley (2009)]. Pakistan's own institutions have had some success in getting policy change [Niaz (1995)].

Technology

Pakistan has developed several research institutions for agriculture—both national and Provincial. The consensus is that they have not made steady upward progress and that they are weak on applied research, links to farmers and links for upgrading the technical competence of the extension system. Given the rapid pace of biotechnology the capacity in Pakistan has not been expanding at a rate commensurate with the long term opportunities. The extension system is considered weak but that may be due to inadequate operating budgets and to weak links to research which should link through trials on farmer's fields to upgrade extension. Foreign technical assistance would be invaluable in accelerating development of these systems.

Farmers Organisations

Pakistan has considerable potential in high value commodities—livestock and horticulture—indeed the bulk of the acceleration in the agricultural growth rate will be in these commodities. For the small farmer to compete, particularly as super markets make their inevitable entry to dominate food retailing in Pakistan, farmers must be organised. Only then can they meet the quantity and quality standards of export and supermarkets. It is essential to expand rural electrification distribution systems—cooperatives are the usual means of doing so. Rural financial markets require major expansion and reform, and again farmer organisation is normally a necessary condition for success.

Infrastructure

Is there a plan to place every village on an all weather road with electrification? A country such as Pakistan needs that. With a high growth rate so dependent on high value commodities that tend to be perishable roads and electrification are essential [Ahmed (1987)].

VIII. CONCLUSION

The contemporary shifting of demand for food more rapidly than supply and consequent upward pressure on prices is hugely deleterious to the poor. As in almost all food insecurity situations this one can only be solved in terms of the global aggregates by substantial increase in the rate of growth of agricultural production. The countries experiencing the rapid growth in demand must play a major part in this process—most have been lagging in agricultural growth over the past few decades. The principle bottleneck to increased supply is the set of public goods—policy analysis, technology, credit, farmer's organisations, and infrastructure—all of which are essential complements

to private sector farmers and the businesses serving them. Governments must of course leave the donor fad of favouring small unrelated projects, for focus on the aggregate growth and the national institutional capacity essential to that growth.

Individual countries may of course protect their poor by various programmes that ensure their supply of food. However those programmes require increasing the total supply of food either through export restrictions or import. Without those production increasing measures efforts to protect the poor only shift the burden to the poor of countries lacking full coverage of such programmes. Those will be the poorest countries, lacking their own resources and dependent on donors of food aid whose supplies become small with the rise in prices. Those countries are largely in and dominate sub-Saharan Africa.

As individual countries understandably try to protect their own poor, optimal programmes differ between urban and rural areas. In urban areas there is a wealth of analysis that clarifies how urban distribution programmes may be most efficient in targeting the poor. Those programmes involve some sort of rationing and price reduction for the poor. It is important that such programmes not widen urban rural income disparities, thereby increasing the migration to cities with a consequent loss of efficiency.

For rural areas guaranteed employment schemes are self selecting towards the poor and help solve the supply problem by creating roads and other productive infrastructure. Unfortunately lack of prior planning minimises the extent to which such programmes are utilised, particularly by the international agencies that supply so much of the food aid. Prior planning is needed to have standby programmes ready to go. For the regular suppliers and users of food aid it is unconscionable that such planning has not occurred.

The second programme for rural areas, rarely practiced, would be to develop specialised programmes to double the yields on the subsistence farms that are populated largely by the poor. On average those with farms too small to produce half the poverty level of income produce half their income from farming. They could achieve a 25 percent increase in real income through such a programme.

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Comments

I would like to congratulate PIDE on selecting the theme of food security for this year's Allama Iqbal lecture. The sudden onrush of the food crisis last year caused much concern world-wide, but especially in Pakistan, both because of the severity of the crisis and also because we do not have adequate social protection. A repeat of country wide protests because of food shortages, among all the other security issues we have to grapple with, is the last thing we want. Bringing clarity to the complex issues underlying food security—the simplistic preoccupation with food self-sufficiency a couple of decades ago resulted in waste and inefficiencies in agriculture—is thus timely and Professor Mellor's lecture is a significant contribution.

The lecture is a treasure trove of analysis, information and policy wisdom. Though only 15 pages long, it spans a whole spectrum of food security dimensions: on the inter-temporal dimension the paper distinguishes between short and long term impacts that open up the choice of policy instruments; on the trade regime dimension, the paper traces out the effects under an open versus a closed trade regime and the impact it has on prices and incomes; on the spatial dimension, the effects on rural households are separated from those on urban households and households in food surplus areas from those in food deficient or draught stricken areas; on the distributional dimension, we learn about differences in the impact on different categories of households distinguished by whether they are net buyers of food or net sellers, whether they are engaged in agricultural or non-agricultural activities. In short, we have a general equilibrium framework for food security consisting of at least four markets and as many or more categories of households that yields insights on prices, employment and income for each category of household. And we have all this richness without a single mathematical symbol in the entire paper; instead it is prefaced by a beautiful quote from Iqbal exhorting us to take our destiny in our own hands by using the beautiful analogy of collecting dew. A veritable feast!!

Hard pressed, I would say that there are two central messages of the paper: In the long run, the best form of food security is to increase agricultural output; both food as well as non-food. One lowers the price of food in both urban and rural areas and the other increases employment and raises incomes of the rural poor and results in increased ability to buy food. In the short run, the demand and supply gaps are best addressed via efficient management of food stocks, both at the global as well as the local level, and ensuring transportation to make food available across regions; for the very poor in both urban and rural areas, short term food security requires adequate social protection programmes that enable the poor to buy food.

This emphasis on food security for the most needy is appropriate. In this context we would do well to quote Iqbal again:

*Jis khet say dehqan ko muyassar na ho rozi,
uus khet ke her khoshai gandum ko jala do.*

I am sure Professor Mellor and I would both disagree with over-simplistic translations of this verse.

It is, of course, reassuring that the conclusions of the Allama Iqbal lecture and the Prime Minister's task force on food security led by Mr Sartaj Aziz are consistent. The task force report, written independently, operationalises the theoretical arguments put forward in the Allama Iqbal lecture and is quite specific in its recommendations. It defines food security in terms of the following three propositions:

- Raise overall agricultural growth rate to at least 4 percent per annum in 2010-2020.
- Evolve an efficient and equitable system of food procurement, storage and distribution to ensure that food is available at affordable prices throughout the year in all parts of the country.
- Improve the access of poor households to food by adopting a pro-poor growth strategy and providing non-farm employment on a substantial scale.

The task force report then identifies the key areas of reform to achieve food security:

- Policies and institutions involving credit policy, building overall capacity to design and implement agricultural growth strategies and passage of important pieces of legislation (Seed Act Amendment Bill, Plant Breeders Rights Bill).
- Agricultural strategy entailing diversification to higher value added crops, addressing the serious emerging water constraint and improving the quality for livestock.
- Food procurement, storage and distribution requiring focus on the likely fiscal burden of the support price of Rs 950 per 40 kg (Rs 23.75 per kg) compared to the cif price of Rs 800-850 kg (Rs20-21 per kg), and the procurement target of 8 million tons out of a much larger expected output of 25 million tons.
- Reducing poverty entailing the pursuit of strategies for greater employment.
- Safety nets implying adjustment of the Benazir Income Support Programme (costing Rs 34 billion and covering 3.2 million households) and the Punjab government programme (costing Rs 22 billion and covering 1.8 million households) with a total cost of Rs 56 billion is much higher than previous such programmes that never exceeded Rs 10 billion).

Thus between today's Allama Iqbal lecture that clarifies the theoretical underpinnings and the task force report that provides the operational details, we have the makings of a comprehensive strategy for food security. The rest is up to our capacity to implement well designed programmes—and that is a different story.

A discussant has to go beyond accolades so I will do my duty and raise a few questions to provoke a discussion:

While laying the foundations of the agricultural growth strategy, the paper points to the need for reviewing the pro-urban, pro-manufacturing bias of economic managers to bring back the focus on agriculture. I have two problems with this argument. One is that to my mind the policy bias is pro-consumption and not pro-manufacturing. We see this in a host of policy choices: exchange rate management, credit allocation, energy pricing, public investment in infrastructure, tax policies etc., all of which further exacerbate the Dutch disease problem originating in the domination of remittances in South Asian

economies. As a result, the manufacturing sector, especially manufactured exports, has been anemic and has not generated high productivity, high wage employment on a scale it is capable of—as demonstrated amply in East Asia where manufactured exports were the harbingers of structural change and creation of a solid middle class.

A discussion on food security—as defined in the Allama Iqbal lecture and the task force report—is the right place to focus on the vulnerability dimension of poverty in Pakistan. Several studies on poverty have identified the large clustering of the poor around the poverty line who rise above it in good weather and fall below it when rains fail. Employment diversification in the rural areas—both on and off farm—may well be the best course for reducing such vulnerability. A more explicit treatment of this aspect of poverty would be useful in a discussion of food security, agricultural growth and social protection.

If agricultural growth is key to addressing food security, what role does foreign direct investment have in it? Can we look to large retail chains like Metro—and others in the livestock sector—to provide the stimulus for improvement in crop quality and product standards? What policies are needed to ensure that such investors yield the benefits of scale economies in capturing lucrative foreign markets and contribute to increasing productivity, generating employment and raising wages for small farmers and non-farming rural households.

How should we begin to build climate change dimensions into agricultural growth and food security issues? What does this emerging problem—a lot of water initially as the Himalyan ice melts and little of it later—imply for the design of agricultural growth strategies? Which regions and pockets of rural households are most vulnerable to the impact of climate change and what can we do about it?

Given similarity in endowments and differences in R&D and innovation capacity, what can we expect to gain in opening up to India?

Finally, last year's food security crisis, revealed many gaps in the global knowledge about total food output (supply) and its take up (demand). Many would argue that while demand may well be outstripping supply in the medium term, the size and speed of the spike in international food prices was in the nature of a speculative bubble—a desperate and cruel attempt by international fund managers to gouge out surplus from the World's poor before the spectacular crash. This suggests a more careful monitoring of international commodity prices and some regulation to prevent such cynical speculative bubbles.

In conclusion, given our resources—one of the world's largest irrigation system, fairly well defined property rights, long experience in managing technological change, partners eager to engage with and support us—the world is right to expect us to be a part of the solution to the emerging world food crisis and not a major source of the problem. Today's Allama Iqbal lecture, along with Mr Sartaj Aziz's task force report, have clearly spelt out the challenges that need to be met. Let us rise to meet those challenges.

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Comments

- (1) The World Development Report 2008 underscores the vital role of agriculture sector in sustainable economic development, food security and poverty reduction. It argues that using agriculture as the basis for economic growth in agriculture-based countries require a productivity revolution in smallholder farming and that pathways out of poverty open to the rural poor by agriculture include smallholder farming and animal husbandry, employment in the high value agriculture production and supply chain, and entrepreneurship and jobs in the emerging, rural non-farm economy.
- (2) Dr John Mellor in his key note lecture on food security has stressed that the path to food security is through growth in agriculture production which leads to increased farm income reduced poverty and food security.
- (3) The issue therefore is not food security per se, but how to increase agriculture growth in an environment of resource constraint and high cost of inputs to achieve food security on sustainable basis.
- (4) The recent food crisis in the wake of global food insecurity underpinned the continuing importance of agriculture and need for its revitalisation to ensure sustained food security and broad based economic growth. According to the World Development Report [World Bank (2008)], cross country comparison shows that GDP growth.
- (5) Originating in agriculture is at least twice as effective in reducing poverty as that originating in other sectors of the economy and that agriculture continues to be fundamental instrument for sustainable development and poverty reduction in most agriculture based countries. The challenge is to make agriculture growth pro-poor and equitable.
- (6) In the context of declining sector growth, increasing incidence of rural poverty and food insecurity, the future agriculture sector strategy must address the systemic issues and challenges in the agriculture sector to reverse the current trend and create enabling environment for high growth trajectory by achieving a minimum growth rate of 4 percent per annum with strategic focus on small farmers and landless livestock holders or laborers on the one hand, and on competitiveness and sustainability of the agriculture growth, on the other. The strategy should also prioritise a short to medium term investment program to revitalise agriculture and rural sector.
- (7) Based on a number of sector strategy studies undertaken by the international and national experts in recent years and consultation with major stakeholders, the following sector issues and challenges are considered most critical.
- (8) *Food Security and Rural Poverty*: Past interventions and investments in agriculture sector particularly in the development and dissemination of green revolution technologies (seed, water and fertiliser) and investments in

irrigation and rural infrastructure have had high pay-off in terms improved productivity, food security, and poverty reduction. The relationship between agriculture growth and poverty has been less clear in recent years. The challenge is to make agriculture growth more pro-poor and equitable for which a well developed and functioning rural non-farm sector is important to generate employment, ensure income diversity and reduce poverty.

- (9) *Skewed Ownership of Productive Assets:*¹ The skewed ownership of productive assets, particularly land and water, poses special challenges for policy makers to ensure that the agriculture development strategy and policy framework, cater to the needs of both segments of the farming community. It is generally perceived that with the exception of green revolution era of 1970-1990, the agriculture policies and investments have largely benefited the large farmers. The challenge is to devise strategies which make agriculture growth more equitable. As well, the agriculture support services need to be tailored to the needs of multitude of small farmers and livestock holders.
- (10) *Deteriorating Terms of Trade in Agriculture:* The deterioration in terms of trade as a result of high input prices and low commodity prices resulted in little or no private investment in agriculture over the past several years. On the contrary, farmers tended to invest their agricultural income in other sectors of the economy. There is need to strengthen relevant policies and institutions to monitor the terms of trade for major crops and animal products to ensure food security and export competitiveness.

Poor Sector Governance: Poor sector governance including politically motivated investment decisions, undue favors, corruption, insecurity, and protracted litigation over land and water dispute poses major constraints to improved productivity and poverty reduction. Public sector bureaucracies with little or no accountability to stakeholders fail to deliver the critical support services to those who need them most. These services often relate to water delivery, research, extension, credit and marketing. The land and water disputes, in particular, lead to protracted litigation and consume a significant chunk of farmers' time and income. Improving governance is therefore crucial for improved productivity and poverty reduction.

- (1) *Agriculture Markets and Trade Policies:* Direct Government involvement in marketing and trade of agricultural commodities while necessary to stabilise prices and avert market failures, must be kept to minimum. They entail large financial losses and discourage private sector investment in storage and trade infrastructure. Instead, the concept of private sector-led Farm Service Centers and farmers associations is promoted to increase farmer's market power for production and marketing of agriculture commodities, particularly perishable high value products (e.g., fruits, vegetables, meat, milk, and dairy products). The trade policies to promote export of these products need to address the constraints relating to sanitary and phytosanitary (SPS) measures in

¹A large number of small and subsistence farmers (86 percent of 6.6 million farm households) owning less than 50 percent of the land and water resources; and a small number of large farms (14 percent of total) with more than 50 percent of the resources.

compliance with WTO and/or importing countries' requirements and provision of supply and cool chain infrastructure.

- (2) *Improving Public Service Delivery:* The rural public service delivery is highly fragmented with major components allocated across the various levels of government requiring a concerted effort to coordinate government's agriculture and rural development efforts. Improvement in public service delivery in dispute resolution of land and water, provision of agriculture support services, irrigation water, health, education, water supply and sanitation is pre-requisite to improve agriculture productivity and quality of life.
- (3) *Improving Water Use Efficiency:* is sine qua non for sustainability of agriculture in Pakistan. The current water allocations, water pricing and irrigation systems are outdated and inefficient resulting in low productivity per unit of water and land. The water delivery system is subject to tempering and abuse by the influential and powerful due to poor governance and leads to lingering water disputes and litigations. All these problems call for major reforms in water allocation, distribution, and pricing system to improve water use efficiency and improve water productivity. In the meantime, urgent measures are needed to improve water use efficiency at the farm level through laser land leveling, bed planting, zero tillage, substitution of high delta crops such as sugarcane with low delta high value crops such as oilseeds and pulses, adoption of low delta/aerobic rice production technology, high efficiency irrigation systems high value crops, carps, etc.
- (4) *Institutions and Policies:* The current state of many agriculture research and policy institutions is too weak to address the current and emerging challenges of agriculture. They suffer from both technical and financial constraints as a result of neglect over the past two decades and are unable to deliver new agricultural technologies (transgenic and hybrid varieties of commercial crops, fertiliser and energy efficient farming practices, water saving technologies, etc.). Policy instruments (relating to agriculture terms of trade, pricing and subsidies, IPR, SPS, WTO, etc.) to enable Pakistan to compete in globalised world. There is therefore urgent need to address these constraints by strengthening the relevant institutions both at the federal and provincial level.
- (5) There is a need for a more coherent and integrated agriculture sector strategy which includes crops, livestock, horticulture, water, rural development, forestry and fisheries to address the issues and challenges referred to above. The strategic interventions should therefore focus on the following:
 - (a) Improving the productivity, competitiveness, and sustainability of agriculture production systems with emphasis on small holders through better crop and animal husbandry, accelerated adoption of quality seed, resource conservation technologies including efficient use of water and fertiliser, recycling of crop residues in soil, zero tillage, laser leveling, bed planting, and integrated pest management etc.

- (b) Making agriculture growth pro-poor through diversification into high value agriculture with value addition and supply chain (livestock, horticulture), and generating non-farm employment by promoting agro-based rural enterprises (SMEs).
- (c) Ensuring fair price to farmers (improved terms of trade and effective procurement arrangements at government fixed price).
- (d) Improved access to agricultural credit and other public and agriculture support services.
- (e) Development of market infrastructure and related policy reforms.
- (f) Food safety and compliance with international quality standards (SPS).
- (g) Demand driven agriculture research and extension system for development and dissemination of new technologies and innovations.
- (h) Strengthening of the sector policies and institutions with focus on good governance, resource poor small farmers, landless livestock holders, women, and environment.

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