

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 ones country. At least in the modern world ones 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 ones 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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