

JOHN W. MELLOR

Lectures on
AGRICULTURAL GROWTH
AND EMPLOYMENT

**An Equitable Growth Strategy
and its Knowledge Needs**

with comments by
Syed Nawab Haider Naqvi

Editor:

Syed Nawab Haider Naqvi

Co-editor:

M. Ghaffar Chaudhry

Co-editor for this volume:

Sohail J. Malik

Literary Editor:

Aurangzeb A. Hashmi

Biographical Sketch

JOHN W. MELLOR has been the Director of the International Food Policy Research Institute (IFPRI) since 1977. Previously, he was Chief Economist at the United States Agency for International Development, and before that, Professor of Economics, Agricultural Economics, and Asian Studies at Cornell University (USA). Dr Mellor, a U.S. citizen born in Paris, France in 1928, obtained Ph.D., M.Sc., and B.Sc. degrees from Cornell University in 1954, 1951, and 1950, respectively, and a diploma with distinction in 1952 while a Fulbright Scholar at Oxford University.

Dr Mellor is known as one of the earliest proponents of agriculture's role in leading the way to overall economic growth in developing countries, an approach he has helped to empirically establish through the several books and more than 100 articles he has authored, co-authored, or edited. His current research deals with a variety of subjects, including the present global food surplus, labour productivity, and credit policy issues.

He has won numerous honors and awards, including the Wihuri Foundation's International Prize in 1985, the first social scientist to win this award, and the 1987 Presidential End Hunger Award.

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LECTURES IN DEVELOPMENT ECONOMICS

The purpose of this new series is to create useful knowledge about development economics and to disseminate it widely. It is not possible to prescribe exactly the topics that will be discussed in this series. Indeed, it would not even be desirable to do so because this subject is still developing. The mystery of the development process is not yet fully understood. The days of chivalry, when economic development was seen as simply a function of physical capital formation, are gone. The importance of such factors as human capital, education and religion as determinants of both the rate and the composition of economic growth is now gradually recognized. And then there are the efforts to understand more clearly the relationship between economic growth and income distribution, In this connection, the vital role of structural reform is also being realized. The practical (social and political) requirement of alleviating the incidence of absolute poverty has brought to the fore the key role of agricultural development. Furthermore, there is now a greater awareness of the importance of endogenizing the demographic variables in order to understand fully the problem of underdevelopment as well as the many ways of solving it.

In direct proportion to the comprehension of these issues, the intellectual fashions have changed among economists. And there are no signs — a healthy sign, of course — that economists will remain far behind Valley Girls in their love of fashion. As such, we have left it to the contributors to this series to decide on the topics of their lectures. Still, it is to be expected that economists, as if guided by an 'invisible hand', will select areas of enquiry that are most relevant not only theoretically but also for practical policy-making.

The contributors to this series are all members of the Advisory Board of the Pakistan Institute of Development Economics (PIDE) and of the Editorial Board of *The Pakistan Development Review*. The visits of these outstanding economists have been made possible by a generous grant from the Ford Foundation, which is administered by the Institute of International Education (IE), New York. It is to be hoped that the success of this series, which we can predict with certainty, will lead to greater financial support from the Ford Foundation and other donor agencies. Even more important is the 'fact' that these contributions will serve the cause of knowledge formation in an area where its marginal productivity is most likely to be optimized.

The present lecture by Prof. John W. Mellor is the seventh in the series. Prof. Mellor, a member of the International Editorial Board of *The Pakistan Development Review (PDR)*, is an outstanding authority in the general area of Agricultural Economics. It is in this area that his intellectual contributions are most noteworthy. The two lectures published here, along with the lively discussion that follows, should be of great interest to academic economists and also to policy-makers. It is hoped that this publication will be read with interest throughout the world by the concerned social scientists.

Syed Nawab Haider **Naqvi**

**INTRODUCTORY
REMARKS**

by

Professor Syed Nawab Haider Naqvi

INTRODUCTORY REMARKS

by

Professor Syed Nawab Haider Naqvi

Professor Mellor, distinguished guests, ladies and gentlemen;

It is my pleasure to briefly introduce, in the next ten minutes or so, our distinguished speaker in the PIDE/PSDE series of Lectures in Development Economics.

Professor John W. Mellor is one of the leading lights in the foggy area of agriculture economics. His work, along with that of a few others, is largely responsible for lending legitimacy and respectability to agriculture economics as a distinct and important field of enquiry in its own right—indeed, for bringing agricultural economics within the fold of the highly cultivated culture of economics. I am sure that there would not be many serious graduate students who have not benefited from his seminal contributions to the subject which are invariably marked by an exceptional degree of expositive lucidity. I myself had the privilege of reading his many articles as a graduate student at Princeton.

Professor Mellor is currently the Director of the International Food Policy Research Institute. — IFPRI, for short — at Washington, D.C., a position that he has held since 1977. To get there he has had to work hard. To begin at the beginning, he entered Cornell in 1950 as an undergraduate student and did not really leave Cornell's precincts till 1977. His first (intellectual) 'crush' on Cornell culminated in his accepting a lectureship there in 1952. He obtained his Ph. D. in 1954.

In the meantime, as if to inhale some fresh air, he also went to Oxford University from where he obtained a diploma in agriculture economics with distinction. He reached the apex of the academic profession — won full professorship — in Agricultural Economics in 1965.

While establishing himself firmly as a first-rate academic, he also started accumulating a lot of academic-cum-administrative experience. He was Acting Director, Centre for International Studies, and Director of the Program on Comparative Economic Development, and Chief Economist and Associate Assistant Administrator for Policy Development and Analysis with USAID. He has also been the Director of several important research projects, including the USAID and Cornell University projects on "Agricultural Prices in Economic Development: Their Role, Function and Operation" and the "Analysis of the Direct and Indirect Effects of Technological Change in Agriculture". As Director of IFPRI, Professor Mellor has been instrumental in furthering research ties with several institutions in the developing world, including our own. With our mutual blessings, the PIDE-IFPRI collaboration has already given birth to a full-length study, *Household Food Security in Pakistan: The Ration Shop System*. I am sure that time will confirm that the institutional collaboration between the PIDE and IFPRI is more than just a marriage of convenience.

Professor Mellor has published more than a hundred research papers and several books that have helped to bring about a "structural transformation" in the realm of agricultural economics (see Appendix A for a list of his complete works). In recognition of the many shining landmarks that he has created for the students of the subject, a grateful academia has showered on him many an honour and award. In 1967, he won "the best published research award" of the American Agricultural Economics Association for his pioneering work, "Towards a Theory of Agricultural Development". In this paper, he takes issue with the accepted litany of the Lewis, Fei-Ranis models on the ground that these models "tend to minimize the difficult problem of how surplus is extracted from agriculture" (p. 25). On the other hand, the Jorgenson model is found wanting because, contrary to all empirical evidence, it "emphasises a situation in which the entire agricultural population is

living at minimum subsistence levels" (p.26). But he does glean from the Lewis model the key role of food as a wage good, and from the Jorgenson model the central importance of technological change in the agricultural sector, Both these ideas are put to good use in Professor Mellor's own model, In 1978, the American Agricultural Association honoured him by recognizing his book, *The Economics of Agricultural Development*, with the award of "publication of enduring quality". The book has since then passed the stiff 'endurance test' prescribed by the academic profession for classics. Most of the ideas that he later elaborated are stated there. Again, in 1986, the Association bestowed the "enduring quality" award on his seminal paper, with Bruce Johnston, that appeared in the *AER* in 1961 and was largely responsible for defining the state of the art at the time by dispelling the "false dichotomy of agricultural versus industrial development". A major contribution of this paper was its thesis that to free the (agricultural) leviathan from the chains of Ricardian diminishing returns, agricultural productivity must be increased through technological change. His "constructive work which has remarkably promoted and developed the securing of nutrient supply for mankind" won him the Wihuri International Prize in 1985. He is the first social scientist to win this prize. In 1987, he received the Outstanding Alumni Award from his *alma mater*; and in the same year, he won the Presidential End Hunger Award. To have won so many awards for breaking new ground in the 'labour abundant' and 'capital scarce' discipline of agricultural economics is a truly great achievement.

Professor Mellor has spent a lifetime analysing the nature and role of agriculture in the process of economic growth and attempting to determine "the scope for synthesizing an agricultural role into the mainstream of development thought".¹ He has persistently argued "for treating agriculture as a separate delineable sector in the theories of development"² because the growth of agriculture depends not only on the sector itself but also on what happens in the rest of the economy.

¹John W. Mellor. "Agriculture on the Road to Industrialization". Ch. 2 in J. P. Lewis and Kallab (1986). *Development Strategies Reconsidered*. Overseas Development Council, p. 67.

²John W. Mellor. "Towards a Theory of Agricultural Development". In H. M. Southworth and B. F. Johnston (1969). *Agricultural Development and Economic Growth*. New York: Cornell University Press, p. 21.

By thus delving deeper into a lot of virgin territory, he has helped to understand the "dynamic balance between food supply and demand". He has focussed specifically on increasing the supply of food to mobilize labour and to contain the rising capital intensity in developing countries; on the inevitability of introducing technological change to roll back the onslaught of the Ricardian diminishing returns; on the need to increase rural employment to stimulate growth in the non-agricultural sectors by restructuring effective demand in favour of wage goods; on the necessity of achieving a better allocation of scarce capital resources between agricultural and non-agricultural activities; and on studying the effects of changes in food prices on agricultural output and rural poverty.

He emphasized quite early in his academic career the need to study the relationship between agricultural and non-agricultural sectors, and to build empirical bridges between these sectors to facilitate an understanding of the "nature of agriculture's role in the process of economic growth". In his classic paper of 1961 he clearly recognized that "economic development is characterized by a substantial increase in the demand for agricultural products, and failure to expand food supplies in pace with the growth of demand, can seriously impede economic growth". This is so because "if food supplies fail to expand in pace with the growth of demand the result is likely to be a substantial rise in food prices leading to political discontent and pressure on wage rates with consequent adverse effects on industrial profit, investment and economic growth".¹ The concern for increasing food supplies as a means of mobilizing rural labour force has since then remained a central theme in Professor Mellor's thinking on the subject.

In his authoritative 1984 paper, which he terms a "lineal descendant" of his 1961 article, he cites yet another basic reason why the growth in the agricultural and non-agricultural sectors should be seen as interdependent. Recognizing that "extremely low capital/labour ratios in the dominant rural sector are at the heart of the development

¹B. F. Johnston and J. W. Mellor. "The Role of Agriculture in Economic Development". *American Economic Review*. Sept. 1961. (pp. 571, 573 respectively).

problem",⁴ a dualistic pattern of development which concentrates capital in the modern manufacturing sector is seen as counterproductive. He, therefore, prescribes that scarce capital resources be 'spread' between sectors to optimize overall growth. He argues for a "food- and labour-intensive" development and shows that the increased production of food plays the role of promoting a pattern of effective demand which is consistent with the low capital/labour ratios in developing countries; as well as the role of providing wage goods essential to labour mobilization.

Professor Mellor's intellectual odyssey, in the forbidding and dense area of agricultural economics, of which I have just recounted the basic dimensions, has had but one overarching conception as his guide, namely, to relate agricultural and overall economic growth to the reduction of widespread poverty and hunger. Indeed, he is one of very few economists who have understood the complexity of the problems of relating economic growth to poverty. He shows his full awareness of this problem in his 1984 article, wherein he states that "the reduction of malnutrition and related manifestation of poverty requires a set of interacting forces, characterized as a ring, that link nutritional need, generation of effective demand for food on the part of the poor, increased employment, a strategy of development that structures demand towards goods and services which have an employment content, production of wage goods and an emphasis on growth in agriculture" (p. 533). What Professor Mellor is stressing is that, in order to make an impact on poverty, economic growth must focus on a strategy which is essentially "agriculture-led" and (rural) "employment-led". Notice that this is not exactly the same thing as the "balanced growth" strategy, which he whole-heartedly advocated in his 1961 paper to promote agricultural and industrial development. This transition in his thinking reflects a refinement of his earlier ideas based on nearly three decades of exhaustive research in the developing countries, especially India — where, incidentally, he also found his "better half". While accepting that the eventual transition of underdeveloped economies from

⁴J. W. Mellor and B. F. Johnston. "The World Food Equation". *Journal of Economic Literature*. June 1984. p 551.

a predominantly agricultural to a predominantly industrial-cum-services economy must take place as the economy moves up the development ladder, he has come to realise, even more than in the past, the virtues of his first love, namely agriculture, in maximizing growth and employment.

And in order to prove that his love for agriculture (and food production) is not merely an infatuation, but is based on "rational" grounds, he has made several important contributions. Notable amongst these is the 1981 Lele and Mellor study, which showed labour supply as a function of the separate but related food and labour markets.⁵ Out of this Lele-Mellor symbiosis has been born a clear understanding of the crucial relationship between the need for expanding agricultural employment and of increasing the production of the wage good, i.e., food. As higher agricultural employment puts greater income in the hands of the poor people who tend to spend 60 to 80 percent of their incomes on food, a failure to increase the output of food would raise food prices, which is undesirable because *a higher price of food is poverty-increasing*.⁶ Hence, the need for achieving "a high-level equilibrium between food production and employment", which Mellor justifies both "on social-welfare grounds and because it leads to a higher overall rate of growth".

Ploughing ever deeper, Professor Mellor parts company with the traditional Lewis and Fei-Ranis formulations, which model developing countries as 'blessed' with highly elastic, "unlimited supplies of labour", possessing zero, or very low, levels of productivity. In the Lewis and Fei-Ranis models, since the surplus agricultural labour lives on the margin of subsistence, no additional food (wage goods) supplies are needed to mobilize labour for employment in the manufacturing sector, which is seen as essentially a capital-intensive activity. Thus the employment growth in these traditional models is constrained by the availability of capital. Not so in the Mellor model, in which "if food supply

⁵Uma Lele and John W. Mellor. "Technological Change, Distribution Bias and Labour Transfer in a Two-Sector Economy". *Oxford Economic Papers*. November, 1981.

⁶Mellor showed in his 1966 paper that a higher-price food relative to non-agricultural goods also turns the (domestic) terms of trade in favour of agriculture, which is undesirable for a number of reasons-e.g., it redistributes income in favour of a low-saving sector and it discourages the flow of rural labour to urban jobs.

is not expanded, increased employment will cause the price of food to rise, squeezing the real incomes of labourers back nearly to the previous level, reducing the incentive to work, placing upward pressures on wages, and reducing employment".⁷

To summarize, the "agriculture- and employment-led strategy" that Professor Mellor has finally settled on has three essential interacting elements. Given the constraints on the available land area, the proposed strategy hinges on "land-augmenting" technological change designed to increase both output and employment because the production techniques it throws up would tend to be less capital-intensive than those found in the non-agricultural sector. Accelerated growth in rural employment due to appropriate technological change would stimulate the demand for non-agricultural output. And, finally, the overall structure of demand for goods and services would be orientated towards more labour-intensive activities to contain the undue rise in capital-intensity and to maximize employment generation. In his model this is assured partly through the nature of technological change in agriculture, the dominant sector, and partly through the linkages between agriculture and the rest of the economy.

For *Hamlet*, the play itself, I now call upon Professor John W. Mellor. I also take this opportunity to congratulate Professor Mellor on finally completing his long march (or shall we say *Yatra?*) from India to Pakistan, via Washington!

⁷John W. Mellor. "Agriculture on the Road to Industrialization". Ch. 2 in J. P. Lewis and Kallab (1986). *Development Strategies Reconsidered*. Overseas Development Council, p. 77.

Lecture I

**AGRICULTURAL GROWTH
AND EMPLOYMENT**

*Lecture I**

AGRICULTURAL GROWTH AND EMPLOYMENT

Professor Naqvi, Dr Chaudhry and distinguished guests:

The growth record in Pakistan has been admirable, particularly compared to other countries at roughly the same level of per capita income. But, more important to the theme of my lectures, the growth of agriculture has played an important role not only in its direct contribution to overall growth, but in its indirect effects. It is those indirect effects on both overall growth and particularly on employment that I will emphasise in my lecture today.

I begin with a basic idea about agricultural and employment growth: if you get agriculture growing rapidly and if you have employment growing rapidly, you have done the basic job of economic growth and development. If those two elements in the process are moving well, the bulk of the population is participating in growth. That is basically what development is all about.

Conversely, in countries achieving growth largely or solely through the non-agricultural sector and hence largely with very low employment growth rates, both overall rates of growth and participation in growth are low. Such countries may look quite successful in terms of the appearance of modernization, but that appearance is deceptive by the appropriate development measures of growth and participation. I would like to deal with a number of what may seem to be simple and well known points—but ones so fundamental and yet so often ignored that it is useful to discuss them systematically.

This and the following lecture are based on a series of lectures delivered at the Pakistan Institute of Development Economics, Islamabad, Pakistan in December 1986. The author appreciates the assistance of Frank Z. Riely and Sohail J. Malik for their substantial work on these lectures.

While emphasizing the fundamental nature of the agricultural sector in growth, we want to be very careful not to jump to particularly important wrong conclusions about the long-term position of agriculture. The reason for emphasizing agriculture is not that we want it to remain the dominant sector of the economy, but precisely because emphasis on agriculture can move the process of transformation of the economy away from agriculture more rapidly than any other initial emphasis.

Development is basically concerned with changing consumption patterns such that the agricultural commodities, particularly food commodities, rapidly decline in *relative* importance in consumption. People want to consume much more than food in their consumption patterns — more housing, clothing, and a whole range of modern goods and services. Thus, with development, agriculture must decline in relative importance in the economy. And, we also note that we cannot absorb more than a small proportion of the growing population in agriculture. Agriculture will not be able to productively employ even the large number of people already working in the sector at very low levels of productivity. The structure of employment has to change rapidly towards a high proportion of the population in the non-agricultural sector.

So when we talk about the relationship between agriculture and employment growth in overall growth, what we are concerned about is the initial role of agriculture in a process of transformation. Now that is very confusing to a lot of people. Many people think that if the objective of development is to transform the economy towards the non-agricultural sector, it seems rather strange that one would start by emphasizing agriculture. I will, of course, deal with a number of reasons why that movement is necessary. But let me just provide one rather normal number to you to drive home this point about the economic transformation.

From the employment point of view, we would have to consider it very fortunate indeed if the elasticity of employment in agriculture with respect to growth in agriculture was as high as 0.6. In other words, if for each one percent of growth in the agricultural sector you can get 0.6 percent growth in agricultural employment, that would be a very high

number. Indeed, with the increase in modernization of agriculture, we find many situations in which that employment elasticity is as low as 0.2 or 0.3. If you think in terms of normal ceilings to agricultural growth being in the 4 and 6 percent range, you can see that it is virtually impossible for agriculture to productively absorb even the full growth of population in a developing country. With a 6 percent rate of agricultural growth and an elasticity of 0.6 percent, direct agricultural employment could grow at a rate of 3.6 percent, but these conditions are not likely to be obtained anywhere over a period of time. Thus, agricultural growth alone certainly cannot provide a high level of productivity for all of the existing population in agriculture.

We should keep one other point about development in mind in this respect: what we are pointing towards is getting up into the 6, 7, or 8 percent rates of overall growth in the economy. There is no way that agriculture alone can provide such rates of growth. It can contribute only through relatively rapid growth on its own and then through stimulation of other sectors which must then grow at a faster rate than agriculture.

I will briefly discuss three points with respect to agriculture and employment relationships: first, the relationship with respect to wage goods; second, the relationship with respect to the structure of demand in the society; and, third, the direct relationship with poverty.

I start with the wage goods argument. Basically, in a developing country with a major agricultural sector and with a relatively low-income labouring class, you cannot increase employment without rapid growth in the domestic production of agricultural commodities. Not even trade can save the economy from the problems which are presented by failure in agriculture. I will dwell on each of those points sequentially,

Let us start with a simple one which we all understand. The marginal propensity to spend on food of low-income labouring class people is very high — on the order of 60 to perhaps as high as 80 percent. This means that if you increase employment in a low-income developing country, you inevitably increase the demand for agricultural commodities, and

foodgrains in particular, by the extent of 60 to 80 percent of the incremental wage bill. In the early plans of the Soviet Union and the second 5-year plan in India, there was a view that you could increase employment by marshalling the underemployed labour in the economy with their existing level of food consumption and use them to produce capital goods. I think we are all clear now that that simply is not possible.

If you marshal underemployed labour in the agricultural sector for growth in other sectors, you have to induce them to provide that labour through an increase in the total wage bill. That increase in the wage bill will be largely spent on agricultural commodities. Now, what happens if you increase employment at a substantial pace and do not increase the supply of wage goods or, in other words, if you do not increase agricultural production? Obviously, what you get are very powerful inflationary forces. If you increase the wage bill, that increase will be spent largely on food. If the supply of food is not increased, those additional expenditures will naturally increase the price of food. Since demand for food is quite price inelastic, even small increases in the wage bill will tend to give substantial increases in food prices.

Following a neoclassical argument, we can see how that will choke off the growth of employment. Rising food prices, in order to keep equilibrium with respect to the labour force, will force a rise in the wage-rate of labour relative to what labour produces in the form of non-agricultural commodities. That will in effect make labour relatively more expensive than capital. The economy will, in a neoclassical context, move gradually into substitution of capital for labour, reducing the demand for labour. There will be two subsequent effects.

Obviously, a poverty effect follows a reduction in the demand for labour: there is a reduction in opportunities for increases in the real income of the labouring class. There is also a growth effect. The economic growth rate will be reduced because you are moving your economy away from the utilization of labour which is an abundant resource towards the utilization of capital which is a scarce resource. That is clearly a sub-optimal solution.

I make a small technical comment in this respect. The way to look at the whole question of wage goods in labour mobilization in a developing economy is in the context of a two-market situation. The labour market is, in effect, the product of the labour market *per se* and the food market. The supply of labour is highly-elastic; its demand depends on a whole range of variables including the pace of capital formation. But the labour market also is a function of the wage goods (food) market, with its own supply and demand. Final equilibrium is an equilibrium between these two markets — the labour market and the food market.

Thus, in a country like Pakistan, one faces a highly elastic supply of labour *per se* and may, a point I will cover in a moment, face an inelastic supply of food. If the supply of food is inelastic and we look at the equilibrium between the labour market and the food market, we then find the inelasticity of the food market enforcing on overall inelasticity in the labour market. That is something which is very important to keep in mind and to which we will return.

I have been running through a more than one century-old neo-classical explanation of why you cannot increase employment faster than the growth in the basic supply of wage goods. The presentation is in a closed economy context. I will give a trade modification to that in a moment. But first I must point out that very few countries operate in a neoclassical way. Instead of the rising price of wage goods pushing up the price of labour with respect to the output from labour and so on, what normally happens is that governments respond to the rapidly rising wage goods bill (food prices) because these inflationary forces pose serious economic problems and, not least of all, political problems. The government will then normally institute an anti-inflationary policy either through monetary or fiscal measures.

The only way those measures can succeed, which will always be glossed over by the political system, is by constraining the growth of employment. That will be done by a tight fiscal policy (cutting back government expenditures and the employment growing from government

expenditures), or a tight monetary policy doing what it always does first — constraining the supply of working capital. Firms that are labour-intensive tend to be materials-intensive also and hence are particularly vulnerable to any reduction in working capital.

Thus, a tight monetary policy will constrain expenditure on employment by private firms and businesses and even farms. An anti-inflationary policy, in this context, has to be an anti-food consumption policy and, therefore, is an anti-employment policy. Of course, it is not government's preferred choice to reduce employment, but through the pressures on them to relieve inflationary forces, they have to move on that front. Obviously, if inflation is rising from some source other than increased employment, then the anti-inflationary forces need not work through employment. But clearly if the source of inflation is rising food prices, then the government must operate on the employment front.

Now, what about the possibility of dealing with the wage goods problem by imports? We know that, in a sense, that is possible because countries like Singapore and Hong Kong have managed to increase employment very rapidly without a vigorous agricultural sector. For all practical purposes, they do not even have an agricultural sector.

We must understand however that in a large country in which you have a large agricultural sector and a large underemployed labour force — neither of which applies to the city states like Hong Kong or Singapore — if you move employment at a pace more rapidly than the domestic production of wage goods and try to meet the resulting gap with imports, you very shortly find the import magnitudes so large that you gradually have an impact on the real exchange rates.

You quickly, in a matter of two, three, four years, see imports of agricultural commodities, wage goods as we are calling them here, moving to a level which pushes up the aggregate amount of imports. That will cause a trade and balance-of-payments imbalance which finally affects the real exchange rate. That will then push up the price of food. That holds even though the international price is stable and even though you have a very minuscule effect on total trade in agricultural commodities. The domestic price effect is caused purely by the exchange rate

effect from rapidly increasing food imports. You obtain a real exchange rate that has the effect of raising real food prices and, therefore, the real price of labour. Some counter-measures are likely to be taken, either through neoclassical forces working through the market or, more likely, through government actions to restrain food imports. In the latter case, the domestic price rises directly in response to reduced imports or through anti-inflationary fiscal or monetary policies of the type previously discussed. Either way, employment is squeezed.

We have seen these forces very clearly in African countries in the last decade. There you have had rapid growth of employment basically stimulated by massive foreign assistance which is driving up demand for home-goods. Countries try to keep food prices down in that context by moving heavily into the import market. Imports of food grow very rapidly. That eventually affects the real exchange rate and therefore pushes up the domestic price of food.

The World Bank and various other institutions have been berating Africans for not doing something about raising their real food prices, never noticing that the real food prices in most African countries have been rising rapidly, essentially through more or less neoclassical forces of the type which I have just outlined. Thus, we see potential for a substantial wage goods problem in developing countries if they try to increase employment rapidly.

Now, let us turn the argument around. What if, in fact, the agricultural sector is moving at a reasonably rapid rate but the economy is not experiencing sufficiently rapid growth of employment? What policies are needed to accelerate growth in employment? What is the role of agriculture in that context?

Accelerating growth in employment in a developing country is basically a dual problem. The first element of the problem is expanding the savings and investment rates. Development in the final analysis is substantially a matter of increasing capital intensity. In fact, if you define capital broadly so that it includes human capital, including

expenditures on the development of institutions such as research in agriculture and in other sectors, then the whole process of development is a process of increased savings, increased investment and, gradually, increased capital intensity. So if we want a rapid rate of growth in employment, eventually at least, we have to move to higher saving rates.

At least in the long run, this is a serious problem for Pakistan. Pakistan has an unusually low savings rate even compared to countries achieving a considerably slower growth rate. Of course, with such a vigorous small- and medium-scale sector in Pakistan, it is likely that the savings and investment figures are both understated somewhat, simply because a lot of savings and investment is occurring in sectors in which it is difficult to enumerate and estimate in national statistics. But even with an adjustment for such under-reporting, it is probably correct that Pakistan's savings rate is on the low side and, therefore, a source of concern.

But, there is a second aspect to the whole question of providing capital to increase employment. That is the capital spreading problem, It is typical in developing countries to have a high proportion of the nation's capital concentrated in creating employment for an extremely small proportion of the total population — a concentration of capital in a few large-scale, highly capital-intensive industries — thereby leaving a small amount of capital to be spread extraordinarily thinly over the rest of the labour force.

I want to emphasize that the capital-labour ratio in production is the quantity of capital divided by the quantity of labour. So it is incorrect to talk pejoratively about developing countries following capital-intensive strategies of development. The problem is not that the strategy is capital-intensive. The problem is that the strategy is bimodal — the increments to investment are divided very unequally and part is invested in very capital-intensive processes and part in labour-intensive processes.

The serious problem in developing countries is that commonly a very large part of capital is concentrated in a very few capital-intensive industries, therefore, leaving a very small part spread very thinly for the

rest. In fact, one can argue that in a number of developing countries, there may be declining capital intensity for the bulk of the labour force in those countries. This may well be the case in India, it is almost certainly the case in the Philippines, it probably has been historically the case in China for a considerable period of time.

In these circumstances, there is so much concentration of capital in the capital-intensive industries that the amount of capital left over is not sufficient to absorb even the population growth in the rest of the economy, let alone allow any gradual increase in capital intensity. That is the antithesis of economic growth and development. We know very clearly from the work of J. R. Hicks that it is an absolutely suboptimal situation. Even though Hicks did not emphasize the problems of developing countries, he did observe that dualism in investment patterns resulted in much less employment growth than might have been the cases.

We must realize that the problem of capital spreading is not an easy problem to solve. We know there are a number of industries in which the most capital-intensive processes, ones that use a huge amount of capital per worker, are the lowest-cost processes even if labour is virtually free.

Perhaps the best example is fertilizer production. If you are to produce fertilizer, no matter how cheap your labour is, the low-cost process is going to be an extremely large-scale plant with an extremely capital-intensive process. We very recently had a controlled experiment on this in the People's Republic of China where they tried to produce fertilizer on a small-scale basis. They, of course, had extremely low-priced labour. Nevertheless, they ended up with a cost of producing nitrogen that is on the order of several times higher than nitrogen produced in large scale, capital-intensive plants built in China itself. In other words, they had a controlled experiment that showed very clearly that the lowest cost technology even in low labour cost countries is in the highly capital-intensive processes. Therefore, you have a very difficult problem if you find, as we do, that modernizing agriculture requires rapid growth in use of commercial fertilizers. How do you handle that situation? Trade provides the answer, another issue to which we will shortly return.

Another example of an innately capital-intensive industry is electric power generation. We find that generating power is done much more cheaply through capital-intensive processes, no matter how cheap labour is. And we find, for example, that probably the single most important input into many small-scale industries in developing countries is cheap electric power. We find all sorts of very labour-intensive industries still needing electric power if they are to compete with other industries. And we know of no way of producing electric power except through capital-intensive processes. We also find that, for all practical purposes, electricity cannot be imported. Thus, the question of capital spreading is not one that can be solved entirely by choice of technique. Some capital-intensive goods must be produced domestically. Development cannot have simple, immutable rules.

Fortunately, we also know that for a large number of goods and services, there is a wide range of techniques, such that if you have low-labour costs, the optimal technique is a very labour-intensive technique. Thus, constraining capital intensity is difficult but not impossible. If we want to have rapid growth of employment, we have to structure the economy in such a way that emphasizes production of those goods and services which can be produced economically through labour-intensive technologies.

There are two principal means of structuring an economy towards commodities and outputs which can be produced through labour-intensive techniques. One is through trade — import the capital-intensive goods and services and export labour-intensive goods and services. We now have ascendent in development economics, a concept of export-led growth. I want to emphasize some problems with export-led growth before returning to discuss a more modest but nevertheless important role for trade in a high-employment strategy of growth.

South Korea epitomizes trade-led growth. South Korea initially neglected its agriculture, emphasizing a highly expansionary policy in manufacturing. The international market was the primary source of demand for that rapidly growing industrial output. Because agriculture was initially stagnant, trade necessarily provided the market for increased

output. Subsequently, Korean agriculture has been pulled up by the demand growing from the successful industry, not the other way around. We can see from the Korean example that two conditions are necessary, if growth is to be led by exports.

First, there must be a generally expansionary global trade environment, which we have had over the last few decades. It is important at present to be concerned as to whether we will continue to have such rapid growth in international trade in the future. Second, you need very large capital inflows. The large capital requirements are necessary to achieve rapid overall growth primarily from exports. Thus, countries that have followed a trade-led growth pattern tend not to sustain the necessary growth in the capital stock entirely from their domestic savings rates. And again, South Korea is a prime example of tremendous capital inflows. Both the rate of export growth and capital inflow achieved by South Korea is possible for a small country which has a very special relationship with large, wealthy countries. Obviously, South Korea's strategic placement in the context of geopolitics has been favourable from that point of view. Not all countries can have such a favoured position.

We will shortly return to the trade issue and indicate its very important but somewhat subsidiary role in a development strategy that has an important emphasis on agriculture and employment. But first, let us turn to a partial alternative to trade for structuring an economy in an employment-oriented direction. That is to accelerate growth in the agricultural sector and use agricultural growth as a means of structuring demand in favour of a high employment content. We must first understand the process of agriculture development.

The growth of the agricultural sector is basically a process of technological change: It is a process of introducing new technologies, which greatly increase factor productivity in the agricultural sector through high yielding crop varieties — such as the wheat and rice varieties which have been so important in Pakistan for two decades and the cotton varieties which have been so important in the last half decade or so in Pakistan. These all represent major increases in factor productivity

in the agricultural sector and hence a major net addition to national income.

Now the question we raise when we make a major addition to national income in the agricultural sector through technological change is how that increment to national income is to be expended. First of all, you are putting a large increase in income into the hands of agriculturists. We know that they will spend at least two-thirds to three-quarters of that income on consumer goods, even if they have a very high marginal propensity to save and invest. Hence, the first impact of major growth from improvements in technology, in addition to national income through agricultural growth, is a big increase in consumption expenditure.

We know that throughout Asia, peasant farmers, the typical farmers who are producing the increased agricultural output, spend a minimum of 40 percent of those increments to income on locally-produced non-agricultural goods and services. Those goods and services, and we should note the importance of the service aspect, have very high employment content. These are goods and services for which there is a wide range of choices of technique and the optimal technique turns out in developing countries to be very employment-intensive.

We also find on the order of 20 percent of increments to income spent on agricultural commodities which have a very high employment content and a relatively low land input. These include particularly fruits, vegetables, and livestock commodities. Because the marginal propensity to spend on these commodities is high, and the base of consumption is significant, the total demand generated for these commodities by increased income is immense. They use a tremendous amount of labour in their production.

In Pakistan, we could see this particularly clearly in the rapid growth in milk production, but we also see this in the vegetable sector and, to some extent, in the fruit sector. Now, these are not the flashy elements of development like steel mills and petrochemical plants, but they represent a basis for significant additions to national income. They

have a genuinely high employment content and represent a major contribution of agricultural growth to a desirable structure of the economy.

We should note again that development should be seen as a participatory process; that development which only involves a very small proportion of the economy and a very small proportion of people is not really development as most of us envision it. The processes I am describing, in which 40 percent of incremental expenditure for non-agricultural production is mobilized in rural regions and in the larger market towns, marshalling people in fruit, vegetable, and livestock commodity production, are processes of commercialization bringing a large proportion of the population into the modernization process. You are not bringing them in as labourers in large-scale steel mills or petrochemical plants, you are bringing many of them into a process where they are beginning to think about buying and selling and manufacturing on a small scale, converting raw materials into output. You are getting a very large proportion of the population beginning to think in production terms. That is a major contribution to development.

We had a lot of pro-industrialization talk in the 1950s and early 1960s that argued for, emphasized, industrialization over agriculture because industrialization opened people's minds and brought them into a commercial process. I am saying that you get a much better effect from that point of view through an initial emphasis on agriculture, thereby bringing in very broad participation in relatively small-scale industries.

Now I want to make two related asides. What I have done so far is talk about the role of agriculture in the production of wage goods and the role of agriculture in structuring demand in a more labour-intensive way. My first aside concerns the relation between poverty reduction and an agriculture- and employment-oriented strategy of growth. They are one and the same. Increased food supplies and increased income from employment are the basic elements of poverty reduction. Recent analysis at the International Food Policy Research Institute, using the extraordinarily effective and useful sets of statistics compiled in India on rural poverty — on the proportion of the population falling below the poverty

line — shed light on this relation. These data measure changes in poverty over a substantial period of time.

Development strategies in India have had a very strong orientation toward large-scale, capital-intensive, heavy industry. That has resulted in slow growth in employment and, hence, has resulted in rather little downward trend in absolute poverty. That, in turn, has made it essential, in order to achieve political stability, to give emphasis to specific anti-poverty programmes.

Study of change in the incidence of poverty in rural India over the last few decades demonstrates several relations of importance to this discussion. First, there has been a mild downward trend in the underlying level of poverty in response to specific programmes. Second, there have been very wide fluctuations in the incidence of poverty: using a specific poverty measure based on basic calorie requirements, the fluctuations were from below 40 to above 60 percent of the rural population. That means 20 percent of the rural population moving up and down across the poverty line over time.

And, those movements tend to be not sharp fluctuations from one year to another, but sequences of years in which the poverty line is rising and sequences of years in which it is declining. That provides an opportunity to pin down rather accurately what are the forces at work in causing those fluctuations. These forces are probably quite common across developing countries, including Pakistan.

What are the primary forces at work? The most important are the level of per capita food production and the level of food prices. When the level of per capita food production is rising, the level of poverty is declining. That relationship is very clear and for good reason. When per capita food production is rising, both the direct and the indirect effects of rising per capita food production cause increased employment. Employment is a critical determinant of the level of absolute poverty in rural areas throughout Asia.

We are able to statistically disentangle the level of food prices from food production and find that prices are also very important. When food

prices rise, poverty also rises. Poverty declines, in turn, when food prices fall. The level of food production and food prices are, of course, closely related. We are able, however, with reasonably good statistical techniques, to separate them moderately well.

The question one asks oneself, from the poverty point-of-view, is how can one have rising food production and declining food prices? Are they not antithetical to each other? Do we or do we not need rising food prices in order to provide an incentive to farmers to increase food production? The answer is no. Of course, there is a way out of that problem and that is through technological change.

Incentives can be provided to farmers to increase food production at the same time food prices are declining if the cost of production for farmers is reduced. And we can reduce the cost of production with high yielding crop varieties and the associated technical changes. It is now possible to absorb much lower food prices than in the past and still have rural prosperity because the cost of production, not per acre of course, but the cost of production per unit of output, has declined significantly with the green revolution.

In India, judging from trends over time, I indicated three forces in declining real poverty. The first is food production per capita, the second food prices, and the third, marking a downward trend in poverty, is specific poverty abatement policies.

What sort of public policies bring the development process directly to the rural labouring class and the poorest rural people? One must, of course, emphasize the importance of special employment-oriented schemes. Such programmes, of themselves, have been quite effective in rural India: guaranteed employment schemes, special loan programmes for small and even landless farmers to get into dairy farming and other labour-intensive enterprises, credit schemes, and so on.

If it had not been for the overbalancing effects on the food price and the food production front, India would have had a declining trend of rural poverty because of these special programmes. Poverty abatement

policies are unlikely to show an actual decline in poverty if agriculture is doing badly. In Pakistan, with a much more successful record on the food production front and, to some extent, on the food price front, such special programmes could be quite effective in poverty reduction.

The same points about poverty relationships stated above can be corroborated by reference to cross-country comparisons. Through this we can bring out the second major aside to which I referred above — that is, that success in agriculture in developing countries tends to bring increased food imports. What is the normal relationship in the development process between growth in the agricultural sector, and, in particular, foodgrain production growth and the rate of growth of employment? Is the normal situation for food production to grow more rapidly than employment so that one has downward pressure on food prices or is the normal situation for employment to grow more rapidly than food production with an upward pressure on food prices? The direction of pressure on food prices indicates the direction of pressures on trade.

To the surprise of many people who are depressed about the problems of dealing with employment in developing countries, the normal situation in developing countries is for employment growth to move more rapidly than food production and, therefore, to place upward pressure on domestic food prices and, hence, to foster increasing imports. To make that point clear, let me cite some extraordinarily striking numbers. A study at the International Food Policy Research Institute analyzed the 28 developing countries with the highest growth rates in what we term basic food staples production over a 20-year period. In terms of Pakistan, that basically means foodgrain production, so I will express the results in terms of foodgrains.

The average growth rate in foodgrains production for these 28 success stories was four percent a year. Those same countries, in that 20-year period studied, increased their foodgrain imports by 365 percent! In other words, the countries that were most successful in increasing foodgrain production also increased their foodgrain imports. The 365 percent increase overdramatizes the examples because they

started from a small base of foodgrain imports. But the absolute numbers from those countries are also impressive. They increased their foodgrain imports from roughly four million tons to something over 12 million tons in that 20-year period. They changed from being negligible importers of foodgrains to becoming a significant element on the global food market.

We know that if we do a closed economy model of agriculture-driven growth, food prices will decline. In such a model, the dynamic element is growth in foodgrains production. If we assume that employment grows maximally, consistent with the wage goods constraint, the terms of trade will turn modestly against the agricultural sector. Thus, it should be expected that in a development pattern led entirely by agriculture, there should be rapid growth in employment but not quite sufficiently rapid to maintain the terms of trade for food as they were at the beginning of the period. There will be a deterioration in real agricultural prices.

Given that, how do we explain the situation for the 28 fast-growth agricultural countries? The explanation is that, in addition to the effect of agricultural growth, some autonomous growth occurs in other sectors. After all, even in low-income developing countries, there is initially a non-agricultural sector of significant proportions. If there is growth created endogenously in that sector as well, added to the growth in the agricultural sector, the result is overall demand for food growing more rapidly than the supply of food and, thus, pressure either for increased imports or for increased prices.

In this context, the common question is how can those countries afford to pay for increased imports of food. Let me be very clear on two points in that respect. First, we are only talking about a small proportion of the incremental demand being met from imports, so that there is not a significant real exchange rate effect from that growth. And, second, I want to emphasize that economies that experience rapid growth in domestic agricultural production, relaxing the wage goods constraint in that way, and that have rapid growth of employment are facilitating their natural comparative advantage to export relatively

labour-intensive goods. Those countries do very well on international markets. Thus, they have a relatively high rate of growth of exports to finance substantial imports, including supplementary imports of basic food staples.

In this context, let us speculate with respect to Pakistan, The agricultural resources in Pakistan are sufficiently favourable, compared to the general situation of the world, so one would probably not expect to see major food imports into Pakistan in the context of a high agricultural growth rate and high growth rate of employment. There are a few developing countries that are sufficiently rich in natural resources for agricultural production that they may even have very high rates of growth in employment and still move increasingly on to the foodgrain export market. The two major cereal exporters among the developing countries are Thailand and Argentina. Those two countries alone represent 80 percent of net cereals exports from all the developing countries that are net exporters. There are probably one or two more countries, such as Burma, that could be in that situation if they had sensible domestic policy.

Pakistan, I suspect, may well end up falling in a neutral position on this. You have an extremely favourable agricultural resource base and should be able to achieve a very high rate of growth in agricultural output. But you also have a tremendous scope for increase in employment in the economy and, hence, effective demand. Perhaps it is reasonable to expect those two forces to about balance out. In any case, Pakistan's good agricultural resources, if properly developed, offer an excellent opportunity to effectively pursue a high employment strategy of growth.

I want to make two policy-oriented remarks at this point — one about trade and the other about public investment. Going back to the trade issue, capital spreading is, of course, very important in a high employment policy. I think that this leads to a position on trade which is a little different from the usual one of the trade economists and the export-led, growth-oriented economists.

We are discussing here a development strategy in which effective demand for growth in the non-agricultural sector comes substantially from increased incomes in agriculture which, in turn, arise from the cost savings of technological improvement. There is, however, a need to restrain growth in capital intensity. We know that many capital-intensively produced commodities are necessary to a high employment strategy — fertilizers and pesticides are essential to agriculture; steel is essential to the various metal working industries; plastics are important; probably synthetic fibers are of some importance; and so on. A high employment strategy with a capital constraint requires turning to imports to meet the needs for the bulk of such commodities.

I would have a very simple rule to follow with respect to what capital-intensive goods to produce domestically and which to import: produce domestically those capital-intensive goods and services which cannot be imported, the number one example of which is electric power. Put enough capital resources into those commodities to ensure a balance of supply and demand at global price relationships.

In the case of electric power, that means massive investments in that sector. As demonstrated all too frequently among developing countries, Pakistan has been underinvesting in the electric power sector. The only occasional power shedding in Karachi or Islamabad does not compare to the substantial power shedding in rural market towns and in the agricultural areas. That is extraordinarily costly in terms of employment. Electric power is a small proportion of costs of labour-intensive industries, but unreliable power raises their costs very substantially.

Not investing in the importable capital-intensive goods and services sectors raises very important issues with respect to essential commodities. There are concerns about the reliability of imported inputs for agriculture and labour-intensive industry. That reliability must be insured through appropriate exchange rates and other trade policies. I do not want for a moment to pretend these are easy decisions. After all, I do not think governments make bad decisions where the right decisions are easy to make. The wrong decisions are always justified by a very powerful argument which has a good deal of merit.

To summarize, trade is very important to an agriculture and employment-oriented strategy, but it is not the leading edge of development. The leading edge is the agricultural sector. We will return later to the needs of agriculture if it is to grow rapidly.

The second issue I want to raise about policy for an agricultural-led, high employment strategy relates to the trade issue but only indirectly. That is the level and composition of public sector investment.

An agricultural-led, high employment strategy has to be broadly diffused geographically. It, by definition, has to reach a high proportion of the population. That reinforces the natural tendencies in the strategy to broad participation by all income classes. But much more importantly, the requisite broad geographical spread in turn requires a massive investment in rural infrastructure.

We take it for granted that in an urban-oriented, capital-intensive, large-scale industrial strategy there has to be tremendous investment in the infrastructure of large cities. Reliable power for large cities, good roads, lack of traffic bottlenecks, good telephone and communications and so on. We may still not do as good a job as we should in the major centres but we know those are essential. But in an agricultural-led strategy, emphasizing the development of small- and medium-scale industries in the rural areas, you need the same kind of infrastructure.

Let me emphasize that the rural industries need electric power if they are to achieve cost reduction. They also need good telephone communication because they are very much concerned with markets and trading in raw materials. Those raw materials and markets will not be entirely in the rural areas. There has to be communication with the larger world. For these small-scale firms, the prices at which they buy and sell, the speed with which inputs come to them to meet their rapidly fluctuating production needs, depends very much on good communication. And you will find that, if those entrepreneurs cannot have good communications in a rural town, they will locate in a major city and have a smaller employment content in their output. Thus, massive investment in the rural infrastructure is necessary to the agriculture- and employment-led strategy.

We underrate how deficient those rural infrastructures are. I would be fairly certain that, if you did a study in the Punjab of Pakistan, you would find that probably one quarter to one third of the farming area of the villages is not fully integrated into a highly commercialized process of modern agricultural production because they simply do not have the adequate infrastructure and infrastructure investment to support that.

Of course, the poorer the infrastructure, the less we see the area; so it is understandable that casual observations have a strong bias to understate those needs. All of us have a high opportunity cost of our labour and time. We are not going to take the time to go into the remote rural areas. We understate the extent to which, even in the productive agriculture areas, there are villages which are isolated due to underinvestment in infrastructure.

I want to make one final comment on infrastructure. Infrastructure starts with what we might properly term hard infrastructure: the roads, the electrification, the telephone systems, and so on. But those lead immediately to what is productive and that is the soft infrastructure: the trained people who bring themselves to the market towns to make use of this hard infrastructure; credit institutions and people with a higher education who run those credit institutions, providing credit to the farmers and the small industries; bus services and the people that are needed to run them; and medical services which are needed to look after those people. Who will locate in the market towns which do not have some kind of a reasonable medical facilities, which do not have a cinema in the town and so on?

Those people are not going to locate in such places unless they have good soft infrastructure of institutions. And you cannot have a good soft infrastructure unless you have a good hard infrastructure. So, what I want to drive home is that, where agriculture is not moving adequately, where it is not having a stimulating effect on growth and driving a very vigorous small- and medium-scale industrial sector, that is substantially because of the inhibitions coming from inadequate infrastructure investment.

To summarize the public policies that favour the kind of development strategy we are addressing, I come back to the need for a very thoughtful expansion of trade policy and a very thoughtful and expansionary investment policy in infrastructure. I would suggest that we look back at countries that have been successful in this respect and see that, if the essentials of development are to be provided, there are very few resources and very little time required for governments to provide once these principal requirements are met. Meeting those goals, however, requires a considerable re-ordering of priorities.

DISCUSSION

Dr S. K. Qureshi: Prof. Mellor, you indicated that the area that public policy needs to attend to is the provision of rural infrastructure. You also said that, by implication, technical change would lead to increased productivity. One thought that immediately comes to mind is this: how would this kind of policy be financed? The real life situation, in Pakistan at least, is that agriculture has been squeezed in many different ways. Even if the physical capacity to generate more finances exists in a technical sense, unless this is tapped properly, we will be resorting to inflationary financing. Moreover, improper government responses may lead to distortions and the growth process may not go very far. That is one point.

With regard to the other case you made concerning poverty alleviation, I agree with you that providing employment to the rural poor solves about 80 percent of the problem. But then I would say that there is a basic problem in the asset distribution that exists in Pakistan, if we follow the kind of agriculture strategy that you pleaded for, what would happen is that we will have more employment and also more income for the rural poor. But, in the same vein, these technical innovations will be increasing returns to land. As the process of development goes on, the landlords will be earning a large part of this increase. So, unless there is a policy on asset redistribution accompanied by substantial institutional reform, the policy is likely to fail.

There is a need to think about whether to just give the poor more jobs or to make decisions to provide some kind of asset redistribution

as well as better access to other institutional facilities. Then again, I am not sure of the price policy implications of the kind of strategy you advocate. There is this real issue of urban *vis-a-vis* rural policies and then within rural areas there is the problem of shifting between crops, dairy and livestock. Moreover, due to agricultural growth, in the next 10 to 15 years there will be lots of indirect demand for manufactured goods. There will thus be a problem of the sequencing of price policy. Therefore, I think just keeping this kind of policy indefinitely will also create problems. I would really like you to throw some light on this issue.

My final point is that, I would like you to touch on the issue of physical capacity and on the political economy type questions concerning a switch to a different kind of policy altogether. You have given us a very good description in a technical economics sense as to what this new strategy is and how the different pieces fit together. However, the political economy problems exist and class interests in Pakistan are strong. There will be many issues to sort out, such as how we will go about breaking this class structure and bringing about the consensus required so that this new strategy can be put into effect. Thank you.

Prof. John W. Mellor: This is an extremely interesting set of comments and questions that raise quite basic issues. Let me start with some thoughts on the financing side.

Getting agriculture moving, which is central to the strategy we are delineating, requires considerable public financing. Agricultural research is key to the whole process. In western developed countries, the private sector is doing much more than it did in earlier stages of development. This includes a lot of agricultural research and much of the agricultural extension work on input distribution. Unfortunately, this often leads to unrealistic expectations as to what the private sector can do in developing countries. At earlier stages of development, it may do some valuable work on hybrids, but is unrealistic to expect the private sector to do the bulk of agricultural research. You still need a large public sector research system. I am not even optimistic that the private sector will promote fertilizer in areas where farmers have not been using it. After all, we are

talking about market development which is likely to be too expensive for private sector firms.

For agricultural growth to get moving, there has to be immense public investment in infrastructure as well, including expansion of electrical power generation by easily 15 to 20 percent per year. A 10 percent rate of growth in electric power is simply not adequate to support high growth rates over a long period of time. This means tremendous difficulty for governments in raising the quantity of resources that are necessary. In my opinion, a considerable amount of resources for rural infrastructure has to be raised in the rural areas themselves. That implies that there has to be development of local governmental institutions. People in rural areas have to get together to help themselves to raise resources in whatever way they may feel is most suitable in order to increase expenditures at the local level. But, I think we see very few examples in the world of rural people who are willing to put up with high rates of taxation by a central government, especially when there is a great deal of uncertainty as to whether or not any of that will ever come back to them. So, the whole local government issue really cannot be separated from the issue of an agricultural, employment-oriented strategy of growth. We all know that is a very difficult issue because it raises very basic issues about the whole political system in a country.

We are talking about a strategy which should be very appealing to the left because it is oriented towards producing basic consumption goods for the poor and it is oriented to their basic way of making a living.. And the left, of course, is supposed to be concerned particularly with mitigating the problems of the poor. But the left is usually not very eager to see the development of rural local government because they recognize, what I think is true all over the world, that such a government will be dominated by the more well-to-do agricultural interests. In effect, though, that is necessary because it is those interests which are particularly concerned with developing the infrastructure and that will have to pay the taxes to finance it. So, we find a tension between the concern for redistributive policies towards the poorest people in rural areas — a set of policies which have to come from central governments not from local governments — and a need to raise local resources for investment

purposes. I think it is important for scholars to face up to the genuine nature of those tensions and not try to brush them aside. There are real problems of conflict in society and conflicts even from the point of view of an equity- and poverty-oriented strategy. As I keep reminding you, what I am talking about is a strategy oriented towards poor people because they are producing the food which they consume — and they are the marginal consumer of food — and because it increases their employment.

Asset distribution enters into a poverty alleviation strategy in several ways. An asset distribution with large concentrations of land, the owners of which have an interest in continuing a feudal system of management, is antithetical to the development strategy I am talking about. The owners do not want rural people to have more education and rising employment and incomes because they fear rural people will become a political force that will threaten their position. Asset distribution, particularly of land, can be looked at from the point of view of its maximum effect in increasing production. Simply dividing the land among the agricultural population fairly evenly would then be the optimal strategy. We find no economies of scale beyond the family labour force in agriculture. Thus, a very broad distribution of land would be the simplest way to maximize growth in agriculture. Obviously, however, such a distribution is likely to be politically impossible.

A fair amount of skewness in the distribution of land creates problems for the strategy I am talking about. If the system is feudalistic, this strategy will not go anywhere. However, the strategy may be adapted to situations involving less skewedness in land distribution than in feudalistic systems. This would be based on the consumption patterns of the larger landowners. We know from a wide range of studies that the relatively large peasant farmers have consumption patterns that are skewed to a very substantial extent to locally produced, non-agricultural goods and services. In Pakistan, these farmers are often termed kulaks and operate 20 to 50 acres or more. Such farms generate the effective demand for an increase in employment in other rural sectors. That is a viable land distribution system from the point of view of the strategy I am discussing. It may not be optimal — in terms of a maximum increase

in agricultural production — but it is more likely to be politically feasible.

Let me just comment on another private sector issue concerning the accumulation of capital for creation of small- and medium-scale private industries and expansion of the labour-intensive part of agriculture. This can be taken care of fairly well through natural market processes. These will result in the prices of goods and services demanded by the prospering agriculturalists rising relative to agricultural prices and thereby increasing profits of suppliers, part of which will be reinvested. We know that when their profits are good, small- and medium-scale industrialists tend to reinvest at a very high rate in their own firms. Since we are talking here about relatively rural, market town-oriented activities which are labour-intensive, you can count on market processes to be quite effective. In that case, the terms of trade will not move against the agricultural sector.

Although market processes may provide most of the capital needs of a development strategy for rural, small- and medium-scale industries, governments need to examine their credit needs more carefully. We know that the main credit requirements are for working capital rather than fixed capital. This, of course, is the most difficult kind of credit to provide. However, we have developed fairly effective methods of providing this kind of credit for agriculture. I believe we can also deal with special problems of small- and medium-scale nonfarm sectors.

At this point, I would like to digress with some speculative comments on the relation of education to the rate of growth of employment. We are beginning to do some research on this at IFPRI. I believe that the rate of growth of demand for educated people is highly elastic with respect to the overall employment growth rate. In other words, the more you accelerate the growth rate, the more you are going to accelerate the demand for educated people. Consequently, public expenditures for education can quickly become a sizeable addition to the requirements of a growth strategy.

The bulk of the employees in small- and medium- scale industries in rural areas have at least primary and frequently secondary education.

From what I know of the Pakistan scene, I suspect that eventually you will find the lack of education in rural areas, mass education, an inhibiting factor to development. Perhaps much sooner than you might think. I recognize that this is a very delicate subject, but let me make a few observations. We find that in developed countries, the educational level of the mother is a far more important determinant of the educational level of children than the education level of men or the father. This leads me to suggest that you probably need to be concerned about the implications of an educational structure which leaves a high proportion of rural women without much education. This clearly has implications in terms of demand for education by the next generation. I realize that it is dangerous to generalize from one culture to another, and I want to be very cautious in saying that the relationship between mother's education and that of her children in other countries will be true for Pakistan. But at least you should be looking at that very seriously from this point of view. Of course, this has immense income distribution implications. Restricted access to education is probably more deleterious to the poor in the long run than restricted access to land.

On the prices issue, speaking purely in the context of long-term growth, there are also other reasons why these policies are important. Once you get a high rate of growth in the agricultural sector, there is a simple trade-off between lower prices and higher employment. At a given rate of growth of agricultural output, the faster the rate of growth of employment, the higher agricultural prices will be. That is because of the immense increase in effective demand for food resulting from higher employment of the labouring classes. Conversely, if employment does not move rapidly with agricultural growth, low-income people will benefit substantially from declining agricultural prices. In each case, poor people benefit. They either get higher employment or lower prices for food. Higher employment, obviously, is the preferred route because it stimulates growth in GNP and a higher living standard for low-income people.

Dr Faiz Mohammad: Let me first join the earlier commentator by complimenting Professor Mellor on giving such a thought-provoking

lecture. Your central thesis appears to present not just a strategy of agricultural growth but a strategy of economic development. In that context, the main emphasis that appears to come out of your lecture is that agriculture should play a leading role in this strategy, I think there cannot be two opinions about agriculture playing an important role in a country like Pakistan, However, when it comes to giving a leading role to a particular sector, then I think a number of questions arise and a number of problems need to be resolved. As students of development economics we all know that this type of strategy has been suggested in the past in the idea of balanced and unbalanced growth and so on. Looking at this particular strategy of development, the first question that comes to mind is what are the objectives of this strategy. Do we want to transform agriculture under the concept of the new international economic order which considers that industrialization can take place only if sufficient surplus has been generated in the agricultural sector, as is evident from the history of other countries? Is the objective of this development strategy to transform the society as it is? Are we looking at the socioeconomic transformation of the society, as, of course, should be the objective of the development strategy of any country like Pakistan? Or are we simply looking at making agriculture a properly growing sector?

The second question which comes to mind is where are we right now? Does the strategy which you are proposing imply a really rapid and major shift in the agricultural sector? Moreover, how reproductive does this change have to be? At what pace do we have to develop agriculture? And if we have to neglect other sectors, what has to be the pace of that neglect? Do we start from a clean slate? If we do then, perhaps, the requirements for this strategy will be different. Currently, we are placed in a very difficult economic situation where we have to find avenues for financing heavy international debts. For this we have been striving to generate more exportable commodities. What is going to happen to this pressure on the economy if we go for a major shift in the agricultural sector?

Prof. John W. Mellor: I think you are quite right that we should get the objectives of development out into the open. As I see it, the objective of development is to bring all people into processes that increase their

freedom of choice. For very poor people that means not only raising their incomes, but also bringing them into productive processes where they can make better use of their minds in facing expanding choices. This, of course, involves formal education. Therefore, I prefer development that emphasizes agriculture and small- and medium-scale sector industrialization because it involves many more people.

Pakistan is following the development strategy I am talking about to a degree greater than most developing countries. Pakistan's agricultural sector has a very successful record. You have been one of the fastest growing countries in basic food staple production. In my view, your overall growth in GNP simply could not have been achieved with an alternative strategy. There is a vigorous market-town economy in the Punjab and you have had broad participation in other small- and medium-scale sectors. I am emphasizing your achievement because I believe clear thinking people will accept the broad strategy that you generally have been following.

It obviously makes no sense for the capital-short countries of the Third World to be net-repayers of debt. We have to get out of the mind set that these debts ought to be repaid in the near future. A capital-short country should be building high-growth rates on their rich labour, and, I would argue, rich agricultural resources. These high growth rates can finance an ever-increasing amount of debt which over time may actually decrease as the percentage of the GNP. We have a very unfortunate situation in the world at the present time, but I hope we will get beyond it shortly. I was very encouraged by the comment of Barber Conable, the new President of the World Bank, that we have to get the debt crisis behind us so the World Bank can get on with its real business — development. He also observed that the World Bank is misnamed; it is not a bank, but a development institution. I welcome the return of this approach after a four to five year hiatus.

Mr Shaukat Kazmi: Thank you, Mr Chairman. Professor Mellor, I think you have been dealing mostly with short-term problems and I say this because I am dealing with the prices side of the question. Your strategy is based on comparative advantage where you transfer resources to

sectors or sub-sectors where you can produce the most. But in the international environment where most of agriculture is subsidized heavily, the development of some of the sectors of developing nations is severely inhibited. Take the case of the dairy industry in Pakistan. We are importing large quantities of milk powder which is heavily subsidized and cheaply available. Because of this, it is not possible for Pakistan, in the short term, to develop its dairy industries and compete with imported milk,

Secondly, the Pakistan government follows the policy of what you call support prices so that agricultural prices may not hurt the poor farmers. This has advantages, but in the long run it can lead to the shifting of land from one crop to another which maybe more productive at that particular time. This is something of a disadvantage. Lastly, I think you were mentioning mostly neoclassical type models and I may be wrong in this, but in Pakistan's case, I think that a classical model is more applicable as far as the land-owing class is concerned. This class is not consuming manufactured goods produced in Pakistan but relies mostly on imported goods. This has an adverse impact on our balance of payments problems.

Prof. John W. Mellor: The strategy I have delineated has a good deal in common with the current neoclassical emphasis on the private sector and trade orientation to free the economy for small- and medium-scale entrepreneurs. Once you have a vigorous private sector with substantial public sector support in infrastructure and education, trade issues will take care of themselves moderately well. Let us not understate the size of the markets in developed countries for relatively labour-intensive goods and services. They are not all textiles. In the case of Pakistan, there are potentials for fruit and vegetables and livestock commodity exports not only to Western Europe and North America but also to the Middle East, where your geographical location gives you a comparative advantage.

I understand the pessimism of lot of people about the trade environment in developed countries these days. But do not forget that there is a great deal of trade among these countries in labour-intensive

agricultural commodities, such as processed fruits and vegetables and flowers. It is very important to developing countries to do everything they can to assure that the GATT rules are enforced, opening trade with developed and developing countries. That is something which should be possible to accomplish in the GATT negotiations. There are a lot of opportunities to displace some developed countries in this huge market — for example, processed vegetable exports from Italy. A number of developing countries have succeeded quite well in finding niches in this trade environment. Even the depressed textile trade may offer opportunities. A niche that seems small to a developed country could be large to Pakistan.

This question of subsidization of agriculture in developed countries is difficult. The major impact of those subsidies has been to reduce world prices of cereals below what they would otherwise be. That is basically a good thing for developing countries which are, in general, net importers of cereals. I think Pakistan has enough potential to reduce the cost of production so that you can probably carry on with cereals prices at the present level or only somewhat higher. I personally think that cereal prices have overshot at the bottom. My view was reinforced when the World Bank in July reduced its projected 1995 rice price by over 30 percent from what it projected a few months earlier. When the World Bank makes radical changes in their projected prices, it is almost always wrong. I assume they are wrong this time. That gives me some confidence that we have overshot on the low side! I have been agitating for the Bank to give up this fancy modelling which is so subjective, and simply use moving averages to project future prices. But I have not had any success as yet.

A somewhat low level of cereal prices is probably favourable for the development of labour-surplus countries. The dairy subsidies and the meat subsidies are a more difficult problem. But, the European Community may not be subsidizing its dairy industry as heavily as has been assumed. Much of that subsidy compensates for high support prices of dairy feeds.

India has taken large quantities of cheap surplus dairy products from Europe in particular. These have been sold in India's markets and

the proceeds used to develop the indigenous dairy production and marketing system. This might be a useful approach for Pakistan. However, one thing Pakistan should not do is to allow trade to kill an industry in which it obviously has an immense comparative advantage. Since dairying is labour intensive, it is especially suitable for development on a small-scale basis. I would expect over the long-run Pakistan will shift a large area out of wheat and into high quality roughage production, particularly berseem and lucerne. Nothing should be done to interfere with that process.

Just a final brief comment on consumption patterns, it is my understanding that even, though the Punjab has a fairly skewed distribution of income, you do have a reasonably good consumption pattern from the point of view of the distribution of income. I do not know the situation in Sind that well, it may be that distribution is too skewed to have favourable impacts on consumption. However, some orientation of consumption towards imports of consumption goods may be good. We should always look upon import displacement strategies as dynamic strategies. One should not look at a static level of consumption and then talk about development of local industries to produce some of those goods locally. We should be looking at it as a dynamic process in which today we displace certain imports because we have a comparative advantage in producing them and then tomorrow import different goods and later displace them.

An IFPRI study of the consumption patterns in Bangladesh found that the richer farmers have very high elasticities of demand for imported consumer goods but very low marginal propensities to spend on them. The high elasticities are built on a very low base of initial consumption. And we see a tendency for a dynamic processes. The richer rural people import small quantities of consumer goods. Once the market is developed, some of those goods are displaced because local producers have a comparative advantage in producing them. So we should not be entirely negative about the imported goods in terms of market development and eventual displacement.

Mr Akmal Siddique: It had been a long cherished desire to listen to you Prof. Mellor and I must thank the PIDE for providing this opportunity.

Thank you very much. Mine is more of a comment than a question. I am really concerned about the heavy subsidies to agriculture given by the United States, the EC countries and Japan, if I remember the figures correctly, last year the U.S. gave away about 30 billion dollars, the EEC about 25 million dollars and Japan about 15 billion dollars, to their farmers. Does it really leave any room for the farmers in developing countries to compete in international trade? Starting from the late 1970s after the oil embargo and into the 1980s where we have seen a lot of protectionism in the U.S. and a lot of heavy subsidies, there has been less economics and more politics in the decision-making process. I wonder if we have to go back to the initial name of our subject, i.e. political economy, sometime very soon now. Would you like to comment on that? Thank you very much.

Prof. John W. Mellor: I am sure that economics and politics have more in common than is often assumed to be the case. After all, both economists and politicians are concerned about increases in human welfare and in improving its distribution. I think the conflict between what economists say and what politicians do is less a matter of different objectives than it is ignorance of each other's point of view. Economists need to devote more effort to analyzing political problems and assisting policy-makers to assess the probable effects of alternative policies. Economists also can serve an important social function by calling attention to differences in the objectives of particular political groups and those of the masses in a society.

Subsidies in developed countries fluctuate considerably over time and are now extremely high by historical standards. Periods of high subsidy are also periods of rapid rates of adjustment in the agricultural sector. This indicates that in developed countries, where there is virtually no increase in demand for agricultural commodities, the benefits of technological change in agriculture have to be realized almost entirely by withdrawing resources from agriculture or by exports. The developed countries have been rapidly withdrawing resources from their agricultural sectors. There are, though, questions of how much, at what pace, and at what cost in human deprivation should be tolerated. Although Western European countries and the United States are concerned about the high

pace with which resources have been withdrawn from agriculture, the important question is just how to reduce it. This question raises difficult tradeoffs for those countries.

The large exports of cereals being made available by developed countries is beneficial to developing countries which are able to increase growth in employment more rapidly than in food production. These countries are increasing imports of cereals. Conversely, developed country exports are harmful to countries like Argentina and Thailand and would be for Burma if that country had reasonable domestic policies. It is not clear whether they are good or bad for Pakistan. So far, you have been able to generate growth in demand for food more or less commensurate with your agricultural growth capacity. Consequently, the cereals strategy of developed countries has not been inimical to you.

My impression is that Pakistan should be concerned less about exports of cereals from the developed countries and their subsidies and devote much more attention to access to their fruit, vegetable and livestock markets. That is where you want to fight the battle on trade. In general, in the United States, those commodities have been left pretty much to the free market and you do have some opportunities to sell there. In Europe, there has been a tendency to protect those sectors. So, there is probably an opportunity to fight a very limited battle in the GATT negotiations, probably in alliance with the United States. You once had access to those markets, a fact that gives you some advantage. There also may be some points on which you can align yourself with Australia and Canada.

I hope what I have just said will not be construed to mean that I like or accept an international economic order in which rich countries dominate world trade negotiations while developing countries are lucky if they can have any influence at all. However, given that deplorable situation, you need to pick your areas of influence on trade very carefully. As far as agriculture is concerned, I have suggested that you concentrate on the fruit/vegetable/livestock sector. You also want to play a role on anti-dumping. Dumping by the rich countries into the

Middle East is deleterious to Pakistan where you have particularly good access to the market. You need to agitate against it and get as much support as you can.

Dr Abdul Salam: I just have one very brief comment on the excellent lecture by Professor Mellor. The subsidization of cereals by the U.S., EC, and other developed countries has some serious implications for countries like Pakistan, India, and Bangladesh. It reduces the incentive to farmers to develop these sectors. Secondly, the advice that we in this part of the world get is, free your markets and subsidize your farmers. But what we see happening in our own backyards is exactly the opposite of that. Thank you.

Prof. John W. Mellor: It must be frustrating to developing countries that developed countries give them so much advice that they themselves do not follow. Unfortunately, one of the advantages of being a rich country is that you can do a lot more preaching than a poor country. It is one of the unfortunate realities of the world.

Development of low-income countries is absolutely crucial to long-run growth in prosperity in developed countries. I deplore that we in the developed countries follow so many short-run policies that are inimical to the developing countries and are not in anybody's long-term interest. I would repeat that I think world cereal prices have overshot the market on the low side. Therefore, it makes a certain amount of sense for a developing country not to let its domestic prices (assuming a correct exchange rate) drop all the way to the present world level. And developing countries have been, in general, fairly successful at keeping their domestic price fluctuations smaller and smoother than international fluctuations. This is probably a time to protect your domestic prices somewhat.

I should emphasize that the development strategy I am talking about is certainly facilitated by a correct exchange rate. An overvalued currency that protects the industrial sector has a significant anti-agriculture effect. A country like Pakistan should watch the exchange rate very carefully and make sure it is not overvalued.

I am a strong proponent of using average real prices as a way of predicting future prices. Modelling exercises just are not sufficiently developed at present to improve on past averages. If real world prices have not recovered substantially in three to four years, you will have to adjust downward. You are fortunate in Pakistan that you have many opportunities to reduce the cost of production in the agricultural sector, not only by breakthroughs in agricultural technology but by increased sophistication in the use of existing technologies.

Over the longer run, Pakistan may be able to export some cereals. This could create a difficult situation for Pakistan if prices stay low. I do not think this is going to happen, but if it does you may need to restructure your agriculture somewhat more rapidly than otherwise. On a more optimistic note, I think I am correct in saying that your largest cereal export is a specialty product — high quality rice which brings a premium in world markets. Hopefully, your research system will reduce the cost of production of this high quality rice so that you can take even greater advantage of this opportunity.

CONCLUDING COMMENTS

by

Professor Syed Nawab Haider Naqvi

We have just heard a very refreshing and stimulating lecture. A number of important issues have been raised by Professor Mellor in a very short time. These certainly will have excited everyone's imagination just as much as they have excited mine. However, I would like to add a note of caution. Prof. Mellor has through his gift for lucid exposition of extremely complicated issues created the illusion of an inherent simplicity of the issues involved.

Like all illusions, this one also can be very deceptive. What Prof. Mellor, in effect, is asking us to do is to shed a lot of the traditional wisdom about economic development. As is well known, economic development is ultimately a process of 'structural transformation' that takes you from agriculture to industry. The industrial sector is cast in the role of the 'engine of growth' in this process. By contrast, the agricultural sector, a mere milch-cow, is used to *sustain* the industrial sector by providing cheap labour—drawn up at an unchanging real wage from the swamp of "unlimited supplies", to use Arthur Lewis's oft-repeated phrase. The share of agriculture, which is seen as a sustainer and not as an initiator of overall growth, in total value-added, would decline; and so would the proportion of the labour force employed in agriculture. On both these counts, the industrial sector would gain what the agriculture sector was condemned to lose—condemned by the very logic of 'structural transformation'.

This is a persuasive story, and one which is widely accepted, but as Prof. Mellor has pointed out, some very important aspects of the growth

process are missing from the plot: for example, what happens to employment in the rural sector, to the rural real wage, to the availability of wage goods, and to the prices of wage goods? One also finds amiss in traditional wisdom the subsidiary role assigned to the largest sector of the economy—the agricultural sector, that is—in the growth process. But, above all, the central issue of poverty, especially rural poverty, is left undecided in the hope that the "trickle down" effect will take care of the problem. But to miss all this is to miss an awful lot because, if reducing poverty is the aim of economic development, a *rising* level of employment — and hence of real wage of the (rural) poor — is among the most essential means to achieve this aim. And somewhere in this chain of events must also appear the level of supplies of wage goods (the agricultural commodities), and the prices at which these supplies are made available.

Prof. Mellor has chosen, unlike the modest lady who conceals more than she reveals, to be somewhat 'immodest' by revealing what traditional wisdom usually keeps covered up. He achieves this intellectual 'striptease' by making a high rate of agricultural growth *and* employment-creation the necessary condition of a 'successful' story of economic growth—whereby 'success' is directly related to the alleviation of mass poverty. But note this. No claim is made for agricultural growth to directly generate enough overall growth or employment. It would *not*. Neither is it asserted that the share of agriculture in GDP would not decline. It *would*. What Prof. Mellor does is to emphasize the role of agriculture as an *initiator* — and not just a *sustainer* — of the growth process. Prof. Mellor introduces technological change, food production, and food prices, as vital elements of his model. Technological change—i.e., the introduction of high-yielding varieties of seeds and improved agronomic practices, etc. — tends to reduce the cost of production of food. When this happens, it becomes possible to increase food output at the same time as food prices are *declining*. With the growth in wage goods (food) production playing a dynamic role, agricultural growth will directly create employment. This will happen because of the relatively labour-intensive nature of technological change in the agricultural sector, which, in turn, permits the 'right' kind of "capital-spreading".

At' this stage, three growth-propelling forces are simultaneously at work. *First*, a higher (rural) employment—by modifying the *structure* of effective demand and raising its overall level—will stimulate the growth of the agricultural and non-agricultural sectors of the economy. *Second*, a higher rate of growth of wage-goods production will increase the *supply* of goods and services for which the demand has already been created. *Third*, a higher (wage goods) production, helped by appropriate technological change, will raise the real income of the (rural) poor by *lowering* the prices of wage goods. These three forces work together to accelerate agricultural growth, to raise employment, to increase the supply of wage goods, and to stimulate effective demand—initially in the agricultural sector and *then* in the non-agricultural sector. And these growth-propelling forces are expected to be strong enough to reduce poverty, precisely because of the large 'weight' of the agricultural sector.

To inject some empirical content into his thesis, Prof. Mellor uses his model to explain why the growth rate is higher in Pakistan than in other countries—like India. While a low rate of savings remains the Achille's heel of Pakistan's economy, its growth record can be explained partly by the fact that capital is probably "spread" better here than in India. His model would predict Pakistan's economy growing at a faster overall rate *because* it has been relatively more successful in increasing food production at reasonable prices, and in generating a higher rate of employment. All this could only lead Pakistan, as it actually did, to achieve greater success in reducing poverty (especially rural poverty—and that, too, at a lower rate of savings) than did India. This is an interesting hypothesis about Pakistan's consistently superior growth performance, a phenomenon which most observers find somewhat paradoxical.

I have presented here just the bare bones of Prof. Mellor's growth model to make sure that his essential message is not lost. But the bare-bones picture is no substitute for the fleshy, real-life picture which Prof. Mellor just presented to us in his lecture. I am sure that the audience has

enjoyed seeing this picture at least as much as I have done. A vivid proof of this assertion of mine is the lively question-and-answer session in which we all participated enthusiastically, and which I had to cut short somewhat prematurely to meet the binding time-constraint.

On this happy note, I conclude a most stimulating and fruitful session. Thank you.

Lecture II

**RESEARCH NEEDS FOR AN
AGRICULTURAL AND EMPLOYMENT
GROWTH STRATEGY**

Lecture II

RESEARCH NEEDS FOR AN AGRICULTURAL AND EMPLOYMENT GROWTH STRATEGY

Prof. Naqvi, Dr Chaudhry, distinguished guests:

My topic in this lecture is the research needs for an agriculture and employment strategy of growth. What do we not know that is important to the pursuit of such a strategy? Research deals with the area of the unknown. Policy deals with synthesizing from the known (even if it is wrongly known) but is itself continuously pushing forward from the known. Thus, policy and research must always go together if progress is to be made. Of course, policy-makers may depreciate research because it seems not related to the world, as they must see it and deal with it, because they have difficulty comprehending the language of researchers, and because they fear that future research will make these present decisions seem wrong and even foolish — as may the real world make theories themselves, at times, seem foolish.

For our present purpose of exploring the impact of knowledge needs on research, we need to divide the subject into elements that derive from the elements of the strategy. Let us renew the argument from that point of view.

The basic engine of growth in this strategy is technological change in the agricultural sector bringing about decreases in the cost of production per unit of output or, more technically, increases in output per unit of input. Such technological change encompasses high yielding crop varieties, improved agronomic practice and so on. And then, because we

are dealing with a very large sector, through that decrease in the cost of agricultural production and the increase in factor productivity, a major increase occurs in national income. That increase in national income falls into the hands of the farming classes, the small farmers and the peasant farmers, whose expenditure stimulates growth and increased national income in other sectors of the economy.

The impact on other sectors of the economy works most importantly through expenditures on consumption goods and services. Of the increment to income, perhaps 20 to 30 percent is expended for capital investment in agriculture, leaving 70 to 80 percent for increased consumption expenditure. At that point, we are talking about a somewhat Keynesian phenomenon in which growth in expenditure stimulates growth in sectors of the economy where there are underemployed resources, particularly including labour; thereby mobilizing those resources in relatively labour-intensive production of goods and, particularly, of services in the rural sector.

That process certainly includes major market towns, thereby including urban concentrations of at least modest significance. When I allude to a Keynesian phenomenon, I am referring to the increase in effective demand stimulating production processes which use underemployed resources particularly labour. But, it is a non-Keynesian phenomenon in the sense that it cannot be accomplished simply with fiscal policy. The reason those sectors cannot be stimulated with fiscal policy or monetary policy is because the mobilization of labour requires an increased supply of the wage goods on which the increased labour force spends its money. A key underemployed resource, labour, requires for its mobilization another resource, food, that is already being utilized fully.

To further recapitulate what is in fact a fairly complex argument: the increased demand from the increased real income of technological change brings about increased employment. Labour is, in one sense, an underemployed resource and, in that sense, the strategy outlined has Keynesian elements. However, that labour will spend its incremental income largely on food and agricultural commodities; if that food and the agricultural commodities are not available, increased demand creates

inflationary forces. The non-Keynesian element of the strategy is that real goods and services must lie behind that increased employment. Of course, that part of the circle is closed by the increase in the agricultural production with which we started. Technological change, through the increase in incomes, increases effective demand; but, in the process, it has also increased the physical supply of food and other agricultural commodities that are the real resources necessary to back the increased employment. So we have a closed circle. It is not a perfectly closed circle. It is not a precise commodity balance between the increased supply of food, the increased employment of labour, and the increased consumption of the non-agricultural goods and services.

Now, the issue that I want to deal with in the lecture, from a research point of view, is: how does one go about facilitating those processes? How does one go about facilitating, in particular, these very powerful linkages between the agricultural and the non-agricultural sector? I would like, rather briefly, to run over a whole series of research questions. I would like, in a sense, to put them on the table and to open them up for your own thought. I will direct the presentation of research issues into four component parts: the consumption patterns; the production systems in the rural areas; infrastructure; and the agricultural production processes themselves.

I will start with the consumption patterns. Research is required to identify the consumption patterns of the class of people in the rural areas whose incomes are most substantially increased by improved agricultural technology. In a sense, that is a very easy research question. We already have large numbers of consumer surveys available. We should analyze them, classify them in an appropriate manner and draw conclusion as to what the consumption patterns are and what impact they will have on the non-agricultural sector.

Unfortunately, frequently, perhaps always, existing consumer budget data are not adequate for the particular tasks I have in mind. I am concerned specifically with who is receiving the increased income from improved technology and the expenditure patterns for that increment to income to those people. Here we need to look particularly at

the increased income of the peasant farming class, the small farmer, the kulak as they are sometimes pejoratively called. What is their income class? How are they spending that income?

In the case of landlord-tenant systems, one obviously has to be concerned with the increased incomes of the tenants, as well as those of the landowners. How the added income divides between these groups is itself a complex matter, relating to tenancy rules, land supply and demand for labour and land, as well as customary practices. Neither neo-classical economics nor theories of exploitation will assure the answer to this question. It is an empirical issue.

Thus, we need a breakdown of expenditure patterns or consumption expenditures according to income and social class. Then, we need to look at a rather detailed breakdown of the consumption patterns of these people especially with respect to non-agricultural goods and services.

We find here that our consumption surveys tend to provide detail only on those elements which are dominant for the population as a whole. They do not often shed light on the non-agricultural goods and services which are important for the income groups experiencing the initial major increase in benefits from the green revolution or, more generally, from improved agricultural technologies. For example, the breakdown on consumer durables in most consumption surveys is quite inadequate for understanding what policies are needed to facilitate growth in supply of those goods. The breakdown for services, in general, is inadequate for understanding the major opportunities and needs for that sector. Even the education and the transportation categories that do appear in most consumer surveys are not detailed enough to illuminate the needs for meeting the demands implicit in these expenditures.

We need to know, in particular, to what extent these expenditure patterns are oriented towards locally-produced goods and services, to what extent are they oriented towards goods produced in more distant parts of the same nation and to what extent are they imported from other countries. Further, we need to know the capital intensity of their production. These data tell us much about the policies needed to obtain

maximum national growth and employment multipliers from the initial stimulus of agricultural growth.

Thus, the need is for considerable detail beyond that normally contained in consumer surveys. We must remind ourselves why we want that information — it is so that we can know in some detail what sectors of the economy are to be stimulated and, particularly, what role government must play in providing that stimulus.

For example, an important question is whether agricultural growth, because of the present land-tenure system, largely benefits wealthy people who are importing Mercedes Benz cars? Are we stimulating the economy through people who have modest incomes, who may be importing things from other, distant, parts of the country but not from overseas? Or, are we dealing with people who are spending largely on the local economy and stimulating employment of relatively low-income people; people who already have available to them the bulk of the social overhead capital needed to expand production?

As I indicated in the previous lecture, studies at IFPRI have found that, for small farmers, about 40 percent of incremental expenditure is on locally produced non-agricultural goods and services. The service sector is a substantial proportion of that total. That figure comes as a surprise to many people since the tendency is to think that the incremental expenditure of the peasant farmers involved in the green revolution tends to have a much higher proportion going outside of the local economy. We find also that the expenditure patterns are towards goods and services that one generally thought of as not being very important to growth and certainly not part of modernization. Locally-made, even crude, furniture is an example. Various household services are also important. And we find that, in general, locally produced goods and services tend to be produced by labour-intensive processes.

This is the type of information needed if we are to understand the public policy needs necessary to encourage those multipliers. We can say very clearly that the larger the multipliers on the local economy, the

more favourable the GNP effect will be, the more favourable the employment impact will be, and hence, the more favourable will be the distribution impact. What one would most particularly like to see from these expenditure multipliers from rural people, as their incomes rise due to increases in agricultural production, is a stimulus to the local landless class. Thus, we need to understand what kinds of restrictions there may be to expanding production of those goods and services, and what kind of restrictions there may be to participation by the poor.

From our studies of rural infrastructure in Bangladesh, we find that, where the rural infrastructure is favourable, wage rates for the landless labour class are about 12 percent higher than in areas that are similar but lacking good infrastructure. This is important evidence of the role of infrastructure in facilitating large local employment multipliers from agricultural growth, an issue to which we will return shortly.

That 12 percent higher real wage rate tells us some very important things about the development process. We know from other studies that markets in rural Bangladesh are working quite well. Thus, we know that this higher rural wage in areas of good infrastructure is not due to traditional market imperfections. The difference does not lie with people in poor infrastructure areas not knowing about jobs in areas where there is good infrastructure. We also know that migration occurs quite easily with low frictions. So there must be some very sound economic reasons why people are willing to stay in an area with poorer infrastructure and work for a wage rate that is less than is available in areas not very far away, where there is good infrastructure. Those better jobs are within walking distance of one or two hours.

Why then do we find such wage differentials? We do not know for sure and, thus, that should be one of the priorities for further research. But, I would speculate that the reason lies with the social overhead required for a labour force. In the area with the lower wage rate, there is a labour force which already has housing and at least, minimal public services. If labourers move towards the better infrastructure where there is a higher wage rate, they have to provide housing for themselves in the new location. They probably require other social overhead expenditure as well.

Thus, we observe an equilibrium that requires an additional wage rate to make it worthwhile for them to migrate to the somewhat higher wage rate area. What that tells us is that there is a social investment in the place where there is poor infrastructure which helps keep them in that area. If you put in the infrastructure so that they can be mobilized where that social overhead expenditure has already been made, then society can take advantage of this relatively low productivity labour and mobilize it to higher productivity without a commensurate increase in cost to society. That is, in effect, a return to the infrastructure investment. We need to understand this in the context of consumption expenditures and the stimulus from those expenditures. We will view the same phenomena from a different point of view later.

From knowing what the consumption patterns are and, therefore, what types of activities will be stimulated by these rural linkages, we must move to understand the processes by which those goods and services will be produced. To what extent can they be produced in the market towns or even in the villages of rural areas? What are the capital-labour ratios in those activities? Which of those activities have a long-term future, and which are the dying industries?

The latter, dying industries, are the ones which, once effective infrastructure is in place, succumb to competition from outside. The dynamic ones will gradually increase their capital intensity, increase their productivity and become competitive firms not only locally but perhaps on a wider scale as well. We, therefore, need to know what their characteristics are in terms of their capital-labour ratios, technology requirements, needs for educated people and capacity to improve themselves over time. In particular, we need to know to what extent these firms draw upon the services which are normally thought of as being provided by the public sector. To what extent is the demand for those services going to increase? In other words, what public services have to be rendered in order to encourage the competitiveness of the more dynamic of those industries so that they can compete with the outside world?

We need an inventory of the activities that are already in the market towns, and what kinds of needs they are fulfilling. We find that when we

do studies of the non-agricultural sector, we tend to concentrate on what are the overtly modern activities in the major cities, paying little attention to those activities which are now encompassed in rural areas and which, in a country like Pakistan, constitute well over half of manufacturing employment. Such a high figure comes as a surprise to most people, but we can document it in country after country. We are talking about a sector of substantial proportions.

The most important need of dynamic rural industries is a reliable, well-maintained road infrastructure. Thus, we need to document to what extent these firms need roads, how they make use of them, and how they must be developed to be most effective. The second most important infrastructure element is a reliable supply of electricity. We need to document more fully how such firms use electricity and to what extent they would be able to increase their productivity and become more competitive if reliable electricity was provided to them. And, unfortunately, we need to know more of the cost to small firms of the unreliability in electricity supply. In other words, if we are serious about the whole issue of electrification, we need to know and to marshal our evidence to show what the effect of electricity or the lack of it will be on productivity. To do that, we need to look in detail at the production economics of the small firms which respond to the rapidly rising incomes of rural people.

Third in importance to the, small, dynamic rural sector is good telephone service. Of course, in developing countries where the telephone is not reliable in the large cities, one may find it humorous to talk of reliable telephones in the villages and the market towns! But it is not at all humorous to the small entrepreneur. We are dealing with small industries which must buy raw materials in distant places and which hope eventually to be producing enough to sell to more distant markets. These are small firms that are labour intensive, that are mobilizing local capital resources. To compete, however, they have to be plugged into the larger economy both for buying and selling. In order to do that, they need to be in communication outside of their market towns and villages and to do so quickly and efficiently. They need to know what is happening to price behaviour, to input behaviour, raw material supplies and so on.

And we must recognize that in developing countries, in general, markets are not working as well as in developed countries. For that reason, it is particularly important for manufacturers to have a close feel of what is happening to the market in which they deal, both from an input point of view and an output point of view. In developing countries, profits of small firms are still determined as much or more by their trading acumen as their production efficiency. So, in some respects, rapid communication is even more important in small industries in developing countries than in developed countries precisely because the markets are fairly imperfect and, therefore, the profitability of the firm is strongly influenced by how quickly it responds to rapidly shifting market conditions.

As we look at the development of the small industries in market towns and rural areas, we find a history of stimulation by growth in local demand, the beginnings of modernization and then movement out into larger markets. They cannot make that progress unless there are good communications systems.

We have so far emphasized the low capital intensity of small rural firms as a desirable feature. But we must remark that the development process is one of gradual capital intensification. Thus, through the development process, one should gradually increase the amount of capital that is combined with labour in the production process. It is, of course, common to indulge prematurely in capital-intensive processes, creating a bimodalism in capital investment through building large-scale, highly capital-intensive factories with much of the available capital, thereby leaving little for any increase of capital intensity for the rest of the economy.

In criticizing such a misallocation, we want to be very careful not to misunderstand the total process of intensification. What we are criticizing in the capital-intensive firm is the fact that it is mobilizing a high proportion of the country's capital, but applying it to only a small proportion of the labour force. Those labourers make a large jump in capital intensity, starving all the rest of the labour force of capital. Ideally, efforts should try to spread the capital more thinly and then to gradually upgrade the capital intensity.

In the market towns of rural Pakistan, firms that start out with very labour-intensive processes, using very little capital, gradually increase that capital intensity as time goes on by gradually upgrading the quality of their machinery. For example, metal working firms may initially use inexpensive machine tools which break down frequently and that, are, therefore, very labour using. Gradually, the owner will increase the quality of the machine tools. Concurrently, they must gradually upgrade the quality of the labour force, representing a necessary investment in human capital. Thus, we are dealing with an element of the non-agricultural sector which is very large initially, but which starts with very low productivity resources, with very low capital intensity resources, and which has the capacity to increase that capital intensity gradually as the economy develops. And we need, as I say, to understand what those processes are, and how the investment process can help provide the necessary public services in a manner most helpful to those firms.

The final element of examining, describing and understanding the existing production system in the small towns and villages is to look at the nature of their capital needs and the way in which credit programmes can be of assistance to them. We know some important items about these firms. We know that their fixed capital requirements tend to be fairly small per worker and in total. We also know that, compared to the larger scale firms in the society, these firms tend to have very large working capital requirements. That is, of course, logical when you stop to think about it. These are firms which are, first of all, employing a lot of labour relative to their fixed capital requirements. Labour obviously requires working capital. Someone has to finance the labour force while the production process is working its way through. In addition, firms which are labour-intensive are almost always also material-intensive. They are not only using a lot of labour, but they are processing quite a lot of raw materials. That also requires financing.

Thus, a critical bottleneck for these small firms is usually working capital finance. That is the part of finance which public sector credit programmes are, generally speaking, least able to meet. They are normally set up to lend for fixed assets with the fixed assets pledged against the loan providing security. It is a much trickier business moving into lending to firms that are using mostly working capital. In a sense, not only

may working capital disappear if such firms do not prosper, but the borrower also may disappear! They are not tied to a fixed capital requirement. So this is a very difficult problem for the lender.

We also note from the experience of developed countries, where these small firms also represent a very large proportion of the manufacturing output, that the mortality rate for such firms is quite high. This, too, is a very difficult problem with respect to financing. On the one hand, one must encourage these small firms because they are the backbone of industrial growth, particularly in early stages of development. We know that they have substantial working capital requirements. We know that it is difficult to provide working capital and to get security. And, we know that there is going to be a fairly high failure rate. In fact, you do not want to stand in the way of that high failure rate because you do want natural selection to set in to choose the more able entrepreneurs.

In those difficult circumstances, the public sector lender is apt to ignore the problem, allowing the ones who are efficient to generate a fair amount of capital internally as the basis for their gradual expansion and forcing the rest to look after themselves with respect to working capital. However, if you are trying to achieve a 6.5 to 7.5 percent growth rate in the economy, you probably cannot afford to ignore a potentially dynamic area and simply let it move at its own speed. I am arguing here that we do need substantial research with respect to the capital requirements of the small firms in the market towns. We need to use that research to find the means by which we may be of assistance to them through institutional credit programmes.

In analyzing the credit needs of small rural firms, we must be prepared to admit that we are on the wrong track. It may be that we simply cannot do anything in institutional credit for these firms simply because the failure rate is so high, the risks are so high and, therefore, the potential losses to institutional credit systems may be excessively high. But, it certainly is something we should be looking into if we want to encourage these types of enterprises.

The third matter I want to discuss briefly is infrastructure. I have already alluded to it in the earlier contexts, so we can cover it quickly. The discussion will distinguish, on the one hand, between hard infrastructure — the physical elements like roads — and, on the other hand, the soft infrastructure of the institutions that directly facilitate productivity — such as those for credit or education.

We do need to know what is the relationship between the various elements of hard infrastructure. What is it that determines how successful a road will be in stimulating the whole range of economic activities discussed above? If you are to have a return to the road, does electrification have to be provided concurrently? Does the telephone have to come more or less with the road, at least in the market towns? Those are very important issues. We would hope that the answer is that they do not all have to come at once.

However, if the complementarities are high, then we have a very difficult political problem of having to concentrate a whole set of activities in a limited number of areas while we are providing sufficient capital to spread out the effort to other areas. And, obviously, the political system pushes you towards spreading these kinds of infrastructure investments very thinly. If we discover that there is a high degree of complementarity among the various component parts, then we have a difficult political problem to face.

I am afraid that what we will discover through research on these issues is that there is a high degree of complementarity among elements of infrastructure and, therefore, there are very hard political decisions to be made about the sequencing of regions for infrastructure investment. You have to do a fairly full job in certain areas to get a return, implying that you move through the sequence of regions much more slowly than otherwise would be the case. Some obvious political problems can arise from that set of circumstances.

Beyond the relationship among elements of hard infrastructure, the roads, the electrification, the telephones, and so on, we must also analyze the relationship of what I refer to as the soft infrastructure or the institutions which come along with the hard infrastructure. What is the order

in which we need to develop institutions? What is the minimum number of them, in terms of complementarity, for achieving major development activities? We could even ask questions about the income distribution implications of various institutions.

Interestingly enough, of the whole range of public institutions, the one that is most frequently used by low-income people is the post office. Therefore, if you are concerned with seeing that public institutions have a favourable effect on low-income people, a post office has to be very high on your list of priorities. I must admit that I do not know why this is the case. The data we have on this is largely on the frequency of use. I suspect that low-income people have remittances from outside and that they have a number of reasons for needing to communicate with the outside world. And so this becomes an important institution for them. I think that this is a very interesting issue because we have strong political and moral pressure to see to it that the development process has a broad distribution and sometimes we find surprises in the institutions which are important to low-income people. We need more studies to find out what institutions matter to whom.

It is useful to push the equity issue further. I go back to my favourite infrastructure element, the telephone. We have studies in India which are quite interesting in terms of the benefits which a village telephone gives to very low-income people. In a little study in Gujarat looking at these issues, we find that the lowest income people in an isolated village are absolutely at the mercy of one or two wealthy people in the village if they suddenly need transport. If there is an extreme illness in the family, for example, where there is a need for quick transportation out of the village, they are completely at the mercy of those one or two families. That obviously can lead to a very exploitative situation.

What a telephone does to the poor people is suddenly give them access to wider alternatives to meet their emergency needs. One can argue that it is a very important element in broadening poor peoples' range of choices and, thus, an important means of reducing the exploitation of very poor people.

Now, to go back to the main argument on growth, there are a tremendous number of institutions involved in the development of the market towns and involved in the health and growth of the small industries of those towns. There are so many such institutions that we need to have some sense of priority for policy as to which ones we are going to be provided and under what circumstances. Again, we have the very critical issue of the complementarities amongst these elements.

Of course, as we look at priorities for rural development, we need to remember that when we are looking at large-scale industrialization in the major cities such as Karachi and Lahore, we take all these infrastructure elements for granted. We just assume that there is a critical infrastructure, that there has to be good road transport, that there have to be telephones, and that there has to be electrification. We assume a rather large set of public sector institutions that will naturally be provided in those centres.

We do not have to study the needs of large-scale industries in the major metropolitan centres and their relative priorities. They are naturally all looked after. I want to make a major point about this. If we are serious about broad-based regional development, taking advantage of agricultural growth to stimulate non-agricultural activities, then we have to be serious about providing the institutions and the hard infrastructure which is available in the urban areas. But, we have to recognize that the demand for these is so immense that priorities must be established. We have to recognize that a scarcity of resources prevents us from doing everything at once. Thus, in making informed decisions, there is a very major need for analysis of these problems.

Frankly, I am underrating or, in a sense, understating the importance of a well-operating political process. Countries do develop. Progress does occur without the kinds of studies I am talking about. Why is that? One reason, of course, is that it is amazing how much inefficiency we can stand in the world and still progress. The other reason is that there are political processes and politicians. Local politicians know what is happening in their constituencies and they know what small firms need. They talk to people in the same way that we do with systematic research.

Thus, the political process begins to generate some priorities in providing services in a way that is probably not all that inefficient. Research should be able to increase the efficiency of those processes somewhat, or perhaps, serve as a substitute for poorly operating political systems.

The normal political process will have a number of distortions because of the biases of an individual politician, biases both in the way the political system works and biases in the constituency that is behind a particular politician. Random factors are important too, such as when an area happens to have a particularly effective politician. The kind of research and analysis I am talking about can increase the efficiency of those processes at least marginally, but enough, I would think, to justify the fairly modest expenditure on such research.

The last area of research I want to discuss concerns agricultural production itself. Here, obviously, I do not want to go into full detail because we are discussing a very broad set of processes — the very processes of growth in the agricultural sector. Let us remember, however, that the driving engine that we are talking about for agriculture is the increase in national income in the hands of a cultivator class. We need to be doing a full range of research to see to it that those processes move ahead efficiently and rapidly. I would like to raise a small number of special issues, however, with respect to research on agricultural production growth which are relevant to the processes I am talking about and their multiplier influences.

The most difficult research problem is the complicated set of regional issues in agricultural production growth. We are talking about a growth process which is driven by technological change in agriculture and that then has very powerful multiplier influences on the rest of the economy. That process depends on what is feasible with respect to agricultural technology. Some regions are going to be fortunate and have technology created which gives them a tremendous boost in their income and swings these multiplier forces into effect. But, some regions will not be so fortunate.

Some of the regions which are not going to move are left out simply because we did not recognize what their capabilities were, and so did not

do the right biological and physical science research. We must try to anticipate and correct those omissions. But some regions are not going to move because the resource base which they have, in terms of what we know of science and technology, is simply not going to respond to even the best improved technology that can be developed for those circumstances. Thus, we can differentiate three types of region-based situations. The first is the dynamic case of a region that is moving; the second is the case of a region that is not moving, but could be; and the third is the case of a region that is not moving and probably cannot. We need to differentiate those cases in order to allocate our agricultural research resources effectively and to move properly with the infrastructure investment. These are especially vital issues.

Note that the whole structure of development discussed in these lectures represents factors which reinforce each other in exacerbating regional income disparities. And recognize that we are talking about increases in regional income disparities because of the differential impact of what happens in agriculture itself; and further, that those disparities are also exacerbated by the very powerful multipliers that arise from agricultural growth.

It is an economic problem, in a sense, that we do not want to waste our investment in infrastructure, in research and in all the other elements of such growth by putting them into the areas where the returns will be very poor. Thus, one of the major research tasks, particularly with respect to infrastructure investment, is trying to sort out where there is to be a large return to these investments and where there is not going to be a return. In some regions, agriculture will be a powerful engine of growth while other regions will not respond because of physical resource deficiencies.

If we only looked at overall growth rates, we would stop here and map the country in a way that would direct investment to the higher-return regions. Obviously, however, we also have very complex political processes at work. We have to recognize that this kind of growth strategy creates a political problem of regional disparities. Hence, we also have to give some thought to whether we are to modify the concentration of

investments in areas that can respond to new technology. If we are not going to make the kind of investments to give accelerated productive growth in the backward regions, what should we be doing in those regions? That, of course, is a very difficult and knotty issue. It is, again, one on which we need to do a great deal of research..

We have to face facts that there are regions which are not going to move very well. We have also to face the fact that there are also human beings in those regions and consider a humanitarian point of view. It is likely that the political problems may suggest responses somewhat different from those suggested by the humanitarian problems.

In general, we have been quite unsuccessful in figuring out how to deal with the problems of regions in developing countries which cannot respond to improved technology. We usually solve that problem by out-migration. The younger, more vigorous people from the low-potential areas simply leave. That results in the horrendous problem of a remaining population that has had its better educated and more vigorous people drained out. The whole problem in a sense represents a downward spiral.

I do not want for a moment to minimize the extent of these regional problems. I simply want to bring to your attention that in countries that spend vast sums of money and do care about the problems in those kinds of areas, we have not come up with very much in the way of solutions. I also want to be very careful not to give you the impression that these are necessarily undesirable development processes because they give regional disparities. Do not forget that the alternative strategies which are oriented towards the large-scale, capital-intensive industries create extreme regional disparities in that it is only large cities that move with that kind of strategy, leaving practically all of the countryside out of the development process. I am talking now about a strategy which brings a major portion of the countryside into the process.

In looking at the areas which are unlikely to move with modern agricultural technology, but which have a potential, we have some very interesting research issues. The first of these research issues brings us back to the infrastructure questions. We continually see the initial impact of agricultural technology, the multiplier effects, as very weak in

the areas that have poor infrastructure. Again, in the case of Bangladesh, even where areas matched in every respect except for infrastructure, the good infrastructure areas use 92 percent more fertilizer per hectare of land than the poor infrastructure areas. Fertilizer is a major carrier of new technology in agriculture and, therefore, those poor infrastructure areas are not benefiting from the initial impact of technology or its effects. Thus, investment should be made in areas with good physical potentials but lacking infrastructure. Developing countries have large areas falling in that category.

We also need to look at our agricultural research systems from the point of view of the extent to which they can succeed and cannot succeed in particular areas. And there we have to be very careful not to fool ourselves. You can always find a plant breeder or a soil scientist who will claim miracles are possible in any particular area. The issue is whether or not they can really deliver. So, we need to look at other parts of the world with similar resources and see whether they have been succeeding where the institutional and trained manpower environment may be somewhat more favourable.

I would like to add to this regional question a very important growth dynamic. In the circumstances of a low-income country, the bulk of the agriculture — practically all of it — is devoted to basic food staples. In the case of Pakistan, most is devoted to the foodgrain commodities. As incomes rise, given the very high income elasticities of demand for a wide range of agricultural commodities, the structure of consumption of agricultural commodities changes very rapidly. In particular, the demand for fruits, vegetables, and livestock commodities grows rapidly.

The optimal physical condition for producing fruits, vegetables, and livestock commodities may at least be somewhat different to what is optimal for the basic foodgrain commodities. Thus, it may be that rapidly changing demand structures open up possibilities for development of some regions which otherwise might have been thought of as fairly backward and having poor prospects. We do need to look very much at the dynamics of demand and see clearly where there is going to be an increase that might be met from a region which is initially disadvantaged given

the old demand structures. That again calls for expansion and the development of the agricultural research system to meet the complete new needs of those regions.

I must now emphasize a point about human capital. The kind of development strategy I am discussing, with agriculture as the leading edge providing strong multiplier forces on other sectors of the economy, is a trained personnel-intensive development strategy. The heavy industry kind of strategy, the capital-intensive development strategy, uses significantly fewer trained people. First of all, it makes much less employment generally, but it makes proportionally even less employment for trained people.

For example, how many highly-trained people are necessary to run a steel mill as compared to basic labourers? We find that proportion to be small in a good deal of large-scale industry. That may be contrary to some of the conventional wisdom, but common sense will tell you that when you move into agriculture, where you have to develop a very complex institutional structure of research and so on to support it, you are obviously talking about a tremendous increase in the demand for educated people. This is especially true when you note the small-scale industries where the proportion of entrepreneurs to workers is quite high. I make that comment in the context particularly of the need for many institutions to support agriculture.

In Pakistan, we see tremendous efforts in developing the Agricultural Research Council and all the work that goes on under that. It has been an exemplary development, but it obviously needs considerable further development to move into the highly modern world of high yield foodgrain production. Further, that system must broaden itself into the very wide range of commodities which come out of agriculture as incomes rise and as the high-income elasticities for many commodities begin to exert themselves.

Thus, we do need much more of research in the whole manpower area to figure out what the increased demands will be, where they are going to be and how the higher educational system has to be structured to

meet those needs. I use research to illustrate the tremendous needs for trained people for a modern agriculture, but the types of points I make can be replicated for many other areas as well. And remember that expansion of investment in human capital is not only a means to a development end but it is an important part of the end itself. How marvelous and fortuitous!

The topic of this lecture has been research needs. I am sure that readers have been a little surprised by my research agenda. Coming from an economist, it probably sounds fairly pedestrian — a whole range of studies that involve fairly simple-minded surveys of what is happening around small-scale industries and market towns, looking at consumption patterns, which we have always looked at, in fairly straightforward ways and a number of manpower studies. But, I would like to make the point that in a development strategy that provides high growth rates and has a high degree of dynamism, there is a tremendous burden on government to try to adjust to the dynamics.

Thus, a tremendous amount of analysis is needed in order to support government in making these critical decisions. That analysis may seem fairly pedestrian on the surface, but research methodology need not be restricted to straightforward, old-fashioned economic tools. There are ways of using sophisticated statistical and econometric techniques in doing what I am suggesting. Such tools are, however, frosting on the cake, not the cake itself. We are talking about the multiplication of a large number of studies that have to be replicated over a fairly wide area in order to give us rather precise information for good policy determination.

I will make a general closing comment. We have many disbelievers about the development strategy set forth here. From that point of view, getting out and doing some social accounting matrices in rural areas, as we have been doing at the International Food Policy Research Institute and as has been done elsewhere, can be quite convincing. For that, you collect the data describing the total economic system of the regions of interest. You feed into those results the changes in agricultural productivity that are feasible, that are being put into effect now, and then

measure those multipliers on the rest of the economy. Again, the ultimate results can be very impressive. Thus, we may need some of those highly-sophisticated social accounting types of studies in order to convince the nonbelievers. But, I hope we can bring the nonbelievers along fairly easily and not put a lot of resources into that kind of effort; and hence get on with policy-oriented research which is necessary to help governments to move vigorously with the strategy. Thank you.

DISCUSSION

Mr Inayatullah: I have a rather unconventional set of questions on research. What is the social utility of knowledge being produced by our research institutions? Because we are increasingly concerned with what is produced in the country in physical terms and what reaches the common man, does our research actually reach the common man? Does it enable him to act effectively and protect his interests? Secondly, most of our dealings in any conference like this are with the professional researchers and the civil servants who are mostly employees of the government. Obviously, the government is not very neutral in its objectives. It has its own interests and, as a result, the institutions and the research agenda seek to legitimize the power of the ruling group and do not necessarily promote the interests of the common man. Basically, the research agenda becomes biased in favour of whoever is the controller of the resources.

My next comment relates to the whole relationship of intellectual centres and the intellectual periphery. As developing countries, we are the periphery of intellectual centres of the West and, thus, have unequal terms of trade. What we produce in terms of research and the problems we tend to investigate are sometimes beneficial to our planners and sometimes probably to the common man as well, but are considerably bent towards validating the theories being produced in the universities and intellectual centres of the West. So the whole question is, what is the possibility of developing research agendas which benefit the common man, in which the common man also participates and is empowered to act effectively?

Prof. John W. Mellor: From an equity point of view, I feel comfortable with an employment-oriented agenda. If the common man everywhere in

the world, and particularly in developing countries, is going to have more control of his environment, his government, and his consumption, he has to raise his income. And the way incomes of the mass of the people get raised is through greater and increasingly productive employment.

Some people are under the delusion that all wealthy people in developing countries work hard while most poor people are sitting around idle. That is what lies behind the surplus labour theory. But we all know that poor people are working extremely hard, but unproductively because there is no allocation of capital, resources, and infrastructure to facilitate a gradual increase in their productivity.

So far, I have been talking about a development strategy that is somewhat common man-oriented, but I have not discussed redistribution of assets and wealth towards the poorer elements in society. There are two reasons for this. First, such a redistribution is not really going to help the common man very much unless he is part of the dynamic of a growth-oriented strategy of development. I strongly doubt that redistribution is necessary to accomplish this in most parts of Asia and Africa. However, where you have a feudal agricultural system, you have to do something to break its back in order to get the agricultural technology dynamics I am talking about. Land reform is vital in such cases.

The second reason I have avoided the issue is that it seems to me that the political systems in much of the Third World really are not oriented to bringing about major redistributions in the foreseeable future. So our efforts will be better spent on doing what we can for the common man within the context of the broad political and distributions systems now in effect. I think I am also motivated by the fact that as a part of an international organization I would like to think of myself as a world person. Redistribution is a very difficult internal political issue best dealt with in national research agendas. But, we must not forget that feudal land tenure systems will virtually block a dynamic, agricultural-based growth strategy.

I should close my discussion on these issues by pointing out two things: (1) I have avoided what I consider to be purely national issues and

have stressed those for which more technological solutions are promising. And, (2) I want to be absolutely clear that I am talking about research that relates to a broad development strategy, not the total research agenda for either agriculture or the general economy. There are a lot of other issues that are not part of my agenda.

Mr Akmal Siddique: Thank you very much, Professor Mellor for another excellent lecture this morning. I have questions and comments on two basic areas. The first is regarding the telecommunication facilities we are talking about — telephone facilities and the like in developing countries— and the second is regarding small farms in developing countries.

Regarding telephone facilities, I would like to share a small personal observation. Everybody knows that telephone facilities are very bad in big towns like Islamabad. The public decision-making in a country like Pakistan does not really involve proper economic sense. If I want to make a call to a railway station, I cannot get my call through because of faulty facilities so I have to pick up my motorbike and get onto the road. I spend two or three liters worth of gas, my time and its opportunity costs while I am on the road. The road is congested and the probability of accidents is high. The social and economic costs of this effort add up. If I had a good telephone facility I could have made a 50 paisa telephone call and received the information right in my house. So this is one aspect that public decision-makers should take into consideration. They should look at the economic cost of not having a proper telephone facility in the country.

Secondly, I would like to comment on small firm businesses. As I understand it, you have advocated small firm business in Third World countries and doing away with capital-intensive projects in a country like Pakistan. Well, my question is what about economies of scale? Moreover, while literacy levels are very low in a country like Pakistan, entrepreneur skills are also very low. What do you suggest under circumstances like this one?

Prof. John W. Mellor: Infrastructure is a serious matter in rural areas and its development will require vast resources. I would not for a minute

suggest that the strategy I am talking about has no resource requirements. Decisions have to be made to do certain things and not do others.

Current studies on resource productivity for small firms are quite impressive. In general, we are finding that these small firms are using resources quite efficiently and productively. In fact, one can make the case that it is the large-scale firms which are misallocating resources in developing countries. So I do not have any problems of efficiency. The small firms also increase their efficiency substantially over time. Those that stay in the business tend to increase their capital intensity step-by-step as their productivity and resources increase. Taken collectively, these firms have a genuine cumulative compound rate of growth.

Small firms, the backbone of an employment strategy, require educated people which means an expansion of the education system. The lack of entrepreneurs and the lack of education are closely associated problems of development. Thus, the development strategy set forth is particularly demanding on educational institutions and entrepreneurship. That is good in its own right, but also requires massive investment in education. In Pakistan, the proportion of your GNP devoted to education is rather small even by the standards of countries with the same per capita income level. That would be a major bottleneck in what I am talking about and you need to do something about it.

As you know, I have had a much more intensive and longer term experience in India, so I find it easier to use that country as an example when discussing these issues. The striking change in India over the last 20 years has been in the tremendous increase in the numbers of people who clearly have entrepreneurial capabilities to develop small-scale industries, as distinct from trading capabilities. It is these vast numbers of entrepreneurs which have produced real growth in the vigorous parts of India. I have not travelled extensively in the Punjab of Pakistan, but I am sure that I would find something similar there. From decade to decade, there is almost certain to be a great deal more entrepreneurship in those towns. What I find exciting about growth led by agricultural demand is that it is widely dispersed in a large number of centres and, therefore, provides opportunities to tap a broad range of talent. There

may be a lack of entrepreneurs in Pakistan, but not a lack of latent entrepreneurship. There are plenty of people who have the potential. The question is what opportunities are being created for them, and what is the educational system doing to prepare them. That is where some action is needed. If anybody is a nonbeliever on these issues, we need some research on it!

Dr S. K. Qureshi: Professor Mellor, I was intrigued by your classification of three kinds of regions when discussing the regional ramifications of the strategy that you have been talking about. Now, you classify regions as ones that are moving, ones that can move and those that cannot move. My feeling is that, in reality, this classification is probably not so airtight. Moreover, in any country this classification would probably be a function of the capability of the agricultural research system.

I would like to present two examples from Pakistan that highlight gaps within our research system that constrain our ability to change the prospects for the different regions that you have spoken of. When we were designing the Tarbela Dam, there were studies that showed that if the pace of deforestation were reduced, the length of the dam will increase. And if the length of the dam goes up you can keep on generating more electricity and the water would be better supplied in larger quantities to the Punjab. These studies emphasized interrelatedness and the need to consider these linkages. The results of these studies were not utilized. Moreover, further research has not really been done that is both region-specific and considers also the interrelationship between different aspects.

We have been talking about technological breakthrough and of the agricultural strategy for generating incomes and employment. The biggest problems of agricultural growth in Pakistan are due to irrigation design. We have problems of waterlogging and salinity. These issues again require considerably more research. What we have done is to sink tube-wells and pump the water. But what happened was that the salinity level of the soil increased, which again requires more irrigation. And, there are also provincial dimensions to our problems; we have sweet water in Punjab and sour water underground in Sind. So what I am really driving

at is that there are in different regions tremendous possibilities for relevant kind of research and that these are distinct and yet very interrelated. And Pakistan's experiences have shown that we need to do more research on efficient public policy so that we realize these possibilities.

Prof. John W. Mellor: It is important to rapidly expand the technical agricultural research system. You do not have nearly enough trained people to do even a small fraction of the agricultural research that is needed. And, when you do have them, you still will have a complex institutional problem of how to organize and mobilize them. You cannot run them from one big organization.

Precisely because of the shortage of trained researchers, you have a very difficult problem of making short-term decisions about the allocation of agricultural research resources. And I have no question that the optimum allocation of those resources from the point of view of growth is going to exacerbate regional disparities. I should emphasize that regional 'divisions may be quite small. I am not talking of Punjab versus Sind, but of smaller places within larger regions.

I also would like to emphasize the point I made about the dynamics of demand. The salvation of traditionally backward areas which have little prospect of responding to certain types of research is that they may have great prospects for producing things for which there is a new and rapidly rising demand.

Because infrastructure is critical to the success of agricultural research and expensive, tough decisions have to be made on where it is to be developed. Generally, response to the agricultural technology is going to be better where production is already fairly high. Simply put, response to technology tends to be percentage increases. Consequently, the absolute increase is greatest in areas where absolute production is already highest. These areas also tend to have higher population densities which will give higher per capita returns on infrastructure investment than areas with a sparse population. Since the more productive areas with the higher population intensity already have somewhat better infrastructure, they will give better responses to technology and to more infrastructure investment. Thus, regional disparities will be increased.

The problem of exacerbating regional differences is probably worse than I implied. We should not gloss over it. At least in the short- to intermediate-term, we are talking about difficult economic and political decisions that call for a good deal of research. We need to know to what extent differential returns to technology and investment in better-off areas exceed those in poorer areas. Are the differences large enough to justify major political risks in going ahead there? Will investment in more productive areas generate enough income so that much more can be spent in other areas later? Or, are the differences fairly marginal and therefore not worth the risks?

Dr F. U. Siddiqui: Thank you, Prof. Mellor, for simplifying a rather complex topic in today's lecture. I would just like to make one comment on the simplified, agenda for research pertaining to the agricultural growth and the employment growth strategy that you highlighted and explained yesterday. I was quite surprised that in a country like Pakistan, considerable research activity has been going on. This was a pleasant surprise to me because I have been away for a number of years. The point I would like to make relates to the application of this research. I think the economist's propensity to keep looking further in developing more sophisticated models is very important. However, I would suggest that there should be greater use of the existing research which has not been coordinated enough and lies scattered in so many different areas. Efforts should be made to use this research and to optimize and economize on the research resources that are always short anywhere and even more so in a developing country.

The second thing which the economists should be concerned with, in order to utilize the research resources productively, is to communicate their results effectively to the policy-makers in the first place and then hopefully down to the users like the farmers in rural areas. Thank you.

Prof. John W. Mellor: IFPRI is very much concerned with research on complex issues of concern to policy-makers. We try to relate our research to the people who are making policy. But, policy-makers are very elusive. It is hard to find anybody who admits to making any policy, I have come to the conclusion that economics research has to be replicated and repeated over and over again in different environments to have an impact! A

study done in one place is not convincing and is likely to be taken as anecdotal. In the U.S., economic research has a tremendous impact because it is done in many different places at different times and is gradually fed to policy-makers by people in whom they have confidence. I think one cannot come to Pakistan without being impressed by the quality of work that is being done. It needs broadening and replication.

Admiral (Retd.) M. Fazil Janjua: First, I would like to compliment Prof. Mellor for a brilliant lecture. I found your lecture intellectually stimulating. I am sorry I missed the lecture you gave at the Institute yesterday. I would also like to express my thanks to Prof. Naqvi and the PIDE for the honour they did me by inviting me here to listen to this morning's lecture. I have known Prof. Mellor for quite some time and we have discussed many issues in an office environment, but I had not had the pleasure of listening to Prof. Mellor lecture. I have particularly enjoyed this lecture since the theories and theses he has presented confirm my own observations in this area. For the economic development of a country, the resources that are available should be utilized for the good of the people. That is obviously the best way of development. I am not an economist. I have some experience in the management of resources, both men and material, and I have some experience in planning and in using the knowledge which social scientists and biological scientists generate in making policies for development. The most apt approach to development is the integrated approach because agriculture covers all regions and because it relies on the development of land, water, and human and climatic resources. Obviously, it is the easiest and best method for development, especially now when we are modernizing agriculture through technological change.

Agriculture can flourish if there is a development in sectors such as fertilizer. We made very good use of our resource of natural gas in the manufacture of urea. However, our urea requirement still exceeds production. So there is a greater stimulus for adding some more fertilizer factories. For this we need equipment and materials to insure that many other activities will be generated; We have an advantage in our manufactured goods sector in those sub-sectors where the raw material is

produced internally. And therefore, your emphasis on development based on industry where the raw materials and resources are indigenous is very apt.

I am impressed by the fact, and I am very glad that this galaxy of economists are listening, that you have emphasized that the development of agriculture is a complex task. I have been in some of the highest decision-making forums of the country where the development of agriculture was generally simplified. I remember one forestry specialist sitting next to me at a meeting where we were discussing what the problems of forestry in Pakistan were. He was insisting that by simply importing some good quality seeds we can have forests all over. I wish it were more widely realized that even the development of forestry includes, among other things, a determination of what trees we should import the seeds for, and what species of trees which could do well under the conditions of our alpine climates in the North and desert climates in the South. Therefore, the selection of the forest is not an easy matter. Then, we have got to raise the seed into seedling and have to have suitable forestry officers to identify the spots to grow them and to educate on proper cultural practices.

I cannot resist the temptation of mentioning a lecture I heard on television in 1983-84, during a drought. In this lecture some social scientist was saying: "Why don't we have a variety that can do without water?" I wish it was possible. It is not. There are certain limits even to the biological sciences. There is a minimum amount of water that would be required. There will be some drought resistant varieties but you just cannot simplify the matter and assume that biological scientists can come up with varieties that require no water at all.

The other thing which I think is very important is that this knowledge which the institutions abroad and particularly the international institutions like the one that Professor Mellor heads is most useful in our country only if there is a national institution capable enough to take over and build it up. In other words, international knowledge is useful to us if there is a national system for research which can then adopt this knowledge to our conditions and give it the right priorities. This

knowledge will not be itself produce the results which we are trying to achieve, to improve prosperity and have the spread effects and improve the quality of life for the people. This requires institutional development at the local level.

The third point I would like to emphasize is that in a developing country, the demand for resources is enormous. Unfortunately, the availability is far less. Therefore, the social scientist's contribution to using the limited resources to optimum advantage is of paramount importance to us. It is here that the research effort is required. What is best for improving the quality of life of the people of Pakistan should be borne in mind. This is the other important aspect. We want to see that the fruits of increased agricultural production are supportive. With increased production, we want to see that the poorest do not become poorer through increased cost of foodgrains. Therefore, the subsidy that the government gives should really go only to the most deserving person. Not everybody in the urban areas should be entitled to that subsidy. I am glad Professor Mellor has mentioned the need to develop knowledge. I assure you that if knowledge exists it will eventually be utilized. In an environment where the resources are limited, the social scientists and especially the economists have a crucial role in assuring that there is no waste of scarce resources. We need to develop the capacity here within our research systems so that we can benefit from the advice and the guidelines derived in international research. I want to thank you Prof. Naqvi for this opportunity and thank you, Professor Mellor.

Prof. John W. Mellor: Well, I'd just like to make a brief comment. First of all, thank you for those very kind remarks. They obviously have caught the essence of what I am trying to say. I think one of the great problem with economists is sometimes we are afraid that if we state things too clearly it will seem so simple-minded that we might not command sufficient respect. I sometimes take that risk, sometimes failing in it. I have had a long association with you with respect to Pakistan and I admire very much the work that you were doing in the ministry here. And I think we see a lot of the benefits of that around at this time, so it is a great privilege to have you in the audience here. Thank you.

FURTHER READING

These lectures are based on a long chain of work, starting with William Petty, Adam Smith, and, to some extent, Thomas Robert Malthus. A more recent impetus is derived from Colin Clark and, perhaps most of all, from W. Arthur Lewis and his celebrated paper on development with "unlimited supplies of labour". In picking up this thread, I owe much to my long time associate Bruce Johnston, as we each took the early ideas and elaborated on them to culminate in a full strategy of economic development which plays to the comparative advantage of developing countries in fostering a technologically improving agriculture and deriving from that a labour using broadly participatory strategy of economic development.

I list below several references that elaborate on my own work, a few that show the thrust of Bruce Johnston's special contributions and one reference to T. H. Lee, now President of Taiwan, who worked with me at Cornell and earlier with Professor Ishikawa. T.H. Lee elaborates the optimal role of agriculture in development with extraordinarily detailed, historical, social accounting data from Taiwan. Two of the readings are co-authored with my wife Uma Lele who contributed much to those two seminal pieces and through endless discussion in these areas of mutual interest. The references are arranged in chronological order according to publication date.

REFERENCES

"The Role of Agriculture in Economic Development". With Bruce F. Johnston. *The American Economic Review*. Vol. 51, No. 4. September 1961. pp. 566-593.

"The Use and Productivity of Farm Family Labor in Early States of Agricultural Development". *Journal of Farm Economics*. Vol. 45, No. 3. August 1963. pp. 517-534.

The Economics of Agricultural Development. Ithaca, New York: Cornell University Press. 1966.

"Toward a Theory of Agricultural Development". *Agricultural Development and Economic Growth*. Edited by Herman M. Southworth and Bruce F. Johnston. Ithaca, New York: Cornell University Press. 1967. pp. 21-61.

"The Functions of Agricultural Prices in Economic Development". *Indian Journal of Agricultural Economics*. Vol. 13, No. 1. Jan-Mar 1968. pp. 23-38.

Lee, T. H. *Intersectoral Capital Flows in the Economic Development of Taiwan, 1895-1960*. Ithaca, New York: Cornell University Press. 1971.

"Growth Linkages of the New Foodgrain Technologies". With Uma J. Lele. *Indian Journal of Agricultural Economics*. Vol. 28, No. 1. Jan-Mar 1973. pp. 35—55.

"Accelerated Growth in Agricultural Production and the Intersectoral Transfer of Resources". *Economic Development and Cultural Change*. Vol. 22, No. 1. October 1973. pp. 1-16.

Johnston, Bruce F., and Kilby, Peter. *Agriculture and Structural Transformation: Economic Strategies in Late-Developing Countries*. New York: Oxford University Press. 1975.

"The Interaction of Growth Strategy, Agriculture, and Foreign Trade: The Case of India". With Uma Lele. In *Trade, Agriculture, and Development*. Edited by George S. Tolley and Peter A. Zadrozny. Cambridge, MA: Ballinger Publishing Company. 1975. pp. 93—115.

The New Economics of Growth — A strategy for India and the Developing World. A Twentieth Century Fund Study. Ithaca, New York: Cornell University Press. 1976.

"Food Price Policy and Income Distribution in Low-Income Countries". *Economic Development and Cultural Change*. Vol. 27, No. 1. October 1978. pp. 1-26.

"Technological Change, Distributive Bias, and Labor Transfer in a Two-Sector Economy". With Uma Lele. *Oxford Economic Papers*, Vol. 33, No. 3. November 1981.

"The World food Equation: Interrelations Among Development, Employment, and Food Consumption". With Bruce F. Johnston! *Journal of Economic Literature*. Vol 22. June 1984. pp. 531—574. Reprinted in *Economic Impact*. No. 50, 1985/2.

Mellor, John W., and Gunvant M. Desai (eds.). *Agricultural Change and Rural Poverty: Variations on a Theme by Dharm Narain*. Baltimore, MD: The Johns Hopkins University Press. 1985.

"Agriculture on the Road to Industrialization". In *Development Strategies Reconsidered*. Edited by John P. Lewis and Valeriana Kallab. U.S. Third World Policy Perspectives Mo. 5. New Brunswick, NJ: Transaction Books for the Overseas Development Council, 1986. pp. 67-89.

Mellor, John W., and Ahmed, Raisuddin. *Agricultural Price Policy for Developing Countries*. Baltimore, MD: The Johns Hopkins University Press. 1988.

**CONCLUDING
REMARKS**

by

Professor Syed Nawab Haider Naqvi

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by

Professor Syed Nawab Haider Naqvi

As Chairman,! carry the responsibility of saying a few words at the very end. Perhaps there is no need for this, considering the lucidity of Prof. Mellor's lecture and the great simplicity with which he presented his ideas, which are otherwise quite complex.

Prof. Mellor has convinced us in these two days that, like love, agriculture is a many-splendoured thing. I especially use the word 'love' because a lot of the classic love stories, at least in Pakistan, originated from the rural areas. We have the moving stories of devoted love such as Sohni-Mahiwal, Sassi-Pannu, etc.—all of them ending in tragedy! Listening to Prof. Mellor, and his repeated emphasis on the need for adequate rural infrastructure—especially telephones, roads and bridges—prompted me to think that Sohni would not have died by drowning if only she could have talked to her suitor, Mahiwal, on telephone to arrange a rendezvous and a ride together; and if both could have made good their escape by road, instead of her having to float alone on an earthen pitcher across the turbulent Chenab! Indeed, Prof. Mellor even provides empirical evidence which suggests that, with better infrastructure, these innocent love-birds would not only have been saved from an avertable tragic ending, but also that they could have lived happily ever after with more money in their pockets! This is because wages tend to be (12 percent) higher in those rural areas where infrastructure facilities are better.

We heard today, and yesterday, the plausible thesis that agricultural growth is a better initiator of overall growth than is industry, because in it technological change, food output, food prices, and employment of labour (and capital) play a powerful expansionary role. I need not repeat his thesis, having summarized the essential elements in my concluding comments yesterday; but, inspired now by today's lecture, let me make a few more remarks.

First, Prof. Mellor has taught us in these last two days that if economic growth really has to contribute to the alleviation of poverty, it can do so most effectively by raising the income of the poor and the level of food output. To achieve these aims, a higher level of food output must be supplied at a lower price for the simple reason that a *higher price of food is poverty-increasing*. This is a very important point because most policy prescriptions to ensure higher agricultural growth argue for a higher, rather than a lower, price of food. The novelty of Prof. Mellor's thesis is that it takes into account the direct and indirect effects of lower food prices on agricultural output by recognizing explicitly the general equilibrium relationship between the labour market and the food market. Policy-makers can avoid reaping the bitter harvests of ill-founded policies, based simply on raising the price of food to stimulate output.

Secondly, economists and policy-makers will do well to remember that if you want to embark on a programme of poverty reduction, it can be done most effectively in the context of a fast-growing agriculture. Indeed, a high rate of agricultural growth is a *necessary* condition for reducing rural poverty. But for the fruits of this growth to be transferred to the common man, it is essential that employment and real wages rise at a fast enough rate. However, this will *not* come about by the growth of the agricultural sector *alone*. It is, therefore, essential to maximize the *indirect* effects of the increments in national income—caused by agricultural growth—on the non-agricultural sector. For this to happen, the structure of effective demand must be changed in such a way as to ensure a high level of consumption expenditure on non-agricultural wage goods. But appropriate changes in the structure of effective demand can be induced only by a judicious combination of market and non-market forces. To leave such a crucial matter entirely to the devices of the Invisible Hand would be, at best, naive.

Thirdly, we should note the importance of the phenomenon of technological change and its nature. It is an historical 'fact' that 3/4ths of economic growth through the centuries has come about because of technological progress. The need for technological progress is felt most compellingly in the agriculture sector where, due to the limited size of land, the 'extensive margin' cannot be fruitfully explored. Indeed, the many dire predictions made by some economists about the acute failure of foodgrain output to meet the needs of a sharply rising population have been proved wrong mainly because of the powerful output-raising effects of technological change in the agricultural sector—e.g., the adoption of the high-yielding variety seeds. Prof. Mellor also employs the phenomenon of output-raising technological change to remove a major worry about his model—namely, how to produce higher levels of foodgrain output at *falling* food prices. Policy-makers would do well to grasp the importance of this phenomenon while framing policies about agriculture.

I would also like to clarify a couple of points.

First, the fact that the agricultural sector must play the role of an initiator in a regime of high economic growth and employment to reduce rural poverty does *not* mean that the industrial and the services sectors should be relegated to a secondary role. Far from that. Prof. Mellor makes it clear that, in the process of structural transformation, the share of the agricultural sector in total GDP must decline secularly; implying that the non-agricultural sectors must grow at a *faster* rate than agriculture. The share of the total labour force employed in agriculture must also decline; again implying that the employment-generating capacity of the non-agricultural sectors must rise at a faster rate than that of agriculture. Indeed, Prof. Mellor has explicitly emphasized that the agricultural sector *by itself* cannot generate the employment and growth required to reduce poverty substantially in a short period of time. Accordingly, he emphasizes the crucial importance of the *indirect* effects of agricultural growth and employment on the non-agricultural sectors of the economy.

Secondly, the nature of the policy prescription that flows from Prof. Mellor's model should be clearly understood. He tells us that the traditional policy of treating industry as an "engine of growth" has not borne

fruit; and that it would have been better if this role had been assigned to agriculture instead. But since such an 'error' has already been committed in almost all the developing countries, how can we implement Prof. Mellor's recommendation to assign agriculture the initiating role in achieving high rates of growth of output and employment? Prof. Mellor's message is the following: now that the growth process has already been initiated by industry, nothing can be done to rewrite history; let us then cut our losses by not neglecting agriculture as has been done in the past. Agricultural growth should be accelerated; but all this does *not* mean that agriculture would henceforth grow at a faster rate than the rest of the economy. Prof. Mellor would rule out such a back-to-agriculture strategy. I wish to emphasize this point in order to avoid any misunderstanding on this issue.

Prof. Mellor has also presented today a whole agenda of research highlighting the need for investigating the consumption patterns, the production processes in rural areas, infrastructure, the distribution mechanism, and the overall development process. It promises to be a highly creative research programme which will help us to a better understanding of the mystique of agricultural growth and employment generation, and the many ways through which the *initial* growth impulses originating in the agriculture sector spread to the rest of the economy. This research agenda should also form an excellent basis of intellectual collaboration between the PIDE and the IFPRI.

I would now like to thank Prof. Mellor for giving us two very enlightening lectures. It is on such occasions that we realize that time flies. I am extremely grateful to the academics and policy-makers, too, who have attended these lectures in such large numbers. They raised penetrating questions, which prompted Prof. Mellor to shed more light on his ideas. We should also compliment the management of Holiday Inn for making extremely good arrangements for this Seminar.

On this happy note, I declare the session closed.

BIOGRAPHICAL SKETCH

of

Prof. John W. Mellor

BIOGRAPHICAL SKETCH**OF****PROFESSOR JOHN W. MELLOR**

Date of Birth:	December 28, 1928	
Education:	Cornell University	1950 - 1954
	B.Sc. , Cornell University	1950
	M.Sc., Cornell University	1951
	Ph.D., Cornell University	1954
	Diploma in Agric. Econ., Oxford University	1952
Experience:	1952—54	Lecturer, Department of Agricultural Economics, Cornell University
	1954—58	Assistant Professor, Department of Agricultural Economics, Cornell University
	1958—65	Associate Professor, Department of Agricultural Economics and Department of Asian Studies, Cornell University
	1961—66	Associate Director, Center for International Studies, Cornell University
	1964—65	Acting Director, Center for International Studies, Cornell University
	1965—77	Professor, Department of Agricultural Economics, and Asian Studies, Cornell University
	1973—77	Director, Program on Comparative Economic Development, Cornell University
	1976—77	(On leave beginning February 1976)'
	1976—77	Chief Economist, and Associate Assistant Administrator for Policy Development

and Analysis, Agency for International
Development, Washington, D.C.

1977— Director, International Food Policy
Research Institute, Washington, D.C.

Professional
affiliations:

Director, Chair, or Member of Project, Commissions, or
Groups:

Member, Senior Expert Group on Rural Credit, Reserve
Bank of India, 1987

Chairman, Directors of the International Agricultural
Research Centers, 1987

Member, Council for Agricultural Science and Tech-
nology (CAST) task force on the project, "The Long-
Term Viability of U.S. Agriculture". 1986.

Director, Research Project (AID and Cornell University),
*Analysis of Direct and Indirect Effects of Technological
Change in Agriculture*, 1974-75

Chairman, Mekong Development Panel, Southeast Asia
Development Advisory Group of the Asia Society, 1974

Director of Research, 20th Century Fund Project on
India, 1970-72

Director, Research Project (AID and Cornell University),
*Agricultural Prices in Economic Development: Their
Role, Function, and Operation*, 1966—70

Representative for Cornell University on the 10-member
Interuniversity Committee for Study Fellowships in
International Development, 1962—67

Director of various Cornell University research projects in India, Pakistan, Nepal, Thailand, Indonesia, Bangladesh, Philippines, Taiwan and Chile

Member,
Editorial
Boards:

International Journal of Development Planning Literature, 1986 –

Environment, 1984-

Pakistan Development Review, 1984-

Human Organization, 1965—70

Journal of Farm Economics, 1961—64

Board of
Directors:

Member, Board of Directors, Overseas Development Council, 1977-

Member, Executive Committee, International Voluntary Services, Washington, 1965-75

Member, Board of Directors, International Voluntary Services, Washington, 1962—75

Member, also Chairman, Board of Custodians (investment committee), Telluride Association (education trust fund, assets circa \$5 million), 1952-59

Visiting
Professor:

Visiting Professor, American University, Beirut, Lebanon, Summer 1968

Rockefeller Foundation Visiting Professor, Indian Agricultural Research Institute, New Delhi, India, 1964-65

CECA Visiting Professor, Balwant Rajput College, Agra, India, 1959-60 (18 months)

Honors and awards:

General: Recipient of the 1987 Presidential End Hunger Award, October 15, 1987

Recipient of the 1987 Outstanding Alumni Award, Cornell University, Ithaca, New York. October 9, 1987

The first social scientist awarded the 1985 Wihuri International Prize — given by the *Wihuri* Foundation for International Prizes in Helsinki, Finland in October 1985, in recognition of "Constructive work which has remarkably promoted and developed the securing of nutrient supply for mankind"

Listed in *Who's Who in Economics, A Biographical Dictionary of Major Economists: 1700—1981*. Edited by Mark Blaug (Cambridge: The MIT Press, 1981)

Fellow, American Agricultural Economics Association, 1980

Fellow, American Academy of Arts and Sciences, 1977

Social Science Research Fellow, Cornell University, 1953-54

Fulbright Fellow, Oxford, 1951-52

Publication: 1986 Winner of Award for Publication of Enduring Quality by the American Agricultural Economics Association for his paper co-authored with Bruce F. Johnston, "The Role of Agriculture in Economic Development",

which appeared in *The American Economic Review*, September 1961

1978 Winner of Awards for Publication of Enduring Quality by the American Agricultural Economics Association for the books. *The Economics of Agricultural Development*. Ithaca: Cornell University Press, 1966

1968 Winner of Award for Best Published Research 1967 by the, American Agricultural Economics Association for the Chapter, "Towards a Theory of Agricultural Development", In Herman M. Southworth and Bruce F. Johnston, (eds.) *Agricultural Development and Economic Growth*, pp. 21-61. Ithaca: Cornell University Press, 1967.

**Publications
of
Professor John W. Mellor**

A. Books — Author

The Economics of Agricultural Development. Ithaca, New York: Cornell University Press. 1966.

Developing Rural India: Plan and Practice with Thomas F. Weaver, Uma J. Lele and Sheldon R. Simon. Ithaca, New York: Cornell University Press. 1968.

The New Economics of Growth — A Strategy for India and the Developing World. A Twentieth Century Fund Study. Ithaca, New York: Cornell University Press. 1976.

B. Books - Editor

India: A Rising Middle Power. Boulder, Colorado: Westview Press. 1979.

Agricultural Change and Rural Poverty: Variations on a Theme by Dharm Narain. Edited with Gunvant M. Desai. Baltimore, MD: The Johns Hopkins University Press. 1985.

Accelerating Food Production Growth in Sub-Saharan Africa. Edited with Christopher L. Delgado and Malcolm J. Blackie. Baltimore, MD: The Johns Hopkins University Press. 1987.

Agricultural Price Policy for Developing Countries. Edited with Raisuddin Ahmed. Baltimore, MD: The Johns Hopkins University Press. 1987.

C. Encyclopedia Articles

- "Farm Mangement". With J. R. Raeburn. *Encyclopedia Britannica*. Vol. 10, No. 1. 1965.
- "Agriculture in Developing Countries". *International Encyclopedia of the Social Sciences*. 1969.

D. Journal Articles

- "British Postwar Policy Towards Farm Mechanization". *Journal of Farm Economics*. Vol. 36, No. 1. February 1954. pp. 98—107.
- "The Average and Marginal Product of Farm Labor in Underdeveloped Economies". With Robert D. Stevens. *Journal of Farm Economics*. Vol 38, No. 3. August 1956. pp. 780-791.
- "Grain Feeding Related to Milk-Feed Price Ratios". With Conrad B. Strauss. *Journal of Farm Economics*. Vol 41, No. 4. November 1959. pp. 805-808.
- "The Nature of Agriculture's Contributions to Economic Development". With Bruce. F. Johnston. *Food Research Institute Studies*. Vol. 1, No. 3. November 1960. pp. 335-336.
- "The Role of Agriculture in Economic Development". With Bruce F. Johnston. *The American Economic Review*. Vol. 51, No. 4, September 1961. pp. 566—593.
- "Increasing Agricultural Production in Early Stages of Development". *The Indian Journal of Agricultural Economics*. Vol 17, No. 2. April-June 1962. pp. 29-46.
- "The Process of Agricultural Development in Low-Income countries". *Journal of Farm Economics*. Vol. 44, No. 3. August 1962. pp. 700-716.

- "The Use and Productivity of Farm Family Labor in Early States of Agricultural Development". *Journal of Farm Economics*. Vol. 45, No. 3. August 1963. pp. 517-534.
- "The Contrasting Response of Rice to Nitrogen: India and the United States". With Robert W. Herdt. *Journal of Farm Economics*. Vol. 44, No. 1. February 1964. pp. 150-160.
- "The Effect of Growth in Demand for Milk on the Demand for Concentrate Feeds, India, 1951-1976". With Bruno de Ponteves. *Indian Journal of Agricultural Economics*. Vol. 19, Nos. 3 & 4. July-December 1964. pp. 131-146.
- "Alternative Estimates of the Trend in Indian Foodgrains Production During the First Two Plans". With Uma J. Lele. *Economic Development and Cultural Change*. Vol. 13, No. 2. January 1965. pp. 217-232.
- "Production Problems and Issues in Agricultural Development". *Journal of Farm Economics*. Vol. 48, No. 5. December 1966.
- "Science and Technology in Agricultural Development". *Science Report*. New Delhi. Vol. 4. Nos. 1-2. Jan-Feb 1967. pp. 241-248.
- "Change in Relative Prices of Agricultural Commodities, India, 1952-53 to 1964-65". With Ashok Dar. *Agricultural Situation in India*. January 1968.
- "The Functions of Agricultural Prices in Economic Development". *Indian Journal of Agricultural Economics*. Vol. 13, No. 1. Jan-Mar 1968. pp. 23-38.
- "Determinants and Development Implications of Foodgrains Prices in India, 1948-1964". With Ashok Dar, *American Journal of Agricultural Economics*. Vol. 50, No. 4. November 1968. pp. 962-975.
- "Farm Management Extension in a Modernizing Agriculture". *Netherlands Journal of Agricultural Science*. Vol. 16, No. 4. 1968., pp. 275-279.

- "Production Economics in the Modernization of Traditional Agriculture".
The Australian Journal of Agricultural Economics. Vol. 13, No. 1.
1969. pp. 25-34.
- "Changing Basis of Demand for Fertilizer in Indian Agriculture". With
Gunvant Desai. *Economic and Political Weekly*. Vol. 4, No. 39.
September 1969. pp. A175-A188.
- "Agricultural Price Policy in the Context of Economic Development".
The American Journal of Agricultural Economics. Proceeding Issue.
Vol. 51, No. 5. December 1969. pp. 1413-1420.
- "Government's Role in the Green Revolution". *War on Hunger*. Vol 4,
No. 1. January 1970. pp. 12-16.
- "The Basis for Agricultural Price Policy". *War on Hunger*. Vol. 4, No. 10.
October 1970. pp 4-9.
- "Dilemma of State Tube Wells". With T.V. Moorti. *Economic and
Political Weekly*. Vol. 6, No. 13. March 1971. pp. A37-A45.
- "New Seed Varieties and the Small Farm". With M. Schluter. *Economic
and Political Weekly*. Vol. 7, No. 13. March 25, 1972. pp. A31-A38.
- "Jobs, Poverty, and the 'Green Revolution' ".With Uma J. Lele. *Interna-
tional Affairs*. Vol. 7, No. 13. January 1972. pp. 20-32.
- "Growth Linkages of the New Foodgrain Technologies". With Uma J.
Lele. *Indian Journal of Agricultural Economics*. Vol 28, No. 1. Jan-
Mar 1973. pp. 35-55.
- "Accelerated Growth in Agricultural Production and the Intersectoral
Transfer of Resources". *Economic Development and Cultural Change*.
Vol. 22, No. 1. October 1973. pp. 1-16,
- "Food Aid and Long-Run World Food-Population Balances". *The
Columbia Journal of World Business*. Vol. 10, No. 3. Fall 1975. pp.
29-36.

- "The Landed and the Landless - The Poverty Connection". *CERES*. Vol. II, No. 1. January-February 1978. pp. 42-46.
- "Food Price Policy and Income Distribution in Low-Income Countries". *Economic Development and Cultural Change*. Vol. 27, No. 1. October 1978. pp. 1-26.
- "Lessons from Experience". *Economic Impact*. No. 3.1978/3. pp. 25—27.
- "Real Test is Commitment to Development". *Development*. Vol. 21, No. 3. March 1979. pp. 38-40.
- "World Food Strategy for the 1980s - Context, Objectives, and Approach". *Entwicklung + Landlicher Raum*. 13. Jahrgang/Heft 6/79. November—December 1979. pp. 8—9.
- "Agriculture in Growth: Changing Research and Data Needs for Effective Policy". Prepared for the Panse Memorial Lecture by the Indian Society of Agricultural Statistics held at New Delhi in February 13* 1980. *Journal of the Indian Society of Agricultural Statistics*. Vol. 32, No. 1. April 1980.
- "Food Aid and Nutrition". *American Journal of Agricultural Economics*. Vol. 62, No. 5. December 1980.
- "Technological Change, Distributive Bias, and Labor Transfer in a Two-Sector Economy". With Uma Lele. *Oxford Economic Papers*. Vol.33, No. 3. November 1981.'
- "Third World Development: Food, Employment, and Growth Interactions". *American Journal of Agricultural Economics*. Vol. 64, No. 2. May 1982.
- "Food Prospects for the Developing Countries". *American Economic Review*. Vol 73, No. 2. May 1983.
- "Feeding the Underdeveloped World" With Richard H. Adams, Jr. *Chemical and Engineering News*. Vol. 62. April 1984.

- "The World Food Equation: Interrelations Among Development, Employment, and Food Consumption". With Bruce F. Johnston. *Journal of Economic Literature*. Vol. 22. June 1984. pp. 531—574. Reprinted in *Economics Impact* (No. 50, 1985/2).
- "Entwicklungspolitische Forschung zur Verbesserung der Ernährungslage der Armen-Forschungsstrategien des International Food Policy Research Institute (IFPRI)". With Joachim von Braun. *DSE/A TSAF - Bericht - Ernährung am Tropo'schen und Subtropischen Standort*. October 1984.
- "The Food Situation in Developing Countries: Two Decades in Review". With Leonardo A. Paulino. *Food Policy*. Vol. 9, No. 4. November 1984.
- "A Structural View of Policy Issues in African Agricultural Development". With Christopher L. Delgado. *American Journal of Agricultural Economics*. Vol. 6b, No. 5. December 1984.
- "Food Aid: Reflections on a Decade of Action". *Food and Nutrition*. Vol. 10, No. 1. 1984.
- "Food Production Needs in a Consumption Perspective". With Leonardo Paulino. *Global Aspects of Food Production: Natural Resources and the Environmental Series*. Vol. 20. 1986. pp. 1—24.
- "The New Political Economy of Food and Agricultural Development". With Richard H. Admas, Jr. *Food Policy*. Vol 11, No. 4. November 1986. pp. 289-297.
- "Famine — Causes, Prevention, and Relief". With Sarah Gavian. *Science*. Vol. 235. January 30, 1987. pp. 539-545.
- "Links Between Technology, Agricultural Development, Economic Growth, and Trade Creation". *Building On Success: Agricultural Research, Technology, and Policy for Development*. ACIAR Technical Report No. 7. Australia. 1987. pp. 19-24.

"Food and Development: The Critical Nexus Between Developing and Developed Countries". Presented at the Nomisma International Conference on the Agro-Technological System Towards 2000, Bologna, Italy, September 18-20, 1986. *Economic Impact*. Vol. 61. 1987. pp. 8-14.

"Food Policy, Food Aid, and Structural Adjustment Programme: The Context of Agricultural Development". *Food Policy*. Vol. 13, No. 1. February 1988. pp. 10-17.

E. Chapters in Books and Conference Proceedings

"Increasing Agricultural Production in Early Stages of Economic Development—Relationships, Problems, and Prospects. In E.O. Heady (ed.), *Food, A Stool in International Development*. Ames: Iowa State University Press. 1962.

"Professional Training in Agriculture for Foreign Students — Role, Problems, and Improvements". In Irwin T. Sanders (ed) *Professional Education of Students from Other Lands*. New York: Council on Social Work Education, Inc. 1963. pp. 210—235.

"Toward a Theory of Agricultural Development". In Herman M. Southworth and Bruce F. Johnston (eds.), *Agricultural Development and Economic Growth*. Ithaca, N.Y.: Cornell University Press. 1967. pp. 21-61.

"Growth of the Market and the Pace of Agricultural Development in Low-income Countries". Reprinted in M. S. Moyer and R. E. Vosburgh (eds.), *Marketing for Tomorrow—Today*. Prepared for the American Marketing Association National Conference held at Toronto, Canada in June 22, 1967. American Marketing Association. 1967. pp. 244-245.

- "Agricultural Production and Input Markets in South Asian Small-Holder Agriculture". In Kurt R. Anshel, Russel H. Brannon and Eldon D. Smith (eds.), *Agricultural Cooperatives and Markets in Developing Countries*. New York: Frederick A. Praeger Publishers. 1969. pp. 107-119.
- "The subsistence Farmer in Traditional Economies". In Clifton R. Wharton, . Jr. (ed.) *Subsistence Agriculture and Economic Development*. Chicago: Aldine Publishing Company. 1969. pp. 209—227.
- "The Role of Agriculture in Economic Development". With Bruce F. Johnston. In Karl A. Fox and D. Gale Johnson (eds.), *A.E.A. Reading in the Economics of Agriculture*. Vol. XIII. Homewood, Illinois: Richard D. Irwin, Inc., 1969. pp. 359-386. *AEA Economic Review*. Vol. 51, No. 4, September 1961. In Metin Berk, Fikret Gorun and Selim Ilkin (eds.), *Iktisadi Kalkinma: Secme Yazilar*. Yayin Publication No. 6. Anakra: Faculty of Administrative Sciences, Middle East Technical University. 1966.
- "Major Determinants of the Productivity of Labor". *Proceedings of the Thirteenth International Conference of Agricultural Economists*. London: Oxford University Press. 1969. pp. 241-248.
- "Expanding Domestic Markets for Food". In Kenneth L. Turk (ed.), *Some Issues Emerging from Recent Breakthroughs in Food Production*. Ithaca, New York: New York State College of Agriculture, Cornell University. 1971. pp. 135-148.
- "Nutrition and Economic Growth". In Alan Berg, Nevin S. Scrimshaw, and David L. Call (eds.), *Nutrition, National Development, and Planning*. Cambridge, Massachusetts: The MIT Press. 1972. pp. 70-74.
- "Models of Economic Growth and Land-Augmenting Technological Change in Foodgrain Production". In Nurul Islam (ed.), *Agricultural Policy in Developing Countries*. London: The MacMillan Press, Ltd. 1974. pp. 3-30.

- "An Employment-Oriented Strategy of Development". In Raymond E. Dumet and Lawrence J. Brainard (eds.), *Problems of Rural Development—Case Studies and Multi-Disciplinary Perspectives*. Leiden, Holland: E.J. Brill Press. 1975. pp. 131-139.
- "Technology to Increase Food Supply". Report of a Seminar on World Hunger — Approaches; to Engineering Actions. Washington, D.C.: National Academy of Sciences. 1975. pp. 15—25.
- "The Interaction of Growth Strategy, Agriculture, and Foreign Trade: The Case of India". With Uma Lele. In George S. Tolley and Peter A. Zadrozny (eds.), *Trade, Agriculture, and Development*. Cambridge, MA: Ballinger Publishing Company. 1975. pp. 93-115.
- "Nutrition and Agricultural Policy". In Beverly Winikoff (ed.), *Nutrition and National Policy*. Cambridge, MA: MIT Press. 1978. pp. 461-468.
- "New Directions in Aid and Development and Their Implications for American Labor". In Ward Morehouse (ed.), *American Labor in a Changing World Economy*. New York: Praeger Publishers. 1978. pp. 291-304.
- "Ending Poverty and Hunger: The Relationship between Strategies for Increased Food Production and Policies for Redistribution". In Louis L. Knowles (ed.), *To End Hunger*. New York: National Council of the Churches of Christ in the USA. 1983. pp. 39-50.
- "The Global Food Situation and the Choice of Development Strategy". In Kenneth C., Nobe and Rajan K. Sampath (eds.), *Issues in Third World Development*. Boulder, Colorado: Westview Press, Inc. 1983. pp. 393-403.
- "The Utilization of Food Aid for Equitable Growth". Presented at the World Food Programme — Government of the Netherlands Seminar on Food Aid, The Hague, Netherlands, October 3—5, 1983. *Report of the World Food Programme Government of the Netherlands*

Seminar on Food Aid. Rome, Italy: World Food Programme/Government of the Netherlands Publication. 1983.

"The Changing Role of Developing Nations in Agricultural Trade", *U.S. Agriculture and Third World Economic Development: Critical Interdependency.* Proceedings of a Meeting of the Food and Agriculture Committee of the National Planning Association, Washington, D.C. April 3, 1984. Washington, D.C.: National Planning Association. February 1987.

"Opportunities in the International Economy for Meeting the Food Requirements of the Developing Countries". Presented at the Utah State University Conference on the Political Economy of Food, Logan, Utah, May 2-4, 1985. In W. Ladd Hollist and F. LaMond Tullis (eds.), *International Political Economy Yearbook.* Vol. 3. Boulder, Colorado: Lynne Rienner Publishers, Inc. 1987. In IFPRI Reprint No. 118.

"Requisites to Global Food Security: Challenges to Developed and Developing Nations". *New Dimensions in Food Security.* Summary Report, 1985 World Food Production Conference. Mundelein, Illinois: International Minerals and Chemical Corporation. 1986.

"Dealing with the Uncertainty of Growing Food Imbalances: International Structures and National Policies". *Agriculture in a Turbulent World Economy.* Proceedings of the Nineteenth International Conference of Agricultural Economists, Malaga, Spain, August 25 — September 5, 1985. England: Gower Publishing Company Limited. 1986.

"Food Production, Food Supply, and Nutritional Status". *Nutrition Issues in Developing Countries for the 1980s and 1990s.* Proceedings of a Symposium held on December 9, 1985. Washington, D.C.: National Academy Press. 1986.

"Food Aid for Food Security and Economic Development". In Edward Clay and John Shaw (eds.), *Poverty, Development, and Food.*

Presented for Festschrift in honour of Hans W. Singer, December 12—14, 1985. England: The Macmillan Press, Ltd. 1987. pp. 173-191.

"Agriculture on the Road to Industrialization". In John P. Lewis and Valeriana Kallab (eds.), *Development Strategies Reconsidered*. U.S. Third World Policy Perspectives No.5. New Brunswick, N.J.: Transaction Books for the Overseas Development Council. 1986. pp. 67-89.

"Prediction and Prevention of Famine". *Federations Proceedings*. Vol. 45, No. 10. Federation of American Societies for Experimental Biology. September 1986.

"International Development Policy: What's Best for American Farmers"? *Reshaping World Agricultural Policies*. Proceedings of the 1987 Luther T. Pickrel Agricultural Policy Seminar. 1987. pp.10—11.

"Food Production, Consumption, and Development Strategy". In Robert E.B. Lucas and Gustav F. Papanek (eds.), *The Indian Economy: Recent Development and Future Prospects*. Boulder, Col: Westview Press in cooperation with the Center for Asian Development Studies. 1988. (Prepared for the Conference on the Indian Economy: Successes, Current Policies, and External Links, held in Boston, Massachusetts, October 4—7, 1986)

F. Conference Papers and Lectures (unpublished)

"Village-Level Research". Presented at the CECA Conference on Agricultural Economics in Southeast Asia, University of Malaya, Kuala Lumpur, May 8—14, 1960. (Reprinted in the CECA reprint series)

"The Role of Agricultural Economics in Agricultural Development of Low-Income Countries". Conference on Training of Asian Graduate Students in Agricultural Economics, Sponsored by the Council of Economic and Cultural Affairs, Inc., New York City, April 7—9, 1961. pp. 1-22.

- "Growth of the Market and the Pace of Agricultural Development in Low-Income Countries". Reprinted in M. S. Moyer and R. E. Vosburgh (eds.), *Marketing for Tomorrow — Today*. 1967. pp. 242—245. Presented at the American Marketing Association National Conference by the American Marketing Association. Toronto, Canada. June 22, 1967.
- "Agricultural Price Policy in the Context of Development". Presented at the International Seminar on Fiscal Incentives to Promote Agricultural Development. Istanbul, Turkey. November 1968.
- "National Planning: The Relation Between Agriculture and Economic Development in the Context of Population Growth". Presented at the Senator Frank Carlson Symposium on World Population and Food Supply. Manhattan, Kansas. December 1968.
- "The Green Revolution—New Potentials for Development". Paper delivered at the Cornell Convocation. Boston, Massachusetts. March 1969.
- "The Role of Government and the New Agricultural Technologies". Presented at the USAID Spring Review. Washington, D.C.. May 13-15, 1969.
- "Policies for Broadening the Desirable Income Effects of Rapid Growth in Agricultural Production". Presented at the Symposium on Science and Foreign Affairs — The Green Revolution, United States House of Representatives Sub-Committee on National Security Policy and Scientific Development. Washington, D.C.. December 5, 1969.
- "Accelerated Technological Change in Agriculture and Its Relation to Environment". Presented to the Conference on Economic Development and Environmental Problems. Williams College, Williamstown, Massachusetts. September 18-19, 1970.
- "The Agricultural Marketing System and Price Stabilization Policies". Presented to the First Asian Conference on Agricultural Credit and Cooperatives, Manila, Philippines, December 9, 1970.

- "Modernizing Agriculture and Theories of Economic Growth". Presented at the Conference on Agriculture in Development Theory. Bellagio, Italy. May 23-29, 1973.
- "Economic and Social Implications and Choices Related to Change in Agricultural Technology". Presented at the Second International Seminar on Change in Agriculture. Reading, England, September 9-19, 1974.
- "Relating Research Resource Allocation to Multiple Goals". Presented to the Conference on Resource Allocation and Productivity in International Agricultural Research. Airlie House, Virginia. January 26—29, 1975.
- "Science and Technology for Agriculture — The Systems, the Context, and the Determinants of Public Policy". Presented to the Conference on Science and Technology Policy in the Developing Nations with Special Reference to the Industrial and Agricultural Sectors. Cornell University. March, 5, 1975.
- "Foreign Economic Assistance and the Choice of Development Strategy". Presented at the Pugwash Conference on Science and World Affairs. Madras, India, January 1976.
- "Agricultural Price Policy and Income Distribution in Low-Income Nations". Presented at the Colloquium on Agricultural Price Policy, Cornell University. February 25-27, 1976.
- "Mobilization Resources of Agricultural Growth — Strategy and Institutions". With Uma Lele. Presented at a World Bank/ADC Seminar on Institutional Innovational Reform: The Ladejinsky Legacy. Kyoto, Japan. October 10-12, 1977.
- "Basic Human Needs — A Development Perspective". Presented at the Plenary Session of the International Development Conference, Washington, D.C., February 8, 1978.

- "Third World Development and the Demand for Agricultural Exports— The Role of the United States". Presented at a Federal Reserve Bank Symposium, Kansas City, Missouri, May 18-19, 1978. (Published in Symposium proceedings.)
- "The University as a Source of Appropriate Technology for Agriculture — Comments on the United States Experience in the Context of Developing Countries". Presented at the Seminar on the Relationship of University Research in Science and Technological Development sponsored by the Indo-U.S. Subcommittee on Education and Culutre, Srinagar, India, September 18—22, 1978.
- "The New Rural-Based Development Strategy". Presented at the UNITAR-EDI Seminar Washington, D.C., March 27, 1979.
- "Elimination of Hunger — Comment on the Report of the Presidential Commission on Hunger". Presented at the Plenary Session, New York Symposium on the Report of the Presidential Commission on Hunger. April 10, 1980.
- "The World Food Problem and BIFAD -- The Need for Production and Research". Presented to BIFAD. May 22, 1980.
- "Food for Health, Development, and Peace". Presented at the Annual Convention of Rotary International. Chicago, Illinois. June 4, 1980.
- "Global Dynamics of the World Food Situation". Presented at Food Security in a Hungry World. An International Food Policy Conference, San Francisco, California. March 4—6, 1981. (Published in Conference Proceedings.)
- "African Food Policy in a Global Context". Presented at a Spring Symposium on Food Problems in Africa, University of Illinois, Urbana-Champaign, Illinois, April 23, 1981,
- "Growth in Third World Demand for Food and Implications for the United States", Presented at the University of Florida, September 15, 1981.

"Labor Supply and Processes of Growth". Presented at Delhi University. New Delhi, India, December 1981 in Honor of Dharm Narain.

"Overview to the Food Situation for Developing Countries to the Year 2000". With Leonardo A. Paulino. Prepared for the Rockefeller Foundation's Conquest of Hunger Program Review Workshop. New York, May 21, 1982.

"Agricultural Growth-- Structures and Patterns". Presented to the International Association of Agricultural Economists, Plenary Session III, Jakarta, Indonesia, August 24-September 2, 1982.

"Food and the Structure of Economic Growth: Its Relevance to North-South Relations". Presented at the Symposium on the World Food Problem and Japan. Japan FAO Association, Tokyo. October 16, 1982.

"Trends in Third World Fertilizer Consumption: Relation to National Policies". Presented at the 8th Enlarged Council Meeting of the International Fertilizer Industry Association. Geneva. December 1, 1982.

"Food and Agriculture in Planned Economics — The Case of India". Presented at the Annual Meeting of the Allied Social Sciences Association. New York. December 27—30, 1982.

"Meeting Basic Human Needs: The Interacting Roles of Growth and Income Transfers". Presented at the Ohio Wesleyan Forum Series on Third World Development—Challenge to Free Enterprise and Democracy, Delaware, Ohio, April 27, 1983.

"Food Price Policy in the Context of Growth with Equity". Precis of Keynote Address Delivered at the Commonwealth Secretariat Consultative Meeting on Food Pricing and Marketing Policy. London. May-3-6, 1983.

"Alternative Development Strategies and the Role and Structure of Agriculture". Presented at a Plenary Session of Meetings of the Rural Sociological Society. Lexington, Kentucky. August 17—20, 1983.

"Agricultural Growth and Generation of Employment". Presented at the 22nd Congreso Agrario Nacional de la Sociedad de Agricultores de Colombia. Cali., Colombia, December 5—7, 1983.

Discussion of C. Peter Timmer's Paper "Private Decisions and Public Policy: The Food Price Dilemma in Developing Countries". Presented at the 75th Harvard Business School World Food Policy Colloquium. Boston, Massachusetts. April 8—11, 1984.

"African Development Bank Lending for Agricultural Development in Africa". Presented at a Symposium for the Board of Governors of the African Development Bank, Tunis. May 10, 1984.

"Effective Food Aid for Effective Food Security". Presented at the Symposium on World Food Security, Food and Agriculture Organization of the United Nations, Rome. September 3, 1984.

"The Changing World Food Situation-A CGIAR Perspective". Presented at International Centers' Week, World Bank. Washington, D.C.. November 7, 1984.

"Food Subsidies, Distribution, and Production Effects". Presented at Workshop on Consumer-Oriented Food Subsidies, Chiang Mai, Thailand, November 13-15, 1984.

"Prediction and Prevention of Famine". Presented at the Federation of American Societies for Experimental Biology (FASEB). Special Symposium on Biomedical Aspects of World Famine, Anaheim, California, April 21, 1985.

"Issues in World Agriculture—A U.S. Perspective". Presented at the American Agricultural Economics Association Symposium on Agricultural and Rural Areas Approaching the 21st Century: Challenges for Agricultural Economics, Ames, Iowa, August 8, 1985.

- "Overview: World Food Situation in Historical Perspective". Presented at Purdue University, West Lafayette, IN. December 12, 1986.
- "Food and Employment Interactions—Strategic Considerations". With Richard Adams. Presented at Annual Meeting of American Association for the Advancement of Science (AAAS) . Philadelphia, PA. May 27, 1986.
- "General Employment Linkages Through Agricultural Growth — A Conceptual Framework". Presented at the VI Latin American Meeting of the Econometric Society. Cordoba, Argentina. July 22, 1986.
- "Agricultural Development Assistance — Goals and Process". Statement Prepared for Briefing on Responding to the Crisis in Foreign Aid. Dirksen Senate Office Building, Washington, D.C. September 11, 1986.
- "Policies for Increasing Food Staple Exports to Developing Countries". Prepared for a Dialogue of Agricultural and Development Leaders Sponsored by the Food and Agriculture Committee (FAC) of the National Planning Association (NPA) Held at Winrock International Institute for Agricultural Development. Arkansas. October 1—3, 1986.
- "The Right to Food: Action to Address the Hunger Problem". Presented at the Conference on the Legal Faces of the Hunger Problem. Howard University, Washington, D.C., October 17, 1986.
- "The New Global Context for Agricultural Research—Implications for Policy". Presented at International Centers' Week, Washington, D.C. November 3-6, 1986.
- "United States Agriculture in the Global Context". Presented at Western Michigan University, Kalamazoo, Michigan. November 19, 1986.
- "Rural Employment Linkages Through Agricultural Growth—Concepts, Issues, and Question". Presented at the Eighth IEA World Congress, New Delhi, India, December 1—5, 1986.

"Employment Growth and the Critical Role of Agriculture". Presented at the International Conference on International Interdependence — Global Underdevelopment". Held in Jaipur. Rajasthan, India. December 8-10, 1986.

"Agricultural Development in Developing Countries and U.S. Farm Exports—Complementary or Conflicting". Presented at the American Farm Bureau Federation Annual Meeting, Anaheim, California. January 13, 1987.

"The Changing Roles of Multilateral and Bilateral Foreign Assistance". With William A. Masters. Presented at the ICS/World Bank Conference on Aid, Capital Flows and Development in Talloires, France. September 13-17, 1987.

"Towards an Ethical Redistribution of Food and Agricultural Science". Presented at the Colloquium. Sponsored by the General Foods and the Smithsonian Institution. Washington, D.C. October 6, 1987.

G. Monographs and Mimeographed Research Publications

"Farming Decisions and Farming Environment in St. Lawrence Country New York". With John H. Foster. Agricultural Economics No.1065. Department of Agricultural Economics, Cornell University. August 1957.

"Variation in St. Lawrence Country Agriculture by Land-Class Groups, 1955". With John H. Foster. Agricultural Economics No.1093. Department of Agricultural Economics, Cornell University. February 1958.

"Part-Time Farming, St. Lawrence Country, New York". With Ichiro Takahashi.. Agricultural Economics Research No. 4. Department of Agricultural Economics, Cornell University. September 1958.

"Grain Feeding Related to Milk-Feed Ratios, Four Areas of New York, 1957". With Conrad B. Strauss. Agricultural Economics Research

No. 14. Department of Agricultural Economics, Cornell University. February 1959.

"Farm Business Analysis of 30 Farms, Midhakur, Agra District, U.P., 1959-60". With T.V. Moorti. Research Bulletin No. 1. The Balwant Vidyapeeth, Bichpuri (Agra). April 1960.

"Estimates of Change and Causes of Change in Foodgrains Production: India, 1949-50 to 1960-61". With Uma J. Lele. Cornell International Agricultural Development Bulletin No. 2. August 1964.

"Estimates and Projections of Milk Production and Use of Concentrate Feeds: India, 1951—1976". With Bruno de Ponteves. Cornell International Agricultural Development Bulletin No. 6. December 1964.

"Notes on Foodgrains Prices, India, 1967-68 to 1968-69". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 2. October 1967.

"Note on Agricultural Price Policy — 1968 Indian Wheat Price Support". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 5. January 1968.

"Opportunities and Problems Associated with Wheat Production, Marketing, and Pricing in the Kathmandu Valley". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 9. April 1968.

"Wheat Production and Utilization as a Leading Edge for Development in the Kathmandu Valley". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 10. April 1968.

"Agricultural Prices in Economic Development — Their Role, Function, and Operation". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 39. June 1970.

- "Developing Science and Technology Systems — Experience and Lessons from Agriculture". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 63. May 1973.
- "Modernizing Agriculture, Employment, and Economic Growth: A Simulation Model". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 75. May 1974.
- "Simulating a Developing Economy with Modernizing Agricultural Sector: Implications for Employment and Economic Growth". With Mohinder S. Mudahar. Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 76. June 1974.
- "Population, Resources, and Jobs — A Summary Statement". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 77. July 1974.
- "The Impact of New Agricultural Technology on Employment and Income Distribution — Concepts and Policy". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 81. May 1975.
- "Recent Testimony to Congressional Committees on World Food Problems and Food Aid". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 82. July 1975.
- "Estimates of Foodgrain Production and Marketings from Input Estimates, India, 1949-50 to 1973-73 and Projections to 1983-84". With Uma J. Lele, Debra Biamonte, and Arthur Goldsmith. Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 83. September 1975.
- "Performance of Private Trade and Cooperatives". Cornell University-USAID Technological Change in Agriculture Project Occasional Paper No. 87. December 1975.

"Agricultural Issues and Trends in Asia and the Near East: Reflections for the Next Decade". Paper Prepared for the USAID Asia and Near East Bureau Senior Agricultural Development Officers Conference held in Bangkok. February 1987.

H. Notes, Comments and Reviews

"Sample Bias from the Elimination of Poultrymen Who Don't Keep Financial Records". *Journal of Farm Economics*, Vol, 34, No. 1. February 1952. pp. 119-123.

"Outlets Used by New York Farmers for Sale of Eggs and Poultry". *Farm Economics* No. 184., March 1952. pp. 4,836—4,838.

"Atomic Energy Applications with Reference to Underdeveloped Areas" (review article). *Journal of Farm Economics*. Vol. 39, No. 4. November 1957. pp. 1 040-1042.

"The Land Changes and the Land Endures". With Howard E. Conklin. *Land, the Yearbook of Agriculture*. United States Department of Agriculture. 1958. pp. 104-108.

"Grain Feeding of Dairy Cows in Relation to Milk-Feed Price Ratios". With Conrad B. Strauss. *Farm Economics*. No. 214. March 1959. pp. 5,753- 5,755.

"Part-Time Farming in St. Lawrence Country". With Ichiro Takahashi. *Farm Economics*. No. 214. March 1959. pp. 5,755—5,757.

"Farm Business Analysis of 30 Farms, Midhakur, Agra District, U.P., 1959-60". With T.V. Moorti. *Journal of Agriculture*. Agra, India. September 1960.

"New York State Agriculture: Position and Problems". With G. W. Hedlund. *Report of the Temporary State Commission on Economic Expansion*. December 1960.

- "Part-Time Farming, Does it Pay"? *Food Farming*. Spring 1962. p. 22.
- "Development in Low-Income Countries — Agriculture's Role is Critical". *Challenge — The Magazine of Economic Affairs*. Vol. 10, No. 5. February 1962. pp. 1—4.
- Review of Jan Tinbergen. *Shaping the World Economy: Suggestions for an International Economic Policy*. New York: The Twentieth Century Fund. 1962. *Journal of Farm Economics*. Vol. 44, No. 1. February 1964.
- "The Objectives and Means of Agricultural Development in Latin America". Statement to the United States House of Representatives Sub-Committee on International Finance of the Committee on Banking and Currency, 89th Congress, Presented in August 29, 1966. *Inter-American Development Bank's Role in Agricultural Development*. Washington Government Printing Office. 1966.
- Review of George Blyn. *Agricultural Trends in India, 1891—1947: Output Availability, and Productivity*. Philadelphia: University of Pennsylvania Press. 1966. *Economic Development and Cultural Change*. January 1968.
- Review of Ralph W. Cummings, Jr. *Pricing Efficiency in the Indian Wheat Market*. New Delhi: Impex India. 1967. *Journal of Asian Studies*. Vol. 27, No. 3. May 1968.
- Review of Gilbert Etienne. *Studies in Indian Agriculture — The Art of the Possible*. Translated from the French by Megan Mothersole. Berkeley and Los Angeles: University of California Press. 1968. *Economic Development and Cultural Change*. July 1969.
- "Elements of a Food Marketing Policy for Low-Income Countries". *The Marketing Challenge: Distributing Increased Production in Developing Nations*. Foreign Economic Development Report No. 7. December 1970.

Report for *East Pakistan Land and Water Development as Related to Agriculture*. A Report of an *Ad Hoc* Panel of the Board on Science and Technology for Intersectoral Development of the National Academy of Sciences. National Research Council. January 1971.

Review of A. T. Mosher. *To Create, a Modern Agriculture*. New York: Agricultural Development Council. 1971. And J. Price Gittinger. *Economic Analysis of Agricultural Projects*. Baltimore and London: The Johns Hopkins Press. 1972. *Journal of Economic Literature*. Vol. 12, No. 1. March 1974. pp. 136-138.

Review of Allen C. Kelley, Jeffrey G. Williamson, and Russel J. Cheetham. *Dualistic Economic Development*. Chicago, Illinois: The University of Chicago Press. 1972. *American Journal of Agricultural Economics*. Vol. 56, No. 4. November 1974. pp. 849-850.

Review of B. S. Minhas. *Planning and the Poor*. New Delhi: S. Chand. 1974. *Journal of Development Economics*. Vol. 3. 1976. pp. 201-208.

"Programming United States Food Aid to Meet Humanitarian and Developmental Objectives". With Barbara Huddleston. Written at the request of Lester Gordon for Brookings Institution's *Assessment of Development Strategies*. (Project Undertaken at request of Secretary of State Cyrus Vance)

"Agricultural Development: Objectives, Strategy, and Policies". Presented to a meeting of the Independent Commission on International Development Issues (Brandt Commission). Tarrytown, New York. August 28, 1978.

"The World Food Problem and BIFAD - The Need for Production and Research". BIFAD Occasional Paper No. 2. Washington, D.C.: Agency for International Development. December 1980.

Review of Jane Jacobs. *Cities and the Wealth of Nations — Principles of an Economic Life*. New York: Random House. 1984. In *Environment*. Vol. 27, No. 3. April. 1985.

Review of Gustav Rains *et al.* (eds.). *Comparative Development Perspectives: Essays in Honor of Lloyd G. Reynolds*. Boulder, Co: Westview Press. 1984. *Journal of Economic Literature.*} Vol. 23. March 1985.

Review of Gilbert Etienne. *Rural Development in Asia: Meetings with Peasants*. Beverly Hills, California: Sage Publications, Inc. .1985. *Environment*. Vol. 29. March 1987.

I. Public Testimony Documents and Committee Reports

"Population, Food, and Employment". Testimony to the United States House of Representatives Select Committee on Population, Ninety-Fifth Congress. December 1978.

"World Food and Nutrition Problems". Statement to the Committee on Foreign Relations of the United States Senate, Ninety-Sixth Congress, March 1979.

"World Food Prospects and the United States". Testimony before the United States House of Representatives Agriculture Committee, Washington, D.C. July 22, 1981.

"Reestablishing Growth in Developing Countries — The United States Interest". Testimony before the United States Senate Foreign Relations Committee. Washington, D.C.. January 10, 1983.

"Long-Term Development in Sub-Saharan Africa". Testimony before the Sub-Committee on Foreign Operations of the House Appropriations Committee. Washington, D.C. May 1, 1985.

"United States Foreign Assistance — What is the Comparative Advantage"? Testimony Presented to the Senate Foreign Relations Committee Hearings on the Agency for International Development. Dirksen Senate Office Building. April 24, 1986. pp. 147-151.

"IDA and African Development". Statement Prepared for the House Select Committee on Hunger Hearing, 100th Congress, First Session,

held in Washington, D.C. July 23, 1987. In the *World Bank in Africa*. Serial No. 100-112. Washington: U.S. Government Printing Office. 1987. pp. 68-70.

J. Chairmanship of Theses

Master's Theses

- Ukegbu, John Ndubeze. "The Cocoa Industry and the Gold Coast". Department of Agricultural Economics, Cornell University, June 1954.
- Stuart, Winston Graham. "A Co-operative Approach to the Problem of Small-Holder Land Settlement in the Island of Jamaica". Department of Agricultural Economics, Cornell University. September 1956.
- Takahashi, Ichiro. "Comparison of Part-Time and Full-Time Farms in St. Lawrence County, New York". Department of Agricultural Economics, Cornell University, June 1957.
- North, Ronald Morris. "Interregional Changes in Cotton Production in the United States, 1899—1949". Department of Agricultural Economics, Cornell University, September 1957.
- Luykx II, Nicolaas Godfried Maria. "Economic Influence on Changes in The Size of the Agricultural Labor Force in Densely Populated Underdeveloped Countries: The Japanese Experience". Department of Agricultural Economics, Cornell University. February 1958.
- Strauss, Conrad Barend. "Economic Aspects of Dairy Feeding Practices in Four Counties of New York, 1957". Department of Agricultural Economics, Cornell University, September 1958.
- Rowell, Hollis Urie. "An Application of Input-Output Analysis to Study the Effects of Changes in Agriculture on the Economy of St. Lawrence County, New York". Department of Agricultural Economics, Cornell University. February 1959.

- Ismael, Julius Emanuel. "Some Aspects of the Rice Distribution Controls in Indonesia, 1950—1958". Department of Agricultural Economics, Cornell University. September 1959.
- Singh, Hakim. "Application of the Technique of Farm Planning and Budgeting in the Punjab". Department of Agricultural Economics, Cornell University. September 1961.
- Etherington, Dan Maxwell. "Structural Changes in Peasant Agriculture: A Comparative Study of Indian and Japanese Farm Data". Department of Agricultural Economics, Cornell University. February 1962.
- Franco, Alberto. "A Study of Domestic Consumer Demand for Food in Colombia, 1958—1965". Department of Agricultural Economics, Cornell University. June 1962.
- Herd, Robert William. "The Effects of the Complementarity of Nitrogen and Unconventional Inputs on the Rice Production Function: India and the United States". Department of Agricultural Economics, Cornell University, January 1963.
- de Ponteves, Bruno Charles de Ruffi. "Alternative Projections of the Supply and Demand for Milk in India and their Influence on Demand for Concentrate Feed, 1951—1976". Department of Agricultural Economics, Cornell University. June 1963.
- Otto, Leonard Henry. "A Case Study of an Intensive Vegetable Cultivation Project in the Artibonite Valley, Haiti and its Contribution to Agricultural Development". Department of Agricultural Economics, Cornell University. September 1963.
- Brunet, Ian Druce. "The Economic Development of New Guinea". Department of Agricultural Economics, Cornell University. September 1967.
- Shortlidge, Richard Lynn. "The Profitability of Educational Investments in India". Department of Agricultural Economics, Cornell University, June 1970.

Schluter, Michael Gerald Galton. "Differential Rates of Adoption of the New Seed Varieties in India: The Problem of the Small Farm". Department of Agricultural Economics, Cornell University. September 1971.

Doctor's Theses

Janlekha, Kamal Odd. "A Study of the Economy of a Rice Growing Village in Central Thailand". Department of Agricultural Economics, Cornell University. September 1955.

Foster, John Henry. "Change in the Rural Areas of St. Lawrence Country, New York". Department of Agricultural Economics, Cornell University. June 1957.

Stevens, Robert Dale. "Capital Formation and Agriculture in Some Lebanese Villages". Department of Agricultural Economics, Cornell University, February 1959.

Lele, Uma Jayant. "Efficiency of Jower Marketing: A Study of Regulated Markets in Western India". Department of Agricultural Economics, Cornell University, September 1965.

Simon, Sheldon Robert. "Changes in Income, Consumption, and Investment in an Eastern Uttar Pradesh Village, 1954 to 1964-65". Department of Agricultural Economics, Cornell University. September 1966.

Weaver, Thomas Floyd. "Irrigation and Agricultural Development in Raipur District, Madhya Pradesh, India". Department of Agricultural Economics, Cornell University. February 1967.

Dar, Ashok Kumar. "Domestic Terms of Trade and Economic Development in India". Department of Agricultural Economics, Cornell University, June 1967.

- Bawa, Ujagar Singh. "The Relationships Between Agricultural Production and Industrial Capital Formation in India, 1951-52 to 1964-65". Department of Agricultural Economics, Cornell University. June 1968.
- Lee, Teng-Hui. "Intersectoral Capital Flows in the Economics Development in Taiwan, 1895-1960". Department of Agricultural Economics, Cornell University. June 1968.
- Desai, Gunvantari Maganlal. "Growth of Fertilizer Use in Indian Agriculture: Past Trends and Future Demand". Department of Agricultural Economics, Cornell University. June 1969.
- Farruk, Muhammad Osman. "The Structure and Performance of the Rice Marketing System in East Pakistan". Department of Agricultural Economics, Cornell University. June 1970.
- Greene, Brook Alexander. "Rate of Adoption of New Farm Practices in the Central Plains of Thailand". Department of Agricultural Economics, Cornell University. January 1971.
- Shortlidge, Richard Lynn. "The Employment and Earnings of Agricultural Graduates in India: A Benefit-Cost Case Study of G.B. Pant College of Agriculture and Technology". Department of Agricultural Economics, Cornell University. May 1973.
- Schluter, Michael Gerald Gallon. "The Interaction of Credit and Uncertainty in Determining Resource Allocation and Incomes on Small Farms, Surat District, India". Department of Agricultural Economics, Cornell University. August 1973.
- Donovan, Wlateral Graeme. "Employment Generation in Agriculture: A Study in Madhya District, South India". Department of Agricultural Economics, Cornell University. June 1974.
- Hirashima, Shigunochi. "Interaction Between Institutions and Technology in Developing Agriculture: A Case Study of the Disparity Problems

in Pakistan Agriculture". Department of Agricultural Economics, Cornell University. August 1974.

Desai, Bhupendra Maganlal. "Relationship of Consumption and Production in Changing Agriculture: A Study in Surat District, India". Department of Agricultural Economics, Cornell University. January 1975.

Ranade, Chandrasekhar Govind. "Distribution of Benefits from New Agricultural Technologies: A Study at Farm Level". Department of Agricultural Economics, Cornell University. January 1977.

Delgado, Christopher Linn. "Livestock Versus Food Grain Production in Southeastern Upper Volta: A Resource Allocation Analysis". Department of Agricultural Economics, Cornell University. May 1978.

Sambrani, Shreekant. "Structural Changes in the Indian Economy, 1950-51 to 1965-66". Department of Agricultural Economics, Cornell University. August 1978.

Hart, Gillian Patricia. "Labor Allocation Strategies in Rural Javanese Household". Department of Agricultural Economics, Cornell University. August 1978.

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