

*Distinguished Lecture*

## **Agricultural Growth in China and Sub-Saharan African Countries<sup>1</sup>**

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### **1. INTRODUCTION**

Agriculture remains a dominant sector in the economies of most African and several Asian countries. However, the poor performance of agriculture in Africa stands in sharp contrast to the robust agricultural growth in many Asian countries.<sup>2</sup> In this regard, the experience of China is perhaps as impressive as it is relevant to many countries in Sub-Saharan Africa. A general observation is that the productivity of land and labour has to rise through intensive agriculture, given the limited area of arable land (in China and Africa) and the high rates of growth of population (as in Africa). In many African countries, labour productivity has fallen and land productivity has not increased significantly. In China, productivities of both land and labour have increased significantly since at least the early 1980s.

Agricultural output can increase in three ways: (i) get more from the same quantities of inputs through better utilisation of the existing capacity; (ii) use increased quantities of inputs; and (iii) use new techniques to raise the productivity of each input or raise the total product curve. All of these may require changes in tenurial arrangements, levels of investment in infrastructure and support services, and policies that affect the prices of outputs and inputs. A close examination of factors underlying the contrasting experiences in China and African countries reveals important differences in the institutional and policy environments affecting the individual behaviour with regard to the adoption and use of new (profitable) technologies to raise the land and labour productivities. This paper is intended to highlight the linkages between agricultural growth and the institutional, policy, and behavioural aspects, contrasting the experiences of China and African countries.

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<sup>1</sup>The Terms "Africa" or "African countries" refer to the Sub-Saharan African countries.

<sup>2</sup>A similar contrast can be observed generally in the rates of growth of population in African and Asian countries, with high and stable rates in the former and falling rates in the latter.

## **II. MACROECONOMIC STRUCTURE AND AGRICULTURAL PERFORMANCE<sup>3</sup>**

In 1992 the income per capita in China was \$470 and in Africa \$530. However, the average Chinese enjoyed a standard of living more than twice as high as an average African: \$2,946 versus \$1,250, using the purchasing power parity exchange rates [UNDP (1994)]. Nearly 46 percent of the population in Africa and only 9 percent in China are in absolute poverty. Poverty in rural areas—where 70-72 percent of the people of Africa and China reside—is even more widespread in Africa: over 65 percent of the rural population in Africa (or 237 million people) and about 13 percent in China (or 105 million people) live in poverty. Agriculture is the single most important sector of the African economies; its share in the Gross Domestic Product (GDP) has stayed between 30-35 percent in the last 25 years. In China, the share of agriculture in the GDP has fallen from around 40 percent to 27 percent in the same period. It is interesting that agriculture employs about two-thirds of the labour force in both Africa and China. The direct contribution of agriculture to trade (exports and imports) is even more significant in Africa (48-50 percent) than in China (28-30 percent).

Africa's population (518 million) in 1992 was just less than one-half of China's. But the population gap has narrowed in the last 25 years: the population in Africa grew at rates of 2.7-3.0 percent per year during 1965-92, whereas the population growth rate in China fell from 2.1 percent to 1.4 percent per year in the same period. The Chinese economy expanded at 6.4 percent per year during 1965-80 and 9.1 percent during 1980-92, which allowed the per capita income to rise annually at 3.3 and 7.4 percent in the two periods. The economies in Africa, on the other hand, grew at decelerating rates, falling from 5.3 percent in 1965-80 to 1.8 percent during 1980-92. Given the rising rates of growth of population in African countries, the average income per capita rose annually at 2.6 percent in the first period but fell at the rate of 1.2 percent per year in the second period.

The low growth rate of the GDP in Africa is mirrored by the poor performance of the agriculture sector: its annual growth rate was only 1.9 percent during 1965-80 and fell to 1.7 percent during 1980-92. The indices of total agricultural output, food output, and crop output during 1975-92 (1979-81=100) strongly support the differential performance of the agriculture sector in Africa and China. In terms of food security, the situation in African countries seems to have deteriorated: the index of food output per capita fell from 108 in 1975 to 93 in 1992, but increased in China from 91 to 145. Cereal production per capita in Africa has likewise consistently declined from 169 kg in 1970 to 140 in 1993; it increased in China from 251 to 350 in this period. If net imports are added to the domestic production, the availability of cereals in Africa fell from 175 kg per person in 1970 to 150 in 1992, but rose

<sup>3</sup>The data used in this section are shown in Tables 1 and 2.

Table 1

*Macroeconomic and Agricultural Indicators in Sub-Saharan African Countries and China*

Indicators	Sub-Saharan Africa						China					
	1970	1975	1980	1985	1990	1992	1970	1975	1980	1985	1990	1992
Population (Million)	270	310	359	417	487	518	830	924	987	1,059	1,143	1,162
GNP per Capita (US\$) %	250	400	660	600	520	530		200	270	380	410	470
Share of Agriculture in												
GDP	35	31	30	33	32	33	38	36	35	33	28	27
Labour Force	78	75	73	70	67	66	78	76	74	71	67	66
Trade	63		57	52	49	48	35		72	44	33	28
Agriculture Value-added (US\$)												
per Worker	456	454	458	476	534	540	206	213	228	318	358	385
per Hectare	346	365	391	432	542	566	706	800	949	1,477	1,758	1,906
Indices of Output (1979-81 = 100)												
Agriculture		93.9	100.5	111.0	127.9	135.0		84.7	98.8	130.2	159.2	175.4
Food		93.1	100.4	111.1	129.0	136.7		84.6	98.8	127.4	157.6	175.8
Crop		97.9	100.6	111.4	129.4	137.2		85.7	98.4	125.1	144.9	149.8
Food per Capita		108.0	100.4	96.1	96.2	93.4		90.8	98.7	118.6	136.1	145.2
Cereal Output												
per Capita (kg)	169	165	152	151	135	140	251	258	283	321	340	350
per Hectare (kg)	837	896	883	1,026	1,049	1,110	1,875	2,074	2,923	3,837	4,199	4,587
Cereal Availability/												
Capita (kg)	175	166	163	175	146	150	257	261	299	323	354	350
Arable Land per Capita (Hectare)	0.488	0.440	0.393	0.345	0.279		0.118	0.106	0.099	0.089	0.081	
Irrigated Areas as % of Arable Land	2.9	3.1	3.9	4.5	4.7		38.9	43.7	46.4	47.1	51.4	
Fertiliser Use												
per Hectare (kg)	6.7	10.0	12.1	13.7	14.7		36.1	58.9	134.0	209.1	290.3	

*Continued-*

Table I- (Continued)

Indicator	Sub-Saharan Africa			China		
	1965-80	1970-80	1980-92	1965-80	1970-80	1980-92
Average Annual Growth Rate of (%)						
Population	2.7	2.8	3.0	2.1	1.8	1.4
GDP	5.3	3.6	1.8	6.4	5.2	9.1
Agriculture Value-added	1.9	1.6	1.7	3.0	2.6	5.4

*Source:* The data and estimates are from: World Bank, *World Development Report*, various issues; UNDP, *Human Development Report*, various issues; World Bank, *World Tables 1994*; FAO, *Production Yearbook*, various issues; FAO, *Trade Yearbook*, various issues; FAO, *Fertiliser Yearbook*, various issues; African Development Bank, *African Development Report*, various issues; and People's Republic of China, *Statistical Yearbook of China*, various issues.

*Notes:* 1. Agriculture Value-added is in 1985 US dollars for African countries and 1980 US dollars for China.

2. Indices of total agricultural output, food output, crop output, and cereal output are for all of Africa. The end-year for these indices and for the index of cereal output per capita is 1993.

3. Cereal availability is total domestic output plus net imports.

Table 2

*Changes in Agricultural Output and Food Production in Selected African Countries and China*

Country	Population	Average Annual Growth Rate of Agriculture Value-added			Average Annual Growth Rate of Food Output per Capita 1979-92	Food Production per Capita Index 1991 (1979-81=100)	Calorie Supply as % of Require- ments 1988-90
		1986-89	1987-92	1989-92			
Nigeria	101.9	3.8	6.2	4.0	2.0	123	93
Tanzania	25.9	4.7	5.3	7.8	-1.2	78	91
Kenya	25.7	4.5	1.0	0.1	0.1	103	86
Uganda	17.5	6.1	4.5	2.6	0.1	98	83
Chad	6.0	3.7	12.0	11.6	0.3	102	69
Benin	5.0	4.6	8.5	4.6	1.8	119	101
Botswana	1.4	17.6	15.8	2.8	-3.1	68	100
Guinea-Bissau	1.0	7.3	-1.0	-4.3	1.1		97
Comoros	0.5	3.6	2.2	1.4			90
Cape Verde	0.4	16.7	1.8	2.2			125
Total (10)	185.3	7.3	4.6	3.3			

*Continued—*

Table 2 - (Continued)

Country	Population	Average Annual Growth Rate of Agriculture Value-added			Average Annual Growth Rate of Food Output per Capita 1979-92	Food Production per Capita Index 1991 (1979-81=100)	Calorie Supply as % of Require- ments 1988-90
		1986-89	1987-92	1989-92			
Ghana	15.8	2.3	2.0	0.6	0.3	116	91
Ivory Coast	12.9	2.3	-1.1	-1.9	0.1	93	122
Burkina Faso	9.5	1.5	3.8	1.2	2.8	119	95
Sierra Leone	4.4	3.6	-1.0	-1.6	-1.2	84	86
Total (4)	42.6	2.5	0.9	-0.4			
Sub-Saharan Africa						96	92
China	1,162	3.6	4.2	4.6	2.9	138	112

Note: Data sources are given in Table 1.

consistently from 257 kg to 350 kg in China.<sup>4</sup> Africa had to import a sizable proportion of its own cereal output to avoid food disasters throughout the 1980s and the early 1990s. The food dependency ratio in China was less than one-half of that in Africa: it increased from 6.5 in 1970 to 10.2 in 1990 in Africa and from 1.7 to 4.7 in China.

In view of the general economic decline in African countries between the late 1970s and the early 1980s, several governments undertook economic reform–stabilisation and structural adjustment–programmes with assistance from the International Monetary Fund (IMF), the World Bank, and other international donors.<sup>5</sup> Admittedly, there is much controversy about the short- and long-term effects of these programmes on growth, poverty, and the environment. Recent evidence seems to suggest that in some of the African countries there has been visible economic recovery since the late 1980s.<sup>6</sup> However, looking at some of the major indicators of performance for the agriculture sector in 14 of these countries–10 of which have received certificates of success from the World Bank–in recent years, only in Burkina Faso, Nigeria, and Benin the annual growth rate of food output was between 1.8 and 2.8 percent during 1980-92; in 3 countries there was a decline in the growth rate; and in others the rate of growth was less than 0.5 percent. In China, the annual growth of food per capita was 2.9 percent in the same period. While the index of food production per capita (1979-81=100) in 1991 was significantly higher in Nigeria, Benin, Burkina Faso, and Ghana than in other African countries, the average for Africa was 96 as against the average of 138 in China. The estimated growth rates of the value-added in agriculture during 1986-92 show a disturbing trend in Africa: the average annual rate during 1986-89 was 7.3 percent in the top 10 countries, but declined to 3.3 percent during 1989-92, the most recent period for which the data are available. In China, on the other hand, the annual growth rate of agriculture went up from 3.6 percent during 1986-89 to 4.6 percent during 1989-92.

Most of the observed difference in the performance of agriculture between Africa and China in the last 25 years can be attributed to changes in the productivity of major agricultural inputs.<sup>7</sup> For example, the agriculture value-added per hectare in China more than doubled (rose from \$706 to \$1906), but in Africa it rose by less

<sup>4</sup>The indices for Africa include the North African countries: Egypt, Libya, Algeria, Tunisia, and Morocco. If the indices of these countries are excluded from the total, the picture is more depressing.

<sup>5</sup>See [World Bank (1994a)].

<sup>6</sup>See, for instance, the two volumes on Sub-Saharan Africa by Husain (1994) and World Bank (1994).

<sup>7</sup>Wen's (1993) study of total factor productivity (TFP) in China's agriculture shows that most of the growth in the 1950s came from increased inputs; followed by declining TFP during 1958-60 ("The Great Leap Forward"); some improvement from 1960-68 followed by deterioration and stagnation ("The Cultural Revolution") upto 1977-78. The TFP index was at 70 (1952 = 100) in 1978. It has nearly doubled–risen from 70 to 140–during 1978 and 1992. There is no similar study of changes in TFP in African agriculture.

than two-thirds (\$346 to \$566) during 1970-92. The average product per agricultural worker rose by 87 percent (from \$206 to \$385) in China and only 18 percent (from \$456 to \$540) in Africa in the same period. The yield gap of cereals between Africa and China rose consistently from 2.24 to 4.13 during 1970-93: in 1990-93 the average yields were around 1.1 and 4.3 metric tons per hectare, respectively.

A part of the explanation for the rapid growth of agricultural production and productivity in China is reflected in the availability of irrigation water and use of chemical fertilisers. In Africa, less than 5 percent of the arable land is presently irrigated (rising from nearly 3 percent in 1970), whereas in China 51 percent of the area is irrigated (rising from 40 percent in 1970). The average rate of fertiliser (N+P+K) application is around 15 kg per arable hectare in Africa (rising from 7 kg in 1970) and 290 kg per hectare in China (rising from 36 kg in 1970). Similar differences seem to exist in the use of quality (hybrid) seed of major crops, pesticides, and machines.

### III. SOME EXPLANATIONS OF THE DIFFERENCES IN AGRICULTURAL GROWTH

The conventional wisdom in the 1950s was that China would face long periods of hunger and famine and the African continent will produce increasing agricultural surplus for rapid industrial growth. The events so far have run the other way. A substantial body of literature has recently developed on both China and African countries about the performance of their economies and the process of agricultural growth in the last 15-20 years.<sup>8</sup> It is important first to underscore some of the major differences in the *resource endowments and structural conditions* that have a strong bearing on the performance of agriculture in China and Africa. This will be followed by a review of the differences in the evolution of institutions and policies, investments in infrastructure, and development of support services.

#### 1. Structural Differences

While African agriculture is largely rain-fed, China has the advantage of irrigation for a substantial proportion of its arable land. It is estimated, however, that Africa has a potential for irrigation to about 20-25 million hectares and only 15-20 percent of that potential is presently used. Further, the yield level on irrigated lands in Africa is about 3.5 times the level observed on rain-fed lands [Cleaver (1993)]. There is not much potential for additional arable land in China. In fact, the land base has been shrinking in the last 20-25 years: it has gone down from 0.12 hectare to

<sup>8</sup>Some of the relevant literature is shown in the list of references and cited where necessary in the paper.

0.08 hectare per capita during 1970-92. The arable land base in Africa has expanded somewhat (132 million to 140 million hectares), but it is shrinking more rapidly in per capita terms thanks to the high rates of population growth and urbanisation: it has fallen from 0.49 to 0.28 hectare in this period. Much of the expansion of land base in Africa has been achieved at the expense of forest and pasture (grazing) lands.

Natural disasters—floods and droughts—can severely damage agricultural production in any environment. Droughts, however defined, are both frequent and severe in many African countries as a result of the variability in rainfall in the arid and semi-arid areas and the poor capacity of soils to retain moisture. Many African countries are particularly vulnerable to the effects of drought because of (i) dependence on rain-fed agriculture (crop and livestock production) and its importance to the GDP, (ii) limited infrastructure, (iii) low level of income per capita, and (iv) large-scale armed conflict or civil strife.<sup>9</sup> China has not encountered drought on this scale, although flooding in some years—as recent as 1991—has affected agricultural output on a significant scale in some regions.

Until recently, in many African countries, because of the relative abundance of land in relation to population, “shifting” and “slash and burn” agriculture has been practised over large areas. Long rotations and a mix of pastoral and crop husbandry have adequately met the needs of people and their soils. However, with increased population, soil degradation, and generally low productivity, intensification of agriculture has become a necessity in most African countries. A transition from shifting to settled agriculture—shorter rotations—is now indeed under way, creating pressure on the natural resource base and on the traditional linkages between animal and crop husbandry. The traditional technologies and the customary land systems are unable to accommodate the needs of a rapidly growing population [Lele and Stone (1989)]. China, on the other hand, has known settled and intensive agriculture for centuries. In recent decades, the intensification of agriculture in China has progressed due mainly to productivity increases. The development of rural infrastructure—including irrigation—and the adoption of new labour-intensive (land-augmenting) technologies in the 1960s and 1970s have made a major contribution to this process.

Finally, the conditions for agricultural growth in China and African countries have differed in another, perhaps crucial, respect. The political and social stability—with expanding institutional capacity of the government to promote the economic well-being of citizens—observed in China has not developed in Africa in the post-independence period. On the contrary, in many African countries, the rules of good governance have generally been abused as is evident in civil strife, lawlessness, and the pervasive rent-seeking behaviour of governments, farmers, and businessmen on a large scale. As will be argued later in the paper, governments in many countries

<sup>9</sup>For an interesting study of the impact of drought in Africa, see Benson (1994).

adopted the attitude—even when they lacked the institutional capacity—that rapid economic growth requires their visible hand and not the invisible hand of the market, and that the industrial cart must be placed before the agricultural horse. This strategy of economic development was a misinterpretation of recent history and, as it turns out, a prescription for failure. Here again the government in China has shown more flexibility and pragmatism than observed in Africa.

## **2. Evolution of Institutions**

There is a general agreement that property rights in natural resources—agricultural land, pastures, and forests—should be well-defined, understood and enforced to use the resources efficiently for the common good. “Open access” represents absence of property rights, results in wastage and degradation of resources, and may even perpetuate poverty. There is, however, much disagreement about the exact form of property rights (private, customary, and state): how have these forms evolved and which one of these is the “best” for the economy and society?<sup>10</sup>

Private property rights in agricultural land, as these exist in several countries outside Africa, imply exclusivity, security, and transferability: one can do what one likes, within limits, with one’s land as property. This right is recognised in law and enforced in practice. In the customary land system, as it exists in many African countries, a person or a household enjoys the usufruct of land, but not its ownership, by way of association with a tribe or through kinship. This right is transferable within the family through inheritance or within the tribe through tenancy in one form or another. The tribal authority regulates these rights by customary law and practice. In the third system, as it exists in China and some other countries, the right of land ownership belongs exclusively to the state. Individuals and groups may be assigned the rights of usufruct to specific pieces for a fixed period. These rights are not transferable between individuals and groups without the legal consent of the state. The users of land are simply tenants of the state under well-defined rights and duties.

The traditional Chinese land system before the establishment of the People’s Republic in 1949 can best be described as “feudal”: much of the land was owned by landlords who leased it in small (fragmented) parcels to the landless peasants. A land reform programme was completed during 1949-1952, under which land was taken away from landlords without compensation and distributed free to the poor and landless peasants. The Communist party experimented with various forms of cooperatives, while retaining the private property right in land. Initially, the peasants

<sup>10</sup>Some of this literature is reviewed by Platteau (1992). There is considerable debate about the effects of farm size—economies or diseconomies of scale—and tenancy, sharecropping, fixed rent, and wage labour on agricultural productivity and rural income distribution. This debate goes back to the nineteenth century.

were encouraged (not forced) to join these cooperatives. The results of the experiment in “advanced cooperatives” were very positive in terms of the increase in the agriculture value-added and grain output during 1955 to 1957.

The “people’s communes” were established in 1958 as large-scale collectives of peasants who lost the ownership of land, and with it the freedom to make decisions. After the disastrous failure of agriculture during 1959-61, causing widespread famine, hunger, and deaths on a very large scale, the communes were decentralised. Each commune was split into 13 “brigades” (with about 15,000 people), and each brigade was divided into 7-10 “production teams”. There were 35 households or about 60 workers in each production team, which became the basic operational and accounting unit for income distribution: each worker was rewarded on the basis of “work points” he/she accumulated. The commune system—in which the state owned the land, made decisions about crops, prices, and inputs and the peasants were rewarded on work points—remained intact until 1978.

After the death of Mao Zedong in 1976, there was considerable political uncertainty for about three years. By the end of 1978, Deng Xiaoping and his supporters in the Communist Party emerged as the successful leaders of China. A series of major reforms were introduced in 1978-1979 to improve the performance of the economy in general and the agriculture sector in particular [Harrold (1992)]. These reforms also reflected a break from the ideology of collectivism and egalitarianism previously pursued in rural areas. It was acknowledged that the key to farmers’ incentives was to solve the managerial problems in the team system. Rewards to individuals were not tied directly to their effort—because of the difficulties and the high cost of monitoring the agricultural work which is sequential and spatial—so the incentives for work were low and undercontribution to effort was pervasive.<sup>11</sup>

While the government initially considered subdivision of the collectively owned land into individual household parcels to be contrary to socialist principles, a small number of production teams—located in areas frequently visited by flood and drought—first secretly and then with the blessing of local authorities began the system of contracting land and other resources to individual households in return for output quotas and local taxes. These teams produced much higher yields than other teams in the same area. This “household responsibility system” (HRS) spread to other areas and official recognition was given to the new system in 1981. By the end of 1983 almost all rural households in China had adopted the HRS. Initially the households were given short-term leases of one to three years, but in 1984 the lease period was increased to 15 years. At the same time, sub-leasing of land and use of

<sup>11</sup>A formal explanation of the underlying theory and a test of some hypotheses about collective farms in China is given by Lin (1988).

hired labour were permitted. The contracting household had to meet the quota obligations (as rent to the state) and pay the local taxes.<sup>12</sup>

Recent studies of the impact of economic reform in China have argued with good evidence that the institutional change from the commune system to HRS contributed about one-half of the increase in TFPI during 1979-1989. The rest was due to increased levels of inputs, resulting from the price incentive.<sup>13</sup> While the productivity effects of HRS have been generally recognised, there is a debate about its consequences on the distribution of rural income. A general impression is that the distribution of income in rural China has become more unequal since the advent of the economic reform programme [Khan *et al.* (1992); Lin (1994)]. Some of the inequality has been contributed by the marketed component of the household production; the rest is on account of the spread of rural industries, property income, and wage differentials.

The land system in Africa is in a state of flux, creating much uncertainty about the property rights in agricultural land, pastures, and forests. It is hard to describe the land tenure of Africa both because of its diversity and the changes under way with or without government action. The customary land system, before the imperial encroachments of Europeans into Africa in the nineteenth century, was based on the abundance of land relative to population. The right of landownership did not extend to the individual or household: they enjoyed secure and transferable rights to the use of land within the tribe or kinship group. Communal ownership of pastures, forests, and agricultural land was the common pattern. The technology used in agriculture—slash and burn and shifting cultivation with long fallow periods—was consistent with the resource endowment and the institutional capacity of tribes and kinship groups. Land parcels, distributed to individual households on the basis of need and the size of household, were rotated among the households.

Europeans introduced the ownership rights of individuals to agricultural land—taken away from Africans usually by force—for settlers in Africa (e.g., Kenya, Malawi, Zimbabwe, Zambia, and the Ivory Coast) to grow commercial crops for export. Africans were generally allowed to maintain the customary land system and to produce mainly subsistence crops. In many areas, they were forced to provide labour to European farmers and commercial plantations. In several African countries, a dual land system had emerged by the early 1950s when the African states started to gain independence [Platteau (1992)].

<sup>12</sup>A detailed account of institutional changes in China since 1949 and the government's shifting policy on HRS in recent years is given by Ash (1993); Lardy (1990) and Stone (1993).

<sup>13</sup>This general conclusion is reached in several studies, but a rigorous analysis is provided by Lin (1988) and Wen (1993). According to Wen (1993, p. 34), the "commune system was detrimental to [sic] and the HRS has been conducive to an increase in TFPI, and there was an outward shift of the production frontier following the dismantlement of the commune system". It has also been argued that the institutional change has dynamic effects.

In very few countries of Africa—Kenya is perhaps the best example—the post-Independence governments have introduced and enlarged on a systematic basis the private (individual) right of landownership. A debate has often followed about the increasing concentration of land and landlessness. In some countries, agricultural land was taken away by the state from the tribal (communal) system and private landowners, as in Ethiopia, Tanzania, and Nigeria. There is evidence that, in many African countries, the customary land system—which is still predominant—has lost much of its structure due to (i) the increasing pressure of population on arable land, (ii) the increased mobility of labour, (iii) the expansion of markets, (iv) the emergence of *de facto* tenancies in various forms within and outside the tribal and kinship groups, and (v) the lack of interest and inadequate institutional capacity of governments to restructure the customary land system.<sup>14</sup>

There is much uncertainty and insecurity of tenure in land throughout Africa, affecting the incentives to make long-term investments and adopt (new) profitable technologies where they have become available. It is this state of insecurity of tenure, and not necessarily the incapacity of the customary land system to adapt to changing circumstances, that inhibits agricultural growth in many African countries [Migot-Adholla *et al.* (1993); Platteau (1992) and Smith *et al.* (1994)]. The transition from the communal to private property in land requires policies that can first arrest the decay of the customary land rights into an open access regime—as is clearly evident in pastures and forests—and provide a legal framework for property rights that are well-defined, secure, and transferable. Restrictions on rights by custom or law, in the face of rapid population growth and continuous cultivation, can have serious implications for investment in land and technological innovations in agriculture [Migot-Adholla *et al.* (1993)].

### 3. Prices and Markets

In the early 1950s, four views came to dominate public policy in many developing countries: economic development means rapid industrialisation; rapid industrialisation requires transfer of resources from the agriculture sector through implicit and explicit taxes; import substitution is the key to rapid industrial growth; state controls and planning, and not private markets, are superior (and faster) vehicles for achieving the goals of development. In China, the Communist Party emulated the Soviet (Stalinist) model of development, with adaptation to local conditions and in keeping with the views of Mao Zedong, from the mid-1950s to the late 1970s. The socialist ideology allowed little or no room for private production and trade. In most African countries, after independence, governments adopted

<sup>14</sup>Burkina Faso is one of the few countries in which the government has started providing land titles to the traditional communities.

policies that discriminated against agriculture, subsidised industry, and suppressed private markets through pervasive controls and regulations.

A major difference between China and Africa was that the economy of China was far less dependent on foreign trade and was industrialising far more rapidly than the economies of most African countries. African countries were particularly vulnerable to changes in international markets since most of them depended on export earnings from a limited number of agricultural products (commercial crops) and imported most of the manufactured goods. Internally, the governments pursued policies that weakened the agricultural production system and did not necessarily diversify the economy efficiently. Many of these countries had to start importing food in the early 1970s, whereas once they were exporters of grain, for which they were unable to earn adequate foreign exchange due to the falling terms of trade for their exports. Africa's agricultural export performance deteriorated significantly from 1970 to 1984. This trend followed closely the high levels of distortions in the agricultural sector: government's involvement in the pricing and marketing of export crops and the highly overvalued exchange rates. The rising food imports and declining domestic production were due to rapid urbanisation, exchange rate distortions, and a decline in international food prices and income [Jaeger (1992)].

Until 1979 the Chinese leadership maintained a policy of food self-sufficiency—which has been called “food fundamentalism”—particularly in grain production irrespective of the differences in regional comparative advantages. Also, it kept the producer prices of agricultural goods at levels which were far below the border prices to provide cheap food to industrial workers and urban consumers. Prices were administratively determined. Producers' sales quotas were fixed. State purchase prices and state selling prices bore little relationship to each other. Prices were irrelevant to distribution, since commodities were allocated in a planned way through the administrative system. Finally, prices did not affect consumer behaviour, since supplies of key commodities were sold by allocated rations.

The most important policy change in China began quietly in 1978, and with much fanfare in 1979, with price increases for producers to improve agricultural profitability and raise peasant incomes. Initially, the average increase for the quota prices was 17 percent and 41 percent for the above-quota prices. The procurement prices in 1981 were an average of 42 percent above those in 1977. The government also liberalised the procurement system: it progressively reduced the base targets for unified sales, restored the negotiated sales, and allowed greater freedom to sell the surplus production at negotiated prices or on the free market. In response, producers attempted to sell a greater proportion of their output in the higher-priced categories or on the free market. The trend towards liberalisation of the state procurement and pricing system was maintained: by 1991 about 50 percent of all agricultural products purchases took place at market prices; 20 percent were subject to state guidance

prices—where maximum and minimum prices were set, and 30 percent at state-determined prices [Findlay *et al.* (1993)].<sup>15</sup>

The price and procurement reforms in China, combined with the institutional reforms, have had several important effects on the agriculture sector and the rural economy: farmers are allocating their resources more efficiently; production and productivity of crops and livestock products have been rising substantially; regional comparative advantages are being exploited more fully; inter-regional markets (network of markets) are developing rapidly; and rural incomes, savings, and investment have increased significantly [Findlay *et al.* (1993); Khan *et al.* (1992); Lardy (1990) and Lin (1994)]. The indirect effect of the economic reform programme in rural areas has been the rapid growth of non-agricultural enterprises, commonly known as township enterprises. Labour freed from agriculture was available to develop new types of production, spurred on by the higher returns from such investments. The phenomenal growth of these enterprises, owned by individuals and townships (local governments), is reflected in the fact that they accounted for 54 percent of the value of rural production and 25 percent of the value of national output in 1990 [Findlay *et al.* (1993)]. Rural enterprises represent a key element in China's rural development strategy, providing inputs in agriculture, absorbing rural labour, producing for the market, and helping to raise rural incomes.

It is fair to say that much of the blame for the deterioration of African agriculture can be placed on government policies which have shifted the internal terms of trade strongly against agriculture and created market distortions that reduced efficiency [Russell (1993) and Vyas and Casley (1988)]. Farmers in Africa faced probably the highest burden of taxation in the world until the mid-1980s through explicit taxes—low producer prices, export taxes, and taxes on agricultural inputs—and implicit taxes through overvalued exchange rates and high levels of industrial protection [World Bank (1994)]. The result was a shift of resources—especially labour—out of the sector, and a decline in both public and private investment. The decline in Africa's agricultural exports coincided with substantial and widespread macroeconomic distortions and the deteriorating real prices paid to farmers: lower real producer prices and higher real exchange rates had a proportionate impact on declining agricultural exports [Jaeger (1992) and World Bank (1994)]. Rising food imports were a reflection of slow growth in food production, urbanisation, and higher demand for imported food.

Governments in Africa have intervened heavily in the production and marketing of export crops (cashew, cocoa, coffee, cotton, groundnuts, palm oil, tea,

<sup>15</sup>Initially the government did not pass on to consumers the price increases of basic (rationed) commodities (grains in particular). However, in 1991 the retail prices of grains and other farm products were increased significantly. It may also be noted that the compulsory procurement quotas were replaced by purchasing contracts between the state and farmers [Ash (1993) and Lin (1994)].

and tobacco) through marketing boards and parastatals. Most of the parastatals have enjoyed monopoly power in purchasing and exporting usually at prices not linked to the world market prices. In spite of the economic reforms undertaken in recent years, there are still serious barriers to private competition. Often the marketing boards retain a *de facto* monopoly through control over processing and privileged access to bank financing. Similarly, boards can squeeze out private agents by setting unprofitably low price margins and relying on the government to subsidise their losses. Even when competition in the domestic purchasing has been allowed, the government maintains control on the export of major crops (*e.g.*, cocoa and coffee in the Ivory Coast). The operations of the parastatals and marketing boards have been very costly and inefficient [World Bank (1994)].

The intervention of governments in the pricing and distribution of food crops was less pervasive but still substantial: in about 15 countries the intervention was heavy. In some countries, government intervention was restricted to marketing of imported foods (mainly wheat and rice) to urban consumers, having indirect effects on domestic producers. Evidence suggests that government controls on distribution and price were not very effective and the evasion through parallel markets was substantial [Jaeger (1992) and World Bank (1994)]. Food prices have been affected less than the prices of export crops by government policies due to (i) ineffective policy interventions and (ii) limited imports of cheap food. Trends in consumer food prices show that relative to border prices, at official exchange rates, domestically produced food crops were more expensive relative to imported wheat and rice in the 1970s. As distortions in real exchange rates have declined and food markets have been liberalised in the last 6-8 years, prices of traded food crops have increased while the prices of non-traded crops (tubers and roots) have fallen. Policy reform in the pricing and distribution of food crops has been rapid in those countries that intervened heavily mainly because of the disastrous financial position of food crop marketing boards.<sup>16</sup>

Governments in several African countries have recently embarked on economic reform programmes, including corrections in the exchange rates and producer prices of both export and food crops, reducing the role of marketing boards and increasing participation by the private sector in the production and distribution systems. The results so far are quite mixed in terms of the impact of these changes

<sup>16</sup>Prices and distribution of agricultural inputs, chemical fertilisers in particular, have also been subject to heavy government intervention. Most of the inputs have been subsidised partly to compensate farmers for the excessive taxation of agricultural products and partly to give incentives to farmers to adopt new and profitable technologies. There is much debate about the price distortion-subsidy-on fertilisers in relation to the fertiliser use and the efficiency of the public distribution systems. Governments in Africa, as in other parts of the world (including China), have started to reduce gradually the levels of fertiliser subsidy and increase the participation of the private sector in the distribution system [World Bank (1994)].

on the performance of the agriculture sector [Husain (1994) and World Bank (1994)]. One reason is that no country in Africa has both good macroeconomic and agricultural policies: exchange rate distortions and government intervention in marketing are still prevalent in most of the countries. The other reason is that the response of farmers also depends on non-price factors: land tenure; physical and social infrastructure in rural areas; and support services.

#### 4. Infrastructure and Support Services

Development of agriculture requires public and private investment in physical and social infrastructure and in support services of agricultural research and extension. The returns on physical infrastructure—canals for irrigation, roads and railways for transport—are usually high since they increase the net returns on the production and marketing of agricultural products. The multiplier (secondary) effects of a well-developed and well-maintained transport and communications system are also substantial [World Bank (1994a)]. Similarly, investment in rural education and health care has high returns, provided the quality of output is good. Effective agricultural research and extension services, provided by the public and private sectors, also have a significant impact since they introduce new production technologies that increase productivity and incomes. These infrastructural inputs and services tend to complement their positive effects on the agriculture sector and the rural economy. The cumulative direct and indirect effects strengthen the linkages between sectors in the overall economy.

The contrast between China and Sub-Saharan African countries with regard to the development of rural infrastructure and agricultural support services is quite revealing. For one thing, a much higher proportion of the GDP in China than in Sub-Saharan Africa has been saved and invested for decades and the trend has been rising for the former and declining for the latter.

	Saving		Investment	
	1970	1992	1970	1992
Sub-Saharan Africa	18	15	20	16
China	28	39	27	36

The data on public and private investment in building the rural physical and social infrastructure are either scanty or unavailable. A general impression is that in Sub-Saharan Africa the levels of investment and the returns on these investments have been significantly lower than in Asian countries, including China. It is also acknowledged that the density of roads and railways and the quality of transport

infrastructure are lower in most Sub-Saharan African countries than in China [World Bank (1989) and (1994a)]. Comparative data on investment in rural health and education, and on the quality of these services, are not available.

The development of the irrigation infrastructure and the supply of new technologies, based on agricultural research and transmitted through extension services, are normally undertaken by the public sector in most developing countries. Governments in many countries also spend substantial funds out of their budgets on the subsidies for credit and agricultural inputs as incentives for farmers. A consistent set of data for government spending on these activities are not available for many countries. However, the best estimates of the share of agriculture (including water development) in total government spending in Sub-Saharan Africa and China in the last two decades show significant disparities.

	Spending on Agriculture as Percent of Total Government Spending					
	1970	1975	1980	1985	1988	1991
Sub-Saharan Africa	–	7.3	7.1	6.4	7.5	–
China	7.6	12.1	12.4	8.3	–	8.2

The basic indicators of water development in China show rapid progress during the Maoist period. The irrigated area increased rapidly in the 1950s and 1960s, with locally organised small-scale projects and publicly funded construction of large-scale surface structures. Tubewell development in the late 1960s and 1970s supplemented these investments. Similarly, the flood control and drainage efforts were significant. These incentives contributed to the expansion of high-yielding varieties (HYVs) of wheat, rice, and corn. In the post-Maoist period, the growth of irrigated area stagnated, as did the proportion of pumping facilities, for a decade. The immediate causes were contraction in public spending on new construction; inability of the local governments to fill the gap; and institutional changes—replacement of communes by HRS—making the renovation and management of the infrastructure more difficult. In view of the negative impact of the decline in irrigation and irrigated area on multiple cropping and yield levels, the provincial and local governments started to mobilised funds and people in 1987 to construct, restore, and renovate the irrigation system [Stone (1993)].

Africa has limited irrigation, which tends to act as a major constraint on the introduction of new technologies and inputs. However, there is substantial potential for irrigation, drainage, and water storage in many countries which have predominantly arid and semi-arid conditions. Many irrigation schemes in Africa

have tended to be extremely expensive by world standards. Often the government agencies maintaining the irrigation systems are underfunded and perform no better than other parastatals. Generally, the large-scale schemes have been more poorly designed, constructed, maintained, and operated than the small-scale schemes. Less complex, small-scale irrigation schemes, run by individuals or communities, appear to be more productive and viable [Cleaver (1993)].

China's experience with the introduction of HYVs and use of water and fertiliser during the Maoist period was quite impressive. In the 1950s, the government undertook ambitious and basically well-oriented programmes to import desirable varieties from abroad and selective local cultivars for rapid dissemination and it set up a national network for breeding, testing, producing, and diffusing HYVs. During the 1960s and 1970, in spite of the excesses and unconventional management practices associated with the Cultural Revolution, the system for breeding, local testing, and adaptation became well-established and dispersed throughout China. The post-Maoist period inherited a highly developed, broadly-based research system for providing and extending a stream of increasingly productive varieties of major food crops (wheat, rice, and corn).

The agricultural extension system in China operated quite effectively until the reforms of the early 1980s. The service was undertaken by a handful of agriculturists together with the peasants employed as agricultural technicians assigned to specialised stations to carry out verification trials, demonstrations, and training of farmers working in the production teams under the commune system. Decollectivisation has posed problems for the extension system: the shift from a top-down model—linked through the commune system—to a client-oriented model—linked to the HRS—has been difficult. A major difficulty has been the reduced funding to both research and extension services since the early 1980s. coordination between extension and input supplies has broken down and the links between education, research, and extension have become weaker.<sup>17</sup>

Most of the modest agricultural growth in Sub-Saharan African countries has been contributed by the expansion of cultivated area on which the increasing agricultural population has used traditional methods of production. There has been some expansion of irrigation (e.g., in Sudan, Nigeria, Somalia, Swaziland, and Madagascar), but the use of fertiliser has remained remarkably low. The Green Revolution has not come to Africa. There have been major constraints on the demand for and the supply of improved agricultural technologies. On the demand side, the constraints have been bad macroeconomic and pricing policies, shifting cultivation, poor soil and water conditions, inadequate financial resources to buy the needed inputs, and poor infrastructure linking the farms to the markets.

<sup>17</sup>Accounts of the recent problems in China are given by Johnson (1990); Lin (1994) and Stone (1993). The government has started a major reorganisation of the research and extension services.

On the supply side, a scrutiny of successful innovations in Africa shows them to have been taken up in relatively narrow areas, suggesting the importance of adaptation to specific situations [Smith *et al.* (1994)]. Until the 1960s, the primary emphasis of the modest agricultural research systems was on export crops. In the 1970s, the emphasis shifted to food crops. The national agricultural research centres—based mainly on donor assistance—were established in the 1980s. In recent studies, it has been found that the research institutes are poorly funded, contain research programmes with little relevance to agricultural needs, and do not collaborate with one another [Cleaver (1993)]. The agricultural extension services in Africa are run by the public sector, usually as a large but ineffective agricultural bureaucracy. The donor-assisted experiments on agricultural extension in Africa through commodity projects and programmes in the 1960s and 1970s were likewise major failures. They were not responsive to the specific needs of farmers. Effective extension services have made a difference in some situations, e.g., public sector extension services for hybrid corn in Kenya and Zimbabwe, cotton in West Africa, and soil conservation in Burkina Faso; and private companies extension services for tea, rubber, and tobacco in Kenya, the Ivory Coast, and Zimbabwe. The training and visit (T&V) extension system recently established in 27 African countries is supposed to overcome the constraints on transferring productive and profitable technologies to farmers.<sup>18</sup>

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<sup>18</sup>Studies of the T&V system in Kenya and Burkina Faso have shown that it is a more effective approach to transfer new technologies to farmers [Cleaver (1993)].

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## Comments

### 1.

Professor Mahmood Khan has excellently portrayed the contrasting performance of agriculture in Sub-Saharan Africa and China. His explanations of the former's poor performance as against the robust agricultural growth in China are also borne out by evidence contained in various World Bank reports, some of which are cited by the author and in publications elsewhere. The recently published UNCTAD's LDC 1995 Report also endorses Professor Khan's explanations, which run in terms of differences in resource endowments, structural conditions, evolution of institutions and policies, private and public investments in infrastructure, and development of support services between the two regions. There is hardly any scope for disagreement on these issues. Africa suffered chronic disadvantages in all these areas which constrained the growth not merely of the region's agriculture, but of manufacture and other activities as well.

What is, however, most striking in Professor Khan's paper is that he has tried to draw a comparison between the incomparables. China's vast continental size, large population, high resource endowment, and long years of relative political stability do not leave much scope for making any meaningful comparison between her and Sub-Saharan Africa, which is dissimilar in every imaginable aspect. In Sub-Saharan Africa, 32 out of the 46 countries are least developed with very fragile economies. There are also countries with large geographical areas (Ethiopia, Chad, Zaire, Mali, Niger, Sudan, Mauritania, and Angola) as there are countries of very small size. There are again populous economies (Nigeria, Ethiopia, Tanzania, Zaire, Sudan, and Kenya), as there are countries with very small populations such as Guinea-Bissau, Comoros, Djibouti, Equatorial Guinea, Gambia, and Sao Tomé and Príncipe. Thus, even within Africa there are glaring disparities for which a meaningful deduction is difficult to make. Each country has its own distinct problems and inherent weaknesses for which solutions have to be found to suit their own conditions. Policy actions that have been ideal for China can hardly be replicated to Africa, not even to those places that are relatively better endowed with resources.

While the root causes of Africa's poor agricultural performance have been aptly diagnosed in Professor Khan's paper, no remedy or appropriate line of action to overcome these ills is suggested therein. Appropriate solutions to Africa's manifold problems are not easy to find, but the paper could at least provide some guidelines or a direction for policy in the area. African economies have heterogeneous problems, and even though most of these countries adopted reform measures, such reforms were not always designed to suit their conditions and hence have failed to lift the structural constraints facing these countries. Severe political conflicts, civil strife, large-scale displacements of populations, and a breakdown of the system of governance resulted in output loss in all sectors and impoverished the people (e.g., Rwanda, Liberia, Somalia

ad Sudan). Unless these problems are solved, economic reform can hardly activate the development process of these countries.

Not all African countries are, however, strife-torn, but unfavourable natural factors affected agricultural production in many of these countries, particularly in those where rain-fed agriculture is the most important sector. The poor production performance has been matched almost equally by their disappointing export performance, a consequence of sharply declining international prices of major agricultural commodities. A way out of this could be to undertake product diversification to increase the production of high value-added, income-elastic exports of agricultural products. Unfortunately, diversification, as is being currently tried by some countries, such as Benin, Madagascar, Sierra Leone, Ethiopia, Lesotho, Uganda, Tanzania and Mozambique, is constrained by the lack of skills and investment resources as well as difficulties to penetrate export markets.

It is unfortunate, as the author has rightly observed, that the Green Revolution technologies have largely bypassed Africa, although the adoption of new technologies has contributed significantly to agricultural growth in many Asian countries. A notable example is Bangladesh, which has achieved near self-sufficiency in food through a widespread use of HYVs of rice, improved farming and irrigation methods, and more efficient application of fertilisers.

With appropriate policies, it is not difficult to achieve a 2-3 percent growth in agricultural production, as evidence of successful regions and countries elsewhere indicates. These policies include satisfactory producer prices, high-yielding technologies, improved marketing, more effective research and extension, and bigger investments in infrastructure.

African countries need to increase both agricultural production and productivity. While more arable land and cropping intensity will raise crop production, additional factors such as the adoption of yield-increasing technology, the intensification of production through irrigation, and increased use of chemical fertilisers can bring about a significant increase in food production. African countries have made very little use of these, and hence there is little fear of adverse environmental effects.

Attributing much of Africa's poor agricultural performance to price distortions and inefficient price interventions that discriminated against agriculture, the author casually refers to the need for appropriate agricultural price reforms aiming at restoring producer incentives. Such reforms, however, are concerned not only with raising prices of agricultural output but also with removing producer support, e.g., subsidies for fertilisers and credit. The latter have the effect of raising the production cost and hence offsetting the incentives provided to output. There is a long-drawn controversy about the continuation or withdrawal of subsidies but a general conclusion is that correcting relative prices through structural adjustment

measures is in conflict with the objective of increasing agricultural output and exports. In fact, price incentives cannot raise supply elasticities for long unless these are accompanied by non-price complementary measures to improve capabilities in the areas of research, extension service, marketing, storage, transport, etc.

Africa's agricultural problems are too complex to be solved by a single stroke. The major thrust should be on creating an infrastructure and a policy environment that would allow increased production in those commodities in which the countries have a comparative advantage. There is also the need to strengthen the capacity of national agricultural research systems. Regional cooperation among national research institutes should be promoted so that they can develop or adapt the technologies that Africa needs. Environmental concerns should also be duly addressed by adopting strategies such as those for soil conservation and reforestation.

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## 2.

The current big success story in development is China, while the continuing failure is Sub-Saharan Africa. Mahmood Hasan Khan provides a wealth of data and interpretation that is valuable to understanding what can or cannot be done to achieve accelerated growth, and what the principal hurdles will be in getting Sub-Saharan Africa onto a sustained, sustainable growth path. The paper is clear that the purpose is to minister to Africa. But, the paper has a potential value to Pakistan as well, lying as it does between the striking success of China and the tragic failure of Africa. These remarks address that potential.

China's current success follows a three decades-long period of secular stagnation, marked by alternating periods of major setbacks and recovery. At the time, many China experts as well as the more general public saw the great leap forward and the cultural revolution as innovative approaches to development that were succeeding and should be emulated. That long period was associated with general euphoria about China's development—euphoria that could be supported only by taking the sum of discrete periods of recovery from sharp decline as sustained growth. But, the average growth rate in agriculture for the period from the post-recovery point of the mid-1950s to the end of the 1970s was less than that of South Asian countries. Thus, one should be permitted a bit of cynicism as to whether the current surge is real and sustainable.

However, unlike the earlier recoveries, this one has already far surpassed previous peaks, and shows no sign of losing steam. And, unlike earlier periods, the statistics on growth, consumption, shifts in consumption patterns, and trade all seem fully consistent with each other.

Since 1980, as the author shows, agricultural output grew at 2.9 percent per capita of the total population. It is a substantial rate of growth per capita that tells us that agriculture is playing an important role in the economic transformation through its direct and indirect effects. For Pakistan to do comparably well, given its high population growth rate, would require about a 5.5 percent overall growth rate in agriculture—a rate achieved by Pakistan in the past, but far above the current level.

The deterioration of Pakistan's agricultural growth since the mid 1980s was initially masked by an extraordinarily high growth rate in cotton (and to some extent livestock and horticulture), but all the other major commodities were declining in growth rate, generally to less than the population growth rate. It was only a matter of time before the cotton growth rate declined to more nearly normal levels (to say nothing of ceasing entirely for a period) and thereby unmasked the poor growth in the bulk of agriculture. To emulate China, Pakistan's agriculture and its major component parts must be put back on the growth path.

One other strong feature of China's growth comes out of the paper. Agriculture has had strong multipliers on other elements of the rural sector in China. Thus, 54 percent of the rural value-added is in the non-agricultural sector, and that

represents 25 percent of the national product. Over half of all value-added is in the rural sector. Punjab has had a similar experience; but with the slowing of agriculture, its stimulus on other sectors will also slow down, and is indeed beginning to slow down. Agriculture's strong positive multipliers also have their down side.

What have been the major sources of the current high growth rates in China's agriculture? Credit is now given largely to the economic liberalisation and the return of farmer incentives. But, it is important to realise that agriculture has sprung forward with those critical changes because other factors had already been taken care of. It is also well to recognise that after a long period of stagnation agriculture was ripe for a period of greatly accelerated "catch-up growth" as the missed opportunities accumulated over decades were suddenly availed of.

The favourable features established over the preceding decades were: (1) an egalitarian rural social structure that facilitated the development of local government and community action; (2) a high level of education, with essentially all of the rural population in the early working ages literate, and many with intermediate-level education; (3) an excellent system of village-to-market roads and other physical infrastructure, including rural electrification and telephones; (4) an effective agricultural research system with its complements of direct farmer contact and good basic research; (5) and, most important to the early surge of output, a massive increase in fertiliser availability from the huge investments of the 1970s. Indeed, increased fertiliser supply accounts for a good half of the increased agricultural output in the recent surge of agricultural growth. In that context, liberalisation released enormous rural energy. A small aside: with land area so limited and yields already high, and a previously enforced subsistence mentality, growth in the recent past has depended substantially on the shift in composition of agricultural output to high-value horticulture and livestock.

Africa is of course deficient in all these elements, although many African countries are now making investments in education at a far higher level and with better results than in Pakistan. Pakistan is intermediate on most of the factors that led to success in China. What are the issues for Pakistan?

It is not reasonable to think of Pakistan achieving the degree of rural equality achieved by China, nor the means chosen. But, one should ask: How does inequality in income and power in rural Pakistan impede the development of essential community organisation and action, and what ameliorative steps are needed to solve the problem at least to the point of proceeding with rapid growth?

Of course, the lesson of the need for massive rural infrastructure investment is clear and needs to be emulated. Rural education too is widely understood to be the Achilles' heel of Pakistan's development. The Pakistan research/extension system does not seem poor relative to the general standards of developing countries, but to match China it needs to move upstream to more basic research (e.g., a strong

virology capacity to deal with problems such as the current cotton virus crisis), and it needs to move closer to the farmer for feedback and improved research. Pakistan has a special problem, generally not faced by China, of water allocations and quality. That requires institutional changes for which China provides only a portion of the answer. These few areas, requiring a major change in investment and institutional structures, are in total a large task, not easily carried out. A sense of strategy and commitment to rural growth are essential to succeeding at such large tasks.

One can learn from China. The basis for much of the lesson is in this paper, aimed at Africa but capable of hitting the Pakistan target as well. But implementation is complex, and requires commitment and priority.

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