

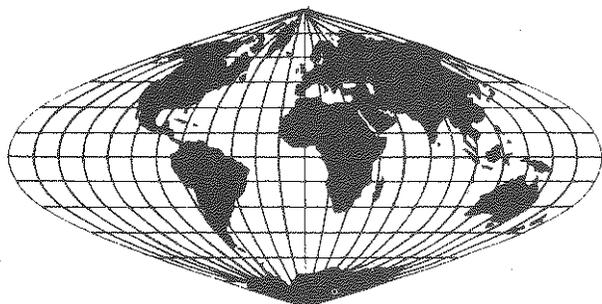
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# CORNELL/INTERNATIONAL AGRICULTURAL ECONOMICS STUDY

**A BRIEF OVERVIEW OF MAJOR  
DEVELOPMENTS AND FUTURE  
PROSPECTS FOR THE CHINESE  
AGRICULTURAL ECONOMY**

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A Brief Overview of Major Developments and Future Prospects for the Chinese Agricultural Economy.\*

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In this essay we present both an overview of the history of the Chinese agricultural economy since 1949, and discuss recent developments in the rural areas and their possible impact on social organization, agricultural production, rural employment opportunities, and rural income and consumption patterns.

In the first part of this paper we summarize the process of communalization initiated in 1949 and its impact on agriculture. We briefly look at patterns of growth in agricultural output, and at the use of inputs including labor, fertilizer, machinery and improved varieties. We consider patterns of income and consumption and look at recent Chinese statements that suggest that a significant portion of the rural populace is underfed.

Since 1977 rural China has been experiencing a number of rather important changes. Serious commitments to agriculture through the implementation of new policies designed to foster rapid growth in rural productivity have raised the expectations of the Chinese government and many Western scholars. While reviewing the current status in the rural areas of the three issues - social organization, agricultural productivity and employment, income and consumption - we discuss some of the possible prospects for the future. Finally, we emphasize that the Chinese model of agricultural development, although not wholly transferable, can certainly provide useful insights for other developing countries.

#### The Setting

Chinese agriculture, developed over a period of several centuries under conditions of land resource constraint and labor surplus, had reached a high state of technical development by the nineteenth century. The technological advances made throughout this period permitted a long-term growth in agricultural output that was approximately equal to concurrent population growth. Notwithstanding crop failures resulting from the vagaries of weather, by all accounts pre-modern Chinese farms were remarkably productive on a per hectare basis.<sup>1/</sup> However, despite relatively high yields, there is no indication of a significant gain in agricultural productivity as measured by the ratio of output to population.

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By the mid-20th century China had exhausted most of the possibilities for further sustained agricultural growth using traditional inputs. Since the man-land ratio was high, the law of diminishing returns limited the productivity of additional laborers. With the exception of the Northeast, Chinese farmers were already exploiting all the cultivatable land that it was economically feasible to use. In Southern and Eastern China the cropping index exceeded 150. Further increases in agricultural output were dependent to a large degree on the injection of modern inputs, such as chemical fertilizers, cement, machinery, etc. produced by the non-agricultural sector. At the turn of the century, China, with a primarily agrarian economy, lacked the underpinnings necessary to rapidly develop such industries.

By contrast, Japan was gradually developing an agricultural support system whose primary components included: 1) a formal agricultural research system, 2) an industrial sector with the capacity to produce agricultural inputs, and 3) a transportation network to allow the easy movement of inputs to rural areas. In the 1920s Japan exported this successful system to its East Asian colonies Korea and Taiwan. China shared a long history of population pressure on the land with Japan, Korea and Taiwan, but it lacked the political or economic power to follow the model suggested by its neighbors. Although efforts were made under Republican rule to develop an agricultural research system, political disunity and constant conditions of war seriously disrupted such work. The industrial sector, except Manchuria, which was developed and controlled by the Japanese from the late 1930s, consisted largely of consumer goods industries and was grossly ill-equipped to produce agricultural inputs. Transportation networks, constrained by the vast and rugged Chinese terrain, were primitive and deficient. Although agricultural production continued to grow slowly throughout the first half of the century, output only fed the populace at or near the subsistence level. Any surpluses that did exist were appropriated by the landed gentry and the state, leaving little for increased consumption or for development purposes.

In 1949 China found itself in a unique position with regard to agricultural development. It shared the common problems of population pressure with East Asia, and underdevelopment with South and Southeast Asia. However, although East Asia was able to depend on a proven agricultural support system and South and Southeast Asia were able to both expand cultivated area and intensify use of traditional inputs to increase agricultural output, China did not have such clear options. In spite of the fact that the scope for increases through the use of traditional inputs was essentially exhausted, improvements were urgently needed just to avoid a deterioration in per capita production and in the already low standard of living. Although China might have imported modern inputs to fuel increases in production, problems of size and scale made this option impossible. Imported agricultural technology, an additional possibility, requires adaptive research, and, as we have noted, China lacked an established research system. When the communists came to power they initially tried to increase output through the use of traditional inputs in combination with significant social reorganization that allowed them to efficiently mobilize peasant labor.

## The Collectivization of Agriculture

A series of major institutional changes, culminating in the collectivization of agriculture, reshaped the basic structure of the rural economy after liberation. These institutional changes were designed to promote the goals of equality, growth, and industrialization.<sup>2/</sup> However, political debate as to the most appropriate institutional structure necessary to promote these goals has led to continuing institutional modifications. Two related issues in this debate have been the degree of priority awarded to agriculture over industry, and the degree of freedom allowed peasants in production decisions.

During land reform (1950-1952) the government effectively destroyed the power of the rural elite by seizing their land and redistributing it to landless families. However, the lack of capital and agricultural inputs still continued to retard efforts to improve productivity. At first collectivization proceeded slowly, but in 1958 with the onset of the Great Leap Forward, all peasants were rapidly reorganized into the now familiar commune, brigade, and production team structure. This radical departure from the traditional social system initially resulted in a loss of producer incentives evident in the sharp drops in agricultural production during the Great Leap Forward from 1958-1960. Severe weather deficiencies aggravated the situation even further. Subsequently, the government substantially modified commune structure through the restoration of some decision-making power to lower levels, and by dropping the accounting level for the sharing of profits to the production team.

Despite rapid collectivization in the 1950s, not all cultivated area was absorbed. Approximately 5 percent was retained by individual families (depending on the area) for private use. The private sector specializes in the intensive production of highly valued vegetable and meat products. For most families income from the private plot supplies 20 percent or more of total annual income.

Following liberation in 1949, the government, in the absence of modern inputs from the underdeveloped industrial sector, substituted surplus labor mobilized under the commune structure for capital investment in agriculture (e.g. irrigation development, land improvement and organic fertilizer production). Efforts were made using indigenous resources to develop small-scale rural industries to produce key agricultural inputs such as chemical fertilizer and cement. During this period (1957-1975) China's farm sector was able to absorb nearly 100 million new workers, amounting to an increase of 40 percent in the agricultural labor force. Despite this,<sup>3/</sup> the annual labor input per worker also rose by at least 40 percent.

There was clearly an immediate high payoff after 1949 for the mobilization of labor to increase multiple cropping activities, to gather and process organic fertilizer, and to improve irrigation and flood control facilities. However, after three decades it is apparent that the marginal productivity for capital investment in agriculture has fallen relative to the profitability of labor in public and private sideline activities. This, together with

the short supply of vegetables, fruits and livestock products, are among the underlying reasons explaining the current interest in creating a somewhat more flexible rural commune structure with greater private and small group initiative in decision making.

Since 1949 the state's relationship with the rural areas has been essentially extractive in nature, with the collective structure functioning as a convenient link between the state and the peasants. Grain production was emphasized, and surplus grain was removed through taxes and quotas at unfavorable producer prices. Although the state encouraged the rapid development of rural areas, it urged the use of local resources and made only limited direct investments. Some have argued that collectivization led to the "exploitation" of agriculture for industrial development. It should be noted, however, that an industrial bias has been characteristic of the policies of most developing countries, whether communist or non-communist, and in fact is a necessary prerequisite for the development of an industrial base.

### Modernizing Agricultural Production

Chinese agriculture can scarcely be viewed as modern by Western standards, yet the three decades since 1949 have been a period of rapid modernization. We begin by reviewing gains in grain output made during this period, and then examine the process through which modernization has taken place.

Quantitatively measuring the performance of Chinese agriculture, and grain production in particular, is a difficult task. Although statistical material for the periods 1949-1957 and 1976-1982 is quite complete, the intervening Great Leap Forward and Cultural Revolution periods saw a rapid decline in the collection and publication of all agricultural statistics. Recent publications, such as Zhongguo Nongye Nianjian (Chinese Agricultural Yearbook) (1980) and Zhongguo Jingji Nianjian (Chinese Economic Yearbook) (1981), have in many cases provided complete series for most important indicators, but only at the national level.<sup>4/</sup> Thus, it is difficult to make assessments of regional differences in performance.

For the period 1957 to 1979 grain production in China increased at an annual rate of about 2.5 percent, and total agricultural output grew somewhat more rapidly. These growth rates are very consistent with those achieved for India, or for the developing countries of South and Southeast Asia. However, there is a considerable variation in performance among Chinese regions, just as in Indian regions.

Broadly speaking we can say that North and Central China grew more rapidly than South and West China, that non rice areas grew more rapidly than rice regions, and that the areas of better soil and water conditions grew more rapidly than the marginal agricultural areas. Of course there are major variations both among and within regions. Growth in grain output was most rapid in Northeast China (the former Manchuria) where cultivated area expanded rapidly and hybrid corn varieties were substituted for lower yielding millets, sorghum, and soybeans, and in North China (the North Central Plain), due principally to the expansion of tubewell irrigation and the use

of improved varieties of wheat. Yield level and rates of growth in North China have been comparable to those in North India. By contrast in South China, where rice is the primary crop, between 1957 and 1979 grain production grew at less than 2 percent, despite the widespread adoption of modern, fertilizer-responsive, semi-dwarf varieties of rice.

The introduction of modern inputs has taken many forms. Pumps replaced hand-powered irrigation lifts to improve efficiency in irrigation and drainage; mechanical threshers saved labor at harvest time; and chemical fertilizers in combination with organic fertilizers raised yields. These and many other inputs were produced by small-scale rural industries. Rural industries have a mixed record in terms of economic efficiency, but nonetheless played a vital role in agricultural and rural development. Lacking the capacity to build modern plants for the production of fertilizer, cement, iron, steel, farm machinery, and electricity and to deliver the final product to the farmer, China adopted technologies that, although inefficient by Western standards, seemed appropriate to its particular conditions.

Growth in agricultural production has been accompanied, not only by the increasing use of modern inputs, but also, as mentioned, by a significant decline in the gross value of output per man-year. Also, total productivity, as measured by the ratio of total agricultural output to total inputs, has probably declined.<sup>5/</sup> Slow gain in factor productivity notwithstanding, there has been substantial technological progress. It is evident that any developing country committed to full employment of surplus labor and achievement of an annual growth in output of 2 to 3 percent, cannot initially expect to achieve a significant growth in total factor productivity. Free market economies might be expected to register more rapid growth in productivity at the expense of a higher level of under- and unemployed in the economy.

The development and dissemination of biological technology in agriculture depends to a large degree on state investment in agricultural research and extension. This is true for both free market and centrally planned economies. It is difficult to judge the capacity of the Chinese research and extension system. As in most other developing countries, there appears to be a lack of trained professional researchers, particularly at the sophisticated levels. Nevertheless, the low level, applied research-extension system seems vastly superior to that of other developing countries. The so-called "four level research network-county, commune, brigade, and production team" has potential for rapidly extending new technologies to the local level. However, there have been several instances where political pressure, or commandism, forced the adoption of inappropriate technologies.

Despite the occasional undermining of scientific research, particularly during the Cultural Revolution period, China has succeeded in developing and disseminating modern varieties of rice, wheat, and corn with yield potentials similar to those developed at the international agricultural research centers (International Rice Research Institute, [IRRI] and Centro Internacional de Mejoramiento de Maiz y Trigo, [CIMMYT]). In 1977 China

announced the release of the first F<sup>1</sup> hybrid rice variety ever to be produced, a significant scientific achievement. Since China's agricultural development depends greatly on its capacity to generate new agricultural technology, the question remains: what are the long-term effects of the Cultural Revolution on agricultural research and how long will it take to overcome these effects?

### Income and Consumption

Statistics for income and consumption are even more difficult to obtain than for production. Basic production figures give us some guidelines as to how much food was available, but tell us nothing about the distribution of food grains among regions or between rural and urban areas. There seems to be considerable difference of opinion as to the relative degree of equity achieved. One view is that China has basically solved its food problem, not through extraordinary production gains, but by a more equitable distribution of what is already produced. This view was quite widely held prior to Mao's death. An alternative, but increasingly popular opinion, is that a significant portion of the population subsists on a substandard diet, "below the poverty line." In making this reassessment of the situation Western scholars have certainly been influenced by the recent Chinese policy statements that emphasize the inequity in consumption patterns and the failures of past decades.

By all accounts the gross value of agricultural output between 1957 and 1978 increased slightly faster than population growth in the rural areas. The State Statistical Bureau estimated that average per capita rural income was 170 yuan (\$100) (1980). Average urban incomes tend to be much higher. A one - to three-fold differential between rural and urban incomes is the oft-quoted figure, and it may be higher still in some areas. With divergent growth rates of agricultural output and uneven access to factor-endowments, as well as to urban markets, there are large income differences between and within communes, and even within teams.

The much publicized CCP Central Committee acknowledgement of 1977 (deleted in the revised versions of the same document) that "more than 100 million people in rural areas suffered from lack of grain," reinforced the idea that significant distributional problems still exist. The consensus seems to be that total average caloric consumption was probably not greatly different in 1978 than it was in 1957, although recent gains in production and the enactment of more liberal policies in the rural areas have raised average consumption levels. However, many many observers believe that the distribution of food grains has been more equitable in China than in India and other developing countries of South and Southeast Asia, although as indicated by the official statement above, regional variations still exist.

The Chinese government is well aware of rural inequity. Recently it divided production teams into three broad categories based largely on per capita income.<sup>6/</sup> About one third of the production teams are described as well run, with per capita incomes above the subsistence level of 120 yuan (\$70). Incomes (including sidelines) total 400-500 yuan or higher in some locations. Another one third of the productions are not as wealthy, but possess the fixed assets, including farm machinery, irrigation systems, and some industrial capacity needed for further development. The remaining third of the production teams are marginal. Average annual per capita income is only 60 yuan, well below the subsistence level of 120 yuan.

An important reason for depressed consumption overall has been the high rate of savings and investment. Rural savings have been utilized to develop small-scale industries and services such as health care and educational facilities. As much of the capital construction was achieved through the mobilization of labor, whose opportunity cost is not easy to ascertain in a labor surplus economy, the exact magnitude of the total investment continues to be a matter of debate. We can say that rural investment in China has been rather high in comparison to that of other developing countries. At the same time however, there seems to have been an underinvestment in agriculture by the central government, and hence a lack of much needed industrial inputs.

Another important aspect of the income and consumption pattern has been population growth. Here again a lack of reliable data makes it difficult to analyze the situation. However, it is clear that the rate of population growth has been gradually pushed down over the past decade from more than 2 percent, to close to 1 percent. The present leadership regards this as too high and has called for zero population growth by the year 2000. Strong rewards and sanctions have been imposed to enforce the concept of the one or two child family, and the program appears to be meeting with considerable success, even in the rural areas where there are strong incentives for larger families.

#### Recent Policy Changes in Agriculture

Recently Chinese policymakers have announced the institution of new policies that they hope will raise agricultural output and increase productivity through the use of material incentives. At the same time they have verbally reiterated their basic commitment to "agricultural first." These policy initiatives seem to have brought the Chinese development model closer to that favored by most Western capitalist economists. As a result, many Western scholars have been rather uncritically enthusiastic about the possible outcome, while rejecting the past as a period of mistaken policy directions and of neglect of economic considerations. While the question of how successful the new policies will be in accelerating agricultural production and in raising the living standard is important, we believe that the new policy direction is not as radically different as some think. Rather, the policies are part of the continuous evolution of the development of Chinese agriculture. As such the policies will certainly have an impact, but perhaps not as

large as that currently hoped for. We focus our discussion around recent changes in China's rural areas under the broad headings social organization, agricultural production and employment, income and consumption. We also review future prospects based on current developments.

### Social Reorganization

The communists radically restructured rural social institutions to develop equality in the countryside, to promote increases in agricultural production, and to efficiently gather and use capital and labor for the development of a rural industrial sector.<sup>7</sup> Since 1949 there has been an ongoing conflict between stress on equality and stress on productivity. A central issue has been the role of the commune, brigade, production team, and family in agricultural decision making and in the sharing of income. The left wing of the communist party tended to designate greater authority to the commune and the brigade. But, with the end of the Cultural Revolution period and the shift in agricultural policies at the end of the 1970s, decision-making responsibility and income sharing have increasingly been delegated to the lower levels.

At present several forms of the "responsibility system" are being experimented with throughout China.<sup>8</sup> Under the "responsibility system" teams, families or individuals contract with the state to produce a certain quantity of goods on a piece of communal land. However, collective ownership of farmland is certain to continue as China seeks to develop a more efficient organization of local production and management systems.

Will there be radical changes in social organization and rural institutions in the future? Since the end of the Cultural Revolution period the tides of political and economic pressure appear to have been flowing in the same direction. As mentioned previously, the rising profitability of private and side-line activities, the development of transportation and industry to serve the needs of agriculture, and the desire to move away from a policy of local self-reliance in food production have all begun to exert pressure on existing rural institutions. Older institutions, such as People's Communes, may begin to obstruct, rather than encourage progress. For example, policies that emphasize local decision making and a greater degree of personal freedom may also lead to some relaxation of laws that restrict rural-urban migration. However, adequate urban employment opportunities could not be easily created to match an unrestricted population flow. Obviously Chinese decision makers must move slowly when considering policy changes.

It seems almost certain that rural institutions will undergo some changes. How radical or pervasive these changes will be is difficult to predict as China still seems to be in an experimental mood. The lack of unity and decisiveness in recent policy decisions may be a healthy sign that old solutions, no matter how successful in the past,

may not be entirely appropriate for the future. For a country as large and diverse as China different regional patterns of rural organization may be completely consistent with political, economic, and social realities.

### Effects on Agricultural Production

Given China's land resource constraints and the disparate topography and climate, as well as the already high use of premodern inputs, the attainment of an overall growth rate of agricultural production of 2.5 percent between 1957 and 1979 has been a remarkable achievement. Despite this favorable growth record, the efficiency of agricultural production, measured by growth in output relative to growth in inputs, has been declining. Whether this has been due to the process of collectivization itself, the mismanagement of agricultural resources, or the limits imposed by diminishing returns on an already highly developed land base is a matter of open debate among scholars.

Will the new policy directions lead to greater efficiency in agricultural production? Several observers see great scope for improvement in agricultural productivity through policy changes and modifications in the organization and management of agricultural resources.<sup>9/</sup> However, the related question of the relative importance of continued technical improvement remains to be answered. Concern has been expressed that severe resource constraints, coupled with setbacks in agricultural research and technology development associated with the Cultural Revolution,<sup>10/</sup> could seriously limit future growth in agricultural productivity. Because of continuing reassessment on the part of the Chinese, it is still virtually impossible to evaluate the magnitude and impact of those policy changes that have been implemented. However, the Chinese press reports a favorable response in the rural areas.

### Prospects for Employment, Income and Consumption

It is commonly agreed that collectivization and the rural industrialization facilitated by it have enabled China to intensively use both its land and labor resources. Intensification of cropping practices, sometimes pushed beyond economically feasible limits, adoption of labor-using plant and animal products, and extensive farm land construction campaigns led to massive absorption of labor. Admittedly, underemployment is still prevalent in the rural areas, but outright unemployment is largely absent. Consequently, labor productivity has declined steadily since 1952, and is likely to continue to decline in the decade ahead as more people join the work force.

The commune system of work-related income distribution, widespread employment, ensured access to minimum food requirements regardless of ability to pay, and relatively low prices of basic consumer necessities, has meant that, even at low levels of income and consumption, health standards and expectation of life are high compared to other developing

countries. However, despite greater equity within communes, regional and rural-urban disparities in production, income and consumption are still similar to those found in other developing Asian countries.

What will be the nature of change in rural employment, income, and consumption? There are two essential aspects of this question: Will the overall level improve? Will the distribution be more or less equitable than in the past?

The most encouraging sign for overall improvement relates to the aggressive stance the government has taken towards population control policy. As we mentioned, government policy to restrict the size of families to one or two children is apparently having an effect, even in the rural areas where there are still strong incentives for large families. In spite of these population control measures, employment problems will continue for more than a decade as children born prior to the 1980s enter the labor force.

Ultimately, a reduction in population growth, coupled with rising incomes, will lead to demands for a more varied diet. Increased diversification and specialization of agriculture should help meet some of these rising consumer demands. However, the government may also have to resort to an even greater use of the world market, to both fulfill consumer expectations, and make more efficient use of agricultural resources. Under current policies China seems to be willing to continue importing large quantities of grain to meet the urban demand and to make up deficits resulting from crop failures caused by unfavorable weather.<sup>11/</sup> As a result, balance of payment will continue to be a serious constraint. At least in the foreseeable future, imports of grain for animal feed will not rise significantly.

Policies designed to increase the efficiency of agricultural resource use by allowing an economically more rational pattern of resource allocation and commodity production should reduce income disparities among regions, although those areas with low quality land and overcrowding will still have to rely on government assistance to raise their living standards. Policies that are designed to give more decision-making authority to teams or private households, such as the "responsibility systems" currently in use, are likely to increase income differentials locally as well as between regions. Just how far such policies will be pushed is difficult to say. Occasional weather related short falls in agricultural production could create a more conservative mood in policy planning, leading to reinforcement of production targets to ensure adequate grain supplies and avoid excessive dependence on imports. However, underlying economic forces are likely to continue to bring pressures for policy change over the longer run.

## Lessons from the Chinese Experience

What are the lessons to be learned from the Chinese experience? Is the Chinese model of development transferable. These are questions frequently raised by those concerned with development. Today the Chinese leadership is asking similar questions. What are the lessons to be learned from the West? How can China catch up?

We have emphasized the unique set of conditions existing in 1949 that set China apart from its more advanced neighbors in East Asia and from the less-developed countries in South and Southeast Asia. Chinese development strategy and institutional reforms bear the mark not only of communist ideology, but also of centuries of cultural and economic development coupled with intense population pressure on the land.

Although it lacked the necessary preconditions for agricultural development, China did achieve some measure of success in increasing agricultural production and improving the distribution of food. Despite the recent suggestions of shortages, its record of supplying basic needs to the entire population has been more impressive than that of most developing countries. The collectivization of agriculture and related institutional reforms that facilitated the mobilization of labor and the creation of small-scale industries, were an integral part of the development strategy.

We have long recognized that institutions, policies, and strategies of development that have proved successful in one country are not readily transferable to another. The recent experience of the "green revolution" has also emphasized that the appropriate choice of technology is determined by the institutional and socioeconomic setting. There is always the danger that the lessons one might draw from another's experience might be the wrong lessons. This fact notwithstanding, it seems reasonable to expect that such risks of error will be more than offset by the benefits derived from the sharing of experience in agricultural development, even more so since the Chinese experience has many unique facets.

In agricultural technology an active program of professional exchange has been underway for about six years. For example, scientists at the International Rice Research Institute in the Philippines are now studying the Chinese technology that produced F<sup>1</sup> hybrid rice. Scientists at the International Potato Center in Peru are analyzing the Chinese technology for producing potatoes from true seed. Chinese scientists in turn are learning more advanced techniques in breeding for insect and disease resistance from these centers. Scientists and scholars on both sides are interested not only in the technology per se, but also in the institutional organization of research and extension that produced this technology.

A seminar was held in 1974 to review the Taiwan experience in agricultural development. In a summary of the discussion "Lessons and Issues in Taiwan's Development" Falcon wrote as follows:

To me the single most impressive aspect of Taiwan agricultural development has been the delicate manner in which agriculture has been provided with labor intensive technology and modern inputs, while at the same time being squeezed heavily in net resource terms (Falcon, 1974).

No one would argue that the PRC's approach to agricultural development is "delicate," and yet the above statement has a great deal of relevance for the Chinese experience. Chinese efforts in the area of labor absorption and mobilization for capital investment deserve special attention by governments confronted with a severe land constraint and a rapidly growing population of landless agricultural laborers.

The development of Chinese agriculture is in the formative stage and events of the recent past are still unclear. A glimpse into the future suggests that the road ahead will be as difficult as that already traveled.

#### FOOTNOTES

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