

# **Accelerating China's Rural Transformation**

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## Abstract

China's rural economic achievements of the past two decades—rapid growth and declining poverty—have been remarkable. However, replicating these achievements and improving sustainability during the next two decades will be difficult as many underlying conditions have changed. Economic reforms were initiated when supply shortages constrained growth, but currently, weak demand is more constraining. Furthermore, the productivity gains are largely exhausted from transition policies and institutions; future productivity gains will come from efficiencies, stimulated by market forces, and improved productivity of scarce water and land resources, through resource conservation and new technologies. The rural-agricultural sector will remain dependent on a robust urban-industrial sector to create jobs and absorb surplus rural and agricultural labor—thereby permitting the remaining farmers access to additional land resources. Several crucial rural institutions need to be fostered—an effective fiscal system, a more efficient financial system, a workable land tenure arrangement with marketable land-use rights, and improved agricultural investment incentives. Continued reform will entail further liberalization of production, pricing and marketing policies and strong government promotion of a market environment and investments in public services and infrastructure.

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## Preface

The primary purpose of this report is to identify and consolidate information on crucial issues that impact on rural development in China. The report, prepared with the assistance of Chinese and non-Chinese scholars and analysts, assesses strategic options from the perspective of efficiency, equitable development and growth.

The authors acknowledge that many reforms in the macroeconomic environment and in other sectors are ongoing and that additional reforms are planned; many of these go beyond the scope of this report. We recognize that concurrent macroeconomic policy and institutional reforms across all key sectors would be unmanageable and destabilizing; therefore, priorities consistent with Government's gradualist reform approach need to be established. Such economy-wide reform priorities and individual reform sequencing are the responsibility of Government, giving due consideration to social stability issues (food security, employment, etc.) that temporarily override economic efficiency criteria, and require "second-best" reform solutions during the transition.

The report is presented in the spirit of assisting government officials and World Bank staff to prioritize policy and institutional reforms and public investment decisions in the rural sector. Also, it is hoped the report will support the Government in defining rural reform priorities and programs for the Tenth Five-Year Plan. As priorities are established, the World Bank is ready to work with government officials to move beyond strategy and help design and prepare the tactical approaches to implement priority rural subsector reforms.

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The report benefits from discussions with staff of various international organizations (International Food Policy Research Institute and Asian Development Bank), international nongovernmental organizations (Ford Foundation), and bilateral agencies (Economic Research Service, United States Department of Agriculture). The report includes ideas generated during discussions and interviews with numerous Chinese and international scholars, particularly those associated with Chinese research institutions. Also, it cites the findings and conclusions contained in a wide selection of literature.

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## Abbreviations and Acronyms

ABC	Agricultural Bank of China
ADBC	Agricultural Development Bank of China
bcm	Billion cubic meters
CAAS	Chinese Academy of Agricultural Science
CASS	Chinese Academy of Social Science
CCAP	Center for Chinese Agricultural Policy
DDT	Dichloro-diphenyl-trichloro-ethane
EPBs	Environmental Protection Bureaus
FAO	Food and Agriculture Organization
FDI	Foreign Direct Investment
FFW	Food for Work
HRS	Household Responsibility System
GDP	Gross Domestic Product
GVAO	Gross Value of Agricultural Output
HRS	Household Responsibility System
IFPRI	International Food Policy Research Institute
IOU	I Owe You
IPM	Integrated Pest Management
IPR	Intellectual Property Right
IRD	Institute of Rural Development
LGPR	Leading Group for Poverty Reduction
MFIs	Microfinance Institutions
MOA	Ministry of Agriculture
MWR	The Ministry of Water Resources
NEPA	National Environmental Protection Agency (now SEPA—State Environmental Protection Agency)
NGO	Nongovernmental Organization
ODA	Overseas Development Assistance
PBC	People's Bank of China
PPP	Purchasing Power Parity
R&D	Research and Development
RCCs	Rural Credit Cooperatives
RCFs	Rural Credit Foundations
RFIs	Rural Finance Institutions
SMEs	Small and Medium Enterprises
SOE	State-Owned Enterprise
SPC	State Planning Commission (now SDPC—State Development Planning Commission)
TFP	Total Factor Productivity
TVEs	Township and Village Enterprises
VAT	Value-Added Tax
WUA	Water User Association
WTO	World Trade Organization



# Executive Summary



In its two decades of reform, China has achieved remarkable agricultural and rural-industrial growth, impressively reduced poverty, and reversed some of the environmental and natural resource degradation. The population growth rate also continues to decline. Since 1978 aggregate gross domestic product (GDP) has grown at an average annual rate of 10 percent; agricultural GDP, at 5.2 percent; and rural industrial output, at 31 percent. The number of residents living in absolute poverty has declined by 210 million, to about 6 percent of the rural population. *However, these trends have slowed noticeably in recent years and China's rural sector still faces considerable challenge in achieving further development.*

Rural reforms have been gradual, deliberate, and largely effective as the rural sector has increasingly moved away from a planned economy—despite several remaining remnants of the planning legacy and continuing market interventions by government. However, the productivity gains from transition policies are largely exhausted. Sustaining rural income growth will require a carefully crafted effort for several reasons: Many of the conditions that facilitated earlier growth no longer prevail. In addition, China's rural products, input, labor, and land markets, while improving, are still in their infancy. Finally, China still needs to foster several critical institutions, such as an effective fiscal system, a more efficient rural financial system, a workable land tenure arrangement, and a revamped trade and investment environment for agriculture.

Increasing rural standards of living, eliminating poverty, and reversing the divergence in rural and urban income levels will require a delicate balance of productivity-enhancing investments and bold policy measures to remove

the constraints that are preventing the emergence of institutions that fully incorporate market principles. In the long run, the government should divest itself of industrial and other commercial activities and focus investments on public services, research and extension, and infrastructure. Policy should focus more on developing government's regulatory role and less on direct market intervention. Our ultimate vision of China's rural economy is one in which economic administrators focus on promoting policies, creating institutions, and targeting public investments that improve resource allocation and comparative advantage, enhance productivity, and facilitate more efficient markets. In this vision, economic administrators intervene only where markets are inefficient or have the potential to positively affect national welfare, such as alleviating poverty and redistributing wealth, controlling environmental pollution, and improving management of natural resources.

## Rural Fiscal Policy's Undermining of Sectoral Growth

An inefficient rural fiscal system is one of the most important problems hampering rural development. Decentralization has led to a self-sufficient rural fiscal structure that, coupled with a development legacy oriented toward the urban-industrial sector, has hardened budget constraints and distorted rural investments toward developing potentially taxable local industry at the expense of rural-agricultural infrastructure and development investments that are long term and growth oriented. Over the two decades of reform, national tax revenues have declined to about 12 percent of GDP—a portion that is among the world's lowest. The 1993 fiscal reform and adoption of a value-added

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tax increased central control over revenues and stemmed the declining trend in collections in both rich and poor regions. However, revenue reallocations are still urban biased, regressive, and ineffective in redistributing resources. Thus, the equalization of taxation, redistribution, and expenditure for public goods has declined, particularly in the poorest regions. Furthermore, net rural-to-urban fiscal outflows have increased and now exceed Y 100 billion annually, starving the rural sector of investment and operating resources. The massive movement of funds out of the rural economy indicates its importance in the national economy and emphasizes the necessity of keeping it healthy.

General (untied) fiscal transfers to townships and villages have declined by two-thirds, in real terms, over the past decade. Thus in the environment of reduced subventions and in the absence of taxing authority, local governments have imposed unofficial, nontax levies and fees on rural producers and consumers and rely on other creative mechanisms to finance governance, social obligations, and unfunded central government mandates. Since the most easily tapped source of off-budget revenues are derived from miscellaneous fees assessed on rural enterprises, poor areas that lack such enterprises are further disadvantaged. Off-budget collections are not officially sanctioned, are not transparent, frequently are regressive, are inconsistently levied, distort investment allocations, and have occasionally caused rural dis-sentiment. *Because of the urgent need for additional resources, the government should consider converting some of these fees and levies into transparent components of the tax system.*

Inadequate budgets for rural social service and advisory institutions (for example, nature and forest preserves, agricultural research and extension, schools, and rural clinics) frequently result in the diversion of staff and financial resources from their primary mission to commercial activities to supplement budgets. Infrastructure investment funds are often redirected to potential tax-producing enterprises or diverted to meet salaries and other recurrent

costs. Also, to generate revenue some protective agencies resort to exploiting the resources they are charged with protecting.

Further fiscal reform is imperative to enable China to maintain rural infrastructure and services, sustain long-run growth, and reduce poverty. Further assessment of the consequences of such a highly decentralized economy is needed, along with options for additional revenue sources and expenditure reduction. A radical option would be to transfer the basic unit of fiscal responsibility from townships to counties (except perhaps for the most industrialized towns with surplus budgets). This would reduce administrative staff, a move that would significantly reduce costs, as wages are the primary expenditure at the township level. Reducing numbers of "grass roots" staff, however, may hinder policy implementation. Local government consolidation and reform should be high on the policy agenda.

### Rural Incomes, Off-Farm Employment, and Township and Village Enterprises

Recent increases in agricultural income have resulted, in part, from increased farmgate commodity prices. This option has been fully exploited as domestic prices are near international price equivalents—unless government decides to embark on a costly farmer subsidy program and ignore the commitments made in the yet unfinished World Trade Organization accession negotiations. Other options for improving agricultural income growth include (a) increasing factor productivity; (b) diversifying production into labor-intensive, higher-value commodities; and (c) investing in transport and other marketing infrastructure to reduce marketing costs and enable farmers to increase their share of consumer expenditures. Factors affecting these alternatives are reviewed in this report and in other recent World Bank publications.

The transformation of China into a more affluent, modern industrial economy depends on sharply increasing incomes and shifting a large part of the population out of agriculture.

Obtaining off-farm employment has been the surest route to improving incomes. In the past, rural and urban institutions restricted the movement of labor off the farm. The recent explosion of off-farm work proves that many of these barriers have been removed. (Nearly 140 million of China's 450 million rural labor force work in nonfarm jobs.) However, obstacles still prevent farm families from moving to locations that promise them higher returns, particularly features of the urban economy, such as strict prohibitions to job access, urban resident permits, and restricted access to urban services. Rural barriers are less restrictive, although debate continues regarding how land tenure arrangements, quotas, and other institutions affect household decisions to seek employment or residence outside of agriculture. *China should make every effort to eliminate the barriers to the movement of labor off the farm.*

Typically, off-farm employment is associated with rural-urban migration, but in China's case township and village enterprise (TVE) employment and rural-rural migration also is an option. Millions of rural workers have migrated to urban jobs in the past decade, but for the next decade such migration may become a less viable option, as restructuring of state-owned enterprises (SOEs) and rationalization of employment has begun. A surplus of unemployed urban-industrial workers will have priority for deployment in any newly created urban jobs, making agricultural labor's search for nonrural employment in cities more difficult. Off-farm migration to rural industries could play an important job-creation role. Rural industry provides the fastest-growing subsector of the off-farm labor market. Continued out-migration would permit those remaining in the agricultural sector to combine additional land, water, and capital with their labor and improve income. Improvement in the land/labor ratio will be a crucial element in increasing future income within agriculture, particularly if water development and conservation schemes and credit-institution reform increase water and capital availability. *Given the inevitable conflict that will*

*arise between laid-off urban workers and city-bound rural migrants, China should promote policies that encourage the efficient expansion of rural industries.*

### **Consolidating Past Gains from Rural Enterprises.**

The contribution of TVEs to China's rapid economic growth during the reform period has been extraordinary. TVEs contribute 40 percent of the national gross industrial output and employ about 130 million workers—representing the major employer of rural nonfarm labor. Unfortunately, output and employment growth are decelerating, access to credit has been curtailed, and severe debt problems are appearing. However, ownership and management are evolving from collective and cooperative to private ownership in response to the changing economic environment. By 1997, 90 percent of TVEs were privately owned and accounted for more than half of TVE employment. Also, the management structure of those firms that remain collectively owned is rapidly shifting away from fixed-wage management contracts to more responsive profit-sharing and fixed-lease arrangements.

The initial conditions that favored the rapid development of rural industries no longer prevail; product competition has increased, production has become more efficient, and competitive pressures have eliminated the large profits of earlier years. However, the inland provinces have a few advantages that tend to offset the disadvantage of being distant from major, high-income markets along the coast, including lower-cost labor and often better access to agricultural raw materials. Some coastal TVEs have sought to relocate inland to take advantage of these benefits. However, an attempt by the less developed regions to emulate the policies and institutions of an era that no longer exists would be counterproductive. *Local governments in inland and other disadvantaged areas should promote, but not subsidize, small-scale family enterprises that target local niche markets and enterprises that can exploit local*

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*comparative advantage, or aid firms that emphasize agriculture and related sideline production more than industry. Officials promoting rural industry inland should also seek to elicit the management and capital inputs of those who have successfully developed enterprises in other areas.*

The financial needs of TVEs are not well met by the financial markets, which is a serious constraint. Rural financial reforms have curtailed formal credit, and as credit becomes restrictive, TVEs are among the first to lose access. A portion of the credit problem is due to uncertain creditworthiness of the TVEs. However, this is paradoxical, as TVEs are the most dynamic segment of the industrial sector. Given their importance in the national economy, China must find a way to increase their access to credit. *Explicit financing (for onlending or loan guarantees) for small and medium enterprises channeled through existing financial institutions is an option. However, a training program to improve financial management and operational skills of both the lending institution and borrowing enterprise should accompany, or be a component of, a financing program.*

### Reforming Rural Credit.

The financial sector has reformed more slowly than some other sectors, and the government maintains strong controls. Several financial institutions have developed to serve the rural sector, but most lending is to rural enterprises and to state agencies to procure grain and cotton (policy lending). The Rural Credit Foundation system, the smallest and newest quasi-state credit institution, is the only institutional credit source that lends primarily to agricultural households. Informal credit among villagers, both with and without interest, is an important component of agricultural production credit.

A definitive separation of policy and commercial lending is clearly needed. China should fully understand that policy lending to state agencies for mandatory procurement of grains—particularly that which goes into grain procurement, strategic reserves or buffer stocks—will

incur losses. Concentrating policy lending in a single institution would permit better monitoring of costs, subsidy requirements, and impacts.

China must decontrol interest rates if rural credit institutions are to adequately serve the sector. Rural financial institutions (RFIs) focus primarily on lending, but they could improve service to the rural community by creating new savings deposit instruments that provide attractive combinations of return and liquidity. Such instruments, combined with improved rural markets, may persuade farmers to hold increased savings in the form of deposits and less in the form of grain. Regulation must be prudent to ensure stability and safeguard deposits while avoiding excessive restrictions.

Rural credit is constrained, in part, by the lack of technical and financial skills of RFI staff, which limits their ability to evaluate alternative projects and monitor loans appropriately. China should develop institutions that support RFIs in improving their capacity to screen loans, enforce repayment, improve the use of loan histories and credit ratings, develop and standardize accounting and reporting procedures, evaluate assets and collateral, and develop resale markets for collateral. Also, China should create a diversity of RFIs to compete and specialize in meeting the needs of different demand characteristics—which might range from full-service banking to specialized banks for rural industry to microfinance institutions.

### Productivity-Enhancing Policies and Investments

#### Research and Extension: A Means for Raising Total Factor Productivity.

Historically, the agricultural sector has been well served by the public research system. By creating new technologies and crop varieties and improving agronomic practices, the research system raised total factor productivity in agriculture, expanded production frontiers, reduced long-term production costs, and improved rural incomes. Growth accounting analyses indicate that crop growth over the past decade was

overwhelmingly attributable to research investments. Unfortunately, agricultural research investments have declined in real terms and research expenditures as a proportion of agricultural GDP have fallen below the average of developing countries, creating concern for long-term agricultural growth. Without access to new efficient production technologies, China's farmers will be disadvantaged in competitive international markets.

Government has several options: (a) increase public investments in agricultural research and technology transfer to develop a continuing stream of applicable modern agricultural technology for agriculture; (b) encourage domestic private sector investment in new agricultural technology; (c) provide incentives for foreign entrepreneurs to develop and produce new technologies for the domestic market; and (d) encourage the import of technology developed elsewhere through minimal import constraints and tariffs. The most efficient process is likely to be a combination of these activities; some government-financed research is necessary to ensure priority issues and public goods are addressed. This especially true where research benefits are long term or cannot be readily captured and would not be undertaken by the private sector (such as research on subsistence commodities for resource-poor areas and natural resource management).

A large quantity of fiscal resources continue to be directed into the grain subsector. These resources consist primarily of storage facilities, stocks, and monetary subsidies—all of which absorb finances but have no investment multiplier effect on growth. Redirecting some of these resources to agricultural research would have a better impact on long-term growth. However, pending fiscal restructuring, several actions could improve the efficiency of the existing research funds, increase research financing, and increased access to nongovernment research results. *To ensure the most important research issues are addressed, the government should make the competitive grants-awarding process fully transparent and widely publicized and en-*

*sure broad scientific representation on judging panels and access for younger, recently trained scientists. To increase research financing, the government could impose cesses on agricultural commodities that are processed (such as cotton, tobacco, and tea) or at transit points where a cess can be administratively collected, such as an export port. After enforcing of intellectual property right (IPR) protection and licensing become better established, commercial activities of research institutes should be discontinued. However, in the shorter term, implementing a matching grant program to provide funds equal to an institute's commercial earnings, rather than automatic funding reductions, could strengthen the research program. China cooperates with several of the International Agricultural Research Centers. Increasing its interaction with these institutions and with additional centers that focus on livestock and crops in arid and semiarid zones could improve China's access to agricultural technologies suited to poverty areas.*

Extension services suffer from substantial financial problems, staffing shortages, and staff skill deficiency. Funding shortages have driven away many field staff. Those remaining in-post require increased training to upgrade their existing skills and acquire new skills related to production of nontraditional commodities, and new methods of understanding and addressing marketing issues. *Given the small scale of its farms, China must revitalize its public extension system. Some activities of the public extension service could be assumed by the private sector if commercial companies were permitted greater participation in domestic marketing. Such activities would include introducing new seed varieties, managing pests, applying agrochemicals (including fertilizer), and controlling the quality of commodities.*

### **Foreign Direct Investment in Agriculture.**

China has been enormously successful in attracting foreign direct investment (FDI)—primarily in labor-intensive manufacturing—which

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has been an important source of new job creation. However, only about 4 percent of actual FDI inflows during the 1990s was for agricultural and agriculturally related manufacturing investments. FDI in technology-intensive agroindustries (seed, agrochemicals, veterinary pharmaceuticals, and agricultural machinery) have important modernization potential and could supplement or substitute for research that is currently being carried out by China's own, already-stressed research system. *Given the potential contribution to sectoral growth, the government might actively seek foreign investment in technology-intensive industries as well as capital-intensive industries, such as fertilizer, which is in short supply domestically.*

Although the government has enacted IPR legislation, legal protection is perceived to be poor and China's large potential market for new input technology has not attracted significant private investments. Consequently, technology developed by transnational corporations and made available for Chinese farmers primarily comprises inputs that are very difficult to replicate, thus the property rights are technically protected. If transnational corporations are to provide and promote proprietary technology, China must show that it will resolutely enforce its recently enacted IPR legislation. In addition, officials of transnational corporations have indicated that the weak regulatory environment, opaque foreign investment policy, and fragmented wholesaling and retailing networks inhibits investment in technology and capital-intensive industries. *Incentives need to be crafted to stimulate investment and resolve the various marketing and distribution constraints.*

### Resource Development and Production Inputs

#### Water: The Major Constraint to Future Agricultural Productivity.

China has abundant labor but other resource inputs are in short supply. Water is agriculture's most limiting agricultural resource, particularly

in northern China—and the government has identified several hundred water development projects to assist in alleviating this constraint. Despite massive investments in water development and conservation over the reform period, water available for irrigation in 1993 was marginally less than that of 1980. Given the unmet water requirements in some sectors and the higher productivity of water in other sectors, large investments in developing new resources and in improving distribution and use efficiency are needed if supplies to agriculture are to be maintained. The most probable source of new supplies are water transfers from the more water-abundant south, as both surface and groundwater resources are fully or overexploited in most northern locations. *China should initiate work on one or more of the south-north transfer routes as early as possible, as completion will be costly and time consuming.*

While water transfers from the south will help shortages in the north in the near term, they will not increase long-term water supplies in the north, as the transfer volumes will likely be less than current overabstraction of groundwater in the North China plain. *Investing in projects for improving irrigation efficiency is equally important.* These would include improving delivery efficiency through rehabilitating systems and lining canals (or building pipelines), and improving on-farm efficiency through implementing advanced application techniques and new water-saving technologies. Achieving the targeted delivery efficiency of 78 percent would deliver an additional 100 billion cubic meters of water to farmers' fields—increasing production and farmers' income enormously.

Applying financial resource constraints means that farmers will be required to shoulder the costs of managing, operating, and maintaining lateral canals. Some successful pilot programs in transforming irrigation management agencies into self-financing entities have developed and should be replicated as rapidly as institutional managers can be trained. However, farmers have little incentive to conserve water and alter their cropping patterns if water

costs are low or unrelated to the amount used. Therefore, to ensure water conservation and efficient on-farm water use, we encourage rapid implementation of full-cost volumetric water charges. *China must begin to address ways to begin to implement water pricing schemes.*

In southern China, controlling the flow of abundant water is the greater issue. Flood control is an integral component of an investment program, and China should clearly direct additional attention to watershed management.

### **Land Resources and Land Use Rights.**

Nearly every farm household in China is endowed with land. By law, land ownership rests with the village (or collective), which contracts or otherwise allocates the use of the land to households. The central government recently extended legal tenure security on contracted land from 15 to 30 years, but village leaders frequently do not follow these policy directives. The dynamics of household and village demographics and other policy pressures often induce local authorities to reallocate land before contract expiration. Although significant long-term gains to productivity would likely be associated with better tenure, several analyses have demonstrated that China's land tenure system has only a marginal impact on agricultural production. However, the absence of secure tenure rights does prevent farmers from using land as collateral and limits their access to formal credit markets.

Formal land-rental markets are infrequently found in China. Informal arrangements allow households to transfer short-term use rights to others for a fee—including tax and quota liabilities—although the proportion of land rented is very small. Farmers find renting out their land increasingly difficult as increasing numbers of rural residents migrate or otherwise obtain nonagricultural employment, leading to inefficiencies in land utilization. Finding a mechanism to permit the remaining full-time farmers to access additional farm land, and thus improve incomes by raising the land/labor ratio, is imperative.

Despite the benefits that farmers would receive if land were privatized or if land rights were more secure, a number of household surveys have determined that most farmers prefer collective ownership and periodic land adjustments based on demographic dynamics. Therefore, an abrupt change in land property rights, such as privatization, would have significant social costs and be ill advised. *Given the importance of land in China's rural society, continuing experiments in the land market and tenure to carefully assess impacts on security, income, equality, investments and efficiency are crucial.*

### **Improving Resource Use and Allocation Efficiency**

#### **External Agricultural Trade.**

Agricultural trade increased about 50 percent over the past decade—somewhat less than overall trade—and the agricultural trade balance has been positive in all but one of those years. Although the trade data series are short, they imply that the composition of agricultural exports increasingly reflects a production and trade pattern consistent with comparative advantage—exports of labor-intensive horticulture products and imports of land-intensive cereals have both risen.

In the interest of stabilization, state trading companies continue to monopolize much of China's agricultural trade. But several factors combine to deny achieving the stabilization goal. State trading companies respond slowly to changing trade conditions, implement trade quotas planned far in advance of harvest (by the time the trade occurs it may be unrelated to prevailing supply conditions), and in the absence of competitive efficiencies destabilize, rather than stabilize, supplies and prices. Prices in some of China's grain markets have been more volatile than international prices and grain imports/exports have exacerbated domestic supply fluctuations over the past decade.

A liberal, open, and competitive grain market—including state and nonstate enterprises operating under the same constraints, incen-

## Accelerating China's Rural Transformation

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tives, and commercial standards—would facilitate more rapid trade responses to grain surpluses (including surplus stocks) and shortages, and be more stabilizing than the current market. More open trade would require removing trade quotas and replacing the two-tier grain tariff regime (1 to 3 percent for within quota and more than 100 percent for above quota) with a single tariff rate that would provide farmers with downside price protection and protect consumers from exorbitant price increases.

If China maintained tariffs at the binding rates that it has offered in its World Trade Organization (WTO) negotiations, grain and oilseed prices for domestic producers and consumers could be maintained at about 60 percent above world prices. While such bindings are low by international standards, they would prevent China from adopting the extreme protectionist policy of its East Asian neighbors, and prices could be kept at a level that would significantly benefit grain and oilseed producers. If China's objectives focused more on consumer welfare, it would lower the tariff rate, making production of these crops less attractive and directing productive resources into alternative high-value crops. This would improve the long-run welfare of both producers and consumers. To the extent that rural poverty groups are not self-sufficient in food staples, a high import-tariff regime would increase their food costs, but liberalized trading rules would hurt those who specialize in grain production, a part of the rural population that is still relatively poor.

### Reevaluating Food Security.

Some national objectives will require compromise if other objectives are to be effectively addressed. This particularly applies to 95 percent cereal self-sufficiency and maintaining large buffer stocks, which compromise poverty reduction and efficiency objectives and exert a substantial drain on the national and provincial treasuries. Evaluating national food security from a financial perspective and placing greater reliance on domestic and international markets would address both efficiency and food-

security objectives. Savings resulting from decreasing grain storage could be redirected to assist those groups most affected by trade liberalization. Growth and income also might be increased by discontinuing grain quotas and permitting farmers to select their own production combination on the basis of their resource availability and prices.

From a financial perspective, China is food secure because its foreign exchange reserves and balance of trade are highly favorable. International grain prices are expected to continue their long-term decline, although short-term volatility is likely. International grain reserves exceed 100 million tons, and the major grain-exporting countries could rapidly produce and export much larger volumes if a steady growth in export demand were anticipated. China also has the infrastructure and bureaucratic expertise to run an effective buffer-stock system as part of its domestic marketing strategy. This system could also be used in conjunction with imports to buffer domestic prices. *Liberalizing international cereal and oilseed trading would be an efficient option for managing trade and supporting the objective of 95-percent grain self-sufficiency.*

### Domestic Marketing: Room for More Improvement.

Marketing and pricing policy reforms have led to unprecedented market development over the past decade. Most food commodities are now sold at market prices, and statistical analyses indicate domestic grain markets are well integrated and increasingly competitive and efficient. The rise of a private trading class has resulted in 25 to 35 percent of China's grain procurement going through private channels.

Despite the rapid emergence of China's markets, problem areas remain, including continued intervention by government grain agencies, incomplete separation of policy and market functions, the continuance of producer quotas, and the high expense involved with a large and costly grain reserve. The marketing channels of the grain bureau continue to incur losses, ex-



tend overdue loans, and require large subsidies—inefficiencies that result in part from the conflict of their operating commercially while implementing policy directives. Grain stocks have continued to rise and require expensive maintenance from the fiscal and financial system. An appropriately budgeted government agency should be responsible for maintaining grain reserves or buffer stocks, knowing that it will incur losses directly related to their size. Therefore, China should carefully evaluate the need for reserve stocks from the perspective of minimizing requirements. India and Indonesia employ buffer stocks to stabilize grain prices, albeit at significant cost, but procure only 20 to 25 percent of the marketed grain.

If the proposed grain reforms of 1998 had been successfully implemented, the government would have met its complex set of policy objectives of improved efficiency, protection of farmer income, and reduction in government's fiscal burden. However, policy implementation departed from the design and will likely fall short of meeting the core objectives. Recent measures adopted in mid-1998 are reminiscent of those of the 1980s, which were costly and relatively unsuccessful. These measures include remonopolizing farmgate procurement at government-determined prices, prohibiting the grain bureau enterprises from selling grain at prices below the government-determined procurement prices, and clearly separating commercial and policy functions and central and local government responsibilities in price stabilization and buffer stock management. Implementation of the new policies will likely lead to substantial grain overprocurement—stressing financial and physical storage capacity.

Although the marketing of fruit, vegetable, and livestock products was liberalized more than a decade ago and has grown rapidly, several policy and institutional constraints impede marketing efficiency. Standardizing national quarantine and phytosanitary inspection procedures and shipping documents applicable to all interprovincial commodity transport would improve marketing efficiency and farmers' in-

comes. Commodity transporters meeting national standards should be able to transit all provinces unhindered upon presentation of certified documents at provincial border checkpoints and payment of officially sanctioned transit fees (based on weight, number of axles, or other objective criteria).

Producer marketing associations are institutions designed to improve farmers' bargaining power with respect to downstream purchasers. A few farmer organizations have developed in rural China, but these focus primarily on production rather than marketing. The government could assist their development by establishing a positive legal and regulatory framework for their existence and obligations. The lack of prohibiting legislation is insufficient to encourage them to develop. Also, farmers need technical, managerial, and training assistance to develop the expertise required to establish such an organization and to develop associated market intelligence units. Without marketing organizations, farmers are unlikely to be able to exploit market niches and meet supply deficits that may exist in scattered markets.

The government could assist market development by making market information comprehensive and by consolidating the information system under the auspices of a single agency. To ensure adequate information was provided to the central market information agency, China could make licensing of wholesale markets conditional on timely submission of market information.

### Poverty Alleviation

In the early years of reform, rapid growth was associated with rapid reductions in poverty—which was achieved, in part, by labor migration to the coastal areas, where growth and job creation were occurring most rapidly. The 50 million residents still living below the national poverty line are believed to live in areas that are remote, less accessible, and very resource poor—limiting potential for increasing agricultural production. The large wage-rate differentials between poor rural areas and pros-

perous urban (and rural) areas provide powerful migration incentives and means to overcome poverty. To alleviate poverty, these areas will need nonagricultural employment and improved linkages with the rest of the economy. Education, which makes individuals more marketable in the labor force, also contributes to poverty alleviation.

Effective poverty alleviation requires getting well-designed programs to those who need it. Properly targeting poor households rather than just poor counties is crucial—subcounty administrative units need to be considered. Targeting in some provinces has improved in recent years, but targeting in some other provinces has been less effective. Designing and implementing poverty reduction programs on the basis of detailed consultations with local leaders and planned participants is particularly important. Community participation has been an integral element in designing the World Bank-supported poverty reduction projects, which also involve concentrated resources and intensive monitoring. Food-for-work projects apparently have been quite successful, in part because the funds bypass the fiscal system and in part because the projects are narrowly defined, easily monitored, and focus on high-return investments. Investments in agriculture, rural enterprises, roads, and other rural infrastructure have increased the productivity and income of the poor. However, resource constraints in many poor areas limit efficient infrastructure investments. Investments that do not have reasonably favorable rates of return should be reconsidered unless poverty alleviation considerations are compelling.

While economic growth is clearly associated with poverty reduction, programs for reducing poverty have had mixed success in increasing growth. If poverty programs are to contribute to long-term growth, they must be based on efficiency criteria and add to investment stock. The subsidized credit program for poverty alleviation generally has not reached the poor, achieves low repayment rates, and should be replaced with programs that place funds into

the hands of rural households. In some areas, “grassroots” microfinance programs that are able to reduce the transaction costs involved in evaluating projects, issuing loans, and monitoring repayment by using peer monitoring and group lending have succeeded in alleviating poverty. Such programs must be carefully designed, staffed, and implemented, and their impacts must be carefully evaluated. Also, it is important that credit policies be sufficiently flexible, particularly regarding interest rates, that the programs can be sustained.

### Natural Resources and the Rural Environment

Natural resource degradation and pollution of the rural environment are a serious concern. Anecdotes, quantitative assessments of small circumscribed areas, glaring visual impacts of erosion and pollution, and the 1998 Yangtze River flood create an impression of very severe degradation. However, little nationwide quantitative assessment of the extent and severity of natural resource and environmental problems has been conducted. The natural resource base suffered from widespread deforestation and pasture conversion to cultivated land, leading to serious erosion problems during the 1950s and 1960s—situations that were reversed in the 1980s and 1990s. The evidence on environmental degradation is ambiguous; statistical data indicate that forest cover is increasing and sediment traps along the Yellow River have reduced sediment concentrations by 25 percent in the lower reaches. However, many rivers are polluted along lengthy stretches, coastal wetlands continue to be drained, and desertification is said to be increasing.

Also, interpretations of the impact of environmental degradation on growth conflict. Various estimates of the cost of environmental degradation range from zero to 15 percent of GDP, but the highest estimates are based on gross assumptions that are not credible. One of the more comprehensive studies on the impact of environmental pollution and ecological degradation estimated the cost at 7 percent of

GDP. However, the cost of degradation reduction and prevention has not been analyzed. Better information is needed to determine what prevention and reduction measures would be economically efficient. Also, minimal effort has been made to determine the proportion of degradation that is occurring naturally. *A thorough quantitative assessment of the impact on growth of natural resource degradation and environmental pollution and the costs and benefits of preventive and remedial actions is essential to support an effective natural resource policy.*

Several factors contribute or lead to environmental degradation. The legal framework to conserve natural resources and protect the environment exists; however, the fiscal system often provides insufficient financial resources for environmental protection services to properly perform their jobs. Consequently, agencies responsible for conservation and protection are often encouraged to use natural resource assets to generate revenue for wages and other

recurrent expenses. Such income-generating activities may exploit the resource and contribute to further degradation. *The fiscal resources for environmental protection, maintaining biodiversity, and sustainable management of long-term natural resources must come from the public treasury.*

Poverty is an important contributor to environmental degradation. The present, rather than the future, is the concern of the very poor. Consequently, denuding hillsides to cultivate subsistence crops and deforestation to meet immediate fuelwood needs have led to erosion and natural resource degradation. Various projects have found that improving erosion control through increasing vegetative cover and improving cultivation techniques are economically efficient and should be replicated. Similarly, expanding the forest resources to support continued growth in construction and agroprocessing has been an economically efficient investment.



# *Part I*

# *The Rural Sector Challenge*

## *1. A Vision for the Rural Sector*



Since the founding of the People's Republic, the leaders of China have been preoccupied with one overarching goal; the modernization of the nation. Our vision for the early part of the 21<sup>st</sup> century perceives the rural economy as an integral part of this modernization effort, with equitable increases in income, and the elimination of poverty, achieved in large part by transferring rural labor to the urban-industrial economy—all accomplished in an environmentally sustainable manner. We envision an enormous government effort in transforming its role into an investor for public services and goods and fostering a market environment—enabling individual farm and nonfarm producers, consumers, and traders to make more efficient decisions and improve their welfare.

In pursuit of this vision, two issues remain

central to the government's rural development objectives: food security and poverty alleviation. China has made remarkable progress in meeting these goals; the economy, including the rural sector, has grown at phenomenal rates during the reform period. The growth of food supplies has exceeded the growth of domestic demand and China exports horticultural, livestock, other agricultural, and aquacultural products. The growth of rural industry has been an important element of recent growth as the rural economy continues to diversify. Increased productivity and income growth have reduced the massive pre-reform poverty problem, improved the standard of living of most residents, and launched the structural transformation of China from a traditional rural to a modern society.

However, growth will be difficult to sustain

and many challenges face those responsible for China's modernization. The economic base is considerably greater than it was two decades ago, the easy sources of growth have been tapped, and several underlying conditions have changed. Further expansion and intensification of China's cultivated land base will be difficult and input levels for agriculture are already high. Development of additional water resources will require massive investments. Future growth will increasingly rely on technology, capital, increased cropping intensity, and production shifts to higher-value commodities. The early rapid growth of township and village enterprises (TVEs) and the expansion of jobs they created were possible because of large, unfulfilled domestic demand—a situation that exists much less today. Past growth also relied partially on new export markets and foreign direct investment inflows. Increased global competition will make further expansion of export markets more difficult.

### Objectives and Structure of this Report

The objective of this report is to identify and develop strategy options that will assist policymakers and donors to prioritize investment decisions, policy and institutional reform efforts, and continue to guide China's progress toward modernization. This volume presents our vision of the growth and development of rural China in the 21<sup>st</sup> century. To this end, we systematically review the institutions, state of China's resource base, and the policies that transformed the rural economy in the following chapters. We explore the macrolinkages with the rural sector and impacts of industrial and external sector interactions on rural incomes (Chapter 2). We examine the state of China's rural fiscal and financial service systems, and try to assess how further reform and performance can be enhanced (Chapters 3 and 4). We search for options in which government can assist producers manage their resources more efficiently by improving domestic markets and

international trade (Chapters 5 and 6); and encouraging new productivity-enhancing investments in land, water, and new agricultural technology (Chapters 7 to 9). Further attention is focused on efforts required to revitalize township and village enterprises (Chapter 10), poverty alleviation (Chapter 11) and environmental and natural resource protection (Chapter 12).

We briefly review recent rural economic and income growth and achievements, examine the sources of growth, delineate a number of challenges still facing China's rural sector leaders, and recount some of the basic strategies that leaders have at their disposal to address them. We discuss the State's roles and options in establishing an enabling environment to maintain the growth momentum into the next century, including governance, regulatory framework and market interventions, investments in rural infrastructure and public services. Some weaknesses in the rural fiscal and financial policies and institutions are exposed that, unless resolved, could seriously undermine future growth. Public interventions in domestic marketing and international trade are then discussed, followed by a review of investments in rural infrastructure and public services. Finally, the necessity to reduce poverty while maintaining growth is emphasized, as is the importance of sustainable growth through natural resource and environmental protection and pollution control.

Although this vision statement addresses problems across the rural economic spectrum, several important topics have been excluded. The problems of village governance, barriers to the emergence of rural producer and marketing organizations, the development of agricultural input markets (such as seeds, fertilizer, pesticides, and custom services), and rural infrastructure are not examined. Their exclusion does not mean they are unimportant but that time and budget constraints precluded a more comprehensive assessment of the sector. Some recently completed and impending World Bank studies address some of these issues.

### Post-Reform Growth and Achievements

Historically, agriculture has been the primary contributor to rural growth, but the exceptional growth of the output value of TVEs (averaged 24 percent, 1985-95) has made them a major factor since 1987. By 1995 the output value of TVEs was more than that of agriculture. Total agricultural output grew at an annual rate of 4.2 percent between 1985 and 1997. Growth in the major agricultural components is illustrated in Figure 1.1. Crops continue to contribute well over half of the output value despite rapid growth in livestock and fisheries. Livestock contributes about 30 percent of the output value; fisheries, less than 10 percent; and forestry, about 3 percent. Recent analyses by Zhong (1998) concluded that China's agricultural databases tend to overstate production, particularly livestock statistics; thus these growth rates may well be upwardly biased. Notwithstanding adjustments that will follow the evaluation of the recent agricultural census data, the statistics will likely confirm exceptionally high agricultural growth.

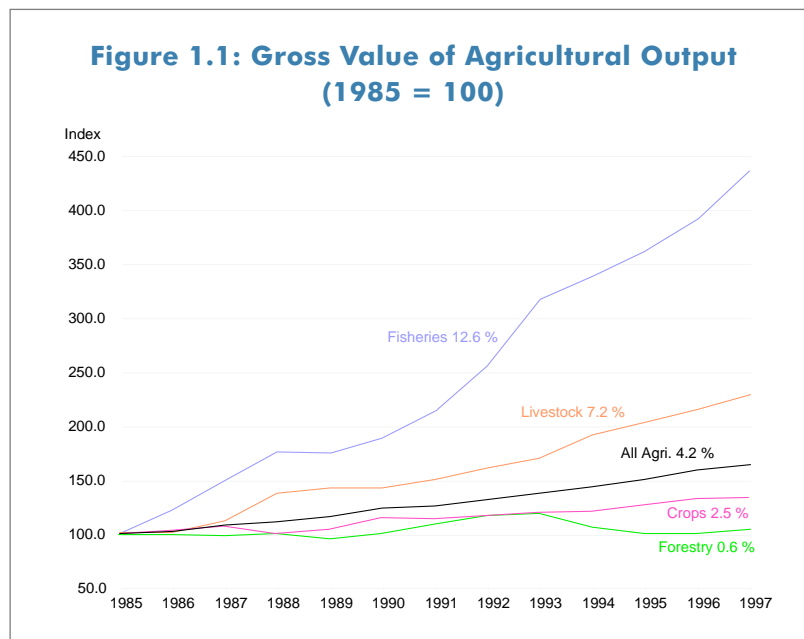
Rapid economic growth and active poverty alleviation activities lifted more than 210 million from poverty and reduced the number to around 50 million in 1997—about 6 percent of the rural population. The explosion of rural industrial growth and off farm employment has been an important element of China's overall rapid economic growth, rapid increase in rural incomes, and poverty reduction. TVEs expanded rapidly during the reform era, contributing more than 40 percent of China's industrial output. Rural enterprises also were an important source of job

creation. More than 135 million people found off-farm jobs by the mid-1990s—contributing to the 63 percent increase in real per capita incomes between the mid-1980 and mid-1990s.

Rural reforms have been gradual and methodical and often based on policy experiments. These experimental options are limited to specific geographical locations to ensure that actual and theoretical results are sufficiently consistent to proceed with wider implementation. If the experiment is judged unsuccessful, it is discontinued; however, if it meets a declared objective, the policy is promoted nationwide. This format is perceived to have been successful and will likely remain the norm for future rural reforms. Thus reforms in areas of major importance (e.g., land) will proceed slowly until sufficient experiments indicate the selected policy will meet a complex of objectives. Experimental approaches to policy reform may be costly in efficiency terms and should be discouraged in the longer term; but "Big Bang" reforms practiced in some other transition economies, are unlikely to be practiced in the near term in China.

### Sources of Past Growth

A significant part of output and productivity has come from improved incentives for house-



holds, TVE owners and managers, and local government officials. Replacing communal responsibility with the household responsibility system (HRS) contributed 30 to 60 percent of the growth of agricultural output during the early reform years. Improved incentives for managers of rural industry and the rise of private rural firms made the sector one of the most dynamic elements of China's economy. However, institutional reforms provide one-time, incentives.

Investments in agricultural technology, rural infrastructure, and social welfare also have increased productivity in the rural economy. Over the entire reform period increased productivity from investments in agricultural research and extension system exceeded productivity increases generated by HRS. Improvements in irrigation and water control also continued to help expand yield frontiers, especially in North China. These are the types of investments that will increase resource allocation efficiency in the long run.

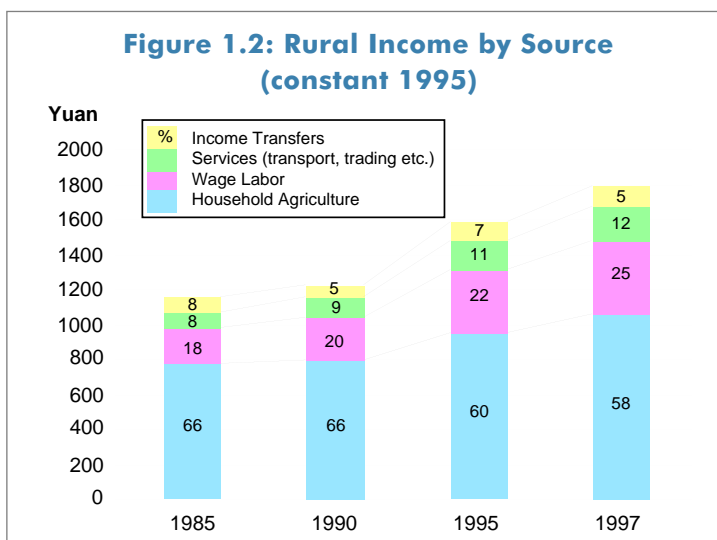
Increased domestic market integration and linkages have further improved efficiency in the rural economy. The rise of markets has increased specialization and resource allocation efficiency. Domestic resources use patterns are increasingly more consistent with regional comparative advantage. Markets for most agricultural commodities, farm inputs, and labor have increased income earning opportunities for many rural households and have contributed to the decline in poverty.

### Persistent Challenges

While past growth and development achievements have been impressive, future growth will be more challenging as much of the potential gains from transition have been achieved. An unnecessarily large component of the agricultural economy remains focused on cultivating relatively low-valued cereals, due in large part to the policy envi-

ronment. Food-security goals remain an important element in policy-making. Grain fundamentalism, the provision of relatively inexpensive and stable supplies of grain for the urban population, still prevails in the form of quotas, marketing regulations, direct and indirect subsidies (albeit reduced from previous levels), and by social pressure from local officials. Such policies obligate farmers to ignore market developments and cultivate lower profitability crops such as grain and cotton. The emphasis on grain production also has resulted in the conversion of some fragile ecosystems—wetlands, forests, and pastures—into cultivated lands, contributing to biodiversity losses and soil erosion.

The structure of rural income earnings has evolved slowly. Wage labor as a proportion of net income has increased to only 25 percent despite the extraordinary growth in TVEs (Figure 1.2). Household income from nonagricultural activities, such as trading, construction, and transport, also increased but is often not an option for many households and individuals, particularly in inland provinces. Although the importance of agriculture continues to decline, it still provided 58 percent of rural household income in 1997. But income inequality has increased rapidly and income gaps between rich and poor, urban and rural, and coastal and inland are growing. Relatively equitable income distributions prevailed in the late 1970s, but





by the mid-1990s income distribution in China was among the world's most inequitable. Income growth rates in rural areas are less than half the level of urban residents.

Decentralization generally has been a growth stimulus, but it has also created fiscal problems and retarded *potential* growth as the rural tax base is exceptionally limited. *The fiscal crisis is an overriding problem facing the rural sector.* The rural economy has neither viable fiscal nor financial institutions. Declining real investment for virtually all agricultural and rural infrastructure, and declining recurrent expenditures for services and activities, bodes ill for future growth. Mandated expenditures absorb a large and increasing portion of the budget, leaving little for activities such as technology development and transfer. Many public-service institutions and staff are encouraged to undertake commercial activities to supplement budgetary resources

Increased support of agricultural research, water control and management, rural infrastructure and social services is needed. But the agricultural research and extension system is weak and deteriorating, and restrictions on importing high technology from international sources for agriculture inhibit farmers' access to better agricultural practices. New production technologies and many services could be developed and provided by the private sector—domestic and international—but weak enforcement of existing intellectual property rights and poor wholesale and retail channels discourage interest and investment by such firms.

Poverty and environmental degradation remain serious problems. Millions of people remain in poverty pockets in resource-poor rural areas—particularly in the southwest and northwest mountainous uplands. Poor regions, characterized by poor physical and human capital, receive lower levels of investment in basic services and infrastructure. Poverty disproportionately affects minority groups and is an important cause of natural-resource degradation.

### Future Vision: Meeting the Challenges and Modernizing Rural China

China's miracle growth is aptly titled and with good governance China should continue on a sustained growth path. This positive vision of the rural economy will require numerous policy initiatives and institutional reforms, accompanied by an enabling macroeconomic environment that treats rural-urban, agriculture-industry-service, and government-private sectors as equally important and mutually supporting partners. China will approach modernity when these sectors are integrated, self-reinforcing partners. Each sector would have equal access to efficiency-priced resources, ensuring no cross-sector subsidization except for targeted subsidies to poverty groups.

As part of the policy and institutional reform, the government would not only balance agricultural-rural with other sectors but identify and separate the roles and activities that it will retain as public goods and services and those it will permit nongovernment entities to undertake without intervention. Government also would embrace the private sector as an integral component of the development process and encourage it to become the new engine of growth. New jobs for productively absorbing the underemployed, redundant labor from government downsizing, state-owned enterprise (SOE) restructuring, and new labor-force entrants must come from nonagricultural and nongovernment sectors.

Government reconsideration and reexamination of several policies—including those related to domestic production and marketing, external trade, and 95-percent grain self-sufficiency—with the objective of consistency and efficiency would likely alter policies enabling farmers to produce, and merchants to trade, more labor-intensive and higher-value commodities. Reforming the domestic-market and international-trade structures to make them more market responsive would have mixed impacts, and the impacts of specific reforms should be carefully assessed before being implemented. A

reconsideration of national fiscal policies would include identifying methods and procedures to generate more tax revenue from the rural sector and to allocate more resources to poverty areas and to subprovincial jurisdictions, and to either discontinue off-budget revenues and expenditures or incorporate them into the budget. Financial policies would be reexamined to ensure that financial flows were driven by financial incentives—not by administrative decisions to support or subsidize state-owned industry—and assist in leveling the playing field. The rural-agricultural sector would have equal access to credit, although conditions of lending may well differ to cover various risks and higher administrative costs of smaller rural loans.

Agricultural income would be increased by ensuring farmers had access to more nonlabor resources (land and water, credit, capital, and technology) to permit them to move toward more optimum input and output combinations, including higher-value livestock, aquatic, and horticultural products. However, land is a unique production input that performs an exceptionally important social-security role in China; thus legal changes in tenure forms would be implemented only after careful assessment. Nevertheless, a land-use market would be developed to provide a mechanism for full-time farmers to access additional land resources and optimize (or move toward optimum) inputs and improve income.

## *Part II*

# *An Enabling Environment for Rural Development*

## *2. Rural Income and Macroeconomic Linkages*



The rural and urban sectors are dualistic and poorly integrated. China's rural sector has continuously transferred resources to the urban-industrial sector, including capital, wage goods (food), industrial inputs, and to a lesser extent, labor. However, constrained labor flows have contributed to the large differential in rural and urban labor productivity and income. The rural sector has also served to buffer the impact of macroeconomic shocks on the urban economy. The spread of market forces and increased reliance on competitive prices has tended to increase the flow of labor and other resources and improve integration in recent years. Unless labor movement constraints are lifted the dualistic nature will remain.

### **A. Domestic Macroeconomic Dimensions**

As China has moved from a planned to a more market-oriented economy, balanced sectoral growth and integration have become more important. The urban-industrial sector provides the demand for the rural sector's marketed surplus, and as the agricultural economy becomes an increasingly smaller component of the national economy, changes in growth rates of the industrial and service sectors strongly affect the agricultural and rural economy.

### **Domestic Terms of Trade**

In most countries growth in the total productivity of all production factors (land, labor

and capital)—total factor productivity, or TFP—has led to declining rural terms of trade—despite various price support and subsidy programs. In China, however, rising domestic demand, the phasing out of administered pricing, and the adoption of market prices improved farmer terms of trade over 1990–97, as reflected in the ratio of prices received by farmers to prices paid by farmers. Domestic commodity prices are now similar to international border-price equivalents; thus China's trade and price policy decisions will influence future trends in terms of trade. If China liberalizes its trade, domestic terms of trade should decline over the near term consistent with international expectations. If not, demand will likely rise faster than supply in the near term, meaning prices will rise unless imports are expanded. Other national policies and events not effectively captured in terms of trade calculations, such as output planning and quota procurement, enforce both implicit and explicit transfers from rural to urban sectors. In addition, national credit policies generally favor ur-

ban investors and discriminate against rural borrowers. Rural residents, on the other hand, have benefited from lower increases in consumer prices relative to urban residents over the past decade and rising opportunities to remit wages.

### Resource Flows

Over the reform period direct budgetary expenditures to agricultural activities have exceeded agricultural tax receipts, but the net *fiscal flow* to agriculture declined during the early and mid-1990s. Fiscal expenditures include allocations for investments in irrigation, land improvement, specialty crop production bases, etc. However, a net outflow from the rural economy has occurred as taxes from rural-based industries were considerably greater than the net flow to agriculture. The net annual rural-to-urban flow averaged about Y 113 billion (constant 1995) over the 1994–96 period (Table 2.1); but the official resource flow may have reversed in 1998 as above-market prices for grains directed significant resources into the agricultural sector.

**Table 2.1: Resource Flows from Agricultural and Rural Sectors to Nonagricultural and Urban Sectors (Y billion, constant 1995)**

	Fiscal System		Financial System		Grain Marketing (implicit tax)	Total Resource Flow	
	Agricultural to non-agricultural	Rural to Urban	Agricultural to non-agricultural	Rural to Urban		Agricultural to non-agricultural	Rural to Urban
1980	-38.5	-30.0	13.2	3.7	46.0	20.8	19.7
1985	-18.4	11.8	23.5	7.4	15.6	20.7	34.8
1990	-31.1	16.1	68.9	47.8	43.0	80.8	106.9
1991	-35.6	20.0	59.4	28.3	27.9	51.6	76.2
1992	-35.8	38.5	536.9	17.3	20.8	41.8	76.5
1993	-28.5	103.8	49.1	8.6	24.9	45.5	137.4
1994	-26.4	105.2	53.4	38.3	59.5	86.4	203.1
1995	-21.3	122.5	51.1	27.8	50.2	80.0	200.6
1996	-22.1	113.2	44.0	27.6	32.9	54.7	173.7

Source: Derived from China Finance Yearbooks and China Statistical Yearbooks, various year

Regardless of the direction of *official* fiscal and financial resource flows, it is improbable that the “farmer’s burden” has been lifted. Large amounts of off-budget funds (not included in Table 2.1) are generated in the rural sector through unofficial taxes (levied particularly on TVEs), various fees, and corvée labor levied on rural households. Farmers are legally subject to a maximum total payment (township fee, village fee, and labor—or monetary equivalent) of 5 percent of the previous year’s net income. However, several county-level surveys have concluded that a plethora of additional fees and charges are levied by provincial and subprovincial jurisdictions that increase actual tax and “tax-like” payments of rural households to 20 percent or more of their income (Wen 1998). To the extent that these resources are spent on salaries of township or village officials (and surveys indicate that many farmers perceive their village is overstaffed with officials), instead of rural infrastructure and services, such fees are a pure tax. Furthermore, if the resources are *not* spent in rural areas, additional outflow of rural resources may occur through unofficial channels that are not captured in the consolidated fiscal statements.

Investments in land and water resources are obviously necessary for continued sector growth, but investments in energy (electricity), transport (road, rail, waterway and port), and other infrastructure that reduces marketing costs are equally important for promoting rural-sector growth. Analysis by World Bank staff indicates that the infrastructure investment elasticity in East Asia is 1.0, implying that for every 1 percent of per capita growth, infrastructure stock needs to increase by 1 percent of gross domestic product (GDP). Therefore, if applicable to China, infrastructure investment will need to be 6 to 7 percent of GDP if GDP growth goals are to be achieved (World Bank, undated).

To stimulate domestic demand and develop infrastructure, the government has embarked on a three-year \$1.2 trillion infrastructure investment program. A recent component was a Y 100 billion bond issue to finance investments

commencing in the fourth quarter of 1998. Much of the investment will focus on rural infrastructure that employs rural labor for irrigation, road, and rail construction and on rehabilitation of the rural electrical grid.

The investment program described above may be having an impact—fixed-asset investment rose 28 percent in the third quarter (year-on-year basis). However, the composition of the investment effort remains a concern as investments during the first nine months of 1998 rose by 20 and 19 percent, respectively, for SOEs and property development. Thus a real risk remains that investments may be diverted from financing public goods to SOEs, where overcapacity is already serious and returns are low.

China’s financial sector, like those in other Asian economies, has not evolved in parallel with real sector performance, remains structurally weak and potentially puts rural growth and development at risk. Government intervention, in the form of policy lending, pervades the banking system; and government remains involved with SOE investment in nonpublic goods. Lardy (forthcoming) reports that, if properly accounted for, the banking system’s nonperforming loans would be 30 to 40 percent of GDP. Stock and commodity futures markets remain underdeveloped and underregulated, and many have been closed or consolidated.

Analysis of data from the banking system indicates a net transfer of financial resources from agriculture to industry throughout the reform period, although such findings need to be interpreted with caution because of concerns on the coverage of the available statistics. Consolidated data on rural savings and loans exclude transactions of Rural Credit Foundations (RCFs), the smallest of the rural credit institutions, and results in a modest understatement of the *financial flows*. Conversely the inclusion of Agricultural Development Bank of China (ADBC) data contributes to overstating financial flows, as its lending is almost exclusively for agricultural procurement by government marketing agencies. Many deposits in the Agricultural Bank of China (ABC) are by urban resi-

dents. After making allowances for these shortcomings, it is clear that although rural industries (TVEs) absorb a portion of these transfers of agriculture to industry, a significant rural-to-urban financial flow (¥ 30 billion per year in 1995 real terms) remained during the 1994-96 period. Whether the financial flows reflect the response of rational investors moving funds from low-return to high-return sectors or whether they result from distortions in the financial and fiscal system is undetermined, but the massive movement of funds out of agriculture and the rural economy highlights the importance of the sector and emphasizes the importance of keeping it healthy.

About 40 percent of the SOEs incur losses and survive on subsidies and bank overdrafts—which then become nonperforming loans of the banking system. A government priority is SOE restructuring, of which a major element is employment rationalization. This, combined with downsizing the civil and military services, will move large numbers of workers to the ranks of the unemployed. Labor reductions should improve SOE performance, but the reduced labor income will certainly erode demand and emphasizes the need for rapid growth to create new jobs for redundant labor. This overhang of unemployed urban-industrial workers will have priority for employment in newly created jobs and make it difficult for rural workers to stay and work in urban enterprises. To mitigate the impact of income losses, government has budgeted ¥ 1.5 billion for a new welfare program to assist laid-off, retired, and disabled workers.

Tight credit that has hampered growth and expansion of small and medium enterprises (SMEs)—which account for 60 percent of industrial output—has been relaxed. Lending by state-owned commercial banks to SMEs, including TVEs, has been increased by several billion yuan. This should bode well for expansion and employment, but it is as important to ensure borrowing proposals and loans meet appropriate financial and economic efficiency criteria.

### Labor

In general, the rural labor force acts as a buffer stock for the urban economy, providing labor under booming economic conditions and absorbing labor back from the city when job growth slows (Zhang et al., 1999). The buffering capacity provides a stabilizing influence for the overall development of the economy, but continued access of rural workers to urban jobs is a crucial element of China's modernization, providing income-earning opportunities for poor rural residents and increasing the efficiency of urban enterprises. Recent reforms in SOEs have resulted in layoffs for large numbers of urban workers and, as a consequence, many cities have enacted regulations restricting employment for rural migrants to low-quality, low-paying job categories. Such regulations and general urban investment slowdowns affects the rural migrant labor force and its families. The adverse consequences of layoffs and urban recession could be mitigated by placing the unemployed in retraining programs, instead of granting them privileged access to jobs without regard for their skill level.

### Rural-Urban Migration and Employment

Natural population growth is slower in urban than in rural areas but over the past two decades China's urban population increased from 18 to 30 percent (in 1997) of total population—due partially to expanding urban boundaries and partially to rural-urban migration, which has been continuous despite restrictions on population movement. A changing complex of incentives and disincentives influences both the decision of rural residents to migrate and the characteristics of migrants. The rural-urban income differential has been a powerful stimulus to migrate (officially or unofficially) but the household registration system made it difficult for rural residents to obtain access to urban social services and obtain well-paid jobs; also, village “use it or lose it” land policies may inhibit family migration. Jobs available to mi-

grants were primarily in traditional male-dominated construction or transportation sectors as industrial SOEs are still obliged to hire urban residents. Thus, urban-bound migrants are typically young males whose families remained in the villages to till family plots.

Market development, relaxation of labor movement and urban employment restrictions, and discontinuance of the grain coupon system in the early 1990s removed some of the migration disincentives. Meanwhile, the continuing rural-urban income gap has maintained the migration incentive. During the 1990s urban job creation and employment increased at five times the rate of rural employment and up to 100 million rural laborers and self-employed traders have migrated to cities and coastal regions (Chan 1996, Huang and Cai 1998).

Barriers to migration appear to be primarily on the urban side, implying rural-urban migration will increase as the constraints and barriers are removed. Whether such migration will result in the creation of megacities or whether new medium-size towns will be developed as job centers remains under debate. Regardless, however, increasing pressure will be placed on urban infrastructure and services and additional urban investments will be required. A strong, and open, urban sector is important for the rural economy as migration reduces the agricultural labor force and improves the ratio of nonlabor/labor resources and income potential.

Agricultural employment reached an absolute peak of about 350 million in 1991 and then declined by 19 million by 1997—but agricultural employment as a proportion of total employment declined continuously over the reform period and now accounts for less than 50 percent of total employment. However, China is unique as a large share of industrial output is produced by rural industries that employ about 25 percent of the rural labor force. Thus, during the same period the rural industrial sector created about 38 million additional off-farm jobs. Although TVE employment suffered a decline in 1997, it is too early to determine if the employment trend has reversed as temporary de-

clines have previously occurred.

TVE growth and expansion has been impressive over the entire reform period—except during 1989-90. Despite rapid growth in rural industrial employment, output, and wages (TVE wages have grown at 18 percent annually), and the substantial direct and indirect contribution to the rural economy, rural-urban income disparities have worsened since 1985. Doubtlessly, rapid TVE expansion prevented the income ratio from being even more adverse, but it was unable to reverse the worsening trend. Jin and Qian (1998) found that TVEs did not increase average per capita rural income given the levels of nonfarm employment and/or local public goods provision. Furthermore, the local nature of rural industry also has contributed to rising intrarural inequality (Rozelle, 1994).

TVEs not only have successfully generated off-farm work opportunities for the local rural labor force, but for workers from other villages as well, creating rural-to-rural migration. Rural-to-rural migration in China is a paradox internationally—it has previously not been observed on such a large scale, and yet in China it is the fastest growing subsector of the rural labor force. The rise of private sector ownership can, in part, account for the shift in hiring nonvillage residents, since their owners are unconcerned with noneconomic criteria, such as employment priority for local workers. From the migrant's viewpoint, common backgrounds permit rural in-migrants to better integrate into the work environment. These factors, in addition to the fact that most TVEs engage in labor-intensive light industry, mean that in-migrants are more likely to be women, older, and less educated; rural-to-rural migration is one of the most important new windows of opportunities for rural residents into the wage economy.

An analysis of factors influencing migration found few village institutions that constrained migration (Lohmar, Zhao, and Rozelle 1999). Village “use it or lose it” land policies may inhibit family migration, but land tenure and grain delivery quotas, *per se*, do not influence migration. However, the ability to rent out land while

maintaining nominal use rights appear to facilitate out-migration as does the existence of informal credit markets.

There are, however, several factors that facilitate out-migration. The overwhelmingly important migration determinant was a “village network.” Past migration leads to future migration—fellow villagers who can be relied upon for information (and possible financial assistance), including potential job prospects, provide a chain to attract additional villagers into the migrant labor force. A similar linkage has been found for Mexican laborers working in U.S. agriculture—where it is common for contractors to solicit additional labor from the same village as previously recruited labor. Education generally improves the chances of obtaining off-farm employment—although that factor is more important for workers who live and work at home than those who engage in rural-to-rural migration. Urban in-migration continues to be severely inhibited by the household registration system and limited access to urban social services.

### Rural-Urban Income Dichotomy

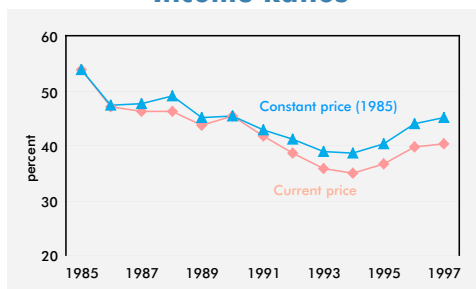
Inequality, among other things, is a barometer of the efficiency of an economy as well as its political stability, and the fact that during the reform era China has experienced an exceptional increase in inequality is cause for concern. Gini ratios have been above 0.40 since the early 1990s and have continued to rise. China's rural-urban income gap is large by international standards—particularly when the recent 1998 revisions to urban per capita in-

come data are applied. In nominal terms, the rural/urban per capita income ratio declined from 0.54 in 1985 to 0.35 in 1994, then recovered by five percentage points between 1994 and 1997 (Figure 2.1). These ratios compare poorly with Vietnam where the 1997/98 rural per capita income level was 67 percent of that of urban incomes (Bales). Even when adjusting official rural and urban income data for housing costs and other poorly measured or excluded components of income, rural/urban income ratios do not improve. Further, Yang and Zhou's (1996) analysis of rural-urban income ratios, for 36 countries over the 1985-95 decade, demonstrated that urban incomes are rarely more than twice rural incomes. The urban/rural income ratio of only one country (out of 22 for which 1995 data were available) exceeded that of China. Using consumption as an income proxy, China compares unfavorably with India in terms of its rural/urban inequality. In 1993-94 the per capita rural/urban consumption ratios were 0.28 and 0.61, respectively, for China and India.

The rural/urban income ratio using constant 1985 prices, reflects the differential increases in the cost of living between rural and urban areas, and illustrates a similar but slightly more modest decline in relative incomes. However, these data underestimate both rural and urban in-kind income. Price deflators adjust for differential price changes but not price levels. Adjusting for this differential (15 percent), imputing rent to rural incomes and adjusting urban incomes to include in-kind income for housing, education, health care, pensions and other subsidized services provides more accurate income estimates. These adjustments lowered rural incomes to 31 percent of urban incomes in 1990—substantially less than the 45 percent suggested by official data (World Bank, 1997c).

The large rural-urban income gap points to a large differential in labor productivity and to constrained factor mobility, especially labor and capital; it also reflects the arbitrary nature in which compensation levels are set. Although

**Figure 2.1: Rural-Urban Per Capita Income Ratios**





only examining data through 1992, Yang and Zhou (1999) determined that the marginal productivity of labor in agriculture, TVEs, and SOEs was Y 601, Y 1,211, and Y 9,346 respectively, in 1992. Such large productivity gaps indicate barriers to labor mobility prevent a narrowing of the differential—despite large numbers of sanctioned migration and larger numbers of “floating” population. The government attempts to control the pace of migration to ensure urban services are not overwhelmed, and in part to assure urban grain sufficiency. Other factors also constrain migration, including: lack of job information, housing, medical, education and other social services which are unavailable to rural migrants. Government policies continue to support and subsidize urban standards of living, including the absence of hard budget constraints for SOEs (protecting urban jobs), and low-cost capital for urban enterprises although housing and enterprise reforms and fiscal constraints are mitigating these benefits as urban workers now pay higher rents and contribute more to their pension and medical benefits.

Intrarural inequality has also risen rapidly during the 1980s and early 1990s, a type of inequality that may be more socially sensitive since rural residents may be more aware of the differences in standard of living between themselves and other rural counterparts (Rozelle,

1996). The World Bank (1997a) has shown that one of the largest gaps exists between coastal and inland provinces. Some of the gap may be due to factors restricting the flow of labor and other resources between rich and poor rural areas. With rising market integration, the barriers may be declining, but large initial discrepancies in resource, human capital, and locational endowments may require generations to equalize wealth levels.

It will be very difficult to improve the trends in rural/urban income ratios without improving labor efficiency and productivity through increased capital/labor and land/labor ratios in agriculture. While the former ratio can be increased by making capital more accessible, significant increases in the land/labor ratio can be achieved only by transferring labor out of agriculture. During the early and mid-1990s increasing agricultural prices contributed to increasing rural incomes, preventing further deterioration in the rural/urban income ratio but additional reliance on agricultural price policy is limited since the prices of many commodities are now above international prices. Shifting production to higher-value commodities and continued improvements in TFP will permit modest income growth in agriculture, but without additional land and capital per agricultural laborer, future per capita income growth in will be slow in agriculture.



*The production of labor-intensive, high-value commodities such as fruits and vegetables (particularly greenhouse vegetables), uses land resources more efficiently than does the production of grain crops – but more importantly, provides higher incomes.*

### B. The International Market

Internationally, exchange rate policies, grain trade quotas, and monopoly state trading influence the performance of China's rural economy and trends in rural incomes and consumption. Also the ongoing Asian financial crisis and the continuing lack of economic growth and reduced demand for imports in Japan and Korea have the potential to hinder rural growth and development.

China's agricultural export value (food and tobacco, but excluding natural fibers) is only 7 percent of total export value—considerably less than most of its neighbors; also agricultural exports are only 7 percent of agricultural GDP. Thus while \$11 billion of annual agricultural exports is obviously important, it is *relatively* unimportant in relation to total production and to the share of total exports. The impact on agricultural imports likely will be minimal given the relatively high quota and tariff protection for agricultural commodities. Several models (e.g., IIE model described in Noland et al. 1998 and the G-Cubed model described in Stoeckel et al. 1998)<sup>1</sup> have been developed to measure the devaluation impact of Asian-crisis countries on trade patterns. The IIE model indicates China's trade balance could decline by \$12 billion—primarily through reduced exports, with 50 percent of that reduction accruing to Japanese and Korean markets. The balance of the reduced exports would be derived through third-country markets lost to competition from the devaluing Asian countries. The G-Cubed model indicates that China's import adjustments would be relatively rapid and would return to their baseline trend by 2000. However, three factors will mitigate against increased imports: (a) quota and tariff protection of agricultural commodities are relatively high; (b) with the exception of palm oil, the major agricultural imports are temperate commodities that are not produced in the devaluing countries; and (c) internationally traded commodities are internationally priced and will be largely unaffected by devaluations.

Japan, Korea, and Hong Kong are China's

principal export destinations—absorbing about 70 percent of its agricultural exports. Total exports to these destinations have declined over the past year, but the share of agricultural commodities has remained relatively constant. *Thus, the recovery of the Japanese and Korean economies is crucial to maintaining and expanding China's agricultural exports.*

As the manufacturing sector is less regulated and more important in the external market than agriculture, it will likely absorb most of the market changes brought about by the Asian crisis. TVE export destinations are unspecified, but TVEs export about 40 percent of their output. Thus, TVE export demand will likely be reduced, which in turn will reduce TVE employment and rural incomes but the impact on agriculture should be marginal.

### Exchange Rate Policies

Since consolidating the two-tier exchange rate in late 1993 the nominal exchange rate has appreciated about 5 percent against the U.S. dollar (through 1997). The real effective exchange rate (trade weighted), however, appreciated by 30 percent (International Monetary Fund). To the extent that international prices influence, or establish an upper bound, for domestic prices, the impact of exchange rate appreciation has been to limit the domestic price increases. Thus, had the real effective exchange rate not appreciated, farmgate prices for grain, cotton, oilseeds, and other traded commodities *could* have been 30 percent higher. Instead, the appreciation benefited urban consumers.

Although prospects seem increasingly unlikely, the international community remains concerned about a currency devaluation by China and its impact both internally and externally. A devaluation would erode domestic and international public confidence, reduce foreign direct investment (FDI) inflows, and increase domestic debt but would yield relatively small gains. While China could theoretically benefit by regaining some comparative advantage in labor-intensive manufacturing previously lost to devaluing countries, actual gains would be

limited—particularly if it precipitated a further round of devaluations. Actual gains would accrue in competing third markets, as bilateral trade between China and the Asian-crisis countries is relatively small. These factors, plus the large positive trade balance, appear to substantially mitigate this risk.

A devaluation would have different impacts on different components of the rural and agricultural sector. Producers of tradable commodities, both farmers and industrial TVEs, would experience increasing costs because fertilizers, agrochemicals, and various other raw materials are imported. However, output values would increase more thereby increasing incomes for that component of the rural sector. Producers of nontraded goods, subsistence farmers, poverty groups, and urban wage earners would experience an income decline, and the number of residents living in poverty would increase. The impact models suggest that a very modest devaluation would return the real effective exchange rate to the pre-crisis level.

In contrast to many other Asian economies, China has a continental market—most domestically produced goods are domestically consumed, with modest reliance on external markets. Although exports and worldwide demand are important to domestic growth, contributing about 3 percent to recent economic growth, the health of the domestic economy is of far greater consequence. Total trade as a percent of GDP, or trade intensity, demonstrates the relative importance of external markets. In the Asian-crisis countries, trade intensity ranges from about 50 percent (Philippines) to almost 200 percent (Malaysia). China's trade intensity is 35 percent, with exports composing 20 percent of GDP. However, using purchasing power parity (PPP)-adjusted estimates of GDP reduces the trade intensity ratio to about 10 percent.

### Import Restrictions

China's scarcity of land and abundance of rural labor imply that market forces will ultimately make land-intensive products expensive—if imports are restricted. Normal weather

fluctuations imply that, periodically, inflation will emanate from a combination of diminished production and restrictions on imports. Economic logic suggests that low-value, land-intensive, and nonperishable products (such as grain) should be produced less and imported more, so that higher-value, labor-intensive commodities, like fresh vegetables and animal products, could be produced more efficiently, abundantly, and competitively. Nevertheless, grain imports are restricted. Possible explanations include concerns for: (a) famine, which occurred as recently as 1958–60; (b) overreliance and high cost of importing large quantities of grain (i.e., China is too large to rely on substantial imports of grain, as it would increase world prices and deprive other importing countries of supplies); and (c) managing rural-urban terms of trade (i.e., transfer investable and consumable resources from rural to urban areas). Nevertheless, the impact of this restriction is suppression of the value of overall rural output and rural household incomes.

### State Trading

Grain exports and imports traditionally function as balancing mechanisms to dispose of domestic surpluses or to acquire stocks to make up production deficits. However, China's external grain trade also serves political interests as grain trade targets are planned, but unpublicized, in advance of the crop year. Trade is intended to be stabilizing, but unfortunately, China's execution of trade plans has tended to exacerbate fluctuations in domestic cereal supplies (rice, wheat, and corn), and prices (Carter et al. 1997; World Bank 1997b).

### Conclusions and Recommendations

The rural and urban sectors are strongly linked, but full integration is impeded by various policies and institutions that fosters or hinders resource flows. The policy framework transfers fiscal resources from the rural sector; the net flow of financial resources to the urban sector may be policy directed or may represent efficient markets that transfer resources to

higher return uses. Regardless, the rural sector provides a large net capital flow to the urban sector and illustrates the importance of maintaining a vibrant rural economy. Conversely, rural-urban labor flows are policy-inhibited, leading to adverse rural/urban per capita income ratios. It is improbable that long-term sustainable increases in agricultural income can be achieved without removing large numbers of agricultural laborers from the sector and increasing the average land/labor ratio.

The following medium term steps to progressively transfer labor from the agricultural sector and reverse the diverging trend in rural/urban income ratios are recommended:

- *Remove migration constraints.* This would include disassembling administrative and institutional barriers to rural laborers seeking urban employment. However, for this policy measure to be effectively implemented, the current rise in unemployment in urban labor markets must be reversed. As the State completes its labor adjustment over the medium term, it is expected that urban unemployment will decline and create a more

favorable environment for removing these restrictions without social disruption.

- *Support policies and social services that facilitates migration.* This would include support of a land use market that would permit migrants to lease their land to others yet provide a minimal amount of security if urban employment was terminated. Additional support to rural education to improve vocational skills would increase the marketability of the rural labor force and encourage migration. Removal of the constraints on urban non-residents' access to urban social services, such education for their dependents, would also promote migration.
- *Encourage the creation of labor-intensive off-farm jobs.* To modernize its economy China must support technology-intensive industries, which are typically capital-intensive as well. However, some industries have the option of operating in either capital- or labor-intensive modes; where this option exists the labor-intensive mode should be pursued given the large number of jobs that must be created to absorb agricultural labor, improve agricultural land/labor ratios and incomes.

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<sup>1</sup> Although CGE models have been developed to analyze the impacts of the Asian crisis, only the results from two of the more comprehensive models are mentioned in this report. They are (a) the model developed by Noland Liu, Robinson, and Wang (described in Noland et al. 1998), hereafter called the IIE model, and (b) the Asia Pacific G-Cubed model (described in Stoeckel et al. 1998).

### 3. Rural Public Finance



China needs a healthy public finance system to enable government to provide basic infrastructure and social services and an enabling environment for equitable and sustainable income growth. For the rural sector, this includes providing or facilitating investments in farmland improvements, agricultural research and development, extension services, infrastructure such as roads and communications, and social services (such as education, health, and social security). The fiscal system also sets incentives that guide the allocation of resources and influence development.

China has one of the world's most decentralized systems for providing government services. In many countries subnational governments provide day-to-day administrative and social services, but financing typically comes from the national treasury. Local governments

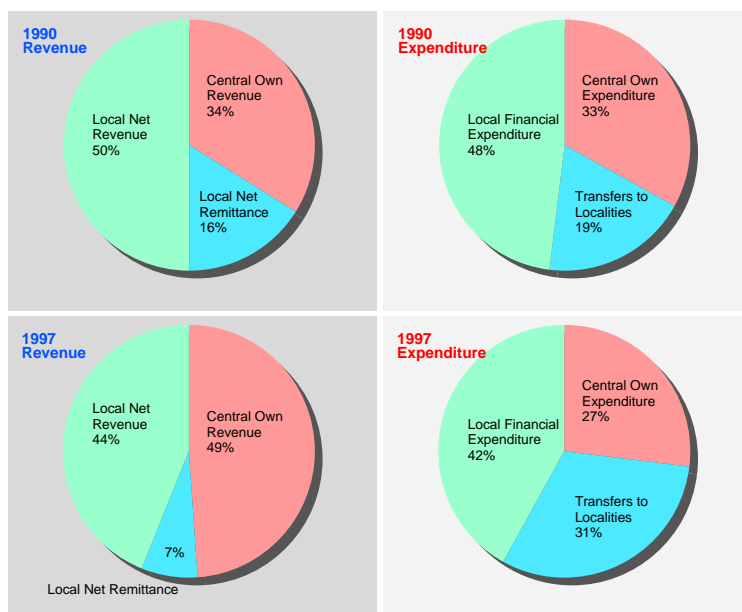
in China, however, are largely self-financing, a trend that has increased during the reform period. China's provincial county and township governments in rural areas financed 48 percent of budgetary expenditures from local sources in 1990, but collected 66 percent of the revenues (Figure 3.1), a level much higher than in most countries.

#### The Conduct of Rural Public Finance

A typical county budget is divided into three main parts, with roughly 40 to 45 percent of the total spent on social services, 25 to 30 percent on administration, and 10 to 15 percent on capital expenditures. The expenditure shares are changing as an increasing share of the budget is spent to meet social services mandated by the central government and pay nationally set salary levels. A distinguishing feature of China's

fiscal system is that rural government functions overlap and are performed jointly by the county and the township or town, with some help from village residents' committees. At the end of 1997 China had nationwide some 2,100 counties and county-level cities, 44,700 townships and towns, and 740,000 village residents' committees. This large governmental apparatus is staffed by a large and rapidly growing number of officials, whose salaries and benefits

**Figure 3.1: China, National and Subnational Shares of Revenues and Expenditures**



have commanded an increasing share of the budget. In contrast, while agricultural investments absorb an important share of both capital and administrative expenditures, its share has declined over time.

The expenditure responsibilities of township governments have two primary foci: social services, principally education, health and welfare; and administration of law and order and of disaster relief. Providing infrastructural support to the economy—agricultural extension, water conservancy, farm mechanization, and other capital investments in the rural sector is the responsibility of the county government.

Although villages are not a formal part of the government and do not have independent fiscal power, they still play an important role in China's fiscal system. When people's communes were disbanded in the early 1980s, production brigades and teams reverted to their traditional name of "village." However, they inherited a framework of governance from the collectives and exercise significant expenditure duties, such as salary or subsidy payments to village officials, social welfare for the aged and infirm, and sometimes supplementary educational or health provision. During the collective era, these obligations were financed from local proceeds. To the extent that many villages continue to carry on these functions, they have had to find off-budget mechanisms for financing them, usually through nontax levies on rural incomes and production.

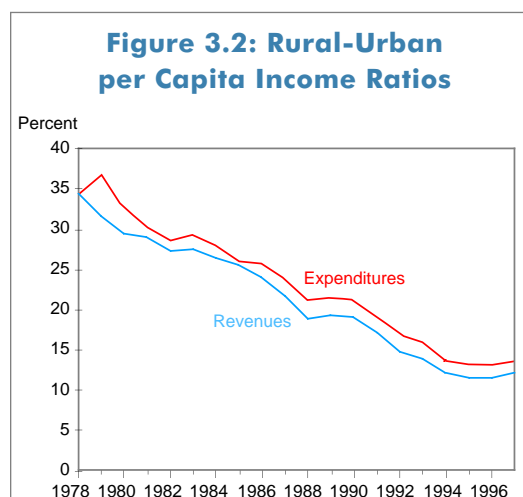
A legacy of the planned economy is the treatment of the agricultural sector as marginal to the fiscal system—it is neither a significant source of revenues nor a major recipient of fiscal transfers. In the planned economy, the real fiscal transfers took place through the price mechanism ("the price scissors") that extracted surpluses from the agricultural sector by setting low prices for agricultural raw materials and high prices for manufactured consumer goods (Huang and Rozelle). Support to agriculture included subsidies that were external to the fiscal system; they were provided through government controlled low prices for agricul-

tural inputs (fertilizers, fuel, and electric power) and investment in industries that produced agricultural inputs. As these price-based taxes and subsidies have disappeared, the tax contribution by agriculture and allocations to the rural economy have fallen.

These changes to rural public finance have occurred in the context of overall fiscal reform that has lagged behind China's transition to a market economy throughout the past two decades. The revenue-generating capacity of the old system has been eroded with dismantling of planning mechanisms, and the nationwide budget (all jurisdictions) has declined from more than 30 percent of GDP in the late 1970s to the current 10 to 12 percent of GDP (Figure 3.2). In contrast, treasuries in other East Asian and developed countries command 20 to 30 percent of GDP (some highly socialist nations such as Denmark and Israel approach 50 percent).<sup>1</sup> This fiscal decline has reduced the capacity and willingness of higher-level government to transfer resources to the rural sector.

### Tax Reform in the 1990s

Concern with central revenue decline led to a comprehensive reform of the fiscal system in 1993, as part of the effort to modernize macroeconomic policy. The main issues were defining a more stable and rising revenue base; making the tax structure more transparent and less distortionary; and modifying national-



subnational revenue sharing. Key provisions included the adoption of a value-added tax (VAT) and revenue-sharing arrangements. The new tax policy appears to have met some of its goals. It has stemmed the rapid fall of tax revenues as a share of GDP (Figure 3.2), and central government control of revenues and expenditures has reversed (Figure 3.1).

The tax system remains centered on industry. (The VAT is assessed primarily on industrial products.) Rural governments have become increasingly dependent on VAT revenues generated by TVEs, and the increased remittances of VAT to the national government has almost certainly increased rural budget deficits as little progress has been made in revenue redistribution. The reforms did not address regressive intergovernmental tax sharing and redistribution issues, and thus created serious shortfalls in many rural counties and townships. Tax sharing is based on collection, so that rich provinces receive more central transfers and rebates than poor provinces (Rozelle, Zhang, and Huang 1998a). Thus, overall intergovernmental transfers are strongly disequalizing. For example, Guizhou, Shaanxi, and Sichuan Provinces had budget deficits exceeding 20 percent in the mid-1990s, after including central government transfers.

The grain quota tax (during times when the market price is above the state-set procurement price) is no longer targeted at supporting urban

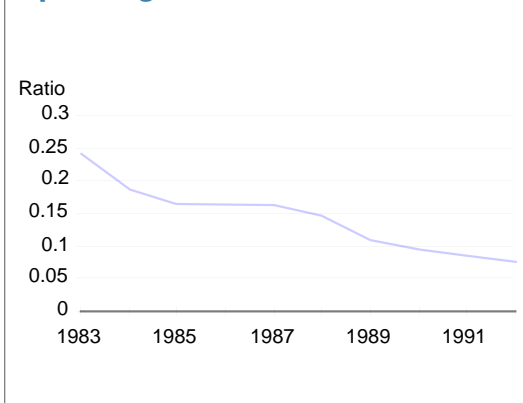
grain subsidies; rights to these quota taxes (the difference between market and quota prices) are unclear. The Ministry of Agriculture is experimenting with changing all farmer tax burdens into a grain tax, which has met with some success and some problems.

### Government Transfers

Subventions from national and provincial governments still are an important component of the budgets of counties and townships. However, the untied transfers that formerly provided resources to counties and townships for general expenditures are increasingly replaced by specific, earmarked transfers for agricultural infrastructure investment, education and health care support, welfare, and disaster relief. A 1988 national policy fixed general transfers in nominal terms, irrespective of requirements; in real terms, inflation has since eroded more than two-thirds of their value. The impact is most serious in poor counties.

Targeted transfers are eroding less rapidly, but the reforms have imposed more fiscal demands on localities, as transfers are inadequate to meet mandated expenditures. Unfunded public-service mandates abound; for example, the central government often announces targets, such as specific reductions in school dropout rates or improvements in infant mortality, but the funds to achieve the goals are not provided. To meet these mandates county and township governments must raise the financial resources.

**Figure 3.3: Investment to Wage Spending Ratio, Shaanxi, 1983-'92**



### Impact on Investment and Provision of Rural Social Services

Persistent fiscal gaps, or shortfalls between required expenditures and fiscal capacity, have several adverse effects. One is that many rural governments are unable to provide the level and quality of social services mandated by national policy.

### Investments

Deferred investment is an immediate victim of fiscal shortfall. As officials struggle to meet

wages and other immediate needs from diminishing revenues, these needs are displacing development-oriented investments (Figure 3.3). Even if budgetary officials are directed to allocate funds to fixed investment, the funds are often diverted or borrowed, and if not returned, the investment is not just delayed but permanently deferred.

### Rural Education

Calls from the national government to bolster rural education are not matched by earmarked allocations. National officials have set an education expenditure target of 4 percent of GDP by 2000, up from 2.66 percent in 1994. Imploring local governments to increase education funding more rapidly than the growth in financial revenue has gone largely unheeded, and meeting this target appears improbable. Insufficient fiscal revenues have undermined the quality of education as measured by a number of human capital indicators. For example, a State Statistical Bureau survey shows that 30 million Chinese students have never been to school or have dropped out, 4 million drop out of school each year because they cannot afford the cost, and only 64 percent of rural students complete primary education without repeating a year.

### Rural Health

Ministry of Public Health goals call for 8 percent of rural budgets to be spent on health care. National officials have mandated improved facilities, expanded coverage, and minimum training for doctors. Rules describe what is expected of county and township leaders for establishing ideal rural health systems. However, like education, the actual resources allocated to achieve national objectives fall far short of needs. The national government allocates only 2.4 percent of its recurrent budget for health care services, and only 1.2 percent of the capital construction fund. The situation is more severe in poor areas.

School fees and health charges have soared in recent years. West (1998) reports in many areas there are both rising dropouts due to difficulty in meeting these new schooling costs, and falling maternal and infant health care visits because of rising costs. In areas where funds cannot be raised, education and health services have disappeared or declined in quality, resulting in the large-scale out-migration of teachers, doctors, and other professionals.

### Extrabudgetary Revenue Sources

A second adverse effect of fiscal pressure is the growing reliance on off-budget finance. The

**Table 3.1**  
**Township Finance in China, 1986-93 (Percent)**

	1986	1987	1988	1989	1990	1991	1992	1993
<b>Total revenue</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Budgetary revenue	83.3	82.7	80.0	75.9	74.6	72.0	71.5	73.8
Extrabudgetary revenue	5.0	4.7	5.6	6.0	6.4	6.9	7.1	6.5
Self-raised funds	11.7	12.6	14.4	18.1	19.0	21.1	21.5	19.8
<b>Total expenditure</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Budgetary expenditure	77.4	76.6	74.3	69.4	69.0	66.4	65.9	67.6
Extrabudgetary expenditure	6.4	6.1	7.0	7.2	7.4	7.7	7.6	7.0
Self-raised funds	16.2	17.3	18.7	23.4	23.6	25.9	26.5	25.4

Source: Ministry of Finance, 1994.



ability of local governments to raise revenues varies greatly and determines the quantity and quality of local public services. County and township officials are evaluated on their fulfillment of mandates. This is an important reason for the increasing of local fee assessments and rising burdens (Wen 1998).

To meet the revenue requirements of these expenditure demands, county and township governments attempt to increase revenue from off-budget sources. Without legal taxing authority or ability to borrow, counties and townships have developed off-budget sources, primarily extrabudgetary funds (EBFs) and self-raised funds (SRFs). From the late 1980s through the early 1990s, the proportion of total funds from these sources rose continuously, reaching 28.6 percent in 1992 (Table 3.1). At the township level, EBFs are fewer (compared to cities), and consist mostly of rural education and agricultural tax surcharges. The majority of off-budget revenues come from SRFs, which include miscellaneous fees (assessed on local enterprises), rental income (from leased collective assets), and remittances from TVEs. The Ministry of Finance has reported that, on a national basis, off-budget revenues bring total revenue collection to about 30 percent of GDP (*Agency France Presse*, Beijing, Sept. 22, 1998).

The growth of off-budget revenues has eased fiscal pressures for many localities, but it has also produced adverse consequences. It has hastened the decline of the formal fiscal system by providing an alternative tax source that is 100 percent retained. It has created a tax system beyond the reach of the formal fiscal system that is ad hoc, nontransparent, and regressive; the lack of legitimacy may be more of a source of rural discontent than the total burden. Also, local officials rely almost exclusively on enterprises for SRFs, thus the most rural and poorest jurisdictions have the weakest potential for supplementing budgets from these sources.

Perhaps the most egregious consequence of off-budget financing is the tendency of county and township governments to give policy and

regulatory agencies control over the assets they regulate or operate (or the resources they are charged with protecting). Officials then encourage agency officials to use these assets to generate income for staff salaries and other expenses. This is a pervasive issue and will resurface in subsequent discussions of natural-resource management and agricultural extension.

### Equalization Issues

Previous studies have noted unusually large differences in per capita budgetary revenues among provinces (World Bank 1992a; Wong, Heady, and Woo 1995). However, revenue and expenditure differences are also large at subprovincial levels; and with decreasing transfers, per capita revenue and expenditure have become increasing correlated. While the VAT was designed to permit the central government to control more fiscal resources, negotiations have enabled provinces to keep a large proportion of the taxes they generate. This retention of taxes, combined with the regressive rebate, mitigated the more progressive nontax transfers and intended redistribution impact.

### Fiscal Crises in Poor Counties

In recent years deficits have become persistent in poor counties. In 1994, half of China's counties had difficulties meeting even basic expenditures, such as wage disbursements (Park et al. 1996). Counties can generate extra revenues by selling urban permits, borrowing funds earmarked for other uses (such as family planning or school construction), or borrowing from local SOEs or banks—a frequent, although legally prohibited, practice. Poorer counties are revenue starved even more than is reflected in acknowledged net deficits; hidden deficits are represented by budgetary funds diverted from prescribed uses to pay salaries and wages. Salary and wage payments are often deferred, and some county and township governments have declined to pay for employee benefits, such as health reimbursements. (Counties can appeal to upper-level governments for special subsi-

dies or increases in fixed subsidies, but these adjustments are only made in special cases, such as natural disasters.) These hidden deficits indicate that financial statistics systematically underestimate true fiscal deficits.

### Effect of Budget Pressures on Public Expenditure Patterns

The pressure to eliminate deficits may result in underinvestment in public goods, especially in poorer areas (where needs are greatest) and increase incentives for local governments to maximize revenues rather than social welfare (Wu 1994). Local governments' placing priority on meeting their wage bills has led to deferred maintenance and deteriorating capital stock in many of the poorer counties—and consequently to declining efficiency of resource use (Gallagher and Ogbu 1989).

The impact of fiscal reforms on the ability of county and township governments to make productive investments in infrastructure and social services has important implications for economic development in poor regions. Some of the fall in investment in poor counties might be expected to be compensated by increased spending through other channels, especially China's poverty program. Recent research in Sichuan, shows that local investments in education, health, and agriculture lead to growth, but poverty program investments typically replace, rather than supplement, budgetary investments (Rozelle, Zhang, and Huang 1998a); and on-budget investments and social services have declined from the mid-1980s to the 1990s.

Deficit counties have begun to reduce their wage obligations through wage suspension, staff termination, and reorganizations that reassign, but do not terminate, local government personnel. Some county and township government bureaus have been redesignated as companies, with worker pay linked to profits. Other bureaus and agencies are urged to design and pursue revenue-generating activities; and many staff (both those reassigned and still in government) pursue entrepreneurial activities, such as opening restaurants and hotels or engage in trade.

### Conclusions and Recommendations

The conduct of rural public finance affects the entire nation's stability and long-run growth prospects. However, the rural fiscal system generates inadequate revenues and poorly redistributes collected revenues, which, unless improved, will constrain long-term development.

Fiscal decentralization has transferred control over most resources and residual rights over most incremental revenues to subnational jurisdictions. National directives and tax-collection problems have also reduced resource redistribution (Wong 1997). Fiscal reforms have hardened budget constraints for all subnational jurisdictions; and fiscal sharing rules have increased tax collections in both rich and poor regions (Park et al. 1996; Wong 1997). Some scholars have identified growth-inducing effects in China's fiscal reform, supported by empirical evidence (Lin, Liu and Zhong 1997). However, the reforms are incomplete, as widespread fiscal crises suffered by so many rural governments has reduced potential economic growth, welfare, and equity, and has led to investment starvation. Some 70 percent of the counties and townships have net deficit budgets, and their policy obligations continue to rise.

China's tax system is characterized by deficient revenue generation and public service spending at all levels. The tax system is heavily industry-dependent and has neither made tax assignments clear, nor given rural communities a revenue base on which to build rational fiscal plans. The 1994 tax reform increased the tax collection power of the central government, which would allow more equitable redistribution. While more revenues have flowed into central coffers (reducing local revenues), little has been shifted to poorer areas, and the new tax policy continues to favor relatively affluent areas, exacerbating rather than alleviating the rural fiscal crisis.

Fiscal resources in poor deficit areas are insufficient to meet the rural sector's development investment requirements. Increased pressure at county and township levels to generate revenues leads to biased development policies

and may become distortionary and inimical to economic development. For example, investments in revenue deficit regions may tend to be industry biased, because of the relative ease of tax and fee extraction, even if investments in agriculture might better serve growth and distributional goals.

We recommend the following steps to improve public financing of the rural sector:

- *Continue financial reform to rectify a potentially serious constraint to long-run sustainable growth and poverty alleviation.* Mechanisms to broaden local tax bases and generate more on-budget revenue from all sectors, including agriculture, and improve revenue redistribution to reallocate revenues more equitably are sorely needed. China must reconsider the regressive components of the overall fiscal system, especially the new VAT and rebate policies, to improve fiscal flows to poorer areas. Given the magnitude and sensitivity of the problem, it must be solved internally; outside agencies can assist only marginally by providing assistance in identifying the strengths and weaknesses of the current system, designing and assisting with experimental programs, and assisting in public fiscal policy training.
- *Continue evaluating the consequences of managing such a highly decentralized economy, including both benefits and costs of decentralization.* Alternative fiscal structures to be considered include returning basic fiscal responsibility to the county, from the township—for all but perhaps the most industrialized towns. Such a move would have a number of consequences and tradeoffs. For example, the incentive for townships to monitor policy and reduce administrative costs might decline and policy implementation might suffer. In return, however, the scope for redistribution would broaden; administrative personnel could be reduced; and unauthorized taxes, fees, and levies may be reduced.
- *Track grain quota taxes and design ways to capture them for county and township budgets or eliminate all or convert it into a more easily collected tax, such as a progressive land or head tax.* Assistance could be provided in evaluating the results of converting all farmer tax burdens into a grain tax and in expanding these efforts to look at a broader array of fiscal instruments.

<sup>1</sup> World Bank, *World Development Report, 1997*, World Bank, Washington, DC, 1997.



*Traditional (backyard) livestock and poultry production balances crop production by utilizing crop residues and surplus farm labor – and adds to farm income.*



## 4. Rural Credit and Finance



Mobilizing and efficiently using available financial resources is important for achieving high rates of economic growth, especially in developing countries where such funds typically are in short supply. As economies grow, financial institutions often play an important role in directing resources to their most productive use. As a result, greater financial intermediation (loans as a share of GDP) usually accompanies higher incomes (Gertler and Rose 1996; Levine 1997). However, governments in developing countries often use state control of the banking system to pursue policy goals that are not always consistent with efficient intermediation.

The recent Asian financial crisis highlights the potential dangers of weak financial systems. The crisis has heightened scrutiny of China's state banking system, whose fragility stems from the continued use of the financial system to support urban-based state-owned enterprises and other policy lending. The government has also implemented strict lending controls periodically to combat inflation. Recently, steps have been taken to reduce the amount of nonperforming loans, which account for at least a quarter of outstanding loans of China's four major state-owned banks (Lardy 1998). Pursuit of these goals has led to strict regulation and efforts to control emerging financial institutions. Despite a number of important financial sector reforms, financial markets have been liberalized more slowly than most sectors (Tam 1995). Significant progress in reforming China's rural financial institutions (RFIs) thus will likely depend upon the success of overall SOE and banking system reform.

Given that the majority of China's population resides in rural areas, rural incomes have grown markedly during the reform period, and

rural enterprises have been the most dynamic sector of industry, the rural sector is a major source and target of financial resources fueling China's growth. Concern over the performance of China's RFIs stems from several factors. First, the banking system's hunger for financial resources may unduly tax RFI deposits and policy goals may influence lending. Second, regulated interest rates imply credit rationing, making private entrepreneurs and farmers, especially the poor, likely to have difficulty gaining credit access. TVEs also have had difficulty gaining access to bank credit, especially during periods of macroeconomic stabilization (Zhu and Brandt 1995). Even without interest rate regulation, small farmers are often rationed out of formal credit markets (Carter 1988). Field researchers observe that in some poor villages, local credit cooperatives have stopped lending to farmers. Between 1988 and 1995, rural financial intermediation has not deepened; in fact, farmers have reduced credit financing for key activities, such as fertilizer and livestock purchases (Table 4.1).

### Types of Rural Financial Institutions

The rural sector is serviced by financial institutions that differ in size, branch numbers, and role in the rural economy. The largest RFIs are the Agricultural Bank of China (ABC), the Agricultural Development Bank of China (ADBC), Rural Credit Cooperatives (RCCs), and Rural Cooperative Funds (RCFs).<sup>1</sup> Each plays a unique role in providing deposit and lending services to the rural sector and overall economy. Together, the ABC, ADBC, and RCCs account for 24 percent of total assets, 27 percent of total deposits, and 34 percent of total lending (Table 4.2).

**Table 4.1: Percent of Households Engaged in Different Activities that Finance Activity with Loans and Average Loan Amount, by Activity**

Year	Fertilizer	Livestock	Small Business	Illness	Construction	Other
Percent of Households Engaged in Activity that Finance Activity with Loans						
1988	30	25	32	38	56	25
1995	22	18	34	37	56	24
Average Loan Amount of Household Receiving Loan (yuan, in 1988 prices)						
1988	125	238	1,205	494	1,667	499
1995	90	143	3,767	849	2,161	550

Note: There are 32 observations for Zhejiang, Sichuan, Hubei, Shaanxi, and Shandong; and 24 observations for Yunnan.  
Source: Village survey by Rozelle, Park, Huang et al., 1996.

**Table 4.2: Deposits, Loans, and Assets of China's Financial Institutions, 1996**

	Deposits	Loans	Assets
National Total (billion yuan)	6,853	6,433	12,856
<i>Of which (percent):</i>			
Policy Banks	0.6	14.1	7.9
Agricultural Development Bank	0.6	9.7	5.5
State Development Bank	0.0	4.1	2.2
Export/Import Bank		0.2	0.2
State Commercial Banks	65.7	64.5	72.6
Agricultural Bank	13.9	14.0	11.4
Industrial and Commercial Bank	27.7	28.0	28.2
Bank of Communication	7.1	7.1	16.4
Construction Bank	17.0	15.5	16.5
National Commercial Banks	6.6	4.7	6.0
Regional Commercial Banks	1.8	1.5	1.6
Credit Cooperatives	20.8	14.0	10.1
Rural Credit Cooperatives	12.8	9.8	6.8
Urban Cooperative Banks	2.1	1.2	0.2
Urban Credit Cooperatives	5.8	3.1	3.1
Postal Savings	3.1		
Trust and Investment Companies	1.3	1.2	1.8

Source: Data from *China Financial Yearbook 1997*, compiled by Sehrt (1998).

Interest rates, both deposit and lending, are regulated by the central bank, the People's Bank of China (PBC), and are adjusted at irregular intervals. Effective rates as of July 1, 1998 were as follows:

	Percent
Working capital loans – 6 mos.	6.57
Working capital loans – 1 yr.	6.93
Construction loans – 3-5 yrs.	7.65
Demand Deposits	1.44
Time Deposits – 1 yr.	4.77

Source: *China Statistical Year Book, 1998*

### **Agricultural Bank of China**

The ABC was established to support state trading units and enterprises in rural areas, and farmers. It has branches in nearly every county, and has township-level business offices (which approve loans) and smaller deposit-taking branches in urban and rural areas. Until 1994 loans from the PBC were an important source of funds—which financed policy loans, mainly for agricultural commodity procurement by state trading companies. When policy lending responsibility was transferred to the ADBC in 1994, the sources and uses of funds changed. Deposits, primarily by individuals, are now the major source of funds, although deposits by firms are growing more rapidly. Households receive only 16 to 17 percent of the lending portfolio; the major use of funds is working capital loans for industry, commerce, and TVEs. As the ABC has become more commercial, it has increasingly served as an intermediary in transferring funds out of rural areas. The ABC was requested to resume responsibility for a large and growing group of policy loans in 1998—they now compose about 10 percent of lending activity. Repayment on these loans remains problematic because of an inability to monitor loans effectively and credibly demand repayment.

### **Agricultural Development Bank of China**

The ADBC was established in 1994 to assume policy loan responsibility and allow the ABC to become a fully commercial bank. The ADBC's policy loans increased rapidly from Y 356 billion at the end of 1994 to Y 625 billion in 1996. About 90 percent of policy lending is financed by PBC low-interest loans, mainly for procuring agricultural commodities (primarily grain, but including cotton, pork, and oilseeds) by state trading companies. ADBC lending to grain bureaus has become a significant share of nonperforming loans in the banking system and was an important reason for reform of the grain marketing system in 1997. To allow the ADBC to concentrate on addressing this prob-

lem, administrative responsibility for poverty and other development loans was returned to the ABCs in 1998.

### **Rural Credit Cooperatives**

RCCs are the most numerous RFIs and the only financial institutions with well-developed village networks. Although cooperatives in name, they are closely supervised by the state banking system. Historically, they have had a close administrative relationship with ABC, and until placed under PBC supervision in 1996, served as a conduit to channel rural household savings to the ABC. More than 50,000 township-level RCCs exist, operating as independent accounting units, complemented by more than 250,000 village credit stations. The RCCs are the major depository for rural household savings and, in principle, have greater flexibility in meeting local credit demands. They have few policy loan responsibilities, more leeway to adjust interest rates, and provide greater convenience through deeper village penetration. However, they are subject to local political influences and portions of their extensive branch network are unprofitable. RCCs have been more effective (than the ABC) in meeting the credit needs of rural households and enterprises (Park, Brandt, and Giles) but the lending portfolio is primarily TVE loans; agricultural households receive only 24 percent of the lending volume.

### **Rural Cooperative Funds**

RCFs emerged in the 1990s in many parts of China as new and dynamic quasi-state financial institutions, organized at the township level under the administrative supervision of the Ministry of Agriculture, with lending focused on local households and rural enterprises. Because they are unofficial, RCFs are less strictly regulated and cannot accept deposits or make loans; instead they collect shares and allow borrowing—but have stricter collateral and guarantor requirements than other RFIs. Share funds were estimated at about Y 100 billion at the end of 1996 (Cheng, Findlay, and Watson 1997), 44 percent from households (Park, Brandt, and

Giles 1997). RCFs are the only RFI primarily concerned with agriculture. Loans to TVEs were initially prohibited but later permitted as capitalization increased. In 1995 households received 45 percent of RCF loan volume; TVEs, 24 percent.<sup>2</sup> Their success suggests a large unmet demand for rural credit. RCFs compete with RCCs for deposits (shares), and because of fewer interest-rate restrictions and tax exemptions, provide higher shareholder returns than RCCs. In 1998 The State Council announced its intention to incorporate RCFs into the RCC system. However, local government leaders and the Ministry of Agriculture support the RCFs, as they are locally controlled and focus more on household agricultural activities. Implementation of this policy is still under discussion among ministries and regulatory agencies.

### Other Financial Institutions

Several other financial organizations operate in rural areas. Some rural households receive loans directly from the local government budget or Ministry of Civil Affairs relief programs. In some provinces, that ministry has set up Mutual Assistance Credit Groups (MACGs) that provide production and consumption loans to help poor households to smooth income shocks. MACGs were estimated to hold about Y 1.2 billion at the end of 1993 (Zhu, Jiang, and Braun 1996). However, most MACGs have encountered difficulties of falling capitalization due to the low interest rates and relief orientation, which provides poor incentives for loan repayment. Informal organizations, such as rotating credit societies, have also been revived in the reform era.

### Performance of RFIs: Savings and Intermediation

Household savings deposits have reached high levels and rural deposits have increased steadily along with rising rural incomes. However, they have increased more slowly than urban deposits and comprise a modest share of total deposits (13 percent). The marginal propensity to save is relatively high (0.32) but lower

than in the early reform period.<sup>3</sup> Also, the wealth profile of rural households suggests that sizable savings are not held in the form of deposits or other financial assets. Combining financial and State Statistical Bureau data, a four-component wealth profile (housing, deposits, grain, and fixed assets) of rural households was constructed. Deposits accounted for 17 percent of this wealth in 1996, and grain, which sits idly and is not intermediated for productive use elsewhere in the economy, accounted for 12 percent. Also, holdings of cash balances reportedly are nearly as great as savings deposits in some regions. Rural residents have a high propensity to invest in residential housing, by far the largest component of wealth.

Informal lending plays a slightly more prominent role in Chinese villages than in other Asian countries (Park 1998). Informal borrowing has been 10 to 11 percent of income during the 1990s, and a national survey found that more than 65 percent of farm loans were derived from informal sources. Informal loans are more important than formal loans, especially for consumption.

Eighty-five percent of informal loans are at zero interest, but when interest is charged, it is at least twice that charged for formal loans. In a national survey, the number of villages reporting positive interest rates for private lending doubled between 1988 and 1995. The average monthly rate on informal loans was 1.9 percent (25 percent per year), considerably higher than the rate set by the state (about 8 to 10 percent). While this rise in informal lending is a positive trend, and has been shown to increase labor mobility (Rozelle et al. 1998), fertilizer use (Xiao 1998), and small business development, its expansion suggests a failure of formal lending institutions to meet the credit demands of rural residents.

In the 1990s, rural lending by RFIs has not increased significantly as a share of rural economic output, contrary to the expected pattern of greater intermediation with higher incomes. ABC intermediation, in particular, has deteriorated. While RCC intermediation has increased,



many farmers and other small potential borrowers are still rationed out of formal credit. In addition, more developed provinces, especially coastal provinces, have lower rural financial intermediation rates than poorer provinces, a striking pattern that implies that richer provinces are being taxed by the financial system.

Econometric analysis of intermediation rates show that ABC/ADBC lending is highly influenced by policy concerns, and that funds do not flow as expected to faster growing, more developed regions. The pattern of RCC lending, while not highly influenced by policy variables, also does not respond to economic fundamentals. These findings suggest significant barriers to interregional investment and lending. Much of this is due to regulation. For example, recent reforms have greatly restricted horizontal movement of funds among banks. Local governments sometimes mandate that funds be retained for lending to local enterprises and individuals. Also, field work has shown that the lack of regulatory protection and clear rights to monitor, control, and access investment earnings make banks reluctant to loan across jurisdictional boundaries.

### Challenges of Financial Reform

Financial system reform, including decentralization and commercialization, was one of five priority reform initiatives announced at the 1998 National People's Congress. Priority has been given to reducing the large volume of bad debts held by China's state financial institutions, but concern for rural access to credit has also turned official attention to rural financial reform. In August 1996 the State Council issued a "Decision on Rural Financial System Reform" and established an interministerial Coordination Group for Rural Financial System Reform, led by PBC (The People's Bank of China 1997).<sup>4</sup> The reforms are not completely new, as changes in the rural financial sector are part of a broad reform initiative that began in the 1980s.

With stability a national priority and continued financial support to SOEs still a neces-

sity, the government maintains control over financial resources to influence the composition and level of bank lending. The decision to support poorly performing SOEs may reduce the financial resources available to the rural sector. This, in turn, creates pressures to tax resources rather than encourage efficient financial intermediation.

The priority focus of current financial reform is to preserve the solvency of the banking system while addressing the bank's nonperforming loans—a process that almost surely will require significant bank recapitalization. While the annual reports of both the ABC and ADBC show modest profits, these figures lack credibility; ADBC officials have openly acknowledged an inability to cover costs.<sup>5</sup> The ABC also has a large stock of overdue loans with little prospect of repayment. Similar problems plague the RCC. In recent years, more than one-third of RCC branches have reported losses,<sup>6</sup> and as of 1994, 31 percent of RCC outstanding loans were delinquent (Shen 1998). These figures underestimate the true amounts of overdue loans because loans are often rolled over (refinanced with new loans) rather than being classified as overdue.

Improving profitability of financial institutions is closely tied to improving loan repayment, which in turn is tied to effectively screening and monitoring projects. In this way, banks' pursuit of profits promotes efficient resource allocation. Some rural financial institutions have instituted better incentive systems for their managers and staffs. In some areas, local branches keep independent books, charting local profits and loan portfolio composition, and base compensation packages on each unit's performance. Branch restructuring, adoptions of new loan approval procedures, and use of credit histories are becoming more common.

Regulated *interest rates* on deposits, loans, and interbank borrowing and lending probably play the largest role in distorting resource allocation decisions by inviting misallocation and rent-seeking. Inflation has led to negative real interest rates on deposits and loans in some

years. Official rates are well below those for informal lending, and without the ability to respond flexibly to the demand characteristics of different groups, the formal financial sector must exclude some of them. Between 1996 and 1998 many local branch banks reduced lending in favor of depositing additional funds with the PBC—which was more profitable given the interest rates offered, expected repayment rates, and the costs of transactions. In early 1998 the PBC adjusted the difference between reserve deposit and loan interest rates to encourage greater lending.

The ABC and RCC permit independent branches to adjust official interest rates within regulated bands, but local governments have the authority to narrow these bands. RCFs have the most flexibility to adjust interest spreads by adjusting dividend payments.

The ability to transfer funds across regions and institutions is necessary to diversify risk and intermediate funds to their most productive use. The interbank market was gradually liberalized over the 1980s and early 1990s (Xia 1995). However, in 1996, control over fund flows was strengthened and the interbank market centralized. Without national office authorization fund transfers were allowed vertically, but only within the same bank. RCCs can freely transfer funds to other branches in the same county through the county association of RCCs, but transfers between counties must have PBC authorization.

Other policy factors influencing profitability include ill-defined incentives for bank managers to maximize profits; excessive reserve requirements and loan quotas; poor accounting and credit rating systems; and the combining of policy and commercial lending in the same institutions. Institutional constraints, such as inability to seize collateral and a legal system that poorly enforces loan repayment, still remain, making it difficult for banks to support high-return but risky ventures.

A stated aim of the reforms is to more clearly separate policy lending from commercial lending, but efforts to separate these functions in

separate institutions have achieved limited success. Some ADBC loans have been diverted to commercial uses and some ABC loans remained policy oriented. The ADBC took over the ABC's policy loan portfolio in 1994, but some of the policy loans were returned to the ABC in 1998. Delinquent policy loans continue to be a major problem and will require stronger measures than simply isolating loans in policy banks.

Part of China's financial reforms have been to diversify the range of financial institutions and to increase competition. Regional banks, private banks, trust and investment companies, other nonbank financial institutions, and even a few foreign banks have gradually entered the financial sector. The government, after segmenting the lending responsibility of state-owned specialized banks in the 1980s, has encouraged more open competition among them in the 1990s. However, the recent failure of the Guangdong International Trust and Investment Company suggests that nonbank institutions also may be saddled with bad debt, raising concerns about the system's ability to prudently regulate banks.

Local governments that have influence over local bank branches also may seek to protect the deposit base of "their" banks to further their own agendas. These factors create pressures to restrict competition from new and innovative financial institutions and to resist implementation of reforms that grant full independence to bank managers. In recent years, the government has sought to increase regulation over urban credit cooperatives, organizing many into Urban Cooperative Banks (Sehrt 1998). In 1998, the State Council announced its intention to incorporate RCFs into the RCC system: each RCF would either become a new RCC branch (or merge with one) or be disbanded. Even if these takeovers are not completed, many rules still restrict the expansion of activities of less traditional RFIs, such as RCFs and private banks. At the same time, prudent financial regulation of new financial institutions must be maintained.

### Reaching the Poor and the Role of Microfinance<sup>7</sup>

Most observers believe that China's regulated financial system has been especially hard on the poor, who have had difficulty gaining access to loans. However, poor areas may have benefited from interregional barriers to intermediation; recent surveys in poor counties surprisingly find that many households have at least partial access to formal credit.<sup>8</sup> As the system becomes more commercial, however, more funds will likely flow from poor to rich areas. New microfinance institutions (MFIs), which began in 1994, hold promise for eventually providing financial services to large numbers of the poor. However, they face difficulties, given the strict regulatory environment, lack of financial expertise, influence of local governments, and remote nature of poor villages.

Formal financial institutions often deny loans to poor rural households because these households lack collateral, face riskier environments, and need small loans that have high transaction costs. The government has tried to reach the rural poor through a targeted, subsidized loan program begun in 1986. As with programs in other developing countries, it has failed to reach the poor and has achieved low repayment rates (Park, Wang, and Wu 1997).<sup>9</sup> Subsidized interest rates of 2.88 percent per year make the loans attractive to rich households, enterprises, and local leaders. The loans are considered to have a welfare dimension that encourages delinquency. On-time repayment rates in 1991, 1992, and 1993 averaged 53, 55, and 48 percent (China Science and Technology Commission Research Group 1995).<sup>10</sup>

International experience has shown that improved access to credit can promote entrepreneurial activity and help lift the poor from poverty. Some operational models for providing financial services to households have been excluded traditionally from the banking system. These models range from expanding sustainable financial services by commercial banks (BRI in Indonesia and BancoSol in Bolivia) to group-based loans targeting the poor (Grameen Bank

in Bangladesh). Their successes stem from transaction cost reductions (by reducing traditional branch-banking structures) and the use of collateral substitutes (e.g., harnessing peer monitoring through group-lending contracts and improving incentives by increasing loan sizes—on the condition of repayment history). Pilot microfinance institutions and programs in China have experienced positive results since their introduction in 1994. However, most of these have been supported financially by domestic and international organizations. In 1997 several provincial governments began replacing traditional subsidized loan programs with microfinance programs supported by poverty alleviation funds.

MFIs hold promise for increasing credit access for China's poor but require very careful management and a flexible regulatory environment to flourish. Several factors create challenges not faced elsewhere, including the inability to use land as collateral because land and land-use markets do not exist. Microfinance in most countries also is primarily nongovernmental. However, in China, pilot microfinance programs typically draw staff from local governments and must operate within restrictive regulatory environments, despite financial system reform efforts. Finally, China's poor are located in mountainous, sparsely populated regions, providing fewer opportunities for petty traders and small businesses that are the main demanders of microcredit in other countries, and which provide cash flow enabling weekly loan repayment.

Strict enforcement of official interest rate restrictions will doom microfinance programs. Many microfinance programs have been allowed to charge effective rates of interest above official rates, and this policy should be continued. Interest rate restrictions should be lifted in experimental or target areas to permit MFIs to reach more of the poor in a financially sustainable manner. MFIs serving poor areas should also be allowed to experiment with collateral substitutes in their lending operations. The government may have a rationale to offer temporary

subsidies or guarantees to some RFIs to encourage them to attempt changes that may be risky or require a period of learning. Partially subsidized microfinance programs that are focused on alleviating poverty hold the potential for reaching an even larger portion of the poor.

The extent to which financial sustainability and poverty alleviation goals conflict depends on the ability of MFIs to economize on transaction costs and reduce lending risk, and the elasticity of credit demand of the poor to the interest rate. Many microfinance programs around the world, including all of those operating in China, rely on external subsidies to cover costs. Some mature institutions, such as BancoSol in Bolivia, have achieved financial sustainability through experience and by realizing economies of scale, but do not target the poorest households. Grameen Bank does a better job targeting the poor but relies on subsidies. We noted earlier that the average *informal* loan rate of positive interest was 1.9 percent a month (Park, Brandt, and Giles 1997). It is unclear how long it will take, if ever, for China's microfinance programs to achieve sustainability at those rates.

Many times the urgency of poverty alleviation may induce a government agency to invest in the poor by supporting MFI expansion, even if such expansion is not self-sustaining. Are the costs to the government and donors worth it? The answer depends on whether the costs of the subsidies are substantially below the net benefits to the poor. This depends on the degree to which subsidized loans actually reach the poor, the maintenance of operational efficiency, the degree to which keeping interest rates low increases the credit demand of poor households previously not borrowing, the degree to which subsidies limit the scale of the MFI, the confidence in continued funding over time, and whether public funds would be better spent on other projects, such as schools and health clinics. Recent surveys of pilot nongovernmental organization (NGO) and government programs find that repayment rates have been high, but targeting of the poor has not been very successful.

However, a willingness to subsidize microfinance programs should not be confused with a willingness to support inefficiently run microfinance programs. Financial losses and inefficiencies can significantly and quickly increase the total cost of achieving poverty alleviation goals. *How* one subsidizes programs is important, with an important goal being to provide strong incentives for programs to maximize efficiency (Morduch 1997a). This requires continual data collection and clear accountability. To date no domestic microfinance program of which we are aware—run by NGOs, donors, or government—has developed a time frame for achieving or improving cost effectiveness. Lacking are careful evaluations both of financial sustainability and of targeting effectiveness and impact. Although plans exist to support improved accounting procedures for Chinese microfinance programs, measures of household-level impacts are also needed to properly consider the desirability of subsidies. This is especially true given that China's pilot microfinance programs are heavily subsidized by international or domestic government sources.

### Conclusions and Recommendations

Long-term solutions to China's rural financial problems ultimately depend on solving or reducing the nation's SOE problem. Some government reforms have aimed to increase competition in the financial sector, but at the same time the government is reluctant to yield its control over financial resources. In industry, competition from the nonstate sector has been an important disciplining force for improving SOE performance (Naughton 1996). Extending this strategy to the financial sector would permit free entry by new, innovative financial institutions (such as RCFs) to meet the demand of market niches and provide greater performance incentives for managers of existing institutions. In other transition economies, new entry has led to more reform than simply bank restructuring (Claessens 1996).

A regulatory framework is also needed to

safeguard the interests of depositors, but over-regulation interferes with efficient intermediation. Widening interest-rate bands and experimenting with greater decentralization and deregulation of interest-setting authority could increase the volume of rural deposits and loans.

We recommend the following changes to the policies governing rural financial institutions:

- *As an overall strategy, create a rural financial sector with a diversity of institutions that face competition and specialize in meeting the needs of groups with different demand characteristics.* These institutions could range from banks to cooperatives to microfinance institutions. Regulation must be prudent to ensure the stability of the system and safeguard deposits, but must avoid excessive restrictions (e.g., on interest rates and inter-bank lending) whose effect is to exclude groups from credit access.
- *Permit and encourage financial institutions to create new deposit instruments that provide attractive combinations of return and liquidity to better service the savings needs of rural residents.* This will benefit households directly and increase the stock of investable funds.
- *Deregulate interest rates.* Expanded discretionary bands for onlending interest rates is an important step in reforming rural finance, but greater deregulation will be required. In the current reform environment, further liberalization of the rural financial system will likely be postponed because of the priority being given to SOE restructuring and to reducing the fragility of the banking system. Still, government should encourage experiments, on a local basis, with new institutional forms and deregulated interest rates, especially in areas where higher rates are necessary for profitable banking (such as poor areas).
- *Encourage competition and innovation while maintaining prudent financial regulation.* This means regulating rather than eliminating or co-opting RCFs. The emergence of new institutional forms should not be held hostage to

the government's desire for control of financial resources. Rather, competition can increase performance by improving incentives, and the government should concentrate on influencing financial flows indirectly.

- *Develop institutions that support the ability of banks to screen loans and enforce loan repayment.* It should expand the use of loan histories and credit ratings; reduce the cost of lawsuits, asset value assessments, and repossessions; develop resale markets for collateral items; standardize accounting and reporting procedures by firms; and allow financial institutions to restructure branch systems and adjust personnel.
- *Improve financial management and banking skills.* Much of the Chinese literature cites the poor quality of bank employees as a key constraint to development of commercial banking. Improving technical expertise on financial risk management and other bank management skills should be a top priority of the government and the donor community. Allowing entry by foreign banks would greatly enhance such efforts.
- *Continue to strive for a clear separation of policy and commercial lending in different institutions.* The following can help the ADBC better realize its role as a policy bank without adding a financial burden: (a) the recent decision to return some policy loans to the ABC should be reversed; (b) the ADBC should be empowered to demand accountability for repayment of policy loans, which may require reform of the grain marketing system (below), and to have the authority to refuse loans with unacceptable risk; and (c) PBC financing of ADBC lending should be gradually eliminated.
- *Discontinue the subsidized credit program for poverty alleviation.* This program, like similar programs in other countries, fails to reach the poor and achieves low rates of repayment. Instead, it should focus on: (a) supporting the microfinance movement to help those poor for whom lack of credit is an important investment constraint; and (b) provide noncredit

## Accelerating China's Rural Transformation

support (e.g., education, infrastructure) for those poor who will not benefit from credit because of other more pressing needs.

- *Provide financial support or subsidies to microfinance programs, but only if linked to conditions on cost effectiveness and financial sustainability.* Various organizations, whether international or domestic, governmental or nongovernmental, can provide this support; however, decisions on which microfinance programs to support and on subsidy levels should depend on a rigorous assessment of the cost efficiency of different programs and the added benefits generated by subsidies. Organizations can also train program man-

agers in financial monitoring and accounting skills or attract individuals with those skills; train program evaluators and support research on program design; financial sustainability, and impact assessment; support ways to broaden the scope of financial services provided by existing RCCs and RCFs so that these services reach the poor, either independently or collaboratively with microfinance institutions (especially to include savings as a component of microfinance); support institutional forms that guarantee the independence of project managers from local governments and provide strong incentives for cost efficiency.

<sup>1</sup> Rural residents also save in other specialized banks, the post office, and other quasi-government institutions; purchase government bonds; and invest shares directly in local enterprises or the stock market.

<sup>2</sup> Credit survey in Zhejiang, Sichuan and Shandong reported in Park, Brandt, and Giles, "Giving Credit Where Credit is Due: the Changing Role of Rural Financial Institutions in China", William Davidson Institute Working Paper No. 71, University of Michigan, 1997.

<sup>3</sup> Based on fixed effects estimate using provincial data on per capita incomes and expenditures from 1985 to 1996.

<sup>4</sup> New reforms aim to separate Rural Credit Cooperatives from branches of the Agricultural Bank of China, increase the collective nature of RCCs and the commercial nature of ABCs, prepare for the establishment of new rural cooperative banks in relatively advanced areas, and increase operational agencies of the Agricultural Development Bank (responsible for policy loans).

<sup>5</sup> Albert Park interviews in various provinces, 1997 and 1998.

<sup>6</sup> Albert Park interview with national RCC, August 1997.

<sup>7</sup> This section draws heavily from Morduch, Park, and Wang (1997).

<sup>8</sup> Albert Park surveys of 450 households in six poor counties in six provinces.

<sup>9</sup> See Adams (1984) for a description of problems faced by subsidized credit programs in other countries.

<sup>10</sup> The programs are described in greater detail in Park, Wang, and Wu (1998).



*Higher risk, higher labor input, higher incomes, and increased use of seasonal credit for purchased inputs characterizes specialized household producers of improved livestock and aquatic products. Intensive aquatic production also makes efficient use of open waters and marginal crop land – if water is available.*

## 5. The Development of Markets



### The Development of Markets

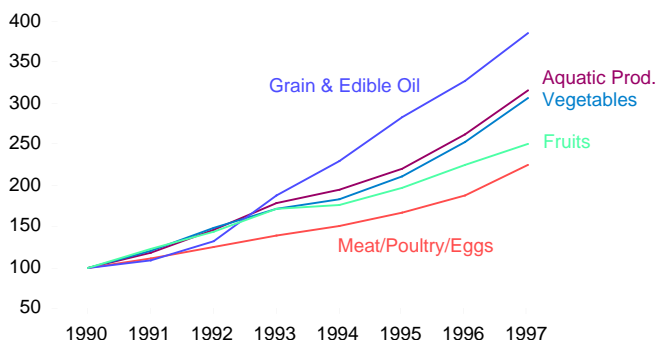
With the introduction of the Household Responsibility System, China solved its basic food production problems—although production problems could return if agricultural research and technology transfer are deprived of resources. Agriculture’s more serious problems now involve the continuing development of a healthy marketing environment in agriculture, one in which farmers make their resource allocation and marketing decisions based on undistorted price signals created by competitive traders, and in which officials shift their attention to promoting more efficient markets and intervening only to buffer prices against extreme fluctuations. In short, the agricultural marketing challenge is a “second-generation” problem that must address both policy and infrastructure.

While gradualism has been the hallmark of China’s rural transition, the pace of reform in commodity pricing and marketing have been varied. Perishable commodities have experienced the most rapid transition. The market transformation for grain, vegetable oil, and cotton has been marked by alternating reform and retrenchment cycles that continues in the late 1990s. By early 1998, China’s grain markets had become surprisingly integrated, competitive, and increasingly efficient. The *Government’s reform plan*, announced in spring of 1998, was poised to initiate a new set of reforms that very likely could have created a marketing and policy environment that would

have promoted even more efficient allocation of resources and provided policymakers indirect means to guide markets and stabilize prices. However, grain marketing policy initiatives since mid-1998 have reversed market liberalization by prohibiting private sector involvement in crucial areas, and reasserting expensive and inefficient administered procurement, storage, and trade by parastatal organizations.

Improved marketing efficiency reduces transactions costs and allocates an increased share of consumer expenditures to producers thereby increasing producer incomes; but it also benefits consumers through reduced cost. Physical markets have developed rapidly in rural and urban areas. The number of free markets at the end of 1997 exceeded 87,000, of which about 25 percent were located in urban areas. Despite the smaller number of urban markets, the value of their transactions has exceeded that of rural markets since 1994. Following decontrol of perishable product marketing in 1984, free-market sales led by fruit, increased rapidly; but grain and edible oil marketing continued to be controlled throughout the 1980s. By the end of the decade free-market grain sales only doubled while the sales value of other commodity groups

**Figure 5.1: Free Market Sales Index of Agricultural Products (constant value)**



quadrupled or quintupled. However, as grain policy liberalized in the early 1990s, free-market sales of grain and edible oil accelerated to become the fastest growing commodity group on the free market (figure 5.1). Sales *volume* in open markets demonstrate a similar growth pattern.

Policy and infrastructure constraints affect the grain and nongrain market differentially. Pricing and marketing policy strongly affect grains, for which most marketing and market infrastructure is under the auspices of state grain enterprises. Alternatively, the efficient development of perishable product markets is constrained by information shortages, interregional procurement restrictions, and limited infrastructure.

### Grain Markets

The high fiscal costs of government intervention in the grain market caused the central government to move increasingly toward commercialization during the 1990s. Most grain responsibilities and policy activities, except for a national reserve, were transferred to the provinces, including responsibility for local supply-demand balances under the Provincial Governor's Responsibility System (GRS). In theory, commercial operations of state grain enterprises have been separated from policy responsibilities undertaken on behalf of government (e.g., procurement of the grain quota and storage of State Grain Reserve stocks) to ensure subsidies are allocated only to the latter. Commercialization policy focused on the profitability of government grain agencies and rationalizing grain bureau staffing, but private sector competition emerged, handling an estimated 25 to 35 percent of commercially marketed grain in the mid-1990s.

Over the past decade, government has enacted frequent pricing and marketing reforms, which are often partially retrenched and which led to three-tier prices—all of which remained below the border price, at shadow exchange rates, until 1994. Estimates of nominal protection rates indicate that all major grains were

taxed through the early 1990s, but by 1995 prices had increased to international levels (rice) or above (wheat, maize, and soybeans). The disequilibrium between domestic and world price is due in large part to the partially closed grain markets and state-controlled trading system. Historically, the most heavily taxed grains were exported in most years (rice and maize), but rising domestic prices have mitigated this price bias.

Although the government has maintained strong control over grain markets, the “free markets” have continued to flourish. Cointegration analyses conclude that reforms have improved spatial market integration and that subsequent policy retrenchments have not reversed this integration trend (Rozelle, Pray and Huang 1997; Wu and Huang 1998; Zhou and Wan, 1999). Recent analyses using parity bounds and spatial equilibrium methods (Rozelle et al. 1999) also find that throughout the early and mid-1990s grain markets became increasingly competitive, less fragmented, and more efficient. Transaction costs, including those for transportation, handling, and marketing, remained high—up to four times the levels found in developed countries—but are likely a function of the congested transport system and antiquated grain handling methods. Unfortunately, market commercialization efforts have been discontinued.

### Recent Policy

Faced with rising fiscal burdens (due to higher levels of government grain stocks) and falling farmgate prices in the late 1990s (caused primarily by record levels of grain production in 1995 to 1997 and a decline in demand growth), the government reassessed its grain policy in early 1998. The main goals of the new reforms were to: (a) correct the inefficiencies in the grain marketing system (including problems of concurrent commercial and policy operations by the grain bureaus); (b) reduce the fiscal burden of the grain system; and (c) stabilize grain prices and farmer incomes. While the overall goals of the reform were not new, a new sense of ur-



agency was present, due partially to the need for fiscal savings and partially to government concerns for rising grain prices if farmers reduced sown areas and applied fewer inputs.

The major measures adopted to implement the ongoing reform and meet the challenging set of announced objectives include the following:

- *Clear separation of commercial and policy functions to parallel the separation of commercial and reserve grain.* Commercial companies will be responsible for farm procurement and interprovincial grain transfers with financing independent of the state budget.
- *Clear separation of central and local government responsibilities.* Buffer stocks for price stabilization and disaster relief stocks will be the responsibility of the central government. Local governments will be responsible for stabilizing local prices and the Governors' Responsibility System will be retained.
- *Clear separation of old and new grain debts.* The grain financing debt is approximately Y 200 billion, of which Y 130 billion represents defaulted policy loans with the balance representing borrowing for commercial operations. These debts are to be repaid over a 10-year period.
- *Setting the state procurement price above the current market price to protect farmers' income and ensure a stable supply of marketed grain.*

This ambitious grain policy agenda addressed several crucial issues and if implemented as planned, a commercialized trading system with state-owned and private firm competition would have emerged. Also, a government-owned policy-oriented, stock-holding agency with sufficient reserves and storage capacity to create an effective buffer stock system would have been created and the separation of policy and commercial functions would have led to large fiscal savings. Depending upon government's perception of reserve stock adequacy, additional stocks could have been purchased (and farmer incomes supported) or not purchased (supporting fiscal objectives)—although farmer incomes may have been affected until production patterns adjusted.

However, this agenda was not followed and market liberalization efforts were abandoned in mid-1998. Instead, government adopted a policy mix that will likely be unable to *simultaneously* meet its goals of creating a more efficient marketing system, reducing its fiscal burden, and maintaining stable prices, including:

- remonopolization of farmgate procurement;
- a renewed commitment of the government to procure *all* sales by farmers at the state-set procurement price; and
- prohibition of the grain bureau from selling grain at a price lower than the state-set procurement price.

The new policies have many characteristics of early grain marketing reform efforts. It is too early to empirically evaluate the impacts of this new reform program, but it is questionable whether the policy mix will stabilize the domestic grain market, improve grain market competition, and reduce the government's fiscal burden in managing the grain system.

### Grain Reserves<sup>1</sup>

Most efforts to control commodity supply and price volatility through buffer stocks, stabilization funds, international commodity agreements, and government intervention in commodity markets have ended in failure. Buffer stock programs often accumulate large reserves of commodities (U.S. and E.C.) with resultant high costs for interest and storage, stabilization schemes typically end in bankruptcy because of their unsustainable high cost (Australia), and different country objectives, along with high cost, have caused many international commodity agreements to lapse (World Bank 1999). Government intervention is very costly and eventually has been fiscally unsustainable for most countries.

Industrial country governments have been divesting from grain storage because the cost of holding reserve stocks exceeds the perceived benefits of grain price stability. Reserves are maintained as commercial stocks by more efficient and competitive private enterprises. Food grains in these countries comprise a small por-

tion of agricultural incomes and consumer expenditures, and price instability is *relatively* unimportant. *Nevertheless, there are economic arguments for price stabilization in developing countries where food grains are a major cost element in the food basket.*<sup>2</sup> Several countries, notably India and Indonesia, have stabilized prices employing modified buffer stock programs—but at high fiscal cost. Jha and Srinivasan (1997) determined that India's buffer stock program was the most costly policy instrument for price stabilization—compared with other options.

The State Administration for Grain Reserve (SAGR) manages reserve stocks on a noncommercial basis and pays Provincial Grain Bureaus to handle grain on its behalf. The state grain reserve target of 40 million tons, together with reserves maintained by provincial and other jurisdictions, and 90 million tons of commercial and semicommercial grain procured by State Grain Enterprises is an extraordinary quantity of grain (and proportion of marketed grain) handled by the State to maintain price stability<sup>3</sup>—and is extraordinarily costly. Information on the volume of China's reserve stocks and stock releases are unavailable; thus, costs and efficiency cannot be evaluated. *But price stability could surely be effected with smaller reserves.*

Large reserves protect against *possible* transitory shortages, but less costly alternatives are

available. Tying China's food grain security to the global markets and making greater use of these instruments should be more efficient at stabilizing prices and should cost less than the large stock program currently followed. *Although greater reliance on the international market would be more efficient than maintaining stock for the most severe contingency, additional port and handling capacity may be necessary.* Prior to the mid-1990s, when domestic grain prices were below international prices, maintaining large strategic grain reserve stocks was *relatively* less costly; however, domestic grain prices are currently above international border price equivalents—making it very costly to carryover stocks. Estimated carryover costs are indicated in Table 5.1 based on 1998 farmgate grain prices (marginally different from 1997 prices).

### Perishable Product Marketing

Livestock and aquatic products, and fruits and vegetables, were the first food commodity markets to be liberalized. However, these markets can be characterized as “constrained competitive” at best. A series of information and regulatory constraints, both legal and quasi-legal, inhibit the development of economies of scale and a fully free and competitive market. This applies particularly in the area of cross-border (township, county, and provincial) marketing.

**Table 5.1: Cost of Carryover Stocks  
(Yuan/ton)**

	Farmgate Grain/ Prices (1998) <sup>/a</sup>	1998 Unit Prices <sup>/b</sup>		Storage loss 5% <sup>/c</sup>	Interest Cost 10% <sup>/d</sup>	Storage fee <sup>/e</sup>	Total Cost
		Import	Export				
Rice	2,175	4,108	2,047	108.8	228.9	126.0	463.7
Wheat	1,445	1,560		72.3	152.1	126.0	350.4
Corn	1,270		646	63.5	133.7	126.0	323.2

/a Average of government and market prices.

/b Import and export unit values derived from trade statistics.

/c Grain losses in storage are assumed to be 5 percent.

/d Interest costs are 10 percent of the value (per ton) of stored grain after storage losses.

/e The State Administration for Grain Reserves pays Y 120/ton of grain placed in storage; these costs are increased by 5 percent to account for storage losses.



Farmers delivering seed cotton to buying station.

### Commodity Procurement and Economies of Scale

Some joint-venture firms and wholesale markets have developed scale economies in procurement, processing, and distribution, but county-specific procurement and processing linkages hinder the development of scale economies by local enterprises. County food-development corporations that process perishable products are prohibited from crossing county boundaries to contract (with farmers) for produce, thus forcing processors to turn to in-county wholesale markets that attract produce from adjacent counties. Other food marketing firms have begun to specialize in high-value fresh products in response to strong demand by urban consumers and by hotels, restaurants, and institutions and compete with imported products for market share.

Small county processing plants have been encouraged to create value-added products and absorb agricultural products within local areas. This structure may have been justified earlier, when transportation networks were poor. However, with improved transportation and road infrastructure, intercounty transport of product has become competitive. Restricting firms from sourcing products from neighboring locales has often left these firms with excess capacity, and despite favorable lending practices by local financial intermediaries, they often were underutilized and noncompetitive—leading to insolvency. The uncertain legal framework for firm consolidation and discriminatory sourcing

practices continues to inhibit firms from expanding across county boundaries, and bordering counties continue to operate suboptimal processing plants in the same product categories (e.g., slaughtering plants, fruit juice plants).

### Transportation and Documentation

A lack of refrigerated, containerized, and intermodal transport services further constrains marketing. Inland access to the major urban coastal cities still largely depends on railway transport, but traffic flows must conform to the priority routes established during the command economy period. For example, meat can be shipped north from Chengdu but not south. Rail transport is further hampered by delayed rail-car acquisition, frequent space cancellation, and lengthy transit time. Transit time for **express** rail cargo service from Chengdu to Beijing (2,000+ kilometers) is 15 days, versus 7 days by truck.

Interprovincial barriers to trade in perishable and processed foods include inconsistent weighing, inspection, and other procedures, and the lack of national standardized quarantine and phytosanitary inspection certificates and clearance documents. Inspection and control authorities at each provincial (municipal) boundary may question documentation validity—particularly at the boundaries of provinces producing competing commodities. Jurisdictions treat agricultural commodity transport differentially, requiring drivers to present various licenses to inspection authorities. Border checkpoints are maintained for quarantine inspection, payment of transit and shipping fees, and other document clearances, but drivers of trucks from out of the county or province may face delays—which damages commodity quality and value. Drivers also may be required to pay unofficial fees. Governments of most other countries require that trucks transiting jurisdictions in which they are not registered pay fees based on objective criteria (e.g., gross weight, number of axles, etc.).

### Market Information

In developed market economies, government-funded information networks—e.g., U.S. Department of Agriculture (USDA)—provide ongoing market information for each level of industry activity, with information access available to all organizations and individuals. In China, market information has historically been collected as inputs for government policy decisions rather than to help markets perform more efficiently. Public information on market prices and volumes is limited to a few national and major regional wholesale markets and commodity exchanges. Although such data are recorded by other wholesale market managers, information on production, stock, and flows is restricted, and for some products, disaggregated price and product turnover information is kept proprietary. Producers or wholesale market managers at the county level require clearance from the provincial State Statistics Bureau to access disaggregated census data on county or provincial production statistics and regional trade flows by product. In addition local producers and wholesale markets have limited access to information from the Ministry (or Bureaus) of Agriculture. Public information on interprovincial trade is either difficult to access, or is unavailable. Contractual delivery agreements are principally negotiated between producers and joint-venture processing plants (as well as state export agencies). These are proprietary agreements, and confidentiality of contract content (e.g., prices, volumes, delivery arrangements) is maintained.

### Producer Marketing Associations

Historically, producer associations were formed to improve farmer bargaining power with respect to downstream purchasers and to improve farmer income. These associations are administered by producers on behalf of their membership, and virtually all organizational and operational criteria are established and enforced by members. In China, a few farmer organizations have developed from village associations, focusing primarily on production—promoting

modern production technologies and husbandry, rather than marketing. Membership fees pay for training, specialized extension (often from an agricultural university or research center), and other services, such as publicizing applicable regulations.

The success of producer marketing associations requires a number of facilitating factors. For positive reinforcement in establishing marketing associations, a legal framework for their development and a regulatory framework defining the commercial obligations (e.g., contract enforcement, adjudication) of associations and their members are necessary; the lack of prohibiting legislation is insufficient. Technical, managerial, and training assistance is required to educate farmers (and local officials) on commercial principles and alleviate suspicions of collective decisions. In the absence of market linkages and marketing alternatives (high-value processing plants or fresh markets), farmers are unable to obtain price premiums for higher-quality products. Thus, marketing associations must have an integrated market intelligence and sales unit to assemble price, quality, and quantity information in differentiated markets. Central to the development of producer associations is the ability to extend their structures across administrative boundaries into neighboring production areas to assure supply access and control.

### Conclusions and Recommendations

Determining how the new policies will meet the objectives is difficult. The proposed measures might not stabilize farm-gate prices (or farmer incomes), improve grain marketing efficiency, or reduce the aggregate fiscal burden, although a portion of the burden may be transferred from the central to provincial governments.

Consequences of the new policies will likely include the following: (a) A substantial overprocurement of grain may stress the procurement and storage capacity, physically and financially, and inhibit commercialization of state grain enterprises. The enormous procurement

and storage costs will also be difficult to finance, creating incentives to purchase grain at discount prices (below the government determined price), with IOUs, or decline to procure grain beyond anticipated sales. (b) Urban consumer prices will increase, which will reduce both grain demand and discretionary urban incomes. (c) The grain market gains in efficiency, integration, and competitiveness acquired during the early and mid-1990s will be reduced.

The new policies will likely return the structure of the grain market to that of the late 1980s. Even with total separation of day-to-day commercial operations and specialized government agencies to implement policies, commercial trading will be difficult while the government continues to set procurement prices at above-market levels.

Although private traders will be permitted to participate in wholesale and retail marketing (after procuring supplies from the state grain enterprises), whether the basis for private and nonprivate competition will be equal in terms of similar access to output and credit markets, consistent licensing, and similar tax arrangements are unclear. Also, the state enterprises may continue to suffer from operational handicaps, such as exaggerated employment or excess welfare responsibilities.

Officials disapprove of significant import reliance for grain supplies for fear of destabilizing the world market, if China imports very large volumes of grain. This concern is used as a defense for intervening in production, marketing, and trade. However, the inefficiencies and fiscal costs of these interventions are enormous and seriously affect farmer incomes. Elsewhere in the world, governments in both developed and developing countries are divesting their grain procurement and supply systems and buffer stocks.

We recommend the following to further develop China's markets:

- Commercialization measures have been suspended to accord priority to other reform measures, however *the policy measures to commercialize the trading activities of the grain*

*bureaus and discontinue monopoly grain procurement should be reinstated as early as practicable.* As currently implemented, the grain marketing policy will incur enormous costs and drain budgetary resources from other potential rural development investments.

- *Transform the enormous stock of grain reserves held by central and provincial governments into a transparent, market friendly buffer stock system.* This would require, inter alia, intensive analyses on the optimum size of reserves, stock locations, international market linkages, price bands to be defended, and trigger mechanisms for open-market transactions.
- *Invest in public goods that promote market development: transport and communications infrastructure; market institutions, such as wholesale and futures markets; market information; the development of uniform grain quality standards; and contract enforcement mechanisms.* In an increasingly commercial environment, the government's role is to serve as an impartial arbiter of fair market competition, steadfastly prohibiting rather than encouraging barriers to interprovincial trade. Closing or isolating markets destroys incentives for producers and traders, exacerbates inequities, and makes stabilization through buffer stock operations less effective.
- *Encourage flexible sourcing and procurement structures for agroindustrial commodities.* Such structures are necessary to ensure appropriate and efficient scale processing technology and to promote reinvestment in future cost-reducing technologies, which in turn are necessary to maintain firm profitability.
- *Consolidate the marketing information system under the auspices of a single agency, and make it more comprehensive (i.e., include quantity and quality along with price).* To ensure adequate information was provided to the central market information agency, licensing and license renewal of wholesale markets could be conditional on the timely submission of market information. Situation

and outlook information (assessment of production conditions and probable marketing) of perishable commodities should be disseminated similar to that currently released by the Ministry of Agriculture (MOA) for grains and oilseeds.

- *Assist in broadening and strengthening farmer association management, through training programs.* Few, if any, farmer associations have the skills and knowledge base to advise producers on market channels for differentiated products. However, broadening and strengthening association management to engage in market development, promotion and other marketing activities—and thus further empower producers in the market place—would improve agricultural income. Producer associations could improve the planning and distribution of horticultural and livestock products, linking production with efficient scale processing industries. They could also extend consumer deliveries by exploiting regional product specialization and seasonality, thereby improving income levels and stability.
- *Standardize national quarantine and phytosanitary inspection procedures, certificates, and shipping documents, and apply them equally to all interprovincial commodity transport.* This would improve marketing efficiency and increase farmer income. If national quarantine certification conditions were met, lower jurisdictions should have no authority to restrict commodity movement. The establishment of preclearance qualifications and procedures would further increase efficiency. Processing-plant certification for quarantine purposes has made frozen shrimp exports to the United States less bureaucratic and more efficient than interprovincial livestock marketing. Inspection and certification procedures should be transparent and standard fees should apply.
- *Require trucks transiting provinces in which they are not registered to pay fees based on objective criteria.* These fees also should be transparent, standardized, and universally applied. Transit fees and levies beyond those officially sanctioned should be vigorously discouraged.

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<sup>1</sup> This section relies substantially on World Bank 1997b.

<sup>2</sup> Rice price stabilization by Indonesia's Bulog (Badan Urusan Logistik) is estimated to have contributed almost one percentage point to GNP growth in its early years, 1969-74 (Timmer 1996).

<sup>3</sup> Indonesia's Bulog stabilized domestic rice prices during the past three decades by relying heavily on private-sector traders and performing only a marginal market role. Bulog's *maximum* annual rice purchase was 25 percent of production and designed carryover stocks were 1.0 million tons.

## 6. International Trade and Foreign Capital Flows



### A. Trade

#### Introduction

China is an important global player in the trade of selected agricultural commodities. At various times over the past decade China has imported as much as 17 percent of the world's traded wheat, 25 percent of its fertilizer, and 28 percent of its soybean oil, while exporting as much as 10 percent of the world's traded corn. Agricultural trade, which in the following discussion includes aquacultural and maricultural products, was reasonably well balanced over the 1990s, with small surpluses in most years.<sup>1</sup>

The nominal value of China's *total* exports and imports grew at annual rates of 13 and 12 percent over 1980–96; the ratio of foreign trade (exports plus imports) to GDP increased marginally to 7.1 percent, valued at purchasing-power parity, or PPP (World Bank 1998). Agricultural exports and imports grew considerably slower at average annual rates of 7.1 and 5.9 percent and accounted for just under 3 percent of global agricultural trade in 1996. However, growth in the *real* value of agricultural trade averaged only 2 percent annually, from 1980 to 1997—less than half the growth rate of real agriculture GDP.

#### Trade Objectives, Policies and Institutions

The highly visible production and trade policy goal of grain self-sufficiency is inconsistent with other national efficiency objectives. This objective has changed only marginally over the reform period. Through the 1980s external grain trade was basically to balance individual food and feed grains. In the 1990s, as it became increasingly apparent that China does not enjoy a comparative advantage in grain production,

the domestic grain self-sufficiency target was redefined as of 95 percent of consumption.

Other objectives, such as improving the efficiency and responsiveness of the trading system in meeting national requirements, are consistent with other efficiency objectives. Policy and institutional reforms initiated during the 1990s include; consolidation of exchange rates, eliminating most government determined prices, encouraging competition by decentralizing and demonopolizing the trade of many commodities, commercializing operations where monopolies remained, transforming trading companies into handling agents, reducing the number of commodities requiring import and export licenses, and reducing tariffs. Removing the remaining distortions to permit trade to reflect production comparative advantage is an important element in accelerating rural income growth.

The two-tier exchange rate was consolidated in December 1993. During the mid-1990s market determined prices for agricultural commodities increasingly replaced government determined prices. Trade decentralization increased the number of firms eligible to engage in foreign trade—from about 1,200 in 1986 to about 200,000 in 1996.

#### State Trading

Rapid progress in liberalizing other aspects of trade accentuates the lack of reform in state trading. While any licensed foreign trade company may trade certain agricultural commodities—external trade in “strategic commodities,” such as food grains, textile fibers, and chemical fertilizers, continues to be restricted to specialized and monopoly national trading corporations. Some national trading corporations have been transformed into for-profit enterprises, including the Cereal, Oil, & Foodstuffs

Importing and Exporting Corporation (COFCO), for grain, edible oil, and sugar; China National Chemicals Import and Export Corporation (SINOCHEM), for chemical fertilizer; and the Cotton Import and Export Company of China. COFCO handles grain as a monopoly agent for importers and exporters, but grain trading still remains subject to import and export licenses and quotas. COFCO is not only a large trader, it also is an erratic one, generating wide year-to-year swings in trade volume. Lack of information characterizes China's trade transactions, causing uncertainty to both those who COFCO represents and those who COFCO buys from and sells to.

### Impact of Reforms

Unlike many neighboring countries (where governments have protected agricultural prices and subsidized farmers), China consistently taxed farmers until the mid-1990s by maintaining farmgate prices below border price equivalents—except for small volumes of grain sold to nongovernment buyers at market prices. Nominal protection rates estimated at official exchange rates for the major grains, oilseeds, and cotton clearly show declining negative protection (i.e. taxation) over the 1980s and 1990s, and now hover within a 10 percent band around zero. By 1997 most grain and cotton procurement and market prices approached international price equivalents—and by 1998, exceeded international prices.

Exportable commodities—such as rice, maize, soybeans, and cotton—were more heavily taxed than importable commodities, such as wheat. If the impact of the overvaluation of the domestic currency and the tariff protection system is considered (recently reduced), agricultural incentives are further distorted, depressing food prices and redistributing income from farmers to urban consumers and the agroprocessing sector. On the other hand, the gradual liberalization of prices and agricultural markets has significantly reduced the distortions in recent years.

While import tariffs have been reduced and

many trading companies are permitted to import various agricultural commodities, monopoly trading corporations and import quotas still apply to some of the major agricultural imports—cereals, oilseeds and vegetable oils, and wool. Furthermore, the size of the quotas are not publicized.

Comparative advantage in agriculture often declines in the process of economic growth, and this is expected to happen in China. In nations where arable land is scarce, the comparative advantage in agriculture tends to decline more rapidly (Anderson 1990). In general, the comparative advantage of China's agricultural sector has been declining for land-intensive crops. China's net grain imports will likely increase in the future; and a gradual change in trade composition, including import shifts from food to feed grains, seems inevitable.

### Shifts in Trade Patterns

Although the growth rate of agricultural trade has been below that of industrial exports, China's share of the world's agricultural trade has increased, suggesting that trade liberalization has been effective despite the remaining barriers. Trade structure changes have accompanied rapid economic growth. Agriculture's share of GDP and trade was about 30 percent in 1980, declining to about 20 and 10 percent respectively by 1997. These changes reflect improved sectoral resource allocation and the transferring of comparative advantage from agricultural to manufactured products.

The value of agricultural exports was \$20.2 billion in 1997, of which grains (Chinese definition), primarily oilseeds, composed about 11 percent. China's agricultural trade balance (Table 6.1) and trade in major commodity groups (Figure 6.1) indicates the changing composition of trade and suggests an export trend toward products in which China has a comparative advantage. Import data do not yet suggest a trend in commodities in which China is comparatively disadvantaged. Grain imports in 1997 and 1998 were particularly low—probably a consequence of the 95-percent grain self-suffi-



**Table 6.1: China's Agricultural Trade Balance, 1992-97**  
(million dollars—nominal)

	1992	1993	1994	1995	1996	1997
Bulk Commodities <sup>/a</sup>	193	1,439	78	-4,955	-3,529	-1,253
Consumer Ready Products <sup>/b</sup>	1,985	2,030	2,520	3,458	3,836	1,463
Horticultural and Other Food Products <sup>/c</sup>	951	1,073	1,426	1,281	1,177	1,085
Processed Intermediary Products <sup>/d</sup>	1,129	1,208	400	-1,259	-811	-2,614
<b>Total Trade Balance</b>	<b>4,259</b>	<b>5,750</b>	<b>4,424</b>	<b>-1,475</b>	<b>673</b>	<b>-1,319</b>
Other Agricultural and Resource Products (OARP) <sup>/e</sup>	2,746	2,885	4,761	6,130	4,580	743
<b>Total Balance Including OARP</b>	<b>7,005</b>	<b>8,635</b>	<b>9,185</b>	<b>4,655</b>	<b>5,253</b>	<b>-576</b>

/a Grains, seeds, raw tobacco, cotton, and raw sugar.

/b Processed meat, dairy products, processed vegetables and fruits.

/c Trees, flowers, fresh fruits and vegetables.

/d Live animals, flours and meals, gums, saps, oils, hides and skins, raw wool.

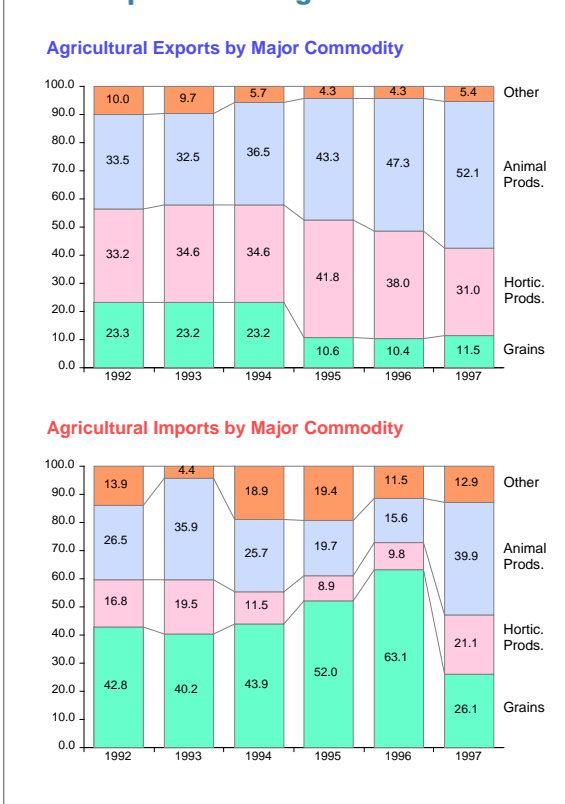
/e Seafood, beverages, leather, forest products, wool yarn and fabrics, cotton yarn and fabrics.

Source: Compiled from China's Customs Statistics Yearbook, various years.

ciency objective. The net exports of land-intensive bulk commodities, such as grains and oilseeds, have fallen, while exports of higher-valued, more labor-intensive products, such as horticultural and animal (including aquaculture) products, have risen (Figure 6.1). The cereal export embargo, in effect during portions or all of 1994 to 1996, severely constrained grain trade, but grain exports did not noticeably recover following the lifting of the embargo. The importance of grain exports, which accounted for about 23 percent of total agricultural exports in the pre-embargo period, have fallen by about half. Thus the embargo appears to have simply emphasized the declining trend in cereal exports. In 1997 horticultural products, primarily fruits and vegetables, and animal and aquatic products, accounted for more than 80 percent of agricultural exports. Grains typically make up more than one-half the value of imports, with wheat and vegetable oils and fats the major components, but were substantially less in 1997, when animal products were of major importance. These external trade trends reinforce agricultural production patterns observed by Park, Rozelle, and Cai (1994), and Rozelle et al. (1997b), who found that domes-

tic production is increasingly moving toward commodities in which a comparative advantage is enjoyed.

**Figure 6.1: Major Commodity Groups as a Proportion of Agricultural Trade**



### Trade Barriers: How Severe?

China has significantly reduced tariffs over the past decade for nonagricultural commodities, and additional reductions are under discussion as part of the World Trade Organization (WTO) negotiations. China reduced its simple average import tariff from 42 percent in 1995 to 17 percent in 1997 (U.S. Trade Representative 1998). Agricultural import tariffs of 40 to 60 percent, although higher than the average for all commodities, are considerably below those of most developing countries. These tariff reductions are progressive but mask significant nontariff barriers. A variety of nontariff barriers restrict imports, including tariff quotas, import quotas, import licenses, phytosanitary measures, and state trading—applying particularly to grains, cotton, vegetable oils, and fertilizer (U.S. Trade Representative 1998).

Although China maintains a high tariff for above-quota imports, tariffs for some of the major import items—such as grain, soybeans, and cotton—are below 5 percent, if within-quota. Within the WTO context, China has offered to reduce its weighted<sup>2</sup> average, binding (i.e., maximum) tariff to 41.3 percent by the year 2004, including a reduction on grains from the current 66.9 to 51.6 percent—a very low level for developing countries and more similar to those adopted by large grain-exporting nations. If WTO membership is agreed and accepted on these terms, it would preclude China from following a protection-based agricultural trade policy option used by its more-developed East Asian neighbors.

These tariffs must all be interpreted cautiously because they are often combined with quotas. For example, the most favored nation (MFN) tariff on wheat was 114 percent as of 1996 and the WTO-bound rate is 65 percent for the year 2004; but a tariff-rate quota applies and imports *under* the quota are subject to only a 1.0 percent tariff. The rate is 114 percent for imports above the quota. Similar licensing of tariff-quota imports applies to rice, maize, soybeans, edible oils, and wool. The within-quota tariff rate is relatively low: 1 percent for all ce-

real grains, 3 percent for soybeans, 13.8 percent for edible oils, and 1 to 3 percent for wool. The above-quota tariffs are quite high, but whether these high tariffs have ever been applied is uncertain.

### Impact of WTO Accession and Trade Protocols

The process of WTO accession has involved several trade liberalization commitments, and additional commitments doubtlessly will follow—all of which will impact directly on domestic agricultural commodity prices and rural incomes. The commitments include terminating the trading monopolies now enjoyed by state trading enterprises. This will permit nonstate trading entities to import portions of the tariff-rate quotas, ranging from 10 percent (wheat) to 67 percent (cotton) to 90 percent (soybean oil in 2006) and represents important structural reform which will improve trading efficiency. In addition, domestic trading and distribution rights will be liberalized over a three-year period, permitting transnational firms to engage in domestic distribution—including fertilizer, which heretofore has been highly protected from distribution competition. Further, China has committed to discontinue export subsidies and trade distorting domestic subsidies and base agricultural import protection solely on tariffs, thereby eliminating protectionist (nonscientific) elements of agricultural sanitary and phytosanitary regulations. If China is to remain an exporter of rice and corn, domestic prices will necessarily decline to levels consistent with international price equivalents. Although precise impacts of WTO accession can be determined only through detailed supply modeling, it is clear that prices for and production of these crops would decline and near-term agricultural incomes will be reduced—unless yields can be increased or production costs reduced.

Tariff bindings and tariff-rate quotas (TRQ), are an integral element of the tariff based regime. Average import tariffs for agricultural products would decline to 17 percent by 2004, leaving agriculture somewhat more protected than in-

dustry, where the average import tariff will be reduced to about 9.5 percent. However, very low tariffs (3 percent or less) will apply to TRQs of most bulk commodities—those commodities in which China does not enjoy a comparative advantage—cereal grains, cotton, soybeans and soybean derivatives (meal and oil). The existence of a TRQ does not necessarily mean that imports will immediately increase to meet the quota. For example, the TRQ for rice is 2.7 million tons in 2000 rising to 5.3 million tons in 2004; but the international rice market is very “thin” and rarely has any country imported more than 2 million tons annually. And, if imports of that magnitude were attempted in 2000, international rice prices would increase dramatically, similar to the rapid price increases following China’s import of 1.6 million tons in 1995. Nevertheless, given that international cotton and soybean prices are below domestic prices, the availability of cotton and soybean TRQs will inevitably result in domestic price declines and income reduction for producers of these commodities.

### Price and Supply Volatility

Long-term trends in global grain prices, which have been declining for well over a century, are forecast to continue declining over the next 10 to 15 years according to recent studies

by the World Bank, the Food and Agriculture Organization (FAO), and the International Food Policy Research Institute (IFPRI).<sup>3</sup> Sharp short-term (2-3 year) price increases (and decreases) have and will occur in reaction to major policy decisions on grain production and storage by major producing and trading countries, exceptionally favorable or unfavorable weather with resulting harvest impacts, wars, natural calamities, and similar events. For example; the dramatic price spike in 1995-96 followed a sell-off of 220 million tons of international grain stocks during the previous decade, coupled with a 1995 drought in some U.S. grain-producing areas.

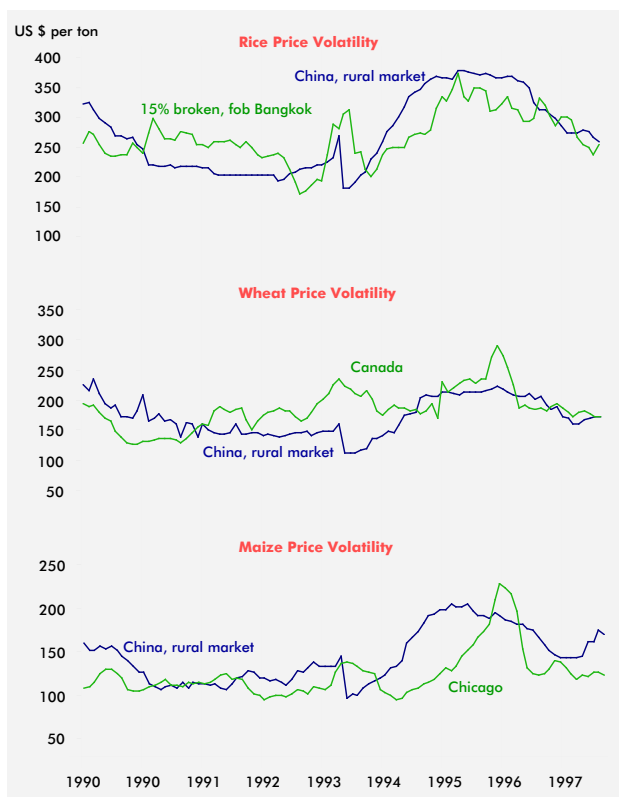
Future grain price volatility, around the declining trend, is likely to be greater than of recent decades because of policy changes in the major exporting countries. These changes include both those made due to the WTO Agreements on Agriculture and unilateral decisions by the U.S. and the E.U. governments to reduce stock holdings for budgetary reasons. These changes will keep world grain stocks low in the future and lower stocks could lead to greater price volatility because the smaller buffer against a poor harvest.

The monopoly structure of the state trading company creates inefficiencies and distortions in the domestic economy and may even create uncertainty in world markets. Price stabiliza-



*Modern bulk grain handling systems are replacing bagged grain handling in domestic and international trade.*

**Figure 6.2: Domestic and International Grain Price Volatility (dollars per ton)**



international prices (Figure 6.2).<sup>4</sup> Similarly grain supply (produce and net imports) fluctuations have been exacerbated by trading.

The calculation of standard error terms around price trend lines (1990-97) clearly demonstrates that domestic grain prices are more volatile than international prices. (Table 6.2). Also, an analysis by Chen (1999), using provincial average farmgate prices (weighted average of quota, negotiated, and market prices), determined that price variation, as measured by coefficients of variation (CV) had increased over time—CVs for rice and corn prices doubled between the 1975/85 and 1985/95 decades, while the CV for wheat prices increased by 50 percent.

Furthermore, net trade in rice and corn have exacerbated production fluctuations as net exports have tended to be less in years of high production and more in years of low production. The impact of trade is indicated by the higher standard error term for “pro-

duction is becoming an increasingly important goal of trade policy. However, importing during periods of relative abundance and exporting during periods of relative scarcity have made prices in China's domestic market more volatile than international market prices. Huang (1998) demonstrated that domestic prices of all three major cereals have been more volatile than

production + net trade” in Table 6.2. This apparent anomaly probably derives from executing export plans which are developed several months prior to harvest. Storage statistics are unavailable, thus it is uncertain whether trade exacerbates *total* supply volatility. However, wheat trade dampens production fluctuations as additional supplies can be rapidly imported if needed. An

**Table 6.2: Grain Price, Production, and Supply Volatility (1990-97)**

	Wheat		Rice		Corn	
	S <sub>y,x</sub>	CV	S <sub>y,x</sub>	CV	S <sub>y,x</sub>	CV
Domestic Market Price <sup>/a</sup>	29.4	0.18	54.2	0.20	26.3	0.19
International Price <sup>/a</sup>	21.2	0.15	30.6	0.12	19.7	0.18
Domestic Production <sup>/b</sup>	5.9	0.055	8.5	0.046	8.7	0.091
Domestic Production + Net Trade <sup>/b</sup>	4.6	0.040	8.7	0.046	13.2	0.132

<sup>/a</sup> Monthly data

S<sub>y,x</sub> = Standard Error of Estimate

<sup>/b</sup> Annual data

CV = Coefficient of Variation

argument could be made that corn supply, which is harvested late in the year, is a function of the previous year's harvest and the current year's net trade. However, lagged production does not dampen fluctuations as the estimated standard error is similar to that for production.

During the early and mid-1990s a number of futures markets, including grains, were established in China. While designed to facilitate price hedging between suppliers, users, and trading companies, trading was "thin" and the markets were considered speculative, subsequently, government closed or consolidated several futures markets. However, global commodity markets and market liberalization permit short term supply and price risks to be managed (hedged) through commodity derivatives markets (futures and options). Futures hedging is an efficient management tool when annual imports are required to meet consumption requirements but inappropriate as insurance for *possible* imports. China's deficit wheat position is partially hedged in international futures markets. This is relatively easy given that international futures markets, such as the Chicago Board of Exchange, is very liquid, and China is an annual net importer of wheat—thus a minimal amount can always be hedged. Similarly, as long as China remains a net corn exporter, a minimal amount of the exports could be hedged. It is much more difficult, however, to manage price risk for uncertain quantities of imports and exports, because if a hedged position is not fulfilled, significant sums could be lost (or gained). It is important to realize, however, that reliance on the international market for annual requirements usually will be less costly than attempting to store or carryover large stocks. **Futures options** are relatively inexpensive *theoretical* alternatives, but market transactions in these instruments are too few to be a viable option for China given the magnitude of year-to-year fluctuations in imports.

### Undocumented Imports

China tends to import bulk agricultural commodities directly, but a large share of processed

food and consumer-ready products are first imported into Hong Kong and then re-exported to mainland China. Hong Kong officially re-exports about 55 percent of its agricultural imports. In addition to recorded shipments from Hong Kong to China, a large unofficial trade exists (USTR 1998; Wong 1998). Estimating the dollar value of undocumented agricultural exports from Hong Kong to China is difficult, but it could exceed \$1 billion per year. Undocumented shipments of fresh fruit into mainland China may account for up to 70 percent of Hong Kong's fruit imports (Wong 1998).

Also, the value of official re-exports from Hong Kong to China tend to be underreported. Wong (1998) reports that more than 50 percent of Hong Kong's agricultural product re-exports to China had unit costs that averaged 6.2 percent less than their import value. Alternatively the export-import margins for agricultural products re-exported from Hong Kong to non-China destinations show that agricultural products imported into Hong Kong from non-China sources and re-exported to non-China destinations have an average margin of 15.3 percent. Positive margins for re-exports to non-China markets and negative margins for re-exports to China, strongly suggest that the value of agricultural product exports to China is underrecorded.

### Conclusions and Recommendations

The government largely monopolizes international trade in bulky strategic agricultural products (cereals, vegetable oils, cotton) and determines annual import and export grain quotas; but with little transparency regarding either the quantity or value of the quotas. Import tariffs have little practical meaning because numerous nontariff barriers exist. In addition, import quotas are subject to alternative tariff schedules.

As China liberalizes the trade regime, consistent with joining WTO, a continuing shift in the pattern of trade will be generated. However, it remains uncertain whether China would remain a near-term, net agricultural exporter and

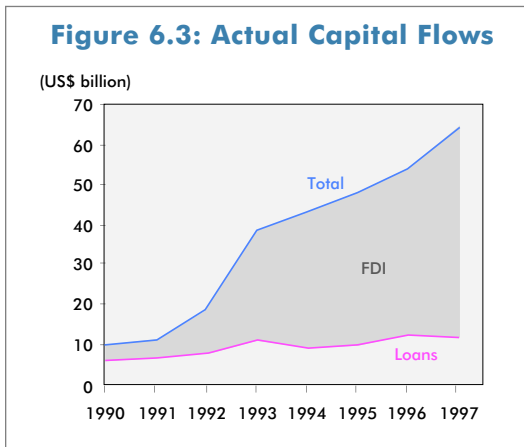
gradually increase grain and other bulk imports (Wang 1997) or if producers would meet rising demand by shifting supply functions through increased investments in agricultural research, irrigation, and other productivity-enhancing activities (Huang, Rozelle, and Rosegrant forthcoming).

We recommend the following changes in trade policy to help improve the rural sector:

- *Promote trade competition.* Even if China maintains a closed trade policy, competition will increase efficiency, transparency and the effectiveness of trade policy.
- *Permit the market to have a greater role in determining trade patterns to reap comparative advantage gains.* This would probably mean increased overall agricultural trade and, in addition, a shift toward importing more land-intensive agricultural products (grains, oilseeds, and cotton) and exporting more labor-intensive agricultural products (fruits, vegetables, livestock and aquatic products). To achieve comparative advantage gains, China's trade regime must be more open and might involve removing implicit taxes on farmers, reducing perverse trading incentives for state trading agencies, and making the state trading agencies more transparent and more accountable to market discipline.
- *Change the grain self-sufficiency policy.* The 95 percent grain self-sufficiency goal is inconsistent with an open-trade policy. A continuing policy commitment to (near) grain self-sufficiency means large inflows of grain will not be permitted even if China opens its borders to (otherwise) free agricultural trade. If this policy is pursued through future grain price subsidies, it could be achieved only by closing the border to less expensive foreign cereals—beyond the 5 percent import quota.
- *In liberalizing trade, assess the welfare impacts, and measures required to cushion any adverse impact on portions of the rural population who are at risk and less able to par-*

*take of new production opportunities.* In an open economy, grain prices would almost certainly decline, according to recent analyses by the Center for Chinese Agricultural Policy (CCAP). Thus, grain farmers would suffer income losses, but consumers would gain, as would those producers able to produce higher-value specialty commodities for both domestic and export markets. The impact on subsistence farmers in poor areas would depend upon whether they were net producers or consumers of grain.

- *Phase out state trading.* Even if China removes explicit nontariff barriers, a monopoly state trading firm could unilaterally block trade despite rules and regulations. Even if trade remains subject to quantitative controls, more competition would generate competitive efficiencies.
- *Design an effective set of release rules for grain stocks and coordinate releases of buffer stock with imports and exports and maintain smaller grain reserves at a reduced cost.* Tens of millions of tons of grain stocks maintained at costs of tens of billions of yuan have been unable to stabilize grain prices because of conflicting incentives, unclear control rights, and poorly defined release rules and management practices. China has created a system of granaries that is extremely expensive and is not contributing to stable prices.
- *Enact WTO accession related agricultural policies promptly.* Some of the benefits of WTO accrue through reform of various trade institutions, structures, and policies, therefore waiting for WTO accession to implement the reforms merely delays receipt of the benefits. Also, China will be deprived of several agricultural policy instruments after joining WTO, thus the transformation to a more comparative advantage and market oriented production structure should be initiated while all policy instruments remain available to moderate any negative transitional income effects.



**B. Capital and Technology Flows**

An important factor in China’s rapid economic and employment growth has been the investment provided by external capital inflow over recent years. Actual capital inflow has increased continuously during the 1990s (Figure 6.3), although, by 1997 inflow commitments (loans signed and FDI agreed) declined by 50 percent from the high of \$123 billion in 1993. The large inflows of FDI since 1993 has been the primary source of increased capital as lending volumes have increased only marginally. In addition to providing capital, FDI has performed an important role in transferring new technologies and management approaches to the economy as a whole—in many cases contributing elements that otherwise would have constrained growth. Understanding the role of FDI in China’s economic growth, the policy environment that encourages and discourages agricultural investment, and the record that China has built in importing technologies from international sources are important in designing more effective policies to facilitate increased inflows of more advanced agricultural investment and technology and accelerate rural economic and income growth.

**Global Foreign Direct Investment and China**

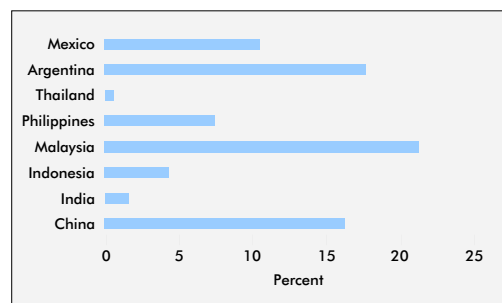
In 1992, however, FDI in China exceeded loans. During the 1990s FDI quadrupled, comprising three-fourths of the actual capital in-

flow in 1996 (\$54.8 billion). Contracted capital was \$81.6 billion in 1996, but declined precipitously to \$51 billion in 1997.

Globally, most foreign direct investment occurs between Organization for Economic Cooperation and Development (OECD) countries (UNCTAD 1997). Eighty percent of capital outflow from OECD countries is to other OECD countries, primarily for acquisition of existing manufacturing and service enterprises. Only 0.1 percent of FDI outflow from OECD countries is directly for agriculture—although a portion of the manufacturing FDI involves agricultural inputs and processing.

The United States receives the largest volume of FDI. However, 85 to 90 percent of the inflow also is for acquisitions and mergers, making the principal effect an ownership change, which often creates scale efficiency at the cost of minor employment reductions. In contrast, China is the recipient of the largest FDI inflows for new investments and expanding existing enterprises. The source of FDI inflow also is unique, as much of it originates with the relatively wealthy Chinese diaspora, scattered worldwide but concentrated in Southeast Asia. Total contracted inflows and actual utilization since 1992 have totaled \$417 billion and \$151 billion, respectively. However the FDI inflow is somewhat overstated. A portion of the inflows (estimated at 25 percent, Harrold and Lall 1993) represents recycled funds—funds that originate in China, which are sent offshore (primarily Hong

**Figure 6.4: FDI Inflow as Percent of Gross Fixed Capital Formation, '91-95**



Source: United Nations Conference on Trade and Development, *World Investment Report*, 1997.

Kong) and return to China as FDI inflow. Such recycled funds enjoy preferential policies unavailable to domestic investors. In addition, about 70 percent of the inflows are “in-kind” equipment and technology, which is often overvalued.<sup>5</sup>

While total FDI inflow into China is massive, the magnitude is similar to several other countries when measured relatively. During 1991–95 (when comparable data are available for other countries), inflows averaged 16 percent of capital formation, somewhat less than Malaysia and Argentina. (Figure 6.4). (Singapore and Hong Kong were omitted because of their unique characteristics as financial centers with large capital inflows and outflows.) However, preliminary data for 1997 indicate that FDI inflows represented 25 percent of China's gross fixed capital formation. By other measures, China ranks even lower: inflow stock represented 18 percent of GDP in 1995—and inflow stock *per capita*, at \$106, is the smallest in East Asia, except for \$100 per capita in the Philippines. China has modest FDI outflows for the acquisition of modern and proprietary technology in nonagricultural industries.

### FDI Regulatory Reform and the Tax Environment

China's FDI policy, has evolved gradually and methodically. Following adoption of the “Open Door Policy” in late 1978 and the issue of the Equity Joint Venture Law in 1979, China opened four Special Economic Zones (SEZs) for FDI. This was followed by expanding the SEZ concept to 14 coastal cities and Hainan Island in 1984, to three development triangles in 1985, the entire coastal area in 1988, and all provincial capitals (except two) and major Yangtze cities in 1992. Foreign investment regulations classify investments into categories of “encouraged,” “permitted,” and “restricted”—in addition to a “prohibited” category that describes characteristics of activities in which foreign investments are disallowed (rather than identifying specific industrial subsectors). The business income tax and VAT that apply to domestic en-

terprises is 33 and 17 percent, respectively. However, various tax and tariff incentives apply to FDI. Beyond the standard set of incentives, income taxes for firms engaged in agriculture are reduced by 10 to 30 percent for an additional 10 years.

Copyright, patent, and other intellectual property right (IPR) protections have developed slowly. The patent law became effective only in 1985 but did not apply to chemicals and pharmaceuticals until 1993. Plant-variety protection became available with passage of the plant breeder's rights law in 1997.

### Constraints to Inflows

Despite improvements to the investment environment, many barriers exist to the further inflows of agricultural technology through transfer or investment. Extensive interviews with corporate officials of transnational corporations involved with agricultural input manufacturing or commodity processing investments in China, identified four common frustrations which restrains them from investing more funds and transferring additional new technologies:

- Foreign investment policy is not transparent, which is manifest in frequent policy changes.
- The extensive regulatory environment requires multiple negotiations as national regulations apply only if the foreign investment exceeds \$30 million. Otherwise negotiations must be held with officials in each province where products are to be sold. Conversely, it may be easier to satisfy provincial than national regulations, resulting in several small investments that might be less efficient than one large investment.
- The weak enforcement of IPRs is a major concern for corporations with copyable technologies. Transnational corporations that can prevent technology loss by technical means do so; but agrochemicals are widely reported to be reverse-engineered, except when the active ingredients are very complex molecules.
- Even when technology can be protected and when market demand is high, fragmented



retailing and wholesaling networks reduce market penetration. Some of these constraints are a function of poor physical infrastructure. Other constraints are regulatory which protect the domestic service sector from international competition.

### FDI in China's Agricultural Sector

The natural incentives for FDI in China, are (a) a large domestic market and (b) a labor surplus economy. The government typically structures foreign investments to be labor-intensive and about 60 percent of China's FDI inflows have been in labor-intensive manufacturing activities. This helps create nonagricultural employment and contributes to income growth generally, but does not address modernization of the agricultural sector.

Given the smallholder nature of China's agricultural economy, agricultural FDI would be expected to be modest. Indeed, "projects that use up large tracts of farmland, that are not beneficial to the protection and development of land resources, ..." are prohibited (MOFTEC 1998). Agricultural FDI inflows accounted for only 1.3 percent of the actual FDI inflows during the 1990s, and were concentrated in labor-intensive (horticultural crops, poultry and aquatic) production (Table 6.3). The largest investments were for crop production—but were below the crop share of gross value of agricultural output (GVAO); forestry received 15 percent of the investment—considerably greater

than its share of GVAO

The past policy environment, unfortunately, has not provided equal opportunity or encouragement for all to invest in agriculture. The early restrictions on FDI location, and subsequent liberalization, made policy the primary determinant of investment location. An econometric analysis of agriculture FDI confirmed the importance of policy and supported the conclusion of other studies that the level of accumulated FDI *stock* greatly influences current inflows (Petri 1995; Dobson 1993). Thus, official policy concentrated investments along the coast in the 1980s and the investment accumulation continued to attract FDI in the 1990s. As late as 1996, some 85 percent of agricultural FDI inflows were into the coastal provinces plus Beijing and Hebei. Other important location determinants were transport intensity, urban population (market size), and the real wage rate.

### FDI in Agriculturally Related Manufacturing

Regulatory, IPR, and marketing constraints have been important factors in keeping the inflow of FDI for agricultural manufacturing relatively small—even more than direct investment in crop and livestock production has. Accumulated FDI inflows for agriculturally related manufacturing, over the 1987-96 decade were \$6.0 billion representing only a fraction of aggregate FDI.

Investments in agricultural inputs—including

**Table 6.3: Agricultural Subsector Distribution of Contracted FDI Inflows (1994-96)**

Subsector	FDI Inflow		GVAO Percent Share
	\$ million	Percent Share	
Crop Farming	1,211.9	33	58
Forestry	534.2	15	4
Livestock	845.8	23	30
Fisheries	906.5	25	8
Agricultural Services	160.2	4	–
<b>Total</b>	<b>3,658.6</b>	<b>100</b>	<b>100</b>

Source: Ministry of Foreign Trade and Economic Cooperation (unpublished materials).



*A modern cotton spinning mill near Shanghai*

ing fertilizer, pesticides (and other agrochemicals), seeds, and agricultural machinery—have substantial modernizing potential for the agriculture sector. Although China lists all of these inputs in the “encouraged” category (except for seeds of grain, vegetable oils, and cotton which are restricted), investments remain exceedingly small—\$195 million (in 1995)—and accounted

for only 3.0 percent of China's agricultural input sales. Marketing problems plague companies that try to distribute their products in China's vast geographic market, in part because of wholesaling restrictions, vague rules, and poorly enforced IPR measures.

The distribution of agricultural manufacturing FDI is shown in Table 6.4.

As table 6.5 indicates, technology-intensive investments represent only 2.5 percent of agricultural manufacturing FDI.

### FDI and Agricultural Modernization

FDI assisted in modernizing the poultry industry by importing grandparent genetic stock and breeding parent genetic materials domestically. The introduction of superior nutrition feed milling and mixing paralleled the development of the poultry genetics. Also, almost all of the plant breeding and screening research by

**Table 6.4: Financial Indicators of Agriculturally Related Foreign-Financed Enterprises, 1995 (Billion yuan)**

Subsector	Total FDI	Total Assets	Total Sales
<b>Agricultural Inputs</b>	<b>1.58</b>	<b>5.55</b>	<b>4.64</b>
Fertilizer	0.58	1.57	1.28
Pesticides	0.38	1.55	1.33
Veterinary Medicines	0.16	0.71	0.61
Agricultural Machinery	0.46	1.72	1.42
<b>Agricultural Processing</b>	<b>38.71</b>	<b>150.89</b>	<b>128.24</b>
Food Processing	12.00	54.85	60.58
Food Manufacturing	12.18	39.51	28.33
Beverage	11.58	44.04	28.50
Tobacco	0.20	1.20	0.56
Fiber Processing	0.80	2.65	1.61
Leather Processing	1.47	7.91	7.76
Timber Processing	0.63	1.42	0.90
<b>Total</b>	<b>40.29</b>	<b>156.44</b>	<b>132.88</b>

*Note:* These data may not capture all agricultural manufacturing FDI as some agrochemical and agricultural equipment may be manufactured by enterprises that are primarily involved in producing other mechanical equipment and nonagricultural chemicals.

*Source:* Office of the Third National Industrial Census, Data of the Third National Industrial Census of the People's Republic of China: State-Owned, Foreign-Funded and Township and Village Enterprises, Zhongguo Tongji Chubanshe, Beijing, 1997.

**Table 6.5: Distribution of Foreign-Financed Enterprises in Agriculturally Related Manufacturing, by Factor Intensity, 1995 (Percent)**

	FDI	Total Assets	Sales Value
Labor-Intensive <sup>/a</sup>	66.9	67.7	74.6
Capital-Intensive <sup>/b</sup>	30.5	29.8	22.8
Technology-Intensive <sup>/c</sup>	2.5	2.5	2.5
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

/a Includes food processing, food manufacturing, natural fiber processing, leather and feather processing, and timber processing.

/b Includes beverage manufacturing, tobacco processing and fertilizer manufacturing.

/c Includes pesticide, veterinary pharmaceuticals, and agricultural machinery.

Source: Office of the Third National Industrial Census, "Data of the Third National Industrial Census of the People's Republic of China; State-Owned, Foreign-Funded and Township and Village Enterprises," Zhongguo Tongji Chubanshe, Beijing 1997.

foreign-financed enterprises has been on hybrids (corn, sunflower, sorghum, and rice) because hybrid varieties are difficult to copy. As long as the confidentiality of the hybrid parents is maintained, the IPRs are technically protected.

In the agrochemical sector the pesticides that allegedly have not been reverse engineered are those whose active ingredients are complex molecules which are difficult to copy. Others, despite official agreements, are allegedly copied and sold without any compensation to the inventors. Although the legal environment provides adequate protection for IPR, enforcement remains weak. The current effort by Monsanto to market its Bt variety of cottonseed will be closely watched—if the seeds become widely available from non-Monsanto sources, other high-technology and biotechnology firms will be reluctant to invest in China.

### Loans

Nationally, loans were the most important element of foreign capital flows until replaced by FDI in 1992. These loans are largely sourced from bilateral (50 percent) and multilateral (30 percent) agencies, with only 20 percent coming from commercial sources—primarily to finance exports. However, for the agricultural sector, overseas development assistance (ODA), loans and grants, remain a more important source of

foreign capital than FDI. Agricultural ODA is overwhelmingly sourced from multilateral agencies (80 percent), with about 20 percent provided by bilaterals and a very small amount from NGOs. A recent evaluation of ODA determined that \$8.28 billion was granted or loaned to the rural-agricultural sector during the period 1994–97 (UNDP 1998); more than double the \$3.66 billion FDI inflow (1994–96). Loans, primarily from the World Bank and secondarily from the Asian Development Bank, comprise about 90 percent of the assistance with the balance provided in the form of grants—primarily from UNDP and WFP.

Nearly all ODA is tied to projects, some of which are national in scope and cannot be allocated to any particular region. However, the Eastern, Central, and Western regions equally share ODA *grants* for nonnational projects; ODA *loans* have been primarily to the Central region (50 percent), followed by the Western region (30 percent) and the Eastern region (20 percent). These distribution patterns contrast sharply with FDI inflows which have been invested overwhelmingly in the Eastern Region (85 percent). The immediate impact of ODA is increased budgetary support for rural infrastructure and service investments (including on-farm investments), which will lead to increased rural incomes. To the extent that many projects have

**Table 6.6: ODA Allocations by Subsector (Million dollars)**

Subsector	Amount	Percent
Integrated Agricultural Development	2,773	33.5
Water Resources	1,608	19.5
Support Services	1,196	14.5
Agricultural Inputs	1,053	12.7
Forestry	802	9.7
Livestock	265	3.2
Crops	127	1.5
Fisheries	86	1.0
Other	366	4.4
<b>Total</b>	<b>8,276</b>	<b>100.0</b>

Source: UNDP. *China Agriculture and Food Security Resource Book: A Compendium of Donor Activities (1994–1997)*, Beijing, 1998.

research and technology transfer components (either domestic extension or international transfer), longer term productivity and income impacts will be generated. Integrated agricultural development projects were the largest recipient of donor assistance, followed by water resource management and development and support services (Table 6.6).

The World Bank provided about 70 percent of ODA resources over the 1994–97 period, but with the phasing out of soft loans between 1997 and 1999 World Bank assistance to China diminished by about 45 percent. Thus, it is uncertain whether ODA will continue to provide robust support; however, ODA comprises a relatively small portion of rural investment support and its decline is unlikely to seriously impact on rural growth.

### Conclusions and Recommendations

Given the fiscal constraints facing agricultural research and technology transfer, FDI in agricultural inputs could become much more important for modernizing China's agriculture. Although FDI tax policy is favorable to agriculture, it has been an insufficient incentive to attract significant investment in agricultural inputs.

If China's farmers are to have ready access to the latest and most modern production tech-

nology, either (a) FDI must be attracted into the *input* industry, (b) agricultural technology imports must be unrestricted, or (c) domestic research on modern agricultural technology must be intensified.

The following policy initiatives would improve the investment environment and provide incentives for renewed investment in agricultural input manufacturing and contribute to agricultural modernization:

- *Design incentives to stimulate investment in those activities of priority interest.* Include agricultural modernization as an FDI objective and actively solicit multinational investment in modern crop and livestock genetics and biotechnology, pesticides and other agrochemicals, and sophisticated farm machinery.
- *Attract investment into the country's chemical fertilizer industry.* The technology of modern high-analysis fertilizer manufacture is well known, but capital requirements are high. The existing FDI stock in fertilizer manufacture of about \$70 million is trivial relative to the \$350 to \$600 million required for a single modern scale-efficient urea or diammonium phosphate plant (500,000 tons of elemental nutrients). Increased FDI in nitrogen and phosphate plants would introduce known technology and needed management skills

and reduce fertilizer import requirements. If international firms were involved in raw material (phosphate rock) mining, fertilizer manufacture and blending, and were permitted to market directly to farmers, they also would be prepared to invest in technology transfer service centers<sup>6</sup> (e.g., soil testing laboratories).

- *Have strict and publicized enforcement of IPR protection for agrochemicals, veterinary pharmaceuticals, plant and animal genetics and biotechnology, and other agricultural technologies to reassure investors that theft of proprietary technology would not be tolerated.* The legal framework is in place but its enforcement remains uncertain.
- *Eliminate the “joint ventures with majority Chinese ownership” restriction on FDI for grain, oilseed and cottonseed development.* This restriction has hindered investment and technology transfer into these activities, and disallowed Chinese farmers from enjoying the most modern, internationally developed seed varieties.
- *Liberalize domestic marketing constraints.* The current requirement that Chinese partners must have a majority share in domestic marketing enterprises makes transnational firms reluctant to manufacture high-technology products, as they are unable to control their distribution. Firms that manufacture agricultural inputs need the opportunity to market their products directly to farmers. Also, market competition would improve distribution efficiency.
- *Improve the transparency of the FDI regime.* Taxation, the application of import tariffs, and foreign exchange rules are adequately defined. However, application and approval procedures are complex requiring separate negotiations with officials in each province in which investment and operation is proposed. There is also a problem of China’s changing the rules after investments have been made—while this may be necessary for equity or other reasons, a provision for “grandfathering” the foreign enterprises over an adjustment period is needed.

<sup>1</sup> These trade balance data are based on China’s Customs Statistics, and are on a calendar year basis. They do not account for undocumented trade between Hong Kong and China. The data must be interpreted carefully because of alternative definitions of agricultural trade, which may or may not include certain seafood and lumber products. This paper follows the USDA classification system but includes aquatic products as agricultural. The Food and Agricultural Organization of the United Nations (FAO) includes more commodities in their definition of agricultural trade and thus the FAO’s value of agricultural exports and imports exceeds that reported by the USDA.

<sup>2</sup> In computing the average binding rates for 2004, the 1994-96 import values were used as weights.

<sup>3</sup> Islam, Nurul (ed.), *Population and Food in the Early Twenty-First Century: Meeting Future Food Demand of an Increasing Population*. International Food Policy Research Institute, Washington, DC, 1995.

<sup>4</sup> As different exchange rates applied to certain traded commodities during the early 1990s, computing an accurate “average” exchange rate is difficult and could introduce a distortion in these data for international comparisons.

<sup>5</sup> In 1994, an investigation by the State Administration for Import and Export Inspection revealed that the actual value of equipment in 5,500 FDI Projects was 19 percent below contractual commitments. UNCTAD, Division of Transnational Corporations and Investment; *World Investment Report 1995, Transnational Corporations and Competitiveness*, United Nations, Geneva, 1995.

<sup>6</sup> From discussions with planning and international sales staff of transnational fertilizer corporations.



## *Part III*

# *Managing Rural Development*

## *7. Cultivated Land*



### **Introduction**

Land ownership—or the possession of key land-use rights—provides rural households several benefits. Long-term tenure security, and freedom from the arbitrary loss of these rights without compensation, is critical to providing incentives for long-term investment and land maintenance. Transfer or rental rights play a similar role and can be instrumental in promoting efficient land allocation across households. By providing small farmers with a form of collateral, secure and well-defined land rights also can help the development of rural credit markets. Land also serves as an important source of food security and social insurance and can help absorb family members unable to work

off-farm, or whose off-farm jobs have been terminated.

Rural reforms and the introduction of the Household Responsibility System (HRS) in the early 1980s radically altered the organization of agricultural production and the incentives facing rural households. With the extension of land-use rights and residual income rights to households, agriculture production shifted from a collective- to a family-based farming system, but land was not privatized. Ownership remains “collective,” and local governments either control or influence household land use and land decisions.

The initial rural reforms triggered an unprecedented acceleration of agricultural growth

in China. Empirical studies (McMillan et al. 1989; Lin 1992; Huang and Rozelle 1996) attribute approximately half of this increase to the incentive effects associated with better residual income rights. Following reduced growth after 1984, attention has increasingly focused on the land management system, the dimension of the farm economy that has been probably least altered since the initial reforms. Poor incentives related to tenure insecurity, for example, are thought to have discouraged investment in agriculture, slowing productivity and economic growth. However, other factors also negatively affect agricultural productivity.

The consequences of changing institutional arrangements governing cultivated land use are potentially enormous. The debate on land policy suffers from a number of weaknesses, principally the lack of an enumeration of basic facts about domestic land tenure as they have evolved over recent years. Empirical work on the determinants of land rights and their effect on household behavior and the farm sector is minimal, thus few data exist to support the development of land policies.

### Issues of Ownership

The rural reforms vested ownership rights with the “collective,” which is usually taken to mean the village, although ambiguity over ownership is surfacing in an increasing number of areas. In some villages the village group (the old production team) is recognized *de facto* as the owner of the land. In other villages, however, ownership is with the village (the old production brigade) and in a small minority of cases, ownership reportedly resides with the township. Ownership disputes have developed between village groups and villages, particularly where land is to be converted to nonagricultural uses with a high commercial value. Nevertheless, the collective “owns” the land rights and the internal debate focuses on how to construct a new set of rights on collective land. Legal privatization (as opposed to *de facto* privatization through extended tenure, rental, and inheritance rights) is not a policy issue. The majority of farmers

reportedly do not support it, and it is not on the government’s policy agenda of any group. Moreover, China lacks the ancillary institutions (credit markets, land registration, and legal system) that could make land privatization successful.

### Management, Forms of Land Tenure, and Property Rights

Five major forms of land tenure are sanctioned by the national government. These tenure forms and their share of household tenured areas are: (a) responsibility land—79.4 percent, (b) ration land—8.3 percent, (c) contract land—5.5 percent, (d) private plots—5.7 percent, and (e) reclaimed land—1.1 percent. Responsibility land, comprising more than three-quarters of the cultivated land, typically has a commodity delivery quota assigned and faces the possibility of reallocation to other village households. These tenure forms, in turn, are packaged into several types of land tenure systems, including the two-field system (combined responsibility and ration land), and three-field system (adds contract land).

Although these tenure types differ in terms of household rights and obligations, they provide a less than satisfactory way of differentiating land tenure systems. The residual income and nonresidual rights that farmers have on responsibility land may differ in villages within the same region. Therefore, the following discussion disaggregates the tenure forms into their component rights, including security of tenure, rental or transfer rights, freedom of crop selection, and conversion to alternative agricultural uses.

In most villages, land-use rights are lost (or gained) through village-wide reallocations (land transfers among farm households initiated by the village leadership). *Tenure security*, thus, is inversely related to the frequency of reallocations. Survey data for 215 randomly selected villages in eight provinces show that the average number of reallocations per village since the implementation of HRS in the early 1980s is 1.7 (Brandt 1998). In 60 of the sample villages, however, land had not been reallocated





*Stocking rates on low rainfall grasslands must be managed carefully to avoid degradation.*

since HRS. The magnitude of reallocations also differs from community to community but on average entails about 50 percent of a village's cultivated land and affects about 65 percent of households. For the entire sample, slightly more than half of all cultivated land has been reallocated at least once during the reform period.

Nearly 70 percent of surveyed villages report that households are free to transfer their use rights to other households. In the remaining 30 percent, constraints on transfers most often take the form of restrictions on renting to nonvillagers and the need to obtain prior authorization from village leaders. The transfer of land-use rights among households is typically short term, and entails the payment of a fee and the assumption of tax and quota liability in return for use of the land. Despite the high percentage of villages reporting unconstrained transfer rights, the percentage of land rented in China is low. In 1995, more than three-quarters of the surveyed villages reported some rental, but the rental market is thin, representing about 3 percent of the land area; most transactions are between relatives. Thus, most interhousehold transfers occur administratively rather than through land rental markets.

In three-fourths of villages, households are reportedly free to decide crop mix. This statistic should be interpreted carefully, however, as constraints on crop choice need not be explicit. Quotas and limited freedom to convert quotas into cash also may affect crop choice. In Liaoning, for example, grain quotas average about 25

percent of gross output, and typically cannot be fulfilled in cash. Cotton quotas in parts of Hebei and Shandong appear to have similar effects. Household autonomy to convert cultivated land to alternative agriculture uses (e.g., constructing a greenhouse or fishpond, converting dry land to paddy) also is restricted. More than half of all villages report such restrictions.

Although broad land policy is determined by the central government, the differences in property rights across counties, townships, and villages indicate that the real locus of land-use decision making is the village (Li 1998). In fact, China's Organization Law of the Village Committee vests village leaders and government with legal authority over land rights.<sup>1</sup> The transfer of decision-making power from the central to local and village authorities is so extensive that China is arguably now one of Asia's most decentralized countries (Liu, Yao, and Carter 1998).

### Land Reallocation

Empirical literature has identified a number of factors that appear to affect village reallocation policy. With the introduction of the HRS, land was typically allocated to households in a fairly egalitarian way on the basis of family size, demographic composition, and labor supply (Putterman 1993). Land reallocations help maintain equal access to land as household-level demographics change. As new households are formed, and depending upon nonagricultural employment opportunities, household income disparities are created that are contrary to the village's original egalitarian distribution of land. These disparities create pressure to redistribute use rights to maintain minimum consumption levels. Also, land reallocations help eliminate inefficiency caused by demographic and labor supply changes and poorly functioning labor and land rental markets (Turner, Brandt, and Rozelle 1998).

Leaders in some affluent suburban villages may be using their positions to extract rents through periodic land readjustments and land sales to nonagricultural, nonvillage interests (Johnson 1995). In other locations, direct rent

seeking from land is less common, as nonvillage demand is minimal and only a small proportion of farmers actually pay cash for use rights. More commonly, village leaders use their control over land to ensure state interests are protected and state policies (i.e., taxes and quota fulfillment) are implemented. This can be achieved by threatening land expropriation from households that do not meet policy obligations and by rewarding farmers who do with additional land. (Rozelle 1994; Li and Rozelle 1997). Alternatively, land may be reallocated from farmer households with high off-farm earnings who find agriculture relatively unprofitable (Turner, Brandt, and Rozelle 1998). These actions also are self-promoting—if policy obligations are met, the village leaders may be promoted, gain status within the cadre community, or receive other benefits.

Tenure security, and other property rights, are the outcome of a complicated interaction among the interests of the state, villagers, and village leaders—interactions that need to be better understood before conclusions can be derived. The infrequency of land reallocation (averaging every six years in villages which have reallocated land) and differences in the amount of land involved suggests that transaction costs are important in explaining reallocation behavior. These costs include the direct cost of conducting the reallocation, and the indirect costs of agricultural disruption and the potential impact on investment behavior (i.e., tenure insecurity costs).

### Impact of China's Land Management System

Empirical work on property-right formation and its effects is quite limited and is inadequate for policy formulation. That undertaken has focused on three key dimensions of the impact of village land policy: (a) land allocation decision rules, (b) impacts on static efficiency, and (c) impacts on dynamic efficiency. Unfortunately, no available work rigorously examines how land rights affect income distribution, poverty alleviation, or provision of social insurance—three

of the important aspects used to justify the current system.

### Land Allocation and Equity

Analyses of household-level data support the view that land in many villages originally was allocated on the basis of family size, possibly adjusted for demographic composition (Burgess 1998). Universal and egalitarian access to land increased calorie consumption in an economy characterized by uncertain food markets with high transaction costs. However, more recent reallocations appear to be fine tuning ratios of land to labor to reflect household participation in off-farm labor markets. In many villages, households with family members working off-farm receive less land per capita. In a few villages with extreme labor shortages, leaders are consolidating land into larger farms that, in turn, are often major beneficiaries of subsidies for expenditures on current and capital inputs. If these land allocation patterns are typical of villages throughout the country, and if such trends continue, the original, purely equity-based, criteria may be giving way to an effort to make allocations more efficient.

With constrained rental markets, the only way significant household land reallocation can occur is by administrative decree, which can be viewed as a market substitute. However, high information and implementation costs make “fine-tuning” reallocations less efficient than well-functioning rental or sales markets. An



*To control erosion and conserve limited rainfall on the Loess Plateau, the land is terraced before planting either annual or tree crops.*

analysis of household data for 1994 for villages in Hebei and Liaoning found that despite efforts to shift land among households, land distribution across households is still inefficient (Benjamin and Brandt 1998). Better access to off-farm opportunities and reallocations that redistribute land from the land rich to the land poor attenuate but does not eliminate these losses.

The impact of tenure insecurity on investment behavior is behind recent calls to extend tenure to 30 years, but estimates of these dynamic incentive effects are limited. A recent analysis using household data from Hebei found that households apply more fertilizer and labor to their private plots that are more secure and to plots they have farmed for longer periods, receiving higher yields (Guo, Rozelle, and Brandt 1997). However, the impact of several other important factors (e.g., size of plot, land quality distance from plot to homestead) were not econometrically differentiated and yield impacts were only minimal. Another analysis of Zhejiang households examines other long-term investments, (e.g., wells and drainage), finds a similar effect, and suggests that a reduction in the frequency of reallocation by half would result in an output increase of only 5 percent (Carter and Yao 1998).

These results must be interpreted carefully. The studies only show the returns to alternative tenure but do not capture the potential returns of shifting to an alternative property-rights regime in which households enjoy more secure tenure and are less constrained in other dimensions. They are, also, geographically narrow, making generalization of the findings difficult. Because of regional differences in agronomic, climatic, and socioeconomic traits, opportunities for long-term investment would be expected to differ significantly between localities. The analyses ignore village-level investment and its potential interaction with household investment.

Land reallocation that helps equalize land-labor ratios between households may give rise to an inverse relationship between dynamic and static efficiencies. Reallocating land may equate

resource intensities and improve short-term allocative efficiency, but it may undermine security of tenure, thereby reducing investment incentives and long-term efficiency. This illustrates the dichotomy between market and administrative allocations: rental transactions in a well-functioning market would not undermine tenure security or lead to decreased investment. This dichotomy highlights the importance of understanding why rental-market transactions are so few. If rental markets could be made to operate effectively, they might be able to replace leader-implemented land reallocations without the adverse incentive effects. Potential reasons why rental may not exist, however, include (a) ideological or moral restrictions on land rental, (b) problems of contract enforcement, (c) “use it or lose it” rules that discourage rental, and (d) village leaders’ discouraging rental because it makes quota fulfillment more costly.

### Conclusions and Recommendations

Empirical studies suggest that improved tenure security would improve household investments and output. However, incremental productivity is marginal and these studies do not incorporate nontenure options (e.g., village investments) and factors (e.g., differences in climate, geography, and general agroenvironment, and increased freedom in crop choice) that affect productivity, output, income, and welfare. Nevertheless, the recent decision to extend tenure on responsibility land to 30 years is generally perceived to improve farmer incentives to invest in land improvements. Although this improves tenure security, the system likely has significant short- and long-term efficiency costs. The inability to use land as collateral may be slowing the development of credit markets, as farmers have few other collateralizable assets. If rental-market barriers are created by nonsecurity factors, extending security may increase inefficiency in land allocation as rural residents increasingly become employed off-farm—or as other demographic changes occur. Also, the inability of nonagricultural households to lease out their land could lower on-farm in-

vestments and inhibit agricultural household access to additional land.

China's record for rapid rural growth, stability, and poverty alleviation may—or may not—be linked to its flexible land system. The lack of knowledge on alternative tenure structures makes undertaking rigorous research on productivity and equity impacts imperative if informed policy judgments are to be made. Given the uncertainties surrounding land tenure changes, and before further tenurial reforms are introduced, testing rental markets and alternative land tenure arrangements is imperative for careful measurement of impacts on income, equity and social security, investments, short- and long-term efficiency.

Within this framework, we make the following recommendations:

- *As an interim strategy, continue to allow village determination of property rights regimes.* Difficulties and differences that exist in property rights across villages suggest that this would be the best strategy for now. However, the government should consider how to improve village governance to eliminate egregious abuses of local power (such as illegal land sales) and to ensure that the allocation of property rights in land reflect the wishes of the local community. This kind of local flexibility may be advantageous should the adverse effects of the Asian financial crisis and the ongoing restructuring in the SOE and collective sectors intensify in the near term. In earlier macroeconomic retrenchments, off-farm employment opportunities dried up for many rural residents and migrants, forcing a re-

turn to agriculture. A sharp decline in urban growth, combined with a reduction in local off-farm opportunities, would require reabsorbing perhaps tens of millions of unemployed in the rural sector.

- *Continue to experiment with rental markets and alternative tenure arrangements to develop some form of marketable land-use right.* This should also include continuing to assess income, social insurance, and poverty alleviation, equity, investment, and short- and long-term efficiency. Farmers' apparent preference for village ownership and periodic land adjustments emphasizes the need to proceed cautiously with tenure adjustments. A characteristic of rural reform has been experimentation (often conducted in the Rural Reform Experimental Zones under the auspices of the MOA's Research Center for Rural Economy)—successful experiments are adopted widely and those deemed unsuccessful are discarded. As rural households become more distinctly nonagricultural or agricultural, the latter must have access to incremental land to maintain income growth parity.
- *As land use rights becomes marketable, conduct additional modest experimentation to develop land-use rights that allow for development of collateral and to help develop credit markets.*
- *Ensure some form of social insurance.* The social security role of arable land is so important that China can only ignore it by replacing it with some other form of social insurance.

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<sup>1</sup> Article 4, Organization Law of the Village Committee of the People's Republic of China, *China's Agricultural Yearbook* (Zhongguo Nongye Nianjian) 1988, pp. 459-460.

## 8. Water Resources



As the single most important natural resource constraint, water management is crucial to China's continued development in all sectors. Although additional water is needed for agriculture, future water requirements will increase most in the nonagricultural sectors, particularly municipal and industrial uses. Without either more-efficient water use or the development of additional supplies, economic growth could be seriously impaired.

### Water Scarcity and Scarcity Allocation

China's renewable water resources consist of 2,711 billion cubic meters (bcm) mean annual river runoff (including inflows originating in other countries, but excluding an average outflow of 732 bcm to lower riparian countries) and groundwater resources estimated at 760 bcm that, generally, are not additional to the renewable water resources because their recharge is dependent upon surface water resources. As water balance statistics for 1993 (last year in which water balance statistics are

available) indicate only 518.6 bcm of water was used, China would seem to have more than enough water to meet foreseeable requirements—if it were developed (Table 8.1). However, much of the runoff cannot be economically exploited because rainfall and runoff are concentrated in 3 or 4 summer months. Also, China's water resources are maldistributed spatially, similar to other large countries with multiple agroclimatic zones. The locational imbalance results in southern China (the basins south of, and including, the Yangtze river basin) receiving about 80 percent of the national runoff, but contain only 36 percent of the cultivated land.

Although irrigation composed two-thirds of the water consumed (1993), agriculture is a residual water user, following allocations for municipal, industrial, and rural household uses. However, many municipal allocations are supply constrained and fall seriously short of urban requirements and demand. The 343.4 bcm used for irrigation represents about 80 percent

**Table 8.1: Water Balance and Estimated Water Requirements, 1993, 2000, and 2010 (Billion cubic meters)**

	Industry	Urban	Rural Households	Irrigation	Other Agriculture	Total
<b>1993</b>						
Requirements	83.8	24.1	24.4	424.3	36.5	593.1
Supply/Use	88.9	24.1	23.1	343.4	39.2	518.6
Balance	+5.1	0.0	-1.3	-81.0	+2.7	-74.5
<b>Requirements</b>						
<b>2000</b>	126.8	50.4	32.4	433.5	32.4	688.4
<b>2010</b>	206.5	79.7	43.1	448.3	56.1	833.7

Note: 1993 precipitation and runoff was assumed to be at 75 percent probability level.

Source: Nanjing Institute of Hydrology and Water Resources, *Report on the Mid- and Long-Term Plans for Water Demand and Supply*, November 1996, as reported in UN-ESCAP, "China: Water Resources and Their Use," 1997.

of the water requirement for optimum crop yields. Rural household water use includes consumption by both rural residents and domestic livestock. "Other" agriculture use is primarily for aquaculture, but also includes forestry and pastures. Portions of urban and industrial wastewater are reused, thus sectoral uses are not totally additive.

To inhibit the existing negative water balance from worsening, water must be appropriately priced to encourage greater efficiency in water use (for all applications, including industry and irrigation), water delivery systems must be efficiently operated and maintained, and conveyance and application efficiency improved. However, improving efficiencies of local schemes will result in only modest water savings for the entire water basin. This is because most of the losses from inefficient irrigation schemes return to the hydrologic (surface or groundwater) system and are available to downstream users. The *actual* water savings (available for incremental use) within a water basin, is only the reduced amount of nonbeneficial evapotranspiration and nonbeneficial outflow to the ocean. **Actual** water savings can be generated only through agronomic and irrigation management measures that improve water use efficiency and reduces nonbeneficial evapotranspiration; for example, improved crop genetics, plastic and organic mulching, and irrigation scheduling. Given the limited ability to improve the water balance through improvements in overall irrigation system efficiency, developing additional water supplies is important; but undeveloped supplies also are limited. The Ministry of Water Resources (MWR) has proposed several hundred water development projects, including water-saving irrigation technologies, improved irrigation efficiency projects, and new supply development to increase water supplies. To assist in maintaining agricultural and rural income growth, and to address food security needs, the MWR proposes to expand the effective irrigated area to 53.3 million hectares by 2000 and 58.0 million hectares by 2010.

The term "irrigated area" most quoted in

statistical references applies to *effective* irrigated area, which encompasses the crop land that is leveled and is banded and connected to a source of irrigation. However, this area may not necessarily receive irrigation water. Effective irrigated area was estimated at 50.4 million hectares in 1996. *Actual* irrigated area is the area cultivated at least once during the year and receives irrigation water—although not necessarily optimum supplies; and *stable* irrigated area is the area supplied with sufficient water to meet average-year crop requirements.

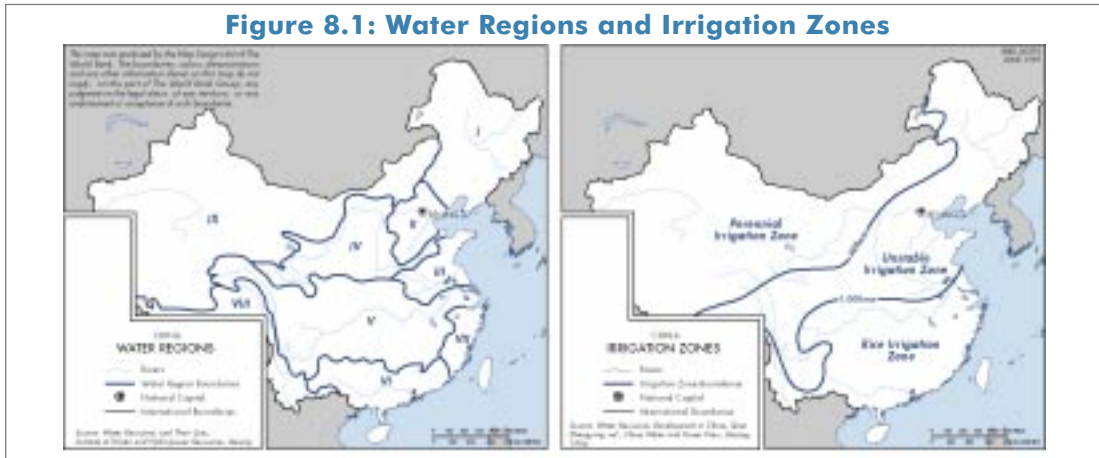
China has nine Water Regions, which conform to the major water basins.<sup>1</sup> Also, the country is divided into three irrigation zones, broadly based on precipitation patterns and the "irrigation index" (the percentage of crop water requirements that must be met from irrigation) and that cut across the water regions. The irrigation zones are defined as follows:

- *Perennial irrigation zone.* Mean annual precipitation is 400 mm (15.7 inches) or less and the seasonal distribution is generally insufficient to meet crop needs.
- *Unstable irrigation zone.* Mean annual precipitation is 400 to 1,000 mm (15.7 to 39.3 inches) and includes the major portion of China's agricultural land. Rain-fed agriculture is possible and widespread, but optimal yields can be obtained only with ensured irrigation and drainage.
- *Rice irrigation zone.* This zone comprises southern and southeastern China, where rainfall is more than 1,000 mm and the climate is highly favorable for agriculture. Two or three crops per year are common.

The irrigation zones and water regions are shown in Figure 8.1.

### Finance and Management

Previous work has demonstrated that irrigation investments make important contributions to agricultural (crop) growth (World Bank 1997; Huang and Rozelle 1997). Water conveyance is one of the few rural-sector areas where real investments have increased over the past decade; growing at an annual rate of 17 per-

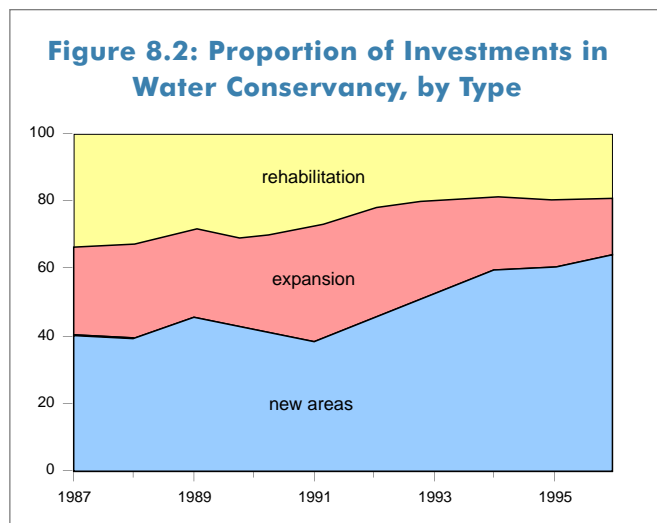


cent between 1987 and 1996—and exceeding ¥18 trillion in 1997. Budgetary resources are allocated primarily for new irrigation projects as the proportion of investments for rehabilitation and expansion of existing schemes has declined (Figure 8.2). Water charges to and collections by farmers, while minimally adequate for routine operation and maintenance, are insufficient to cover periodic repairs and rehabilitation of system structures. (Yet farmer obligations, including corvée labor and water fees, are substantial.)

The MWR is responsible for managing China’s water resources, but a large part of MWR’s responsibility is delegated to seven major river-valley commissions covering the Yangtze, Yellow, Huaihe, Haihe, Pearl, Songhua, and Liaohe rivers and Taihu Lake. Regional-level responsibility rests with the Provincial Water Resource Bureau, with offices in each prefecture and county, and charged with management of the main canals, system improvement programs, and supervision of the Township Water Management Stations (WMSs)—the latter are responsible for maintenance and management of lower system canals and gates and, through village staff, for scheduling water and collecting water charges. At the village level, Water Management Committees (WMCs)—in collaboration with the Township WMS and Agricultural Services Station—are responsible for local distribution. The WMC

is also responsible for organizing farmer labor for maintenance and system expansion and for collecting water charges. Groundwater for irrigation use is largely managed by local governments.

The government’s strategy is to transform irrigation management agencies into self-financing, independent legal entities—a system increasingly being adopted in other countries. One of several experimental institutions, the Self-Financing Irrigation and Drainage District, has been successfully piloted for several years and it, or similar institutions, will increasingly be responsible for holistic water management. The structure comprises a Water Supply Corporation and Water User Associations (WUAs). The Water Supply Corporation is for management, organization, and maintenance of the main irrigation system and supply of bulk water. The



WUAs are established by farmer groups for construction, management, and operation and maintenance of lateral canals and on-farm systems and would purchase the measured volume of water delivered (i.e., at the head of each lateral). In the pilot stage WUAs have been highly satisfactory in improving water management efficiency (reducing water use while increasing production), rationalizing field channels, and reshaping plots to facilitate mechanical cultivation. *Given the financial constraints and the accumulated deferred maintenance, the transfer of system responsibility and management to self-financing enterprises should proceed as rapidly as expertise can be developed.*

### Constraints and their Alleviation

Few options are available to alleviate basin-wide water shortages; **development of new water supplies**, where undeveloped supplies exist, is an obvious option. Numerous projects are proposed to increase water supplies from surface sources. The multipurpose Xiaolangdi and Wanjaizhai projects in the Yellow river basin will collectively contribute only about 4 bcm to the annual water supply when completed. As the cost of these two projects (excluding resettlement) is about \$3.6 billion (which includes hydropower and other benefits), the magnitude of the water supply capacity problem becomes clear. Certainly, the Three Gorges project will increase available supplies and stabilize water resources for a large area. Also, either route of the South–North transfer scheme would bring about 14 bcm per year of abundant Yangtze water to the drier north (Liu 1996). However, the volume involved would be less than the current level of groundwater overexploitation in the north and supplies from such transfers would be available only about a decade after initiating the project.

Beyond developing new supplies, only investments which reduce nonbeneficial evapotranspiration and nonbeneficial outflows to the ocean, or that improve crop use efficiency actually contribute to making additional water available *system-wide*. Investments which reduce water

percolation saves water for individual schemes, but improves basin efficiency only marginally as percolation and runoff recharges the groundwater and downstream surface flows. However, some agronomic and management efforts would generate water saving effects. These include **crop genetic research** which has the potential to save water by creating new drought-tolerant varieties that produce more output using less water input. This will necessarily become an increasingly important research agenda as water becomes increasingly scarce in the north China plain and other major agricultural areas.

**Land Leveling.** Surface irrigation accounts for 99 percent of the irrigated area but the plots are still leveled by traditional methods. To make efficient use of water, fields must be level; precision leveling will save water as reduced water application will reduce evapotranspiration and yield per unit of water applied will increase. Laser land leveling is a decades-old technology but is relatively new to China. Internationally the cost of laser leveling is about \$300 per hectare or Y 165 per mu (assuming maximum movement of 300 cubic meters per hectare) and generally produces yield gains of 30 to 50 percent and reduces water application needs by 10 to 25 percent. This technique may not be applicable to all areas but should be considered when field sizes are large enough to efficiently accommodate laser equipment.

**Plastic Film Mulching.** This technique consists of covering the soil with a film to reduce evaporation. It has developed rapidly and is now applied to more than 1.3 million hectares. Remarkable water-saving and yield-increasing effects have been achieved, with water efficiency reaching 90 percent. Cotton experiments on plastic film mulching in Xinjiang has achieved water savings of more than 70 percent.

**Full-Cost and Volumetric Water Charges.** The State Council document, *Industrial Policies on Water Conservancy* (1997), addressed the need for appropriate water charges. Water charges for new economic projects are to be set sufficiently high to cover operation and maintenance costs, pay taxes, repay loans, and yield



rational profits. Water prices on existing schemes are to be adjusted upward over a three-year period to conform to the same principles.

Irrigation-water measurement is steadily increasing, but in most systems the measurement is undertaken only at major offtakes and branches, so farmers effectively pay flat rates. Water measurement is only *necessary* at the lateral canal operated by the WUA, which buys the water and ensures a balanced allocation to the members. Also, water measurement is essential for correct irrigation scheduling to meet crop requirements system-wide and flatten peak demand periods.

**Demand Management.** Cropping patterns remain determined by a combination of climatic conditions, market forces, and government direction. The grain quota system continues to operate and, thus, water charges will not influence the grain area planted.

**System Rehabilitation and Improvement.** Many of China's irrigation schemes were constructed in the 1950s. Several were inadequately designed and constructed and were often inadequately maintained. Consequently, many schemes require rehabilitation and modernization not only because of these problems, but because of natural aging. A 1990 survey by MWR found more than one-half of the structures and canals surveyed had deteriorated in varying degrees and about two-thirds of the deteriorated infrastructure was due to natural aging (Chen and Ji 1995). Investments in these activities would improve irrigation scheme efficiency and perhaps farmer equity, but may not improve basin-wide efficiency significantly.

**Canal Lining and Pipelines.** This is the most widely adopted water-saving practice. Canal lining also improves operations. Antiseepage techniques for canals include linings of stone, concrete, plastic film, asphalt, and asphalt-felt. The effect of these techniques has produced water savings exceeding 50 percent within an individual WUA. Much of the seepage is return flow within a basin, thus the sum of individual scheme savings would be considerably greater than actual basin savings. In some northern provinces, canal networks have been replaced with pipelines, thus preventing seepage and *evaporation* from the distribution network and permitting the cultivation of land previously used for canals. Low pressure pipeline conveyance systems have developed rapidly in the tubewell irrigation areas.

**Advanced Irrigation Techniques.** These techniques include sprinkler, trickle, and low pressure systems; gated pipes; and seepage irrigation. They have been introduced and some equipment is manufactured domestically. Use has yet to become widespread (sprinkler irrigation is estimated to cover only 700,000 hectares), except for some medicinal and other high value crops. *Surge-flow* irrigation systems provides water in a cyclical manner and has the effect of reducing surface infiltration. This system is more complex than conventional gravity systems, but would conserve some irrigation water, as smaller water applications would reduce nonbeneficial evapotranspiration.

**Wastewater Reuse.** Reusing municipal and industrial wastewater will improve overall water efficiency. An estimated 37.3 bcm of mu-



Lining irrigation canals reduces water percolation losses.

municipal wastewater was produced in 1995, of which 23.3 bcm was treated. Wastewater contains considerable quantities of fertilizer nutrients and thus, if treated, is particularly useful for irrigation; however, careful management is required to avoid soil and groundwater contamination. Treatment costs are typically Y 1.00/cubic meter, but its value in irrigating high value crops on the perimeter of cities is much greater.

### The Importance of Irrigation to Agricultural Production and Incomes

In 1996 about 95.5 million hectares were cultivated in China, of which about 50 million (52 percent) were irrigated. However, irrigated areas account for far more than 52 percent of crop production. Firstly, cropping intensities on irrigated land are about 203 percent, whereas on rain-fed land they are about 114 percent. Thus about 66 percent of *sown* area is irrigated. Secondly, the productivity of irrigated land is much higher than that of rain-fed land in most of China. About three-fourths of the cropland lies either in the perennial irrigation zone or in the unstable irrigation zone. Cropping in these areas is risky without ensured irrigation supplies.

Available statistics do not permit directly comparing rain-fed with irrigated crop yields. Controlled experiments undertaken in Shanxi Province and estimates derived from FAO's CROPWAT<sup>2</sup> model (an irrigation scheduling model), under conditions of full irrigation and no irrigation indicated that in wetter locations (Regions V, VI, VII, and VIII), nonrice rain-fed yields are nearly identical to irrigated yields except for vegetables and melons. In drier regions, yields of irrigated grains are always higher. In the Inland Region (IX) most yields, including grains, are more than double rain-fed yields. Otherwise, irrigated yields range from marginally to substantially higher, particularly in the Yellow River Basin (IV), where irrigated winter wheat yields are about double rain-fed yields.

To estimate the role of irrigation in the generation of rural incomes, we mapped the 1996 rural population and provincial level per capita

income data into the water resource regions to derive total rural income. We then converted the results to "Income from Agriculture" and "Income from Crops," firstly by removing the proportion of rural incomes derived from non-agricultural sources, and secondly by removing the proportion of agricultural income derived from noncrop activities—15.8 and 20 percent, respectively. (Substantial regional variation would exist in the proportion of income derived outside of agriculture and of agricultural income derived from livestock.) The result indicated that about two-thirds of total rural incomes derive from cropping activities. Using gross revenue from cropping as an income proxy, we determined that 58 percent of crop revenue came from irrigated areas in the northern regions (I through IV, and IX); and 77 percent in the southern regions (V through VIII).

### Crop Yield and Income Response to Water

In northern China, rice, vegetables, and melons are given priority in irrigation application decisions. Other grain crops, particularly wheat and corn, are on the margin; they receive supplemental irrigation when available. The Shanxi experimental data and estimates using FAO-CROPWAT methodology produced similar results. We discuss the CROPWAT results below.

The model assumed a 20 percent reduction in irrigation supplies to each crop (from the full water requirement). The results indicate that vegetables and melons are the highest marginal revenue producers; the marginal loss was at least Y 4.00 per cubic meter in all regions, and nearly Y 9.00 per cubic meter in Region II. Vegetables and melons would be the last crops on which a farmer would reduce irrigation water. Next would be cotton (northern regions) and then corn or orchards. The *first* crops to cut would probably be wheat, soybeans, tubers, or other grains.

Rice typically cannot be stressed, thus water reductions for rice means reductions in rice area. Kutcher (1998) modeled the impacts of

converting all the rice area in Water Regions I through IV to wheat or corn. The rice areas are relatively small, (except Region I), but given their disproportionate water requirements, could make a substantial volume of water available for other crops if these areas were not produced. (However, rice may be grown in specific areas because waterlogging or other factors may preclude other crop production.). For the amount of water rice requires, up to twice as much winter wheat area could be sown, about 2.5 times as much spring wheat area, and more than three times as much corn area. Furthermore, wheat and corn have an absolute advantage over rice in generating grain output and revenue per cubic meter of irrigation water under P75 rainfall conditions. The table below compares these alternatives on the basis of 1995 estimated yields and 1997 crop prices. Wheat generates up to 50 percent more grain per unit of water than does rice, and corn, between two and three times as much. The results are similar when comparing revenue per cubic meter of irrigation water.

Average revenue, of course, is not average income. Separate survey data from Henan Province (which includes parts of Regions II, III, and IV) for 1996 indicated the income per hectare for wheat—Y 3,658, corn—Y 5,349, and rice—Y 10,040 (Henan Agricultural Statistics Yearbook 1996). (Rice prices were particularly high

in 1996. However, except for rice we do not know whether these average crop incomes are based on adequate or insufficient water supplies.) And, if neither the availability of water nor its cost were a concern, farmers would clearly prefer to grow rice rather than wheat or corn. However, if water becomes *the* (physically or financially) constraining factor in these regions, as seems likely, farmers will need to consider returns to water as well as land use. Farmers who produce rice would suffer modest income loss by shifting rice area to wheat and corn unless (a) nonrice crops are severely starved of water currently, or (b) additional cultivated land is available for cropping with the released water supplies. However, rice accounts for only about 4, 5, and 6 percent of crop income in Regions II, III, and IV, respectively; thus, excluding rice from the cropping pattern would have minimal income impacts regionally. Income estimates per hectare (or mu) are quite sensitive to water application, thus optimizing cropping patterns on available land and water need careful study in each location.

### The Importance of Improving Irrigation System Efficiencies

Gross consumption of irrigation water declined marginally between 1980 and 1993, but national plans call for a sharp increase by 2000 and a further marginal increase by 2010. Given

**Table 8.2: Average Grain Output and Revenue per Cubic Meter of Irrigation Water**

Crop/Region	I	II	III	IV
<b>Average Grain Output per Cubic Meter of Irrigation Water (kg):</b>				
Winter Wheat	n.a.	1.58	1.82	0.98
Spring Wheat	2.04	1.54	n.a.	1.21
Corn	6.07	4.09	4.36	2.22
Northern Rice	1.57	1.36	1.33	0.94
<b>Average Revenue per Cubic Meter of Irrigation Water (yuan):</b>				
Winter Wheat	n.a.	2.33	2.69	1.45
Spring Wheat	3.02	2.28	n.a.	1.79
Corn	6.95	4.68	4.99	2.55
Northern Rice	2.04	1.77	1.73	1.22

n.a. = not applicable.

competing water demands and the high investment cost to increase water supply capacity, coupled with a shortage of financial resources, *the proposed increases are unlikely to be achieved*. However, improving the water delivery system is important and should be undertaken when economically efficient, particularly when it also improves intra-scheme distribution.

The national average overall irrigation system efficiency was reported to be 54 percent in the 1980s (ESCAP 1997). Recent discussions indicate that statistic still applies in much of Northern China.<sup>3</sup> However, the ESCAP study (1997) implied that the national average efficiency had improved to 66 percent by 1993. Thus, *gross* irrigation consumption of 343.4 bcm in 1993 could have resulted in *net* consumption as low as 187 bcm (using the 1980 efficiencies) or as high as 230 bcm (using the implied 1993 efficiencies). The net consumption difference, 43 bcm, is large and represents one of the major sources of uncertainty in water resource information and planning. Depending on how much irrigation efficiencies are improved before 2000, meeting the *gross* irrigation requirement of 433.5 bcm could result in *net* irrigation supplies of between 236 and 337.5 bcm (ignoring natural intrabasin return flows). The marginal value of irrigation is at least Y 1/cubic meter, implying that the range of uncertainty due to these efficiencies is more than Y 100 billion per year of agricultural output, and a similar value in terms of rural incomes.

### Conclusions and Recommendations

Although water resource planning calls for moderately increasing allocated supplies of water to irrigation over the next decade, this will be very difficult to achieve. More probable is a continuation of recent trends, with modest reductions in irrigation water allocations—because most nonflood season surface water is already consumed, and groundwater is heavily overabstracted. Furthermore, silting of reservoirs and neglect of maintenance of the irrigation system implies that local surface water

supplies may even decline.

The high cost of new investments in water-resource development, coupled with increasing economy-wide demands for limited fiscal resources, will likely constrain rapid development of new water resources. Although water can continue to be administratively allocated, it is more efficient and will lead to higher growth, if water is appropriately priced and market forces allocate the water to uses with higher economic value. As the economy becomes more market-oriented, the long-run sustainability of irrigation and drainage will depend increasingly on self-financing entities that are based on hydraulic boundaries (not administrative), with maximum management responsibility and control accorded to farmer users.

From a macroeconomic view, the vastly higher economic values of water generated by the urban and industrial sectors should not be sacrificed for increased agricultural production. The ability of China's industrial sector to generate trade surpluses easily offsets foreseeable reductions in agricultural output that may arise from irrigation water shortages. However, three-fourths of China's population is rural, and depend on agriculture for two-thirds of their incomes. Protecting and increasing these incomes and maintaining growth in agricultural production is a national concern—one that depends in part on more and better irrigation.

Rehabilitating and completing surface irrigation and drainage systems—including the installation of control structures and water measuring devices to improve efficiency—can yield local benefits. Rehabilitation should be undertaken where economic benefits justify the investment, particularly if it provides a more reliable and equitable supply of irrigation water to farmers and increases deliveries to water-deficient areas within the scheme, typically located in the lower reaches of tertiary and quaternary canals. Investments in improving and extending existing systems would likely provide better returns than new construction. (Between 1989 and 1995, the marginal cost of irrigation expansion was about Y 10,000 per

hectare, (1990 terms), representing very efficient investments. However, future investments will prove more expensive.)

If irrigation water supplies do not increase as planned, or decrease, the negative impact on agricultural production and incomes could be minimized by the following activities:

- *Conduct a comprehensive study of system-wide efficiency.* Such a study is sorely needed.
- *Rehabilitate the irrigation and drainage systems where economically justified, to increase the overall delivery efficiency and improve on-farm facilities.* Such investments will have an income impact by ensuring “tail-end” farmers receive a equitable share of water, but system-wide water savings will be modest.
- *Undertake one or more routes of the South-North transfer scheme, which would bring plentiful Yangtze river water to the water-starved regions II (Hai Basin), III (Huai Basin) and IV (part of the Yellow Basin) as early as possible.* Delays will increase the cost in terms of lost industrial and agricultural output, social costs of chronic water shortages, and environmental damage from overuse of ground and surface water.
- *Introduce improved land-leveling technology (e.g., use of laser guided equipment).* This technology appears financially attractive and should be explored as a means of saving water and increasing yields, particularly on newly reclaimed lands. Given China’s small cultivated plots, land leveling may not be practical in all areas but would be feasible in new land reclamation. Full-cost, volumetrically based water charges would provide an incentive to save water and make precision leveling financially attractive.
- *Expand collection, treatment, and reuse of municipal waste water, particularly around larger urban areas, with suitable monitoring and control to prevent contamination by hazardous wastes.*
- *Encourage farmers to refine cropping patterns in water-short areas to more water-efficient crops.* In some areas considerably more wheat and corn could be grown with the water rice currently consumes, with little or no reduction in farm incomes. “Encouragement” would best come in the form of appropriate water pricing supported by farmer education.
- *Introduce and enforce a rational system of water pricing and volumetric measuring.* Over the long term, volumetric measurement would considerably improve water use efficiency. Farmers cannot be expected to conserve water or alter their cropping patterns when effective water costs are low or unrelated to the amount used. Water charges that fully recover cost would encourage better water management on all crops and would influence nongrain cropping patterns by increasing the production cost for crops with higher water demand.
- *Expand self-financing water enterprises to manage water supplies and operate and maintain irrigation systems as rapidly as management expertise can be developed.*
- *Ensure agricultural research and extension programs accord appropriate priority to crop water use efficiency (drought tolerance).*

## Accelerating China's Rural Transformation

<sup>1</sup> Water Regions:

Region	Name	Component Provinces	Major River Basins
I	Northeast	Heilongjiang, Jilin, Liaoning, Nei Mongol	Heilong, Liaohe, Songhua
II	Haihe	Hebei, Beijing, Tianjin, Shanxi, Henan, Shandong	Haihe, Luanhe
III	Huai/Shandong	Shandong, Henan, Jiangsu, Anhui	Huaihe
IV	Yellow	Qinghai, Gansu, Ningxia, Nei Mongol, Shaanxi, Shanxi, Henan	Yellow, Weihe, Fenhe
V	Yangtze	Hubei, Hunan, Anhui, Jiangxi, Jiangsu, Zhejiang, Henan, Guangxi, Sichuan, Shanghai, Guizhou	Yangtze
VI	South	Guangdong, Guangxi, Yunnan	Pearl
VII	Southeast	Fujian, Zhejiang, Guangdong	Qiantang, Minjiang
VIII	Southwest	Yunnan, Tibet	Yarlung-Zangbo, Nujiang, Lancang, Yuanjiang
IX	Northwest	Nei Mongol, Qinghai, Xinjiang, Tibet	Tarim, Yilo, Ertix

<sup>2</sup> CROPWAT is an irrigation scheduling model developed by the FAO, UN. It is described in FAO Irrigation and Drainage Paper No. 46 (Rome: FAO, 1992).

<sup>3</sup> Discussions with river basin commission officials at the Hai, Huai, and Yellow River headquarters, April/May 1998.

## 9. Technical Change and Technology Transfer.....



During the reform period, higher prices and improved incentives have increased agricultural input usage and substantially raised agricultural productivity. TFP, which is the basis of improved efficiency, increased rapidly during the early reform years, but has since tapered off. TFP improvement is, generally, the result of adapting new and improved production technologies, which in turn rests primarily on agricultural (and allied) research and is the fundamental element for long-term increases in farmers' per capita incomes.

The comprehensive extension system during the early post-revolution period played a crucial role in meeting expanding food needs, disseminating technology, and modernizing large parts of China's backward and low-productivity agricultural sector. In the early reform years, the extension system continued to assist technology transfer to farmer households much as it had earlier. Villages continued to hire staff to liaise with township extension agents on plant protection, seed and fertilizer use, and other technologies. However, financial resources have declined in recent years, resulting in a decline in agricultural technology research and promotion efforts.

Agricultural research and the extension of new crop varieties have been shown to be a major engine of agricultural growth during the reform (Huang and Rozelle 1996, and Lin 1992). While farmers were responsive in pursuing new technologies (e.g., hybrid rice), following introduction of the HRS reforms the adoption rate of new technologies declined, which might be because of weakening of the technology distribution system.

### A. Agricultural Research

Funding for agricultural research in China is allocated or generated in three ways. *Core funding*, which finances salaries and social benefits (e.g., retirement, housing, medical benefits), constitutes about 50 percent of government funding for research institutes and centers. To make agricultural research more effective by rewarding those with good ideas, successful past records, and who are working on key projects, the remainder of public support consists of *competitive grants* allocated for projects proposed by scientists. Research budgets also are allowed to be supplemented by additional funds generated through *commercial sales* by the institutes and centers.

### Public Sector Financing

Historically, agricultural research has been in the public sector domain in most countries. Market failure characterizes agricultural research, as it is a public good involving uncapturable externalities, is risky, and is long term. Without public sector involvement, sub-optimal amounts of agricultural research would likely be conducted—and that research would likely focus on easily marketable technology with capturable private benefits and ignore basic and long-term research that maximize society's benefits. In the OECD countries, the private sector now accounts for about 50 percent of agricultural research, as IPR protection enables more of the benefits to be captured.

China's crop agriculture has been well served by the public research system, particularly rice—China pioneered the breeding of semidwarf, high-yielding varieties and today is still the only

country in the world with large areas of hybrid rice. Success in the nongrain subsectors has been less dramatic. The importance of agricultural research, in terms of high rates of return and contribution to growth, is well documented in China and elsewhere. Fan and Pardey (1997) found that government investment in research and development resulted in a 20-percent growth in agricultural productivity in China over 1965–94. Fan (1996) estimated that the internal rate of return to agricultural research over the same period was 94 percent—implying a serious underinvestment in agricultural research. A survey of more than 150 studies of rates of return to agricultural research (worldwide) concluded that rates of return are typically 40+ percent and often exceed 100 percent (Echeverria 1990). Growth accounting and decomposition analyses demonstrated that growth in China's rice, wheat, and maize production over 1984–95 was overwhelmingly attributable to research investments (Huang, Rosegrant and Rozelle 1995 and World Bank 1997b)

### Declining Research Investments

One of the government's objectives is to increase agricultural research investments, but that objective has been elusive. As in many other facets of the rural economy, agricultural research suffers from fiscal constraints, as public resource allocations have been woefully inadequate. The Ninth Five-Year Plan recommended increasing agricultural research expenditures to 29 percent of total government research expenditures, but throughout the 1990s agriculture's share has remained at 13 to 14 percent. Agricultural research intensity (ARI), defined as investments in agricultural research as a proportion of agricultural GDP, declined from 0.49 in the late 1970s to 0.38 in the mid-1990s and although national agricultural research budgets increased during the reform period, the number of research scientists employed increased even more rapidly (Fan 1995). Recent comprehensive data on government expenditures, including provinces and lower jurisdictions, for agricultural research activities presents an equally alarming picture.

*Real* agricultural research expenditures, as measured by deflating current expenditures by the CPI, grew marginally during the late 1980s, but allocations increased during the early 1990s. However, Huang, Hu and Fan's (1998) analysis of disaggregated agricultural research budgets clearly determined that after deducting expenditures for capital construction, salaries (which increased much more rapidly than the general price level), overheads, etc. the *real* expenditures for research projects declined at an annual rate of about 4 percent during the 1990s. These facts, coupled with the rapid increase in the number of agricultural research scientists *reduced the real research funds per scientist by 25–30 percent during the 1990s*. The ARI declined throughout the period reaching an all-time low of 0.38 in 1996 and 1997 (Table 9.1). The declining ARI is likely to reduce future agricultural growth. An international, "rule of thumb" is to spend about 1 percent of agricultural GDP for agricultural research (FAO 1990). As seen above, the downward-trending ARI is below both this level and the developing country average (Alston, Pardey, and Rosebloom 1997). Also, research costs are increasing as additional objectives are incorporated into the research program (e.g., pest resistance, drought tolerance) and research is increasingly turning to more costly approaches (such as in biotechnology), leaving fewer resources for traditional research. The World Bank's Food Security Report (1997b) summarizes the recent research on the determinants of agricultural supply, which demonstrated that increases in China's cereal production, post-1985, was overwhelmingly contributed by agricultural research and technology.

### Making China's Research Investments More Productive

In 1982 the Chinese Academy of Science initiated a *competitive grants* program that allocated funds directly to research scientists as part of a shift in national science and technology policy that encourages research-funding agencies to make grants based on the best pro-



**Table 9.1: Agricultural Research Budgets and Research Intensity, 1986 – '96**

Year	Agricultural Research Budgets		Research Project Funds	Agricultural GDP	Agricultural Intensity (ARI)
	Current	Constant (1995)	Constant (1995)		
	(million yuan)	(million yuan)	(million yuan)	(billion yuan)	(percent)
1986	1,346	3,529	766.9	276	0.49
1987	1,403	3,429	560.7	320	0.44
1988	1,782	3,674	811.2	382	0.47
1989	2,095	3,668	747.5	423	0.50
1990	2,050	3,515	522.7	502	0.41
1991	2,381	3,967	729.1	529	0.45
1992	2,761	4,366	622.8	580	0.48
1993	3,273	4,572	673.6	688	0.48
1994	4,409	5,061	627.1	944	0.47
1995	4,856	4,856	570.7	1,199	0.40
1996	5,238	4,854	548.4	1,388	0.38
1997	5,377	4,795	—	1,397	0.38

Note: The agricultural research expenditure data reported in this table include (a) agricultural research expenditure in research institute system under all ministries, the Academy of Sciences, and the Academy of Agricultural Science at national, provincial, prefectural, and county levels; and (b) agricultural research expenditure in the university system. Agricultural sector includes crop, forestry, livestock, fishery, water, and agricultural services (e.g., machinery, information). Constant prices derived by using CPI deflator.

Source: The State Sciences and Technology Commission (provided by the Center for Chinese Agricultural Policy).

posals. National research administrators also created a number of special research funding programs, particularly in high technology. Funds from these new programs have mostly come from core budgets, meaning research institutions that have not been successful in the grants competition, have experienced falling support, which earlier came to them on the basis of staffing levels.

Since the mid-1990s China has attempted to *commercialize* a portion of agricultural research by requiring research centers to develop commercial products in their institutes and sell their research findings. One of the overall goals from the program is to use commercial profits to finance further research. If intellectual property rights were better protected, research centers could license new technology to commercial entities and enjoy the royalty rights. Instead, the institutes have established their own com-

mercial enterprises and joint ventures as a way of protecting their breakthroughs. However, these commercial ventures have had a number of adverse consequences. Commercialization also has diverted skilled scientists away from research. Studies by Rozelle, Pray, and Huang (1997) show that in some cases more than 20 percent of the scientists in research institutes are engaged in activities that are not related to research and development (R&D). Institute staff are not trained to engage in non-R&D activities, and thus have high failure rates when they do. Other centers have hired staff to run their new business ventures, while at the same time layoffs are occurring because of a lack of funding.

Most significantly, despite all of the effort, commercialization appears to provide few, if any, supplemental funds for research. Research funding regulations stipulate that 30 percent of com-

mercial net revenue should flow back into research programs. In reality, no more than 15 percent of net revenues of profitable ventures (in those centers focusing on rice research) have been returned to research budgets. Most earnings support salaries and benefits of commercial-enterprise staff (Rozelle, Pray and Huang 1997).

Jin (1997) determined that the actions of government officials, who observe the commercial activity in the research sector, further undermines the original goal of the program. For each 1 yuan of commercially generated income, government funding has been reduced by 0.80 yuan. Thus, despite absorbing large amounts of time, energy, attention, and capital, commercialization has led to a net funding increase of only 4 percent (Jin 1997). As government has reduced funding, research centers are forced to seek alternative sources, which, except for an occasional international grant, are largely limited to commercial income. However, the lack of priority for research support creates a downward spiral. Generating additional commercial income results in further reductions in research funding from the budget.

### Potential New Sources of Research Funds

#### Producer and User Cesses

Nonsubsistence and processed agricultural commodities with commercial markets could appropriately be subjected to cesses on sales earmarked for specified purposes, including commodity research. Processed commodities, such as tea, tobacco, and some nonfruit tree crops (e.g. rubber), are well suited to the collection of such cesses. Whether the fee is levied on the producer or user depends on the relative ease of collection. For tobacco, imposing a fee on users through a stamp (or similar) tax collected from the manufacturer is relatively easy. For other crops, such as cotton, levying the fee on producers through deductions at the processing point (ginny) may be easier administratively. Where such a system is employed,

producers should have a voice in determining the focus of research financed in this manner. Subsistence food commodities are unsuited for cess funding because only a small portion of production is marketed—typically in small, uncontrolled marketplaces. Nor are cesses a practical method of obtaining funds for noncommodity research, such as farming systems, soil conservation and other environmental topics.

### Internationally Financed Nonprivate Research

China has access to technology generated by the Consultative Group on International Agricultural Research<sup>1</sup> (CGIAR) institutions and benefits through adaptive research by the FAO, which often includes training, and by some active NGOs. Funds for CGIAR centers come primarily from developed countries (Europe, United States, and Japan) and the World Bank; funding from developing countries comprised only 2 percent of the total budget in 1995. Developing countries, including China, have benefited enormously from the research of these centers at little cost. China has active cooperative programs with the International Rice Research Institute, or IRRI (rice); the International Center for Maize and Wheat Improvement, or CIMMYT (maize and wheat); the International Potato Center, or CIP (potatoes); the International Plant Genetic Resources Institute, or IPGRI (plant genetics); the International Food Policy Research Institute, or



*An IRRI biotechnology laboratory where foreign genes are introduced into rice cells using biolistic process.  
Courtesy of CGIAR Photo Library*

**Box 9.1: India Growth Accounting Analysis**

IFPRI examined factor productivity and government spending linkages with agricultural growth and poverty reduction in India. The results have implications for China. India's TFP increased at an average annual rate of 1.1 percent between 1957 and 1987—with a slightly higher average during the 1967–77 “Green Revolution.” A growth accounting analysis indicated that public research and extension contributed most (59 percent) to TFP growth. However, surprisingly, domestic and foreign *private* research and development also made important contributions—13 and 23 percent, respectively. The contributions of various factors to TFP are indicated in the table below:

Total Factor Productivity by Source of Growth, India, 1957–87		
Factor	Contribution Percentage	Percent
Agri. Research		
Public domestic	0.258	22.8
Public HYV	0.070	6.2
<b>Private domestic</b>	<b>0.145</b>	<b>12.8</b>
<b>Private foreign</b>	<b>0.261</b>	<b>23.1</b>
Public Extension	0.331	29.3
Markets	0.035	3.1
Irrigation	0.084	7.4
Other	-0.054	-4.7
<b>Total</b>	<b>1.130</b>	<b>100.0</b>

Source: IFPRI, EPTD, *Total Factor Productivity and Sources of Long-Term Growth in Indian Agriculture*, April 1995.

IFPRI (food policy); and the International Irrigation Management Institute or IIMI (irrigation management).

**Research and Technology Transfer by Private Enterprises**

Another alternative to government-financed research and extension is through private sector support. As noted above, the OECD coun-

tries rely heavily on the private sector to generate new agricultural technologies, as do some developing countries. For example, domestic and foreign private enterprises have provided the technology that has contributed about 36 percent of India's productivity growth since 1957 (Box 9.1). Most major international seed companies conduct research and sell field-crop seeds in India—a country with agroclimatic conditions much different from North America and Europe and with a far smaller seed market than China. In contrast, only two international companies are selling small amounts of seed (other than vegetable seed) in China.

A few multinational organizations and transnational corporations have research underway in China. Often the research is demonstration in nature and serves more as an extension or sales mechanism. These include the Potash and Phosphate Institute of Canada (PPI); the American Soybean Association; and transnational seed, chemical, and food and feed corporations. These groups have had varying degrees of success and have made varying contributions. For example, in cooperation with the Soil and Fertilizer Institute of the Chinese Academy of Agricultural Sciences, the PPI has demonstrated the beneficial effects of applying more potassium fertilizers, which has led to increased potash imports (and increased productivity). Chia Tai (the China subsidiary of Charoan Pokphand) produces a large portion of China's manufactured feed as the result of poultry feed demonstrations. In addition to these successes, trials undertaken with government agencies have produced ample evidence that adapting additional foreign technology could significantly increase productivity in crops, livestock, and agricultural machinery and equipment. For example, China could take advantage of foreign technology for maize, rapeseed (canola), and soybeans. Research in North and South America and Europe has produced varieties that yield much higher than Chinese varieties under similar climatic environments.

China benefits only marginally from agricultural technology developed by the private

sector. However, given the size of China's agricultural economy and similarity of agroclimatic conditions to those in North America, Japan, and Europe—where private research is quite important—Chinese agriculture has enormous opportunity to grow more rapidly by using technology developed by commercial enterprises and foreign firms. Farmers need to be given access to that technology.

### Intellectual Property Rights

Copyright, patent, and other IPR protection have developed slowly. The patent law became effective only in 1985 but did not apply to chemicals and pharmaceuticals until 1993. Plant variety protection became available with passage of the plant breeder's rights law in 1997—although the application office has yet to open. The legal framework seems adequate, but enforcement is perceived to be weak. In the absence of strong IPR protection, few large multinational companies do research in, or transfer cutting-edge agricultural technology to China. Only companies that can control technology through means other than IPRs and are confident of their joint-venture partners can take the risk.

FDI assisted in modernizing the poultry industry by importing grandparent genetic stock and breeding parent genetic materials domestically (this could be done with some confidence because the technology did not rely on IPR protection but sophisticated hybrid genetics). The introduction of superior nutrition feed milling and mixing paralleled the development of the poultry genetics. Almost all of the plant breeding and screening research by foreign-financed enterprises has been on hybrids (corn, sunflower, sorghum, and rice) because hybrid varieties are difficult to copy as long as the hybrid parents are kept secret—thus the IPR was technically protected.

In the agrochemical sector the pesticides that have not been reverse engineered are those whose active ingredient is a complex, and difficult to copy, molecule. Many others, despite of-



*A promising super-hybrid rice variety under development at the National Hybrid Rice Research and Development Center, Changsha, Hunan, China.*

*Photo courtesy of CNHRRDC*

ficial agreements, have been copied and sold without any compensation to the inventors. Although the legal environment provides adequate protection for IPR, enforcement remains weak. The current effort by Monsanto to market its Bt variety of cottonseed will be closely watched—if the seeds become widely available from non-Monsanto sources, other high-technology and biotechnology firms will be reluctant to invest in China.

Other nontariff barriers to technology transfer include weak contract law, restrictions on the role of multinationals in the agricultural input industry, and government monopolies on the sales of some agricultural inputs. For example, the amount of imported cotton seed allowed for testing is limited to 500 kg per variety, seriously slowing down efforts to test the applicability of foreign varieties in China. Other regulations dictate that companies can only import female pigs, and the health protocols for importing breeding pigs require blood tests conducted in China at a cost of \$300 per head for diseases that already exist in China.

Relying significantly on the private sector for agricultural technology development carries potential hazards, particularly in terms of research focus and priority. The objectives of private firms are unlikely to coincide with society's,

as optimizing long-term financial gains is not necessarily consistent with optimizing society's economic benefits, which include environmental and poverty alleviation objectives. Some officials in China worry that foreign firms with advanced R&D methods and technology will displace domestic expertise and undermine the nation's ability to generate its own research.

**Research Priorities and Efficiency**

Decentralization and financial reorganization has resulted in the state providing a declining proportion of agricultural research funding and greater reliance on provincial and lower jurisdiction financing. Using provincial data, Jin et al. (1997) identified several factors that influence growth in government funding of agricultural research. In the study, government revenues, agricultural GDP, provincial grain exports, and number of scientists (all on a per capita basis) were positively related to agricul-

tural research financing. These findings, although unsurprising, have serious welfare, poverty, and equity implications for regions where the positive factors are lower than the more economically advanced coastal provinces.

Given the overwhelming contribution of research to agricultural growth and poverty reduction, real investments in research must be better managed to ensure that efficiency and long-term objectives are met. A consolidation and reorganization of the research system—eliminating unnecessary duplication and restructuring it along agroecological zones—also would improve efficiency. This would include research applicable to poverty-stricken and resource-poor areas—both high elevation temperate and tropical zones. People in poverty areas often rely on subsistence crop varieties and livestock species that have not received a significant research focus, particularly under adverse environments. These include potatoes, sorghum,

**Box 9.2: Agricultural Research Considerations**

The agricultural research budget allocated to various commodities is unknown, but food grains has been a major focus—and production of cereals has increased impressively. However, in recent years China has turned from a net exporter of vegetable oils, oilmeals, and oilseeds to a net importer, reflecting increasing demand for protein supplements for livestock feeds. However, China's rapeseed is high in glucosinolates and much of the meal is exported because of its toxicity to nonruminant livestock (China's needs for protein supplements is primarily for poultry and pigs). Canada embarked on a research program to improve rapeseed yield and quality in the 1960s and 1970s that yielded rates of return of 100 percent in the early period, declining to 50 percent in more recent years. China's rapeseed yields have grown at only 1.6 percent annually over the late 1980s and early 1990s and remain below those of Canada, Argentina, and France. Although soybeans originated in China, Chinese soybean yields remain far below that of other major producers (Argentina, Brazil, Canada, and the United States). The growth rates of China's cereals and oilseeds yields are shown below.

**Growth Rates of Cereals and Oilseeds Yields, 1985-96**

Commodity	Growth Rate (percent)	Commodity	Growth Rate (percent)
Cereals		Oilseeds	
Rice	1.0	Rapeseed	1.6
Wheat	1.2	Soybeans	2.3
Corn	3.3	Peanuts	3.7
Millet	3.0	Sunflowers	3.2
Sorghum	4.6	Sesame	4.3

millet, barley, buckwheat, beans, goats, poultry and pigs. Recent work on India's research investments (Fan and Hazell 1996) concluded that orienting additional research investments to nonirrigated agriculture would yield greater productivity and poverty alleviation benefits than maintaining a heavy focus on irrigated agriculture.

As research budgets become increasingly constrained, China must use funds efficiently and appropriately identify research priorities. While some priorities and broad financing allocations can be established on objective criteria, such as percent of agricultural GDP or impact on the balance of trade, other priorities must be assessed more subjectively. Obvious examples of the former are drought-tolerant plant varieties (in anticipation of reduced irrigation supplies), feed grains (to support the livestock sector); livestock and fisheries (which are an increasing share of agricultural GDP), and oilseeds and their derivatives (which are an increasing proportion of imports). Examples of the latter are farming systems and varietal improvement in resource-poor areas (for equity and poverty alleviation reasons), marketing and agroprocessing issues, and natural-resource management (where long-term benefits are not captured in economic assessments).

China is concerned about undue reliance on external markets to supply substantial portions of domestic needs. This is because China's large size could potentially disrupt international markets and because the government has a latent fear that a foreign country might apply political pressure through trade embargoes. These concerns partially underlie the grain self-sufficiency policy.

### Conclusions and Recommendations

Improvements and transfers in technology are crucial in improving the health of the rural sector. Agricultural research, along with extension services, is a major engine of growth. To ensure new and continually improving technology, research needs support. Steps the government can take to provide this include the

following:

- *Finance as much of the "public goods" agricultural research as possible.* The returns to agricultural research have been found to be very high and one of the largest past and potential contributors to increasing food supply. By giving financial support to research, the government will accelerate growth and thus is a good investment. Creating an "enabling environment" to stimulate agricultural research by the private sector is also important.
- *Make competitive research grants accessible to the entire research system.* Conceptually, this should enhance the quality of proposals and produce improved results as proposals are rated on the basis of proposed methodology, originality, and *expected contribution to farmers*, among other things. However, competitive grants for projects cannot totally substitute for long-term funding for research programs, which enables more sustained effort on basic R&D issues and more routine research activities. This process may favor experienced, centrally situated scientists at the expense of younger, and perhaps better trained, scientists. Indeed, older scientists at national-level institutes have been the principal beneficiaries of the competitive grants initiative. Widely publicizing the competitive grants program and its evaluation criteria, including a broad range of scientists and institutional representation on the evaluation panel, and ensuring program administration was fully transparent would help meet program objectives. Also, a blind first stage evaluation might be undertaken in which the submission excludes the proposed researchers and the affiliated institution.
- *Develop a grant program that matched a research center's commercial earnings allocated to research—rather than automatic funding reductions.* Such a program could strengthen the research program and give the research staff of the centers more incentive to support commercial activities (Pray 1997).
- *Rigorously supervise any cess collections to*

ensure they are used for their intended purposes and not diverted to alternative uses. Where cesses are employed producers should have a voice in determining the focus of research financed in this manner.

- *Increase participation of international firms in agricultural research.* This would help accelerate agricultural modernization. Without greater participation of the private (domestic and international) sector, China's agricultural productivity will be lower, as farmers will not be assured access to state-of-the-art technology. If imported technology is to supplant government-supported research, an improved IPR policy environment is necessary.
- *Increase reliance on the private sector for research in which the benefits are capturable.* This would enable the government to focus more of its efforts on research issues related to natural resource sustainability, poverty, and equity that commercial companies are unlikely to address. These issues would include, for example, research on soil conser-

vation, and on rain-fed and subsistence crops for resource-poor areas.

## B. Extension

### Financing Agricultural Extension

Technology development and transfer played a critical role in the past growth of food production, but total real expenditures have stagnated since the early 1990s and real expenditures per extension staff member have declined from more than Y 7,000 in the late 1980s to about Y 5,000 in 1994/95 (Table 9.2) Little information is available about the effectiveness of the extension service, but recent declines in technology adoption rates and increasing fiscal problems have weakened the extension system, and government interest in assessing and improving the extension performance has increased (Huang, et al. 1998).

China's small-scale farming requires intensive extension input, creating high extension cost per unit of output. However, China's share

**Table 9.2: Agricultural Extension Expenditures in China, 1986-95**

	Total Expenditures		Extension Staff (thousand yuan)	Expendtr/Staff Constant 1995 (yuan)	Agric. Extension Intensity (percent)
	Current (million yuan)	Constant 1995 (million yuan)			
1986	1,136	2,978	385.3	7,729	0.41
1987	1,270	3,103	404.7	7,667	0.40
1988	1,406	2,899	411.1	7,052	0.37
1989	1,513	2,649	429.3	6,169	0.36
1990	1,740	2,983	454.5	6,564	0.35
1991	2,051	3,417	495.7	6,895	0.39
1992	2,275	3,598	615.7	5,844	0.39
1993	2,554	3,568	604.2	5,905	0.37
1994	3,120	3,582	733.0	4,886	0.33
1995	3,721	3,721	674.9	5,512	0.31
1996	5,706	5,269	—	—	0.41
1997	6,848	6,151	—	—	0.49

Note: Agricultural Extension Intensity is defined as the ratio of agricultural extension expenditures to agricultural gross domestic product.

Source: Huang, Jikun, Ruifa Hu, Jun Song, and Scott Rozelle, "Policy Brief: Agricultural Technology Extension in China," Working Paper, Center for Chinese Agricultural Policy, Chinese Academy of Agricultural Sciences, Beijing, China, 1988.

of agricultural extension investment in agricultural GDP (agricultural extension investment–AEI) became one of the lowest in the world in the mid-1990s. The AEI declined by 25 percent over the 1986-1995 decade and stood at 0.31 in 1995, but large expenditures in 1996 and 1997 appears to have reversed the declining trend. International extension expenditure surveys are less frequent and comprehensive than research surveys; however, an FAO survey of 57 countries presented regional average AEI, which indicates the Asia-Pacific regional average was 0.56 in 1988 (down from 0.68 in 1985), considerably above China's. The 1993 AEI of the United States was estimated at 0.81 (Alston and Pardey 1997), a high level, especially considering the large effort spent by private companies in providing extension-like services.

Extension staff wages and benefits have risen rapidly during the 1990s but remuneration levels, relative to other agricultural sector personnel, declined from 87 to 79 percent between 1985 and 1995. Compensation levels are stipulated by state and provincial governments, but most wage mandates are unfunded; thus local authorities are left with the responsibility of meeting these costs from local budgets. To meet costs, local authorities must assess farmers or divert resources from other expenditure categories. Salary payments as a proportion of total agricultural extension expenditures rose from 43 percent in 1986 to more than 70 percent in the 1990s. In some agricultural extension stations, *actual* public expenditures have fallen below staff salary and retirement obligations. Some local governments have declined to pay extension staff salaries (or only part of their basic wage) and instead have encouraged staff to commercialize their activities or engage in marketing agricultural inputs (fertilizer, pesticide, and seed). Anecdotal evidence indicates that the lack of funds greatly reduces the ability of extension staff to contact farmers and conduct field trials and that, in poor inland counties, salaries were as much as 12 months in arrears (Huang 1998).

### Fiscal Impact on Agricultural Extension Performance

China has a comprehensive, six-level (national, provincial, prefectural, county, township, and village) extension network, with about 675,000 full-time extension workers employed at the national and subnational levels—including a number in larger and more prosperous townships. The system also relies on more than 500,000 full- and part-time extension workers (farmer technicians) at township and village levels in the mid-1990s.

Despite these impressive numbers, work by the Center for Chinese Agricultural Policy (CCAP) in four provinces (Zhejiang, Henan, Sichuan, and Heilongjiang) found that the extent of the extension network had declined and continues to deteriorate in some locales. More than 70 percent of village extension personnel report that the frequency, scope, and coverage of their services has fallen in the 1990s. About 50 percent of township extension stations report similar trends. Large numbers of staff have left the extension service and numerous village extension offices have closed over the past decade.

### Effectiveness of extension work

Declines in agricultural extension expenditure per worker and in relative income are disincentives for extension workers. CCAP's study discovered that active extension workers spent 76 percent of their time on extension work in 1996, about 10 percentage points less than in 1985. (Nonextension township officials report that few extension workers spent even one-half of their time on extension activities.) Regression analyses show that the most significant factors affecting extension workers' effort (i.e., time allocated to extension work and frequency of visiting farmers) are wages and extension expenditures.

Many of those who have remained in the extension system are employed in part-time jobs elsewhere or engage in work-related businesses—selling chemicals, seeds, and fertilizer—as new policies allow and encourage this.



Unfortunately, staff also engage in activities unrelated to extension, such as operating guest houses, restaurants, or other business establishments. Diverting attention to other activities, while helping to supplement incomes and keep the extension system in many areas intact, also has its direct and indirect costs. In recent farmer interviews, only a small minority acknowledged being visited or visiting an extension agent, although farmers still benefit from extension leaflets, radio programs, and other services. Local leaders indicate that the frequency of village visits by extension staff has fallen in recent years. Encouraging extension staff to undertake trade in agricultural inputs creates potential, if not actual, conflicts of interest, as sales incentives may outweigh the value of the product to farmers. Such indirect, policy-induced distortions are increasingly common in many areas of public goods provision and are linked to tightening budgets. They are also linked to a propensity for local leaders to address the fiscal constraint by allowing policy agents to combine the public services they are charged with providing and commercial activities (in this case, farm management advice and input sales).

In industrialized countries the research and extension agenda is largely determined by producers through farmer organizations. However, in developing countries, research and extension institutions typically lack accountability to farmers and often “push” technologies rather than eliciting farmer needs. This was demonstrated in a recent survey by CCAP that found a gap between the opinions of extension agents (and officials and breeders) and farmers regarding the types of technologies needed. For example, higher-yielding varieties were perceived by 81 percent of extension agents (but only 69 percent of farmers), to be a high priority, and 19 percent of the extension staff (but 31 percent of farmers) felt that farmers demanded high-quality varieties.

### Impact of Seed Commercialization

As the seed industry has become more commercialized, seed-enterprise managers have begun to pursue profits and some of the long-standing ties between the extension system and seed system have begun to change (Huang and Rozelle 1997). In some cases, seed companies sell their seed directly to farmers to retain the margin that extension agents might otherwise earn. Furthermore, as seed companies attempt to protect their business interests, they sometimes do not share information on new varieties with extension staff. Consequently, extension agents often lack information on the availability of new seed varieties. As seed companies continue to commercialize, these problems may intensify, especially if extension agents continue to depend on commercial income supplements.

### Conclusions and Recommendations

China’s extension system has performed an important role in boosting agricultural productivity in the past. With nearly 200 million small farms and rising wages, China needs a cost-effective extension system to help it meet future production goals and objectives. Currently, however, the extension system is in disarray, and the quality and quantity of extension services are declining. The government has shown a keen interest in stemming this deterioration.

Some options are currently being pursued that may point to the future direction. Although relatively rare, farmers are beginning to form producer groups and associations in relatively circumscribed areas that contract with professional agriculturalists, aquaculturalists, foresters, and livestock specialists to purchase the latest information on varieties and species, pest control, and other cultural practices. These groups are noticeably in orchard production and fresh-water aquaculture. While this approach seems worthwhile for nonstaple commercial commodities, charging for advice on staple crops in poor areas would not be feasible; for this, government extension will remain necessary and will be one of the few sources of nontraditional information for farmers in remote regions.

We recommend the following steps to maintain and improve agricultural extension services:

- *Improve effectiveness of agricultural extension.* This may include improving links with the research system and establishing formal relationships with the academy system and universities. Improved information systems are needed both in terms of new ideas, technologies, and techniques and to speed their delivery to farmers. Also, new issues, such as marketing, will become increasingly important—and need to be incorporated into the extension program—as the economy develops and farmers increase production of nontraditional crops. Training programs to upgrade the skills of local agents and provide them with the tools to understand markets and follow market trends, should provide a high rate of return.
- *Permit the private sector to participate in agricultural input markets.* This would likely provide some types of extension services, such as soil testing and fertilizer recommendation.

As these responsibilities are assumed by the private sector the responsibilities of government extension will be reduced.

- *Base restructuring of extension programs on their impact on agricultural production.* Although agricultural extension must be restructured, intensive analysis of extension's impact on agricultural production is needed before government officials can redefine structures and determine policy options. Determining the appropriate policy options will be difficult, as little research and information exists about extension in China; with the exception of recent preliminary work by CCAP, quantitative analyses of high-quality extension determinants and the impact of extension on agricultural production is lacking. New research should examine these issues, assessing at the institutional level the traits and value of successful programs, the impacts of policies, and alternative ways of delivering better information to farmers in a more timely fashion.

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<sup>1</sup> CGIAR is a loose-knit group of donors that support 16 institutes around the world with specific research foci, including specific crops, livestock, aquaculture, water resource management, food policy, and agricultural research systems.

# 10. Rural Industry



Rural industry has made an extraordinary contribution to China's rapid economic growth over the past 20 years. Its contribution to national gross industrial output rose from 10 percent in 1979 to nearly 40 percent in 1996 (Dong and Putterman 1997). Output in the rural industrial sector grew at an average annual rate of nearly 20 percent during the 1980s, and the sector created more than 5 million new jobs annually over 1978–96. In 1997 TVE employment declined by 5 million from the 1996 high of 135 million employees, but still accounted for about 40 percent of total nonfarm employment (Jin and Qian 1998; Rozelle, et al. 1997). Rural industry also supplied 25 percent of the nation's total exports in the mid-1990s (Dong and Putterman 1997).

## Performance of TVEs

Despite this sterling record, rural industry's recent performance—particularly in certain subsectors—has raised concerns over the sector's economic health and long-term sustainability. The capacity to create employment declined in the 1990s (Table 10.1), and the marginal propensity of rural industries to

create jobs fell even as output continued to increase. Employment in township-run enterprises, the backbone of the initial rural industrial movement, has fallen since 1994 and employment in village-run firms has stagnated. TVE expansion may have reached a turning point in 1997 when the total number of firms and overall TVE employment declined. Some of the sharpest employment declines (or decelerations in the growth rates) have occurred in some of the coastal areas, the traditional stronghold of rural industries. Nevertheless, total value added (which has replaced gross output value as the measure of output) continued to in 1997.

Rural industry continues, however, to have some bright spots. Private firms have increased their share of *employment* and *output* (Figure 10.1). In contrast to the shrinking collective sector, private and cooperative firms increased their *value added* by 9.5 percent in 1997, increasing their share of rural industry's total value added to more than 50 percent (Du 1998). On occasion employers in rural areas have hired migrants at a higher wage rate than employers in urban areas (Lohmar and Rozelle, 1999).

**Table 10.1: TVE Employment, by Ownership (millions)**

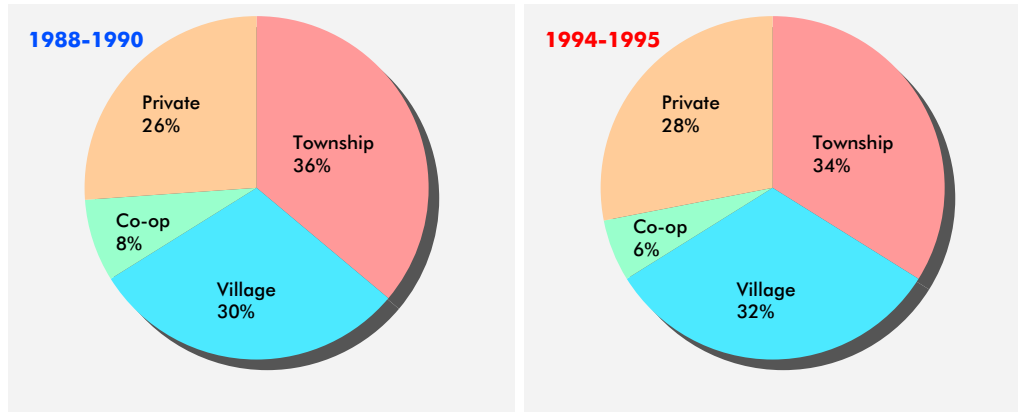
Year	Total	Township	Village	Other <sup>/a</sup>
1980	30.0	13.9	16.1	n.a.
1985	69.8	21.1	22.2	26.5
1990	92.6	23.3	22.6	46.7
1995	128.6	30.3	30.3	68.0
1996	135.1	29.6	29.9	75.6
1997	130.5			

<sup>/a</sup> Includes cooperative and private, but primarily private.

n.a. = not available.

Source: Zhongguo Xiangzhen Qiye Nianjian (various years).

**Figure 10.1: Percent of TVE Output Value, by Ownership Type.**



Sources: Zhongguo Tongji Nianjian, Zhongguo Qiye Nianjian, and Zhongguo Nongye Nianjian, various years

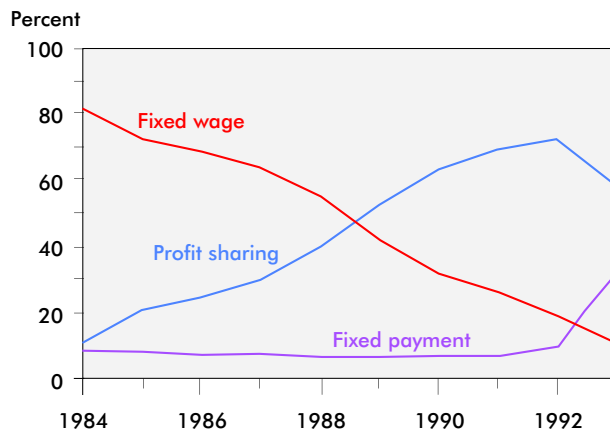
**Key Issues and Critical Questions Facing TVEs**

The future direction of rural industrialization is widely discussed and debated. Inside China, scholars' opinions are sharply divided as to whether the current shakedown signals managerial transformation and consolidation, which would lead to an even more vibrant sector; or whether their small scale, limited capital, often remote locations, and poor management and marketing skills make rural firms inherently inefficient with poor growth potential. Some argue that the inability to let weak firms fail, in part, a consequence of the quasi-public nature of a large part of the sector, could create another financial crisis. This more pessimistic argument asserts that the shift in managerial authority (*gaizhi*) currently underway disguises the sector's poor performance and more competitive and efficient industrial firms will not reemerge. The argument further states that fiscal, financial, and managerial resources

should not be wasted on a sector that is not evolving on the basis of competitive market principles. Still others argue that the current structural transformation signals a fundamental shift towards a more market-oriented sector, with improved management incentives and autonomy.

The incidence of private ownership has risen

**Figure 10.2: Managerial Contract Evolution in TVEs, Sample Data, 1984 - '93 (Percent)**



Source: Chen, Hongyi, and Scott Rozelle, "Leaders, Managers and the Organization of Managerial Contracts in China," Working Paper, Department of Agriculture and Resource Economics, University of California - Davis, 1998.

### Box 10.1: Types of TVE Ownership and Control in Rural Industry

Type 1: *Conventional Public*. Managers are salaried employees; government is sole residual claimant through taxes and profits; officials are deeply involved in major business decisions; and profits, loss, and risk are borne entirely by government.

Type 2: *Liberalized Public*. Managers have incentive contracts based on firm profitability, government receives income flows both in taxes and profits, managers risk only reduced income for poor performance, and government bears all financial risks.

Type 3: *Contract Partnership*. Government shares residual with managers while firm also pays taxes to government, government and managers are joint residual claimants, risk is shared by both parties, and government commitment is not firmly committed to bailing out a loss-making company.

Type 4: *Leasehold*. Managers pay fixed rents to government in addition to taxes, managers are residual claimants, risk is borne by managers, and government is not committed to bailing out the company.

Type 5: *Private*. Managers may seek alliances with government officials for favors or protection, especially for licensing as Type 2 or 3, but ownership and control lies completely with the manager or owner, as does all the risk; and government is not financially committed to loss-making companies, although profitable companies pay taxes.

dramatically, and privatization of collective firms is widespread, even in regions with a strong collective heritage. Also, management authority within collective firms is being decentralized, as witnessed by the marked shift from fixed-wage contract to profit-sharing and fixed-lease contracts (Figure 10.2). Policy plays an important role in encouraging this ownership and managerial evolution, but these policies result from economic pressures to innovate. Other forces (e.g., fledgling financial reforms in certain areas) have also created independent and spontaneous restructuring/reorganizing of rural firms—suggesting the sector is responding to a changing economic environment (Jin and Qian (1998); Kung 1999). Efforts to resolve this debate have been hampered by lack of information on recent changes and the factors affecting recent performance of rural industry.

#### The Evolution of Firm Management

Five different institutional forms have emerged to dominate the enterprise landscape at different times and locations (Walder 1998). As shown in Box 10.1, these firm types can be arranged along a continuum that ranges from

conventional leader-run firms (Type 1) to traditional private firms (Type 5), and three intermediate management structures that have been important throughout most of the reform era. These firms types are differentiated by the nature of the incentives faced by, and the scope of, property rights assigned to firm managers. The extent of local government's concern with losses and willingness to bail out firms in the event of financial losses also varies along this continuum.

China needed participation by local leaders to exploit economic opportunities and create profitable enterprises in the 1980s, as the country lacked well-functioning factor and product markets and had minimal expertise in business management, and the political environment (except in the southern provinces) eschewed private enterprise efforts. The strong incentive to generate tax revenues and create a source of local income pushed local leaders to initiate rural industrialization. At the same time, high demand and the perception of rich earnings attracted them into enterprise management. In Guangdong and Fujian Provinces, however, more developed markets, a more liberal political en-

vironment, and financial inflows from overseas Chinese reduced the need for leaders to be involved. Because high demand and low interregional competition guaranteed high profits for most early entrants, various types of firms coexisted, even if some were relatively inefficient and poorly managed.

Over time, however, the opportunity to generate quick and large profits gradually disappeared under economic pressures, causing localities and enterprises to rethink their traditional managerial strategies. Growth created monitoring problems for leaders by increasing the number of firms (Chen and Rozelle 1998). Rising competition from the massive entry of firms reduced profit margins (Naughton 1994), and declining profits created new fiscal concerns and reduced the ability of local officials to save faltering firms (Walder 1995). At the same time, improving markets for some inputs reduced the need for leadership intervention in business activities (Pan and Park 1998; Chen and Rozelle 1998). These trends induced local leaders to seek enterprise divestiture and encouraged privatization, and better-motivated, more-independent managers have emerged in many of the remaining collective enterprises. Economic and transition pressures also have triggered the rapid expansion of private firms.

Other problems affect the performance of rural industries. Economists place much of the blame for the sector's current ills on falling de-

mand and faltering investment. Demand has fallen, partly because the Asian financial crisis has affected exports and weakened domestic consumer confidence, and partly because of domestic market conditions. Lower remittances due to migrant layoffs have constrained rural purchasing power, while SOE and government reorganization have adversely affected urban incomes. Concurrent tight credit policies in 1996 and 1997, new regulatory limits on the activities of informal financial institutions, and policy failures related to interest rate ceilings, management of nonperforming loans, and financial sector reforms have restricted investment capital.

### Credit Shortage and Creditworthiness<sup>2</sup>

Rural financial reforms have curtailed credit to all but the best-performing firms in the 1997–98 period, an action which has severely restrained TVE development. Both investment and operating-fund shortages continue to constrain TVE growth and consolidation, including private-sector enterprises, as access to formal credit is limited. Capital access depends on the supply of domestic savings and capital inflow, its competitive allocation, the creditworthiness of the applying enterprise, and pressures by leaders to influence loan decisions. Throughout the reform period, capital from the formal banking sector—ABC and RCCs—has been insufficient

#### Box 10.2: TVE Credit Constraints

Weak credit relations between TVEs and banks centers on operating criteria, financial positions, and firm profitability. TVEs frequently have multiple financial and accounting records, which are used for different purposes (e.g., tax authorities, banks and credit authorities, government owners). Also, TVEs lack qualified accountants, auditors, and other financial staff familiar with modern accounting methods. In the absence of a large training program, this problem will remain, leading to continued misinformed lending decisions. Profits, taxes, and defined fees are routinely submitted to appropriate government authorities; but local government departments also impose unauthorized fees and levies that make planning cash flows difficult. TVE assets are often overstated and debt financing is excessive, and although debt ratios are generally lower than those of SOEs, and present excessive credit risks to financial institutions.

to meet TVE needs. Consequently, enterprise expansion has been closely tied to the capacity of TVEs to generate internal funds or obtain informal credit.

TVEs are disadvantaged by credit policy, as they are among the first to suffer when credit is tightened nationally (Zhu and Brandt 1997). TVE gross output value has declined only once, in 1989—also the only year that ABC and RCC lending declined. However, other low-growth periods in 1988, 1990, and 1994 similarly coincide with low credit expansion. Thus, to the extent tight credit was intended to cool off an overheating economy, it has succeeded with TVEs. Other officials would argue that tightening credit to TVEs is a rational policy that should continue regardless of the overall macroeconomic environment, since the sector has an inherently poor future.

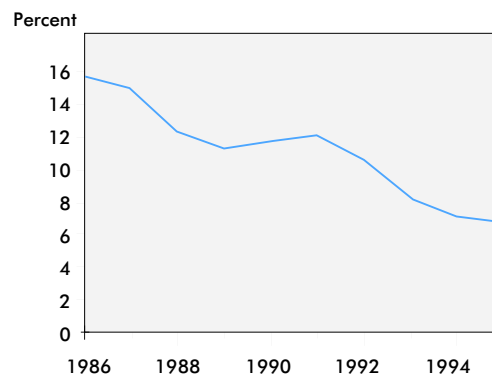
The falling access by TVEs to loans from the formal sector also has a more chronic element. TVE borrowing declined appreciably between 1986 and 1995—falling from 7 to 8 percent of the national loan portfolio in the early 1990s to 3 to 4 percent in 1996/97—and, as a proportion of total liabilities, declined from more than 40 percent to less than 30 percent. Loans<sup>3</sup> as a proportion of TVE output value declined from about 15.5 to 6.5 percent during the decade (Figure 10.3). Loans as a percent of net fixed assets show a similar pattern (at a higher percentage level) with large ratio declines in 1988–90 and 1994. These findings are supported by a source of funds itemization for collective TVEs by Cheng (1998) which shows a 30 percent reduction in the proportion of funds provided by ABC and RCCs between 1991 and 1994 (somewhat less than the decline shown in Figure 10.3, which includes all TVEs).

The plight of TVEs in their quest for financial resources also may result, in part, from their own management and characteristics of the firms in the sector, generally. Banks, especially those who recently have been granted better incentives to earn profits, may have good reason to question the

creditworthiness of some TVEs. Problems associated with the collective ownership and management of TVEs, include (a) financial position and operation misinformation, (b) fee irregularities imposed by local governments, (c) excessive profit remittances, (d) idiosyncratic management changes and strategic bankruptcies, and (e) excessive debt. Not all TVEs suffer from these deficiencies. Neither are all these deficiencies likely to apply to any particular set of TVEs. However, these deficiencies are found increasingly in many TVEs.

While part of these problems stem from underdeveloped institutions, another part arises by conscious choice and is an inevitable consequence of China's legacy. Government at various levels has multiple objectives beyond profit maximization, including expanding employment, sales, tax revenues, and gross output value. In pursuit of revenues, the local governments often require specific amounts of funds be remitted, regardless of whether the enterprise is profitable. When local governments change management of heavily indebted TVEs, the new management often will not recognize debt accumulated by previous management. Although the owners (local government), not the managers, are legally liable for the debt, and credit institutions are unlikely to seek judicial intermediation.

**Figure 10.3: Bank Borrowing as a Percent of TVE Output Value**



Source: Bank staff estimates

The continuing interest of leaders in non-economic criteria is an obstacle to creating more efficient rural firms. Leaders in many areas remain concerned with, and frequently are rewarded on the basis of; enterprise and employment creation, joint venture capital attracted, export volume, potential tax extraction or receipts, and indicators other than investment profitability and viability. To the extent that nonprofit criteria receive consideration, leaders have motive and opportunity to intervene in management and operational decisions. In some instances, interventions have been highly distorting, and may have played a significant role in the evolutionary path of rural firms. Recent field work by Walder has shown that intervention by local leaders have kept failing firms afloat for employment and other nonpecuniary reasons, thus reducing loan access and volume for private industry. In contrast, extensive field work by a team from Stanford, Toronto, Michigan, and California found that in many privatized and quasi-privatized firms, profits, efficiency, and financial management have become the primary objectives of firm owners and managers, and that links with local governments have weakened considerably (Shen, 1998). The debate on the future of TVEs centers on whether or not structural change will lead to reduction in importance of nonfinancial goals.

### Capital Markets, Property Rights, and Constraints to Cross-Jurisdictional Investments

Underdeveloped capital markets are a serious structural problem for TVEs and potentially can cause large distortions in investments and other management decisions. Also, weak property rights over firm assets and ambiguous bankruptcy rules and procedures have minimized the effectiveness of using collateral to secure loans (Shen 1998). Instead, banks rely on expensive monitoring and the guarantees of local governments to reduce risk exposure.

Fuzzy accounting procedures, weak legal enforcement, and continued interventions by local political leaders also make investing across

jurisdictional boundaries difficult. Investing in another township, county, or province frequently removes *de facto* control over assets from the investor. In addition, because monitoring is also difficult, investment fund users frequently have an opportunity to under-compensate the investor with little fear of detection, or of redress, if detected. Receiving a fair hearing outside one's own jurisdiction is perceived to be quite difficult.

These judicial imperfections and undeveloped capital markets mean that successful TVEs usually must reinvest their earnings in their home locale regardless of rate of return. In addition, most opportunities to exploit scale economies by combining investment funds with those in another jurisdiction, for investment in that jurisdiction, are foregone. Scarce management skills and falling shadow rates of return on capital in areas of expanding rural industry may partly explain reduced employment growth. The lower relative value of capital makes investments in labor-intensive industries less attractive, but field visits have noted that leaders in less-developed areas are increasingly interested in attracting outside investment. Some localities have tried to increase the inflow of investment capital, technology, and management skills by offering concession packages designed to overcome the reluctance of investors to invest outside their jurisdictions. Concessions to attract investment include reduced taxes, guarantees against fee



*Rural industry, such as this silk reeling factory, typically either uses local raw materials or produces commodities for local markets. Rural industry employs one-third of the nation's non-agricultural labor force.*



assessments, assurances of independent managerial authority, and provision of infrastructure. Although some cross-jurisdictional investment has occurred (Du 1998), the perceptions of risk are still substantial and constrains increases in the flow volume.

### Conclusions and Recommendations

Rural industry has been a huge contributor to China's rapid economic growth. However, the initial conditions that favored the rapid development of rural industry in the coastal provinces and suburban districts around large cities no longer exist. Product competition is far more intense, and the large profits of the early years are no longer feasible. Increased competition and declining profits have forced consolidation of rural industrial enterprises. This is occurring especially rapidly in the more prosperous rural regions, and has been underway since the beginning of the 1990s. This consolidation will be accelerated for firms that rely heavily on exports, as the Asian financial crisis has reduced demand in Asia, and devalued currencies make competing country products cheaper.

To support rural industry, China should do the following:

- The advantages of the traditional leader-run model have declined rapidly with growth and increased competition, and are inappropriate for developing interior regions. The traditionally pro-collective regions are moving rapidly toward leasing and privatization solutions to their fiscal problems caused by unprofitable township and village firms. *The interior regions should build on these management and ownership trends in implementing industrialization programs. In less developed regions, emphasize agriculture and related sideline production more than industry, and small-scale family enterprises over larger village- and township-owned firms. Markets must be allowed to guide investment decisions, not government-developed strategic plans based on fiscal needs.* The pattern of rural industrial growth, and the evolving institutional forms, suggests that attempts

by the less-developed regions to try to emulate the policies and institutions of an era that no longer exists would be counterproductive.

- *Use different rural-industrial strategies on the basis of geographical and economic area.* Even without rapid industrialization, incomes in coastal provinces would have risen markedly through increased yields; higher crop prices; and development of livestock, aquatic, and sideline activities. For poorer, inland areas, focusing on improvements in agriculture and sideline activities and establishing links to the off-farm labor markets are more promising strategies than establishing rural enterprises. For middle-income areas, one option is to establish efficient rural enterprises to meet local market demands and exploit comparative advantages—low wages, cheap land, and better access to resources such as electricity, water, and raw materials.
- *Establish institutional structures that will limit the liability of investors (and banks), reward and penalize managers for their performance, and compensate shareholders for their interests.* Jurisdictions with large-scale TVEs may face increasing problems if they are unable to find ways to “privatize” or provide better incentives for their capital-intensive enterprises. A major challenge to the transformation of TVE property rights is to find ways to manage the risk of large firms. Private ownership (or good management incentives) is needed, but completing the transition will be difficult unless China can find the appropriate institutional arrangements.
- *Increase TVE access to credit—but ONLY when such loans are based on financial criteria. If TVEs can not operate profitably, they should be allowed to go out of business.* TVE financial needs are not well met by the financial markets. Despite being the most dynamic component of the industrial sector, during periods of tight money, TVEs are the first to be cut off. Given their importance in the national economy, A way must be found to increase TVE access to credit. One option for

improving credit access is to provide explicit funding for onlending or loan guarantees for small and medium enterprises, and cross-jurisdictional investment channeled through the existing financial institutions (ABC and RCCs). However, property-right reforms and the incentives to enforce them must accompany a credit program to permit secured lending and improve loan repayment. To be fully

viable, China would need a training program for managers of the credit institutions, and TVEs; a program to improve management skills might include, project design, evaluation, monitoring, accounting and auditing, and financial management. The cost of acquiring these skills could be a component of a loan.

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- <sup>1</sup> Rural industry includes construction, manufacturing, transportation, and service enterprises located and falling under the purview of township (and lower-level) authorities. They are those enterprises that, because of their rural nature, are supervised by the MOA and, for statistical purposes, are classified as TVEs.
  - <sup>2</sup> This section relies heavily on, Cheng, Enjiang, "Report by Senior Expert on Financial Systems" in "Asian Development Bank, Township and Village Enterprises Development Project (Part B)," Chinese Economic Research Center, University of Adelaide, South Australia (undated).
  - <sup>3</sup> Outstanding loans at year-end from ABC and RCCs. Working capital loans doubtlessly roll over during the year but assuming no change in rollover frequency changes in the ratio would indicate changes in the importance of credit to output value.

# 11. Poverty Reduction



## Introduction

Since the launching of economic reforms in the late 1970s, China has made remarkable progress in its war on poverty.<sup>1</sup> During this period, more than 210 million rural residents escaped *absolute* poverty. Poverty reduction was exceptionally rapid in the early reform years, between 1978 and 1984 the number of rural absolute poor declined by 171 million (World Bank 1992). [Applying the poverty line of \$1.00 per capita per day suggests that 300 million residents escaped poverty between 1981 and 1995, and that about 176 million remained in poverty at the end of 1995 (World Bank, 1997b).] Improving incomes sufficiently to lift 171 million people from the grip of poverty in six years—a remarkable feat—was principally achieved through introducing the household responsibility system and the rapid economic growth that followed. Real per capita income and gross value of agricultural output grew at annual rates of 19.1 and 7.5 percent, respectively, during this period.

The poverty stricken generally live in remote and resource poor areas, but those residing in somewhat more accessible and less hilly locations, with even mildly responsive soils, were able to capitalize on the new economic environment ushered in with the 1978 reforms. Improved markets and output prices made modest use of modern inputs attractive and led to increased farm output. Many officials and observers believed that poverty reduction achieved through rapid agricultural growth was largely exhausted by 1984. The residual poor remained entrenched in poverty in areas that are *very* resource poor, with minimal potential for further agricultural productivity gains. Alleviating their plight will require more intensive efforts.

The absolute poor typically comprise entire

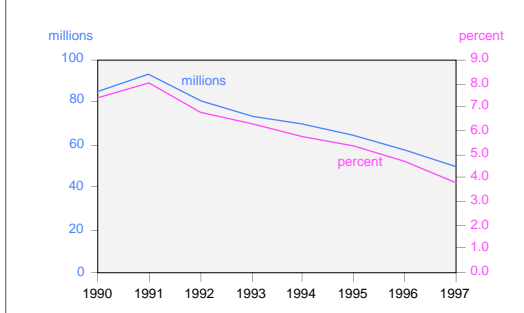
village communities isolated in upland areas. Land quality in these areas is generally so poor that many households are unable to achieve food self-sufficiency, consume subsistence foods beyond their own production levels, and are negatively affected by food price increases. As the poor are risk averse and afraid of lacking food staples, they are unwilling or unable to rely on markets for the bulk of their consumption needs and devote much of their land to grain—even if they have no comparative advantage in its production. Within these communities, the poorest households are most often those further disadvantaged by high dependency ratios, ill health, and other difficulties. Minority peoples are known to represent a disproportionately large share of the rural poor. No evidence exists that women are overrepresented among the poor. Confronted with such challenges, authorities decided that alleviating the remaining poverty required a more intensive effort.

## Government Poverty Reduction Program

With the slowing of poverty reduction, the government introduced several antipoverty programs between 1984 and 1986. It also established the Leading Group for Poverty Reduction (LGPR) under the State Council to coordinate those programs and expedite economic development in poor areas. Economic growth did revive, and since 1991 another 40 million residents escaped poverty—about 49 million, or about 6 percent of the rural population, remained in absolute poverty at the end of 1997 (Figure 11.1).

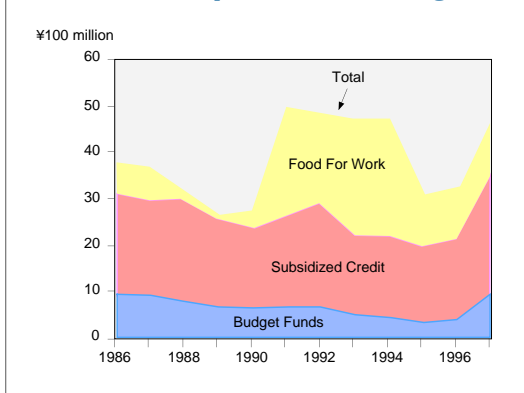
The government has a strong commitment to poverty reduction, and most government agencies and ministries have special poverty

**Figure 11.1: Rural Absolute Poor**



reduction responsibilities, including, education and health programs administered by their respective ministries. However, like many other elements of rural society, the antipoverty effort suffers from fiscal problems. The LGPR coordinates special development grant funds, administered through the fiscal system, and the Poverty Reduction Fund, which provides subsidized

**Figure 11.2: Real Investment in Poor Areas Poverty Reduction Program**



loans for developing poor areas. The regional office of the State Development Planning Commission administers a Food for Work (FFW) program that supports the construction of roads, potable water systems, irrigation, terracing, and other capital construction works. Funds coordinated by the LGPR have fluctuated in real terms, over the life of the program, with little apparent trend (Figure 11.2). Between 1986 and 1995 the funds administered through the fiscal budget declined by two-thirds in real terms. However, the government revived its commitment to poverty alleviation with a sharp increase in

1997 funding, reversing the decade of decline.

Subsidized credit through the Poverty Reduction Fund has become the most important element of the poverty program. During the late 1980s these funds were allocated primarily to households to support agricultural production and other income-generating activities (World Bank 1992). However, by the early 1990s borrowed funds were generally perceived as financing consumption rather than production, repayment rates were very low, and economic growth in poor areas had stagnated as evidenced by the lack of reduction in the number of absolute poor. The credit focus shifted away from households toward “economic entities” or enterprises that could better coordinate activities requiring new technology, greater input use, and marketing support (State Council 1991). Fiscal decentralization had created a budgetary crisis in nearly all poor counties (Park et al. 1996), which, in turn, created strong incentives for local officials in poor areas to invest in revenue-producing enterprises rather than in growth-oriented activities, or to divert earmarked investment funds to meet fixed expenditure obligations, such as wage payments.

By the mid-1990s, it became clear that subsidized credit directed to enterprises was not meeting rural development and growth objectives. The credit did not appear to stimulate local development and loan repayment rates did not markedly improve. The investment approach was often “top-down” as local officials identified collective projects without due consultation with farmers—then allegedly required their participation—in pursuit of scale economies. Rozelle, Park, Huang and Jin (forthcoming) have empirical evidence of the failure of China’s subsidized credit program in Shaanxi during the early 1990s.

When leaders reassessed the poverty reduction effort in the mid-1990s, the focus of subsidized loans returned to poor households. Since then, a debate has raged about how to create an effective structure. Officials are searching for a program that will lead to growth, reduce poverty, reduce lending costs, and improve re-

### Box 11.1: Microfinance in Yilong County

The government and donors experiment with substitutes for collateral, screen projects, and provide support and discipline in microfinance programs—using peer monitoring to manage investments and repay loans.

While microfinance has proven effective in other countries, such projects in China rarely have been evaluated. One evaluation of an UNDP-funded microfinance program in Sichuan Province's Yilong county found that household assets, especially household productive assets, of program participants increased significantly. Participants' other welfare improvements included more diversified cropping patterns, more grain storage, and more monetary savings.

payment rates. This has led to widespread experiments, one of the most high-profile being targeted microfinance programs—which, to date, have had mixed success. Box 11.1 contains an example of an effectively managed and targeted microcredit program that is contributing to higher growth.

#### Targeting: Identifying Poor Areas

Antipoverty efforts might well benefit from a narrowing of the government's targeting criteria from counties to townships or smaller units. The government has approached poverty targeting by identifying counties with low per capita income. A county was identified as poor if its 1985 average rural per capita income fell below Y 300, Y 200, or Y 150, depending on locational and political factors—including the presence of large minority populations. Following numerous targeting complaints, a new targeting operation was undertaken in 1994 by revising the poverty line and adjusting the designation of poor counties. Some counties "graduated," and other were added. Counties included in the poverty program now number 592.

Even after these adjustments, 2 of the 10 poorest counties remained outside the program. The uncertain reliability of the income data calls into question whether the counties included were the poorest. Per capita income statistics from the MOA database generate a different list of poor counties than that in the State Statistics Bureau database. Riskin (1993) suggests that in 1988 more than 60 percent of the poor households lived outside officially designated poor counties, though his survey was not designed for testing these questions. Riskin's work argues that the poverty program should focus on townships or political units smaller than counties.

#### Impact of the Program

In the absence of a comprehensive evaluation of the poverty program, an impact assessment must rely on provincial analysis and anecdotes. Data from Sichuan (Rozelle, Zhang, and Huang 1998b) clearly indicate that in 1985 both gross and net per capita incomes were lower in program counties than in poor, nonprogram counties. Over the following decade, incomes increased in both groups, but by 1995 incomes in the program counties were considerably higher. Income increases in program counties, however, did not keep pace with increases in the nonpoor counties.

Our statistical analysis of the differences in growth rates between county groupings supported the conclusion that program participation increased growth in poor counties. An econometric assessment of income growth in Sichuan (1990–95) indicated that growth in poverty-program counties was about 3.0 percent less than in nonpoor counties (which grew about 4 percent annually). Growth, however, was even slower, in the poor, nonprogram counties.

#### Determinants of Growth—Investment Priorities

Given that the poverty programs have had positive income and growth impacts, which elements have been more efficient in reducing

poverty in participating counties? In the absence of a comprehensive evaluation, we rely on assessments of individual provinces and anecdotes. Rozelle, Zhang, and Huang (1998b) estimated a series of regressions to examine the growth and level of income in Sichuan that could be explained by the poverty program. The results show that increases in economic activities that create linkages with the rest of the economy, such as the rise in nonfarm employment or an increase in sown areas for cash cropping, add to growth. Investment in agriculture, health and education, and electrification also positively affects growth. Infrastructure investments also should positively affect growth, but such investments must be in true public goods (e.g., roads), should be well designed, and require close monitoring. Also, they should not impose high labor investments on farmers.

Despite the investment of Y 96.1 billion (nominal) in poor program counties, poverty programs have not increased total government expenditures into poor areas. This may be a consequence of the fiscal stress that pervades poor areas and the fungibility of resources, allowing officials to substitute antipoverty funds for budgetary resources in program counties and divert budgetary funds to other counties. A common problem of poor area investment management is the diversion of loans and grant funds to other uses before they can reach local investment agencies. Only through creative fund management, which primarily depends on keeping investment funds out of the fiscal system, can large investments be effected in remote rural areas.

Rozelle et al. (1998a) found that in Shaanxi the targeting of subsidized credit to farmers increased growth. Placing funds in the hands of farmers for agricultural investments had positive growth impacts. However, subsidized investments into rural collective enterprises and local SOEs did not increase growth. Surprisingly, investments in agricultural infrastructure also had no positive impact on agricultural output growth, suggesting either that the projects they selected were poorly chosen or run, or that

investments in other types of infrastructure should be accorded higher priority. Projects that create an economic environment fostering entrepreneurship and labor movement, such as increasing human capital, also support growth.

FFW programs have been better than subsidized credit in increasing growth in poor areas, although it is not always the poorest that have benefited the most. Zhu and Jiang (1995) show that income rises in FFW project areas, with road investments generating the greatest benefits. They argue that narrowly defined projects (road building, drinking water, and irrigation) facilitate effective monitoring, and that diversion pressures on FFW resources are less than those applied to development grants transmitted through the fiscal system. Unfortunately, projects often are not placed in the poorest areas, thus the very poor gain only indirectly.

### Investment Options

#### Education and Health

Investments in education and health in most developing countries have high returns and are the most direct way to increase labor productivity. Also, education enhances labor marketability and improves the likelihood of successful migration. Education and health strategies for poverty alleviation are not components of the LGPR's antipoverty program but are implemented by the sector ministries. Unfortunately, the fairly regressive fiscal system requires local residents to bear the costs of education, which can reach 25 percent of per capita incomes (Fan 1994). Low revenue bases lead to poor quality-schools and underpaid teachers; and the high cost of attending school can greatly reduce the demand for education by the poor, who are more responsive to the cost of education. The poor must also have access to productive employment opportunities that make education investment worthwhile, highlighting the need for economic integration and well-functioning markets.

**Box 11.2: India: Government Spending, Growth, and Poverty**

IFPRI conducted one of the most comprehensive evaluations of direct and indirect impacts of infrastructure investments on TFP and on poverty reduction. Investments in roads had little *direct* impact on poverty reduction but the *indirect* impact through improved TFP was significant and greater than any other infrastructure investment. The results are reproduced below:

**Government Expenditure Elasticities on Total Factor Productivity and Poverty Reduction**

	Rural Roads	Education	Soil/Water Conservation	Research & Development	Irrigation	Electricity
TFP	0.0670	0.0427	0.0280	0.0160	0.0116	0.0031
Poverty	-0.2250	-0.1760	-0.0057	-0.0033	-0.0024	-0.0014

Note: The coefficients are *elasticities*; therefore, if government increases rural road expenditures by 1 percent TFP will increase by 0.067 percent and poverty will decline by 0.225 percent.

Source: IFPRI, EPTD Discussion Paper No. 33, *Government Spending, Growth and Poverty: An Analysis of Interlinkages in Rural India*, 1998.

**Infrastructure**

The impact of infrastructure investment on labor productivity and poverty reduction also is potentially very significant. Investments in roads and communications increases access to outside markets, raises returns to labor, makes production inputs cheaper and more accessible, and facilitates labor mobility. Market development will reduce price variability and allow greater exploitation of comparative advantage. Reliable infrastructure is required to integrate poverty areas into the rest of an economic system. International experience shows that rates of return and the impact of poverty alleviation vary widely by the type of road built; e.g., inter-provincial expressways versus dirt roads that penetrate into remote mountainous locations, and all-weather trunk lines into rural farming regions (Jacoby 1998). Investments in roads were found to have a powerful development impact in India (Box 11.2).

Improved transport networks facilitate off-farm and seasonal employment outside home villages and reduces the transport costs—thereby reducing farmers' costs of fertilizer and other inputs, improves reliable access to output markets and generally reduces marketing

margins (Gannon and Liu). A World Bank impact evaluation report on a rural road project in Morocco concluded that improved roads led to increased agricultural diversification and increased use of agricultural inputs and extension services and led to increased value added per hectare. The improved roads also led to increased off-farm earnings, improved quality of education and improved access and use of health services (World Bank 1996).

**Land Quality**

Where land quality can be improved, doing so increases returns to labor. Given relatively equitable distribution of land, improvement in land quality can also meet distributional goals. The impact of local investment in land-enhancing projects by local officials often has been shown to have a significant impact on agricultural production—and on incomes. World Bank experience with investments in land improvement and rural infrastructure projects have shown mixed results—indicating the need for more comprehensive *ex ante* (what is planned compared with what actually occurs) appraisal of projects. While some projects have provided high financial returns to farmers, indirect sub-

sidies have made the projects of dubious economic value (see Jingtai Phase II project discussed in World Bank 1992). State investment in basic agricultural construction has unfortunately declined in recent years. The proportion of the central budget devoted to agricultural investments has declined to only 3 percent, and even these are increasingly diverted to meet other pressing expenditure priorities. Local investments in projects that enhance land productivity have shown a significant impact on agricultural production and incomes (Dong 1998). Data from the Ministry of Agriculture, however, show that local investments occur only in wealthier regions, which represents only a fraction of the rural sector; elsewhere the proportion of local budgets devoted to agricultural projects has almost disappeared.

Accordingly, most land investments rely on labor contribution. This has many positive aspects, but is not a “free” investment. With increased returns to temporary migration and other off-farm activities, corvée labor can have a high opportunity cost, even in the slack season. The importance of well-designed investments is illustrated by comparing yields following implementation of two terracing projects on moderately sloped land in Shanxi (Li 1994). One used designs prepared by the local agricultural technical college and employed heavy equipment along with local labor to create deep, straight-cut terraces with reconditioned soil in each terrace bed. The other was a “traditional” terrace designed by local officials and constructed with local labor and hand tools. Subsequent crop

yields on the well-designed terraces were significantly greater than on unimproved moderately sloping land, but yields did not improve on the “traditional” terraces. Farmer perceptions of spending time and effort on constructing traditional terraces are best summarized by the 1997 comment of a Henan farmer: “We work, we do not get paid, we cannot make other money, and we do not see our land get any better.” However, the experience of The World Bank in Shaanxi province supports the contention that *well-designed* agricultural infrastructure projects have high rates of return.

### Research and Extension

Research and extension have been the most important source of yield and TFP growth in the post-reform period. (World Bank 1997). The national and provincial research system, however, has given low priority to agricultural R&D in recent years; very few technologies have been developed for resource poor areas (Rozelle, Huang, and Pray 1998). The bias against poor areas is even greater for extension and agricultural management services. Low salaries and fund shortages have left extension stations in many poor areas severely understaffed (Hu, Huang, and Rozelle 1998).

### Industrial Development

Many local leaders feel that only through capturing the high value added of successful industrial development will the plight of poor areas change noticeably. Industrial growth is also perceived as the key to resolving the fiscal



*Poverty is often concentrated in resource and infrastructure deficient areas – where arable land, for subsistence crop production, is of poor quality and available only in small plots.*



crisis (Wong 1997). Even in poor counties, taxes on industry and commerce account for the bulk of government revenues. However, TVEs in poor areas have a high failure rate and have been a serious drain on scarce financial capital. Targeting investment and credit to unviable TVE projects may be less effective in successfully promoting TVEs than having long-term investing in education, vocational skills, and infrastructure (Rozelle, Park, Huang, and Jin forthcoming). By 1990, only 4 percent of the rural labor force in China's 120 poorest counties were employed in rural enterprises, in contrast to the 22 percent in the nation as a whole.

### Migration

The large differences in wage rates between rural areas, particularly poor rural areas, and prosperous urban (and rural) areas are powerful migration incentives. The government does not maintain comprehensive time-series statistics on migrant labor, but various estimates have placed the number as high as 100 million (Rozelle et al. 1998, Huang and Cai 1998). Migration destinations have changed from being primarily intraprovincial in the late 1980s to almost equally balanced between intra- and interprovincial movement in the mid-1990s. The urban markets in the Yangtze and Pearl river deltas are major interprovincial destinations. The characteristics of migrants also are changing; women are now entering the migrant labor force at rates higher than men.

Migration has made an important contribution to employment opportunities for many rural communities throughout the nation. Migrant remittance statistics are anecdotal but indicate the important contribution to poor areas. The Ministry of Labor estimated that in 1994 some 37 million rural migrants in 23 large cities remitted Y 75 billion; the Sichuan Labor Bureau reported that the province's 6 million migrant workers remit more than Y 16 billion annually (World Bank 1997d) and total remittances were Y 200 billion in 1997 (*China Daily* Aug. 7, 1998). Per worker remittances of this magnitude far exceeds the per capita income of

poverty households. However, even without migrant remittances, poor households benefit from the decreased demand for food supplies. Migration may also provide less tangible benefits, such as access to better information and availability of capital.

Most migration occurs outside official job placement programs. For example, an estimated 15 percent of Shaanxi's interprovincial migrants used official labor market channels, but few of these would have come from the more remote and poorest counties. While the potential rewards of successful migration are substantial, so are the risks, particularly with spontaneous migration, where there is not only the uncertainty of obtaining employment but also the possibility of exploitation as migrants lack proper documentation and credentials. The overwhelmingly important migration determinant is a "village network." Past migration will lead to future migration—fellow villagers who can be relied upon for information (and possible financial assistance), including potential job prospects, provide a chain to attract new villagers into the migrant labor force.

### Conclusions and Recommendations

Although China has made remarkable progress in its war on poverty, the government can do more, including the following:

- *Improve targeting of poverty programs to aim at smaller political units, such as townships.* The poverty program has successfully targeted poor counties and has had positive impacts on economic growth. However, improved targeting is needed to ensure all the poor are reached.
- *Develop and expand TVEs in poor areas cautiously.* Projects for carrying out any TVE investments should focus on simple, labor-intensive production technologies using local inputs—such as processing of agricultural products—that might offer a comparative advantage.
- *Promote labor market development and expand labor mobility programs targeting poor households.* The quickest means of overcoming

poverty is successful migration, therefore increasing and expanding these programs would have an important and immediate poverty reduction impact. Such programs could expand the pilot poverty reduction activities initiated with World Bank assistance.

- *Explore ways to expand FFW-Type programs.* FFW activities have been particularly successful, in part because the funds bypass the fiscal system and because projects are narrowly defined, easily monitored, and focused on high-return investments. Experiences from other countries that pay low, self-targeting wages for workers on FFW projects show that such programs can lead to both increased growth and target poor households.
- *Design poverty-reduction programs on the basis of detailed consultation with local leaders and planned participants.* Considerable progress in strengthening community participation has been made in two poverty-reduction projects supported by the World Bank.
- *Expand effective microfinance programs.* When properly designed and implemented, microfinance programs are a proven means of achieving sustained reductions in poverty. As experimentation with microfinance schemes expands, their design and implementation will become more critical—and it is crucial that interest rate controls be discontinued. Correcting the mistakes later may prove difficult.
- *Invest in rural infrastructure.* Investments in agriculture, rural enterprise, roads, and other rural infrastructure can increase the productivity and income of the poor. However, resource constraints in most poor areas limit efficient infrastructure investments. The government should avoid making investments that do not have reasonably favorable rates of return.
- *Increase the amount and quality of research and technology support, to develop new and better technologies for resource-poor areas.* Little research and technology support exists for crops and livestock in such areas. Provincial agriculture bureaus extend existing “off-the-shelf” technology packages (often designed for irrigated lowlands) to upland rainfed areas. Development of applied technologies for resource poor areas is urgently needed. LGPR should work closely with agriculture officials to develop such technologies.
- *Maintain and reinvigorate the extension system.* This should continue to be a high priority in all poor areas. Subsistence agriculture will be characteristic of poor areas for many years to come, and one way to increase productivity and prevent the near poor from falling into poverty is investment in new cropping and livestock technologies.

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<sup>1</sup> The incidence of poverty in China is calculated by applying poverty lines (two levels) to a constant price distribution of per capita *income*. The absolute poverty line established at Y 318 per capita per year in 1990 prices reflects the income required to meet minimum nutritional (2,100 calories per day) and nonfood requirements and corresponds to about \$0.70 per day in 1985 PPP dollars. The higher poverty line is set at Y 454 (in 1990 prices) equivalent to \$1.00 per day in 1985 PPP dollars. Both of these measures are below the World Bank standard of \$1.00 per day (in 1995 PPP dollars) of *consumption* expenditure. The Chinese definition of absolute poverty is the basis of the discussion unless otherwise indicated.

## 12. Natural Resource Management and the Rural Environment.....



Rapid economic growth has contributed to increasing pressure on the natural resource base. Most scholars agree that environmental stress and natural resource degradation are primarily functions of inappropriate government policy, lack of appropriate property rights, population growth, and poverty. Increased income and more rational property rights have, according to some scholars, led to improvements in China's rural environment quality. Further improvements, coupled with effective regulation, can improve resource sustainability, soil erosion, and land, forest, and groundwater degradation.

The evidence on the development of China's natural resources in this century is ambiguous—and subject to conflicting interpretations. Time-series data on China's land quality show fertility has risen and fallen during the 20th century and generally has not worsened (Lindert forthcoming). Other measures suggest that the land resource is improving—controls have continuously reduced the area suffering from salinity and erosion, forested areas have recovered from losses in the 1980s, and prevention measures have reduced the areas subject to floods

(Table 12.1). Dust storms and “mud rains” in Beijing and other northern cities have diminished in frequency following the introduction of forestry shelter belts (U.S. Embassy 1998). The Yellow river still transports more sediment than any other river, but silt trapping has reduced the sediment loads from 1.6 billion tons annually before 1960 to 1.2 billion tons subsequently (World Bank 1993). National statistics clearly document the increase in forest cover from 12 to 14 percent (18 million hectares) between 1980 and 1995. The area of nature reserves has tripled in the past decade, although protection of these reserves is not ensured.

However, other measures suggest China faces a deteriorating environment. Pastures in northwest China and on the Tibet-Qinghai plateau continue to be overgrazed and converted to cultivated lands, although some of the conversions subsequently revert to grassland. Coastal wetlands are drained for agriculture (primarily rice) or converted for aquaculture. Statistics are difficult to find, but desertification is said to be increasing. Much of the reforested area is monocultured, and the drop in natural and old-

**Table 12.1: Indicators of Rural Environment and Natural Resource Conservation**

	Water Erodible Area		Salinity Area		Flood Area		Forest Cover (percent)
	Total	Controlled	Total	Improved	Total	Improved	
	(million hectares)						
1975	119.6	40.7	7.1	3.9	22.1	16.1	13–14
1980	118.3	41.1	7.1	4.2	23.4	17.8	12
1985	132.0	49.5	7.6	4.8	24.3	18.5	13
1990	136.0	53.0	7.5	5.0	24.4	19.3	14
1995	163.0	66.8	7.6	5.4	24.4	20.1	
1996	182.7	69.3	7.6	5.5	24.6	20.3	n.a.

n.a. = not available.

Source: China's Ministries of Water Resources, Agriculture, and Forestry.

growth forest may signal a decline in biodiversity, wildlife habitats, and other environmental services provided by natural forests.

Technology's relationship to environmental and natural-resource degradation also is ambiguous. Using modern mechanized terracing equipment on the loess plateau will lead to declining erosion, increased production, and rising incomes and will initiate a positive cycle of rising incomes and environmental improvement. The development of new cold-tolerant varieties of cereals has encouraged their introduction into marginal areas. In many instances, however, technology improves resource use—new crop varieties that incorporate pest resistance will reduce pesticide use. While heavy applications of chemical fertilizers and pesticides have polluted rural water, this probably has been more a function of inadequate farmer education than the technology itself.

Interpretations of the impact of environmental degradation on growth conflict. Estimates range from 0 to 15 percent of GDP, but the higher estimates are based on gross assumptions and anecdotes rather than on systematic national data analyses. The Research Center of Environment and Development, CASS estimated the impact of environmental pollution and ecological degradation on the economy (1992) at Y 200 billion, about 7 percent of GDP, and concluded that agriculture suffered about half those losses. An analysis by Xu (1998) determined that GDP losses from ecological destruction declined 7.5 percent in nominal terms—50 percent in constant terms—over 1985–93. A similar 1992 study concluded pollution and degradation costs were 4.0 percent of GDP (Xia 1997). A study and analysis by Yu, based on data collected by the Ministry of Agriculture found, that ecological losses declined in provinces where economic growth was more rapid and rose in slower-growth provinces in northwest and southwest China. These findings lend credibility to the theory that growth reduces pollution and degradation. However, some scholars find no long-term impact on growth (Li Zhou 1998).

### Legal and Regulatory Framework

China has a hierarchy of laws to address a broad range of urban and rural environmental issues, with the Environmental Protection Law at the apex. Supporting it are the Water Pollution Prevention and Control Law, the Air Pollution Prevention and Control Law, Marine Environmental Protection Law, Forestry Law, Fisheries Law, Water Law, Wildlife Conservation Law, Grasslands Law, and Land Management Law, which govern specific environmental and ecological issues. While the laws establish the general environmental protection framework, implementation authority is vested in the State Environmental Protection Commission, a State Council organization. The State Environmental Protection Agency (SEPA—formerly the National Environmental Protection Agency, or NEPA) is the executive arm responsible for supervising and managing environmental protection. Below SEPA, in all provincial-level administrative regions, are Environmental Protection Bureaus (EPBs). Actual monitoring, implementation, and enforcement is left to subnational agencies. Direct controls, implemented through permits or licenses, are the primary regulatory instruments. Effective environmental conservation and protection problems lie not with the objectives identified in the laws and regulations, but with their enforcement.

Because of fiscal resource limitations, SEPA has delegated most supervision authority over natural resource and rural issues to line ministries and their environmental protection units (as is true in most countries) but, unfortunately production-oriented agencies have obvious conflicts of interest—their officials are evaluated on, and rewarded for, meeting production targets, not environmental protection efforts.

### Fiscal Environment

Inadequate fiscal resources are the most serious constraint to environmental and natural resource protection. The government allocates minimal financial resources to environmental protection and natural resource

**Table 12.2: National Investment in Environmental Protection, 1991-95**

Year	Investments		GNP	Proportion of	
	Current Yuan	1990 Yuan Yuan (billion)		Budgetary Expenditures (percent)	Total Expenditures <sup>/a</sup>
1991	17	19	0.81	5.0	
1992	21	16	0.75	5.6	
1993	27	17	0.68	5.8	4.4
1994	31	17	0.63	5.4	4.0
1995	35	19	0.57	5.1	3.8

<sup>/a</sup> Includes extrabudgetary expenditures.

Source: *China Environmental Yearbook, 1997*; and *China Statistical Yearbook, 1996*.

conservation, and only a small portion of that is directed to the rural environment, primarily for forest protection. While real expenditures for environmental protection increased modestly during the 1990s, relative expenditures declined (Table 12.2).

Fiscal constraints have led to inaction and conflicts of interest. Staffing resources are modest, and local bureaus often have only part-time and inadequately trained staff to implement and enforce antidegradation policies. Within the constrained fiscal atmosphere, local leaders frequently give resource control rights to the agencies responsible for protecting resources—who are then encouraged to use those rights to generate income for staff salaries and other expenses. This can easily induce agency officials to exploit the very resource they are charged with protecting.

These fiscal limitations and responses can lead to severe consequences for the rural environment. For example, officials charged with protecting the nature reserves are provided insufficient budgets to implement their responsibilities and often encouraged to use the reserve's assets to generate the required income. However, such income-generating activities often exploit the very resource they are charged with protecting. Harkness (forthcoming) reports that a nationwide audit by the Ministry of Forestry and the World Wildlife Fund found that these

types of actions had left several nature reserves devoid of biodiversity. The system lacks an independent monitoring or overseer agency to resolve growth and environmental conflicts.

### The State of China's Rural Environment and Resource Base

Little authoritative information exists on the state of China's rural environment and natural resource base. Several studies have been done on various aspects of degradation and the response of various governmental jurisdictions. However, the evidence is fragmented, anecdotal, and based on data of varying degrees of reliability. These problems frequently leave well-intentioned observers confused and faced with conflicting evidence and unclear policy options. In other countries, the World Bank has begun an Environmental Indicators Program, an effort that tries to make a systematic assessment of the available studies, establish in a country what is and is not known about the environment, and make the results known to interested parties both inside and outside the country.

China faces a number of challenges but has had some success in solving problems in some of the most critical areas of rural environment and natural resource protection. The major rural environmental problems are discussed in the following paragraphs.

### Rural Water Pollution

Soil erosion, inappropriate fertilizer nutrient mixtures (particularly excessive nitrogen application), and excessive pesticide use, coupled with the lack of integrated pest management (IPM), at the farm level contribute to rural water pollution and create other environmental problems. Industrial and municipal wastewater discharges are the major polluters of rural water supplies.

TVEs are primarily producers of labor-intensive products but also produce products that generate air pollution, including cement, brick, and tile. While TVEs account for only 10 percent of the nation's industrial wastewater discharge, they treat only a small portion of their effluent and contribute more than 10 percent of industrial water pollution. Paper-making is the most highly polluting TVE activity and accounts for 44 percent of TVE wastewater discharge—thus wastewater treatment of paper mills must be accorded priority.

Application of chemical fertilizer surged following the introduction of reforms—growing at an annual rate of 7.2 percent, even when price subsidies were lifted—and was important in the spectacular growth of agricultural production. Elemental application was 38.3 million tons in 1996. Fertilizer balance sheets for 1995 (Sheldrick 1997) indicate that nutrient application is unbalanced, with excess nitrogen and phosphate applications relative to potash. While some of the excess nutrients may have remained in the soil, the excess nitrogen is more likely to be either volatilized or leached into the groundwater, streams, and rivers. Soil and Fertilizer Institute surveys (1991–93) determined that nitrate concentration, primarily from nitrogen runoff, in groundwater surpassed potable water standards by as much as 50 percent in a few locations. Runoff of excess fertilizer nutrients has been blamed for frequent “red tides” along the southeast coast that are toxic to humans that consume infected shellfish. Fertilizer application methods, placement, and type of fertilizer applied also contribute to environmental pollution. Much of the fertilizer is broad-

cast onto fields and volatilizes or leaches nutrients (particularly nitrogen) before it reaches crop root zones. Ammonium bicarbonate, which is a particularly volatile form of nitrogen and unique to China, remains a substantial portion of the nitrogen fertilizer applied. In part this may result from the conflicting roles of extension staff who retail agrochemicals to earn revenue but also are responsible for educating farmers on plant protection and restraining agrochemical use.

Excessive pesticide application has led to environmental, ecological, and economic problems. Heavy and frequent applications have eradicated the natural enemies of some pests and led to chemical pest resistance—leading to even heavier pesticide applications (International Organization for Pest Resistance Management 1993). This is particularly true in the control of cotton bollworm, where the cost of biweekly application has seriously reduced crop profitability in the traditional cotton area. Also, unenforced chemical pesticide regulations has permitted individuals and firms to concoct and sell pest control cocktails of uncertain strength and composition—which has contributed to the pest resistance problem and may be hazardous. The government banned the use of organochlorine pesticides (such as DDT) in 1983, but residues are still found in the soil along the Yangtze river. Regulations stipulate minimum time periods between final pesticide application and harvesting of fruits and vegetables and set limits for pesticide residues on food products. However, the lack of monitoring and enforcement results in frequent pesticide poisoning and prevents the export of some food products to OECD countries where the tolerance for pesticide residues in food imports is very small. Some 10 to 15 million hectares of farmland are reported to be polluted by pesticides (U.S. Embassy 1997).

Large-scale, continuous monocropping has contributed to the rapid increase in grain production but may also have contributed to a decline in cotton yields in the traditional cotton areas. IPM research is a proven alternative to

chemical pest and disease control. While China is a leader in IPM, chemical pest control remains the norm. If IPM is to become important it must be promoted at the farm level and in farmer training programs.

### Salinization

China's massive investment in irrigation facilities during the 1960s and 1970s was financed largely by the central and provincial governments. Lower-level infrastructure, including minor and tertiary drains, was the financial responsibility of lower jurisdictions. Because of insufficient finances, these drains were never constructed in some areas. Much of the salinization that affects 7 million hectares of irrigated farmland can be attributed to inadequate drainage and, to a lesser extent, to inadequate water for flushing salts through the soil and into the drainage system. About 2.7 million hectares of the salinized area is in the North China Plain, affecting 12 to 15 percent of the cultivated area in the Hai, Huai, and Yellow river basins. The mild levels of salt found will moderately reduce the yields of rice, corn, soybeans, wheat, and even cotton, a moderately salt-tolerant crop. Work by Huang and Rozelle (1995) concluded that salinization reduced grain yields by an average of 7.8 percent in the mid- to late 1980s. About 75 percent of the salinity-affected areas have received some remedial treatment.

### Soil Erosion and Desertification

An oft-quoted statistic suggests that China loses some 5 million tons of soil (including non-agricultural land) to water erosion annually (U.S. Embassy 1997), but we were unable to determine how this statistic was derived, or by whom. When sloping or fragile lands are not protected with ground cover, or are cultivated inappropriately, accelerated surface runoff and soil erosion are inevitable. Some 1.53 million square kilometers are classified as more than slightly eroded (NEPA and SPC, undated). The most seriously affected areas are the loess plateau, the red soils area south of the Yangtze river, the black soils of the northeast plains, and the grass-

lands of the northwest. While the primary direct effect of erosion is a decline in soil productivity and crop yields, crop area also declines as erosion worsens, although this has not been captured in available statistics. Also, an area of 1.53 million square kilometers is classified as desert (Ning 1997). Increasing rates of desertification (land turning into desert) have been reported, suggesting that the annual rate of desertification reached 2,460 square kilometers in the 1990s. While the spread of desert lands may be rapid, the reported level of desertification is untenable. If in fact the desert were expanding at the rates suggested, all the grasslands would have been lost years ago.

A report by the Research Center for Environment and Development found that erosion and desertification had the greatest impact on GDP. Subsequent work (Huang and Rozelle 1995) on the impact of erosion on crop yields determined that it was small, but statistically significant. Had it not been for erosion, China's grain yields would have grown about 5 percent per year more (1983–89). Some erosion is natural, and some is caused by inappropriate agricultural/cultivation practices. The Loess Plateau has been eroding for centuries, exacerbated by inappropriate cultivation practices, but most erosion is likely to be the direct result of either pasture overgrazing, inappropriate conversion to cultivated cropland, and removal of vegetative cover through deforestation and clearing of marginal lands. Erosion was most serious during the 1950s and 1960s when large-scale forest and pasture conversion was undertaken to meet grain production targets. In recent years, pastureland conversion has diminished and forestry conversion has reversed, but large areas have been severely eroded or degraded by cultivation. Erosion control measures had been implemented on almost 700,000 square kilometers through 1996.

### Grasslands

Converting grassland into cultivated land, and overstocking and overgrazing, are major

contributors to desertification. Agricultural policy, particularly the goal of increased grain production and self-sufficiency, historically has been a driving force behind grassland conversion and destruction. Although precise data series are unavailable to evaluate the severity of grassland degradation and desertification, Li (1998) reports that 30 million hectares of grasslands have been converted to cultivated land, contributing to soil deterioration and desertification. China's Environmental Action Plan (NEPA and SPC undated) indicates that in addition to the 1.5 million square kilometers of desertified land, that 1.3 million square kilometers of farmland in northeast, north and northwest China were vulnerable to wind erosion.

The conversion of grassland to crop land for annual crops in low rainfall areas such as Nei Mongol often is highly destabilizing unless irrigable. Planting perennial fodder crops would provide year-round vegetative cover to limit erosion and provide livestock fodder to reduce the pressure on the remaining natural grazing land. However, grassland is still being brought under cultivation on a large scale. Cultivated land in Nei Mongol has expanded by 1.0 million hectares since 1990, but the effectively irrigated area has increased by only 0.3 million hectares. However, lower quality cultivated land also is reverting to grassland; in the late 1980s and early 1990s about 100,000 hectares of the annual decline in cultivated land represented grassland reconversions.

Analyses by the Lanzhou Institute of Desertification concluded that 85 percent of desertification was caused by excessive land conversion, overstocking, and denudation; 12 percent, by inappropriate water use and industrial construction; and only 3 percent, by natural dune movement (Jin 1995).

### Forestry

Perhaps because the consequences of their destruction are so evident, forests have fared somewhat better than other ecosystems in the 1980s and 1990s. The catastrophic floods, ero-



*One of many nurseries producing conifer seedlings for commercial timber plantations and reforestation of watersheds.*

sion, and siltation that resulted from massive illegal cutting of forests for fuel and lumber from the 1950s through the 1970s prompted the government to launch a series of large-scale national afforestation and watershed protection programs. Some analysts have concluded that forest denudation is the most serious natural resource problem (Smil 1996); this may have been valid in earlier years but there is little hard evidence to support this view in the mid-1990s. China's afforestation success in the 1980s and 1990s has been among the world's best, and China is one of the few developing countries in which forest cover is slowly increasing—18 million hectares between 1980 and 1993. However, the net increase masks changes in the forest structure and quality (Table 12.3).

While Table 12.3 illustrates the importance and contribution of shelterbelts and commercial plantations, it also indicates declining forest diversity through cutting of old growth stands and replanting with monoculture plantations, which contributes to deteriorating plant and wildlife habitats, declining carbon sequestration, and loss of nontimber products (such as medicinal plants and fungi) that are important income sources for poor households.

Huang and Rozelle (1998) identified the principal factors in increasing forest cover as investments that improved land quality—primarily irrigation, which increased multiple cropping; growing off-farm employment; and land-tenure arrangements for forested land—forests under



collective management have expanded more rapidly than forests under state management. Negative influences were increasing population density and forest policy. In areas where individual property rights have improved, forest area has increased substantially. Nevertheless, biased forest policies have induced farmers to cut old growth natural forests and replant with monoculture trees and orchards.

China is in the forefront of agroforestry technology, including the successful development of methods for interplanting trees with crops. The government, and local authorities, encourage and finance tree planting to limit soil erosion by wind and water. The practice of planting trees around villages, canals, and roads has been widely adopted, and its positive impact on local wind and water erosion has been demonstrated. The most common use of corvée labor (after road and canal maintenance) is for tree planting (Rozelle and Huang 1998). China has embarked on a number of large afforestation programs, including large shelter-belt development projects in 13 northern provinces, autonomous regions, and municipalities to provide windbreaks, stabilize sand dunes, conserve soils and water, and provide timber resources. However, many shelter-belt developments are single specie stands, which reduces investment costs, but increases survival risks. Other major programs include soil- and water-conservation forests in the up-

per and middle reaches of the Yangtze river, a coastal shelter belt, afforestation in the northern grasslands, and rapid-growing commercial forests. China plans to intensify these programs over the next decade.

### Biodiversity

China, rich in biological diversity, contains about 10 percent of the world's plants, mammals, birds, reptiles, and amphibians. However, over the past few decades, increasing population pressures and development activities have eroded China's biodiversity resources. The combination of a large population and limited land has led to extensive loss of habitats to agricultural and aquacultural production, logging, fuelwood collection, and livestock grazing. The Chinese Academy of Sciences reports that about 200 plant species are believed to have become extinct and an estimated 5,000 species endangered in recent years because of human activity.

Recognizing these problems, the government has significantly strengthened the policy framework for environmental protection in general, and for biodiversity in particular. New environmental protection and wildlife conservation laws were put into effect in 1989, which facilitated development of a comprehensive system of nature reserves, and rationalized categories of protection for endangered wildlife. China has also become increasingly visible in international efforts; In 1992 China became party to the Convention on Wetlands of International Importance especially as Waterfowl Habitat (the RAMSAR Convention) and the Convention on Biological Diversity in 1993. These policy changes have been accompanied by increased emphasis on sector planning and management. In 1987 China produced a national strategy for nature conservation. A National Environment Protection Action Plan approved in 1994 includes biodiversity objectives and priorities. The State Commission on Environmental Protection approved a Biodiversity Conservation Action Plan (BAP) in 1994. The BAP reviews the present status of biological diversity and conservation ef-

**Table 12.3: Reforestation in China (1980-93)**

Type of Reforestation	Area (million hectares)
Total area	+18
Timber	+ 5
Afforested (primarily single species)	+21
Clear-cut, nonreforested	-16
Shelterbelts	+ 6
Commercial	
plantations (including orchards)	+ 5
Other (fuelwood, national reserves)	+ 2

Source: Huang and Rozelle 1998.

forts in China and sets out a comprehensive program of requirements for investment, policy reform, and technical assistance to strengthen national biodiversity management and conservation.

As in many other countries, biodiversity protection in China has focused on establishing nature reserves. The amount of protected areas has dramatically expanded over the past 10 years. China's more than 700 nature reserves total some 56 million hectares—5.5 percent of the country. The State Forestry Administration has jurisdiction over two-thirds of the reserves, and the State Environmental Protection Agency, Ministry of Agriculture, State Oceanography Administration, Chinese Academy of Science, and other agencies administer the remainder. Despite the government's strong commitment to biodiversity conservation, staff levels, management budgets, and training and performance standards have not kept pace with reserve expansion. Few areas are protected or managed effectively, and if current trends continue, biological diversity in many critical reserves will diminish dramatically. The main constraint is fiscal resources, which leaves nature reserves with insufficient funds and staff to effectively perform their protection and management responsibilities. Given the prevailing fiscal constraint, reducing the number and area of nature reserves—and improving the management of the remaining reserves may improve biodiversity protection. This would necessitate a review of the entire Nature Reserve system to rationalize public holdings.



*China is rich in flora and fauna biodiversity, but habitat loss has endangered some unique species.*

## Conclusions and Recommendations

China has had environmental protection achievements and failures. Beneath the national trends, several characteristics appear that may be unrelated to a region's natural ecosystem. We cannot determine whether these patterns are related to the environmental awareness and commitment of local leaders, progress in poverty alleviation, reductions in population pressure, or improvements in property rights. Particularly impressive progress has been made in increasing forest resources. These increases are due, in part, to investments in irrigation and to improved incomes and economic growth. Thus, further agricultural investments, and policies that shift farmers into off-farm employment will promote further improvement in forestry resources—although increased income inequality could mitigate some of the positive income effects.

A few scholars have attempted to quantify the costs of environmental and natural resource degradation, but little analysis has been done on the cost of degradation prevention or reduction. It is the comparison of the costs and benefits of environment and natural resource protection that is relevant to policymakers. Strong analytical evaluations of the costs and benefits of degradation prevention and reduction are needed as a basis for deriving more rational policies for environmental and natural-resource protection. China might consider initiating collaboration with the World Bank's Environmental Indicators Program to collect and analyze the environmental research available on China. The quality of environmental research varies, and thus the findings must be interpreted cautiously. More research is needed to define accurately the problems and remedies.

Financial constraints have pushed protection responsibilities to local production agencies, which have inadequate environmental training, few resources available for monitoring and enforcement, and—most crucially—few incentives to implement national and regional regulations. However, even if other constraints were removed, the fiscal shortages are so se-

vere that officials may have to exploit the very resources they are charged to protect to earn income for staff salaries and expenses. With appropriate incentives, rural development can attract private investment into several activities, but environmental protection is not among this select group. Therefore, resources to provide environmental protection, maintaining biodiversity, and sustaining long-term use of natural resources must come from government budgets.

The issues of environmental protection, pollution control, and sustainable management of natural resources are so complex and have impacts over such long time horizons that without well designed regulations, market failure (exacerbated pollution and unsustainable exploitation of natural resources) is quite possible. Experience indicates that rapid economic growth, fertility deceleration, and poverty reduction contribute to alleviating environmental degradation, but fully adequate protection can be provided only if a regulatory program is enforced. To make such efforts more successful, several changes are needed, including the following:

- *Make regulations specifying standards, penalty schedules, monitoring criteria, and enforcement provisions more precise.*
- *Maintain Natural Resource policy with the line agencies but allocate the responsibility to bureaus above the county level to avoid local fiscal and staffing constraints.*
- *Commit more financial and staff resources to strengthen the capacity of SEPA and Provincial EPBs to monitor natural resource protection, use develop databases, and provide independent advice to government on the state of natural resources. This should include a national land use mapping exercise using satellite imagery and other available data, to provide a comprehensive baseline against which further trends can be measured*
- *The number and size of nature reserves should be rationalized consistent with the resources provided for their maintenance and protection.*

As many nature reserves have local communities within their boundaries, the development of sustainable participatory mechanisms for community-based resource management is a high priority.

- *Reform agricultural regulatory institutions/agencies relating to plant protection and public health (livestock and food) processing, etc.*
- *Provide better education for farmers on balanced nutrient application and timing, fertilizer placement, soil incorporation, and pollution implications of overuse.*

To support the forestry sector, China should take the following steps:

- *Eliminate remaining distortions in the policy framework, particularly the high level of domestic protection that impedes efficient international trade, and the very high level of taxation on timber products.*
- *More rigorously implement sustainable land use requirements in the legal framework, particularly greater enforcement of rules related to annual allowable cuts in natural forests.*
- *Expand forestry resources to support continued growth in construction and agroprocessing—with an emphasis on productivity gains through improvements in silvicultural technologies, particularly planting stock development and silvicultural management.*
- *Shift geographical focus of afforestation activities from the more developed southern and coastal provinces to the poorer inland provinces, with appropriate adjustments to silvicultural technologies that reflect the socioeconomic requirements of poor households.*
- *Develop more participatory approaches for designing and carrying out large-scale afforestation campaigns to strengthen incentives for sustainable resource management by local communities.*
- *Develop comprehensive integrated management plans for forest resources, particularly natural forests, to maximize economic and environmental benefits for local communities.*



# Annex: Policy and Action Matrix

Issue	Action
<p>➤ <b>Macroeconomic Policies and Framework</b></p> <ul style="list-style-type: none"><li>• Policy framework is urban-industrial biased</li><li>• Rural incomes are low.</li><li>• Rural labor force buffers urban-industrial needs by providing labor during boom periods and absorbing labor during slack periods.</li><li>• Massive rural-to-urban financial transfers occur through the banking and credit institutions</li></ul>	<ul style="list-style-type: none"><li>• Remove any remaining barriers to rural migration. (M-L)</li><li>• Develop programs to retrain and redeploy laid-off (redundant) urban laborers and not displace rural migrant laborers, forcing them to return to rural areas. (M-L)</li><li>• Discontinue administered interest rates and other transfer policies to ensure financial flows represent only rational transfers of funds from low- to high-return sectors. (M)</li></ul>
<p>❑ <b>Rural Fiscal Policy and Management</b></p> <ul style="list-style-type: none"><li>• Ineffective control of taxes has resulted in poor redistribution and reallocation of collected revenues.</li><li>• Low, inadequate and secular decline in tax revenues (as percent of GDP) and therefore lack of resources to undertake:<ul style="list-style-type: none"><li>▪ Rural infrastructure investment;</li><li>▪ Manage and protect resources; and</li><li>▪ Provide public goods and services.</li></ul></li><li>• Large off-budget revenue collection.</li><li>• Unfunded expenditure mandates encourages misuse of budgetary resources and undermines incentives to implement policies.</li></ul>	<ul style="list-style-type: none"><li>• Recentralize taxation authority and control and establish reallocation mechanisms and provide incentives that ensure significant resources are transferred from affluent to poor areas. (M)</li><li>• Broaden tax base, including; expanded user taxes/fees, legitimize transparent off-budget levies, make grain quota taxes explicit, consider transferring lowest fiscal accountability from township to county to reduce salary and wage costs and implement if feasible. (M)</li><li>• Provide funds for mandated expenditures. (S)</li></ul>
<p>❑ <b>External Trade Policy and Institutions</b></p> <p>Trade remains government controlled.</p> <ul style="list-style-type: none"><li>• State trading monopolies control the trade in grains, cotton and major production inputs</li><li>• Grain trade quotas but are maintained as confidential information, unavailable to the public and exacerbates domestic supply and price volatility.</li></ul>	<p>Permit market to determine trade patterns.</p> <ul style="list-style-type: none"><li>• Promote, and phase-in trade competition, over a manageable period. Even if China maintains a closed trade policy, market competition would increase efficiency. (S-M)</li><li>• Phase out state trading; even if China removes on-tariff trade barriers a monopoly state trading firm could unilaterally block trade. (M)</li><li>• Discontinue trade quotas and the grain self-sufficiency policy; address food security through trade linkages with multiple suppliers and long-term contracts. (S-M)</li></ul>

### Issue

### Action

#### ❑ Foreign Direct Investment in Agriculture and Agriculturally Related Manufacturing

- Lack of technology-intensive foreign direct investments in agricultural industries.
- Design incentives to stimulate investments in priority subsectors. (M)
- Eliminate unnecessary investment restrictions, such as joint venture requirements. (S-M)
- Publicize and strictly enforce intellectual property rights for agricultural technology. (S)
- Liberalize domestic marketing constraints permitting transnational firms to establish and control distribution networks. (S-M)

#### ➤ Agricultural Pricing and Marketing Policy and Institutions

- Government intervention in grain subsector remains strong and costly. Roles of various governmental jurisdictions in implementing grain policy have been unclear.
- Farm-delivery quotas still levied on farmers.
- Farmgate prices for grain are government determined.
- Farmgate procurement of grains is monopolized by parastatal grain bureaus.
- Government maintains large volumes of grain stocks—although exact amount is confidential.
- Price variability high and increasing.
- The commercial and policy functions and financial accounts of the grain bureau companies overlap.
- The lack of standardized phytosanitary procedures, shipping documents, and transit fees impedes interprovincial marketing of nongrain commodities.
- The absence of comprehensive and consolidated information on markets (prices, quantities, and qualities) handicaps the marketing of farmers and traders.
- In the absence of farmer marketing associations, farmers have few marketing options and receive relatively low prices.
- To increase tax bases and add value locally some counties prohibit cross border procurement of agricultural commodities for processing—resulting in many scale-inefficient agroprocessing plants.
- Insufficient public infrastructure impedes efficient marketing and transport of agricultural commodities
- Rely more on the private sector and market forces to improve agricultural resource allocation and farmer incomes.
- Discontinue government determined grain quotas and prices. (S-M)
- Liberalize grain procurement and permit private traders to compete on an equal basis with the grain bureaus. (S)
- Reevaluate self-sufficiency and grain reserve policies with the objective of reducing government grain stocks and cost. (S-M)
- Clearly separate the commercial and policy functions of the grain bureau. (S)
- Assess costs, benefits, and feasibility of establishing price stabilization program. (S-M)
- Design, establish, and enforce national quarantine and phytosanitary standards applicable to all inter-jurisdictional commodity movement. And if standards are met, prohibit interjurisdictional embargoes on agricultural commodities. (S)
- Consolidate market information systems under the auspices of a single central agency. (S)
- Encourage and promote farmer marketing associations through legislation and introduce training programs for association management staff. (S)
- Invest more in rural infrastructure where economically merited. (S-M-L)

Issue	Action
<p>➤ <b>Rural Finance</b></p> <ul style="list-style-type: none"> <li>• Rural credit institutions more concerned with policy lending than commercial lending</li> <li>• Rural credit institutions have weak capacity to evaluate loans.</li> <li>• Both rural industries and farm households are credit starved.</li> <li>• Lack of alternative deposit instruments</li> <li>• Unsustainable credit subsidies for anti-poverty lending</li> </ul>	<ul style="list-style-type: none"> <li>• Assign policy lending to an institution without commercial responsibilities to ensure policy and commercial lending are fully separated. (S)</li> <li>• Permit and encourage competition and innovation, such as new deposit instruments with attractive combinations of return and liquidity. (S-M)</li> <li>• Deregulate interest rates. (S-M)</li> <li>• Discontinue subsidized and unsustainable credit programs for poverty alleviation and refocus on micro-finance programs or other household-based poverty alleviation programs. (S-M)</li> <li>• Develop institutions and introduce training programs for staff of rural finance institutions including micro-finance programs staff. (M-L)</li> </ul>
<p>➤ <b>Resource Management</b></p> <p>☐ <b>Land</b></p> <ul style="list-style-type: none"> <li>• Lack of land rental market inhibits efficient use of land and labor.</li> <li>• Tenure security may be undermining investment incentives and the emergence of credit since land cannot be used as collateral. Many farmers favor current land tenure system because collectively held land provides security.</li> </ul>	<ul style="list-style-type: none"> <li>• Continue to analyze costs and benefits of alternative land rights regimes and experiment with rental markets and tenure arrangements to improve land management. (S-M)</li> </ul>
<p>☐ <b>Water</b></p> <ul style="list-style-type: none"> <li>• Insufficient water resources available in northern China to meet aggregate requirements.</li> <li>• Inefficient use of existing water supplies.</li> <li>• Large budgetary requirements for maintaining systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Expedite construction of one or more routes of the South-North transfer scheme. (M)</li> <li>• Conduct a study of conveyance and delivery efficiency; rehabilitate systems, line canals and introduce improved technologies where economically efficient. (M)</li> <li>• Expand collection, treatment, and reuse of municipal waste water. (M)</li> <li>• Introduce a rational system of volumetric measurement and water pricing. (S-M)</li> <li>• Expand self-financing water enterprises to manage water supplies and operate and maintain irrigation systems. (S-M-L)</li> <li>• Establish training program for management staff of water enterprises. (S-M)</li> <li>• Discontinue grain quotas and other production constraints to permit farmers to produce commodities consistent with their comparative advantage. (S-M)</li> </ul>

### Issue

### Action

#### ❑ Natural Resources and Forestry

- Natural resource and environmental degradation.
- Consolidate nature preserves and commit more financial and staff resources to natural resource management and protection services. (M)
- Improve training of nature reserve and forestry staff. (M)
- For nature reserves with local communities within their boundaries, develop participatory mechanisms for community-based resource management. (S-M)
- Develop integrated management plans and rigorously enforce regulatory framework, including price structure for exploitation and penalties for noncompliance. (S-M)
- Invest in rehabilitation of watersheds and grasslands where economically efficient. (M)
- Remove forest policy distortions including pricing and tariff protection that impedes efficient international trade. (S-M)
- Improve farmer training on application and placement of pesticides and fertilizers. (S-M)

#### ➤ Agricultural Technology

##### ❑ Research

- Decline in growth of total factor productivity in agriculture.
- Agricultural research funding has declined in real terms.
- Inefficient allocation of research resources.
- Lack of substantive research by domestic and joint venture firms.
- Establish research priorities including subsistence commodities for poverty groups in resource poor areas. (S)
- Centralize and increase budgetary allocations to agricultural research. (S)
- Evaluate alternative financing sources, such as commodity cesses; and if implemented, rigorously monitor collections to ensure funds are not diverted. (S)
- Increase cooperation with international agricultural research centers to obtain and adapt new technology to the Chinese environment. (S)
- Encourage international firms to participate in China's agricultural input industry. (S)

##### ❑ Extension

- Formal extension service is ineffective and near collapse.
- Extension funding has declined in real terms.
- Restructure and revitalize extension service. (S-M)
- Improve extension staff training, incorporating new issues such as solutions to marketing problems and understanding production technologies for nontraditional commodities. (S-M)
- Permit the private sector to participate in agricultural input marketing and technical advice. (S)
- Promote the formation of commodity producer groups and encourage them to retain specialists to provide up-to-date information on varieties, pest control, and other cultural practices. (S-M)



Issue	Action
<p>➤ <b>Rural Industry</b></p> <ul style="list-style-type: none"> <li>• Rural nonagricultural employment has begun to decline.</li> <li>• TVE profitability is declining.</li> </ul>	<ul style="list-style-type: none"> <li>• Increase TVE access to credit and improve credit agency capacity to evaluate investments, monitor and recover loans. (S-M)</li> <li>• Cautiously expand TVE investments in inland provinces and only after careful evaluation of any comparative advantage. (M)</li> <li>• Promote private sector ownership and develop institutional structures which will limit the liability of investors, reward and penalize managers for their performance, and appropriate compensate shareholders. (S-M)</li> </ul>
<p>➤ <b>Poverty Alleviation</b></p> <p><b>About 50 million rural residents continue to live in absolute poverty.</b></p> <ul style="list-style-type: none"> <li>• Excessive leakage of poverty reduction funding to nonpoor, also inadequate supervision contributes to poor quality of program works and services</li> <li>• The remaining poor will require more than economic growth to escape poverty—because they live in very resource poor areas.</li> <li>• Limited funding for development of applied technologies for upland agriculture—improved upland agriculture productivity is crucial to lifting the poor above the poverty line.</li> </ul>	<ul style="list-style-type: none"> <li>• Improve identification of the poor to permit better targeting of antipoverty programs. (S-M)</li> <li>• Augment supervision of poverty reduction programs at the local level to improve quality of works and services. (S-M)</li> <li>• Invest in services and infrastructure that will assist the poor migrate or otherwise transfer out of agriculture, including education, transport and communication services. (M)</li> <li>• Continue experimenting with microfinance and other poverty alleviation programs that are designed to promote household investment. (S-M)</li> <li>• Design and implement anti-poverty programs on the basis of detailed consultation with local leaders and planned participants. (S-M)</li> <li>• Promote small better targeted projects, such as Food-for-Work—which have proven successful. (S)</li> <li>• Use a portion of central government poverty reduction funding for developing applied upland agricultural technology. (S-M-L)</li> </ul>

*Note:* The characters S, M, and L following the individual recommended actions refer to short-, medium-, and long-time periods likely required to implement the actions.



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