Declining Growth in Farm Output and Employment: Implications for China's Economy and Society

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By Dwight H. Perkins

From the latter half of the 1990s to the present, China's agricultural growth has slowed markedly. Rural incomes have fared better because farmers have been able to shift their attention to non-agricultural activities in the rural areas, but this source of increased welfare has also begun to slow in recent years. Experience in recent years indicates that the Township and Village Enterprises (TVEs) that played such an important role in raising rural incomes and industrial output in the latter half of the 1980s and the first half of the 1990s are no longer able to support rapid rural income and employment growth. China could attempt to deal with this situation in a manner similar to what has occurred in modern Japan by paying prices well above world prices for farm products. But China cannot afford the cost of large subsidies to agriculture and China's decision to join the World Trade Organization (WTO) precludes the restrictions on trade in agricultural products that would make high prices possible. To the contrary, prices paid for agricultural products in China have fallen markedly in recent years more or less in tandem with world prices.

This slowdown in farm output and rural income appears at a time when China's countryside still has a huge labor force that is far larger than anything required for producing grain and cash crops at current levels. Rural workers have always looked to the cities for better job opportunities, but the pressure to find work outside farming has become steadily more intense as the rural population of working age increases by many

millions per year while rural employment opportunities stagnate.[1] When combined with the pull of a rapidly rising gap between rural and urban incomes, the result is that much of the young adult population of the countryside is on the move or at least thinking about exploring opportunities in the cities. But employment in the cities that grew so rapidly in the 1980s is no longer able to easily absorb this rural influx. Newly arrived workers in the urban areas often gravitate toward marginal jobs all be it ones that typically pay them more than what they would have received if they had stayed in farming. Most countries undergoing sustained modern economic growth experience a massive shift of labor out of agriculture into urban areas. What makes China different is the enormous numbers of people involved in this shift.

This essay begins with an analysis of what has been happening to agricultural output and rural incomes since the reform era in China started in 1978 with special emphasis on what has happened to land intensive grain crops as contrasted to cash crops and animal husbandry or non-farm rural occupations. This analysis of output and income performance is followed by an attempt to explain why farm output has slowed. That analysis in turn is divided into two parts, one looking at what has happened to agricultural inputs and the other at the changing institutional framework in which farming operates. China's transition to a complete market economy in the rural areas is still far from complete, but, as will be argued, further improvements are not likely to fundamentally accelerate output performance above the levels achieved during the past decade. The

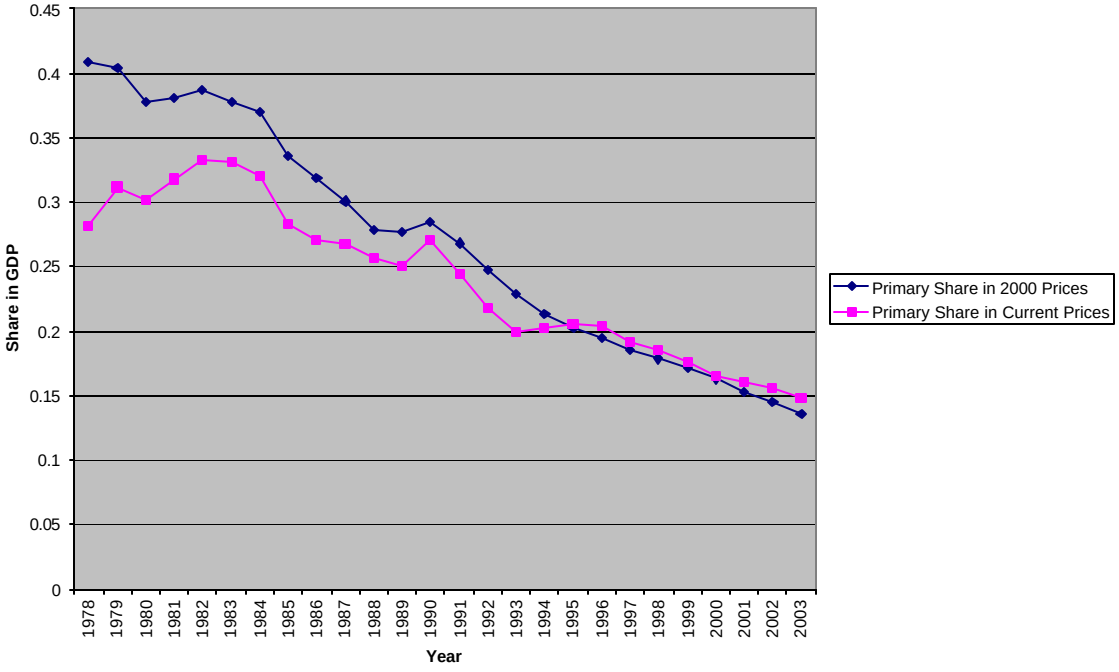
[1] The actual number of people employed in agriculture declined between 1990 and the year 2000 by 28.5 million, but 800 million people remained resident in China's rural areas and the growth rate of population in the rural areas was roughly one percent per year during this same decade and roughly 1.4 percent per year in the previous decade. This suggests that more than 10 million people in their late teens were entering the labor force from the rural areas each year. Large numbers of these people, perhaps most, were leaving the rural areas.

final section of the essay will explore the implications of what is happening in the rural areas for migration to China's cities.

Agricultural Output and Income Performance

In many ways China's agricultural experience is much like that of other countries that have had two decades of rapid growth of GDP. The agricultural or primary sector share[2] has fallen as per capita income has risen. The relevant primary share data are presented in Chart 1.

Chart 1: Primary Share in GDP



When measured in the constant prices of the year 2000, a year when prices for the most part reflected market forces, China's primary sector fell from 40 percent of GDP to only 14 percent between 1978 and 2003 while per capita GDP rose four to six fold depending on how much one discounts the official GDP growth rate estimates. Comparisons with

[2] The primary sector does not include mining in China.

other countries are difficult to make because of the uncertainty surrounding estimates of China's purchasing power parity GDP, but China's experience in this area is not radically different from that of other developing countries undergoing rapid growth starting from a low level of per capita income. South Korea's agricultural share in GDP fell from 40 percent to 19 percent between 1960 and 1975. Large countries in general appear to experience a drop in the primary share from over 40 percent to under 20 percent when income rises by four or five times starting from low levels (around $500 per capita in purchasing power parity terms in year 2000 prices).[3]

Broad GDP aggregates, however, obscure important underlying trends of what has been happening within the agricultural sector. If one looks at the data for grain output (Table 1), it is clear that one reason for the sharp drop in agriculture's share has been the very slow growth in China's major food crops.

Table 1
Grain Output Growth Rates
(In % per year)

1957-1978	2.15
1979-1984	4.95
1985-1996	1.80
1997-2001	-2.15
2002-2003	-2.46

Sources: National Bureau of Statistics, *China Statistical Yearbook, 2003*, p. 430; National Bureau of Statistics, *China Monthly Economic Indicators,* Vo. 27, June 2002, p. 13; and National Bureau of Statistics, *Zhongguo Tongji Nianjian, 1987*, p. 170, and National Bureau of Statistics, *Statistical Communique of the People's Republic of China on the 2003 National Economic and Social Development*, p. 19.

Three quarters of China's sown acreage is in grain if one includes soybeans in this total. On these three quarters of the sown acreage, grain output has grown hardly at

[3] Dwight H. Perkins and Moshe Syrquin, "Large Countries: The Influence of Size," in Hollis Chenery and T.N. Srinivasan, *Handbook of Development Economics*, Vol. 2, (Amsterdam: North Holland, 1989) pp.

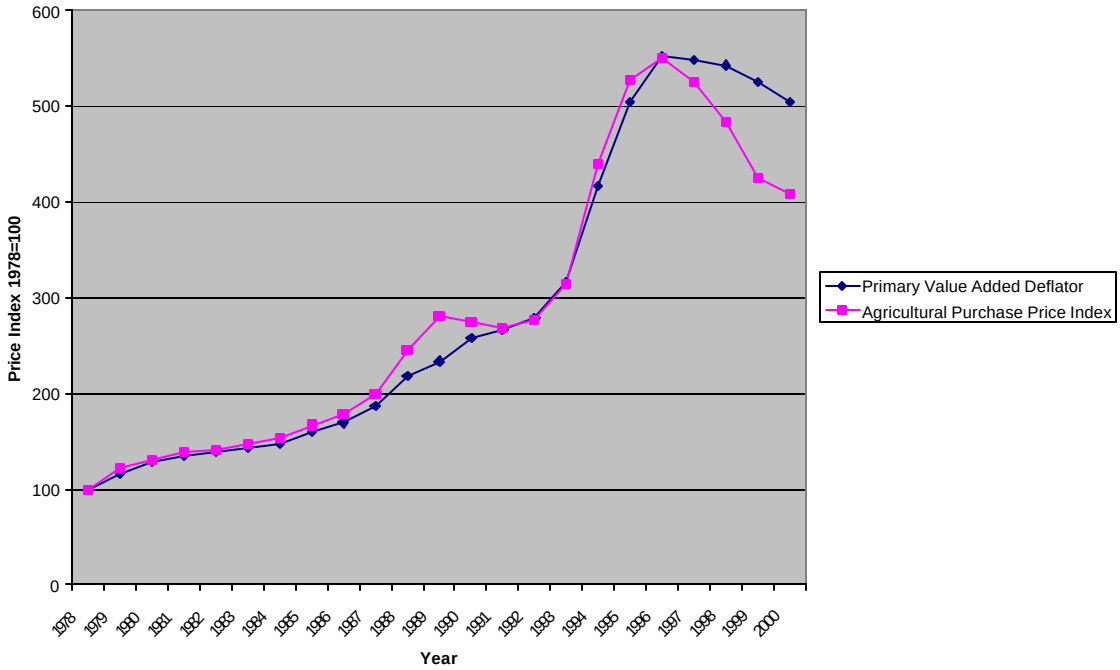
all since the post-decollectivization spurt of 1978-1984 (the actual rate was 0.6 percent per year for seventeen years). Weather, of course, leads to fluctuations in grain output so growth rates based on comparisons of single years can be misleading, but there appears to be little reason to doubt that Chinese grain output growth has been stagnant for a long time--particularly since 1996.

The story with respect to agricultural gross value output and value added is not so grim. Primary sector value added rose by 4.5 percent per year from the end of 1978 through 2003 and gross value of agricultural output in constant prices grew slightly faster although gross value figures are no longer regularly published. Since population growth in the rural areas was negligible (The registered rural population in 2002 was actually slightly less than in 1978), the growth in agricultural value added was sufficient to raise per capita incomes in the rural areas by nearly three-fold if prices remained steady which, as we shall see, they did not. Even in the 1997-2001 period when grain output was falling, agricultural value added grew at 2.9 percent a year in constant prices.

Farmers, however, did not receive constant prices for their agricultural output. Nor did farmers pay constant prices for the goods that they bought on the market. Farm incomes from agricultural activities thus were heavily influenced by what happened to these prices and from 1996 on farmers were hit by falling prices for their produce. Farm purchase prices and the agricultural value added deflator are presented in Chart 2.

1691-1753.

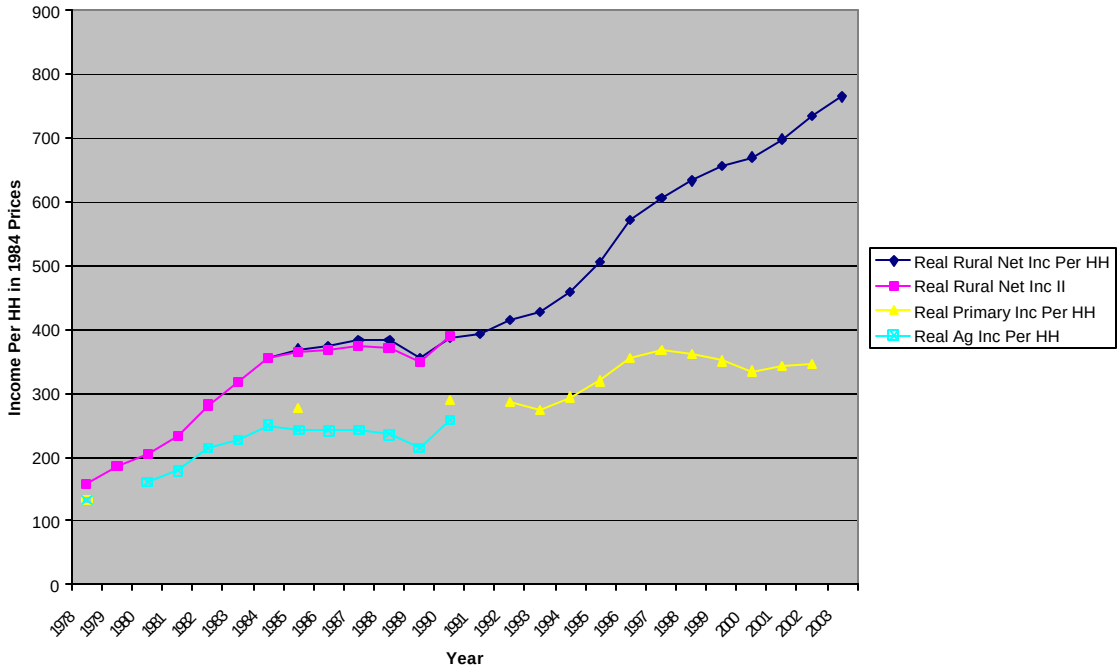
Chart 2: Agricultural Price Indexes



The purchase price index, a better index than the value added deflator of the impact on prices in incomes, shows a marked decline after 1996. There was a small rise in agricultural purchase prices in 2003 but this increase only brought the index back to the level of 2001.[4] The impact of this on farm household income can be seen from the household survey data in Chart 3. The real agricultural income of farm households deflated by the rural consumer price index actually declined after 1997. Leaving aside the pre-1985 big jump in household real income after the return to household farming, agricultural income per household since 1984 has only risen at a rate of 1.3 percent a year with most of that increase concentrated in the years 1994-1996 when farm purchase prices soared even faster than the general rate of inflation. Farm household non-agricultural income, of course, did not stagnate as Chart 3 shows.

[4] China after 2001 changed the way it reported price indexes for agricultural purchase prices and so the data

Chart 3: Sources of Rural Income Per Household



More and more rural people were working in township and village enterprises among other reasons, but, as we shall see below, this source of income has also begun to slow or even come to a halt at roughly the same time that agricultural income began falling.

Explanations for the Slow Growth of Agricultural Output and Income

There is no definitive way of explaining the fall in the growth rate of agricultural output in a short essay, but important elements of the explanation for this phenomenon can be listed. To begin with, the price movements described above have undoubtedly had a negative impact at least on grain output. Grain prices actually moved upward a bit more than fertilizer input prices in much of the 1980s (Chart 4), but then grain prices bore part of the brunt of the anti-inflationary policies of the 1989-1992 period while fertilizer prices kept rising.

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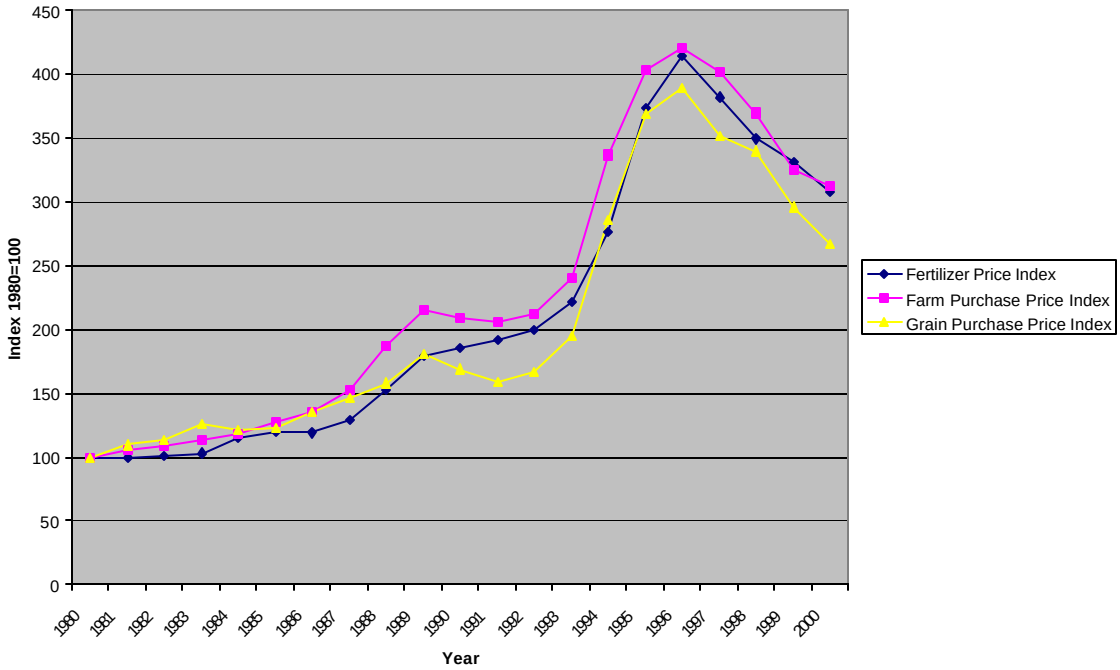
for 2002 and 2003 are not included in the chart.

Chart 4: Fertilizer and Grain Price Indexes



From 1993 through 1995 grain prices caught up with fertilizer prices once again but then immediately fell behind for the next five years. Not surprisingly, grain output grew most rapidly (3.3 percent per year) during the years 1993 through 1996 when the grain fertilizer price ratio was favorable to grain.

The main question for the future is how China's entry into the World Trade Organization will affect these price movements. Clearly the impact of WTO membership would have been very large if China had joined in the mid-1990s when the gap between world prices and Chinese domestic prices was also large. But the fall in grain prices in the latter half of the 1990s has brought these prices much closer to world prices.

Assessing the impact of the WTO on Chinese agriculture is complex because of the many different components of the WTO agreement that have an impact on agricultural output and prices. Tariffs on grain imports into China that are brought in

within the agreed upon quotas, for example, are generally low (one percent for most grain imports with soybeans an exception at 9 percent), but the tariff on above quota imports in the China-US trade agreement currently is in the 60 to 70 percent range and will only fall to 40 percent by the year 2004.[5] Furthermore, the China-US trade agreement does not cover all of the agricultural terms that China agreed to in the final WTO accession and not all of those terms are yet public information.

The most authoritative estimate of the impact of WTO accession on Chinese agricultural prices comes from the Development Research Center of the State Council. Their estimates are presented in Table 2. Except for soybeans, rapeseed,

Table 2
WTO Impact on Farm Prices

	2005 price Decline in (in %)	Farmer Income Decrease (million yuan)
Wheat	-2.28	460
Rice	-1.06	300
Corn	-1.44	390
Cotton	-1.9	320
Sugar	-3.93	200
Soybean	-6.1	440
Rapeseed	-3.84	140
Soybean Oil	-4.51	100
Rape Oil	-4.86	130
Beef	-0.15	180
Pork	-0.98	620
Mutton	-0.13	
Poultry	-1.26	230
Eggs	0.59	
Total		3510

Source: Development Research Center of the State Council, *Adjustment of Economic Policies After WTO Accession* (Beijing: DRC, March 2002) pp. 50 and 54

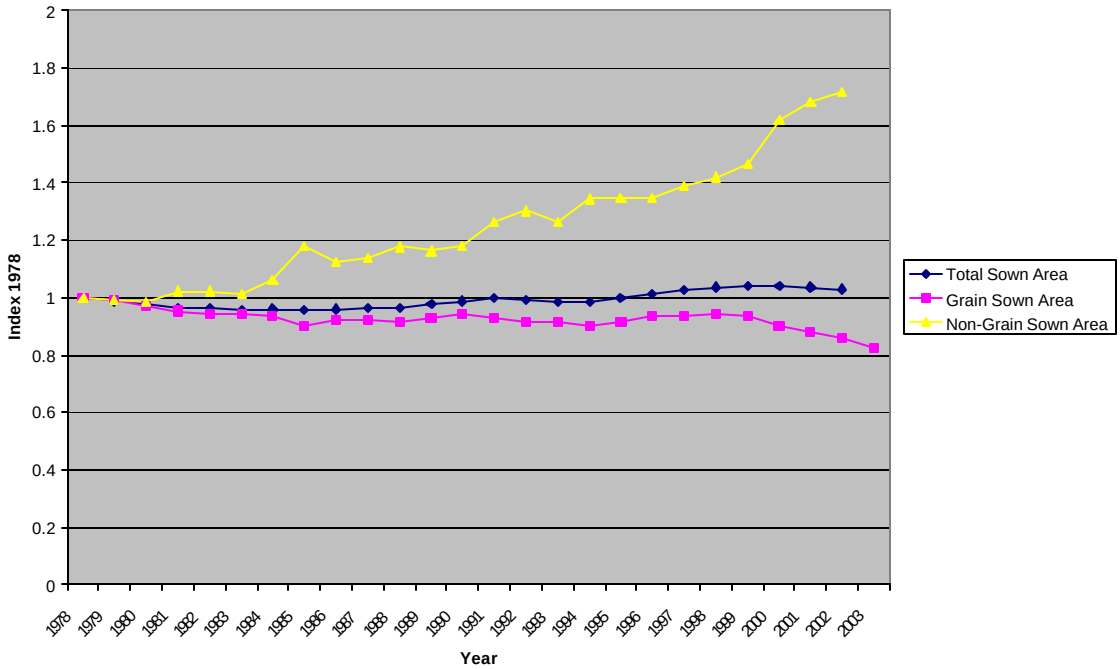
[5] These data are from Francis Tuan and Hsin-Hui Hsu, "U.S.-China Bilateral WTO Agreement and Beyond", in United States Department of Agriculture, *China: Agriculture in* USDA, November 2001), p. 7.

and sugar, the price impact is quite modest. The total impact on farmer income is large in absolute terms at 3.5 billion yuan, but that figure is only 0.25 percent of total agricultural value added. These price and income figures, needless to say, are only forecasts of the likely impact. The actual impact will depend on what happens to world prices after the year 2004. And what happens to both world and Chinese prices will be influenced by policy driven interventions not now known and exogenous shocks such as good and bad weather that cannot be forecast.

The immediate negative impact of WTO accession on agriculture masks potential long-term benefits of China's entry. Freeing up agricultural markets, for example, will lead to a shift in relative prices facing farmers and that in turn will lead to a shift toward crops in which China has a comparative advantage and away from land intensive crops in which China does not have a comparative advantage.

As the data in Chart 5 indicate, acreage sown to grain began falling slightly after 1984 as farmers were increasingly allowed to plant what they wanted, recovered slightly in the 1994-1996 period, and then fell significantly in 2000 and 2001.

Chart 5: Indexes of Sown Acreage



This decline was not as great as it might have been because farmers were still subject to grain procurement requirements. Nevertheless non-grain sown acreage soared in these last two years. The shift to non-grain crops contributed importantly to the rise in rural incomes throughout the latter half of the 1980s and the first half of the 1990s, but even this shift to cash crops was not sufficient to offset the impact of falling farm prices on rural incomes in the latter part of the 1990s through 2002.

Most analysts of Chinese agriculture believe that this shift away from land-intensive grain crops and toward more labor intensive crops such as fruits and vegetables will continue as WTO rules come into force and, everything else being equal, this should raise farm incomes.[6] A few individuals have even argued that this move toward a market determined and more efficient allocation of resources within

[6] See, for example, Bingsheng Ke, "China's WTO Entry and its Impact on the Agricultural Sector," a paper presented at a conference on Financial Sector Reform in China, September 11-13, 2001, at Harvard

agriculture could surpass the gains from decollectivization of agriculture in the early 1980s.[7]

For market forces to have a major impact on agricultural productivity, however, more is involved than just the freeing up of prices. The institutions that support a full market economy must also be in place. China has made substantial progress in this regard, but there is still a long way to go before China has the kinds of rural market institutions that will allow the nation to achieve its full productivity potential in the rural areas.

The household responsibility system introduced throughout China in the 1978-1984 period did return the management of land and labor to the individual household, but it did not extend ownership of that land to the individual household. Instead the household had the right to farm particular pieces of land for 15 years and that was extended to 30 years in 1984.[8] Farmers, however, could not buy or sell land on the market. Reallocations of land did occur but were generally carried out by local governments as the local population increased and local workers left to find jobs in the cities.

Many have argued that this system of land allocation and reallocation undermined incentives to invest in the land and led to the misallocation of scarce arable land resources. Thirty year "leases" would seem to be adequate to encourage investment in the land except for the fact that land was reallocated among villagers far more frequently than this 30-year guarantee implies. In roughly two-thirds of all villages in

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University. A similar conclusion is reached in the Development Research Center of the State Council, *Adjustment of Economic Policies after WTO Accession,* p. 38.

[7] Theodore Schultz quoted in Colin A. Carter and Scott Rozelle, "Will China Become a Major Force in World Food Markets?" *Review of Agricultural Economics,* Volume 23, No. 2, p. 330.

China, land was reallocated one or more times in the 1980s and 1990s. One problem with these reallocations was that they were often not done systematically enough to achieve efficient use of the land. Farm families with ready access to outside employment opportunities would hold onto the land allocated to them even when most of the family workforce had left farming to work in local or more distant factories. Families without easy access to outside employment opportunities would farm their land more intensively because the opportunity cost of their labor was lower than in families with off farm opportunities.[9] More efficient labor markets and a willingness to allow the land to be rented out would substantially eliminate this source of allocative inefficiency.

More recent work using local survey data, however, suggests that many of these arguments about the inefficiency of the current land system with its reliance on administrative reallocation may have been exaggerated. Administrative reallocation, at least in the villages surveyed in one study appears to have raised the efficiency of land use.[10] Local farmers in fact often accepted such reallocations as a reasonable way to deal with the shifting demographic situation particularly when off farm job opportunities were scarce.[11]

The efficiency of land use issue aside, there is an important argument for not relying solely on the market to allocate land in a country where over half of the

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[8] For a discussion of the rural institutional reforms of the 1980s, see Yiping Huang, *Agricultural Reform in China: Getting institutions right*, (Cambridge: Cambridge University Press, 1998).
[9] Dwayne Benjamin and Loren Brandt, "Property Rights, Labor Markets, and Efficiency in a Transition Economy: The Case of Rural China," Unpublished paper, University of Toronto, April 2000 draft.
[10] Matthew A. Turner, Loren Brandt, and Scott Rozelle, "Local Government Behavior and Property Rights Formation in Rural China," Unpublished paper, August 2000.
[11] James Kaising Kung, "Equal Entitlement versus Tenure Security under a Regime of Collective Property Rights: Peasants' Preference for Institutions in Post-reform Chinese Agriculture," *Journal of Comparative Economics*, 21 (1995), pp. 82-111.

population and most of the poorest elements in that population are still in the countryside. With the great accumulation of wealth in the cities and the lack of many alternative investment opportunities, a completely free land market could quickly lead to the concentration of farm land in the hands of absentee landlords as in China's past. At a minimum China would want to restrict land purchases to those who planned to till the land much as was done in South Korea after land reform was completed there in the early 1950s. That said, the efficiency of land use would undoubtedly be improved if some system relying more on market forces and less on local administrative discretion were implemented. Administrative reallocation under local pressure for "fairness" has been far too frequent to encourage some forms of investment and not frequent or substantial enough to eliminate the allocative inefficiency associated with the fact that some farm families have more access to off farm employment opportunities than others.[12]

The rural credit market is only marginally better developed than the rural land market. Individual farmers have little access to credit from the large state banks. The one commercial bank that does lend to the agricultural sector, the Agricultural Bank of China, lends mainly to state commercial enterprises and to township and village enterprises. Most rural households must rely instead mainly on their local rural credit cooperatives or on informal sources of funds from family and friends. These rural credit cooperatives are cooperative in name only since they are under the direct supervision of the central bank. They are also in segregated markets and vary widely in strength. Those on the coast possibly could be turned into truly independent credit

[12] Chen Xiwen, "Thoughts and Policy Proposals for Development of Agriculture and Rural Areas During the 10th Five-Year Plan Period," *China Development Review*, Vol. 2, No. 4, October 2000, pp. 37-38.

institutions, but those further inland will continue to rely on government subsidies in one form or another.[13] Local government influence over the rural credit cooperatives together with below market loan interest rates mean that the bulk of the lending goes to revenue and tax producing units such as the township and village enterprises rather than to individual households. This situation has not improved markedly since the reforms began in 1978.

There are models for the effective delivery of credit in rural areas in general and poor areas in particular (Bangladesh's Grameen Bank, Indonesia's Bank Rakyat Indonesia), and China is experimenting with such models, but the process is still in its early stages.[14] Under the existing system of credit, even the township and village enterprises have difficulty getting access to credit and this situation appears to have worsened over time. TVEs in the past could get credit from the major banks in part because local governments would help impose sanctions against firms that defaulted, but this practice had largely ended by the late 1990s at the same time that TVEs were experiencing rising rates of default.[15] Increasingly banks preferred, where allowed, to lend to outright private local enterprises where repayment was seen as more likely.

The shortage of capital in the countryside is not solely a problem of weak credit institutions. China's fiscal system is badly in need of further reform if the government is to invest adequately in rural infrastructure. Just 1.4 percent of all capital construction investment in the year 2000 went to farming, animal husbandry

[13] Chen Xiwen, *op. cit.*, p. 44.
[14] Albert Park and Changqing Ren, "Microfinance with Chinese Characteristics," *World Development*, Vol. 29, No. 1, 2001, pp. 39-62.
[15] Albert Park and Minggao Shen, "Joint Liability Lending and the Rise and Fall of China's Township and Village Enterprises," Unpublished paper, October 2000.

fishing, and agricultural services.[16] This was despite the fact that farmers paid a substantial portion of the value added tax as well as the various taxes levied explicitly on agriculture. The fiscal problem is particularly debilitating at the local government level. These local governments levy a plethora of fees that in law are not supposed to amount to more than five percent of rural household income, but may in many places reach as high as twenty percent.[17] These fees support some necessary local services but there is a widespread view that far too large a share of these fees has gone to support more the interests of local cadres than the interests of farmers. Taxation based on local fees also has the perverse effect that the poorest areas sometimes try to levy the highest percentage fees. This regressive system derives from the fact that the national government expects much of the local governments, but does little to help those with limited resources to meet national and provincial goals. There are exceptions, of course. Counties designated as poverty counties do receive special funds for development from both the national government and international organizations, but most of rural China has to do the best it can with whatever local resources it has under its control. Many of the poorer local governments have gone deeply into debt.

The weak fiscal status of both the national and local governments has also meant that research and development in the agricultural area has fallen far below an optimum level. Agricultural research as a percentage of agricultural GDP actually declined from 0.49 percent to 0.38 percent from the late 1970s to the mid-1990s.[18]

National Statistical Bureau, *China Statistical Yearbook 2001,* p. 166.

[17] Albert Nyberg and Scott Rozelle, *Accelerating China's Rural Transformation* (Washington: The World Bank, 1999). P.9.

[18] Albert Nyberg and Scott Rozelle, *Accelerating China's Rural Transformation,* p.76.

This inadequate level of research funding is bound to mean slower agricultural growth in the future. When key factor inputs like land, water and chemicals cannot be expected to increase farm output on their own, the only way increases will be achieved is through research that raises the productivity of these inputs. Agricultural research in China is clearly the responsibility of the public sector. Even in a well developed market economy it is not always possible for private firms to appropriate the gains from agricultural research. It is too easy for farmers to take advantage of the improvements without paying. In China where the protection of intellectual property rights is in its infancy, there is little prospect over the next decade for the development of a dynamic private sector capable of making breakthroughs in agricultural research.

The biggest changes in rural institutions since the reforms began, other than the household responsibility system, have been in the marketing of agricultural crops. Rural markets for all kinds of subsidiary products produced in the rural areas were freed up immediately when the reform period began and periodic farmers' markets flourished. The government, however, has been much slower to give up control of the major grain crops and cotton. In the late 1990s there was even an effort to reestablish the government's monopoly control over the grain trade, but this effort was reversed when China moved to join the WTO.

Finally China has gradually been reforming local governments in the rural areas. Under the commune system, local government and the main producing units were one and the same. This had some positive elements in that it taught local government officials to be promoters of local industry and agriculture, not just regulators and tax

collectors. Local government was thus less predatory than is often the case in other countries. But the mixing of government and business functions has its down side especially in the poorer areas, and that mixing continues to plague Chinese rural businesses today. Local governments regularly interfere in the operation of enterprises within their jurisdictions diverting funds for local government use whether authorized by the tax laws or not. Probably the biggest single source of complaint in the rural areas is the above mentioned constant effort of local officials to impose informal taxes and fees whenever they need money. Rural competitive elections for the selection of local leaders is one route being tried to deal with this and other sources of rural discontent.

Factor Inputs and Productivity as Sources of Growth

If market forces and their supporting institutions are to have a positive impact on agricultural growth, they must lead either to the more rapid growth of factor inputs in agriculture or to a higher rate of increase in the productivity with which those inputs are used. Any attempt to measure the contribution of factor inputs to agricultural output logically starts with the fact that sown acreage overall rose hardly at all after the reforms began in 1978, increasing by only 4.2 percent in 23 years, and the grain sown area actually fell in absolute terms. The rural labor force working in agriculture did rise from 1978 through 1991 at 1.4 percent per year but then began declining at 0.5 percent a year thereafter. Labor force figures are particularly subject to biased estimation, but the basic trend is probably correct.

Capital expenditures on agriculture are also difficult to estimate accurately in part because much agricultural machinery is not used primarily for farming. Tractors, for

example, are often substitutes for mini-trucks and used for moving goods to the market, and electric power is used in TVEs and homes as well as to drive irrigation pumps. China's total irrigated acreage did rise but by only an average of 0.8 percent a year (1.7 percent per year since 1996) and the total capacity of farm power machinery rose from 117.5 million kw in 1978 to 385.5 million kw in 1996 and 579.3 million kw in 2002 (or 6.6 percent per year since 1997). China in 2002 had roughly 13 million mini-tractors among other kinds of machinery.

Electric power consumption in rural areas has risen from 25.3 billion kwh in 1978 to 299.3 billion kwh in 2002 and the rate of growth over the past half decade has remained at a healthy 8.6 percent annually. Among other current inputs, chemical fertilizer use rose from 8.84 million tons of nutrient to 43.4 million tons over the 24-year period beginning in 1979. The rate of growth of fertilizer use has slowed marked in recent years, however, to only 1.7 percent a year since 1997 in part because of the shift in the grain fertilizer price ratio. It is also a fact, however, that fertilizer use is already at a very high level throughout China and it is not clear how much more yield response one can expect from increasing applications of chemicals to the land. Assuming China has roughly 130 million hectares of land under cultivation, current chemical fertilizer use comes to 334 kilograms per hectare. In South Korea where there is a much higher percentage of land with enough water to allow large applications of fertilizer, in contrast to much of the land in China's north and northwest, fertilizer application averages a little over 400 kilograms a hectare and there has been no significant increase in application for more than two decades.[19]

[19] Korea National Statistical Office, *Major Statistics of Korean Economy, 2002.3*, p. 27.

Korea has reached a fertilizer saturation point and China cannot be very far away from that point.

If these figures on inputs were put together in a growth accounting framework, it is hard to see how increasing inputs alone could raise agricultural value added by more than 1 or 2 percent a year. Key inputs appear likely to grow very slowly if at all (arable land, fertilizer, irrigation) while others such as labor plus labor saving machinery must deal with the fact that the marginal productivity of labor in agriculture must be very low. The main agricultural role of much of the machinery is to substitute for labor time, and thus cannot be a major contributor to growth if labor marginal productivity is low. Over the next two decades, the principal contribution of further agricultural mechanization will be to maintain existing levels of production while labor shifts to non-farm occupations.

Growth in agricultural value added in China, therefore, will have to come mainly from improved yields using existing levels of inputs, principally by developing better plant varieties, or by shifting even further toward higher value crops. Getting higher yields from existing inputs will not be easy at least for grain because Chinese yields of grain are already high by international standards. There is no technology out there that China can simply and quickly adapt to its own uses and achieve large yield increases. In parts of Asia, for example, the introduction of hybrid varieties of rice should lead to rising yields, but China has been growing hybrid rice varieties for over two decades and these varieties are now planted on half of China's rice acreage.[20] Further gains in China, therefore, will require new technologies based on continuing research most of it within China. The current low levels of investment in agricultural

research mentioned above, therefore, have grave implications for future productivity growth in agriculture.

Additional increases in agricultural output may be achievable through improving the grassland pastures of the northwest and through better breeding of animals. There may be other sources of productivity growth as well, but the main gain from improvements in incentives was achieved in the 1978-1984 period when China returned to household farming. Further gains in incentives will be more modest. Given this situation, the growth rate of agricultural value added over the past five years of 2.7 percent a year can be considered to be quite acceptable by international standards. It is roughly equivalent to the average rate of growth in agricultural value added in low and middle incomes countries in the world as a whole and considerably higher than the agricultural growth rate of the high-income countries.[21] A respectable rate of agricultural growth in international perspective, however, may not be adequate from other points of view. Two to three percent per capita or less may be the best China can reasonably expect to do, but it still may not be enough to ward off an economic or social crisis over the coming decade.

Is China Facing a Food Crisis?

In exploring whether or not China may face a crisis over the coming decade because of the decline in grain output and the slowing of agricultural value added growth, one must first make clear what is and is not a crisis in the Chinese context. The traditional Chinese view of the importance of agriculture to society centered on the role of food--specifically the adequacy or inadequacy of the supply of grain. The

[20] Randolph Barker and David Dawe, "The Asian Rice Economy in Transition," unpublished paper, p.27.
[21] The World Bank, *World Development Indicators, 1998*, p. 178

more conscientious emperors of the Qing dynasty, for example, received regular reports from around the country on grain prices. When prices shot up in one region or another it usually meant there was a local crop failure and impending if localized famine that called for action on the part of the government. Releasing grain from the "ever-normal" granaries was one solution if the stores had been maintained. Failure to correct the problem could lead to banditry, and, if the famine were widespread, to political instability and a threat to the dynasty.

This traditional attitude toward the central role of grain carried over into the modern period. The famine of 1959-1961 with its massive number of deaths greatly reinforced the view that maintaining grain supplies was essential to the stability of the society and government. The result was a series of government policies urging the rural cadres in the Rural People's Communes to focus on grain production and also to store great quantities of surplus grain ("store grain everywhere"). This attitude has also had more than a little influence in the reform period since 1978, but the relevance of this way of thinking about the grain problem has become increasingly out of touch with reality.

Prior to 1978 a case can be made that China suffered a shortage of grain. Grain output per capita at the bottom of the famine was only 217 kilograms and had risen to 316 kilograms per capita in 1978. At the prices then charged for grain, there was excess demand in the 1960s and early 1970s that the government dealt with by instituting a system of rationing. No such excess demand exists today and rationing of grain was abolished long ago. Grain output per capita in 2001 was 355 kilograms and was even higher in many of the preceding years of the reform period. Abolition

of rationing did not lead to a spike upward in grain prices. To the contrary, as we have shown above, grain prices fell sharply in recent years because neither domestic nor world demand for grain was sufficient to maintain prices at their previous levels.

Grain prices have been falling despite the fact that China's consumption of meat and poultry has risen steadily in the reform period. Historically and in the pre-reform era most hogs and chickens were fed chaff and waste products, but the large increase in meat consumption has meant that animals increasingly have to be fed grain as in high-income countries. In 1978, for example, the rural population consumed 7.7 kilograms of pork whereas in the year 2002 rural pork consumption had risen to 13.7 kilograms. If hogs are grain fed, it takes roughly 4 kilograms of grain to produce a kilogram of pork. Urban households, by way of contrast, consumed 16.8 kilograms of pork as early as 1982 and that figure has not changed much since (urban pork consumption in 2002 was 18.7 kilograms).[22] While the per capita level of meat consumption in the cities may not be rising that much, the large and ongoing shift of population to the cities is a further source of increased meat consumption on a nationwide basis. There has also been a substantial increase in poultry consumption in both the rural and urban areas together with an increase in beef and mutton consumption although beef and mutton play a relatively minor role in the Chinese diet. This rise in meat consumption and production is further evidence that China is not remotely close to the subsistence margin when it comes to grain consumption although individual families do fall below subsistence levels in the poorest rural areas.

[22] These data are from State Statistical Bureau, *Statistical Yearbook of China, 1983*, pp. 496, 507; and National Bureau of Statistics, *China Statistical Yearbook, 2003*, pp. 351 and 375.

If China has what appears to be a supply of grain that is well above subsistence levels, what is it that people worry about? Even if China's grain output were to stagnate for 20 years and population were to continue growing at the current rate that is just below one percent per year, grain output in 2022 would still be 291 kilograms per capita, only 8 percentage points below the level of 1978 and more than 30 percent above the famine level of 1960.

These calculations assume unrealistically that farmers wouldn't shift back into grain if output fell toward subsistence levels. Even more importantly, these calculations assume that China would have to supply all of its grain requirements from its own land. This was a realistic assumption in the eighteenth century when transport costs for bulky items such as grain were prohibitively high and few if any countries within thousands of miles of China had large surpluses to sell. The assumption has no bearing on reality in the twenty-first century when there is a world grain market selling 300 million tons a year from the surpluses of Australia, Canada, the United States and Argentina. Only in an all out war situation could China possibly have no access to this international market.

Politicians in many parts of the world often confuse two concepts—"food self-sufficiency" and "food security". Food self-sufficiency means what the words imply—that a country will supply all of its food needs from within its borders. Since grain is the principal source of calories in the diet of the population, either through direct consumption or indirect consumption in the form of meat, food self sufficiency generally has meant grain self-sufficiency. Variations on this theme include Japan's desire for self sufficiency in rice (but not in food more generally) based on what can

best be described as either the mystical properties of rice, or, more realistically, the political power of rice farmers in Japan. The concept of self-sufficiency, as stated above, only makes sense if a country has no access to international markets either because it lacks foreign exchange or is engaged in a war that cuts off trade for a long period. In the latter situation of a protracted war, grain shortages may be the least of the country's problems.

Food security, in contrast, takes into account the availability of international markets for grain and other food products. The question then becomes one of under what conditions a country might suffer food shortages. An embargo on grain imports, for example, even if only applied for a few months, could be a problem if the country had no stores of grain to draw upon. China, of course, has very large stores of grain. Grain storage data are not regularly published, but we do know that total stores in June 2000 were 250 million tons, and the United States Department of Agriculture recently estimated that Chinese grain stores may have been as high as 230 million in 2000/01.[23] How long these stores would last depends not only on their size, but also on what share of food consumption they would have to supply for how long.

The more fundamental issue with regard to food security is the degree to which a country can safely depend on imports to meet its food requirements. For China, the clear answer is that the country could readily depend on food imports for a significant share of its requirements. China's foreign exchange earnings from exports in 2003 were US$438 billion. World prices for grain fluctuate but on average they have been

[23] The official figure is from Chen Xiwen, "Some Opinions on the Current Situation of Grain," *China Development* Review, Vol. 2, No. 4, p.20. The USDA estimates of grain stores were recently revised upward from 66 to 230 million tons so clearly they are at best informed guesses. See Hsin-hui Hsu and

below $200 per metric ton. Chinese domestic grain prices have also been below $200 per ton. In the 1990-1992 period before the run up in prices in the mid-1990s, the average Chinese purchase price of all grain was US$135 per metric ton if Chinese prices are converted at the then prevailing exchange rate.[24] If China were to purchase 50 or even 100 million tons of grain at a much higher world price of US$200 per ton, the foreign exchange required would come to between US$10 billion and US$20 billion respectively. Even if one assumes that Chinese purchases of this magnitude would drive world prices much higher, say to US$300 per ton, it is hard to get grain import figures that amount to more than ten percent of China's annual foreign exchange earnings today. Furthermore, at US$300 per ton one could expect that large amounts of arable land in the United States and elsewhere, that are now out of production, might be replanted in grain thus holding down world prices.

Even if China's exports only grow at 5 percent a year over the next decade and imports of grain rise to 100 million tons at US$300 per ton, grain imports would only use up less than 5 percent of China's export earnings in the year 2011. Five percent is not an insignificant figure, but it is a tiny fraction compared with the early 1960s when the import of 6 million tons of grain a year accounted for roughly a third of all Chinese imports.[25] In the early 1960s, partly by choice and partly by happenstance, China was an autarchic country with little interest in or ability to rely on imports for key commodities. In the first years of the twenty-first century, in contrast, China is one of the world's major trading nations with large reserves of foreign exchange that

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Fred Gale, "USDA Revision of China Grain Stock Estimates," in United States Department of Agriculture, *China: Agriculture in Transition*, November 2001, p. 54.

[24] The price data are from National Bureau of Statistics, *Zhongguo nongcun tongji nianjian, 1993*, p.184

could be used to purchase grain and other key commodities in an emergency. Storing foreign exchange is easier and much less expensive than storing grain.

If it would be so easy for China to rely more on imports of grain and less on domestic production, why has China not gone down this path? Put differently, should Chinese farmers have switched out of grain and into more lucrative crops than has been the case to date? The data on grain imports and exports are presented in Table 3. Far from becoming a steadily increasing net importer of grain, China in the 1990s first reduced net imports to a miniscule level and then became a net exporter of 6

Table 3

Grain in	Exports	Imports	Net X or M(-)
1978-1979	1,764	10,594	-8,830
1980-1989	4,906	13,053	-8,147
1990-1996	9,846	10,091	-246
1996-2000	9,697	3,647.5	6,050
2001-2002	11,790	3,145	8,645

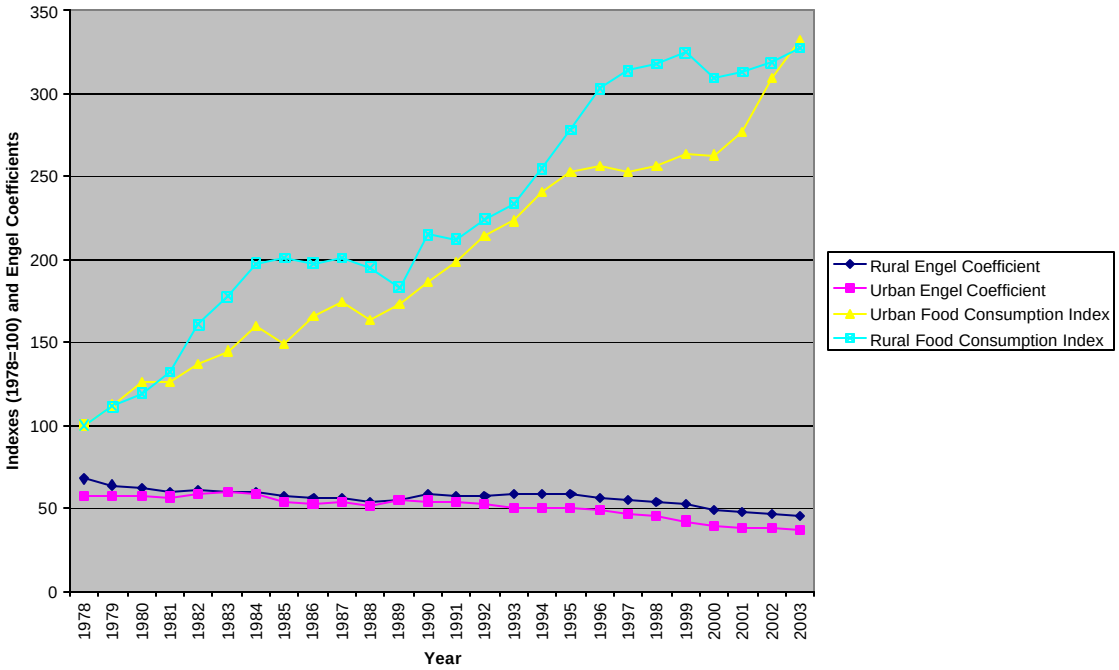
Sources: National Bureau of Statistics, *China Statistical Yearbook* (various years) and National Statistical Bureau, Zhongguo *nongcun tongji nianjian*, 2001, pp. 220-222.

million tons a year. This is not what most observers believed would happen a decade or more ago. Estimates of likely net imports by the year 2000 made at that time, including estimates by this author, ranged as high as 50 million tons a year. Why were these estimates so far off the mark?

To forecast future demand for food in general and grain in particular, one must first forecast the likely increase in per capita income and in population growth. One must then estimate the income elasticity of demand for food and for grain at the varying levels of income over the period being considered. Data on share of food consumption in income and indexes of the real increase in food consumption are presented in Chart 6.

[25] Alexander Eckstein, *Communist China's Economic Growth and Foreign Trade*, (New York, McGraw

Chart 6: Urban and Rural Food Consumption Indexes



The share of food expenditure in income (or Engel's coefficients) fell sharply throughout the reform period according to both the urban and rural household surveys. This is to be expected given the substantial increases in real income that occurred. People spend a lower share of their income on food as their income increases.

The income elasticity of demand for grain, however, is generally well below the income elasticity of demand for food except in very poor countries where grain and food are nearly identical. In China through the beginning of the reform period when most of the rural population was very poor, slow increases in income did lead to considerable increases in grain consumption per capita. But in China after 1978 when rural incomes rose substantially, direct consumption of grain leveled off. In the year 2002 per capita grain consumption in the rural areas was 236.5 kilograms, essentially less than in 1978 when it was 247.8 kilograms. In effect the rural income elasticity of demand for grain

Hill, 1966), pp. 107 and 227.

consumed directly in rural China was zero or even negative. Food demand in real monetary terms increased because there was a major change in the composition of the rural diet—a dramatic shift from coarse grains to fine grains, a more than two fold increase in meat consumption per capita, a five fold increase in egg consumption, a four fold increase in fish and shrimp, and a nearly six fold increase in the consumption of alcohol per capita.[26] Alcohol and meat were a source of indirect demand for grain with increased meat consumption being equivalent to a rise of 30 to 40 kilograms of grain if all of the increased meat was produced by feeding grain to hogs, which was probably not the case. Even if all this meat were fattened on grain, that would only raise the income elasticity of demand for grain in rural areas from below zero to less than 0.1.

Urban households in the year 2002 purchased (and presumably consumed) only 78.5 kilograms of grain, down from 135 kilograms in 1985. The income elasticity of demand for the direct consumption of grain was thus strongly negative throughout the reform period. Meat consumption was higher than in the rural areas, but within the urban areas per capita meat consumption remained level and there was only an increase in alcohol consumption from 7.8 to 9 kilograms from 1985 through 2002. Urban food consumption over the two plus decades since 1978 almost tripled, but as in the rural areas, this increase reflected a move to higher quality food at higher prices, not a higher quantity.

The only real increase in the demand for grain, therefore, came from the rise in population and the growth of population declined steadily from 1.2-1.6 percent in the decade of the 1980s to roughly 1 percent in the latter half of the 1990s. The 48 percent increase in grain output between 1978 and 2001 was just enough to cover the 32 percent

[26] These data are from National Bureau of Statistics, *Zhongguo nongcun tongji nianjian 2001*, pp. 245-246.

increase in population, the increase in the share of the population of adult age, and the increase in meat and alcohol consumption.

Many of the earlier estimates of China's future demand for grain assumed much higher income elasticities than this in part because most analysts placed China's per capita income at a level below what it really was. When efforts to measure the purchasing power parity GDP per capita of China began to bear fruit, estimates using these higher income figures began to produce more reliable estimates of the relationship between income and the demand for grain.[27]

China, therefore, does not have a grain security problem or a food security problem and is not likely to have one anytime in the foreseeable future. To begin with, as has been shown above, domestic production of grain in China has been more than sufficient to meet the increase in demand for grain. Production of grain has been sufficient despite the fact that the sown acreage in grain has fallen steadily over the years from 87 percent of the sown acreage in 1962, the year immediately following the three years of famine, to 80 percent in 1978 at the beginning of the reform period to 74 percent in 1996. By 2001 with the fall in grain prices and the increasing freedom of farmers to plant what they want to plant, the sown acreage in grain fell further to 68 percent.[28]

Even if the sown acreage falls to a point where China does not produce enough grain to meet domestic demand, there is still no food security problem. Nor will there be a food security problem if China's membership in the World Trade Organization leads to increased purchases abroad of grain. As already pointed out, China has the foreign

[27] Ross Garnaut

[28] There are serious questions about the reliability of Chinese arable land and sown acreage data, but there is little reason to doubt that these percentage declines in the acreage sown to grain are reliable even if the percentages are not precise.

exchange reserves and annual earnings to easily pay for any realistic level of imports if the government or private traders want to use the foreign exchange that way. Even if Chinese imports of grain were sufficient to drive up world grain prices, China would have more than adequate means for paying for these higher priced imports. And the higher prices would in turn lead Chinese farmers to return some sown acreage to grain production.

Given China's slow and declining rate of population growth together with an income elasticity of demand for grain that is near zero even when indirect uses of grain for meat and alcohol are taken into account, it is difficult to see how China will experience large increases in the demand for grain in the foreseeable future. Conceivably natural disasters of particular intensity over a several year period could lead to large temporary shortages of grain, but even that would not justify an effort to pressure farmers to produce more grain. To begin with, natural disasters that have a major nationwide impact on grain production are uncommon in China because of the great ecological diversity within the country. In preparing for such a rare disaster, the main issue for the Chinese government is to decide whether it is best to maintain large reserves in the form of grain or whether it would be better to hold those reserves in the form of foreign exchange.

The True Nature of the Crisis in Rural China

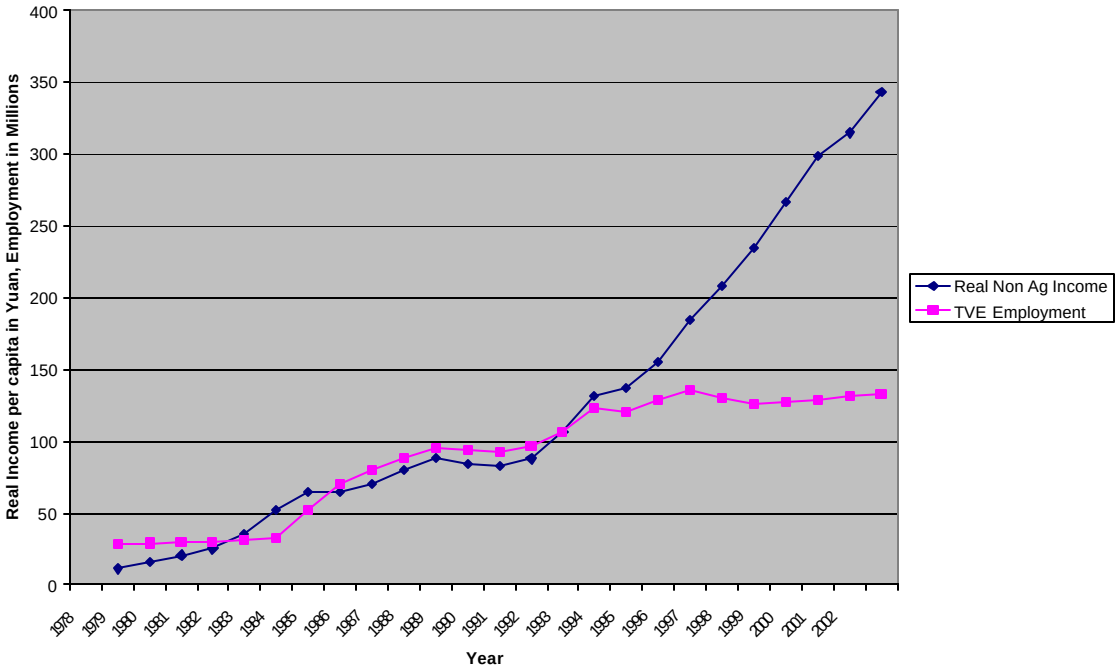
If China does not have a current or pending grain or food crisis, what is the major problem in the rural areas of the country? The simple answer is that China has a rural income problem and that problem is getting worse. The income crisis has two dimensions. One dimension is the fact that there are large and growing disparities in

income between regions in China. The other dimension to the crisis is that rural income growth has slowed to a crawl while income in the urban areas continues to rise rapidly. It is not the case that rural incomes are falling—they are not. But the widening gap between rural and urban incomes is, among other things, putting enormous pressure on the urban areas to which the rural poor are migrating in large numbers. There are no easy or simple solutions to this widening income disparity.

Data on rural income growth since the reform period began were presented in Chart 3 earlier in this essay. The main point of the earlier discussion was that agricultural income stopped growing in real terms after 1996 and grew slowly from 1985 on except for a brief spurt in 1994-1996. What needs to be emphasized here is that real non-agricultural income and employment in the rural areas has also stopped rising in recent years.

The rapid rise in rural non-agricultural income and employment that began in the mid-1980s and carried through to the mid-1990s was a major boon to the reform process. The gradual relaxation of controls over rural to urban migration did not lead to a massive influx into the cities in large part because of the many higher income non-farm opportunities that were opening up in the rural areas. The data on rural non-agricultural employment during the reform period are presented in Chart 7.

Chart 7: Rural Non-Agricultural Income and TVE Employment

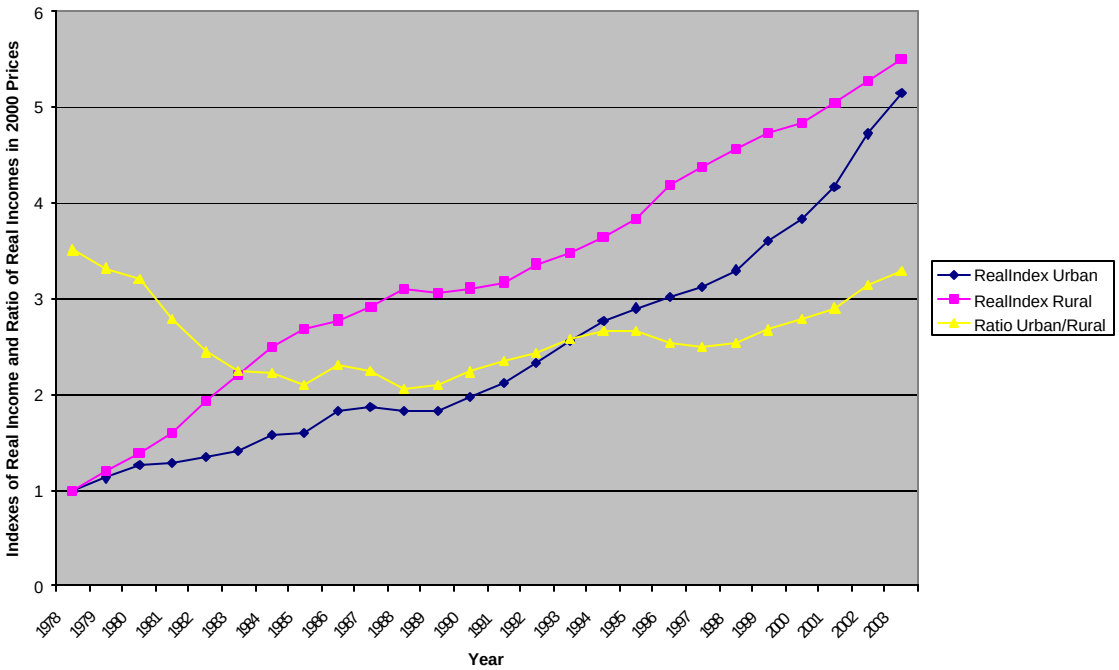


Employment data for China in general and for the rural areas in particular are treacherous to use. Coverage, among other things, sometimes changes without notice. Still, the basic story about employment in township and village enterprises is reasonably clear. Rural employment in these enterprises experienced an annual average increase of 8 or 9 million workers in the 1980s. Employment then stagnated in 1989-1990 because of the anti-inflationary policies of those years and the view of some key policy makers that TVEs were hurting state owned enterprises and lowering state tax revenues. Growth in employment then continued with an annual increase of 7 million workers from 1991 through 1996 peaking at 135 million employees in 1996. But since then TVE employment has declined steadily and they are once again under attack, this time from a much broader array of policy makers than was the case in the late 1980s. During a period when the total rural work force increased by 147 million laborers (1978-1996), employment in TVEs absorbed 107 million workers usually at wages better than the

income they could make farming. Since 1996, while the rural work force has increased by another roughly 20 million, TVEs haven't been able to absorb anyone on a net basis.

Data on rural and urban wages and incomes are even more difficult to use than the data on employment. According to Chinese official data, wages in both the urban and rural areas and in all kinds of employment soared during the years from 1998 through 2002 despite the rural stagnation in non-farm employment and the large increase in layoffs in state owned enterprises in the urban areas. Given that market forces were increasingly setting wages outside of the government, this rapid rise does not appear on the surface to be plausible. The urban and rural household survey data are more plausible in part because one knows how they were collected and so those data will be used here. Indexes of what has happened to rural and urban household incomes per capita are presented in Chart 8.

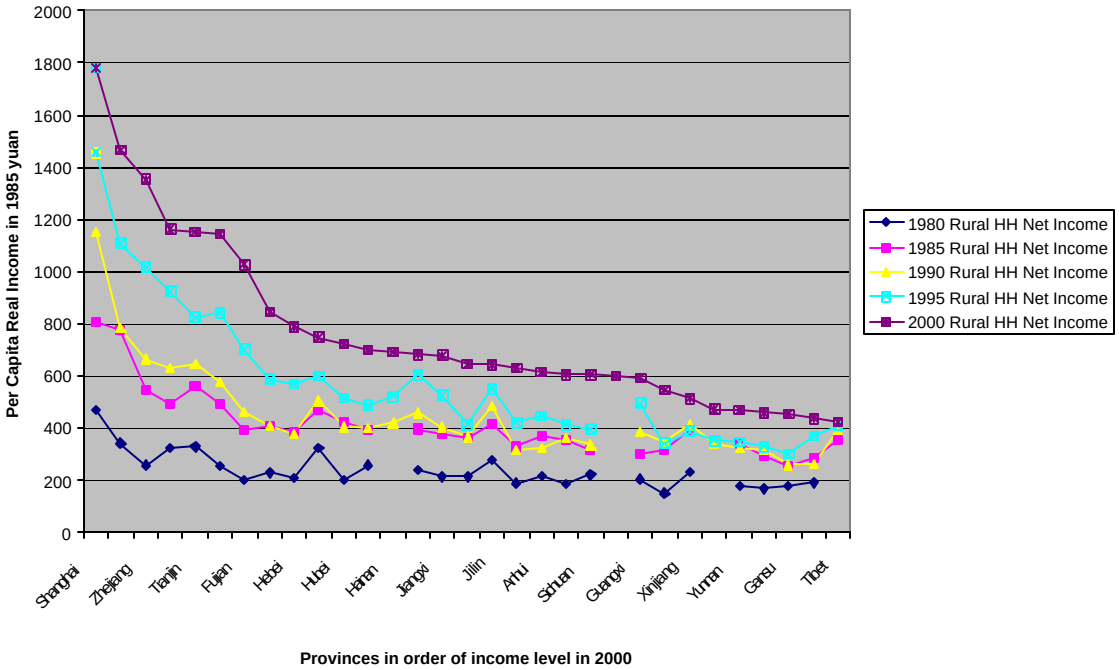
Chart 8: Rural and Urban Incomes Compared



In the period from 1978 through 1985, when China was returning from collective to household based agriculture, rural incomes soared both in absolute terms and relative to urban incomes. The rural-urban income gap thus closed substantially and stayed that way through the end of the 1980s. From 1990 on, however, the ratio of urban to rural incomes has been creeping up with a dip, but only a temporary one, in 1996-1997. Furthermore, the rural-urban gap would have opened even wider in the latter half of the 1990s if it weren't for the very large increase in rural non-agricultural income (see Chart 7) despite the stagnation in TVE employment. How this large increase in rural non-agricultural income was achieved, given the stagnation in employment, remains, at least to this author, a mystery.

The widening gap between urban and rural incomes on a nationwide average basis only captures a part of the real gap in incomes that is widening between the poorest rural residents and the cities, especially the cities along China's coast. The uneven development of China's provinces and counties is often remarked about and for good reason. Provincial data on the widening disparity in rural incomes are presented in Chart 9.

Chart 9: Rural Household Net Income Growth by Province 1980-2000



The data are for rural household income per capita in constant 1985 prices. Both the chart and the table tell a similar story. All of the provinces with real rural income that is growing rapidly are along the coast. The only coastal provinces that are not growing rapidly are Liaoning where the entire economy is suffering from the fact that the province was the center of the pre-reform growth of inefficient state owned heavy industries and Hainan that has always been a very poor area.[29] Real rural household incomes in the coastal provinces with minor exceptions are growing more rapidly than the central provinces and the central provinces more rapidly than the western provinces.

As the chart and the table make clear, this growing disparity in rural incomes started from a base at the beginning of the reform period when there were not wide disparities in rural income at least when measured on the basis of province wide averages. County level data would tell a somewhat different story since much of the rural

[29] Guangxi has been included with the central provinces even though it does have a small coastline. In all

inequality of China was within provinces. Mountainous areas in all provinces tended to be the poorest while rural populations near cities fared much better.

The relevance of these two decade trends to our discussion here is that the rural populations of central and western China are under especially heavy pressure to find alternative ways of earning higher incomes but have few local means for doing so. The greatest concentration of township and village enterprises is in the coastal provinces and that concentration has much to do with why rural incomes in these areas have grown so rapidly. Rural residents in these coastal provinces, therefore, have less of an economic reason for migrating to the cities. Rural residents in the interior, in contrast, have a choice between staying in agriculture with only modest prospects for a substantial improvement in their standard of living or going to the city. But the nearby cities in the interior are not where the economy is most dynamic so they move instead to the coastal cities in search of work.

In most economic models of rural to urban migration, the driving force determining the level of migration is usually the ratio of urban to rural wages or incomes together with the probability of obtaining urban employment. We don't have data on the probability of rural workers finding employment in the cities, but clearly the income gap has been widening, and the national figures we have used understate the degree to which that is the case. The gap between rural incomes in China's interior and urban incomes on the coast, as shown above, is particularly large. If we had used data on income in mountainous interior counties compared with income in the coastal cities, the gap would be even wider. Stagnation in agricultural incomes combined with little increase in rural off farm employment particularly in China's interior is a powerful push to leave the rural

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other respects, however, it is more like a central province.

areas especially for the young and more educated. When urban wages continue to rise, especially for the younger and better-educated rural population, the pull becomes as powerful as the push. One challenge for China over the next decade is to find ways of improving rural conditions in order to lessen this incentive to migrate. The other and probably more important challenge is to devise ways of better preparing those who do migrate for the higher income work opportunities that exist in the cities, and, for the most part, only in the cities.

China thus faces a major economic challenge for at least the next decade to come. The number of "floating" workers, workers with jobs in the cities but registration in the countryside, is approaching 100 million although there are no reliable published figures.[30] Over the next decade, another 100 million are likely to leave the rural areas and the process probably won't end until the rural workforce has been reduced to perhaps 10 percent of the total national workforce. In South Korea, the workforce in agriculture between 1973 and the end of 2001 fell from 50 percent of the total workforce to under 10 percent. China's current agricultural workforce was 50 percent of the total workforce in the year 2000. A drop in that share comparable to what happened over the last 28 years in Korea would involve in China the movement out of agriculture of nearly 300 million workers or 100 million a decade. If families migrate together with the workers, the numbers moving to the cities will be much larger.

The challenge for China, therefore, is to maintain sufficiently attractive conditions in the countryside so that what is already a large-scale migration does not turn into a

[30] The agricultural census in 1996 indicated that a total of 72 million "rural" laborers were working outside their native county (44.9 million) or outside their native province (23.6 million). More recent but less reliable estimates suggest the figure in 2001-2002 was around 81 million rural workers who were working

massive flood of people into the cities. More importantly, a major task for the rural areas is to prepare its younger people for work off the farm either in nearby towns or in more distant cities. Critical to that preparation is the continued expansion in the quantity and quality of the rural education system. The rural areas in the year 2000, because of their larger population, graduated 80 percent more students from primary school than the cities, counties and towns, but the cities, counties and towns graduated more than six times the number of senior secondary school students as the rural areas. That ratio will have to change if the new migrants are not to become a large underclass unsuitable for anything but the most unskilled urban jobs. For the cities and towns, the biggest challenge will be to create 10 million new jobs each year for these new migrants for the next 30 years.

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