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The Impact of Trade Liberalization on China's Agriculture and Rural Economy

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This paper analyzes the effect of China's trade liberalization process on the nation's rural economy. Although some leaders fear there will be substantial negative effects on China's rural sector and food security, a closer examination shows that the World Trade Organization (WTO) accession is part of a longer-term, efficiency-enhancing process of liberalization and opening to the outside world. When analyzed from this angle, the impacts of WTO reform, while not trivial, reflect trends already evident, many of which are positive. For example, while WTO accession may accelerate price decreases for certain crops, such as wheat and corn, prices should rise and export opportunities should increase for commodities such as meats, fruit, and fish. Rural wages in most sectors that employ rural workers should also rise. Finally, this paper describes a number of different ways that China and its rural residents will be able to protect themselves after trade rules are liberalized.

China's foreign trade has been one of the country's most important engines of economic growth and has played an increasing role in the national economy since reform began in 1978. The country's trade-to-GDP ratio increased from 13 percent in

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1980 to 36 percent in 1997. Trade in agricultural products has been a key component of this growth; in the same period, the total value of its agricultural trade increased from $9.29 billion to $25.15 billion, an annual growth rate of 6 percent.[1] Moreover, the agricultural sector has played an essential role in China's domestic development over the last twenty years and will continue to be an important sector in the future. With more than 60 percent of the labor force still in the rural sector, and farm incomes far below those in urban areas, the question of the effect of accession to the World Trade Organization (WTO) on agricultural and the rural economy is one of the key issues for China today.

China's reformers are well aware of the challenge of achieving the liberalization required under the accession agreement. The country's leaders worry that WTO-related liberalization will destabilize the agricultural sector—a sector that encompasses some of China's poorest, most vulnerable populations, parts of which continue to be highly protected—leading to social unrest and political turmoil. Ultimately, however, they are committed to transforming China into a world class economic power and know that liberalization is necessary. It is in this spirit that the decision to sign the WTO accession agreement was made.

In the face of WTO, how can China sustain agricultural growth, achieve food security, and increase farm incomes? What are the impacts of trade liberalization on the production of various crops? Will the largest effects come from inside or outside agriculture? Who will get hurt? Who will benefit? The answers to these questions are by no means clear.

Curiously, despite the enormous potential impacts, few systematic studies of the agricultural effects of WTO accession exist.[2] While all studies show that China's economy as a whole, and the rest of the world, will benefit from China's WTO accession, the effect on agriculture and on the rural economy in general is highly debated. Some researchers claim that the impact of WTO accession on China's agricultural production and world trade will be marginal, and that the real positive benefits will be to rural laborers and other wage earners.[3] Others predict significant negative effects on certain subsectors of Chinese agriculture, such as wheat and soybeans.[4]

To help answer the questions raised above, this paper examines the overall effect of China's trade liberalization process on the rural economy. Although much has been made of the potentially drastic effects on China's rural sector and food security, and the

consequent threat to the country's stability, a closer analysis of the country's past and current policy reforms and economy-wide adjustments shows that the WTO is really just another step in a more than twenty-year process of liberalization and opening to the outside world. The focus on the WTO has made many overlook the progress made prior to accession. The impacts of WTO reform, while not trivial, will reflect trends already evident. In short, while WTO accession poses a challenge to China and will have both positive and negative effects, these effects will, overall, be positive. Moreover, the magnitude and nature of the negative impacts will depend on how China's policymakers manage the agricultural sector as the new trade regime takes effect.

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Agriculture in China's Economy

China's economic liberalization and structural change have proceeded for more than two decades, with vast benefits for China's economy. Annual GDP growth was 8.8 percent from 1979 to 1984, 9.7 percent from 1985 to 1995, and, despite the Asian financial crisis, 7.9 percent from 1996 to 2000. Foreign trade has been expanding even more rapidly: China's trade-to-GDP ratio increased from 13 percent in 1980 to 36 percent in 1997 and 44 percent in 2000.[5]

Many of the successive transformations of the Chinese economy began with and depended on growth in the agricultural sector.[6] After 1978, decollectivization, price increases, and the relaxation of local trade restrictions on most agricultural products spurred the takeoff of China's agricultural economy from 1978 to 1984. Grain production increased by 4.7 percent per year, and fruit, red meat, and fish production grew by 7.2 percent, 9.1 percent, and 7.9 percent respectively. Although agricultural growth decelerated after 1985 after the one-off efficiency gains from decollectivization, the country still enjoyed agricultural growth rates that outpaced the rise in population.

Despite the healthy expansion of agriculture, even faster growth in the industrial and service sectors has begun to transform the rural economy, shifting its focus from agriculture to industry, and from rural to urban. During this process, agriculture's share of the national economy has declined significantly. Whereas agriculture contributed more than 30 percent of GDP before 1980, it fell to 16 percent in 2000, and its share of employment fell from 81 percent in 1970 to 59 percent in 2000. Changes in the external economy for agricultural commodities have paralleled these changes in domestic markets. Whereas the share of primary products, especially those from agriculture, in total exports was over 50 percent in 1980, it fell to only 10 percent in 2000. Over the same period, the share of food in total exports fell from 17 percent to 5 percent.

These overall figures, however, hide differences between subsectors that signal structural changes in the sector as a whole. High economic growth and rising incomes, urbanization, and the development of food markets have boosted demand for meats, fruits, and other non-staple foods. These changes have stimulated sharp shifts in the structure of agriculture.[7] The share of livestock output value more than doubled from 14 percent to 30 percent from 1970 to 2000, and aquatic products rose at an even more rapid rate. The share of total agricultural output contributed by the production of grain and other field crops, meanwhile, fell from 82 percent to 56 percent. Moreover, the largest declines in crop-specific growth rates have been in the grain sector, which has been, and will be, key in determining China's agricultural trade flows.

These patterns in China's economic structure and agricultural trade over the past two decades reveal that WTO accession will not mean a radical reorientation of China's agricultural sector. The shifts outlined above suggest that China was already moving toward a point that was more consistent with its domestic resource endowments—relatively little arable land and an abundance of labor. To the extent that the new trade agreements reduce barriers to allow more land-intensive products into the domestic market and stimulate the export of labor-intensive crops, the main impact of WTO accession will be to push forward trends that were already visible.

The Impacts of WTO Accession on the Rural Economy

Despite the continuity with the past, China's WTO accession agreement does pose new challenges for the agricultural sector and

could potentially have both large positive and negative effects. If agricultural markets were completely opened, the differential between the world market price and China's domestic price, along with the vast production potential of other countries in major commodities such as wheat, cotton, and corn, could result in falling prices that hurt China's producers. It is exactly this effect that some in China worry could lead to destabilization in the countryside. On the other hand, China's leaders are hoping that rural laborers will gain even more from the projected rise in China's exports and other economic activity. Moreover, China is a large country with a complex economy, and the negative price effects on agricultural producers will not be universal. Indirect effects must also be factored into the equation, a number of which promise to provide benefits in the short, medium, and long run for agricultural producers and workers from rural areas. In this section, we discuss the various impacts that China can expect from WTO.

Direct Negative Effects

Much discussion inside and outside of China concerns the negative impacts that WTO accession will have on the rural economy. Some scholars believe that the negative impacts of trade liberalization on China's agricultural sector will be large.[8] Although these papers present little solid evidence, the authors suggest that much of China's wheat, corn, edible oil crops, and cotton are produced at costs above world market prices. Consequently, producers of these crops will suffer declining income as imports rise with the implementation of China's WTO promises.

To understand what may happen for some of these crops, it is instructive to examine the case of soybeans, a land-intensive crop in which China's producers clearly do not have a comparative advantage. Before 2000, soybean importers required licenses, imports were limited by quotas, and the import tariff was as high as 114 percent. As a result of this high level of protection (see Table 1), China's farmers grew most of the nation's soybeans. In anticipation of WTO accession, however, China lowered tariffs to 3 percent in 2000 and began to phase out import quotas. Imports surged from 4.32 million metric tons (mmt) in 1999 to 10.42 mmt in 2000. Most observers believe soybean imports exceeded 14 mmt in 2001. Prices also fell, and the nominal protection rates of soybeans declined from 44 percent in early 2000 to less than 15 percent in October 2001.[9]

Table 1: Nominal protection rates for major agricultural commodities in China, 1997–1999

	Rice	Pork	Chicken	Fruit
1997–1999	-4	-20	-33	-4
	Wheat	Corn	Soybeans	Cotton
1997–1999	22	32	38	25

Note: Export prices of pork, beef and chicken, and import prices of cotton are used as border prices. Domestic prices are prices at urban wholesale markets. The cotton wholesale price is estimated as the state procurement price times 1.25. Official exchange rates are used to convert border prices.

Source: J. Huang, "Agricultural Policy and Food Security in China," Working Paper, Center for Chinese Agricultural Policy, Chinese Academy of Science, 2001.

Given the vast areas of China over which wheat, corn, soybeans, and cotton are grown, and the potentially large gap between domestic and international prices, *complete liberalization* (which is not required by the WTO) would profoundly impact producers of these crops inside China, and the impact would be sustained over time.[10]

A number of other sectors, possibly including steel, chemical production, and automobiles, will become less competitive with the reduction of protection after China's accession to the WTO, and falling demand for labor and downward pressure on wages will hurt the interests of rural workers in these sectors.[11] However, many of these vulnerable sectors are in urban areas dominated by relatively high-paid urban workers, and therefore the largest negative employment effects will likely fall upon urban workers, not those from rural areas. On the other hand, although direct competition between urban and rural workers is fairly limited, rural workers in certain sectors may see additional competition for jobs as laid-off urban workers search for new work. In total, then, the WTO reforms could have a major negative impact on wheat, corn, soybean, and cotton producers, but otherwise, only limited and indirect impacts on the employment and wages of rural workers.

Direct Positive Effects

The largest positive impact of China's WTO accession will come from the rise in demand for rural employment, due to the increased demand for China's products overseas and the more re-

laxed investment environment inside China. As China's access to export markets increases, the sectors most likely to benefit will be labor-intensive ones that hire large volumes of workers from rural areas, such as textiles, electronics, and other light manufacturing industries.

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The higher demand for off-farm rural labor could also exert upward pressure on wages. However, the gradual emergence of China's rural labor markets, and the corresponding increase in the supply of workers, may offset any rise in wages. This was the case in the late-1980s to mid-1990s, when rising demand for labor led to the hiring of more than 50 million workers. Instead of leading to higher wages, the flood of new workers facilitated by the breakdown of traditional barriers in the labor market was more than enough to offset the demand effect. Real rural wages between 1988 and 1995 were almost flat.[12] Given the surplus of labor in the agricultural sector, a rise in rural wages seems unlikely.[13] Still, labor markets would have emerged even without a WTO-led rise in export demand. In the absence of demand increases stimulated by WTO reforms, the additional supplies of workers entering the labor markets might actually have caused real rural wages to fall.

Many observers have overlooked the fact that China's accession to the WTO could have a positive effect on certain key subsectors of agriculture. For most of the past decade, China has exported more agricultural commodities in value terms than it has imported. Indeed, for many products, China has comparative advantages and has long had a net export position. Although published tariff rates will fall on all of these commodities, China already produces and exports them at below world market prices, so falling protection will not adversely affect producers or traders in those commodities. For example, lower tariffs on horticultural products and meats will probably impact only a small portion of the domestic market.[14] Most agricultural exports have been labor-

intensive products such as horticulture, livestock, and other processed products.[15] Many of these are shipped to other Asian economies, though increasing quantities have been going to the United States and Europe. To the extent that the accession package increases China's access to these markets, agricultural producers of these commodities will benefit from higher prices and more export opportunities.

WTO accession may also help limit or eliminate one of the main barriers to China's goods overseas—anti-dumping measures. Japan, for example, has banned the import of four commodities from China, including garlic and jute products. The United States has taken trade actions against Chinese garlic, honey, apple juice concentrate, shrimp and crayfish, and tomato paste. Korea is undertaking similar actions. In these and most other cases, China is accused of dumping, or selling commodities on international markets at a price lower than the cost of production. In fact, however, it appears that in many cases China's producers are not being subsidized either directly or indirectly, but are simply the world's lowest cost producer. However, success in defending itself from such actions depends on mobilizing considerable financial, legal, and political resources that China has not been able to muster. In almost all cases, therefore, China has lost, and its products have been eliminated from the market through high countervailing tariffs in the importing country. Before it entered the WTO, China did not have the right to appeal these rulings, even when the anti-dumping charges were clearly protectionist in nature. As a member, China gains the right of appeal and will be better able to defend against anti-dumping cases that do not have a strong economic basis.

In terms of imports, almost all agricultural producers will benefit from reduced trade barriers and falling tariffs on key agricultural inputs, especially chemical fertilizers, pesticides, and seeds. Currently, prices for some chemical fertilizers and certain high quality pesticides are above world market prices, and quotas limit imports.

Indirect Effects

Liberalizing policies under the WTO agreement could indirectly benefit China's rural economy in a number of ways. First, the changes should encourage more foreign direct investment (FDI) in the agricultural inputs sector and increased imports of agricultural inputs. Second, more general reforms, such as improved accounting regulations, which China must put into place to meet its

trade agreement obligations, should improve the overall investment environment and stimulate competition and efficiency in China's domestic markets.[16] Third, the increasing integration of China's domestic markets into global markets will help producers take advantage of new technology and production techniques in sectors undergoing rapid technological change.

Currently, many explicit and implicit barriers keep foreign firms from investing directly in China's agricultural sector. The pesticide market serves to illustrate this point.[17] If pesticide manufacturers wish to sell their product inside China, they are legally required to produce the active ingredients domestically as well. But foreign firms are hesitant to invest for fear that their product's manufacturing process will be stolen. Dupont's experience in the late-1990s confirmed these fears. Less than six months after the company began production in its new factory, copycat factories were already producing the exact same chemical pesticides and selling them at a price below the breakeven point of the Dupont factory. WTO membership will relax many of these regulations and will allow foreign firms to enter into China's market with more control and ability to protect their products and markets.

More general economic improvements could also have positive effects on agricultural producers and rural industries. Regularized legal and accounting practices will encourage more foreign direct investment, perhaps even more than the abolition of specific barriers such as the pesticide case discussed above. Restrictions on wholesaling, for example, have kept a small number of large state-owned firms in control of the wholesale industry; their buying and distribution practices have kept the products of foreign firms out of the market and inaccessible to producers. If China's entry into the WTO allows for the entry of foreign firms into the wholesaling industry, or encourages domestic firms to innovate, then all those in rural industry and agriculture stand to benefit from access to cheaper, higher quality imports of products such as seeds, pesticides, and machinery. Credit may also become easier to obtain as foreign banks are allowed to offer financing to Chinese agricultural enterprises.

Finally, the integration of domestic agricultural markets with the global market may benefit producers of export goods or crops that are undergoing rapid technological change. Adopting new technology usually results in falling costs or rising output, and therefore higher profits. However, in China, because the domestic agricultural economy is still relatively separate from the world

economy, the commodity price falls as supply expands. Hence, except for the case of the early adopters in the first year or two after the extension of the technology, in the longer run, some or all of the benefit from the fall in costs is negated by the falling price. Once China's agricultural markets are more closely linked to the world market, their domestic demand curve should become more elastic, dampening the negative effects on prices described above and encouraging innovation.

Buffers Against Negative Impacts

In the above discussion, we reviewed the potential positive and negative impacts of WTO on the rural economy. If these impacts accounted for most of the effects, an analyst could measure the price differentials between the world market and China's domestic market, estimate the supply and demand elasticities inside China and on world markets, and then come up with a quantitative measure of the net overall gain (or loss). In this section, however, we will argue that such quantitative calculations may not accurately measure the real benefits and costs to China's rural economy. In fact, at least three factors—policy safeguards, high transaction costs, and household responses—will serve to buffer many rural areas of the country from the effects of WTO accession.

Policy Safeguards

Even in the most radical set of conditions under which China will enter the WTO, at the peak year of eliminating protection, currently specified as 2004, some provisions will allow the nation to protect its rural sector—both under the letter of the agreement and in less direct ways. China's WTO agreement allows officials to manage trade of rice, wheat, corn, edible oils, sugar, cotton, and wool with tariff rate quotas (TRQs). According to the agreement, the nation must allow a certain amount, called the TRQ quantity, to enter at a specified low tariff rate. As shown in Table 2, except for sugar (20 percent) and edible oils (9 percent), the in-quota tariff is only 1 percent on these commodities. TRQ volumes will, moreover, grow over a three-year period, 2002 to 2004, at annual rates of 4 percent to 19 percent. Corn TRQ volumes, for example, increase from 5.70 mmt tons in 2002 to 7.20 mmt in 2004. China does not have to bring in this quantity, but the administration of the TRQs is structured so that if government importers refuse to fill the TRQ, private traders will import the rest.

Table 2. China's market access commitments on farm products subject to tariff rate quotas.

	Import volume (MMT) (State trading share, %)			Quota growth quota (%pa)	In-quota tariff (%)	Out-of-quota tariff (%, as of 1 January)		
	Actual 2000	Quota 2002	Quota 2004			2002	2003	2004
Rice	0.24 (100) [a]	3.76 (50) (50)	5.32	19	1	74	71	65
Wheat	0.87 (100)	8.45 (90)	9.64 (90)	8	1	71	68	65
Maize	0.0 (100)	5.70 (67)	7.20 (60)	13	1	71	68	65
Cotton	0.05 (100)	0.82 (33)	0.89 (33)	5	1	54.4	47.2	40
Wool [b]	0.30	0.34	0.37	5	1	38	38	38
Edible oils [c]	1.79 (100)	5.69 (40)	6.81 (10)	15	9	75	71.7	68.3
Sugar [d]	0.64	1.68	1.95	8	20	90	72	50

a: Figures in parentheses are the share (%) of non-state trading in import quota.
b: Designated trading in 2002-2004 and phased out thereafter.
c: TRQ regime will be phased out in 2006. In 2005, import quota will be 7.27 MMT with 9% in-quota tariff and 65% out-of-quota tariff.
d: Phased out quota for state trade.

Source: Schedule CLII of China's WTO *Protocol of Accession*, November 2001; Statistical Yearbook of China, 2001.

While the TRQ system will mean that China's imports for some commodities will rise and domestic prices will fall, high out-of-quota tariffs will hold down import of these commodities after the TRQ is filled (Table 2). Out-of-quota rates are 65 percent for grains, 40 percent for cotton, and 50 percent for sugar in 2004, and it is unlikely that domestic prices will increase enough to be at a level higher than imports slapped with these out-of-quota tariffs. This means that China can effectively limit the amount of imports to the maximum TRQ for each product. For example, after bringing in imports of wheat up to its TRQ level of 9.6 million tons, China's leaders could legally assess a tariff of 65 percent on any additional imports. At such high tariff levels, China's wheat producers would almost certainly be shielded from international competition, since China's domestic price would have to rise by more than 50 percent to match world wheat prices. The equalization of domestic and world prices could take years, especially if China carries through with its ambitious set of WTO-allowed investments in water control, rural roads, and agricultural research and extension (which would boost domestic supply and keep continued downward pressure on domestic prices).[18] The same is true for almost all other commodities. There will be pressure to continue to liberalize in the next round of the WTO negotiations. But, if the effects are damaging enough, or are perceived to be damaging enough, China's leaders will probably refuse further concessions or demand measures in return, such as delinked producer payments, to offset the negative impact.

Even under the current agreement, if Chinese leaders believe that large parts of the rural sector are being hurt by the WTO reforms, China can be expected to interpret existing rules in such a way as to provide a measure of protection.

Even under the current agreement, if Chinese leaders believe that large parts of the rural sector are being hurt by the WTO reforms, China can be expected to interpret existing rules in such a way as to provide a measure of protection.[19] International agreements are never so specific and comprehensive that a determined government cannot

find ways to limit their impact. One of the best examples of this has been the way in which Korea implemented its TRQ agreements under the WTO. By putting the TRQ rice import quantities "out to bid," most of the TRQ imports that have entered the country have been extremely low quality because the right to import was given to the lowest bidder. This strategy, which Korean leaders can still claim adheres to their WTO commitments, also serves to provide almost complete protection to domestic rice farmers. China can be expected to find similar strategies to limit the impact of required reforms that are perceived to be damaging politically or economically. For example, it is still unclear how China will handle licensing arrangements for private sector imports under the TRQ. One can imagine rules that only give these TRQ import rights to companies that are willing to work in cooperation with the government to minimize the adverse impact of high imports.

High Transaction Costs and Isolated Regional Markets

The biggest uncertainty surrounding the impact of WTO-required reforms on China's rural economy centers around how much higher China's domestic prices are than world market prices. In other words, when WTO reforms partially or fully open China's markets, how much will domestic prices fall?

Price and market reforms were key components of China's policy shift from a socialist to a market-oriented economy. Market liberalization in agriculture began with non-strategic commodities such as vegetables, fruit, fish, livestock, and oil and sugar crops. Little effort was made to liberalize markets for major crops such as grains and cotton. But, as private trading expanded in the early-1980s, and officials allowed traders to buy and sell the surplus output of almost all categories of agricultural products, the foundations of the state marketing system began to weaken. Since the mid-1980s, market reforms have continued, though only in a stop and start way. Repeated attempts—notably in 1985 and 1993—were made to limit the scope of government price and market intervention. But these attempts were followed by retrenchment whenever food price inflation threatened. Despite these periodic cycles in the reform process, markets have gradually emerged in rural China, and evidence of greater integration and efficiency across regions exists.[20]

However, transaction costs inside China remain high, isolating many domestic markets from others in the country. Roads are still poor in many of the more remote rural areas and shipping

goods to market is expensive. Since farms are generally so small (less than 0.5 hectares), a wholesaler needs to purchase goods from hundreds of farmers to fill a truck or railcar, and this takes time. These isolated markets, especially those in inland areas far from the coastal ports—including some of the poorest areas of China where agriculture is still the mainstay of the economy—may be insulated to a certain degree from price changes or other impacts of WTO liberalization.

Household Responses

Most rural households, however, are highly integrated into the rest of the economy and may suffer the adverse consequences of the accession agreement. While these households may experience serious negative effects in the initial period, the costs are likely to diminish over time as they react to their new environment. The impact of the North American Free Trade Agreement (NAFTA) on Mexican farmers provides some pertinent lessons. In the first years after NAFTA came into force, corn farmers in some of the border areas saw a drop in profits and income. These farmers, however, did not stand still and continue to produce at a loss. Instead, they adopted new technologies and made investments that took advantage of positive opportunities created by NAFTA. Many farmers in northern Mexico, for example, invested heavily in fruit and vegetable production since protection in U.S. markets also fell. In many cases, profits after an initial investment period were higher than their profits in the protected domestic corn market.

In China, the magnitude and severity of the negative impact of WTO measures on agricultural production will depend in part on how well households (not just the government) are able to respond. The rural economy has, in the past, reacted rapidly to changes in the external environment. Rural entrepreneurs, for example, responded to the 1980s fiscal reforms by creating an explosion of township and village enterprises. In fact, many of the policies required by WTO accession will help the rural economy react even faster by promoting more liberalized credit, better property rights, the rise of wholesaling networks, and more foreign direct investment.

Conclusion

Based on the history of China's economic reforms since 1978, it is easy to see that while China's WTO promises are bold, they are

consistent with and build upon past reforms. As in the past, these changes will have both positive and negative impacts. While some will be hurt by WTO accession, many more will benefit; in many ways the accession agreement itself will limit the downside effects. In some cases, the indirect, longer-term benefits, such as gaining access to new technologies and integrating into a more modern marketing environment, may have the largest transforming effect on China.

In this new environment, China's leaders will have to learn a great deal about how to manage the agricultural economy. The challenge for policymakers will be to figure out what factors positively affect the rural economy now and what will help modernize the sector in the future, and then make an effort to encourage such trends. In handling negative impacts of agricultural liberalization, they must be careful to avoid encouraging uncompetitive sectors. In some cases, they are going to have to let those parts of China's economy that are inefficient suffer the negative effects of trade reform and encourage producers to shift their resources into sectors in which the nation has a comparative advantage.

Notes

[1] J. Huang and C. Chen, *Effects of Trade Liberalization on Agriculture in China: Institutional and Structural Aspects*, Working Paper no. 42, 1999. Bogor, Indonesia: United Nations ESCAP CGPRT Centre.

[2] Exceptions include J. Huang and C. Chen, *Effects of Trade Liberalization on Agriculture in China*; W. Martin, "Implication of Reform and WTO Accession for China's Agricultural Policies," *Economics of Transition* 9, no. 3 (2001): 717–742; and K. Anderson et al., "Impact of China WTO Accession on Rural-Urban Income Inequality," Paper presented at *Seminar on WTO Accession, Policy Reform, and Poverty Reduction in China*, A Joint Research Program of the Development Research Center of the State Council and the World Bank, Beijing, 28–29 June 2002.

[3] K. Anderson and C.Y. Peng, "Feeding and Fueling China in the 21st Century," *World Development* 26, no. 8 (August 1998): 1413–1429.

[4] Z. Wang, "The Impact of China and Taiwan joining the World Trade Organization on U.S. and World Agricultural Trade: A Computable General Equilibrium Analysis," *An Economic Research Service Report*, U.S. Department of Agriculture Technical Bulletin no. 1858, Washington, DC, 1997; and S. Li et al., *The Global and Domestic Impact of China Joining the World Trade Organization*, Project Report, State Council Development Research Center, Beijing**,** China, 1999 [In Chinese].

[5] National Statistical Bureau of China, *China Foreign Economic Statistical Yearbook*, 1980 to 2001 (Beijing: China Statistical Press, 1980 to 2001).

[6] A. Nyberg and S. Rozelle, *Accelerating China's Rural Transformation*, 1999. Washington, DC: World Bank.

[7] J. Huang and H. Bouis, "Structural Changes in Demand for Food in Asia," IFPRI Food, Agriculture, and the Environment 2020 Paper Series 11, 1996. Washington, DC: International Food Policy Research Institute; and J. Huang and S. Rozelle, "Market Development and Food Consumption in Rural China," *China Economic Review* 9 (1998): 25-45.

[8] Wang, "The Impact of China and Taiwan joining the World Trade Organization on U.S. and World Agricultural Trade"; S. Li et al., *The Global and Domestic Impact of China Joining the World Trade Organization*.

[9] J. Huang et al., "Distortion at the Border, Integration Inland: Assessing the Effect of WTO Accession on China's Agriculture," *Journal of Chinese Economic and Business Studies*, forthcoming.

[10] Even if prices in the world rose temporarily as a result of China's rising imports (which would dampen imports and mitigate the competitive pressure on Chinese producers), there is probably enough flexibility in world cropping systems for wheat, corn, cotton, and soybeans, that foreign producers would respond with greater production, and in the medium term large quantities of these products would be ready to enter China's market at relatively low prices. For a more complete discussion of the complete liberalization scenario, see J. Huang and C. Chen, *Effects of Trade Liberalization on Agriculture in China: Commodity Aspects* Working Paper 43, 1999. United Nations ESCAP CGPRT Centre, Bogor, Indonesia.

[11] A. Park, "Trade and Investment Liberalization in China and the Rural Economy," Working Paper, 2001. Department of Economics, University of Michigan, Ann Arbor, MI.

[12] Nyberg and Rozelle, *Accelerating China's Rural Transformation*.

[13] With movement away from the agricultural sector there will be other benefits if markets for land and labor continue to develop. For example, as individuals leave the rural sector, the scale of farms may expand, creating efficiences and raising incomes.

[14] Exports will grow primarily for those parts of the market that buy and sell only very high quality products, such as meats for five-star hotels that cater to foreigners.

[15] J. Huang, L. Zhang, and S. Rozelle, "WTO and Agriculture: Radical Reforms or the Continuation of Gradual Transition," *China Economic Review* 11 (2000): 397–401.

[16] This is examined in greater detail in J. Huang and S. Rozelle, "China's Accession to WTO and Shifts in the Agriculture Policy," A project report submitted to Food and Agricultural Organization of the United Nations, Rome, 2001.

[17] For a discussion of a number of more restrictive measures, see S. Rozelle et al., "Foreign Direct Investment and Agricultural Technology in China," Working Paper, 2000. Department of Agricultural and Resource Economics, University of California, Davis.

[18] J. Huang et al., "China's Food Economy to the 21st Century: Supply, Demand and Trade," *Economic Development and Cultural Change* 47 (1999): 737–766.

[19] We are not arguing in this section that China is planning to implement policies in this way. In fact, there are many in the government who believe (perhaps rightly so) that such policies, although inflicting some costs on some rural residents, will benefit China in the long run by moving the economy in a

more efficient direction. We are merely suggesting how China might react if its leaders believed its interests were being harmed or its stability disturbed.

[20] A. Park et al., "Market Emergence and Transition: Transition Costs, Arbitrage, and Autarky in China's Grain Market," *American Journal of Agricultural Economics* 84, no. 1 (February 2002): 67–82.