Tracking Distortions in Agriculture: China and Its Accession to the World Trade Organization

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This article examines the impacts of China's accession to the World Trade Organization (WTO) on prices in its agricultural sector. The analysis uses a new methodology to estimate nominal protection rates in China's agricultural sector before its accession to the WTO. These new measures account for differences in commodity quality within China and between China and world markets. The analysis shows that some of China's agricultural commodities are well above world market prices and others are well below. The article also assesses market integration and efficiency in China. It finds high degrees of integration between coastal and inland markets and between regional and village markets. The remarkable improvements in market performance in recent years mean that if increased imports or exports affect China's domestic price near the border, producers throughout most of China will feel the price shifts.

Trade liberalization affects rural populations in a number of offsetting ways (OECD 2001). On one hand, increases in the demand for a nation's industrial goods through higher exports can increase the employment and wages of workers in rural areas. Farmers benefit from new opportunities to export agricultural goods and from better access to more affordable inputs. Rural consumers gain from access to cheaper food. On the other hand, rising imports of lower-priced commodities reduce farm profits, and improved access to export markets raises prices to domestic consumers and to producers that use agricultural goods as inputs.

Although all the effects are important, trade officials concerned about the profitability of domestic producers are frequently interested in the impact of trade liberalization on agricultural prices (Martin 2001). Knowing what to expect is particularly important for countries with many small farmers that

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produce not only for their household but also for commercial markets.[1] Government officials know that agricultural price shifts can have important effects on domestic food production, farm household incomes, national poverty rates, and overall rural stability. Thus, in determining positions for trade negotiations, officials must solve a complicated political economy equation.

But there is often confusion about how trade liberalization will affect producer prices. First, there may be confusion about the level of protection (or implicit taxation) for individual commodities. Studies sometimes reach contradictory conclusions, with some claiming that a commodity is being protected and others that the commodity is receiving negative protection.[2] One reason for the discrepancies is shortcomings in traditional methods of measuring distortions. Studies often assume that price differences between domestic and foreign products equal the tariff rate or calculate differences between an average domestic price, taken from surveys, and an average border price, taken from trade statistics. Such methods may not capture the real protection rate because of aggregation issues and because (if some prices are from interior areas) transport costs are confounded with protection. Also, most analyses assume that trade liberalization affects all prices in the same way, but some internal markets may not function well. In short, the confusion in the literature about the real level of trade protection may lie in the way researchers have measured it.

Second, the source of protection is sometimes unclear (Garcia 2003). Trade negotiations have tarrified most traditional quotas and reduced average tariff rates. In this environment the main barriers to the flow of many agricultural commodities are nontraditional ones, such as domestic tax policies, export subsidies, and tariff rate quotas (instead of traditional tariffs and quotas).

Finally, studies on the effects of trade liberalization can arrive at different answers if assumptions about domestic market integration are not considered. There is often disagreement about the effect of trade liberalization on subsets of producers that produce different commodities, belong to different income groups, or live in certain geographical regions. For example, before the North American Free Trade Agreement (NAFTA) there was a concern that reducing Mexico's tariff on

1. There is also demand for information about the effect of liberalization on prices in more developed economies, where producers exercise considerable political influence. Although the discussion in the article is cast in terms of producer prices, similar arguments can be made for a nation with many poor, landless rural residents. In that case, however, officials are also interested in the effect of liberalization on agricultural prices, but their concerns would focus on how such effects would alter the cost of the average household's consumption bundle. In countries with large populations of smallholders (such as China), the concern of officials with agricultural prices is on maintaining producer prices to keep the income of poor farmers from falling.

2. In China, for example, some researchers argue that the agricultural impact of China's World Trade Organization accession will be substantial, with sharply lower prices adversely affecting hundreds of millions of farmers (Carter and Estrin 2001; Li and others 1999). Others believe that the overall effect on agricultural prices will be modest although there will be substantial impact on prices in some specific areas and for some specific commodities (Anderson and Peng 1998; Huang and Anderson 2003).

maize imports would hurt maize producers, especially those who lived in poor, remote regions (see Taylor 1998 for details of the debate). Some researchers claimed that by lowering maize prices, liberalization would bankrupt these farmers and force them into the migrant labor force, with many of them eventually entering the United States illegally. Others believed that fragmented markets isolated poor, small farmers in many regions of the nation from the direct effects of the NAFTA-induced downward pressure on prices. Today, more than a decade after NAFTA, research shows the importance of market characteristics in determining the effect of trade liberalization on farm producer prices. When commodity markets do not operate well and there is poor integration, the effects of trade liberalization on producer prices in isolated areas are greatly attenuated (Taylor 1998).[3]

To improve understanding of how trade liberalization will affect agricultural prices and how price changes will be experienced in different parts of country, this article describes ways to create more accurate, disaggregated measures of protection (nominal protection rates) that can be used in two ways. They can be used to analyze the expected effects of liberalization and identify remaining trade barriers by matching up different sources of protection to observed levels of protection. After liberalization, they can be used to assess the effectiveness of policy implementation. Price determination and market integration analyses are then used to study domestic markets to assess how price shifts at the border arising from trade liberalization affect different producers in different parts of the country. The main contribution of this study is the way it combines a series of analytical exercises to improve understanding of how trade liberalization will affect the level of agricultural prices and the distribution of their effects.

The impact on agricultural prices of China's accession to the World Trade Organization (WTO) was chosen for study because of the intense interest by officials and academics in how China's WTO agreements on agriculture would affect the prices received by farmers (RCRE 2000; Huang and Chen 1999). China was also selected because of the lack of agreement in other studies about how liberalization will affect farmers. Finally, because many of China's poor rural households live in remote regions far from the coast and rely more than other groups on income from cropping, they are the most likely to be affected by liberalizing measures (Chen and Ravallion 2002).

This case study focuses only on the effects of WTO accession on agricultural prices even though other effects of accession on the rural population will likely

3. In his case study, Taylor (1998) finds that the impacts of NAFTA on Mexican farmers in border regions and those in more remote regions, who face higher transaction costs for marketing their output and buying inputs, differ dramatically. He finds that NAFTA has little impact on those in the poorest areas mainly because they are insulated by high transaction costs. Because economic activities in remote areas are mostly within the household, village, or township, the prices of goods are determined locally and not affected by what happens far away in the nation's border areas. That is not to say that trade liberalization policies do not affect welfare in these areas. But the complicated ways farmers in these economies respond to changes in prices and marketing opportunities usually mean that the effects are much smaller than they would be on households that live and work in completely commercialized economies.

be at least as important (Zhao and Sicular 2002). The analysis does not quantify the total welfare effect, but rather considers the qualitative effects on China's farmers to illustrate one way of conceptualizing the effects of trade liberalization on agricultural prices.

The article reviews China's trade policy liberalization before and after WTO accession, looking at traditional reforms, such as tariffication and tariff reduction, and nontraditional reforms, such as taxation policy, export subsidies, and tariff rate quotas. It then describes how the new measures of nominal protection rates were created and examines how these distortions might change with WTO accession. Finally, it analyzes the nature of China's agricultural markets to see how the price effects of trade liberalization might affect different types of farm households.

I. Trade Liberalization and Remaining Distortions in Agriculture

Partly because of the vulnerability of parts of the rural economy and partly because of the prominence in China's political economy, agriculture has been at the center of discussions of China's entry into the WTO. Yet the likely shifts in China's trade policy and their impacts on agricultural prices are not well understood. Debates on the future of China's agriculture and the price level in the sector remain unresolved. Some argue that the agricultural impact of WTO accession will be substantial (Carter and Estrin 2001; Li and others 1999); others disagree (Anderson and Peng 1998; Huang and Anderson 2003).

Traditional Sources of Protection

Some of this divergence can be traced to a lack of understanding of the policy changes that may be induced by China's WTO accession (Martin 2001). Traditionally, analysts have focused on the measures most frequently used by other countries to protect their agricultural sectors. Most previous work (for example, CARD 2001; Tuan and Cheng 1999; and OECD 2001) focuses on tariffs, quotas and licensing, state trading, and traditional nontariff barriers. Some of these studies implicitly assume that WTO agreements are concerned solely with these policies, that these policies provided most of the protection China enjoyed before accession, and that accession represents China's initial assault on protection at the border.

In fact, after nearly two decades of reform, some of the worst distortions caused by traditional policies have already disappeared. In the late 1970s and early 1980s, the domestic wholesale price of China's four major commodities (rice, wheat, maize, and soybeans), converted at the official exchange rate, far exceeded the world price, measured at China's border. China's main food and feed grain and soybean prices, for example, were 10–90 percent above world market prices (table 1). Over the next 15 years the nominal protection rate became negative for rice and fell to around 30 percent for wheat and maize. Intervention by state traders and the use of nontariff barriers also gradually fell (Martin 2001).

TABLE 1. Changes in Nominal Rates of Protection for China's Major Agricultural Commodities, 1978–2000 (%)

Period	Rice	Wheat	Maize	Soybeans
1978–79	10	89	92	40
1980–84	9	58	46	44
1985–89	−4	52	37	39
1990–94	−7	30	12	26
1995–97	−1	19	20	19
1998–00	−6	26	32	49
1998	−6	22	40	37
1999	−9	30	33	67
2000	−2	26	23	44

Note: Nominal rates of protection are measured as the difference (in percentage terms) between average border prices and average domestic wholesale (market) prices.

Source: Huang (2001).

Falling protection and changes in international trade and domestic marketing policies have resulted in dramatically shifting price trends and trade patterns. Depreciation of China's currency explains a big part of China's changing protection during the 1980s and 1990s (Huang and Chen 1999). Huang and others (2002) also trace the changes in prices following implementation of trade liberalization policies. Between 1985 and 2000 the real price of agricultural commodities (measured by the agricultural price index divided by the rural consumer price index) fell 27 percent (State Price Bureau various years).

These policy reforms led to a large decline in price distortions over the past 20 years. Current policy reforms accompanying China's accession to the WTO should be considered an extension of these past efforts. Much of the falling protection has come from relaxing licensing procedures, reducing the scope of nontariff barriers, reducing tariffs, and tariffying quotas (Huang and Chen 1999). This likely explains why so much research on China's entry into the WTO focuses on these traditional policies. And, as is argued here, while nontraditional policies may be even more important in assessing the effect of trade liberalization on agricultural prices, changes in China's tariff regimes, state trading system, and nontariff barriers undoubtedly will remain a key influence on price distortions in China's agriculture.

Nontraditional Sources of Protection

With many of the gains from traditional trade reforms already achieved, China may need other, less discussed policies to push forward additional trade liberalization. For example, China has used tax policy to protect agriculture, especially for commodities such as soybeans and barley that have been most liberalized in terms of traditional forms of protection. In the early 1990s, leaders radically revised China's fiscal system, making revenue generation more reliant on a value added tax (Nyberg and Rozelle 1999). A 13–17 percent tax is assessed on value added for all goods through all stages of their manufacture and sale.

Because many other countries do not have a value-added tax, national regulations state (and the WTO allows) that the tax should also apply to imported goods that are not for immediate reexport. For a variety of political and tax collection reasons, however, farmers were initially exempt from the tax when they sold their products to traders from their farms or in local markets. When the good is resold in a downstream wholesale market, the trader owes the tax only on the amount of the marketing margin, or the difference between the procurement price and sales price. With marketing margins in China's competitive grain markets at about 5 percent (ranging between 1 and 10 percent, according to Xie 2002), the real value-added tax rate on domestic agricultural goods is only 5 percent that on imported goods (or about 1 percent of the value of the domestic good, compared with 13 percent of the value of the imported good).

When assessed at the border but not at the farm gate, the value-added tax provides producers with rates of protection greater than the official tariff rate. For example, the published tariff rate on soybeans is 3 percent. Theoretically, then, soybean imports when they arrive at China's borders should cost only 3 percent more than China's domestic soybeans. However, when soybeans cross the border, importers must also pay a 13 percent value-added tax. Domestic soybeans, in contrast, are taxed at less than 1 percent on average. As a consequence, the use of a value-added tax at the border gives China's soybean producers more than 10 percent of additional price protection.[4]

China also aggressively used export subsidies in the years leading up to its accession to the WTO to increase exports of some commodities, thereby increasing protection by raising the price of certain domestic commodities (table 2; Rozelle 2003). Maize and cotton have received the largest export subsidies. Interviews in the field during 2001 revealed that maize exporters, especially in northeast China, received subsidies averaging 34 percent of the export price and cotton exporters received subsidies averaging 10 percent of the export price.

Although there are no subsidies for meat exports (that is a more difficult transaction because there are many meat exporters and most of them are private or commercialized public firms, unlike maize and cotton traders that are mostly associated with formal, public state trading firms), tax policies also favor exporters of many livestock products. For example, when meat producers execute an export contract, the company can receive a tax rebate. In 2001 pork and beef exporters received a rebate equal to 5.2 percent of the value of their transaction and poultry exporters received a 13 percent rebate. Because domestic wholesalers are not eligible for the rebates, such policies encourage traders to export.

4. Some scholars in China have also pointed out that because part of the value of agricultural commodity production derives from inputs on which the value-added tax has been assessed, the real tax rate on agricultural commodities is actually higher. Although this is so, the most that could be added would be 2–4 percentage points (15 percent times the share of the inputs that were taxed—about 10–30 percent—depending on the commodity, the technology, and the region of production).

TABLE 2. Subsidies and Tax Rebates for Exports of Selected Agricultural Commodities in China, 2001 (%)

Commodity	Export subsidy	Rebate of value-added tax for exports
Rice	<1	0
Cotton	10	0
Maize	34	0
Pork	0	5.2
Beef	0	5.2
Chicken	0	13.0

Source: Authors' survey.

In summary, then, as China enters the WTO there are still a number of challenges in liberalizing its trade. In addition to using traditional trade policies—tariffs, quotas, state trading, and nontariff barriers—to manage agricultural prices in the domestic economy, China has protected or may decide to protect agriculture with a number of other policy measures, such as taxation policy, export subsidies, and rebates. China may try to use such policies to protect or further open its agricultural sector.

II. NEW ESTIMATES OF CHINA'S NOMINAL PROTECTION RATES IN AGRICULTURE

This section illustrates how to estimate nominal protection rates that avoid some of the common problems of past estimates and that permit more accurate assessment of the impact of China's implementation of its WTO obligations. They show, in a more disaggregated way, the level at which China is protecting agricultural commodities or parts of certain markets. Then, by aggregating these nominal protection rates into single crop-specific rates, these estimates allows assessment of how these methods can be compared with traditional methods of estimating nominal protection rates. (The appendix summarizes some of the difficulties of trying to estimate nominal protection rates for China's agriculture using traditional methods.)

The new nominal protection rates depend on the collection of a new type of data. Interviews and surveys were used to gather information on prices of agricultural commodities to identify price gaps between an imported good on one side of the border (outside China) and a domestic good on the other side (inside China) and between exportable domestic goods as they leave the country and the same goods from other countries that are being traded in international markets. Between August and November 2001, the survey team visited seven coastal cities (Dalian, Guangzhou, Lianyungang, Ningbo, Qinghuangdao, Shanghai, and Shenzhen) and two inland cities (Beijing and

Changchun).[5] Information was collected from samples of domestic traders, importers and exporters, wholesalers, grain and oilseed users, trade regulators, agents, and other grain and fiber officials. More than 100 people were interviewed.[6] Less than 10 percent of those contacted refused to be interviewed.

The survey was particularly concerned with understanding price gaps between the international and domestic markets of commodities in which interviewees were trading or otherwise participating. The survey recorded characteristics (qualities, grades, varieties) of commodities being traded in the immediate marketing area. For imported commodities interviewees were asked about the current international cost, insurance, and freight (cif) price of the good (for a ship docked in their home port) and then about what the good would sell for in a competitive auction. This yielded a series of price gaps for a carefully defined set of goods. Because each interviewee had information on a number of commodities, this process yielded several thousand observations. A similar set of questions was asked about exportable goods, including rice, fruits and vegetables, and meat products. For exported goods that were being subsidized, interviewees were asked how much they would lose if they sold a shipment onto the international market without any financial assistance from the government.

Disaggregated Nominal Protection Rates for Selected Agricultural Commodities

The analysis here illuminates the problems with traditional nominal protection rate estimates of a single rate of protection for a commodity using the typical types of secondary data that are available for most countries. For example, it would be difficult to provide just one nominal protection rate for wheat in China, one of the world's largest wheat importers over the past two decades (table 3). Traders reported that the price of very high-quality wheat from North America was 20–50 percent higher in the domestic markets of China's major ports than when it was sitting on a ship in China's port ready to be brought into

5. Although Beijing and Changchun are inland cities, firms from the two areas are still actively engaged in international and domestic trade. The prices that they quote used the same basis as those quoted by firms from the coast.

6. Because of the absence of a single central authority that manages grain flows, the enumeration team chose their sample by first visiting the local grain bureau in each area to obtain a list of the firms that they were running on a commercial basis and their subsidiaries. Officials in the grain marketing division and transportation division were interviewed. Three firms owned by the grain bureau and three affiliated with the grain bureau were selected. In several cities, the grain bureau had a list of large grain-trading and grain-using firms (such as mills and feed lots). In others, lists were obtained from the market administration bureau. Five firms were chosen on the basis that they were private and had yearly sales of more than 1 million yuan. Representatives of at least two flour or rice mills and feed mills in each location were interviewed. Five stalls at the wholesale market were randomly chosen for interviews. Questions about the grain trade were asked at a number of other entities, such as the grain reserve, the local COFCO agency, and supermarket chains.

TABLE 3. Disaggregated Nominal Protection Rates for Selected Agricultural Commodities in China, October 2001

Commodity and variety	Comparable domestic price per ton		Border price per ton (US$)		Nominal protection rate (%)
	Yuan	US$	cif	fob	
Rice					
Weighted average	—	—	—	—	−3
Thai jasmine rice	3,690	446	380	—	17
High-quality japonica	2,930	354	—	398	−11
Medium-quality indica	1,519	184	—	185	−0.5
Wheat					
Weighted average	—	—	—	—	12
U.S. DNS	2,350	284	190	—	49
Canadian number 3	1,800	218	181	—	20
Australian soft	1,625	196	175	—	12
U.S. hard red	1,550	187	169	—	11
U.K.	1,350	163	145	—	12
China high quality	1,350	163	145	—	12
China medium quality	1,250	151	140	—	8
China low quality	1,100	133	133	—	−0.1
Soybeans					
Common variety	1,950	236	205	—	15
Maize					
Common variety	1,150	139	—	105	32

Note: Estimated at the official exchange rate of 8.28 yuan to the U.S. dollar. —, not available.
Source: Authors' survey.

the country. More precisely, if a ton of imported Canadian number 3 hard white wheat were costlessly brought across the border and auctioned off in China's domestic market in October 2001, the competitive bid price would have been 20.5 percent higher on average than the international price on a cif basis. This price gap would imply that China's protection rate is high, and that if China were to open its markets completely domestic wheat prices would fall and the import volume would rise.

Interviewees were quick to point out, however, that they did not think that even with open markets China's overall wheat price would fall anywhere near 50 percent (even if there were no effect on the world price—they were not considering the impact of China's imports on the world price). They noted that the market for baking-quality wheat, the main use for hard white wheat from North America, is small in China, at most only several million metric tons. Few wheat users in China outside those who demanded flour for making cakes, pastries, and high-quality breads would use this type of wheat even if were available at a cheaper price. On the supply side only a small group of farmers and processors inside China were able to competitively produce and market this type of wheat.

If these supply and demand dynamics are accurate, this would mean that even in a world free of trade restrictions, imports of hard white wheat would continue only until demand for that variety was met and the domestic price fell to international levels. Most of the production of that variety of wheat would shift outside of China, but because of the limited demand for such wheat varieties, only the small number of domestic farmers who had been producing these varieties at the trade barrier–protected price would have to abandon their production following liberalization. Moreover, in this specific case—one with few domestic suppliers and little or no substitution of baking-quality wheat for other domestic uses—there should be only a small price impact on other domestic wheat producers. In short, growers of the high-quality wheat would lose; they would either have to keep growing at a lower price or switch to another wheat variety or some other crop. The overall price impact would be minimal, however, because such specialized wheat varieties fill such a special niche and the quantities involved are small.

Although not as extreme as the case for North American baking-quality wheat, traders reported arbitrage possibilities in other wheat markets (see table 3). With a remarkable degree of consistency, the cif price of medium-quality wheat imports from Australia, the United Kingdom, and the United States (hard red) was reported to be 10 percent lower than the price that interviewees believed the same wheat would command in China's domestic market. Used for more common breads, cheaper pastries, and high-quality noodles, this wheat accounted for an estimated 10–15 percent of China's wheat demand, according to interviewees. However, unlike the case for the highest-quality baking wheat, there was more production in China. During 2001 domestic producers supplied most of this quality of wheat to China's wheat market, enjoying protection provided by state trading or the value-added tax policy (a 13 percent tax is enough to keep these varieties from being competitive inside China's domestic market).[7]

Finally, China's medium-quality wheat, by far the biggest part of China's production (estimated to be more than 60 percent) appears at most to be only marginally protected (see table 3). Interviewees believed if China's medium-quality wheat were sold on the international market in late 2001, it would sell at a discount of about 8 percent. In other words, if international traders could ship this quality of wheat to China, which they have not done to date, it would command a premium of 8 percent. Because this wheat constitutes the largest

7. In China's domestic market, medium-quality wheat from international markets was considered to be equal to high-quality wheat from China's domestic suppliers. Interestingly, evidence that medium-quality wheat on international markets is the same as high-quality wheat supplied by China's farmers is found in the answer to the question asked of interviewees: "If China's higher-quality wheat were sold on international markets, how much loss would a trader incur?" This rate, 10 percent, was almost exactly the same as the premium importers would make from bringing in medium-quality grain from the international market.

part of China's wheat crop, a price gap of this size would likely mean that China's accession to the WTO would lead to imports of this type of wheat (in the absence of a value-added tax or other nontariff barrier).

China's lowest-quality wheat (about 10–15 percent of its harvest) is at the world's feed wheat price. China did export some feed wheat into international markets in 2001 (mostly to Asia, according to an interview). Similar differences in the size of the price gap among varieties of a single type of commodity are found for rice, though not for soybeans and maize, which are more homogeneous products (see table 3).

New Nominal Protection Rates and Sources of Protection for Agricultural Commodities

Although there are differences among major types of any individual agricultural commodity, more traditional aggregate nominal protection rates can be created by weighting the rates by sown area for crops or production shares for meats (table 4). When the individual nominal protection rates in table 3 are weighted by their area shares, wheat, for example, has an aggregate nominal protection rate of 12 percent. Rice, on the other hand, is implicitly taxed at 3 percent. The aggregate figures, though helpful (especially for analysis that is disaggregated only to the crop level), provide much less insight about which groups of farmers in which areas producing which varieties will be hurt or helped if trade liberalization were to reduce trade-related distortions.

TABLE 4. Average Nominal Protection Rates for Major Imports and Exports in China, October 2001

Commodity	Domestic price (yuan per ton)	Nominal protection rate (%)
Imports[a]		
Wheat[b]	1,250	12
Soybeans	1,950	15
Cotton	9,500	17
Sugar	2,612	40
Exports[a]		
Rice[b]	1,954	−3
Maize[b]	1,150	32
Pork[b]	11,442	−30
Beef[b]	13,743	−10
Poultry[b]	9,904	−17
Fresh fruit	5,472	−4

[a]Imports commodities are compared with international prices cif China, and exports are compared with international prices fob, China.

[b]Average nominal protection rates are created by summing the nominal protection rates of individual varieties weighting by share of area sown (production).

Source: Authors' survey.

For commodities with fewer quality differences (such as maize, soybeans, sugar, and cotton to a lesser extent), the aggregate measures have more inherent interest. Maize and soybeans are rarely consumed directly (unlike rice and wheat, which are staple food grains that are sensitive to human tastes and preferences) and are used mostly as a feed or are otherwise processed. Thus, in the next part of the analysis, in which the observed protection rate is matched with the source of protection, only the aggregate nominal protection rates for maize, soybeans, sugar, and cotton are examined.[8]

The findings show not only that significantly positive rates of protection exist for a number of China's major field crops but also that they vary across the country and according to China's position as a net importer or net exporter. Maize prices, according to exporters, averaged more than 30 percent above world prices, meaning that traders would have lost more than 30 percent of the value of their exports without government subsidies. Protection rates differed across regions, however. For example, interviewees in the northeast said that if they were not exporting and foreign maize were to come into China, the importer could make 21 percent on average. In south China, however, the price gap between imported maize (cif China) and maize traded in the domestic market in and around Guangzhou was more than 35 percent. Aggregated across areas and weighted by maize consumption shares, the nominal protection rate on maize was 32 percent in 2001 (see table 4). The level of protection for maize corresponds almost exactly to the subsidies being paid to maize exporters during fall 2001.

Interviewees also reported that despite the large increase in the volume of soybean imports in recent years, there is still an average 15 percent difference between the cif price and the domestic price in the port (see table 4). That a price gap remains seems remarkable considering that China imported almost 15 million tons of soybeans in 2001, the official tariff is only 3 percent, and the commodity can be traded by any foreign trade company. The remaining price gap shows that there may be other reasons for distortions beyond tariffs and state trading. In fact, the gap between the domestic and international price is almost certainly a result of China's policy of assessing a value-added tax on imported soybeans at the border. As already shown, the difference in the tax rate between imported and domestic soybeans is about 12 percent. Because this is the difference between the price of imported soybeans after paying the 3 percent tariff, this suggests that the main distortion in China's soybean price in fall 2001 was the value-added tax.

8. The survey was conducted the same way. In most cases, interviewees reported that there was not much difference in quality among maize varieties and that there was only a slight (around 2–3 percent) price difference between imported and domestic soybeans. Hence, questions were asked both ways. "What was the price difference if imported soybeans (cif China) were auctioned off in the domestic market with no taxes or tariffs added? What was the price difference if domestic soybeans (fob China) were auctioned off in the international market with no subsidies?"

Cotton and sugar were fairly highly protected in October 2001 (see table 4). Traders in south China and Shanghai reported that they could have sold a ton of imported sugar (cif China) for almost 40 percent more on China's domestic market if they did not have to pay any fees. In fall 2001 the official tariff for sugar was 40 percent (MOFTEC 2002). Thus for sugar the main distortion was the official tariff rate, with the value-added tax having almost no role.

Cotton demonstrates one of the shortcomings of this new approach to calculating nominal protection rates. In fall 2001 the average gap between the international and the domestic price of cotton was 17 percent. Interviewees told us that if they could costlessly bring imported cotton across the border in late September and early October 2003, they could earn 17 percent if they auctioned their shipment immediately. When the survey team did follow up work at the end of November, however, the domestic price of cotton had fallen from 9,500 yuan per ton to less than 8,000 yuan per ton, bringing the nominal protection rate to around zero. Then by the end of the year (late December 2001), the international price of cotton also fell. Although the December follow-up surveys by phone covered only a few cotton traders and users, the information from that abbreviated survey indicated that the nominal protection rate was positive again.

The domestic and international prices of other crops varied less than those of cotton in 2001, but cotton provides a cautionary lesson of how nominal protection rates can change rapidly, even over a short period. Thus, if a statistical bureau were to adopt this method as a way to track nominal protection rates for a variety of commodities, the surveys would have to be repeated at periodic intervals.

Assessing the New Methodology

Because one objective was to use the new data and methods for aggregating variety-specific nominal protection rates to generate crop-specific nominal protection rates, this section compares the nominal protection rates created by this time- and data-intensive approach with those using traditional methods, data sources, and assumptions.[9] Although the two approaches yield similar results for some commodities, such as soybeans and maize, the results vary considerably for other commodities. For example, the average price of wheat imports in 2001, calculated by dividing total import value by total import quantity, was 1,393 yuan per ton, whereas the national average price for domestic wheat as

9. These are computed by comparing the domestic wholesale price with the average implicit international price. For tradables it is total value of the import or export divided by the total volume. For some commodities, comparisons using these traditional methods and data may not be comparable to the estimates here because the traditional measures are calculated on an annual basis and those for the estimates here are for a single quarter (fall 2001). In this particular case, because the international and domestic prices of rice, wheat, and maize were fairly constant across the year, there is little bias. But the proper method would be to compare the fall in nominal protection rates from both methods or for nominal protection rates calculated for the entire year from both methods.

reported in the Ministry of Agriculture's reporting system was 1,113 yuan per ton, or about 21 percent below the cif price of imports.

Thus, the standard methodology would imply that wheat, rather than being protected (by 12 percent—see table 3), was actually being taxed by trading policies. Yet as the previous analysis shows, the main reason for the negative rate of protection is that China imports almost exclusively high-grade, baking-quality wheat, whereas its domestic consumers use mostly medium and lower qualities of wheat. Hence, the wrong conclusion is reached when using the specialty prices for imports as an international reference price for types of wheat that are of much lower quality and price. The same problem is found for rice.[10]

This shows the importance of estimating nominal protection rates more carefully, at least for certain commodities. The traditional approaches work reasonably well for commodities that are fairly homogeneous in quality, such as maize and soybeans. But for wheat and rice in China in 2001, comparing average prices inside and outside the country can yield misleading results.

III. Away from the Border Effects

The entire effect of trade liberalization on agricultural prices (and the distribution of the effect) depends not only on the size of the distortion but also on how the effects are distributed, which is largely a function of the nature of China's markets. At least three factors play a role: policy safeguards that prevent market forces from fully equilibrating domestic and international prices; household responses, which include shifting away from commodities whose price falls to production of higher profitability commodities; and high transaction costs, which can buffer the effects of liberalization policies in rural areas. This section focuses on the nature of markets. Policy safeguards are discussed in the conclusion. Household responses are discussed in Taylor (1998), OECD (2001), and Huang and others (2002).

If large areas of the country are isolated from the coastal markets where imports enter the country, WTO accession would not be expected to have highly adverse impacts on the poor, most of whom live in inland areas far from major coastal cities. While being isolated from negative external shocks is a benefit, there are also costs. Those living in poor, isolated areas would not benefit from price rises when there are enhanced opportunities to export. Living in isolated markets also makes households more vulnerable to regional

10. Because China imports only high-quality jasmine rice from Thailand, the international price of rice, 3,908 yuan per ton (calculated by total import value divided by total import quantity), appears to be more than 150 percent higher than the average domestic price, 1,464 yuan per ton. In fact, China's average price protection (tax) rate, calculated on a variety by variety basis, is almost zero (−3, see table 3).

price shocks (which may be caused by regional production or consumption shifts). In contrast, with well-functioning markets, increased import or export flows concentrated in coastal cities will affect the prices that small, poor households face even when they live thousands of kilometers away. Moreover, if markets link inland and coastal areas, local shocks to supply or demand in inland regions are less likely to have any large effect on the prices local producers receive (which in most cases means that price variability will be less).

To the extent that there are high transaction costs inside China and some domestic markets are isolated from others, the impacts of WTO accession policies may not be evenly distributed. Previous work on China's agricultural markets (for example, Park and others 2002) found that markets had become fairly integrated by the mid-1990s. However, certain qualifications apply. First, although markets improved greatly during the early 1990s (compared with the 1980s), the analysis found that in some years large regions of the country, especially poorer areas, were not completely integrated into national markets. Moreover, the study ends with 1995. It is unclear from the literature (although there is no rigorous national study of market integration in the late 1990s) and government market policies during the late 1990s whether markets were likely to have become more or less integrated since the mid-1990s (Nyberg and Rozelle 1999).

Assessing Interregional Market Integration

To assess market integration in rural China in the late 1990s and in 2000, data from China's State Market Administration Bureau were used to see how well prices in different markets moved together and how well integrated prices were between market towns and China's villages.

DATA. The data come from a unique set of price data collected by the State Market Administration Bureau. Nearly 50 sample sites from 15 provinces report the prices of agricultural commodities every 10 days. The prices are averages of transactions that day in the local rural periodic market. The Ministry of Agriculture (2001) assembles the data in Beijing and makes them available to researchers and policymakers.

Price data were examined for rice, maize, and soybeans for 1996–2000 (price data for maize were available only through 1998). The three crops are produced and consumed in nearly every province in China. Because of quality differences among rice varieties in different regions of China, price integration was examined among markets within four regions, South China, the Yangtze Valley, the North China Plain and Northwest China, and Northeast China. Prices for rice are available for more than 90 percent of the time periods for the provinces included in the sample. Prices of maize are available for 13 markets and prices

of soybeans for 20 markets.[11] Product homogeneity for maize and soybeans makes it possible to examine price integration among markets across a broader geographic range. The results for 1996–2000 are compared with the results for 1988–1995 in Park and others (2002).[12]

INTEGRATION TESTS. This section uses more formal tests of market integration. Cointegration means that although many developments can cause permanent changes in the individual elements of a tested series (grain price here), there is some long-run equilibrium relation tying the individual components together, represented by the linear combination, as in equation 1. Here, the Engle-Granger cointegration approach is applied to test China's market integration. The basic intuition behind the approach is that if one can write two price series in the following way:

$$U_t = P_t^i - bP_t^j \tag{1}$$

and if each price series is stationary of order zero, $I(0)$, then this condition implies the existence of a long-run equilibrium. In other words, in the long run the two series will eventually return to a constant mean. Moreover, a linear combination of the two prices shows that it is efficient to predict one market's price based on the information from another market's price. Equivalently, these two price series are cointegrated and the two markets are integrated.[13] If the price series are not stationary of order zero, then a unit root test is applied to determine whether each element of the price series is stationary of order one, $I(1)$. The analysis shows that all price series for the commodities in China's grain markets in the late 1990s are stationary of order one.

Using the stationary price series, one price series is then regressed on another using ordinary least squares:

$$P_t^i = \alpha + \lambda t + \beta P_t^j + e_t \tag{2}$$

11. Because time-series data are used, prices must be converted to a real basis. Nominal prices from the data set are deflated using monthly consumer price indices calculated and reported by the China National Statistical Bureau. Deflation facilitates transaction cost comparisons across time and allows transaction cost increases within periods associated with inflation to be disregarded.

12. To produce the results, cointegration tests are run on each pair of markets using the data for each year. In other words, 36 observations are used (because the price data are available every 10 days) and the number of pairs of markets that are cointegrated in a statistically significant way are counted (see note 13 and text for explanation of testing). For example, for the case of soybeans for the late 1990s (1996–2000), this means that being examined is the extent of integration between 190 (20 * 19/2) pairs of markets in each of five years, which equals 950 pairs of markets. So because prices in 646 markets were found to be integrated (according to the testing procedure), 68 percent of markets are reported as integrated in the late 1990s. Because only 36 observations are used per test, and because cointegration tests typically perform better with longer time series, by splitting data into annual increments, the results are biased against integration. This makes the analysis comparable to Park and others (2002), which follows a similar procedure.

13. Note that the b coefficient need not be unity to conclude cointegration and integrated markets (only needed for applying the much more restrictive criteria of the Law of One Price).

where t is the common trend of the two price series and e_t is the error term. The residual, e_t, is then used in the augmented Dickey-Fuller test:

$$\Delta e_t = \delta e_{t-1} + \sum_{j=2}^{N} \gamma \Delta e_{t-j} + \xi_t. \tag{3}$$

If the test statistic on the δ coefficient is less (more negative) than the relevant critical value from the Dickey-Fuller table, the null hypothesis is rejected and the two series are said to be cointegrated of order (1,1). According to Engles and Granger, this implies that the two markets are integrated. The analysis assumes that markets are integrated when the absolute value of the test statistic is greater than 3 (implying significance at the 10 percent level).

RESULTS. The cointegration analysis shows that China's markets have continued to develop in the late 1990s, especially when the results are compared with the market integration research of the late 1980s and early 1990s (table 5). In the middle part of the reform era (1988–95), a time when markets were starting to emerge, some 20–25 percent of markets showed signs of prices moving together (Park and others 2002).

Using the results from the early 1990s as a baseline, the current analysis shows that during the late 1990s China's markets continued along their path of maturation. The comovement of prices among pairs of markets in the sample shows significant increase in the share of market pairings that are integrated. In the case of maize, for example, prices in paired markets moved together in 89 percent of the cases, up from 28 percent in the early 1990s (table 5). The share of market pairs showing price integration also increased for soybeans, japonica rice, and indica rice. The integration is especially notable because in many cases the paired markets are more than a 1,000 km apart. For example, in many years soybean and maize prices were found to be integrated between markets in Shaanxi and Guangdong Provinces and between Sichuan Province and southern Jiangsu.

Despite significant progress in integration, the results also show pairs of markets that are not integrated. For example, in a third of cases japonica rice prices moved in one market but not in another. One explanation is an

TABLE 5. Percentage of Market Pairs in Rural China that Test Positive for Integration Based on Dickey-Fuller Test, 1988–2000

Commodity	1989–95	1996–2000
Maize	28	89
Soybeans	28	68
Japonica rice (Yellow River Valley)	25	60
Indica rice (Yangtze Valley and South China)	25	47

Note: Results are for two periods from same data set. For results for 1989–1995 for maize and rice, see Park and others (2002). Rice results are for the whole country in 1989–95. Results for soybeans for 1989–95 and all results for 1996–2000 are from the authors.

institutional breakdown or infrastructure barrier (a policy measure or a weak link in the transportation or communication infrastructure) that is fragmenting China's markets for certain commodities, as shown in Park and others (2002). But because every province in China produces and consumes rice, it is also the case that if supply in one region during one period is just equal to demand and if regional price differentials stay within the band between regional "export" and "import" prices, then moderate price movements in another area might not induce a flow into or out of the region that is in equilibrium. For that reason, despite the nontrivial number of cases in the late 1990s in which market prices in pairs of markets do not move together, it must be concluded that the impacts of WTO accession on China's agriculture will increasingly be experienced across wide regions of the nation from coastal to inland areas.

Assessing Village Integration into Regional Markets

The interregional integration of markets is only half of the story, however. The remarkable degree of integration between coastal and inland markets is still not sufficient to state confidently that village households are integrated into the nation's marketing network. That requires analysis of the extent to which villages are integrated into regional markets.

This integration test looks at whether farmers are price takers or whether they reside in isolated villages in which local prices are determined by local supply and demand. The equation to test for village-regional market integration is:

$$P_i = a0 + a1^*A_i + b1^*T_i + d1^*D + e_i. \tag{4}$$

In brief, if variables that affect local grain availability, A_i, in village i significantly affect the village's price, P_i, villages are assumed to be isolated from markets. If the variables that affect local availability do not affect the price, villagers are assumed to be price takers and markets can be thought to be integrated.[14] Availability in each village during the survey year is measured as

14. The data for this study were collected in a randomly selected, nearly nationally representative sample of 60 villages in six provinces of rural China. To accurately reflect varying income distributions within each province, one county was randomly selected from each income quintile for the province, as measured by the gross value of industrial output. Two villages were randomly selected within each county. The survey teams used village rosters and the authors' counts to randomly select 20 households, both those with their residency permits (*hukou*) in the village and those without. A total of 1,199 households were surveyed. The China National Rural Survey project team gathered detailed information on the production and marketing behavior of all of the farmers in the sample, the characteristics of each village, and its relationship to the nearest regional market. Each individual respondent in the survey in each village gives the price and timing of the sale for each commodity. From these data, an average village price for each month are constructed in yuan per kilogram. In a community questionnaire, how far the village's center is from the nearest paved road and the distance to the county market is determined in kilometers. Finally, for any shocks to the farmer's crop, the incidence and the percentage by which the yield fell are known for each crop that the farmer cultivated. No variable that controls for the presence of a community buffer stock system is included, primarily because such an institution is almost never observed in modern China. In addition, sales among farmers within a village are rare (according to data, less than 5 percent of sales).

the sum of production, P_i, and storage, S_i. If markets are isolated, a rise or fall in availability would be expected to negatively or positively affect the village's price. In contrast, if markets are integrated, changes in local availability would be expected to have no affect on the village's price. Because it is total availability (production plus storage at the beginning of the period) that matters ($A_i = P_i + S_i$), total availability should enter equation 4. Equation 4 is solved separately for rice, wheat, maize, and soybeans.

In examining the impact of local grain availability on the household's grain price in equation 4, other factors, D_i, need to be controlled for in the cross-sectional analysis. In equation 4, D_i is assumed to include two components, one spatial (the distance of the village from the county seat, the typical site of the regional market) and one temporal (the timing of the grain sale). The further the village is from the county seat and the closer the grain sales are to the harvest (within the first three months), the lower the price is likely to be. Because village price levels in different provinces are expected to vary according to each province's location (with respect to the port) and infrastructure (the quality of its road and rail network), a provincial dummy variable is also included. For rice, because quality varies so much from region to region, dummy variables for regional quality are included (for South China, the Yangtze River Valley, and North/Northeast China).

The data were collected in a randomly selected, nearly nationally representative sample of 60 villages in six provinces of rural China (the China National Rural Survey). To accurately reflect varying income distributions within each province, one county was randomly selected from each income quintile for the province, as measured by the gross value of industrial output. Two villages were randomly selected within each county. The survey teams used village rosters and their own counts to randomly choose 20 households, both those with residency permits (*hukou*) in the village and those without. A total of 1,199 households were surveyed.

A number of variables were constructed that might affect the price that farmers received in the village. The survey team gathered detailed information on both production and marketing behavior of all farmers in the sample and the characteristics of each village and its relationship to the nearest regional market. Individual respondents provided information on the price and timing of sales for each commodity. The prices for all household sales in the village were averaged, with each sale weighted by its volume in kg. From the information on timing a set of variables was constructed that measures the proportion of village sales occurring within each of the first three months after the harvest. A community questionnaire provided information on how far the village's center is from the nearest paved road and the distance to the county market. Finally, for each crop there was information on any shocks, both their incidence and the percentage by which the yield fell. These were aggregated to the village level.

There are no variables that control for the presence of a community buffer stock system, primarily because such institutions are rare in modern China.

However, farmers, at least in the past, have been known to hold large stores of grain. It is possible that in an isolated village hit by a production shock that caused local prices to rise, farmers could draw on their own stocks so that the local price would exhibit no net change, thus making the village look as though it were integrated into the regional market, when it was not. Beginning year stocks, aggregated to the village level, are used to measure the potential that households stocks might have for increasing availability.

To test the hypothesis, grain price, P_i, is regressed on total grain availability, A_i, for each of the main staple crops i (where $i = 1$), holding the other variables, T_i and D, constant. Total grain availability is measured in three ways: as the production shock, P_i, alone; as the production shock, P_i, and grain storage, S_i; and as the interaction between the grain storage variable and the production shock variable (or a direct proxy of $A_i = P_i + S_i$). Because the interaction effect is the most intuitive (it captures total grain availability of the village in one variable), the regressions that use this version of the variable are reported in table 6. (Results of regressions using the alternative variables are reported in appendix tables A.1 and A.2.) If villages are isolated from regional markets, the coefficient on the interaction term should be negative and significant when there is positive production shock and high levels of grain storage—that is, when the interaction term is large. If markets are integrated into China's larger marketing networks, the coefficient should be insignificant.

The analysis clearly shows that markets in China are integrated down to the village level (see table 6). The signs on the coefficients (and levels of significance in some cases) on the variable measuring the distance of a village from the regional marketing center demonstrate that the further a village is from a market, the lower the price the farmer receives. More important here, the *t*-ratios of the coefficients of the village supply shock variables are all small, signifying that the output of the local village's crops does not affect the local price. The implication is that factors outside the village are the primary influence on the prices that farmers receive, making them price takers. Moreover, when the main variables of interest are interacted with a dummy variable for village income level (equaling 1 when a village is in the bottom two income deciles), the coefficient is still insignificant. In other words, even farmers in China's poor, remote villages are linked to China's regional markets.

IV. Conclusions

This article looked exclusively at the effect of China's accession to the WTO on agricultural prices (although other effects may be equally large or larger). The analysis found that there will be an impact on most farmers in the economy—both those in coastal areas and small, poor farmers in inland areas. The findings, based on new methods to collect data and create more accurate nominal protection rates, show that for some crops, WTO accession will likely lead to a fall in prices and a rise in imports. Maize and cotton prices may be most affected. Soybean and sugar

TABLE 6. Ordinary Least Squares Regression Explaining Effect of Local Grain Availability on the Price of Major Crops in China's Villages in 2000

Variable	Rice	Wheat	Maize	Soybean
Explanatory variable				
Local grain availability				
Village-level climate shocks (production shock)[a]				
Village-level grain storage at the beginning of year (grain storage)[a]				
Interaction: production shock and grain storage[a]	−3.15e−06 (1.31)	7.50e−07 (0.37)	−3.91e−07 (0.33)	0.000045 (0.15)
Control variables				
Distance to the nearest county (km)	−0.00074 (0.74)	−0.0079 (2.1)*	−0.0005 (0.55)	−0.032 (2.76)*
Variables representing proportion of grain marketed during each of the first three months after harvest		Included	Included	Included
Quality dummy variables	Included			
Provincial dummy variables	Included	Included	Included	Included
Adjusted R^2	0.16	0.38	0.50	0.15
Number of observations	31	30	28	17

Note: Village-level price is the dependent variable. *t*-ratios in parentheses.

*Significant at the 5 percent level.

[a]Independent measures of production shocks and grain storage are not included in this version. See appendix tables A.1 and A.2 for versions that includes these variables.

prices could also fall. However, not all effects are negative. There are also commodities in which China has considerable comparative advantage (rice, meats, and horticulture products) and for which WTO accession could provide benefits to those engaged in these activities to the extent that markets in other countries become more open to China's exports. The prospect of increased imports of feed grains (maize and soybeans) at lower prices means that livestock producers could become even more competitive.

How much prices fall because of rising imports or increase because of rising exports in part depends on how China executes its WTO obligations, especially the agreements affecting some of the more nontraditional barriers that were shown to be protecting China's farmers before accession to the WTO. Although there may be room for delay, which could slow the negative effects (for example, China is continuing to subsidize maize exports to keep domestic maize prices from falling and hurting maize producers; Rozelle 2003), the agreement also contains several provisions to limit downside effects. For example, although the tariff rate quotas section lowers tariffs and provides access for nonstate traders to import commodities such as cotton, sugar, and edible oil, it also caps the quantity that can be imported at the low tariff rates. Likewise, the size of benefits to China's producers will depend on how well its trading partners honor their commitments to provide China with better access to global markets for products in which China has a comparative advantage.

Unlike the case of Mexico after NAFTA it appears as though most of China's villages, even those in remote, inland regions, may be well integrated into the economy. This is good news and bad news for poor farmers. The good news is that they can benefit from falling input prices and rising export opportunities. The bad news is that if the results here are correct and maize and cotton prices fall for large parts of China, poor farmers will be affected. The problem, although a short-run one, may affect the poorest households most—households most dependent on agriculture and least able to adjust their cropping structure. Thus, the findings should signal to government leaders the need to consider the welfare effects on these susceptible groups.

Appendix: Challenges and Issues in Measuring Nominal Protection Rates

The wide range of nominal protection rate estimates for China demonstrates that measuring differences between an economy's domestic price and the international price is not straightforward. Several issues complicate such measurement. First, confusion may stem from the way analysts have asked their question about nominal protection rates. Policymakers and researchers have sought to summarize the impact of various commodities in a single number. Trade modelers need a single number to make their analytical frameworks tractable. People want to know *the* price of wheat in China and to be able to compare that to *the* world price of wheat. With this information, the nominal

TABLE A.1. Ordinary Least Squares Regression Explaining Effect of Local Grain Availability on the Price of Major Crops in China's Villages in 2000

Variable	Rice	Wheat	Maize	Soybean
Explanatory variable				
Local grain availability				
Village-level climate shocks (production shock)	−0.108 (1.05)	0.06 (0.61)	0.109 (1.23)	−0.11 (0.49)
Village-level grain storage at the beginning of year (grain storage)[a]				
Interaction: production shock and grain storage[a]				
Control variables				
Distance to the nearest county (km)	−0.00069 (0.69)	−0.0081 (2.15)*	−0.0007 (0.79)	−0.031 (2.75)*
Variables representing proportion of grain marketed during each of the first three months after harvest		Included	Included	Included
Quality dummy variables	Included			
Provincial dummy variables	Included	Included	Included	Included
Adjusted R^2	0.14	0.38	0.53	0.16
Number of observations	31	31	28	17

Note: Village-level price is the dependent variable. *t*-ratios in parentheses.

*Significant at the 5 percent level.

[a]The grain storage variable and interaction variable are not included in this table. See appendix table A.2 for version that adds grain storage variable. See table 6 for a version that includes that interaction term.

TABLE A.2. Ordinary Least Squares Regression Explaining Effect of Local Grain Availability on the Price of Major Crops in China's Villages in 2000

Variable	Rice	Wheat	Maize	Soybean
Explanatory variable				
Local grain availability				
Village-level climate shocks (production shock)	−0.108 (1.02)	0.06 (0.6)	0.132 (1.3)	−0.206 (0.96)
Village-level grain storage at the beginning of year (grain storage)	−8.21e−08 (0.18)	1.12e−07 (0.14)	−4.04e−07 (0.5)	0.00018 (1.66)
Interaction: production shock and grain storage[a]				
Control variable				
Distance to the nearest county (km)	−0.00069 (0.66)	−0.0082 (2.11)*	−0.0005 (0.51)	−0.034 (3.19)*
Variables representing proportion of grain marketed during each of first three months after harvest		Included	Included	Included
Quality dummy variables	Included			
Provincial dummy variables	Included	Included	Included	Included
Adjusted R^2	0.10	0.36	0.51	0.29
Number of observations	31	30	28	17

Note: Village-level price is the dependent variable. *t*-ratios in parentheses.

*Significant at the 5 percent level.

[a]The interaction variable is not included in this table. See table 6 for a version that includes interaction term.

protection rate of a commodity is simply the difference between these two numbers.

However, more careful observation shows that the search for a single number may be one of the main reasons why analysts reach so many different conclusions. There are many prices for wheat in China. Prices vary within a year. They vary across regions. What price should be used in calculating the nominal protection rate? Should it be the price of corn in a Guangzhou feedlot or the price of corn sitting in storage in a farmer's homemade silo in Northeast China? Moreover, not all rice is the same. There are many different varieties and types, all commanding different prices at different places and times during the year. The same sets of issues faces analysts when they attempt to choose a price series (or more difficult yet, the single price) to represent the international price. Should it be fob or cif? Should it be the average annual price or a price during a particular period? If there are many different types of imported varieties, which type should be chosen?

In part because previous studies have not dealt with these issues (at least explicitly), it is unsurprising that different research efforts have generated different estimates of nominal protection rates. For example, Tuan and Cheng (1999) estimated high and variable nominal rates of protection for agricultural commodities: 62 percent for wheat, 15 percent for maize, and 140 percent for soybeans in 1997. Carter and Estrin (2001) find generally negative price distortions. Huang (2001) provides estimates that show that some products are highly protected and others have negative rates of protection.

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