# DISTORTIONS TO INCENTIVES IN CHINA'S AGRICULTURE AND IMPLICATIONS OF WTO ACCESSION

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China's economic liberalization and structural change have proceeded for several decades. Since the economic reforms were initiated in the late 1978, China's economy has grown substantially. The annual growth rate of gross domestic product (GDP) was 8.5 percent in 1979-84 and 9.7 percent in 1985-95. Moreover, despite the Asian financial crisis, China's economy continued to grow at 8.2 percent annually between 1996 and 2000.

Although reform has penetrated throughout the whole economy since the early 1980s, most of the successive transformations began, and in some way depended on, growth in the agricultural sector (Nyberg and Rozelle, 1999). After 1978, decollectivization, price increases, and the relaxation of local trade restrictions on most agricultural products accompanied the take off of China's agricultural economy in 1978 to 1984. Grain production increased by 4.7 percent per year. Even higher growth was enjoyed in horticulture, livestock and aquatic products. Although agricultural growth decelerated after 1985 after the one-off efficiency gains from the decollectivization, the country still enjoyed agricultural growth rates that have outpaced the rise in population. New opportunities in the off farm sectors have allowed farm families to shift part of their household labor out of the agricultural sector into higher paying off-farm jobs.

Despite the healthy expansion of agriculture, the sector still faces a number of serious challenges. According to the World Bank (2000), more than 100 million people fell below the poverty line in the late 1990s, earning less than one US dollar per day in purchasing power parity (PPP) terms. Some regions of the nation are still highly dependent of crop production, such as farmers in some Northeast provinces (maize and soybeans) and the North China Plain (wheat and maize—China's Ministry of Agriculture, 2000). In the past several years, expanding supplies and increased liberalization have pushed real agricultural prices to their lowest levels in history (Park et al., 2002). With the retreat of the state occurring in many sectors of the economy (e.g., rural health care and provision of welfare services—Nyberg and Rozelle, 1999), even though China's record in the rural economy is stellar, there are still large numbers of people who are poor and vulnerable to even relatively minor income shocks.

In part because of the vulnerability of parts of the rural economy, and in part due to its importance in the political economy of a number of developed nations (with whom China had to negotiate its accession to the World Trade Organization—WTO), agriculture has been at the center of discussion of China's entry into the WTO. However, despite being a central concern for China's policy makers and negotiators from other countries, the likely shifts in China's future agricultural policy and its impacts are not well understood. Debates on the future of China's agriculture remain unresolved. Some argue that the impact of China's joining WTO on its agriculture will be substantial, adversely affecting hundreds of millions of farmers (Carter and Estrin, 2001; Li et al., 1999). Others believe that although there will be some impacts, including severe ones in some specific areas, overall the effect of accession on agriculture will be modest (Anderson and Peng, 1998). In part, the confusion about the ultimate impact of WTO can be traced to a general lack of understanding of the policy changes that may be induced from China's WTO accession (Martin, 2002).

However, in another perhaps even greater way, the lack of clarity of the debate can be traced to a lack of understanding of the fundamental facts about the nature of the distortions to China's on the eve of its entry into WTO.

The overall goal of our paper will be to attempt to contribute to the empirically-based literature on the effects on China's agriculture of its accession to the WTO. In general, we seek to answer some of the most basic questions about the expected effects of China's entry in the World Trade Organization (WTO).[1] On balance, will the nation's accession to WTO help or hurt farming households? If farmers lose (gain), who in the agricultural economy will get hurt (benefit)? Are there some regions in the economy that will be insulated from the effects of WTO due to their isolation from domestic markets?

Because of the enormity and complexity of effects of China's entry into WTO, we necessarily restrict the scope of our work. First, we realize the effect on rural households of changes in agricultural commodity prices are only a part of the changes that those in the rural economy will experience. In many cases, even more important effects will occur through changes in off-farm labor markets (e.g., OECD, 2002; Zhao and Sicular, 2002; Rozelle and Huang, 2001). Even within the food economy, however, WTO also will affect the food economy in many complex ways. For example, consumers also will gain from lower prices. Farmers will gain if higher levels of imports lead to lower fertilizer, pesticide and seed prices. In addition, the nature and magnitude of the effects will also depend how closely households are integrated into markets (Taylor, 1998). Subsistence households in remote areas could escape being affected at all even though consumers in areas that are linked to international markets enjoyed a fall in the price of important commodities in their daily consumption basket.

To meet the objectives, we begin the study with the basic premise that to assess the impact of WTO on agriculture, we need to basically answer two sets of issues. First, we need to understand the magnitude of the current distortions to agriculture—both the main policies behind them and the size of the gap between the world market and China's domestic price of the nation's important agricultural commodities. Second, once the size of the "shock" at the border is estimated, to understand the crop-specific and regional impacts of WTO accession (as well as impacts on certain groups of rural residents, such as the poor), we need to understand how well price shocks are transmitted throughout the economy. Ultimately, with a knowledge of the magnitude of the impacts, researchers can work on understanding how the policies that WTO will impose on China will change the gap between the domestic and international price and affect imports and exports, domestic production and production, income and poverty.

To meet these objectives, the rest of the paper is organized as follows. First, after providing a brief context for our analysis and discussing our data, we present measures of nominal protection rates (NPRs) for a set of commodities for China. Next we discuss how these distortions should be expected to change as China implements its WTO obligations and gains access (or not) to the promises that were made to it. The next section analyzes the transmission of prices through the economy. The final section discusses the implication of our findings.

**GRADUAL OPENING AND REMAINING DISTORTIONS**

Although agriculture has been at the center of China's negotiations over its entry into the WTO, the likely shifts in China's future agricultural policy and its impacts are not well understood. Debates on future China's food security are growing. We believe that the fundamental confusion about the ultimate impact of WTO in part can be traced to a widespread lack of understanding of the policy changes that may be induced from China's WTO accession (Martin, 2002). Traditionally, analysts have focused on four sets of trade policies, measures that are most frequently used by other countries to protect their agricultural sectors. In examining the previous work (e.g., CARD, Tuan and Cheng, 1999, and OECD, 2001), we find that almost all of the discussion is directed at tariffs, quotas and licensing, state trading and traditional non-tariff barriers (NTBs). It is implicitly assumed that the WTO agreement is focused solely on these policies, that these policies are responsible for most if not all of the protection that China was enjoying prior to accession, and that accession represents China's initial assault on protection at the border. In fact, while at one time these policies were the source of high distortions, after nearly two decades of reform in the external economy, some of the worst distortions caused by these policies have already disappeared.

The experience of China's agricultural tariff policy illustrates the gradual, but dramatic changes that China has experienced in the past two decades. In the late 1970s and early 1980s, the domestic wholesale price of China's four major commodities, converted at the official exchange rate-- all far exceeded the world price (measured at China's border—Table 1). For example, China's rise price was 10 percent above the world market price (row 1). The nation's wheat and maize prices exceeded the world price around 90 percent. However, over the next two decades, the protection rate on rice became negative and that for wheat and maize fell to around 30 percent (row 6). Although the NPR for soybeans fell similarly between the late 1970s and the mid 1990s, the rate rose in the late 1990s before falling to less than 20 percent in 2001 (column 4 and Xie, 2002). During this time period, the intervention by state traders and the use of NTBs also gradually fell (Martin, 2002).

Table 1. Changes in Nominal Rates of Protection Over Time of China's Major
Agricultural Commodities, 1978 to 2000.[a]

| | Nominal Rates of Protection (percent) | | | |
|---|---|---|---|---|
| | Rice | Wheat | Maize | Soy-bean |
| 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 |

[a] Nominal rates of protection (NPRs) measured as difference (in percentage terms) between average border prices and average domestic wholesale (market) prices.

Table 2. China's agricultural trade (US$ million) by factor intensity, 1985-97.

| Year | Land intensive products | | Labor intensive products | | Labor/capital intensive products | |
|---|---|---|---|---|---|---|
| | Value (US$ million) | Share (%) | Value (US$ million) | Share (%) | Value (US$ million) | Share (%) |
| Agricultural exports | | | | | | |
| 1985 | 2119 | 36.4 | 2199 | 37.8 | 1497 | 25.7 |
| 1990 | 1689 | 17.7 | 4971 | 52.1 | 2881 | 30.2 |
| 1995 | 875 | 6.0 | 7095 | 48.4 | 6704 | 45.7 |
| 1997 | 2158 | 14.1 | 6538 | 42.6 | 6642 | 43.3 |
| Agricultural imports | | | | | | |
| 1985 | 1072 | 43.8 | 680 | 27.8 | 695 | 28.4 |
| 1990 | 4032 | 71.9 | 642 | 11.5 | 935 | 16.7 |
| 1995 | 6575 | 54.5 | 3278 | 27.2 | 2216 | 18.4 |
| 1997 | 4644 | 47.3 | 2179 | 22.2 | 2987 | 30.5 |

Source: Huang and Chen, 1999.

Falling protection and changes in international trade and domestic marketing policies have resulted in dramatically shifting trade patterns. Disaggregated, crop-specific trade trends show how exports and imports increasingly are moving in a direction that is more consistent with China's comparative advantage. For example, the proportion of grain exports, which was around 20 percent of total agricultural exports in the 1990s, is less than half of what it was in the early 1980s (Huang and Chen, 1999). By the late 1990s horticultural products and animal and aquatic products accounted for about 80 percent of agricultural exports. These trends are even more evident when reorganizing the trade data grouping them on the basis of factor intensity (Table 2). The net exports of land-intensive bulk commodities, such as grains, oilseeds and sugar crops, have fallen (rows 5 to 8); while exports of higher-valued, more labor-intensive products, such as horticultural and animal (including aquaculture) products, have risen (rows 1 to 4).

*Non-traditional Sources of Trade Liberalization or Protection*
Based on the preceding discussion, two facts become clear. First, distortions have declined significantly in the past 20 years. Considering this fact, the current episode of policy reform that accompanied China's accession to the WTO should be considered an extension of past efforts. Second, much of the falling protection has come from decentralizing authority and relaxing licensing procedures for some crops (e.g., moving oil and oil seed imports away from state trading firms), reducing the scope of NTBs, the relaxation of real tariff rates at the border, and changing quotas, (Huang and Chen, 1999). It is perhaps for these reasons that much research on China's entry into the WTO focuses on the policies that were responsible for much of the earlier progress. And studying these policy tools, in fact, might be merited. Undoubtedly, changes in China's tariff regimes, state trading system and matrix of non-tariff barriers (NTBs) will play a continuing role in creating or eliminating distortions in China's agriculture. However, in part, because many of the gains from traditional trade reforms have already been experienced, it may be that there also are other, less-discussed policy sources by which China can affect further trade liberalization (or which could allow China to protect its market more, if it uses the measures) as it enters the WTO. Even if traditional policies are still important, it could be that the gains from these other policy reforms may be as important as those that can come from traditional trade reform.

For example, China also has used its taxation policy to protect its agriculture, especially in certain sectors, such as soybeans, that have been most liberalized. In the early 1990s, leaders radically revised China's fiscal system, making it much more reliant for revenue generation on a value-added tax system (Nyberg and Rozelle, 1999). The theory of the tax is that it is assessed on value added in all goods during their manufacture and sales process from the time the raw material comes out of the ground until it reaches the consumer. National regulations state that imported goods that are not for immediate re-export also are to be assessed the value added tax. Although there are varying rates, the typical value-added tax ranges from 13 to 17 percent.

For a variety of political and tax collection reasons, in the early stages of the implementation of the tax, tax authorities decided to exempt farmers from the tax when they sold their products into the market. Traders that purchased grain, for example, from a farmer in his home or in a local market would not have to pay the value added tax. When the good was resold in a downstream wholesale market, the value added tax was then assessed, but the trader only owed the tax on the amount of the marketing margin, or the difference between the procurement price and sale price. Recent fieldwork found that in China's competitive marketing regime, the marketing margins are between 1 to 10 percent. Taking an average of 5 percent, the real tax rate on domestic agricultural goods are only 5 percent of those on imported goods.

Such a tax system can provide some of China's farmers with significant protection. For example, in the case of soybeans, there is only a 3 percent tariff on imports. In recent years, however, many traders have been given the right to import soybeans. Theoretically, then, the international price of soybeans (when they arrive at China's borders) should differ by only 3 percent. However, as they enter the country, soybean importers also must pay a 13 percent tax to meet their value-added tax obligation. Domestic soybeans, in contrast, are taxed, on average, at less than 1 percent. Through this means, then, China's soybean producers have an added around 10 percent of price protection.[2]

China also has used export subsidies in recent years to increase exports of some commodities, and in that way, increase protection by raising the price of domestic commodities (Table 3, column 1). Maize and cotton are the two crops that have received the most substantial export subsidies.

During interviews in the field during 2001, we found that maize exporters, especially those in Northeast China, received subsidies that *averaged* 34 percent of export price (row 3). For example, one trader said that for each ton of maize that his company exported in 2001, it received back 378 yuan per ton (or 45.7 US dollars per ton) after producing an export bill of sale with the export sales price. With a sale price of 104 dollars per ton, the trading company received a subsidy of 44 percent, a level 10 percentage points above the average. In other words, the total payment they received (export earnings plus subsidy) was 1240 yuan per ton, which was even about 90 yuan higher than they could have earned in the domestic market (1150 yuan). We also discovered that cotton exporters received fairly large subsidies when they exported raw cotton, up to 10 percent or more (row 2). Finally, in several isolated cases, rice exporters reported that they received small subsidies (though no more than 5 percent for any single trade) from municipal and prefectural governments, a subsidy that we only documented in south China (although it should be noted that we did not have a chance to interview many rice traders in north China—i.e., ones that might be exporting japonica varieties into the northeast Asia market). Of the rice traders we did talk to, most received no subsidy for their exports, meaning the average subsidy almost certainly was less than 1 percent (row 1).

Table 3. Subsidies and tax rebates for exports of selected agricultural commodities in China, 2001.

| Commodity | Export Subsidies (percent) | Rebate of Value-added Tax for Exported Agricultural Commodities. (percent) |
|---|---|---|
| Rice | <1 | 0 |
| Cotton | 10 | 0 |
| Maize | 34 | 0 |
| Pork | 0 | 5.2 |
| Beef | 0 | 5.2 |
| Chicken | 0 | 13 |

Source: Author's survey

Although no subsidies were provided to meat exporters (it is a more difficult transaction to make fiscally since there are many more meat exporters and most of them are private or commercialized public firms, unlike maize and cotton traders that mostly are associated with formal, public state trading firms), tax policies favor exporters. Based on the trade ministry's estimate of the average value added tax paid on the products exported by meat traders, when a meat exporter executes a contract, the company can receive a rebate equal to the estimated value of the value-added tax (Table 4, column 2). For example, pork and beef exporters receive a rebate equal to 5.2 percent of the value of their transaction (rows 4 and 5). Poultry exporters receive 13 percent rebates (row 6). Since rebates are not provided to domestic wholesalers, such policies give the trading system an incentive to export, since the demand will be higher as the ultimate user outside of China actually sees a relatively lower price than the domestic user.

In summary, then, as China enters the WTO, there are still a number of challenges that those officials interested in liberalizing China's trade will face. Alternatively, China also has a number of instruments that it has been using and may continue to use (legally or not) in managing its domestic economy. In addition, to traditional trade policies, tariffs, quotas and licensing, state trading and NTBs, we have shown that China has protected and/or has the potential to protect its agriculture with a number of other policy measures. In particular, our analysis has shown that taxation policy may still be a tool that China could try to use to protect or further open its agricultural sector.

It also has used export subsidies and rebates to create wedges between the domestic and international prices of importable commodities and to decrease the domestic price relative to the world price of exportable goods.

Table 4.  Disaggregated nominal protection rates for selected grains in China, October 2001.

| Variety or quality | Comparable domestic price | | Border prices (US$/ton) | | NPR (%) |
|---|---|---|---|---|---|
| | Yuan/ton | US$/ton | C.I.F | F.O.B | |
| Estimated at official exchange rate[a] | | | | | |
| | | | | | -3 |
| Rice    Weighted average | | | | | |
| Thai jasmine rice | 3690 | 446 | 380 | | 17 |
| High quality japonica | 2930 | 354 | | 398 | -11 |
| Medium quality indica | 1519 | 184 | | 185 | -0.5 |
| Wheat   Weighted average | | | | | 12 |
| US DNS | 2350 | 284 | 190 | | 49 |
| Canadian #3 | 1800 | 218 | 181 | | 20 |
| Australian soft | 1625 | 196 | 175 | | 12 |
| US hard red | 1550 | 187 | 169 | | 11 |
| UK | 1350 | 163 | 145 | | 12 |
| China-high quality | 1350 | 163 | 145 | | 12 |
| China-medium quality | 1250 | 151 | 140 | | 8 |
| China-low quality | 1100 | 133 | 133 | | -0.1 |
| Soybean Common variety | 1950 | 236 | 205 | | 15 |
| Maize   Common variety | 1150 | 139 | | 105 | 32 |

[a] The estimated official exchange rate is 8.28.

Data source:  Authors' survey.

## NEW ESTIMATES OF CHINA'S NOMINAL PROTECTION RATES

In this section, we estimate a new set of NPRs on the eve of China's accession to the WTO.  These estimates will attempt to overcome some of the previous problems of researchers.  In particular, we try to understand in a more disaggregated way, the part of certain markets (in terms of varieties or commodity type) that China is protecting.  Such an analysis, should help us more accurately assess what the impacts will be after China implements it WTO obligations.  To do so, we first explain how we collected our data.  Next, we look at the disaggregated results.  Finally, in order to make the information more useful to policy makers and other researchers, we create a series of more aggregate NPRs.

The aggregation of our disaggregated NPRs into a single crop-specific figure allows us to assess how our methods would have changed had we used traditional methods of estimating NPRs.  Appendix A summarizes some of the difficulties that practitioners face when trying to measure NPR for China's agriculture.

To overcome the shortcomings of previous NPR studies, we conducted a set of interviews and surveys with the stated goal of precisely identifying the differences in prices at a precise point of time and a particular location between an imported good on one side of the border (outside China) and a domestic good of identical quality on the other side (inside China).  Likewise, we also wanted to identify the same price gap between exportable domestic goods as it leaves the country and the same goods from other countries that are

being traded in international markets. Conducted in 2001, the enumeration team was in the field more than 3 months, from August to November. The team visited 7 coastal cities--Guangzhou, Shenzhen, Ningbo, Shanghai, Lianyungang, Qinghuangdao and Dalian - and 2 other more inland cities, Beijing and Changchun. In each port, a number of "sampling frames" was used to select a sample of domestic traders, importers and exporters, wholesalers, grain and oilseed users, trade regulators, agents, and other grain and fiber officials. In total more than 100 people were interviewed.[3] Only a small fraction (less than 10 percent) of those contacted refused to be interviewed.[4]

**Dissagregated NPRs for Selected Agricultural Commodities in China**
The results of our analysis clearly illustrate the problems with a strategy of NPR estimation that attempts to come up with a single rate of protection for a commodity. For example, it is difficult to provide one single NPR of wheat in China, one of the world's largest importer of wheat (Table 4, rows 5 to 13). Traders reported that the price of very high quality wheat from North America was 20 to 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 the country (rows 6 and 7). More precisely, the average trader told us that if a ton of Canadian Number 3 hard white wheat were brought in and auctioned off in October of 2001, the competitive bid price would have been 20.5 percent higher than the international price on a CIF basis. Hence, based on this price gap, one would have to assume that China's protection price is high, and if it were to open its markets completely, wheat prices would plummet and import volume soar.

However, traders were quick to point out that they did not think that even with open markets, China's wheat price would not fall anywhere near 50 percent (even if there was no effect on the world price—i.e., they were not considering the impact of China's imports on the world price). According to our interviews, the market for baking-quality wheat, the main use for hard white wheat from North America, is actually relatively small in China, at most only several million metric tons (MMTs). We were also told that few users in China outside those who demanded flour for making cakes, pastries, and high quality breads would use this type of wheat, and that only a small group of farmers and processors inside China could supply this type of wheat. If this is in fact the case, this would mean that even in world that was free of any trade restrictions, imports would come into China up until demand was fulfilled and the domestic price for that variety fell to international levels. Alternatively, it could be that all production of that particular variety shifted to outside of China if all of China's domestic farmers who were producing these varieties abandoned them because they could not make a profit at such low prices. In such an extreme case with few domestic supplies and with little or no substitution of the baking-quality wheat for other domestic uses, there would only be a small price impact on most domestic producers. Growers of the high-quality wheat would lose; they would have to keep growing at a lower price, switch to another wheat variety, or change cropping patterns. Since the quantities of such grain are so small, however, the overall impact would be minimal.

While not as extreme as the case for North American baking quality wheat, traders reported that there were arbitrage possibilities in other markets (Table 4, rows 8 to 10). With a remarkable degree of consistency, the CIF price of medium quality wheat imports from Australia, England, and the Pacific Northwest of the United States (hard red) was reported to be 10 percent lower than the price that they believed the same wheat would command in China's domestic market. Used for more common bread, cheaper pastries, industrial uses and high quality noodles, the interviewees believed that this market accounted for around 10 to 15 percent of China's wheat demand. However, unlike the case of the highest quality baking wheat, there was more production in China. In fact, in 2001 domestic producers supplied most of the wheat of this quality into this segment of China's wheat market. In China's domestic market, however, this wheat was considered to be high quality Chinese wheat.

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 that we asked our interviewees: if China's higher quality wheat were sold on international markets, how much *loss* would a trader incur.

Our survey found that 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.

Finally, although there have been no imports of low (or lower-medium) quality wheat from international markets, it appears as if China's medium quality wheat, by far the biggest part of China's production

(estimated to be more than 60 percent) is only marginally protected (Table 4, row 12). Our survey found that traders believed if China's medium quality wheat was sold on the international market in late 2001, it would sell at a discount of about 8 percent. Another way to interpret this result is that if international traders can ship this quality of wheat to China, it would command a premium of 8 percent. Being the largest part of China's wheat crop, then, it is likely that there will be imports of wheat after WTO because of the persistent price gap. The effect, however, appears to be less than 10 percent. hina's lowest quality of wheat (about 10 to 15 percent of its harvest) is at the world's feed wheat price (row 13). 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 grain are found for rice (rows 1 to 4), though not for wheat and maize, which are more homogeneous products (rows 14 and 15).

Table 5. Average Nominal Protection Rates for Major Imports and Exports in China, October 2001.

| Major imports and exports | Domestic price (yuan per ton) | Nominal Protection Rate (percent) |
|---|---|---|
| **Imports** | | |
| Wheat [a] | 1250 | 12 |
| Maize | 1150 | 32 |
| Soybeans | 1950 | 15 |
| Cotton | 9500 | 17 |
| Sugar | 2612 | 40 |
| **Exports** | | |
| Rice [a] | 1954 | -3 |
| Pork [a] | 11442 | -30 |
| Beef [a] | 13743 | -10 |
| Poultry [a] | 9904 | -17 |
| Fresh Fruits | 5472 | -4 |

Source: Authors' Survey

[a] Average Nominal Protection Rates are created by summing the NPR rates of individual varieties weighting with the sown area (production) share.

**New NPRs for China**

Although there are differences among major types of any individual agricultural commodity, by weighting them by their sown area (for crops) and production (for meats) shares, a set of by crop aggregate NPRs can be created (Table 5). Wheat, for example, has an NPR of 12 percent (row 1) when the individual NPRs from Table 4 are weighted by their area shares. On average, the price of all varieties of domestically produced wheat that is sold in the domestic markets of China's major port (and inland) cities are 12 percent above the average CIF price of all types of imported wheat varieties. Rice, on the other hand, is implicitly taxed by 3 percent. The aggregate figures, although helpful (and perhaps needed for analysis that is only disaggregated

to the crop level, are less interesting and provide much less insight about which groups of farmers in which areas that are producing which varieties will be hurt or helped if trade liberalization reduces the distortions.

However, to the extent that certain commodities have less intra-crop quality differences, the aggregate measures have more inherent interest. For example, maize and soybeans (and cotton and sugar) have far less quality differences among varieties than rice and wheat. In part this is due to the fact that maize and soybeans are rarely consumed directly (as are rice and wheat, which make them more sensitive to human tastes and preferences). Instead, maize and soybeans are mostly used as a feed (and animals have less taste preferences) or are processed. As a consequence, in our analysis we only examine aggregate crop NPRs for maize, soybeans, cotton, and sugar.[5]

Our 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 over the nation and according to the position in which China finds itself (as a net importer or as a net exporter). Maize prices, according to exporters, were more than 30 percent, on average, above world prices. In other words, they would have lost more than 30 percent of the value of their shipment, had the government not paid them a subsidy. Protection rates when considering maize as an import differed. For example, traders in the northeast told our survey team that if they were not exporting and foreign maize was to come into China, the importer could make 21 percent. Our interviews in south China, however, found that the price gap between imported maize, CIF, and maize being traded in the domestic market in and around Guangzhou was more than 30 to 40 percent. Aggregated across areas on the basis of their meat consumption shares, we estimate that China's maize NPR was 32 percent in 2001 (Table 5, row 2).

Interviewees also reported that despite the large volume of increase of soybean imports in recent years, there is still a difference between the CIF and domestic price in the port (Table 5, row 3). The average difference between the domestic price and the international price was 15 percent. In one sense, the fact that there is a remaining price gap is remarkable given that China imported almost 15 MMTs of soybeans in 2001, the official tariff is only 3 percent, and the commodity is freely traded without securing a license or quota allocation. On the other hand, the remaining price gap reminds us that there may be other reasons for distortions beyond tariffs and state trading, a point to which we will return shortly.

Our results also find the cotton and sugar were fairly highly protected in October 2001 (Table 5, rows 4 and 5). The case of cotton, however, is an example of how fast the NPR can change across time. The NPR was measured to be 17 percent in October 2001. When our team went back to do follow up work at the end of November, however, the domestic price of cotton had fallen from 9500 yuan per ton in October to less than 8000 yuan per ton. With this fall, the NPR went to less than zero. However, later in the year, the international price of cotton also dipped, a fact that would lead to a higher NPR. Being less variable in 2001 in both China's and international markets, the NPR of sugar remained about 40 percent throughout the year.

**Assessing the New Methodology**
Since one of our objectives was to use a new data source and method for aggregating NPRs data to generate crop specific NPRs, it would be interesting to analyze what would have happened had we not used this time- and data-intensive survey methodology. To conduct such an "experiment" we use the same methodology, data sources and assumptions that many people use for calculating NPRs to calculate an NPR for China in 2001.[6] Although the two approaches give almost the same answers for some commodities, such as soybeans and maize (though soybeans was still overstated, in part because of difference in prices over the entire year—China's domestic prices fell sharply over the year, suggesting that the NPR in late 2001 was lower than it was in early 2001), the answers vary considerably for other commodities. For example, the national average price for wheat in 2001 reported from the MOA's reporting system was 1113 yuan per ton.

The average price of imports calculated by dividing total import value by total import quantity was 1393 yuan per ton. In other words, the domestic price of wheat using these sources of data about prices is 21 percent below the CIF price of imports. From this standard methodology, one would come to the conclusion that wheat, rather than being protected (by 12 percent—see Table 4), was actually being taxed by trading policies. Yet, as we have seen the main reason for generating a negative rate of protection is that China is importing almost exclusively very high grade, baking quality wheat, while its domestic consumers use mostly medium and lower quality of wheat.

The wrong conclusion is reached when one uses the specialty prices for imports as an international reference price for types of wheat that are much lower quality and are lower priced.

The same problem is found for rice. Because China imports only high quality jasmine rice from Thailand, the international price of rice (3908 yuan per ton—that is calculated by total import value divided by total import quantity) appears to be more than 150 percent higher than the average domestic price (1464 yuan per ton). In fact, as shown in Table 4, China's average price protection (tax) rate, calculated on a variety by variety basis, is almost zero (–3).

Thus, according to this illustrative example, we can see the necessity of approaching the estimation of NPRs in a more careful way for some commodities. Using the traditional approaches work fairly well for commodities that are fairly homogenous in their quality characteristics (such as maize and soybeans). We have seen for the case of wheat and rice for China in 2001, however, that comparing average prices inside and outside of the nation can lead to misleading results. Based on this example, one might conjecture that traditional estimates of NPR rates for some products, such as sugar and edible oils, may be fairly reliable. Those for meat products, cotton, and horticulture crops, however, could be misleading.

**WTO EFFECTS AWAY FROM THE BORDER**

While important in determining the size of the shock at the border, the broader magnitude of the effect of the WTO agreement on China's farmers depends not only on the size of the distortion, but also on the size of the area across which it will be felt. This second factor, in turn, is a function of the size and nature of China's market. In fact, there are at least three factors—policy safeguards (that limit market forces from fully equilibrating domestic and international prices); household responses (by which households are able to move into the production of higher profitability commodities and away from those that experience price falls) and high transaction costs (that possibly can serve to buffer the effects of liberalization policies on those who live in rural areas in China). In this section, we focus on the nature of markets. The policy safeguards are discussed elsewhere in this volume. The effects of household responses are discussed in Taylor (1998) and Huang and Rozelle (2002).

Ultimately, the distributional impacts of WTO will depend on the nature of China's markets. If large areas of the country are isolated from coastal markets where imports land, then the effects of WTO may be circumscribed to restricted parts of the country and should not be expected to have highly adverse impacts on the poor who are largely located in inland areas far from major urban centers. While being isolated from negative external shocks is a plus, there is also a cost. Those living in poor, isolated areas also would not benefit from price rises and opportunities to export, and are potentially vulnerable to price shocks as regional production and consumption demand change. However, if markets exist that link together distant regions with the coast and price changes in one part of the economy quickly ripple through the economy, even though imports are infused into (and exports flow out of) areas concentrated around a few large coastal cities, they could have ramifications for poor households thousands of kilometers away.

To the extent that there are high transaction costs inside China and to the extent that certain domestic markets are isolated from others in the country—especially those inland areas that are isolated from port regions where imports land—it could be that the impact of WTO policies are not evenly distributed. In previous work done on China's agricultural markets (e.g., Park *et al*., 2002), it was found that, in general, China's markets were becoming fairly integrated by the mid-1990s. However, this conclusion should be qualified. First, although market improved greatly during the early 1990s, the analysis still found large parts of the country, especially poorer areas, were not completely integrated into national markets in all years. Moreover, the study's dataset is dated. Since the final year of the available data, more than 7 years have passed.

It is unclear since this time whether markets have matured since that time or whether the actions taken by leaders have led to greater fragmentation (Nyberg and Rozelle, 1999). Surprisingly, given the fragile nature of reforming China's agricultural markets, there is almost no recent work that addresses these questions.

**Assessing the Determination of Price and Market Integration in China**
To assess how integrated and developed markets in rural China are in the late 1990s and 2000, we first describe the data. Second, we test for integration and conduct direct tests of how well prices in different markets move together and if prices are integrated between the market town and China's villages. Finally, we measure degree of price transmission.

**Data**
The data come from a unique price data set collected by China's State Market Administration Bureau (SMAB). Nearly 50 sample sites from 15 of China's provinces report prices of agricultural commodities every 10 days. The prices are the average price of transactions that day in the local rural periodic market. The Ministry of Agriculture assembles the data in Beijing, making them available to researchers and policy makers.

We examine rice, maize, and soybean prices from 1996 to 2000 (except for maize that was only available through 1998). The three crops are produced and consumed in nearly every province in China. Rice price data are available for 31 markets. Because of quality differences among rice varieties in different regions of China, we look at price integration between markets within four regions, South China (South), the Yangtse Valley (YV), the North China Plain (and Northwest China--NCP) and Northeast China (NE). For the provinces included in the sample, rice prices are available for over 90 percent of the time periods. Prices for maize and soybean data are available for 13 and 20 markets, respectively.[7] Product homogeneity makes it possible to include a broader geographic range of buyers and sellers in a single analysis, and we are able to assess the integration of markets spread out over 1000s of kilometers. We compare these results to results from 1988 to 1995 that were produced with the same data and published in Park et al. (2002).

**Integration tests**
In this section we use more formal tests of market integration. To do so, we apply the Engle-Granger cointegration approach to test for the integration of China's grain markets. Two or more price series are cointegrated (even if each is individually non-stationary) if a linear combination of the variables (i.e., the differences of the prices) is stationary. Following Engle and Granger (1987), we apply a two-step residual-based test. The first step uses the OLS regression of one price series on another:

$$P_t^i = \alpha + \lambda t + \beta P_t^j + e_t, \tag{1}$$

where t is the common trend of the two price series and where $e_t$ is the error term. The main reason for running the first step is that it provides the residuals, $e_t$, for the second step. The second step then tests for the stationarity of the residuals from equation (1) using the augmented Dickey Fuller test:

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

If the test statistic on the $\delta$ coefficient is less (i.e. more negative) than the relevant critical value from the Dickey Fuller (D-F) table, the null hypothesis maybe 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 from which the price series come are integrated. The absolute value of the test statistics should be greater than 3 at 10% significant level. In our paper, we are conducting only the unit root test, where $j$ equals zero, since the error term from equation (1) is an AR(1) process.

The results of the cointegration analysis support both our descriptive findings and the conclusions of the determinants of commodity price analysis in the previous page, especially when they are compared to the findings of research on market integration in the late 1980s and early 1990s (Table 6). In middle part of the reform era (1988 to 1995), a time when markets were starting to emerge, between 20 to 25 percent of markets showed signs the prices were moving together during the study periods and sub-periods.

According to their findings, although there were many market pairs in which prices did not move together, between the late 1980s and mid-1990s, there was evidence of rising integration.

Table 6.  Percentage of Market Pairs that Test Positive for Being Integrated based on Dickey Fuller Test in Rural China, 1988 to 2000.

| Commodity | 1989-1995 | 1996-2000 |
|---|---|---|
| (Percent of Market Pairs) | | |
| Maize | 28 | 89 |
| Soybeans | 28 | 68 |
| Japonica Rice (Yellow River Valley) | 25 | 60 |
| Indica Rice (Yangtse Valley and South China) | 25 | 47 |

Note:  Results for two periods from same data set.  For results from 1989 to 1995 for maize and rice, see Rozelle et al. (2000).  Rice results are for the whole country in 1989-1995.  Results from soybeans for 1989 to 1995 and all results from 1996 to 2000 are by authors.

Using the results from the early 1990s as a base line, our current analysis shows that during the late 1990s, China's markets continued along their previous path of maturation, markets in China, especially those for maize, are remarkably integrated.  In the late 1990s, examining the co-movement of prices between pairs of markets in our sample, we see a large increase in the number of integrated markets.  In the case of maize, for example, in 89 percent of the cases, prices in one market move at the same time as in another (Table 7, column 2).  This is up from only 28 percent of the time in the early 1990s.  The number of pairs of markets for soybeans, japonica and indica rice show similar increases (rows 2 to 4).  The integration of these markets is notable because in many cases, the pairs of market are separated by more than a 1000 kilometers.  For example, we find prices in almost all years to be integrated between markets in Shaanxi and Guangdong provinces and between those in Sichuan province and southern Jiangsu.

Despite the significant progress in terms of integrations, our results do also show that there are pairs of markets during different years that are not integrated.  For example, in one third of the cases, japonica rice prices moved in one market but did not in another.  The case of indica rice trade is even more notable.  In the case of more than half the time (and places), prices do not move together in China's indica rice producing and consuming regions.  While one explanation for such a result is that there is some kind of institution (policy or infrastructure/communication) breakdown that is creating China's fragmentation, as shown in Park *et al*. (2002), it is also the case that since every province in China has rice production and consumption, if during a certain year in a certain area, supply in that region is just equal to demand and price differentials between regions stay within the band between regional "export" and "import" prices, moderate price movements in another area may not necessarily induce a flow into or out of the region that is in equilibrium.

Even with the non-trivial number of cases in the late 1990s in which market prices in pairs of markets do not move together, based on each of the market performance analyses, one must conclude that the impacts of WTO on China's agriculture will be experienced across wide regions of the nation from coastal to inland areas.  However, this is only half of the story.

While the analysis in the previous section demonstrates a remarkable degree of integration between markets on the coast and those inland, such an analysis is still not sufficient to insure that many of China's villages will be affected by the shocks that hit the coast and are transmitted inland.

Table 7. Soybean, Corn and Wheat Village Price Regression, 2000

| Explanatory Variable | (1) Soybean Price | (2) Corn Price | (3) Wheat Price | | |
|---|---|---|---|---|---|
| | | | | | |
| Distance to the nearest county market | -0.029 | -0.00064 | -0.0095 | | |
| | (2.37)** | (-1.63)* | (3.24)** | | |
| | | | | | |
| Village-Level Shock to Production | -0.04 | 0.12 | 0.081 | | |
| | (-0.17) | (-1.34) | (-1.02) | | |
| | | | | | |
| Other Variables not shown | timing of sales / net purchase or seller / | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

To do so, in this part of this section we examine the extent to which villages are integrated into regional markets. Our test of integration will essentially test if farmers in China's villages are price takers or are villages isolated, making prices determined by local supply and demand.

In briefest terms, if variables that affect local supply significantly affect prices, we will assume villages are isolated and markets are not integrated to the village level; in contrast, if the local supply shock does not affect the price, villagers are price takers and markets will be thought to be integrated.[8] Our regression analysis clearly shows markets in China are integrated down to the village level (Table 7). The signs and level of significance of the coefficients on variables, such as the distance that a village is from the market, demonstrate that the further a village is from a market, the lower the price the farmer receives, which is the expected result. More importantly for our purposes, the t-ratios of the coefficients of the village supply shock variables are all less in absolute value terms than 1.35, signifying that the output of the local village's crops do not affect the local price. One implication of this result is that it is factors outside the village that are affecting the price that farmers receive, making them price takers. In other words, farmers, even in China's remote villages, are linked to the markets of its main commodities.

**Price Transmission Coefficients**
While integrated markets mean that inland markets will experience price changes in the direction of the price movements at the ports (for those crops that are imported and exported), frictions in the marketing system may shield inland producers from some of the effects.[9] Moreover, as we have seen, despite the rise of price integration in China's domestic markets during the reform period, there are still a significant number of market pairs during certain years that do not move together. Hence, when assessing the impact of WTO-induced price shocks at the border on farmers inland, we need to examine the degree of transmission of these effects.

To examine the proportion of the price changes that would be experienced in regions away from the port, we conducted a series of analysis to try to measure the extent of the change of prices inland for a percentage change at the port. We do the analysis for the two major crops for which we have complete data series, rice and maize. In the first analysis, we stack the price data from various markets for the last three years (1998 to 2000) and regress the price of the inland market (in logs in time period t) on the price at the port market (in logs in time period t) and three lags (t-1; t-2; and t-3—Table 8, row 1). The sum of the coefficients on the port variables provide an intuitive measure for the total transmission of price shocks in percentage terms.

The price transmission coefficients range from 42 to 51 percent for rice (the lower range being a measure of the price impact that does not include coefficients with t-ratios under 1.580—column 2). According to these measures, about half of the price change at the port is transmitted to the inland market. The transmission coefficients for maize range from 51 to 57 percent (column 1). This means that if maize prices fell 10 percent at the border due to the import of an amount up to China's TRQ-specified quota limit, the price of maize inland would fall around 5 percent.

Table 8. Transmission Coefficients for Rice and Maize Measuring the Percentage of Price Shock at Port that is Transmitted to Inland Markets in China, 1996 to 2000. [a]

|  | Maize | Rice |
|---|---|---|
| Standard Vector Autogression Model (VAR) [b] | 51 to 57 | 42 to 51 |
| VAR with corrections for autocorrelation. | 49 | 10 to 13 |
| Vector Autogression Model with Impulse Response Simulation [d] | 20 to 35 | 12 to 25 |

[a] The transmission coefficient is interpreted at the average proportion of a price shock in the port market that is experienced by the markets inland.
[b] Standard Vector Autoregression Analysis stacks the price data from various markets for the last three years (1998 to 2000) and regress the price of the inland market (in logs in time period t) on the price at the port market (in logs in time period t) and three lags (t-1; t-2; and t-3). The sum of the coefficients on the port variables is a measure of the total transmission of price shocks in terms of proportions.
[c] This uses the same model as in row 1, but also includes lags of the dependent variable for t-1, t-2 and t-3. Simulation analysis proceeds by shocking the price at the border and following the price from port to inland, holding the own market's price generation constant.

The analysis in the above paragraph, however, does not account for the fact that the error term in the equation could be subject to autocorrelation. The corrected transmission coefficients fall only modestly for maize, declining to 49 percent (Table 8, row 2, column 1). In other words, even after accounting for autocorrelation, if the price at the border (or port) changes by 10 percent, the inland price falls by nearly 5 percent. After the same treatment in the rice equations, however, the price transmission coefficient falls sharply (to around only 10 percent—column 2). According to this result, we find that rice markets are subject to much more friction than those for maize, a result that may result from the inherent differences between rice (a commodity with a wide range of qualities) and maize (a more homogeneous commodity). In other words, when we are observing a price shock in the port market, it may be being caused by the new inflow (or shortage) of a particular type of rice. For example, when a certain type of rice in Guangzhou suffers a shock (e.g., the harvest in one of the production bases is greatly reduced, although the price in another production base (which produces that variety may move), the price in an area that does not produce that variety may not change. In the case of maize, however, it homogeneous nature means that most of the price shock in one market is passed through by traders.

A third analysis confirms the finding of the more traditional price transmission model (Table 8, row 3). Using a impulse response analysis (which basically uses the price transmission model and adds a set of lagged own prices--the price in the inland market in period t-1, t-2 and t-3), we find that 10 percent price change in the port price of maize changes the inland price by up to 35 percent and up to 28 percent in the case of rice.

## CONCLUSIONS

The purpose of this paper is study the effect of China's accession to WTO on the agricultural sector. Although other effects on the rural economy from other subsectors may be equally large or even large, this study's focus on the agricultural sector showed that there will be an impact. However, like other effects, those in the agricultural sector may not all be negative. Our findings, based on new methods to collect data and create NPRs, show that indeed for some crops WTO will likely lead to a fall in prices and a rise in imports. Maize and cotton may be most affected. It is possible that soybeans and sugar could be significantly affected in the longer run. There are also commodities in which China has considerable comparative advantage – e.g., rice, meats, and horticulture products-- and, hence, WTO could provide benefits to those engaged in these activities. The prospect of increased imports of feed grains (e.g., maize and soybeans) at lower prices means that livestock producers could become even more competitive.

The extent to which prices fall from rising imports or rise from rising exports in part depends on how China's executes its WTO obligations. Although there may be room for footdragging (which could delay that negative effects), the nature of the agreement also provides many means to limit the downside effects. Likewise, China's benefits are going to depend on how well their trading partners honor their commitment and provide China with better access to global markets. We suggest that rather than footdragging on its own reforms, China would be better to use some of its capital and goodwill to fight measures in its trading partners, such as Japan's safeguards against mushrooms. Here, China has already had a huge, unheralded win by getting Japan to move from its original proposal for blatantly WTO illegal SPS measures to safeguards that are transparent and temporary. Complainants against foreign trade barriers in WTO tend to have a high success rate. In general, to gain the most in the long run from this agricultural agreement, both China and its partners need to endeavor to try to live up to their agreements.

Our paper also found that unlike the case of Mexico, it appears as if most of China's markets 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 unlike a large number of maize farmers in Mexico who were not affected by NAFTA's reduction in maize import restriction, if our results are correct for large parts of China, its farmers will be affected. The problem, although it is a short run one, may be that it is this group of rural households that are most dependent on agriculture and least able to be flexible. As a consequence, our findings should be taken as a warning to government leaders that they need to begin to be concerned about the welfare of these susceptible groups.

Our results also generate findings that show the close relationship that exists among the degree of integration of an economy, the size of the price effect and the amount that fraction of the TRQ that will be imported. If China's markets are really so integrated, and leaders do not artificially delay the ability of traders to execute TRQs, our findings suggest that the price effects may not be too large (because they will be spread out across a large area of the country). However, if the price effects for a given quantity of imports are not large, the volume of imports may be larger than predicted by some and the bindings may be more likely to take effect. We do not expect in any circumstance that imports will ever exceed the limits put on by the TRQ.

## ACKNOWLEDGEMENT

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**CHALLENGES AND ISSUES IN MEASURING NOMINAL PROTECTION RATES**

Although measuring the difference in price between an economy's domestic price and the international price, the wide range of estimates of NPRs that exist for China demonstrate it is not a straightforward process. In fact, there are a number of issues that complicate NPR measurement. First, confusion may stem from the way analysts have asked their question about NPRs. Policy makers and researchers have sought to summarize the impact of various commodities with a single number. Trade modelers need a single number to make their analytical frameworks tractable. People want to know what is *the* price of wheat in China and compare that to *the* world price of wheat. With this information, the NPR of a commodity is simply the difference of these two numbers.

However, more careful observation shows the search for a *single* number may be one of the main reasons different analysts can come to *so many different* conclusions. In fact, there are many prices for wheat in China. Prices vary across time within a year. Prices vary across regions within a time period. When calculating the NPR, does one look at 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, rice is not rice is not rice. There are many different varieties and types, all of which command different prices at different places at different times during the year. In fact, for some commodities, such as rice, China is exporting one type at the same time it is importing another. The same sets of issues face analysts when they attempt to choose a price series (or more difficult yet, the single price) to represent the international price. Which price should an analyst choose? Should it be FOB or CIF? Should it be the average annual price or a price during one particular period? And, 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 NPRs. For example, Tuan and Cheng (1999) estimated quite high and variable nominal rates of protection for agricultural commodities. Their estimates for wheat, maize and soybeans in 1997 were 62, 15 and 140 percent respectively. On the other hand, Carter and Estrin (2001) finds generally negative price distortions. Huang (2001) provides sets of estimates that show some products are highly protected and in other cases there are negative rates of protection.

Endnotes

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[1] A number of good analytical papers exist that identify the conditions under which China will enter WTO, the possible sources of gain and losses, as well as what effects might be on aggregate trade. (see, for example, Johnson, 2000; CARD, 2001; OECD, 2001; Carter and Estrin, 2001; Tuan and Cheng, 2001. etc.. Little of this work, however, tries to track regional, sectoral or specific effects with empirically based methods.

[2] Some scholars in China have also pointed out that since part of the value of agricultural commodity production uses inputs on which the value added tax has been assessed, the "real" tax rate on agricultural commodities is actually higher. Although certainly this is the case, the maximum that could be added would only be an addition 2 to 4 percentage points (15 percent times the share of the inputs that were taxed—about 10 to 30 percent—depending on the commodity, the technology, and region of production).

[3] Because of the absence of a single central authority that manages grain flows, the enumeration team chose their sample in a number of ways. In each location, we first visited the local grain bureau and obtained access to a list of all grain bureaus, the firms that they were running on a commercial basis, and their subsidiaries. We interviewed an official in the grain marketing division and transportation division. We also chose three firms that were owned directly by the grain bureau and three that were affiliated with the grain bureau. In several cities, the grain bureau had a list of large grain trading and grain using firms (e.g., mills and feed lots). In others, this was obtained from the market administration bureau. Five firms were chosen on the basis that they were private and had yearly sales that exceeded one million yuan. We interviewed at least 2 flour or rice mills and feed mills in each location. Finally, we visited the wholesale market and randomly chose 5 stalls to interview. The team also visited a number of other entities, such as the grain reserve, the local COFCO agency, and supermarket chains. In some cases, the managers of these entities knew the grain trade business well enough to answer our questions, in other cases they did not.

[4] During the interviews, a survey instrument was filled out documenting the scope of the interviewee's participation in China's domestic and international food and fiber trade. We were particularly concerned with understanding the transactions that the interviewees were involved with or knew about that concerned imported or exported grains, fiber, meat and other goods. The survey recorded the characteristics of the commodities that were involved in trade in the immediate marketing area during the fall of 2001. Enumerators then asked the interviewee a series of questions about commodities about which the traders were most familiar. For imported commodities, interviewees first told the enumerators the international CIF price of the good. Second, the interviewee then told enumerators what the good would sell for if auctioned of in a competitive auction. In other words, we elicited a series of price gaps for a carefully defined set of goods. Since, on average, each interviewee had information about a number of commodities, we had several hundred observations. A similar set of questions was asked about exportable goods, including maize, rice, cotton, and meat products, etc.

[5] We should stress, however, our survey was conducted the same way. In most cases, interviewees told us that there was not a lot of quality differences among maize varieties. Moreover, there was only a slight (around 2 to 3 percent) of price difference between imported and domestic soybeans from quality.

[6] These are computed by comparing the domestic wholesale price with the average implicit price of trade, for the importable (exportable) it is total value of import (export) divided by total volume of import (export).

[7] Since we use data over time, we need to convert prices to a real basis. Nominal prices from our 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 us to disregard transaction cost increases within periods associated with inflation.

[8] The data for this study were collected in a randomly selected, nearly nationally representative sample of 60 villages in 6 provinces of rural China (henceforth, the China National Rural Survey—CNRS). To accurately reflect varying income distributions within each province, one county was randomly selected from within 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 our own counts to randomly choose twenty households, both those with their residency permits (*hukou*) in the village and those without. A total of 1199 households were surveyed. The CNRS project team gathered detailed information on both the production and marketing behavior of all of the farmers in the sample and the characteristics of each village and its relationship to the nearest regional market. From each individual respondent in the survey in each village, we know the price and timing of the sale for each commodity. From these data, we construct an average village price for each month in yuan per kilogram. In a community questionnaire, we know how far the village's center is from the nearest paved road and the distance to the county market both in kilometers. Finally, for each crop that the farmer cultivated, we know if the farmer's crop suffered a shock, recording both the incidence and the percentage by which the yield fell. We do not include any variable that controls for the presence of a community buffer stock system, primarily because such an institution is almost never observed in modern China. In addition, sales among farmers within a village are rare (according to our data, less than 5 percent of sales).

[9] It is also possible that there could be transmission elasticities great than unity. Producers in an exporting region may find their price moves proportionately more than in the port. For example, consider the case if the CIF price was 100 and the interior price was 50. If the marketing margin were additive, the rise in the world price of 10 percent