Chapter 3:

A Tale of Two Commodities: China's Trade in Corn and Soybeans

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Introduction

It was the best of times, and the worst of times. It was a time of great expectations, dashed hopes, and surprising plot twists. It was the five-year period following China's December 2001 accession to the World Trade Organization (WTO).

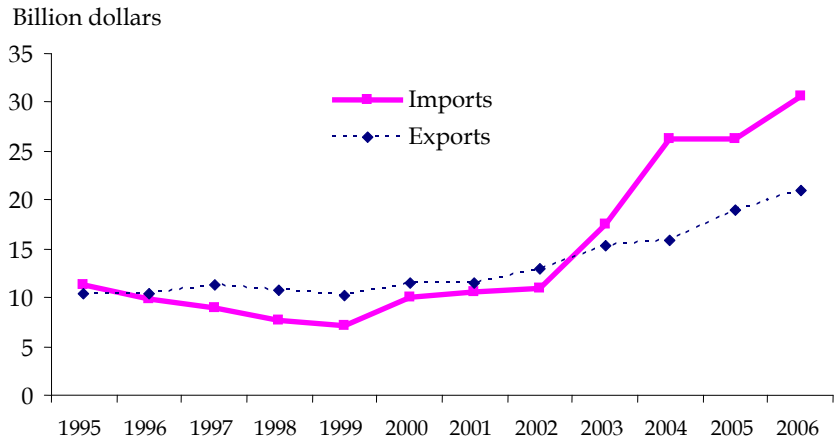
Nearly all analysts predicted that China's agricultural imports would rise sharply after it joined the WTO. The United States (U.S.) and other agricultural exporting countries anticipated "the best of times" after WTO accession as China lowered barriers, experienced faster growth, and increased its imports of grains, oilseeds, and livestock products (Lohmar, Hansen, Hsu, and Seeley, 2002). Many analysts in China anticipated "the worst of times" for the country's small farmers who would be unable to compete with low-priced imported commodities from developed countries.

At first glance, the projections appear to have been correct. China's agricultural imports (using the United States Department of Agriculture's (USDA's) definition which excludes fish and forest products) nearly tripled from $10.5 billion in 2001 to $30.6 billion in 2006 (Figure 1). However, a closer look reveals that China's agricultural trade did not evolve quite as expected. Most analysts expected a broad-based increase in imports of grains, other field crops, meat, and dairy products but the growth in imports, has been concentrated in a narrow range of commodities. It was "the best of times" for U.S. soybean and cotton exporters. Soybeans and cotton combined accounted for nearly half of the $20 billion increase in China's agricultural imports from 2001 to 2006 (Table 1). Natural rubber and palm oil accounted for another one-fifth of the import growth. That means 70% of the growth in China's agricultural imports came from just four commodities.[1]

* The views expressed here are *those* of the author, and may not be attributed to the Economic Research Service or the U.S. Department of Agriculture. The author thanks Francis Tuan, Bryan Lohmar, Ed Allen, Steve MacDonald, Rick O'Meara, William Tierney, and Mary Anne Normile for providing comments on earlier drafts of the paper.

[1] Other descriptions of China's recent agricultural trade trends can be found in Gale (2005, 2007), Tian (2006), and Bao (2007).

Figure 1: China's Agricultural Imports and Exports, 1995-2006



Source: ERS calculations using China Customs Statistics
Note: Definition of "agricultural" excludes fish and forest products and includes unprocessed cotton, wool, and animal hides

It was "the worst of times" for those predicting that China would import corn and wheat. Much of the ex ante analysis of WTO impacts focused on the potential for grain imports, yet cereal imports accounted for less than 2% of China's agricultural import growth. Projections of China's transition to corn net importer are consistently pushed further into the future. China's wheat imports also failed to meet expectations.

The surge in agricultural imports has not led to "the worst of times" for Chinese farmers. The imports that have grown the most are commodities that do not compete directly with products of most Chinese farmers. Natural rubber and palm oil are tropical products not produced in significant quantities in China. Vegetable and fruit imports consist mainly of cassava and tropical fruits from Southeast Asia. Imports of apples and citrus occupy high-end market niches and do not compete directly with Chinese fruit.

There have been complaints about imports from domestic soybean and cotton growers, but demand for these commodities has grown so strongly that production and prices for these commodities did not decline despite the flood of imports. In addition, many Chinese farmers benefited from improved export opportunities. China's agricultural exports grew at a steady pace, just slightly slower than imports.

Table 1: Composition of China's Agricultural Import Growth, 2001-06

HS codes	Commodity	Change, 2001-06	Share of change
		$million	%
NA	All agricultural*	20,071	100.0
5201	Cotton	4,797	23.9
1201	Soybeans	4,680	23.3
4001	Natural rubber	2,438	12.1
1511	Palm oil	1,871	9.3
1507	Soybean oil	779	3.9
07, 08	Fruits and vegetables	917	4.6
41	Animal hides and skins	761	3.8
5101	Wool	470	2.3
04	Dairy products	346	1.7
10	Cereals	213	1.1
	Other agricultural	2,798	13.9

Source: Author's calculations using China Customs Statistics reported by World Trade Atlas
*Agricultural includes HS codes 01-20, excluding fish and seafood, plus unprocessed animal hides, cotton, and wool
Note: Table shows change in calendar-year agricultural imports between 2001 and 2006

Five years after WTO accession, China maintained its self-sufficiency in traditional staple crops while its reliance on imports of soybeans and cotton increased sharply. Calculations based on USDA/Foreign Agriculture Service (FAS) estimates show that China's ratio of domestic production to consumption for rice, wheat and corn rose from 80-90% in 2003 to 100% or higher in 2006 (Table 2). China is also near self-sufficiency in rapeseed. In 2006, China's soybean production met only 35% of its consumption and its cotton production met 75%.

Two Commodities: Corn and Soybeans

The remainder of this chapter looks more carefully at China's trade in two commodities—corn and soybeans—that followed contrasting trends in trade. The corn-soybean story illustrates how China's actual trade patterns do not always follow trends predicted by economists based on fundamental tariff and price relationships.

Corn and soybeans are both land-extensive crops in which China does not have a comparative advantage. Both commodities were traditionally staple food grains in China, but are now used primarily for animal feed and cooking oil. Soybean imports were liberalized in the 1990s to encourage livestock industry development. Corn remains a strategic commodity since it is still considered by many policymakers to be a staple grain and is widely grown by

Chinese farmers (corn output is nearly 10 times soybean output in China). It is the primary crop in northeastern provinces which were hit hard by economic restructuring in the 1990s.

Table 2: China Self-Sufficiency in Major Crops, 1996-06

Year	Rice	Wheat	Corn	Rapeseed	Soybeans	Cotton
			%			
1996	103	103	121	100	92	100
1997	106	113	95	97	95	114
1998	104	101	117	79	76	115
1999	104	104	109	73	62	86
2000	98	90	88	83	58	89
2001	91	86	93	94	54	96
2002	90	86	96	100	47	78
2003	85	83	90	96	45	72
2004	96	90	99	98	43	83
2005	99	96	102	95	37	68
2006	100	103	102	93	35	75

Source: ERS calculations based on USDA/FAS, PSD
Note: Table shows ratio of domestic production to domestic consumption. Inventories are not considered in the calculation

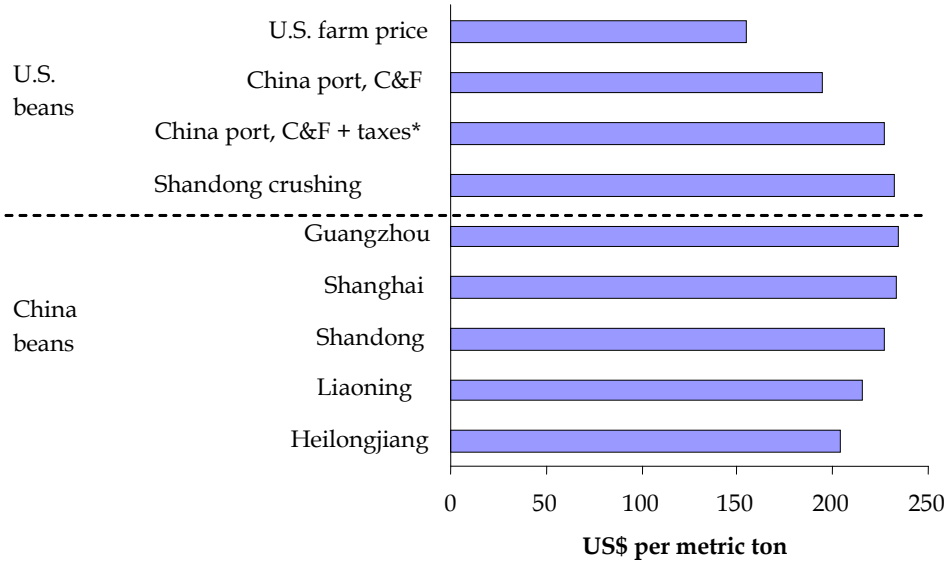
Studies conducted in the 1990s found positive rates of protection for both commodities (Martin, 2003; Huang, Chen, Rozelle, and Tuan, 2003). At the time of WTO accession, China's domestic prices for corn and soybeans were both well above U.S. prices. The price of soybeans in China's main production area (Heilongjiang Province) was 32% above the U.S. farm price (Figure 2), while the corn price in China's corn production areas (Jilin Province) was 47% above the U.S. farm price (Figure 3). Domestic Chinese prices of corn and soybeans are higher in coastal areas where many of China's feed mills and oilseed-crushing plants are located.

After WTO accession, imports of both soybeans and corn were subject to low tariffs. Soybean imports were assessed only a 3% tariff with no quota on imports, a regime that was in place before WTO accession. For corn, China agreed to set annual tariff rate quotas (TRQs) after

WTO accession that would allow imports of up to 7.2 million metric tons (mmt) at a 1% tariff.[2] China also agreed to end export subsidies, a policy that was expected to cut off China's corn exports. Most analysts expected China's corn exports to tail off and its imports to rise after WTO accession in this more liberalized trade regime.

While the fundamental price relationships of Chinese vis-á-vis U.S. corn and soybeans appear to be similar, the trends in trade in the two commodities were quite different. China's imports of soybeans nearly tripled from 10 mmt in 2001/02 to 28 mmt in market years 2005/06 and 2006/07, as its demand expanded rapidly (Figure 4). China's imports of corn remained insignificant and China remained a net exporter of corn. Net exports of corn were 5.3 mmt in 2006/07, down from 8.6 mmt in 2001/02.

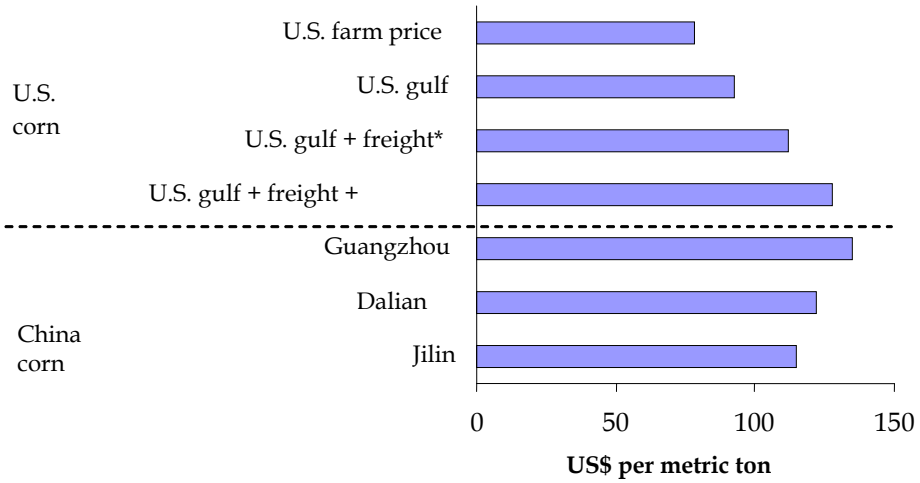
Figure 2: Comparison of China and U.S. Soybean Prices, December 2001



Source: U.S. Dept. Agriculture, customs statistics, and China National Grain and Oils Information Center
* Calculated by author; tariff 3%, value added tax 13%

[2] 32% of the corn quota was to be made available to all end-users. The remaining 68% was reserved for China's state trading company.

Figure 3: Comparison of China and U.S. Corn Prices, December 2001



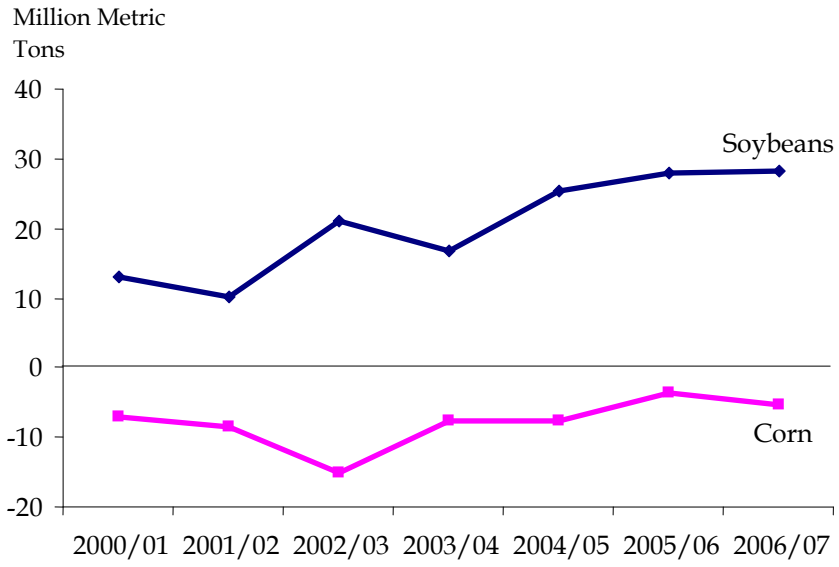
Source: U.S. Dept. Agriculture and China National Grain and Oils Information Center
*Calculated by author; tariff assumed 1%, value added tax 13%

Did China protect its corn market from imports? Apart from tariffs, China utilized several other measures that may have protected domestic commodities. One major policy is the differential treatment of domestic and imported commodities for assessing the 13-percent value added tax (VAT). The VAT is assessed on the gross value of imported commodities, but Latner and Jiang's (2007) analysis suggests that domestic commodities are assessed a lower effective rate due to exemptions for farmers and several categories of farm inputs.[3] The VAT policy affects both corn and soybeans equally and does not explain the divergent trends in trade between the two commodities. VAT rebates for exports (used mostly for corn) appear to be a de facto export subsidy. Delays in approving genetically-modified corn events and distribution of tariff rate quotas in small lots may have constrained corn imports. Domestic policies that induced farmers to plant more grain beginning in 2004 and good weather increased domestic

[3] Imports of several other types of animal feeds including fish meal, bran, distillers dried grains, and rapeseed meal are exempt from VAT (Latner and Jiang, 2007) and the VAT is sometimes waived for other commodities on an *ad hoc* basis.

supplies of corn. High ocean freight rates increased C&F prices of U.S. corn in Asia, but this factor also affected soybeans.

Figure 4: China Net Imports of Soybeans and Corn, 2000-2007



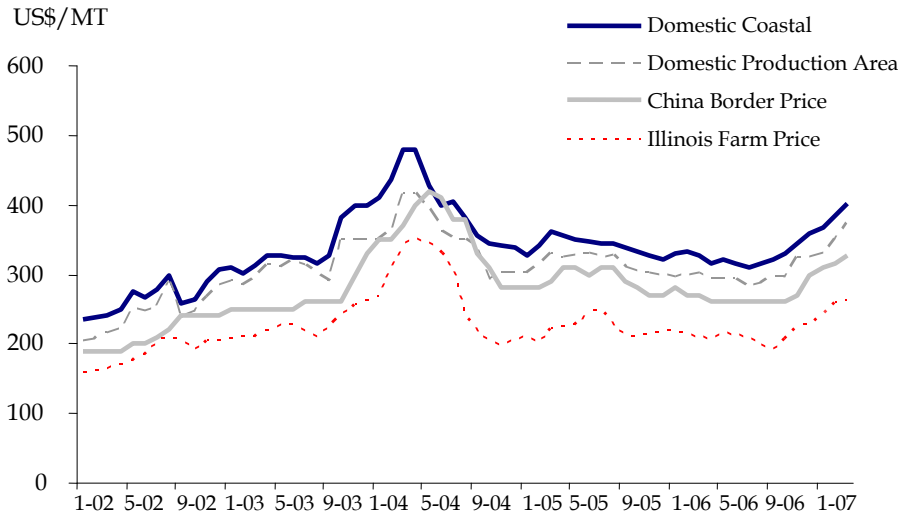
Source: USDA/FAS, PSD
Note: Data are for market years October - September

Monthly domestic and border prices were compared over the period from 2002 to 2007 to assess the degree of protection of the corn and soybean markets. Monthly domestic wholesale prices by province were obtained from China National Grain and Oils Information Center, and converted to U.S. dollars at the official exchange rate for the corresponding month. In Figures 5 and 6, domestic prices are shown for a production area - Heilongjiang Province for soybeans and Jilin for corn - and for a coastal province - Shandong Province for soybeans and Guangdong for corn. The border price for soybeans was calculated as the average unit value of imported soybeans reported in China customs statistics. It was not possible to calculate an actual import price for corn since China imported little or no corn during this period. The unit value of

Taiwan corn imports was used to approximate the price at the Chinese border.[4] These border prices do not include tariffs or VAT.

Domestic prices of both corn and soybeans were above border prices for most months of the period 2002-07 suggesting a modest level of protection. The border price of soybeans was consistently below the coastal (Shandong) domestic price, and usually below the price in inland production areas (Heilongjiang). The monthly differential between the Shandong price and the border price averaged 21% over the period 2002-07, and it ranged mostly between 10 and 30%. After adding the tariff and value added tax, the cost of imported soybeans was still slightly below the domestic price in Shandong in most months. The border (Taiwan) price for corn was below the coastal (Guangdong) domestic price during most months of the period 2002-07, but there were periods during 2003 and 2004 when the border price was at or above the domestic price. After adding the tariff and value added tax, the theoretical price of imported corn was at or above the Guangdong price during most of 2002-07.

Figure 5: China Soybeans--Domestic and Border Prices, 2002-07

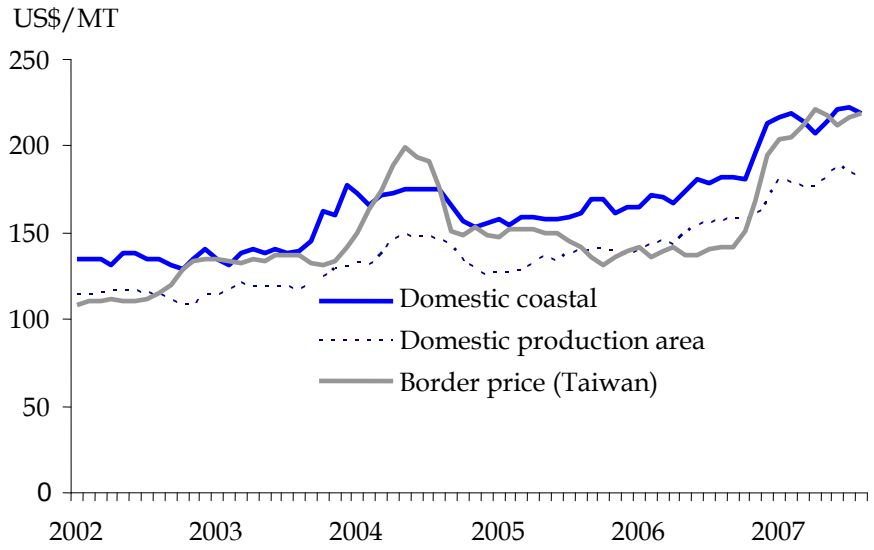


Source: China National Grain and Oils Information Center; China Customs Statistics

[4] A border price was also calculated by adding average shipping costs (U.S. Gulf to East Asia) to the average U.S. Gulf ports price of corn. This measure seemed consistent with the Taiwan unit value.

The co-movements between prices reveal differences in liberalization of the corn and soybean markets in China. Fluctuations in domestic soybean prices appear very closely correlated with fluctuations in the border price, an indicator that international market conditions are transmitted to the China market. Domestic soybean prices in coastal and production regions of China move almost in unison, suggesting that price changes in one region are quickly transmitted to other regions. By implication, international market changes are quickly transmitted to markets in soybean production areas.

Figure 6: China Corn—Domestic and Border Prices, 2002-07



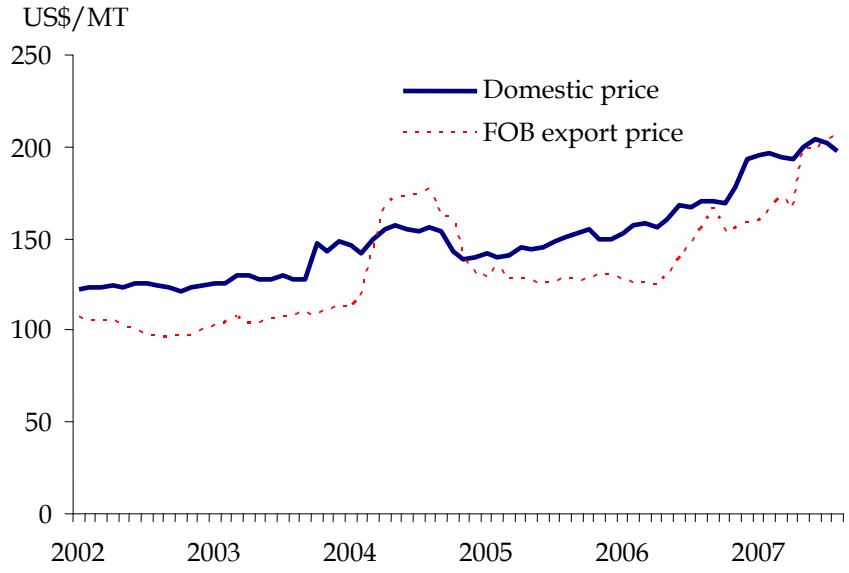
Sources: China National Grain and Oils Information Center and Taiwan Customs Statistics

Price trends for corn suggest that China's corn market is more insulated from the world market. Like domestic soybean prices, domestic corn prices in production areas (Jilin) and coastal areas (Guangdong) move together very closely, suggesting that domestic markets are closely integrated. However, domestic corn prices are not as closely linked to trends in international prices. Sharp peaks in the border price of corn in 2004 and early 2007 are reflected by contemporaneous—but much less pronounced—peaks in Chinese prices, suggesting that shocks to the world market do have some impact on the Chinese market. However, during other periods (2002-03, 2005, and early 2006), there appears to be little co-movement between

Chinese and international corn prices. These recent price trends suggest that the Chinese corn market is more insulated from the international market than is the soybean market.

One of the major differences between China's corn and soybean markets during this period was government stock-holding. China held large government reserves of corn accumulated during the 1990s, but it did not hold large soybean reserves. The soybean market was driven by current-year production and consumption and world prices, but the corn market was dominated by the problem of disposing of huge corn stocks without depressing domestic market prices. China sought to create new demand by developing livestock production, starch, and ethanol industries in corn production areas. The most important means of disposing of corn stocks was subsidized exports. The relatively stable domestic corn prices in China suggest that authorities succeeded in stabilizing the domestic corn market. However, stability came at great financial cost.

Figure 7: China Corn: Domestic and Export Prices, 2002-07



Source: China National Grain and Oils Information Center; China Customs Statistics

China agreed to end subsidies for exports after WTO accession, but corn export sales continued to be made at prices well below domestic prices after WTO accession (Figure 7).[5]

[5] China now claims to offer only a rebate of VAT and waivers of rail taxes. Only two companies are authorized to export Chinese corn, and they must have quotas awarded by the central government to do so. The export price

Since 2002, the unit value of corn exports has generally been 10%-20% below the wholesale price at Dalian in Liaoning Province, the main port for shipments of northeastern corn both to export markets and corn deficit areas in southern China. On average, the monthly average unit value of exports was $24 below the domestic price at Dalian. Calculations based on China customs statistics show that China exported a cumulative total of 42 million metric tons of corn during 2002-06.[6] These figures suggest that the total subsidy cost of corn exports over the period 2002-06 was roughly $1 billion (Table 3). The policy implicitly taxed feed and livestock producers in southern China, but those costs are difficult to quantify.

Table 3: Estimated Subsidy Cost, Chinese Corn Exports, 2002-06

	Unit	Total
Cumulative exports	Million metric tons	42
Estimated subsidy per ton*	Dollars per metric ton	24
Estimated total cost**	Dollars	1 billion

Source: Author's calculations based on data from China Customs Statistics and China National Grain and Oils Information Center
*Average difference between value per ton of exports and domestic price at Dalian.
** (Cumulative exports) x (subsidy per ton)

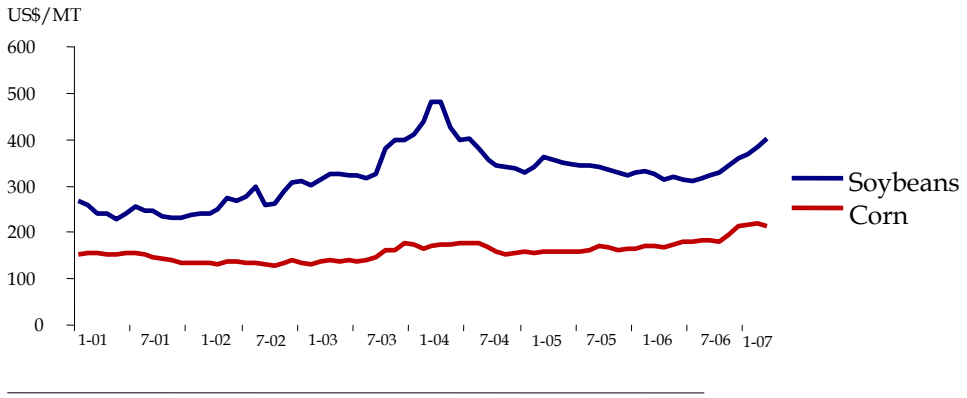
Over the five-year period 2002-06 (calendar years) China's net imports of soybeans totaled 105 mmt while exports of corn totaled 42 mmt. This policy has the appearance of supporting corn prices while allowing soybean prices to fall. In fact, there has been some agitation among soybean interests to protect local farmers from imported beans. Lan (2006) painted a bleak scenario of soybean farmers unable to sell their crops, and attributed their problems to competition from imported soybeans. The Ministry of Agriculture (2006, p. 110) identified the increase in soybean imports as an adverse effect of WTO accession that prevented prices and farm incomes from rising.

In fact, soybean imports have not driven down soybean prices—either in absolute terms or relative to corn. Soybean prices increased faster than corn prices from 2002 to 2004, before

exceeded the domestic price during 2004 when subsidized exports were suspended due to tight domestic grain market conditions.
[6] The cumulative corn export total for the decade from 1997 to 2006 was 74 million metric tons.

falling during 2004-06 (Figure 8). Over the entire 2002-2007 period there was no long-term decline in soybean prices. By comparison, corn prices were relatively stable over that period. According to cost of production survey data collected by the National Development and Reform Commission Department of Price (2006), farm profits from both corn and soybean rose in 2003-05 (Figure 9).

Figure 8: Comparison of Domestic Soybean and Corn Prices, Monthly 2002-07

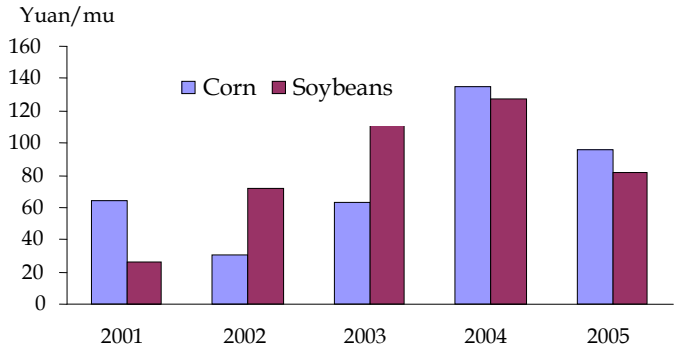


Source: China National Grain and Oils Information Center

Chinese farmers did not abandon soybeans or corn after WTO accession. Soybean area remained at slightly less than 10 million hectares, and China's planted area in corn rose to an historical high in 2005 of 26.4 million hectares, exceeding the previous historical high reached in 1999 (Figure 10). The rise in corn area did not result in a large decline in soybean area.[7]

[7] Planting intentions surveys indicate that there was a shift in area from corn to soybeans in 2007.

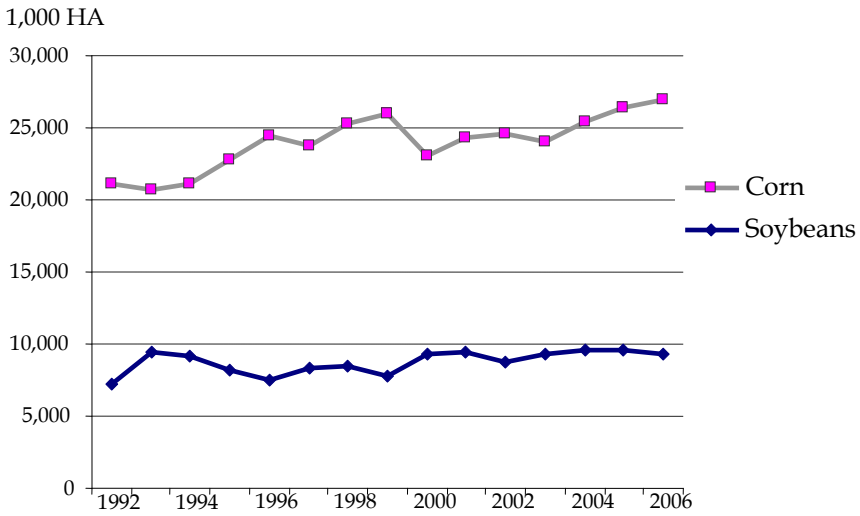
Figure 9: China Profit per Mu, Corn and Soybeans, 2001-05



Source: National Development and Reform Commission

Note: 15 mu = 1 hectare; 8.28 yuan = $1

Figure 10: Planted area, corn and soybeans, 1992-2006



Source: China National Bureau of Statistics

An Ironic Plot Twist

Since the 1990s, the conventional wisdom was that China's growing demand for corn to feed an expanding livestock herd would lead to rising Chinese imports, boosting grain prices and incomes for U.S. farmers eager to find new sources of demand. However, China's growing

demand emerged in the form of soybean imports that grew beyond most forecasters' expectations. China's corn imports have not yet materialized.

In 2006 and 2007, "the best of times" finally emerged for U.S. corn producers. The Illinois farm price for corn surpassed $3.50 per bushel in 2007, up from less than $2 per bushel at the time of China's WTO accession. The new source of corn demand emerged not in China, but in the United States, in the form of the U.S. ethanol boom.

The irony is that new demand for corn in the U.S. affected the China market, not the other way around. Prior to the ethanol boom, China's corn prices were rising gradually in 2005 and 2006, reflecting a tightening of Chinese corn markets as corn stocks diminished and industrial demand for corn expanded. Several Chinese feed and starch companies imported 62,000 metric tons of U.S. corn in the first half of 2006 to test the mechanism for importing grain. No further purchases were made after the sharp rise in U.S. prices in Sept-Nov 2006 made corn imports more expensive. A corresponding jump in Chinese domestic corn prices in Oct-Dec 2006 (despite a good corn harvest in China) followed the spike in U.S. prices. Rising corn prices boosted feed costs, contributing to record pork prices in May 2007 and stoked concerns about food price "inflation" in China. Partly as a result of the jump in Chinese corn prices, Chinese policymakers declared a moratorium on new grain-based ethanol and starch production projects.

An Unfinished Story

China has so far defied the forecasters and remained surprisingly self sufficient in food despite lowering trade barriers while at the same time maintaining stable domestic markets. There is still a lot we don't know about China. The level of grain stocks is unknown. The influence of food security on trade policy is unclear. Livestock statistics are sketchy and animal inventories and production numbers are probably overstated (Gale, Tuan, Fabiosa, and Zhang, 2007). The impacts of poultry and swine diseases on livestock inventories and feed demand are not well understood. China has defied modelers' acreage constraints by achieving a substantial boost in grain plantings in 2004 and 2005 while converting farmland to urban uses without substantially reducing acreage of other major crops.

Of course, the story is not finished. Stories like this one take decades, not years, to run their course. Will China deplete its grain inventories? Will food safety problems and environmental degradation force China to cut back on chemical use and sacrifice yields? Will China approve

domestic production of genetically modified crops? Will China's exchange rate appreciate against the dollar?

We can be certain of two things. More unexpected plot twists are ahead. Making projections of China's agricultural trade is a hazardous occupation.

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