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# China Currency Appreciation Could Boost U.S. Agricultural Exports

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## Abstract

U.S. exports of soybeans and cotton to China have boomed in recent years, but the undervalued exchange rate for the Chinese yuan keeps prices of most other U.S. food and agricultural products more expensive than Chinese products. On average, Chinese retail food prices are about a fourth of U.S. prices. Land-extensive commodities like soybeans, cotton, corn, and wheat have relatively high prices in China, but soybeans and cotton are the only major crops that China imports in significant quantities. With an undervalued exchange rate China's prices are not high enough to attract imports of grains or most livestock products. Appreciation of the Chinese currency would increase the purchasing power of Chinese consumers on world markets and increase China's demand for imported commodities. However, Chinese policymakers are likely to maintain a cautious approach to currency appreciation, motivated in part by farm income and food security concerns.

**Keywords:** China, agricultural, food, retail, farm, prices, exchange rate, currency, yuan, appreciation, exports, trade, apples, soybeans, corn, wheat

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## Introduction

China is being pressured by the United States and other trading partners to allow its currency to appreciate. In June 2007, the U.S. Treasury concluded that the Chinese yuan was undervalued and that the Chinese central bank's intervention in the foreign exchange market contributes to China's persistent trade surpluses and rapid accumulation of foreign exchange reserves. In response to pressure from trade partners, China's monetary authorities have allowed the value of the yuan to rise gradually since July 2005. However, Chinese policymakers are concerned that a sharp change in the exchange rate could result in economic dislocations and financial market instability, and they have adopted a go-slow approach to exchange rate policy reform. Many analysts believe a much larger appreciation is needed in order to narrow China's trade surplus.

Discussions about China's exchange rate are mainly focused on how appreciation of the yuan would affect merchandise trade and financial markets, but exchange rates have important effects on agricultural commodity markets as well (Shane and Liefert).<sup>1</sup> As the yuan appreciates against the dollar, U.S. commodities will become more price-competitive in China, potentially increasing China's demand for agricultural imports. However, not all commodities will be affected equally by currency appreciation, and the potential effects on China's agricultural and food economy are complex.

This report examines how the undervalued yuan affects China's competitive performance in domestic and international markets for agricultural commodities and food products. The report compares Chinese and U.S. prices for various foods and agricultural products to provide perspective on the price-competitiveness of U.S. agricultural products in China and allow informed assessments of how currency appreciation may affect that competitiveness.<sup>2</sup>

<sup>1</sup> China's exports are dominated by machinery, electrical equipment, textiles, toys, and other manufactured goods. Its imports are primarily raw materials, unassembled components, and capital goods such as machinery. See Morrison and Labonte for more background on exchange rates.

<sup>2</sup> The increased availability of price data at the retail, wholesale, and farm levels in China and the increasing role of markets in setting prices make such an analysis feasible. See appendix, "Food and Agricultural Price Data in China."

## The Exchange Rate Issue

Following a series of devaluations and reforms in the 1980s and early 1990s, China maintained a fixed exchange rate of roughly 8.3 yuan per 1 U.S. dollar from 1996 to 2005. Over that period China's trade surplus grew from \$12 billion per year to \$102 billion. Under pressure from the United States to narrow its trade surplus, Chinese monetary authorities made modest changes in July 2005. Authorities allowed a one-time 2.1-percent yuan revaluation and allowed the currency's value to float slowly upward within a narrow daily band. The yuan appreciated against the dollar to 7.6 yuan per dollar in July 2007, a cumulative appreciation of 9 percent over 2 years.

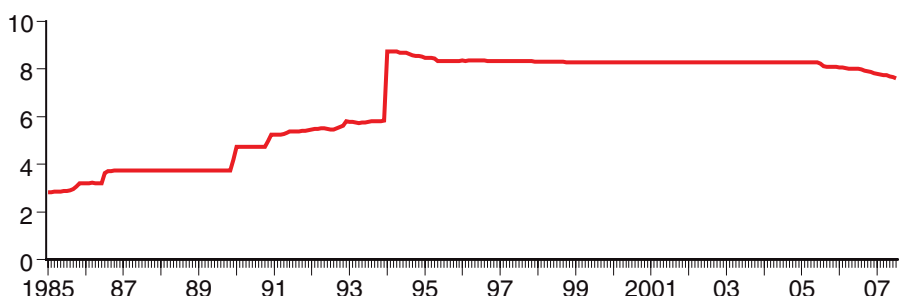
The currency has not appreciated fast enough to narrow China's trade surplus, which grew to \$177.5 billion in 2006, and was projected to exceed \$250 billion in 2007. China's surplus with the United States widened to a record \$232.5 billion in 2006. China's foreign exchange reserves continued to grow as well, reaching a world-leading \$1.33 trillion in mid-2007, up from \$150 billion in 1999.

Even with an undervalued yuan, the United States has a net surplus with China in agricultural trade, and China is one of the top four markets for U.S. agricultural exports. U.S. agricultural exports to China have grown sharply, rising to \$6.7 billion in 2006 from \$2 billion in 2002 (fig. 2). However, U.S. agricultural exports are concentrated in just a few commodities. Apart from

Figure 1

### China-U.S. exchange rate, 1985-2007

Yuan/dollar

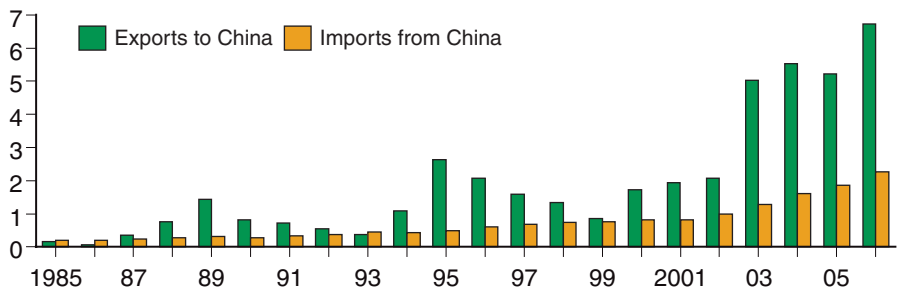


Source: St. Louis Federal Reserve Bank.

Figure 2

### U.S. agricultural trade with China, 1982-2006

Dollars (billions)



Source: U.S. Department of Agriculture, Foreign Agricultural Service.

booming sales of soybeans, cotton, and animal hides, U.S. agricultural products mostly occupy limited high-end niches in Chinese food markets.

As the Chinese currency appreciates, more U.S. agricultural products will become price-competitive in China, and export sales to China may grow even larger. Appreciation of the Chinese yuan will also reduce the competitiveness of China's rising exports of vegetables, fruits, and juices.

## How an Undervalued Currency Favors Local Products

At the current exchange rate, most U.S. agricultural products are more expensive than their Chinese counterparts. Low domestic food prices allow Chinese consumers to attain a reasonably good standard of living on seemingly meager incomes as long as they buy domestic products. Chinese consumers' incomes do not buy nearly as much on international markets where prices are denominated in dollars.

The difference in the amount of real goods and services that can be purchased in China and the United States with a given amount of currency suggests that the economic concept of "purchasing power parity" does not hold, an indicator that the exchange rate is not at its equilibrium value (see box, "Purchasing Power Parity"). As a result, imported foods in China are much more expensive than domestic products, and consumer demand for imports is limited to high-end niche items.

A U.S. dollar buys far more goods and services in China than in the United States, a fact familiar to U.S. travelers to China. In December 2006, the average Chinese retail price of wheat flour was 2.8 yuan per kilogram, while the average U.S. price for flour was \$0.33 per pound, or 5.8 yuan per kg when converted at the official exchange rate. At an exchange rate of 8 yuan per dollar, \$1 could buy nearly twice as much flour (2.86 kg) in China as it can in a U.S. supermarket (1.38 kg).<sup>3</sup> By the same logic, a relatively small expenditure in Chinese yuan is required to purchase a given amount of flour. Average annual flour purchases of Chinese households of 12.5 kg (27.5 lbs) would cost 35 yuan if purchased at local Chinese prices. However, a Chinese consumer would need more than 73 yuan to buy the same quantity of flour at U.S. prices in dollars.

The wide difference between the amount of real goods and services Chinese consumers can buy with their incomes domestically versus what they can buy on world markets also suggests that the U.S. and Chinese currencies are far from purchasing power parity (PPP). In order to bring about PPP at these domestic prices for flour, the exchange rate would have to appreciate by 100 percent to 4 yuan per dollar to equalize U.S. and China flour prices.

Of course, while a single price comparison facilitates explanation and assists understanding, it is not adequate to assess whether PPP holds. We compared U.S. and Chinese food prices for 30 retail food items in July 2006 using official data from price surveys in China and the United States to assess the differences. The selection of food items was dictated by the availability of data from the price surveys, but we tried to include a broad selection of items from different food groups. Chinese and U.S. diets and food availability differ, so it is difficult to find prices for similar items. In some cases, we supplemented official surveys with prices observed from supermarkets or provincial data. We tried to compare foods of similar quality when possible, and cheaper cuts of U.S. meat were used to compare with Chinese meat prices that did not specify a cut. Differences in quality may account for part of the difference in prices. The month chosen for the comparison was arbitrary; the comparisons did not vary by season or year.

<sup>3</sup>In this report we converted weights to kilograms (2.2 lbs) or metric tons (1,000 kg) when making cross-country comparisons. When Chinese prices were reported in jin (0.5 kg or 1.1 lbs) in the original source, we converted them to kg.

## Purchasing Power Parity

When assessing exchange rates, economists often rely on the concept of “purchasing power parity” (PPP), a hypothetical longrun equilibrium where exchange rates are set so that a dollar can purchase an equal amount of real goods or services in all countries when converted to local currencies. If a dollar can buy more goods in one country than another, dollars are expected to flow into the low-price country, bidding up the price of that country’s currency until PPP is restored.

In simple terms, if China and the United States traded only a single commodity, PPP would hold if the price of the commodity in dollars were equal to the Chinese price in yuan multiplied by the exchange rate. Mathematically, the Chinese price in yuan ( $P_{CH}$ ) would equal the exchange rate in yuan per dollar ( $e$ ) times the U.S. price in dollars ( $P_{US}$ ):

$$P_{CH} = e \times P_{US}$$

While this equation rarely holds in practice (transportation costs, tariffs, trade barriers, sanitary and phytosanitary rules, environmental regulations, and other factors can prevent prices and exchange rates from equalizing) economists expect exchange rates and prices in different countries to move toward the equilibrium described by the equation. It is difficult or impossible to calculate the exchange rate that would bring about PPP between the U.S. and Chinese currencies, but it is clear that PPP does not hold at the current exchange rate of about 7.6 yuan per dollar.

*The Economist’s* “Big Mac index” is a popular lighthearted application of the PPP concept, and gives a similar result. It compares the price of a homogeneous commodity—a Big Mac hamburger—in various countries valued at the official exchange rate with the U.S. price. An index of 1 indicates that PPP holds, but the Big Mac index for China was 2.4 in 2006, indicating that the U.S. price was 2.4 times the Chinese price. China’s Big Mac index is one of the highest of all countries included in the survey.

The World Bank’s International Comparison Program estimates that China’s gross domestic product in PPP dollars is four times the GDP converted at the official exchange rate. Wu (1999) cited six such comparisons based on data from the late 1980s that found Chinese incomes in PPP terms were three to nine times higher than incomes at the official exchange rate. Chen, Gordon, and Yan compared Canadian and Chinese food expenditures using 1989 data and found a ratio of 4.6 between Canadian and Chinese food prices, surprisingly close to the ratio calculated in the current study.

We converted all prices into dollars per kilogram using the official exchange rate of 8 yuan per dollar that prevailed at the time and calculated the ratio of the U.S. price to the China price. Most prices are farther apart than flour prices (table 1). Every food price compared was higher in the United States, again suggesting that a dollar buys more food in China than in the United States. Most items were two to four times more expensive in the United States. However, the magnitude of the cross-country difference in prices

Table 1

**China-U.S. comparison of retail food prices, July 2006**

	Unit	China	U.S.	U.S.-China ratio	Description
<b>Grains and oils:</b>					
Wheat flour	<i>Dollars/kilogram</i>	.35	.75	2.1	Standard flour
Rice	<i>\$/kg</i>	.33	1.23	3.7	Long grain uncooked
Salad oil	<i>\$/liter</i>	1.00	1.81 <sup>1</sup>	1.8	Blended cooking oil
Peanut oil	<i>\$/liter</i>	1.79	2.77 <sup>1</sup>	1.6	
<b>Animal products:</b>					
Poultry meat	<i>\$/kg</i>	1.30	2.29	1.8	Whole chicken, fresh
Eggs	<i>\$/kg</i>	.64	1.78	2.8	U.S.: Grade A, large
Pork	<i>\$/kg</i>	1.86	7.28	3.9	U.S.: Chops, center-cut, with bone China: fresh lean pork
Lamb	<i>\$/kg</i>	2.76	9.88 <sup>1</sup>	3.6	U.S.: Lamb shank China: Fresh lamb
Beef	<i>\$/kg</i>	2.39	7.00	2.9	U.S.: Average, all cuts ex. sirloin steak China: Fresh beef
Fish	<i>\$/kg</i>	1.35	6.58 <sup>1</sup>	4.9	U.S.: Tilapia fillet China: Live grass carp
Milk	<i>\$/gallon</i>	2.13	3.08	1.5	U.S.: Whole, fortified
<b>Fruit:</b>					
Bananas	<i>\$/kg</i>	.48	1.12	2.4	China: domestically produced
Apples	<i>\$/kg</i>	1.01	2.52	2.5	U.S.: Red Delicious; China: Fuji
Oranges	<i>\$/kg</i>	.63 <sup>2</sup>	2.05	3.3	U.S.: Navel orange; China: Mandarin
Grapes	<i>\$/kg</i>	1.38 <sup>3</sup>	5.57	4.1	U.S.: Thompson seedless
Pears	<i>\$/kg</i>	.44 <sup>2</sup>	2.64	6.0	U.S.: Anjou; China: Ya
Peaches	<i>\$/kg</i>	.50 <sup>3</sup>	3.05	6.1	
Strawberries	<i>\$/kg</i>	.45 <sup>3</sup>	5.17	11.5	U.S.: 12-oz container
<b>Vegetables:</b>					
Potato	<i>\$/kg</i>	.25	1.22	5.0	White potatoes
Rape greens	<i>\$/kg</i>	.30	2.40 <sup>4</sup>	7.9	China and U.S.: You cai
Green pepper	<i>\$/kg</i>	.68	3.89	10.4	
Celery	<i>\$/kg</i>	.31	3.28 <sup>1</sup>	10.5	
Chinese cabbage	<i>\$/kg</i>	.19	3.28 <sup>1</sup>	17.5	U.S.: Bok choy; China: Da bai cai
Garlic	<i>\$/kg</i>	.55	5.48 <sup>1</sup>	10.1	U.S.: Packaged garlic
Broccoli	<i>\$/kg</i>	.25	3.32	13.3	
Tomatoes	<i>\$/kg</i>	.30	3.25	11.0	U.S.: Field-grown
Sugar	<i>\$/kg</i>	.84	1.11	1.3	Refined sugar

Note: Average prices for 35 Chinese cities reported for July 2006 except where indicated. Chinese prices converted from yuan per jin (1 jin = 500 grams) using official exchange rate of 8 yuan/U.S. dollar. U.S. prices are city averages from U.S. Bureau of Labor Statistics except where indicated and converted from dollars per pound using the ratio of 2.2 kg/lb. Prices are not strictly comparable between the two countries due to differences in quality, degree of processing, marketing costs, and packaging.

<sup>1</sup>Source: U.S. supermarket prices for online shoppers in Phoenix, AZ.

<sup>2</sup>Price for Harbin City (Heilongjiang Province Price Bureau).

<sup>3</sup>Price for Jilin Province (Jilin Agriculture Information Net, <http://www.jlagri.gov.cn/price/index.asp>).

<sup>4</sup>Source: Ethnic Chinese supermarket in Washington, DC area.

Source: Calculations by U.S. Department of Agriculture, Economic Research Service, based on data from China Price Information Center and U.S. Bureau of Labor Statistics unless indicated otherwise.



varied widely, from 30 percent higher for sugar to more than 10 times higher for most vegetables. As noted, the average flour price in the United States was about twice as high, but the price of rice—the primary staple grain in most of China—was 3.7 times higher in the United States. The largest price differences were for vegetables, most of which were 10 times more expensive in the United States. Only a few items (cooking oil, poultry, milk, and sugar) had U.S.-China price ratios less than 2.0.

We summarized these price comparisons by calculating an index of domestic prices in the two countries. The index values a basic consumption bundle of foods at U.S. and Chinese prices using July 2006 prices (table 2). The bundle of foods is the average per capita quantities consumed by Chinese urban households in 2001. At Chinese prices, the cost of these items would be 1,790 yuan, or \$224, at an exchange rate of 8 yuan per dollar. The same bundle of foods purchased at U.S. prices would cost \$920, more than four times the cost at Chinese prices. This comparison suggests that the exchange rate would need to be less than 2 yuan/dollar—a fourfold appreciation in the yuan—in order to achieve purchasing power parity in food.

These price comparisons do not take into account transportation costs, tariffs, and differences in quality, safety, or other attributes. A more careful assessment would compare the price of U.S. products available for sale in China with the price of domestic Chinese products. This is difficult, however, since few U.S. food products are available for sale in China. In the following section we provide a more careful price comparison for apples, one of the few U.S. food products that is widely available in Chinese supermarkets.

Table 2

**Index of U.S.-China food costs, 2006**

Food item	Estimated expenditures per capita <sup>1</sup>		Index
	At Chinese prices <sup>2</sup>	At U.S. prices <sup>3</sup>	
	<i>Dollars</i>		<i>Ratio</i>
Grains, potatoes, oils	42	126	3.0
Meat, fish, eggs, dairy	129	368	2.8
Vegetables <sup>4</sup>	34	370	11.2
Fruit	19	66	3.4
Sugar	3.5	4.6	1.3
<b>Total</b>	<b>224</b>	<b>920</b>	<b>4.1</b>

<sup>1</sup>Expenditures estimated by multiplying average per capita purchases from China National Bureau of Statistics urban household survey, 2004 by prices reported in table 1, except where noted. Calculations exclude melons, beverages, nuts, snacks, shrimp, and food away from home. The total expenditures at Chinese prices are about 60 percent of urban food expenditures reported by China National Bureau of Statistics.

<sup>2</sup>Quantity x Chinese price converted to dollars at official exchange rate.

<sup>3</sup>Quantity x U.S. price.

<sup>4</sup>The index for vegetables was calculated using prices for 6 vegetables for which comparable U.S. and Chinese prices could be obtained. Vegetable expenditures at Chinese prices are obtained from CNBS Urban Household Survey for 2005. The U.S.-China ratio estimated for the six vegetables was multiplied by vegetable expenditures at Chinese prices to estimate vegetable expenditures at U.S. prices.

Source: China National Bureau of Statistics, Urban Household Survey and prices from table 1.

## Comparing Apples to Apples

In this section, we compare the price of U.S. apples available in Chinese supermarkets with the price of various domestic Chinese apples. Apples are also a heterogeneous item that can vary in quality, color, size, and taste, all attributes that can affect the price. A careful comparison shows that U.S. apples sold in U.S. supermarkets are much more expensive than Chinese apples of similar quality that are sold in a Chinese supermarket.

The average retail apple prices reported by U.S. and China statistical agencies are for two different types of apples (Red Delicious in the United States, domestic Fuji in China), but apples of varying price and quality are available in both countries. Imported U.S. apples are valued by Chinese consumers for their appearance and are given as gifts. But much cheaper Chinese apples are purchased for everyday consumption. There is, however, competition between U.S. and domestic apples sold in Chinese stores. In visits to Beijing supermarkets in July 2007, the authors found domestic Chinese apples very similar in appearance to U.S. apples. Sanchez and Wu report that demand for imported apples is weakening as high-quality apples are produced locally in China at lower prices.<sup>4</sup>

According to the China Price Information Center, China's national average apple price for January 2007 was 5.6 yuan per kilogram, but prices reported by a Chinese supermarket<sup>5</sup> (Tianhui Supermarket Fruit Prices, January 5, 2007) showed domestic apples available at widely varying prices, from 3 yuan/kg to 10 yuan/kg (fig. 3). Imported apples were priced at 15.60 yuan/kg, nearly three times the price of commonly purchased domestic apples like Shaanxi Fuji (5.8 yuan/kg), and still 50 percent more than "high-quality" domestic Fuji apples and Aksu apples from western China.<sup>6</sup> The 50-percent premium for imported apples is much less than the differential for apples

<sup>4</sup> U.S. apple exports to China declined by 33 percent in 2006.

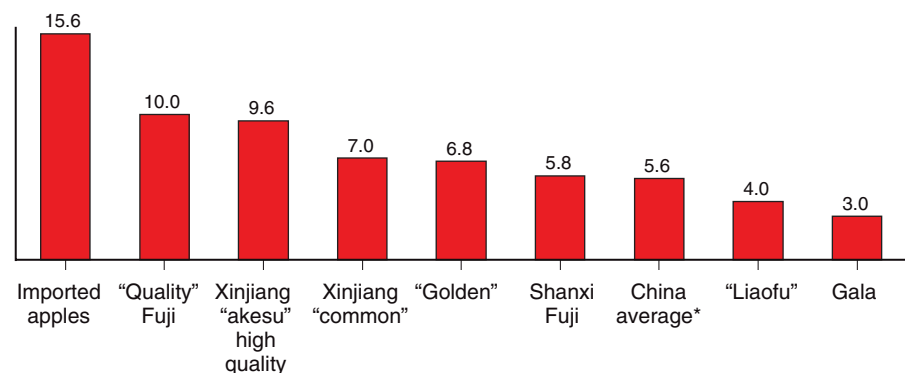
<sup>5</sup> Tianhui supermarket is in Wuxi, a medium-sized city in Jiangsu Province, one of China's wealthier regions.

<sup>6</sup> The price of domestic apples sold by small vendors is even lower than the supermarket price. Domestic fruit is purchased predominantly from small vendors while imported fruit is purchased primarily in supermarkets.

Figure 3

### Imported apples are priced 50 percent higher than high-quality domestic apples in China

Yuan/kilogram



Note: Chart shows Internet price quotations for January 2007 obtained from Tianhui supermarket, a Chinese retail chain that features fresh produce.

\*China average is the national average retail price reported by China Price Information Center.

Source: Tianhui Supermarket, except where noted.

reported in table 1, but it still suggests that the yuan is significantly undervalued when products of similar quality are compared.

Other imported-fruit prices reported by the Chinese supermarket were also well above domestic prices. U.S. oranges were 11.8 yuan/kg and Australian tangerines were priced at 27.6 yuan/kg, while Chinese citrus fruits were priced from 5 to 8 yuan/kg. Domestic plums were priced at 3 to 5 yuan/kg while imported plums were over 37 yuan/kg.

Wholesale fruit prices quoted by the Xinfadi Agricultural Products market in Beijing (one of China's largest agricultural markets) on March 2, 2007 showed an even bigger difference between imported and domestic fruit. U.S. pears were quoted at prices of 24-26 yuan/kg, about five times the price of the most expensive domestic pears (fragrant). U.S. red grape prices were quoted at 32-38 yuan/kg, more than four times the price quoted for domestic red grapes. U.S. plum prices were in a similar price range, but no domestic plum prices were quoted.

## Chinese Farm Prices Vulnerable to Appreciation

While nearly all retail food prices in China are lower than U.S. prices, farm-level prices of some unprocessed farm commodities produced in China are higher than those received by U.S. farmers. Two of these commodities—soybeans and cotton—account for most U.S. farm exports to China. Currency appreciation would make these commodities even more competitive in China and expose Chinese farmers to greater competition.

In 2005 (the most recent year for which data for a wide array of commodities were available), U.S. soybean, corn, cotton, and wheat prices at the farm gate were about 25-40 percent lower than those received by farmers in China (table 3). Peanut and rice prices were just slightly lower in the United States. Farm gate livestock prices were comparable to China's or slightly higher in the United States. U.S. pork and poultry prices were a few percentage points higher than those in China, while egg and milk prices were 30-50 percent higher in the United States. Most horticultural products were much cheaper in China than in the United States, but the difference in prices was not as wide as at the retail level. The U.S. farm price for apples was about 2.2 times the Chinese price. U.S. prices of spinach, cauliflower, cucumbers, and green peppers were two to four times Chinese prices, and the U.S. tomato price was over eight times the Chinese price.

Table 3

### Comparison of prices received by Chinese and U.S. farmers, 2005

Commodity	China	U.S.	U.S.-China ratio
	<i>\$ per 1,000 kg</i>		
Soybeans	310	203	.65
Corn	134	79	.59
Wheat	167	125	.75
Cotton	1,500	1,080	.72
Rice	187	172	.91
Peanuts	401	384	.96
Pork	972	1,095	1.13
Poultry	964	1,014	1.05
Eggs <sup>1</sup>	617	916	1.48
Milk	251	334	1.33
Potatoes	98	152	1.56
Apples	186	404	2.17
Cauliflower	235	662	2.81
Spinach	219	496	2.27
Cucumbers	150	507	3.38
Green pepper	200	734	3.67
Tomatoes	112	915	8.49

<sup>1</sup> U.S. price converted from dollars per dozen assuming a weight of 21 ounces per dozen eggs.

Note: China prices are annual averages from cost of production surveys. Chinese prices converted from yuan per kilogram using the official exchange rate of 8.28 yuan per dollar that prevailed during 2005. U.S. prices are market-year U.S. averages converted from dollars per bushel, per pound or per hundred pounds.

Sources: ERS calculations based on data from National Development and Reform Commission Price Office and U.S. Department of Agriculture, National Agricultural Statistics Service.

These farm price comparisons are mostly consistent with China's agricultural trade patterns. In most years, China imports soybeans, cotton, and wheat, which have relatively high prices in China. As China's currency appreciates, imported grains and oilseeds will become even more price competitive vis á vis Chinese commodities, and imports may expand further. China exports corn despite having relatively high corn prices, but currency appreciation might turn China into a corn importer. China's trade in livestock products is relatively small, but appreciation of the yuan would make imported meat more attractive to Chinese buyers. Currency appreciation would reduce China's substantial price advantage in fruit and vegetable product exports, most of which are priced well below U.S. products.

## Transportation Costs and Tariffs Affect Imports

Comparisons of average domestic prices in the two countries are broadly indicative of price differentials between China and the United States, but the actual price-competitiveness of U.S. products in China depends on transportation costs, tariffs, taxes, and quality differences. We illustrate how differences in farm prices translate to the competitiveness of U.S. commodities in China by performing a more careful comparison of U.S. and Chinese prices of soybeans—the largest U.S. agricultural export to China.

The difference between Chinese and U.S. farm prices for soybeans is mostly dissipated by transportation costs and Chinese taxes, but U.S. soybeans are still price-competitive with Chinese soybeans by the time they reach processors in China (fig. 4).<sup>7</sup> In December 2006, U.S. farm prices for soybeans averaged \$6.14 per bushel (\$223 per metric ton). Prices in Heilongjiang Province of northeastern China—the main production region for soybeans—averaged 2,474 yuan per metric ton, equivalent to \$8.52 per bushel (\$317 per metric ton), about 39 percent higher than the U.S. price.

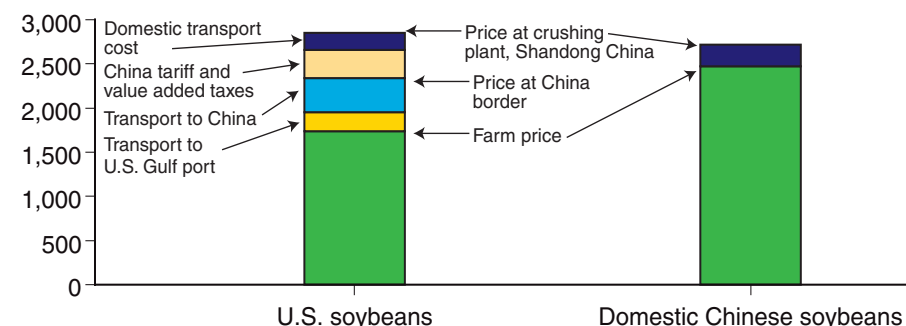
The difference between U.S. and Chinese farm gate prices diminishes as transport costs and taxes are added. Both U.S. and domestic soybeans must be shipped to crushing plants located in coastal areas of China.<sup>8</sup> According to news reports in January 2007, the average price of domestic soybeans paid by crushing plants in Shandong Province (about 800 miles from Heilongjiang) was 2,720 yuan and the price of U.S. soybeans arriving in Shandong Province, was about 2,850 yuan, about 5 percent higher than the price of local soybeans.<sup>9</sup>

While imported U.S. soybeans are slightly more expensive than domestic beans, crushers are willing to pay a premium for them due to their higher oil content, uniform size, and overall quality. Chinese imports of soybeans from

Figure 4

### Comparison of U.S. and Chinese soybean costs to Chinese crushing plant

Yuan/metric ton



Note: Prices are for January 2007. Dollar values converted to Chinese yuan at an exchange rate of 7.8 yuan per dollar.

Sources: ERS calculations based on the following data: U.S. farm price from U.S. Department of Agriculture, National Agricultural Statistics Service. China farm price and price of soybeans at crushing plant from China Ministry of Agriculture. Transport to China and price at U.S. Gulf ports from U.S. Soybean Export Council. Price at China port calculated from China customs statistics.

<sup>7</sup> According to China customs statistics, China imported 1.77 million metric tons of U.S. soybeans in December 2006 and 9.9 million tons for the calendar year.

<sup>8</sup> Older crushing plants in China are located in interior provinces like Heilongjiang and Jilin, and they crush primarily domestic soybeans. Most newly constructed plants are located in coastal areas where they crush primarily imported soybeans.

<sup>9</sup> Shandong Province is also a major soybean production area, but its use of soybeans exceeds local supplies. Shandong's Qingdao port accounts for the largest share of China's soybean imports.

the United States, Brazil, and Argentina reached 28.3 million metric tons for calendar year 2006, accounting for over 60 percent of China's soybean use. Without soybean imports, domestic Chinese prices would be much higher since Chinese demand would far outstrip domestic supply.

Farm gate Chinese corn prices were 50 percent higher than U.S. prices in December 2006, but there were no shipments of U.S. corn to China because shipping costs, tariffs and taxes push the cost of U.S. grains above the cost of Chinese grain (fig. 5). Adding shipping costs, Chinese tariffs and value added taxes (VAT) brought the estimated cost of U.S. corn arriving in China well above the price of Chinese corn. Chinese wheat prices were 12 percent above the U.S. price, and the price of U.S. wheat arriving in China was also above the domestic price. Given these price relationships, China imported little wheat or corn. During 2006, China imported 584,000 metric tons of wheat, down from 3.5 million metric tons in 2005. China bought only one significant shipment of corn from the United States in 2006. China was a net exporter of both of these commodities in 2006.

Price differences between the United States and China vary across commodities, reflecting resource endowments of the two countries. Land-extensive field crops tend to have relatively high prices in China, reflecting the scarcity of land, and labor-intensive vegetables and fruits have low prices.

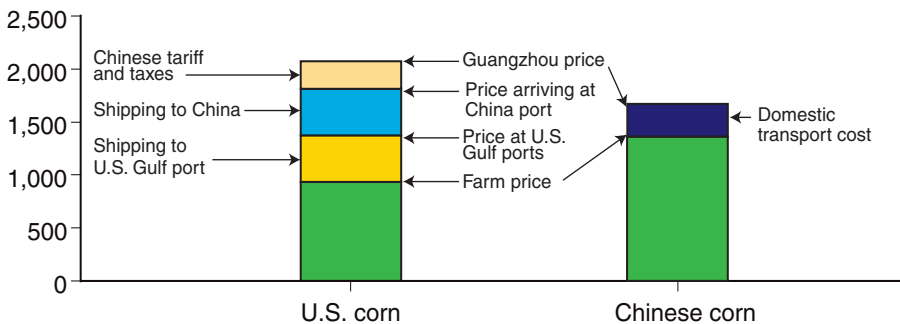
Unhindered international trade would allow global resources to be used more efficiently by concentrating grain production in the United States and other land-abundant countries. However, only a few U.S. agricultural commodities are price-competitive in China at current exchange rates. Just two commodities—soybeans and cotton—accounted for two-thirds of the value of U.S. agricultural exports to China in 2006.<sup>10</sup> In recent years, China has remained near self-sufficiency in rice, wheat, and corn. While China's reduction of tariffs and other border measures has potential to enhance trade flows, its undervalued exchange rate still impedes trade. In effect, China remains reliant on a stressed natural resource base to meet the growing food demands of a large and increasingly wealthy population.

<sup>10</sup> Like soybeans, China's cotton is relatively expensive, and imports have surged due to limited domestic supplies and booming demand from China's textile industry.

Figure 5

**Estimated price of U.S. and Chinese corn, Guangzhou, China**

Yuan/metric ton



Note: Prices at Guangzhou port = January 2007. Price of U.S. corn is estimated; no U.S. corn was shipped to China during this time period. Dollar values = 7.8 yuan per dollar. Port price of U.S. corn does not include domestic transport cost within China.

Sources: ERS calculations based on data as follows: U.S. farm price, U.S. Department of Agriculture, National Agricultural Statistics Service. Price at Gulf ports and ocean freight: U.S. Grains Council. China prices: China Ministry of Agriculture.



## Grains and Field Crops Most Likely to Be Affected by Exchange Rate Change

Appreciation of China's currency would have the most immediate impact on imports of unprocessed grains and field crops. The gap between imported and domestic prices of vegetables, fruits, and processed foods is much wider. Demand for these products would rise as the value of the yuan increases, but a large appreciation of the yuan would be needed to bring import and domestic prices closer together.

Consider how appreciation might affect the retail price of imported apples in China. Chinese customs data show that U.S. apples arriving in China in December 2006 were valued at \$0.83 per kg. Adding China's 10-percent tariff and 13-percent value added tax would bring the cost to \$1.03. At the prevailing exchange rate it would take 8 yuan to purchase 1 kg of imported U.S. apples at the port. The supermarket price of 15.6 yuan for imported apples reported earlier in this report suggests that there is a margin of 7.6 yuan/kg between the port and the supermarket price.

As the Chinese exchange rate appreciates, it takes fewer yuan for Chinese consumers to purchase imported apples at a given price in U.S. dollars, and imports become cheaper relative to domestic products. Assuming that the U.S.-dollar price and the 7.6-yuan port-supermarket margin remain constant, the supermarket price of imported apples would fall from 15.6 yuan at an exchange rate of 7.8 yuan/dollar to 14.8 yuan at an exchange rate of 7 yuan/dollar (a 12-percent appreciation), still nearly 50 percent above the 10-yuan price of high quality domestic apples and nearly three times the price (5 yuan) of apples commonly purchased by Chinese consumers (fig. 6). The value of the yuan would have to more than double to 3 yuan/dollar (160 percent appreciation) to bring the imported apple price to 10.7 yuan, close to the 10-yuan price of quality domestic apples. Nevertheless, while U.S. apples are likely to remain more expensive than domestic apples with even a large appreciation of 40 percent, consumption of U.S. apples in China will surely rise as their price falls.

Fruits are the most common imported food items available in Chinese retail markets. U.S. apples, oranges, grapes, cherries, and nuts occupy a high-end market niche and would likely be among commodities that would benefit from a Chinese exchange rate appreciation. Other food items with narrow U.S.-China price differences, like dairy products, would also see an increase in imports. Most vegetables, which have extremely low prices in China, would require a very large appreciation in the Chinese currency to make imports competitive in the China market.<sup>11</sup>

Imported processed foods tend to be even less price-competitive in China due to the low cost of labor and other services which, in turn, reduce food processing and marketing costs in China.<sup>12</sup> A 2006 National Bureau of Statistics Service Sector Survey Center study of rural migrants who work in cities—a group that supplies much of the unskilled labor for food processing and distribution—found that average wages for this group were \$120 per month, or \$0.50 per hour.<sup>13</sup> By comparison, the average wage for

<sup>11</sup> Most of China's vegetable imports consist of cassava from Thailand and Vietnam.

<sup>12</sup> Ashenfelter and Jurajda's investigation of the effect of factor costs on the Big Mac index found that the cost of a Big Mac hamburger was consistently below PPP in developing countries where labor costs were low.

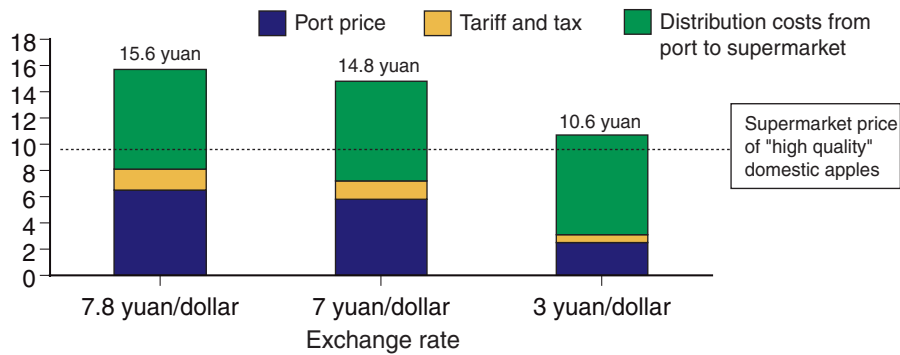
<sup>13</sup> The National Bureau of Statistics survey found that migrant workers labored an average of 6.3 days per week and 8.9 hours per day, implying an average of 56 hours per week.



Figure 6

**Estimated Chinese supermarket price of imported apples at different exchange rates**

Estimated supermarket price (yuan/kilogram)



Note: Calculations assumed constant U.S. dollar port price of \$.83 per kg. and a constant distribution cost of 7.6 yuan per kg. Tariff on apples is 10 percent and value added tax is 13 percent.

Sources: Port price obtained from December 2006 China customs statistics. Supermarket prices obtained from Tianhui Supermarket Fruit Prices.

production workers in U.S. food manufacturing is over \$13 per hour, about 25 times higher than the wage for unskilled Chinese labor.<sup>14</sup>

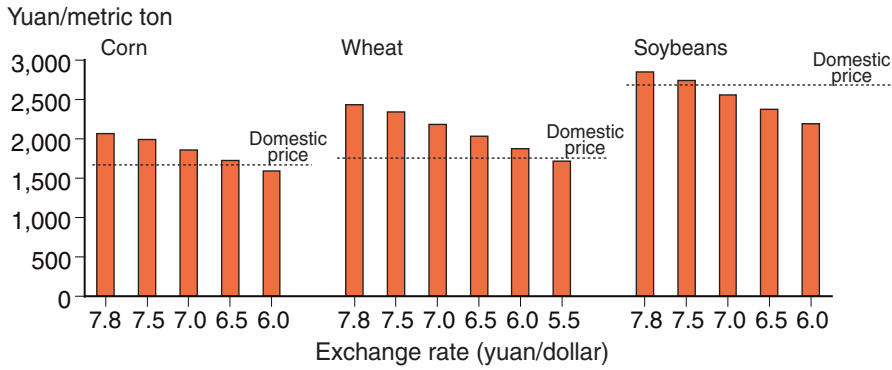
It has been estimated that less than 5 percent of items in Chinese supermarkets are imported (Bean). The absence of imported items is likely due to their high prices vis á vis domestic products. There are many foreign-brand food products available in Chinese retail markets, but most are produced in China where costs are low. For example, a Shanghai supermarket flyer obtained in June 2006 advertised frozen chicken nuggets produced in China by a major U.S. food company at a price of 6.9 yuan per 500 grams. A similar product would cost about \$5 per pound in a U.S. supermarket, or over 40 yuan per 500g, more than five times the Chinese price.

Imported soybeans, wheat, and corn will become more competitively priced in China as the Chinese currency appreciates. Assuming December 2006 prices and ocean freight rates, an appreciation of the Chinese yuan from 7.8 yuan/dollar to 7 yuan/dollar would reduce the cost of U.S. soybeans to Shandong crushing plants from 2,850 yuan to 2,558 yuan per metric ton, about 5 percent below the price of Chinese soybeans (fig. 7). A larger appreciation to 6 yuan per dollar would cut the cost of U.S. soybeans to 2,193 yuan per metric ton, 20 percent below the January domestic price. The yuan would have to appreciate to 6.5 yuan to bring the cost of imported corn close to the threshold where imports are priced competitively vis a vis domestic grain. At December 2006 prices, the yuan would have to appreciate to 5.5 yuan per dollar for U.S. wheat to be price-competitive in China.

<sup>14</sup> U.S. wage calculated by ERS from the 2002 Economic Census, U.S. Census Bureau, as the ratio of production worker wages to hours worked for NAICS code 311, food manufacturing.

Figure 7

### Estimated price of imported commodities in China at various exchange rates



Note: Figure 7 shows estimated price of imported commodities in Chinese currency at different exchange rates. Calculations assume prices and shipping rates prevailing in December 2006 remain constant.

Source: U.S. Department of Agriculture, Economic Research Service calculations using data from China customs statistics and from China Ministry of Agriculture.

## China Price Rises Narrow the Gap Slightly

The difference between Chinese and U.S. prices can narrow without appreciation in the nominal exchange rate if prices in China grow faster than international prices. In 2006 and 2007 China appeared to enter a new cycle of rising food prices, as its food Consumer Price Index rose 5.8 percent in 2006 and 6.8 percent year-on-year in May 2007 (fig. 8). U.S. food prices also rose, but not as fast as Chinese prices. The surge in Chinese prices followed a period of stagnant or declining prices during 1998-2002.

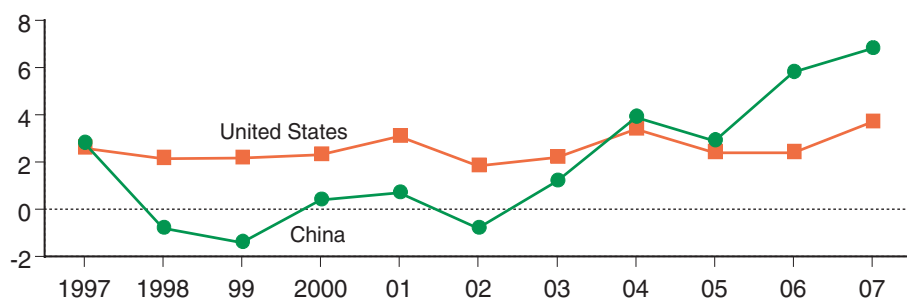
The rise in Chinese agricultural prices during 2006-07 appears to reflect short-term supply interruptions rather than a general inflationary trend. In May 2007, retail meat prices in China were up 17 percent year-on-year, but the percentage change is large because pork and poultry prices were depressed in mid-2006. Pork prices surged to record levels in May and June 2007 due to a combination of: a sharp reduction in hog inventories due to the low prices in the previous year; a serious outbreak of disease in 2007 that further cut hog inventories; and rising feed costs. Some observers anticipated that a resurgence of hog inventories in response to high prices would push hog prices back down in 2008. Retail grain prices were up 6.8 percent on year-earlier levels, reflecting response of China's corn and soybean prices to increases in world prices and surging industrial use of corn in China. Chinese rice and wheat prices, however, did not grow as fast. Vegetable prices were down and fruit prices were essentially unchanged from year-earlier levels. Consumer prices of most nonfood goods and services categories were up less than 2 percent year-on-year in May 2007.

The recent increase in food prices in China combined with appreciation of the exchange rate has narrowed the difference between Chinese and U.S. food prices, but this follows a widening of the difference that occurred from 1998 to 2002. We calculated a U.S.-China food price index similar to that shown in table 2 using monthly data for the period 1996-2007 to determine how Chinese prices have grown relative to U.S. prices over the past decade (fig. 9). We calculated the index using prices for eight commodities (rice,

Figure 8

### Annual change in food prices, China and United States, 1997-2007

Change in food prices (percent)



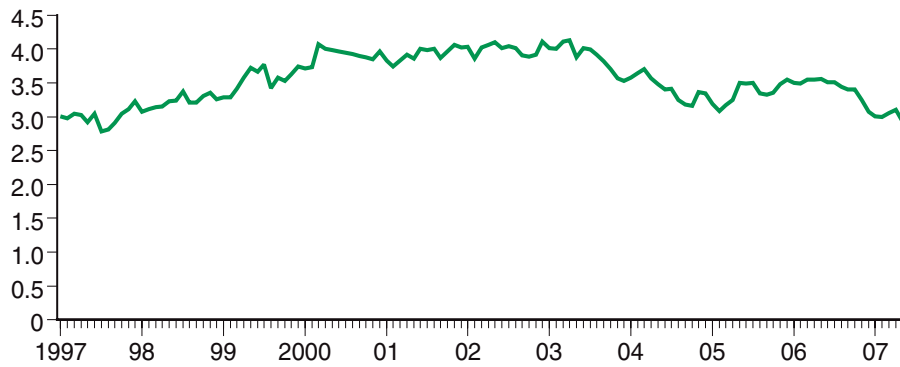
Note: Chart shows annual change in consumer price index for food. Data for 2006 are for December. 2007 data are for May 2007.

Source: U.S. Bureau of Labor Statistics; China National Bureau of Statistics.

Figure 9

### Ratio of U.S./China food prices, 1997-2007

Index



Note: Chart shows ratio of cost of a fixed bundle of rice, flour, pork, chicken, eggs, apples, potatoes, and tomatoes at U.S. and China prices, calculated monthly. China prices were converted to dollars at the official exchange rate.

Source: Calculations by ERS using data from China Price Information Center and U.S. Bureau of Labor Statistics.

flour, pork, chicken, eggs, apples, potatoes, tomatoes) for which data were available over the entire period. The index indicates that U.S. prices were about three times Chinese prices in 1997, but the ratio increased to four by 2002, as Chinese prices were stagnant or declining. A jump in Chinese prices in 2004 reduced the index to about 3.2 in early 2005 before climbing back to 3.5 in mid-2005. The increase in Chinese prices in 2006 and 2007 and the appreciating exchange rate brought the index back down to three by mid-2007, about the same level calculated for early 1997. Thus, the narrowing of the difference between U.S. and Chinese prices since 2004 has reversed the divergence that occurred from 1997 to 2003.

## Appreciation May Bring Domestic Stresses and Chinese Countermeasures

The potential adverse effect of currency appreciation on China's farmers is a factor preventing Chinese authorities from loosening their grip on the exchange rate. Currency appreciation would benefit Chinese millers, processors, livestock producers, and consumers by reducing raw material costs, but Chinese farmers could be hurt by downward pressure on commodity prices and farm incomes. In 2006, rumblings about unfair competition from U.S. agricultural imports were already appearing in the Chinese press (Lan). China's central leadership, determined to maintain rural social stability, has put a high priority on raising rural incomes. Additionally, China's leaders view reliance on imported grain as a potential threat to food security. Given these policy priorities, China's leadership will be slow to support currency appreciation if it leads to an increase in grain imports.

The impacts of currency appreciation on China's farmers could be muted by various policy measures. Imports of rice, wheat, and corn are, in effect, limited by tariff rate quotas on grain imports put in place by the country's World Trade Organization (WTO) commitments.<sup>15</sup> It is likely that Chinese authorities would take additional measures to control the flow of agricultural imports. Chinese authorities can control trade by using phytosanitary barriers, restricting access to import quotas, imposing new regulations or taxes, or subsidizing domestic products. In late 2006, China announced plans for a new system to monitor and report agricultural commodity imports, and it established a soybean producers' association affiliated with the Ministry of Agriculture. These steps are interpreted by many observers as mechanisms that will give China the capacity to exert greater control over soybean imports and restrict them if necessary. Antidumping actions are another tool China may use to protect domestic industries. China is the third-leading user of anti-dumping actions worldwide (Carter and Gunning-Trant). In February 2007 China imposed tariffs on potato starch imports from European Union countries in order to protect its domestic industry.

China has already introduced farm support policies that were intended in part to counter increased competition anticipated following its WTO-related lowering of agricultural trade barriers. Since 2004 China has paid modest direct subsidies to grain producers, offered seed and machinery subsidies, eliminated agricultural taxes that were linked to grain production, and set minimum purchase prices for wheat and rice in key producing areas. In 2007, China announced a major increase in subsidies for agricultural inputs and new subsidies for hog breeders.

<sup>15</sup> As part of China's WTO commitments, annual import quotas were established for rice, wheat, corn, cotton, wool, sugar, and vegetable oils at low tariffs (only 1 percent for rice, wheat, and corn). The quota amounts for rice, wheat, and corn were roughly 5 percent of domestic use of each commodity. Imports above the quota are assessed high tariffs. The quotas are allocated among applicants by government authorities, and a share of each commodity's quota is reserved for state-owned trading enterprises. Quotas on vegetable oils expired in 2006, and were replaced by a bound tariff of 9 percent.

## Fixed Exchange Rate Impedes Adjustments

When trade is unimpeded by tariffs and measures, international price differences dictate resource allocation by inducing economic actors to move goods and services from countries where they are abundant to countries where they are relatively scarce or costly to produce. Since the mid-1990s, China has reduced barriers to trade and allowed most domestic prices to be determined by market forces, but it has kept a tight hold on its exchange rate.

A low value of the Chinese yuan allows China to export labor-intensive goods and horticultural crops that have low domestic prices, but it protects field crops and other commodities that use land and other resources that are scarce in China. Prices of field crops in China are high relative to other domestic Chinese prices, reflecting the scarcity of land. Field crops like grains, oilseeds, and cotton use scarce land to grow products that provide low returns per acre. High crop prices attract domestic farm resources into crop production. However, the undervalued exchange rate prevents Chinese crop prices from rising high enough on global markets to attract imports of crops (and livestock that consume feeds derived from crops) that would free up cropland in China for more valuable uses.

With an undervalued exchange rate Chinese incomes have little purchasing power on world markets. Because of the wide difference between domestic and international prices of foods and other consumer goods, Chinese households are induced to consume primarily domestic products. At the same time, low domestic prices for vegetables, fruits, and processed products encourage China to export labor-intensive products at prices well below those of competitors. These demands put pressure on China's limited resource base to supply the consumption needs of one-fifth of the world's population as well as the demands of overseas consumers in export markets.

China has been slow to allow its currency to appreciate, in part because policymakers want to protect farmers from import competition and they want to maintain a high degree of self sufficiency in food. The threat of rising world commodity prices driven by the boom in crop-based biofuels adds another risk factor. Rising Chinese imports of grains and oilseeds triggered by currency appreciation would add further upward pressure to world commodity prices. These facets of the issue likely will prevent China from making a major adjustment in its exchange rate, instead continuing its policy of gradual adjustment.

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## Appendix—Food and Agricultural Price Data in China

The Chinese government carefully monitors food and agricultural prices collected by several different agencies. Retail food prices are collected by household and retail market surveys; wholesale prices are collected by reports from China's network of wholesale markets; and farm-gate prices are collected from farm household surveys and reports from rural market fairs.

Most of the Chinese retail price data used in this report were collected by the China Price Information Center (CPIC) of the National Development and Reform Commission (NDRC), China's leading policymaking body. Average prices for an array of food commodities are reported by a sample of 2 supermarkets and 2 farmers' markets from each province every 10 days. A consumer price index based on household surveys for a limited number of food categories is also published every month by the National Bureau of Statistics (NBS).

Average farm prices were obtained from cost of production surveys conducted by the price department of NDRC. These data come from price and expenditure information recorded in diaries by a national sample of 60,000 farms. Annual averages are published each year. Ministry of Agriculture (MOA) and NBS conduct similar surveys, but they do not publish prices. NBS also conducts a monthly survey of prices in rural market fairs—the first point of sale for many farm commodities.

Wholesale market prices are collected by MOA, NBS, and CPIC. In addition, many individual wholesale markets, provincial and local price bureaus also report daily average prices on their web sites. The National Grain and Oils Information Center surveys wholesale markets, trading companies, and processors to obtain daily prices of grains, oilseeds, and their products at various locations across the country, which are available to paid subscribers.

Finally, approximations of border prices (export or import prices) can be obtained from customs statistics, which typically report the value and quantity of commodities exported and imported each month. Dividing the value by the quantity provides a unit value that approximates the border price.

**Sources of Chinese food and agricultural price data**

Price type	China government agencies	Description of data collection
Retail food prices	CPIC	Reports from supermarkets and farmers' markets every 10 days
	NBS	Household surveys
Wholesale prices	CPIC, NBS, MOA, NGOIC	Reports from wholesale markets
Farm prices	COP, NBS, MOA	Diaries of receipts and expenditures kept by a national sample of farms
	NBS	Reports from rural market fairs
Import/export prices	Customs statistics	Monthly reports of value and quantity of imports and exports

Note: CPIC=China Price Information Center, National Development and Reform Commission; COP = Cost of Production Surveys, Price Department of National Development and Reform Commission; MOA = Ministry of Agriculture; NBS = National Bureau of Statistics; NGOIC = National Grain and Oils Information Center.

Source: Compiled by U.S. Department of Agriculture, Economic Research Service.