

Soybean trade and production costs in the U.S., Brazil, and China

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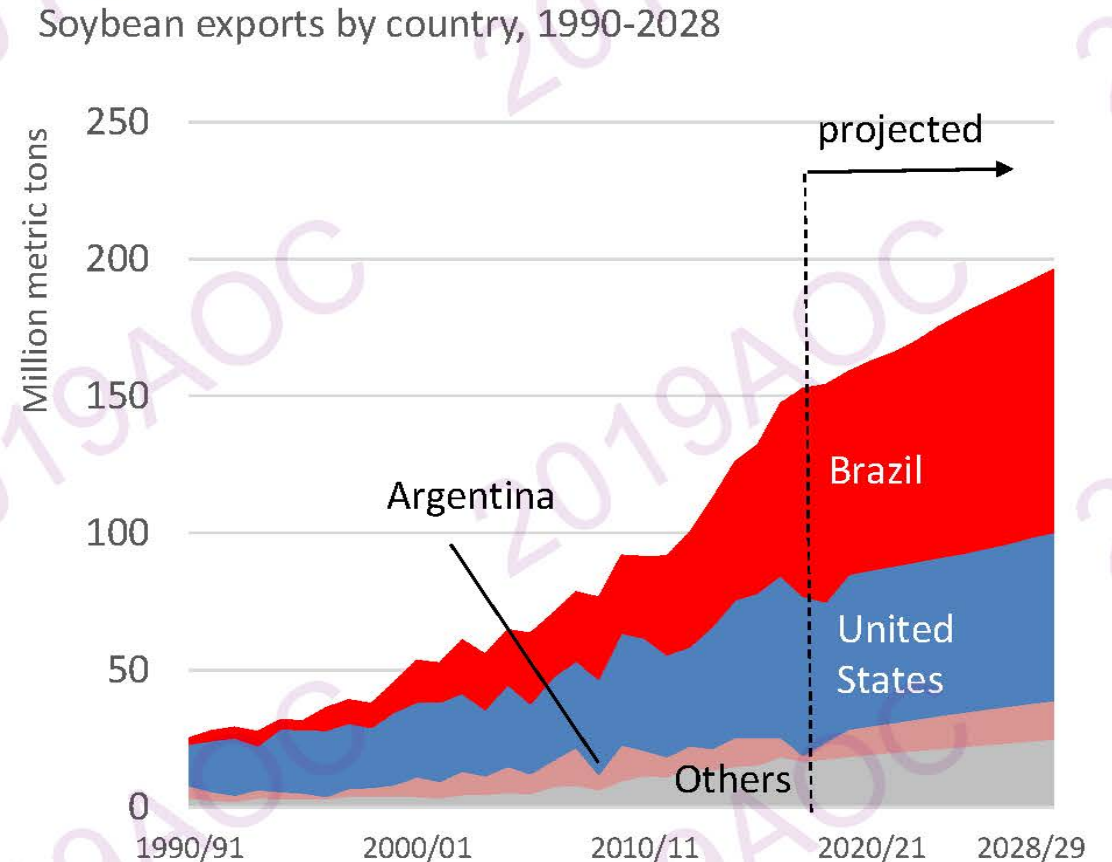
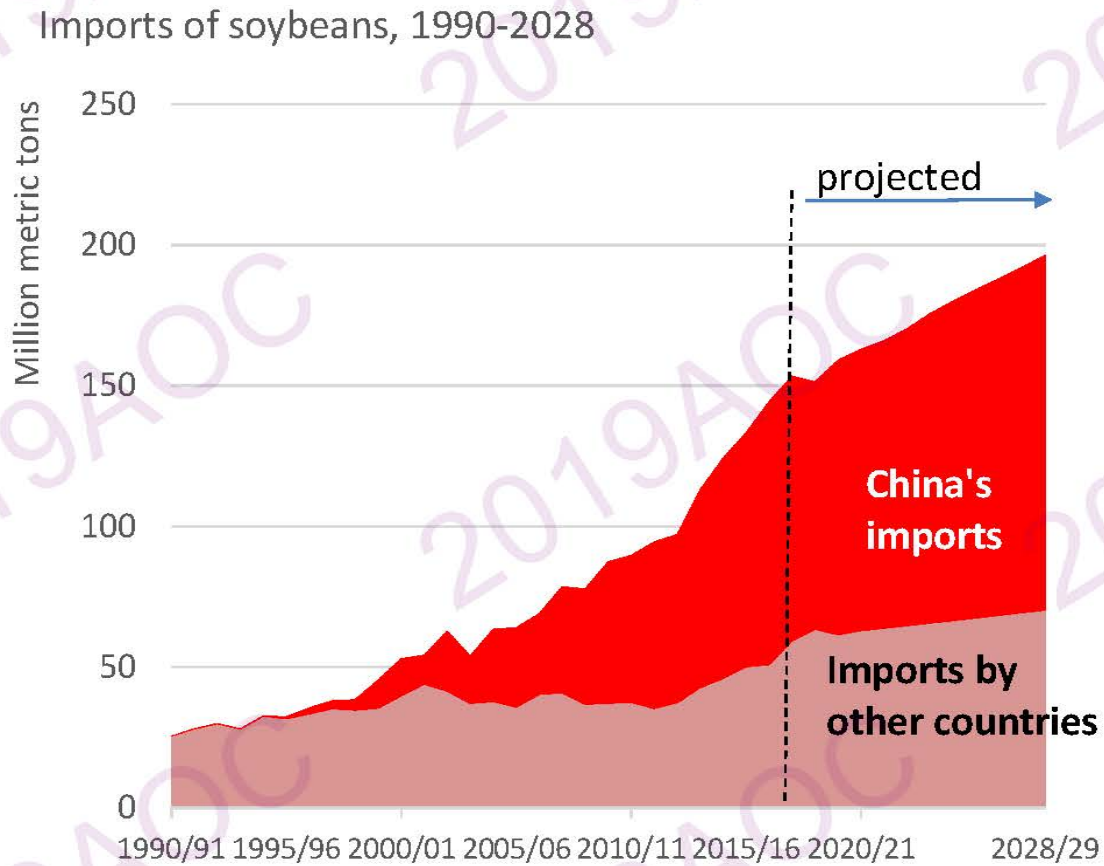
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The Findings and Conclusions in This Preliminary Presentation Have Not Been Formally Disseminated by the U.S. Department of Agriculture and Should Not Be Construed to Represent Any Agency Determination or Policy. This research was supported by the intramural research program of the U.S. Department of Agriculture, Economic Research Service.



China is the largest importer of soybeans

Brazil and the United States are the top exporters



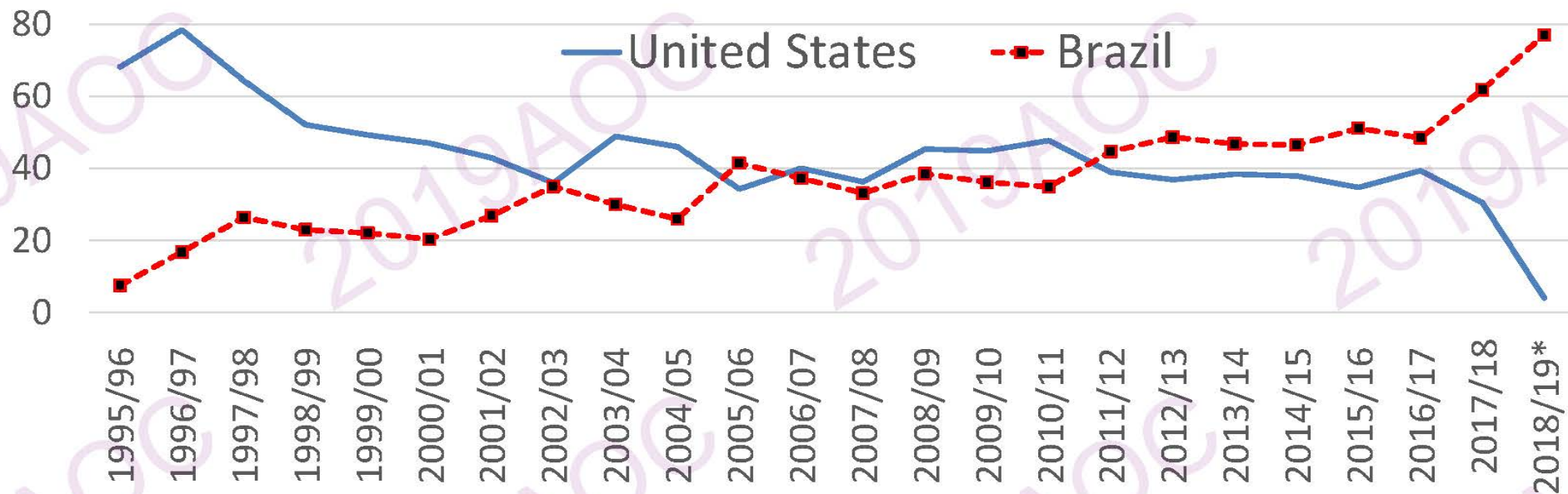
Source: USDA, Production, Supply and Distribution data.



Brazil's share of China's soybean imports has been increasing

China soybean imports: shares supplied by United States and Brazil, 1995-2019

Percent
100



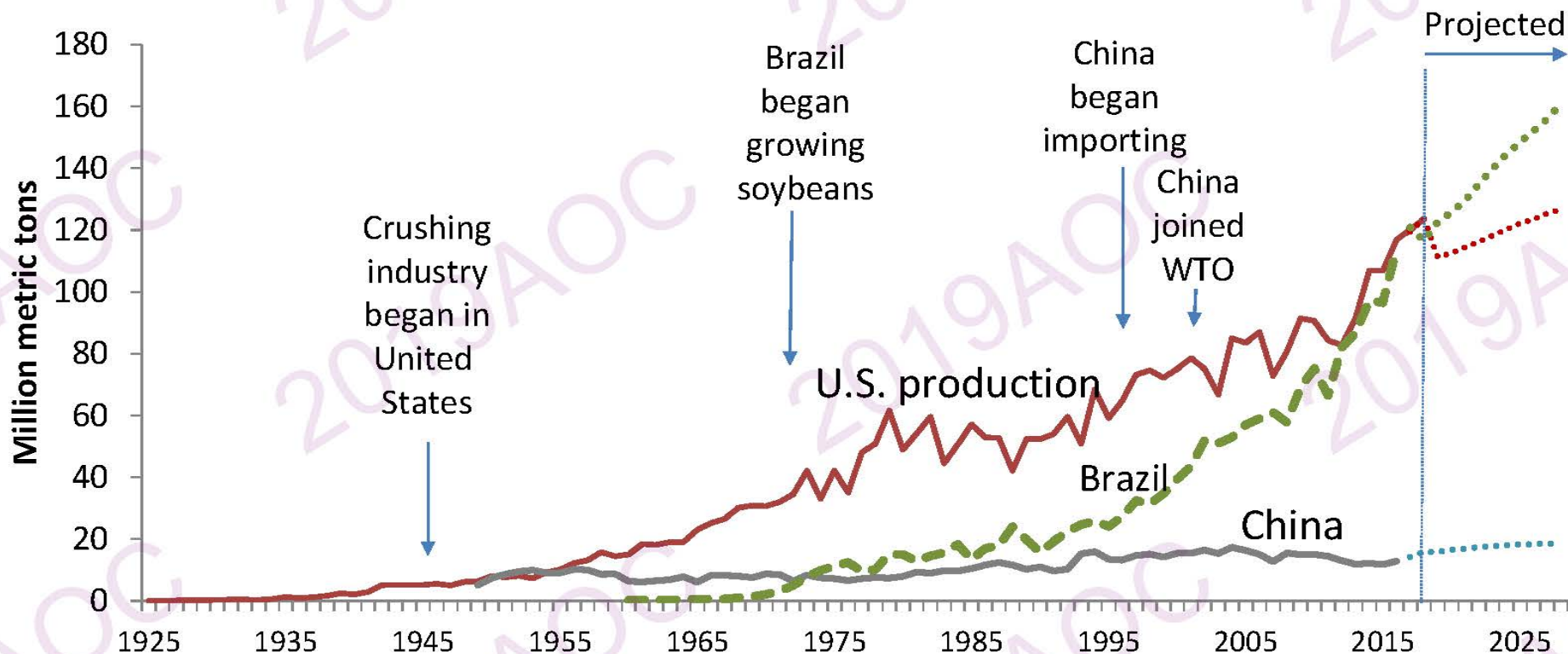
*2018/19 data for October 2018 to February 2019.

Source: Calculated from China customs data.



Soybean production in United States and Brazil surpassed China's production during the 20th century

Soybean production, U.S., Brazil and China, 1925-2028



Source: Data compiled from USDA National Agricultural Statistics Service, China National Bureau of Statistics, UN Food and Agriculture Organization, and U.S. Department of Agriculture (2019) projections to 2028/29.



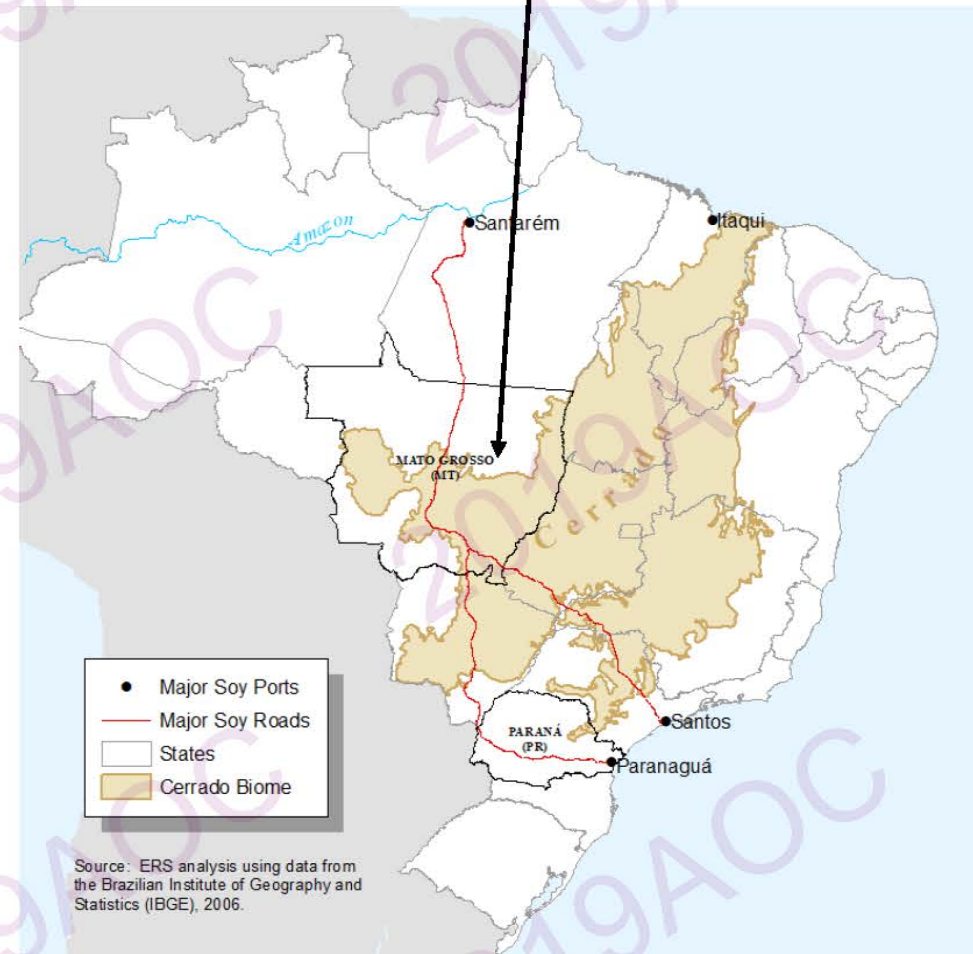
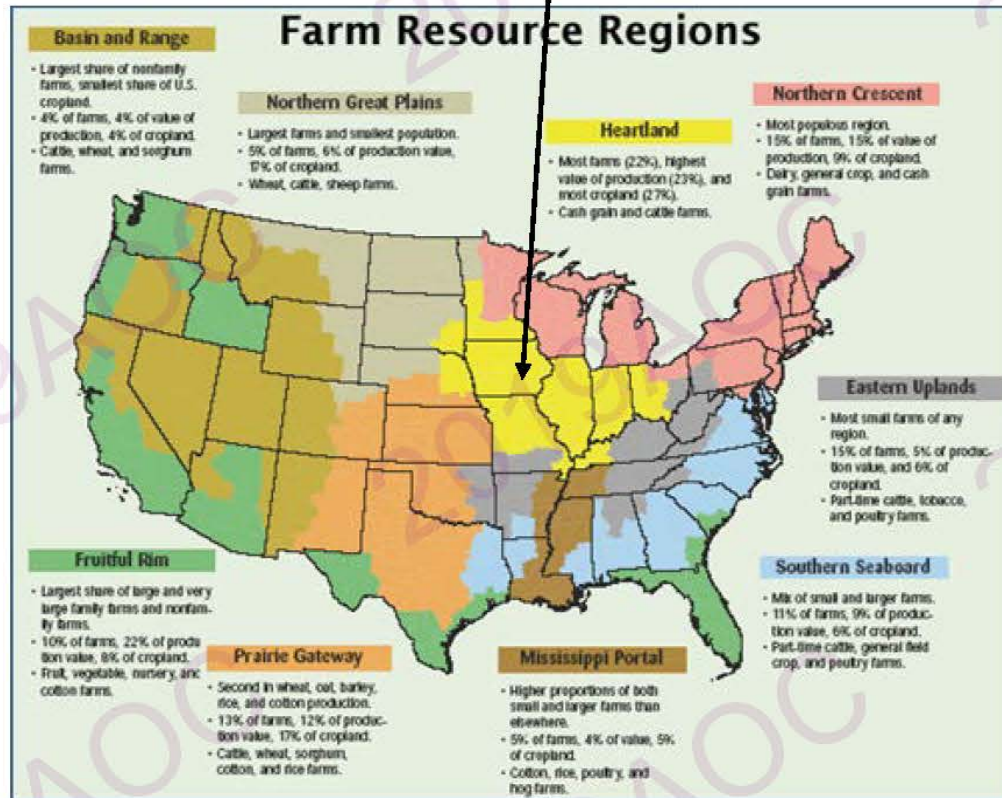
Compare production costs in three countries

- Government estimates, 2017
 - U.S. Department of Agriculture, Economic Research Service, commodity costs and returns
 - Brazil Ministry of Agriculture Marketing Agency (CONAB)
 - China National Development and Reform Commission
- Major production regions
 - U.S. “Heartland” in Midwest
 - Brazil state of Mato Grosso
 - China Heilongjiang Province
- Converted to dollars per hectare and dollars per metric ton



U.S. "Heartland"

Brazil's Mato Grosso State

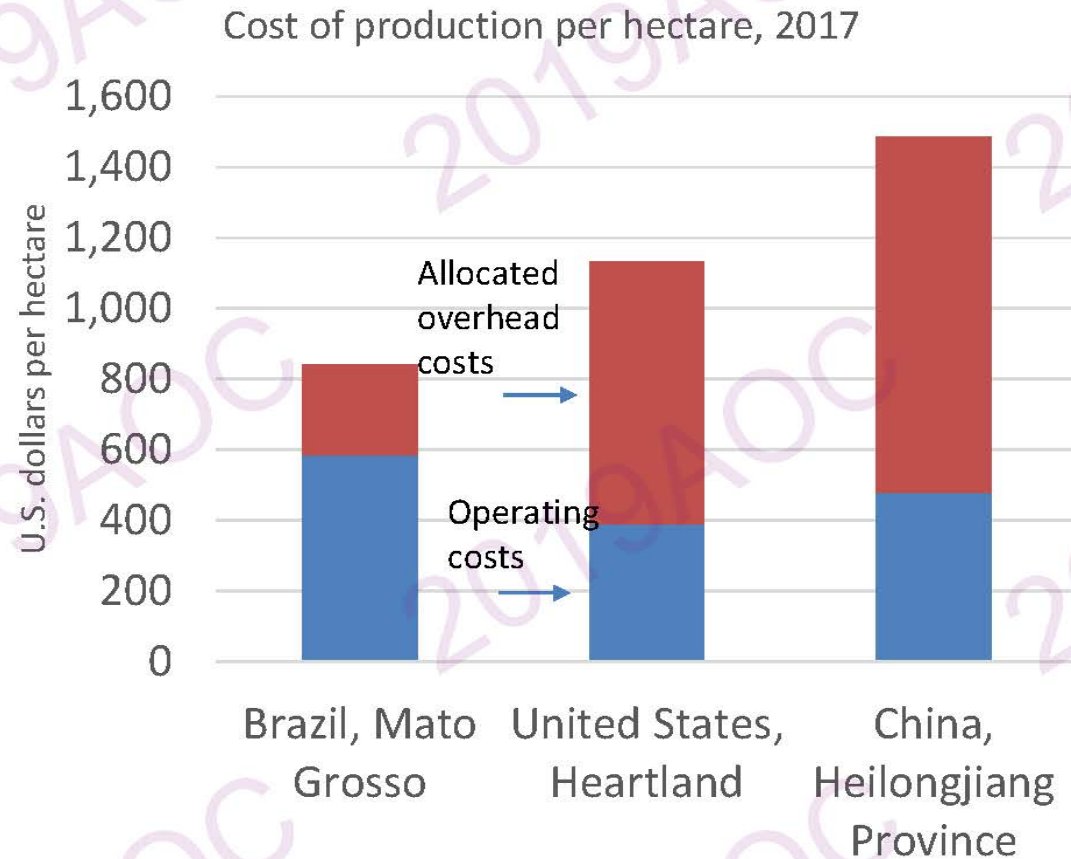


Cost categories

- Operating costs directly related to soybeans
 - Fertilizer and chemicals
 - Fuel, electricity, repairs
 - Custom services for harvesting, ploughing, etc.
- Overhead expenses allocated to soybean enterprise
 - Labor
 - Land
 - Machinery and equipment



Comparison of soybean production costs, 2017



- Brazil has the lowest cost per hectare
- China has the highest cost
- Brazil's operating cost is the highest—soil needs chemical treatments
- China's cost is mostly composed of allocated labor and land costs; operating costs are similar to U.S. and Brazil's

Source: China National Development and Reform Commission, npcs.gov.cn; USDA Economic Research Service, Commodity Costs and Returns <https://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>; CONAB (Brazil Ministry of Agriculture Marketing Agency).



Detailed production cost comparison, 2017

Item	Brazil, Mato Grosso	United States, Heartland	China, Heilongjiang Province
	Dollars per hectare		
Operating expenses	583	390	478
Fertilizer, chemicals, seed	489	272	216
Custom services	44	25	229
Fuel, electricity, repairs	31	91	4
Other operating costs	20	2	29
Allocated overhead	258	742	1,008
Land	92	390	653
Labor	7	56	338
Machinery and equipment	85	225	1
Taxes, insurance, other overhead	74	71	16
Total cost per hectare	839	1,095	1,458

Source: China National Development and Reform Commission, npcs.gov.cn; USDA Economic Research Service, Commodity Costs and Returns <https://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>; CONAB (Brazil Ministry of Agriculture Marketing Agency).



Soybean yield in China is lower than in Brazil and U.S.

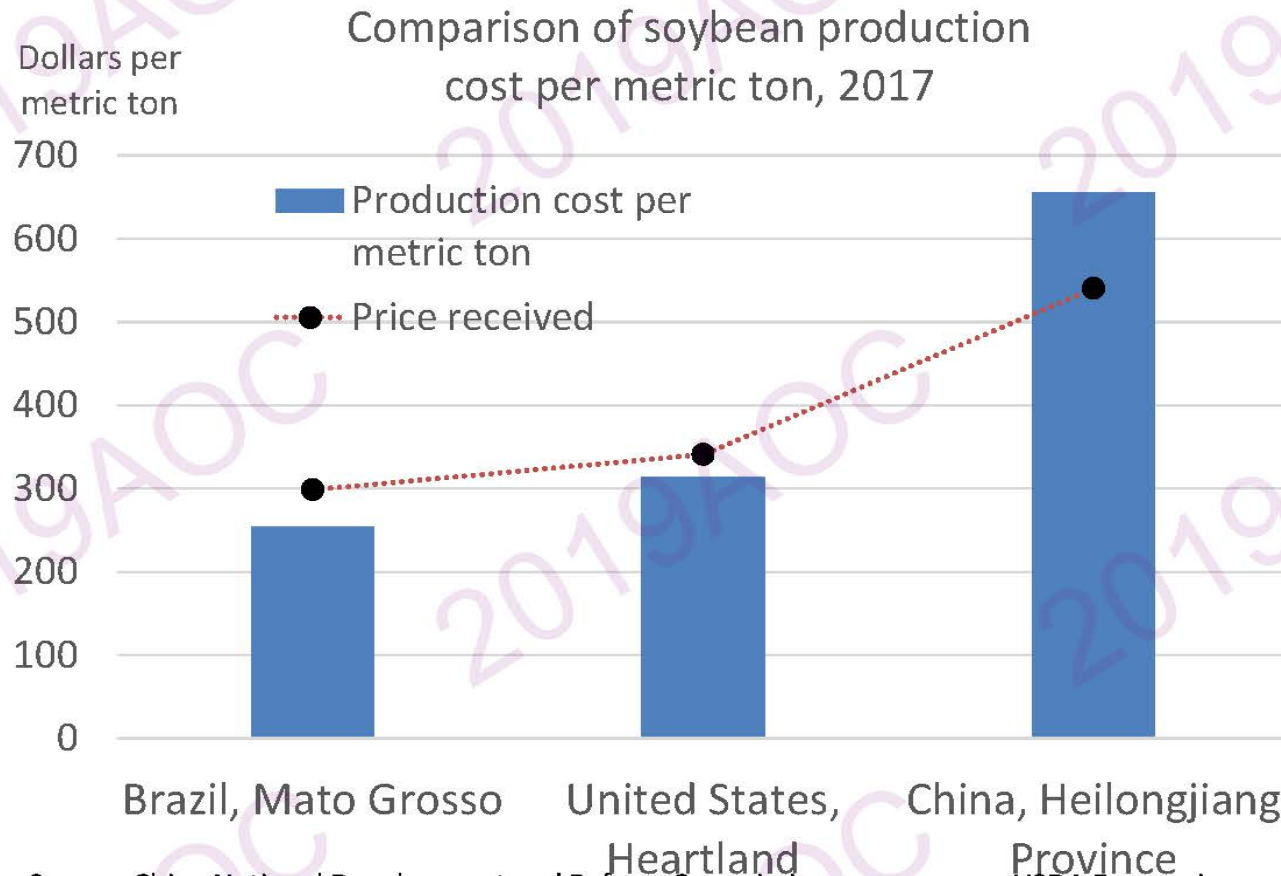
Average soybean yields, 2017



Source: China National Development and Reform Commission, npcs.gov.cn; USDA Economic Research Service, Commodity Costs and Returns <https://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>; CONAB (Brazil Ministry of Agriculture Marketing Agency).



Cost per unit of output plays an important role in price formation



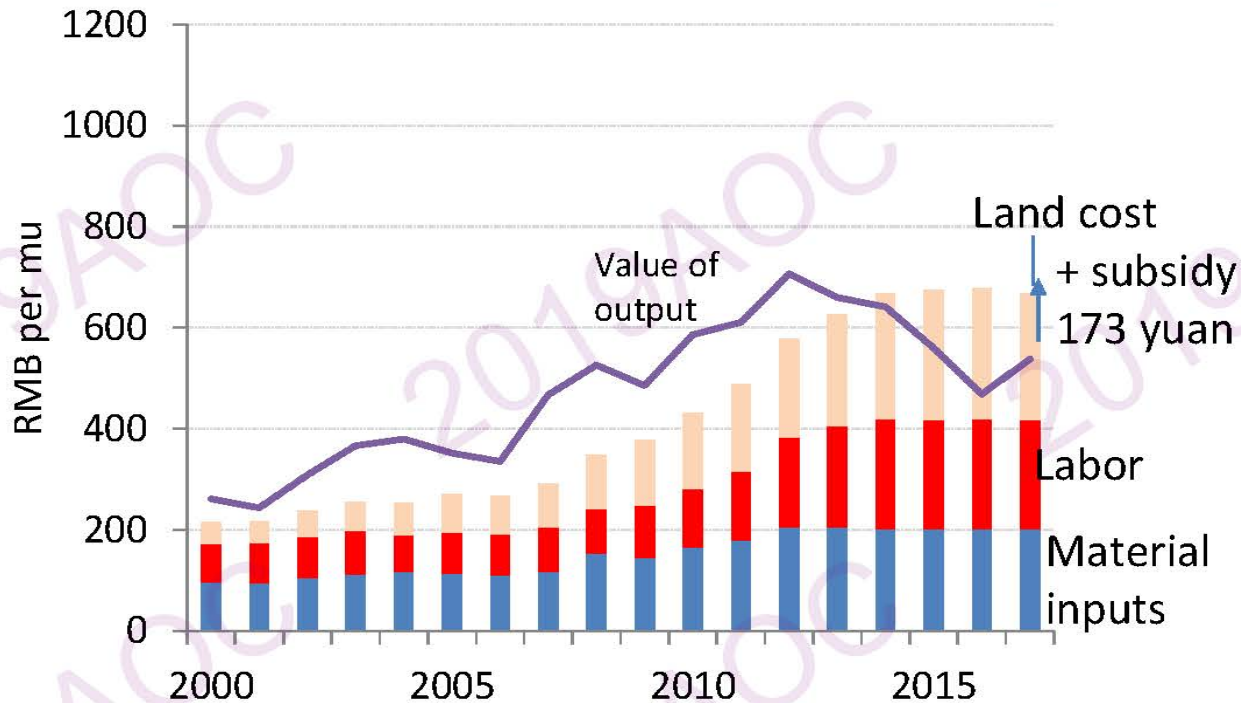
- Farm price and production cost per metric ton are higher in the U.S. than in Brazil
- China's farm price is much higher than in the U.S. and Brazil
- China's farm price is less than production cost

Source: China National Development and Reform Commission, npcs.gov.cn; USDA Economic Research Service, Commodity Costs and Returns <https://www.ers.usda.gov/data-products/commodity-costs-and-returns.aspx>; CONAB (Brazil Ministry of Agriculture Marketing Agency).



China's soybean price fell below production cost in 2014

China: Soybean production cost and returns, 2000-2017



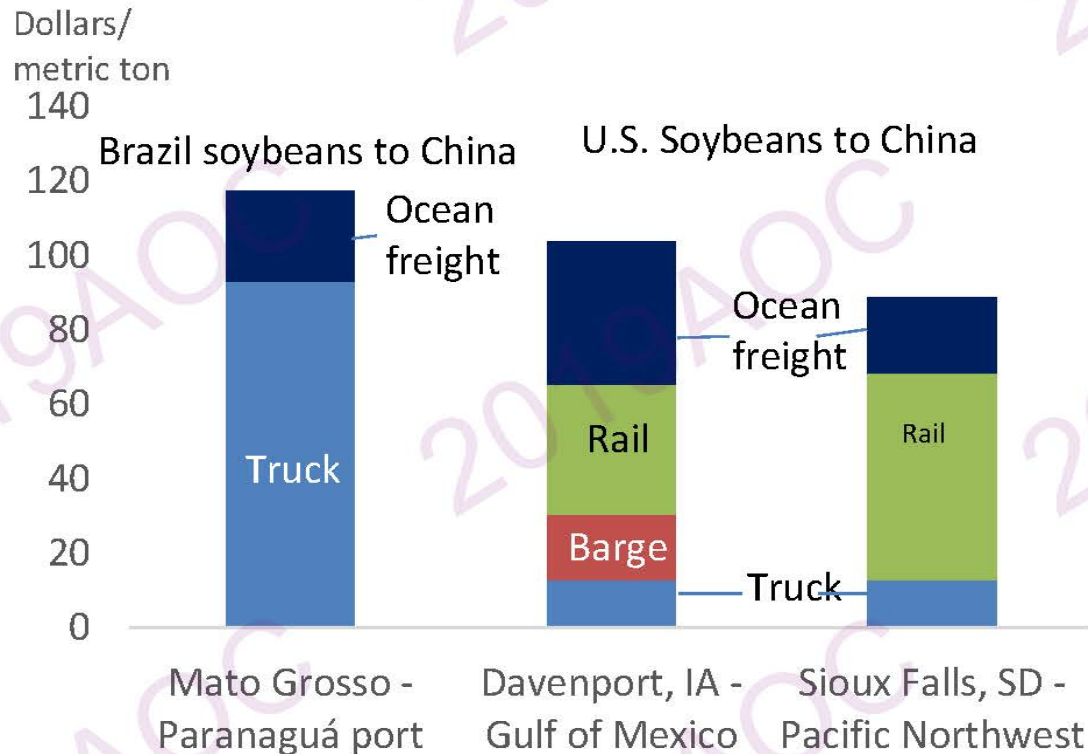
Source: China National Development and Reform Commission.

- China production cost has stabilized
- Value of output (price) decreased from 2012 to 2016
- Heilongjiang subsidies:
 - 2016, 119 yuan/mu
 - 2017, 173 yuan/mu
 - 2018, 320 yuan/mu
 - 2019, 227 yuan/mu



Transportation costs are higher for Brazilian soybeans

Soybean transportation costs to China, selected locations, 2017



Note: Transportation costs to Shanghai, China are shown.

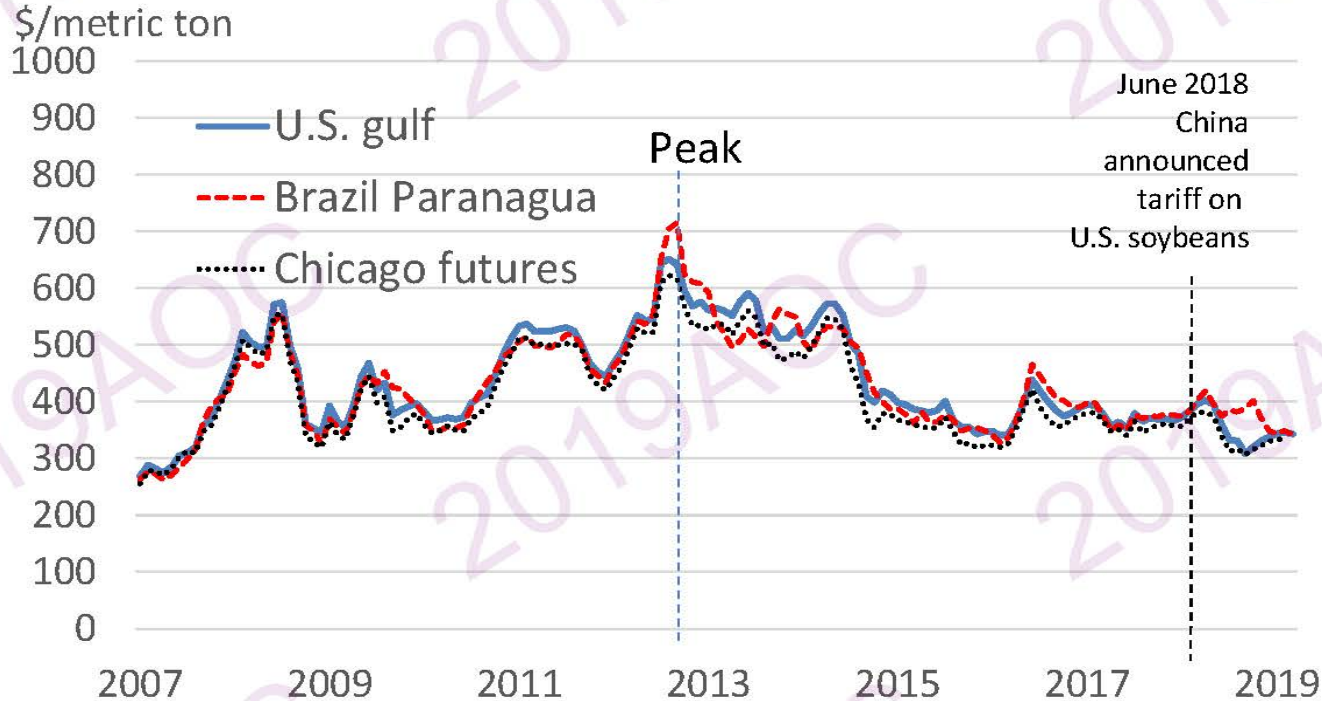
Source: Data drawn from Salin (2018), USDA, Agricultural Marketing Service.

- Transportation cost to coastal ports is higher for Brazil's Mato Grosso
- U.S. soybeans are transported to Gulf or Mexico ports or Pacific Northwest ports to be exported to Asia
- Brazil's soybeans will be even more cost-competitive if transportation costs can be reduced



Competition between exporters narrows price differences

U.S. and Brazilian soybean cash and futures prices, monthly 2007-2019



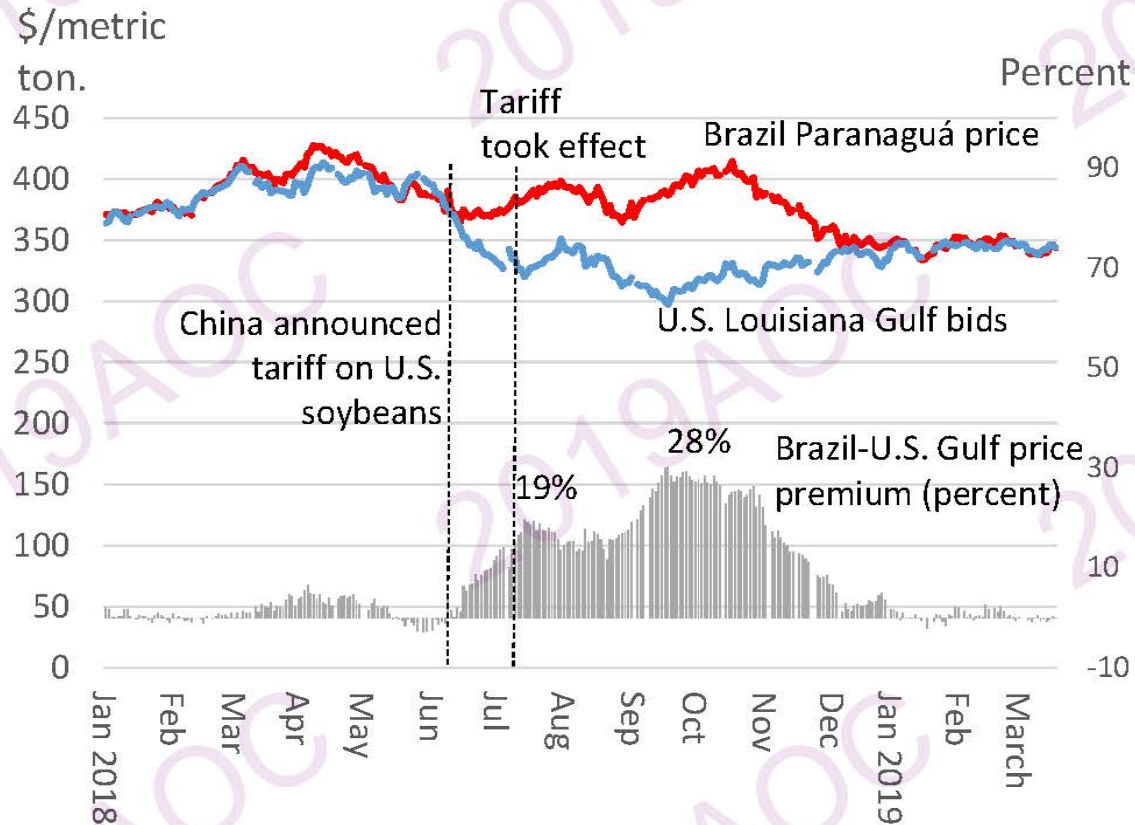
- Brazil and U.S. export prices tend to equalize
- All prices reached a peak in 2012
- Prices are now at about half the peak level
- Brazil and U.S. prices diverged for 6 months during 2018

Sources: Brazil Paranagua soybean cash price, CEPEA (Center for Advanced Studies on Applied Economics); U.S. Gulf cash bids at export elevators, USDA Agricultural Marketing Service, "Market News"; Chicago Futures monthly average, IMF Primary Commodity Prices

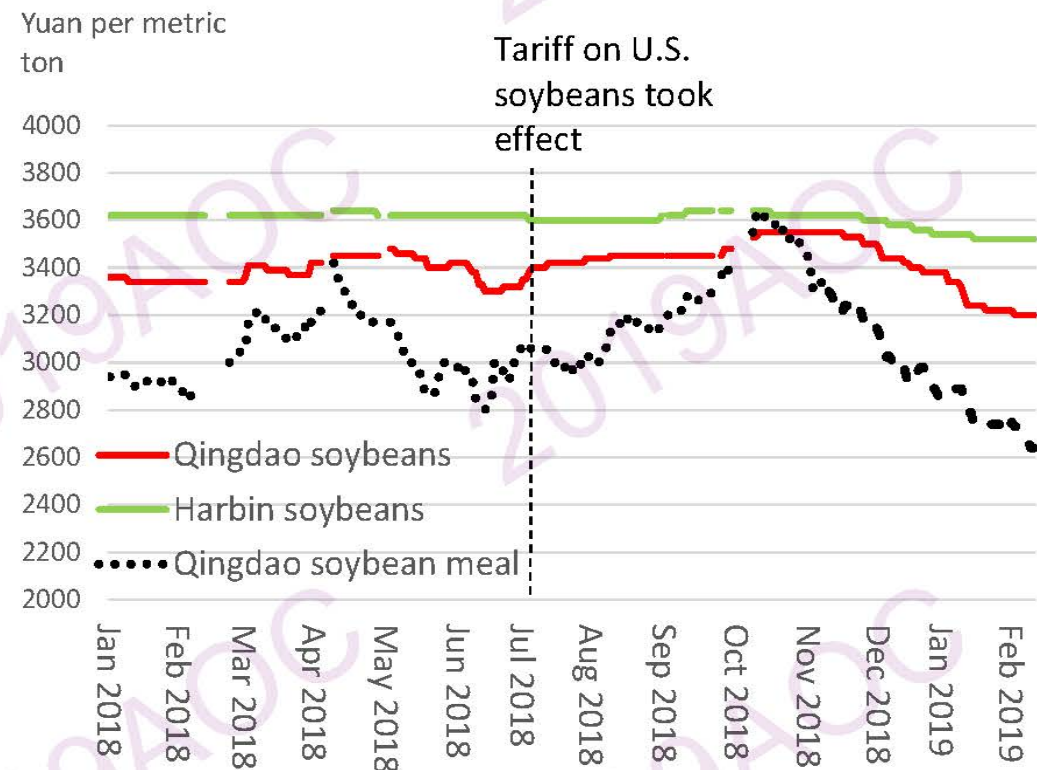


U.S. soybean price fell after China tariff was imposed, U.S. and Brazil export prices converged again November-December

U.S.-Brazil daily soybean prices, 2018-19



China's daily soybean and soybean meal prices, 2018



Sources: Brazil Paranaqua soybean cash price, CEPEA (Center for Advanced Studies on Applied Economics); U.S. Gulf cash bids at export elevators, USDA Agricultural Marketing Service.

Source: China National Grain and Oils Information Center.

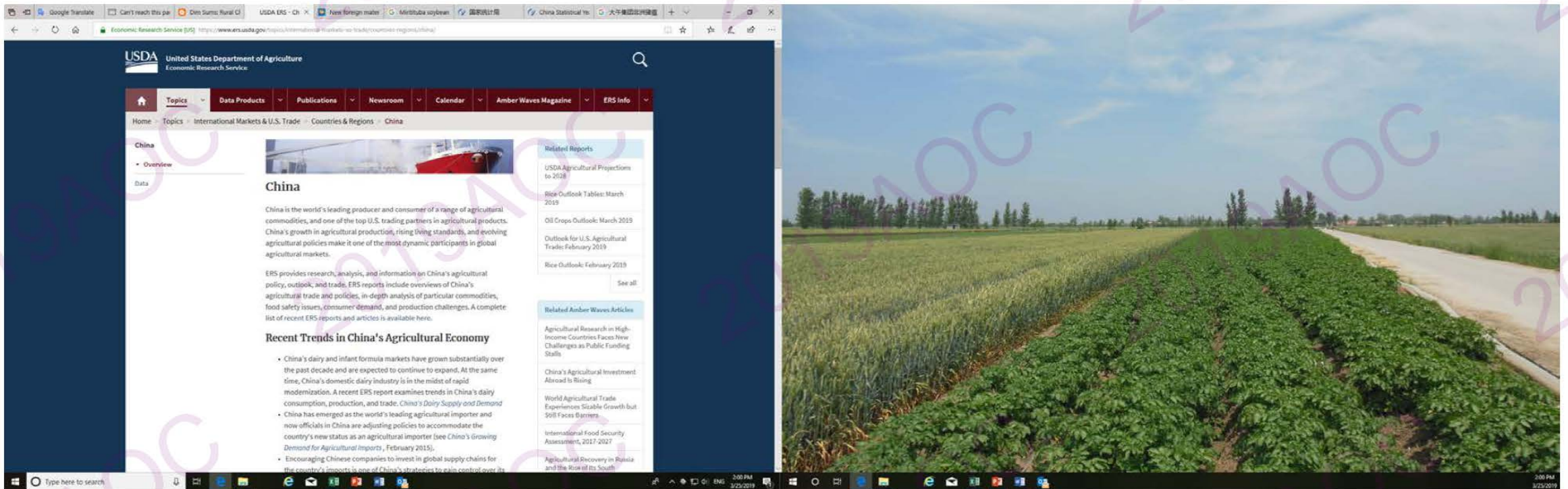


Summary

- Brazil and U.S. have lowest production costs
- Competition between exporters drives down prices close to production costs
- Low soybean prices reflect expanded production by Brazil
- Brazil's cost will be even lower if transportation in Brazil can be improved



For more information, see ERS China topic page
<https://www.ers.usda.gov/topics/international-markets-us-trade/countries-regions/china/>



The screenshot displays the USDA Economic Research Service website. The main navigation bar includes 'Topics', 'Data Products', 'Publications', 'Newsroom', 'Calendar', 'Amber Waves Magazine', and 'ERS Info'. The breadcrumb trail reads 'Home > Topics > International Markets & U.S. Trade > Countries & Regions > China'. The 'China' section features a sub-section for 'Overview' and a 'Data' link. The main content area is titled 'China' and contains a paragraph: 'China is the world's leading producer and consumer of a range of agricultural commodities, and one of the top U.S. trading partners in agricultural products. China's growth in agricultural production, rising living standards, and evolving agricultural policies make it one of the most dynamic participants in global agricultural markets.' Below this is another paragraph: 'ERS provides research, analysis, and information on China's agricultural policy, outlook, and trade. ERS reports include overviews of China's agricultural trade and policies, in-depth analysis of particular commodities, food safety issues, consumer demand, and production challenges. A complete list of recent ERS reports and articles is available here.' A section titled 'Recent Trends in China's Agricultural Economy' lists several bullet points: 'China's dairy and infant formula markets have grown substantially over the past decade and are expected to continue to expand. At the same time, China's domestic dairy industry is in the midst of rapid modernization. A recent ERS report examines trends in China's dairy consumption, production, and trade. China's Dairy Supply and Demand', 'China has emerged as the world's leading agricultural importer and now officials in China are adjusting policies to accommodate the country's new status as an agricultural importer (see China's Growing Demand for Agricultural Imports, February 2015).', and 'Encouraging Chinese companies to invest in global supply chains for the country's imports is one of China's strategies to gain control over its'. The sidebar on the right contains 'Related Reports' with links to 'USDA Agricultural Projections to 2028', 'Rice Outlook Tables: March 2019', 'Oil Crops Outlook: March 2019', 'Outlook for U.S. Agricultural Trade: February 2019', and 'Rice Outlook: February 2019'. Below that is 'Related Amber Waves Articles' with links to 'Agricultural Research in High-Income Countries Faces New Challenges as Public Funding Stalls', 'China's Agricultural Investment Abroad is Rising', 'World Agricultural Trade Experiences Stagnant Growth but Still Faces Barriers', 'International Food Security Assessment, 2017-2027', and 'Agricultural Recovery in Russia and the Rise of Its South'. A large image of a field with rows of crops is visible on the right side of the page.

