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Competitive Analysis of Chinese Soybean Import Suppliers --U.S., Brazil, and Argentina

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Selected Paper prepared for presentation at the
American Agricultural Economics Association Annual Meetings
Long Beach, CA, July 23-26, 2006

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Competitive Analysis of Chinese Soybean Import Suppliers
-- U.S., Brazil, and Argentina

Baohui Song, Mary A. Marchant, and Shuang Xu

Abstract

Globally, China is the number one soybean importer, and the U.S., Brazil, and Argentina are the top three soybean exporters. This research provides a detailed overview of the global soybean industry, analyzes the competitive structure of the Chinese soybean import market by examining both annual and monthly data, and compares competitiveness of the U.S., Brazil, and Argentina in the Chinese soybean import market. Results indicate that the U.S. and South America (Brazil and Argentina) were seasonal complementary soybean suppliers for China and Brazil has the greatest advantage in the Chinese soybean import market, followed by the U.S. and Argentina.

Key Words: Chinese soybean import market, competitive analysis, seasonal complementary soybean suppliers, soybeans trade

Competitive Analysis of Chinese Soybean Import Suppliers
-- U.S., Brazil, and Argentina

Globally, China is the number one soybean importer, and the U.S., Brazil, and Argentina are the top three soybean exporters. In 2005, China's soybean imports accounted for 41% of the world total, and soybean exports from the above three soybean producing countries accounted for over 90% of the world total. Given the above aggregate market shares of these soybean traders in the world soybean market, it is reasonable to assume that the world soybean market, especially the Chinese soybean import market, is not perfectly competitive. The Chinese soybean import market may be characterized as either a monopsony where China, as the major soybean importer, has stronger market power relative to soybean exporters from the U.S., Brazil, and Argentina or as an oligopoly where the U.S., Brazil, and Argentina, as major soybean exporters, have relatively stronger market power.

Song, Marchant, and Xu (2006) found that Chinese soybean importers have stronger market power relative to U.S. soybean exporters. Using this result, and assuming Chinese soybean importers may also have stronger market power over soybean exporters from Brazil and Argentina, objectives of this research include 1) to provide an overview of the global soybean industry; 2) to analyze the competitive structure of the Chinese soybean import market by examining both annual and monthly data, and to examine the relationship between the U.S. and South America (Brazil and Argentina) in the Chinese soybean import market: substitutes or complements; and 3) to compare competitiveness of the U.S., Brazil, and Argentina in the Chinese soybean import market.

Outlook of the World Soybean Industry

Leading Global Soybean Producers

Globally, the top four soybean producing countries include the U.S., Brazil, Argentina, and China, as shown in figure 1 (USDA-FAS, 2006). In 2005, soybean output from these four countries reached 200 million metric tons, accounting for 90% of the global total (USDA-FAS, 2006). Among them, the U.S. led the world in soybean production with an output of 84 million metric tons in 2005. Brazilian soybean output reached 57 million metric tons, about 76% of U.S. production, and ranked second in the world. Argentina produced 41 million metric tons of soybeans and China only produced 18 million metric tons.

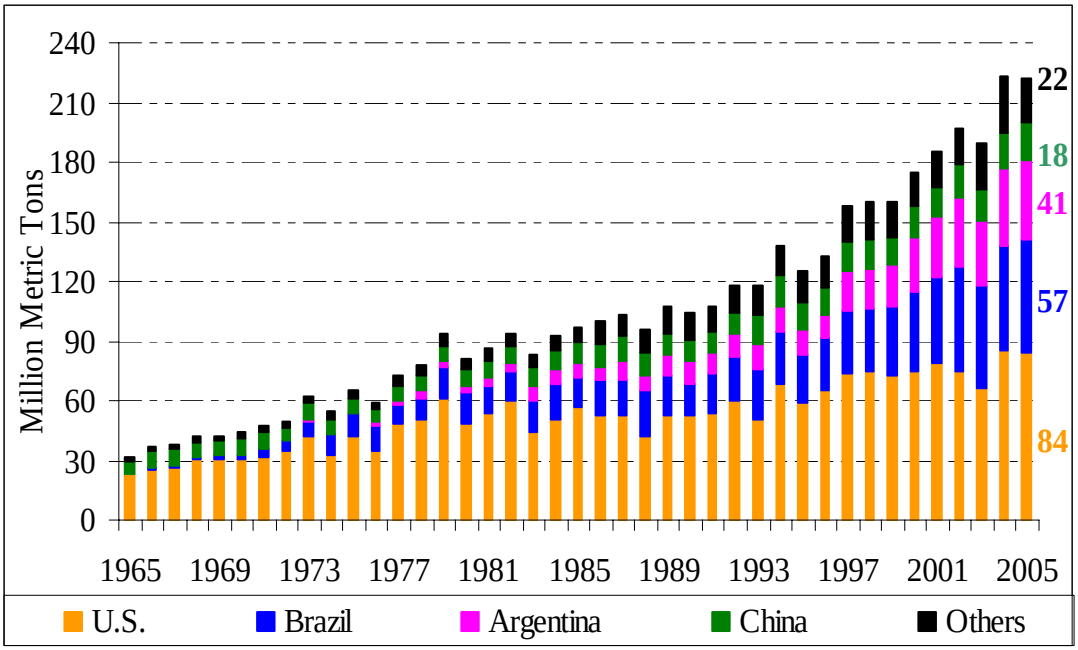


Figure 1. Leading Global Soybean Producing Countries
Source: USDA-FAS, *PS&D* data, 2006.

Figure 1 also indicates that the growth of soybean production was quite stable for the U.S., China, and other countries. In the last four decades, the average annual growth rates of soybean production in the U.S. and China were 5% and 3%, respectively. In contrast, soybean production in Brazil and Argentina increased dramatically in recent years. From 1964 to 2005, the average annual growth rates of soybean production in Brazil and Argentina were 14% and 27%, respectively (USDA-FAS, 2006). From these trends shown in figure 1, it is reasonable to expect that within a few years Brazil may surpass the U.S. and become the largest soybean producer in the world, if Brazil continues its current growth rate. In contrast, the growth rate of Argentinean soybean production is even higher than that of Brazil, and Argentina has also become a strong competitor for the U.S. in the world soybean market.

Leading Global Soybean Consumers

Leading global soybean consuming countries (or economic groups) include the U.S., China, Brazil, Argentina, and the EU-25. Figure 2 compares soybean consumption among these leading soybean consuming countries (USDA-FAS, 2006). The U.S. is the number one soybean consumer in the world. In 2005, U.S. soybean consumption reached 51 million metric tons, accounting for 61% of U.S. soybean output. Brazil, ranking second in soybean consumption, consumed 31 million metric tons in 2005, accounting for 57% of its production.

Argentina's soybean consumption reached 31 million metric tons in 2005, accounting for 76% of its production. In contrast, China's soybean consumption was 45 million metric tons in 2005, while China's soybean production was only 18 million metric tons, resulting in a 27 million metric tons shortage.

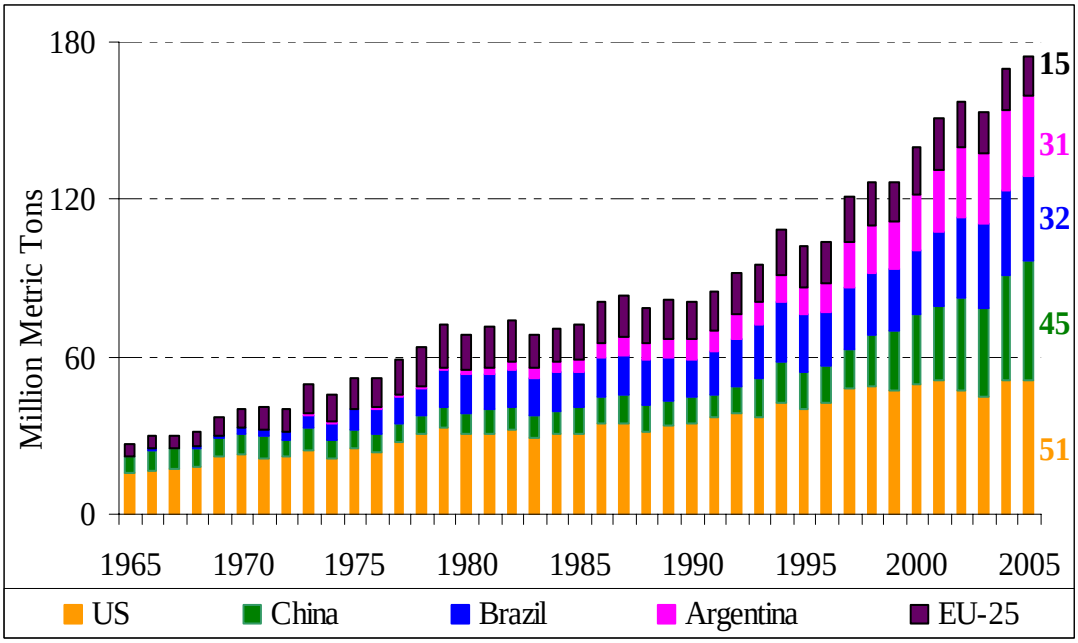


Figure 2. Leading Global Soybean Consumers

Source: USDA-FAS, 2005.

Leading Global Soybean Exporters

The top three soybean exporters in the world include the U.S., Brazil, and Argentina. Figure 3 shows that Brazil's soybean exports reached 25 million metric tons in 2005, surpassing the U.S., and Brazil became the number one soybean exporter in the world. The U.S. exported 24 million metric tons of soybeans, a 3 million metric tons fall compared to 2004. Brazil's soybean exports increased dramatically in the last decade from 4 million metric tons in 1995 to 25 million metric tons in 2005, an over 500% increase. Soybean exports from Argentina also increased in recent years, and reached 10 million metric tons in 2005. Brazil and Argentina became strong competitors for the U.S. in the world soybean market.

The export shares in the world soybean market for Brazil, the U.S., and Argentina were 39%, 37%, and 16%, respectively (USDA-FAS, 2006) in 2005. The sum of soybean exports from these three countries accounted for 92% of the global total. The trends for market shares and the structural changes in the world soybean market are shown in figure 3. The U.S. soybean export share in the world market has been decreasing, especially in the last decade. In 1995, the U.S. soybean export share was 73%, but fell to 37% in 2005, a 36% market share loss in the world soybean market. In contrast, Brazilian market share in the world soybean market increased from 11% in 1995 to 39% in 2005, gaining 28% more within 10 years. Argentina also competes with the U.S. in the world soybean market, and Argentinean market share increased from 6% in 1995 to 16% in 2005.

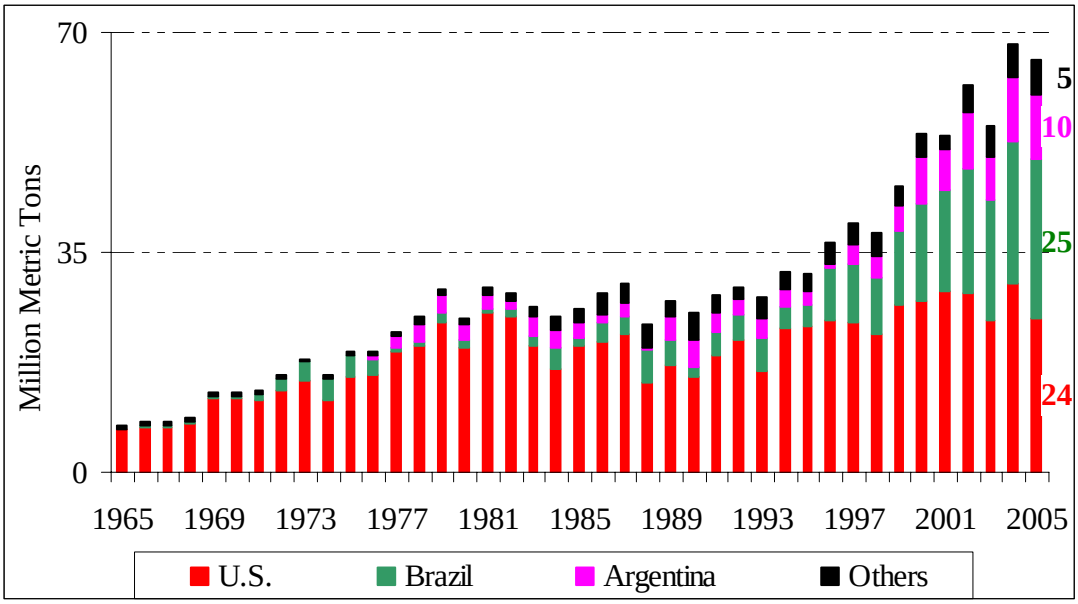


Figure 3. Leading Global Soybean Exporters
Source: USDA-FAS, *PS&D* data, 2006.

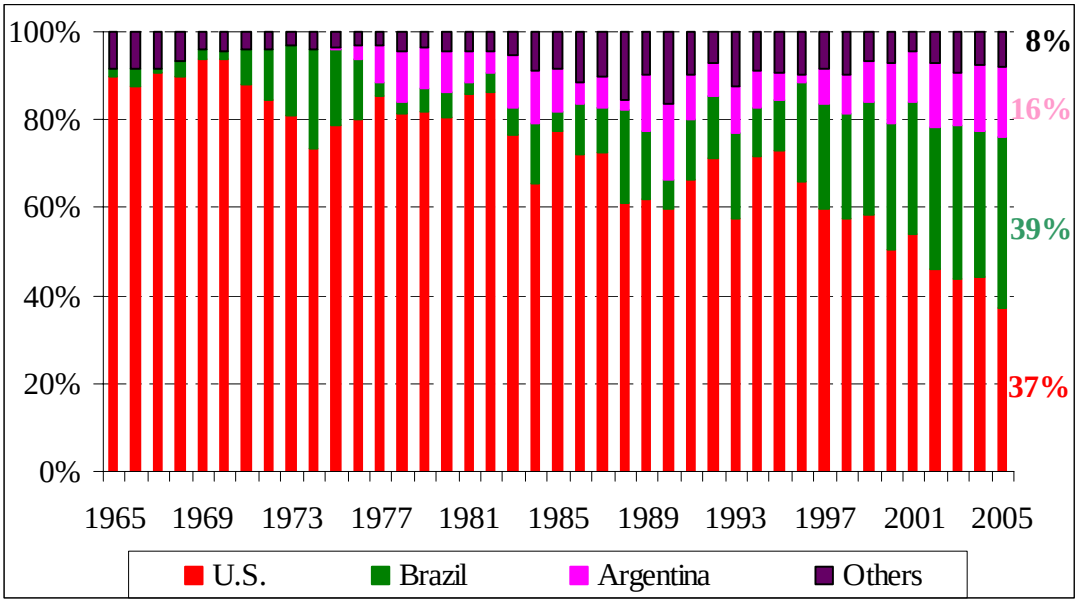


Figure 3. Export Shares of Top Soybean Exporters in the World Soybean Market
Source: USDA-FAS, *PS&D* data, 2006.

Leading Global Soybean Importers

The leading global soybean importers include China, the EU-25, Japan, and Mexico as shown in figure 4. China's soybean imports skyrocketed in the last decade from 0.8 million metric tons in 1994 to 27 million metric tons in 2005, an almost 27-fold increase, while soybean imports into the EU, Japan, and Mexico remained quite stable. In 2005, China's soybean imports accounted for 41% of the world total (USDA-FAS, 2006). Recall that China produced 18 million metric tons and its acreage annual growth rate was 3%. Thus soybean imports play an important role for Chinese consumers. The EU-25 imported 14 million metric tons of soybeans in 2005, which was 22% of global soybean imports. Soybean imports for Japan and Mexico were 4 million metric tons each. Japanese and Mexican soybean import shares were each only about 6% of the world total.

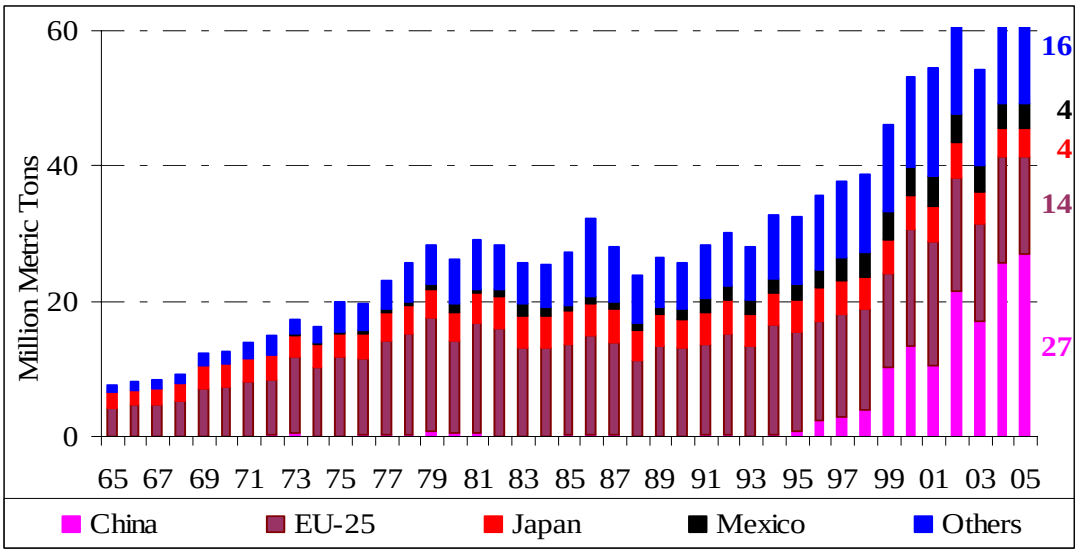


Figure 4. Leading Global Soybean Importers
Source: USDA-FAS, *PS&D* data, 2006.

Global Soybean Market Recap

To recap, the leading global soybean producers are the U.S., Brazil, Argentina, and China. The leading global soybean consumers are the U.S., Brazil, China, Argentina, and the EU-25. The leading global soybean exporters include the U.S., Brazil, and Argentina, and the leading global soybean importers are China, the EU-25, Japan, and Mexico, as shown in figure 5 (Song, 2006).

The growth of soybean production in the U.S. and China was quite steady, with an annual growth rate of 5% and 3%, respectively, in the last four decades. In contrast, the annual growth rate of the soybean industries in Brazil and Argentina were 15% and 28%, respectively, during the same period. However, soybean consumption in the U.S., Brazil, and Argentina did not increase as much as their production. Therefore, soybean exports became an important channel for the U.S., Brazil, and Argentina to deal with their soybean surplus. Soybean exports from Brazil and Argentina increased rapidly in recent years and became main competitors for the U.S. in the world soybean market.

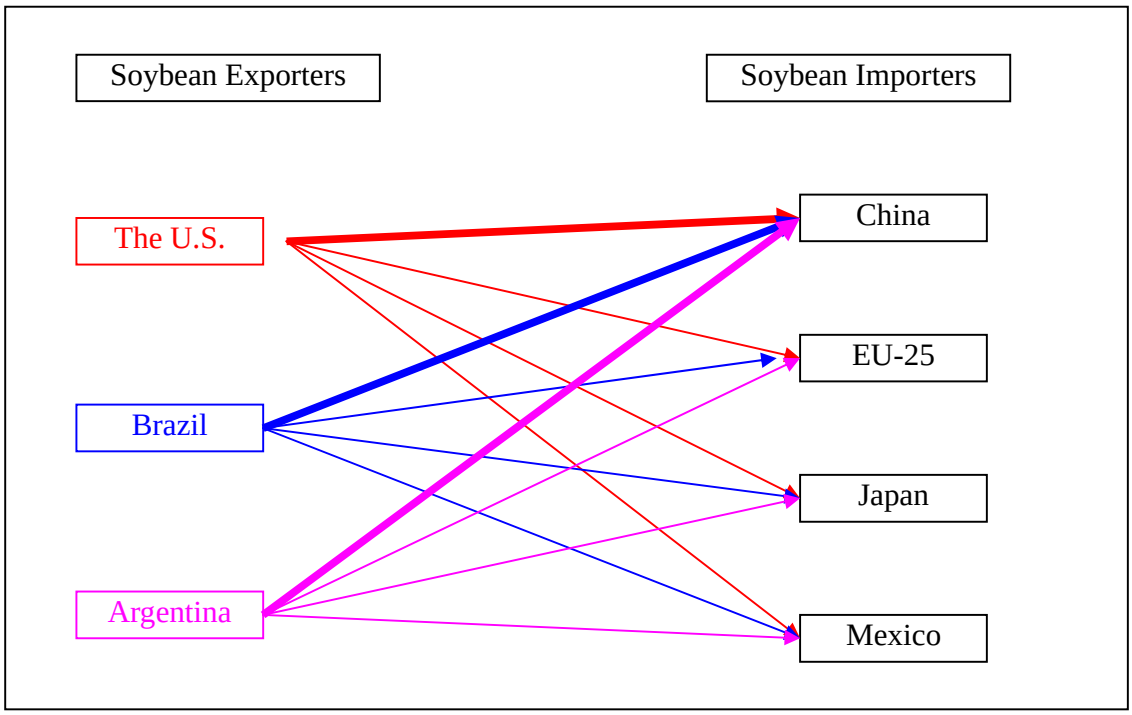


Figure 5. The Global Soybean Market—Exporters and Importers

On the other hand, the main global soybean importers, including the EU, Japan, and Mexico did not increase their soybean imports much in the past. In contrast, for China, as the number one soybean importer, Chinese soybean imports skyrocketed in the last decade and became the primary soybean import market in the world, attracting more attention from top soybean exporters, including the U.S., Brazil, and Argentina.

The U.S., Brazil, and Argentina in the Chinese Soybean Import Market

As reviewed in the previous section, China is the number one soybean importer and the U.S., Brazil, and Argentina are the top three soybean exporters in the world. Figure 6 shows that soybean surpluses (defined as the difference between the domestic supply and the domestic consumption in soybean exporting countries) in the U.S., Brazil, and Argentina increased annually in recent years. In 2005, soybean surpluses in the U.S.,

Brazil, and Argentina reached 33, 25, and 10 million metric tons, respectively (USDA-FAS, 2006). To avoid high accumulation of soybean stockpiles, export markets are crucial for the soybean industries in the U.S., Brazil, and Argentina.

Figure 7 shows the trends of soybean shortages (defined as the difference between the domestic consumption and the domestic production in the soybean importing countries) for the top soybean importers in the world, including China, the European Union, Japan, and Mexico. Soybean shortage in Japan was quite stable in the past, and soybean shortage in the EU and Mexico did not increase much in the past decade. By these trends, it can not be expected that the EU, Japan, and Mexico will increase their soybean imports much in the near future. In contrast, for China, its soybean shortage increased dramatically in recent years, from almost null in 1991 to 27 million metric tons in 2005.

Combining the above trends of soybean exporters and soybean importers, it is reasonable to state that China is and will continue to be the most important market for the U.S., Brazil, and Argentina's soybean surpluses. Song, Marchant, and Xu (2006) established and estimated a U.S.-China partial equilibrium soybean trade model and found that Chinese soybean importers had stronger market power over U.S. soybean importers. Three large soybean suppliers facing one large soybean buyer with a rapid growth potential may support the assumption that Chinese soybean importers may have stronger market power than soybean exporters from Brazil and Argentina.

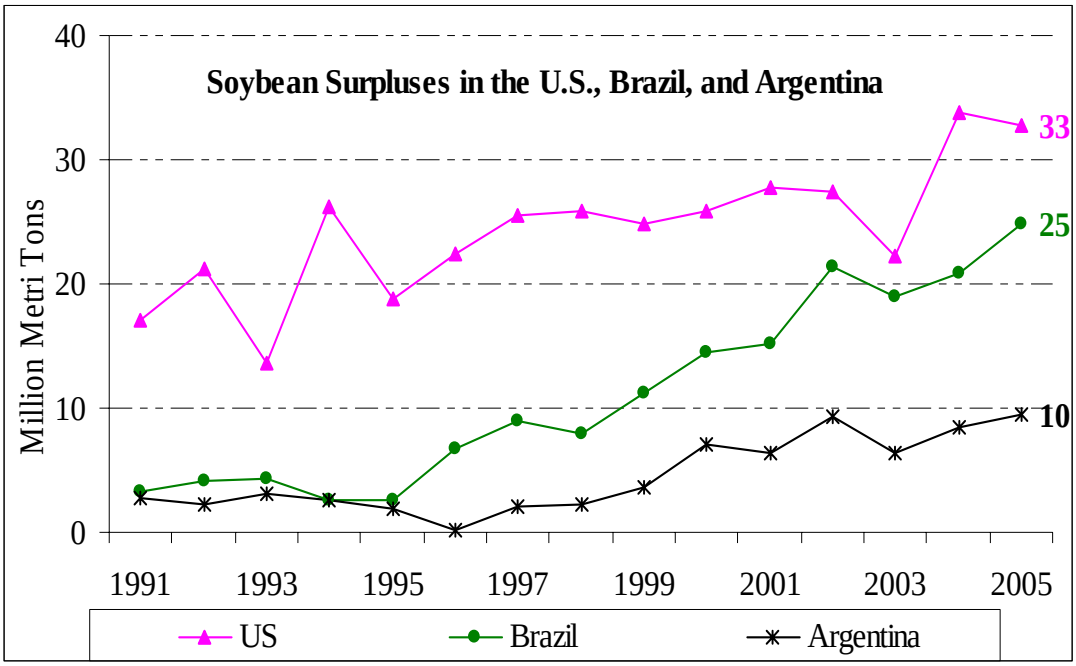


Figure 6. Soybean Surplus in Main Soybean Exporting Countries
Source: USDA-FAS, *PS&D* data, 2006.

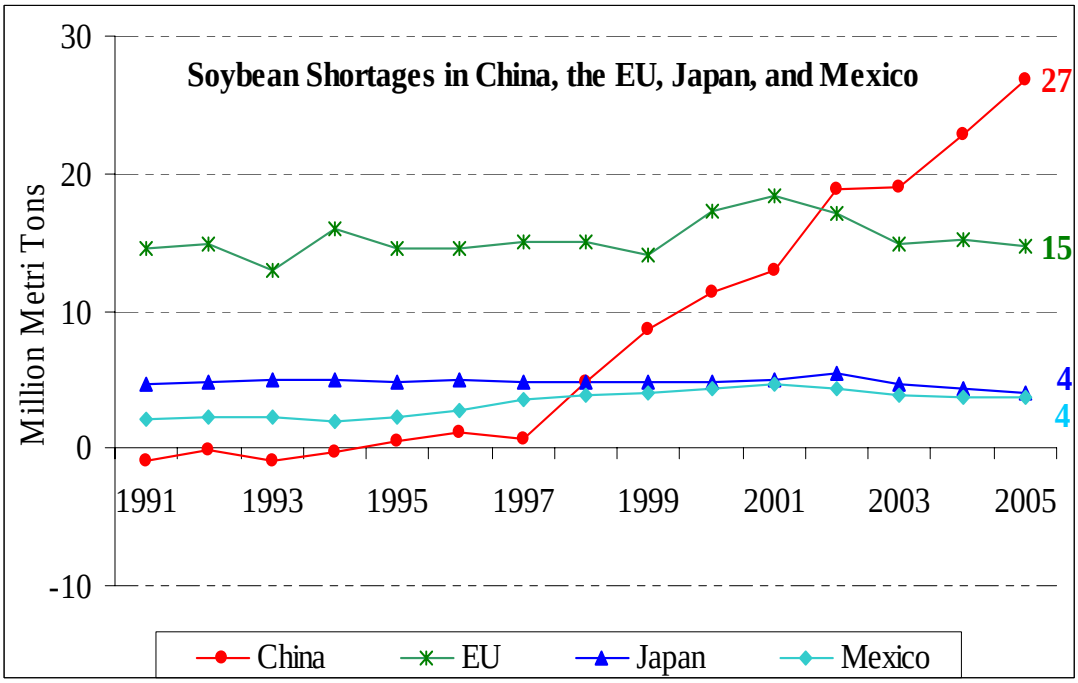
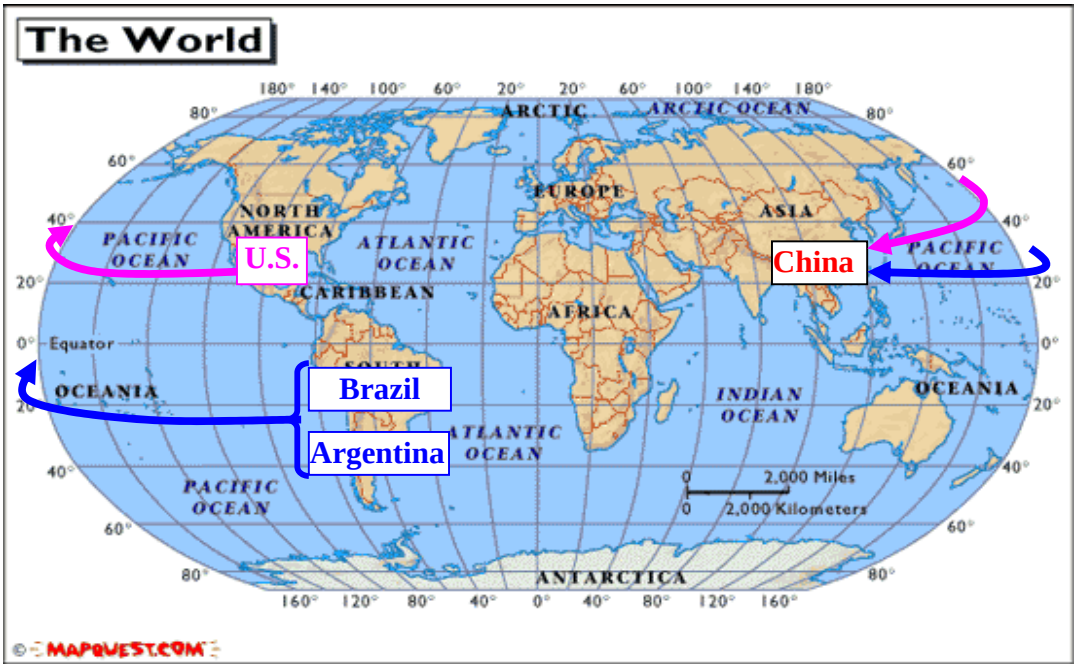


Figure 7. Soybean Shortage in Main Soybean Importing Countries
Source: USDA-FAS, *PS&D* data, 2006.



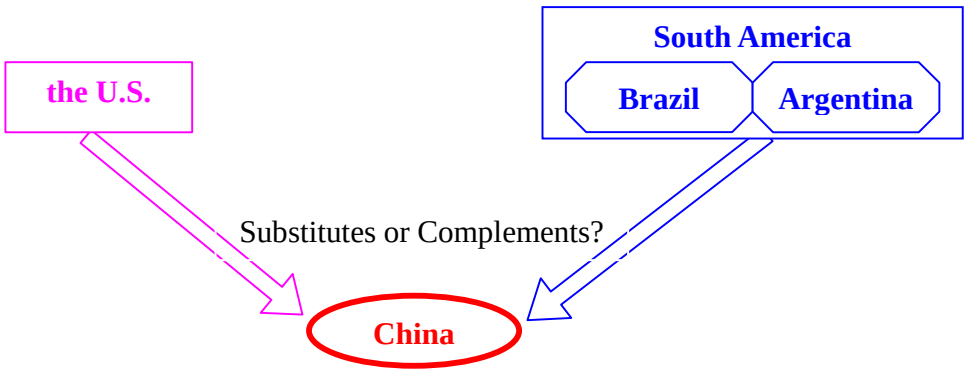


Figure 8. Chinese Soybean Import Market
* Source: MapQuest, Inc. (Mapquest.com).

Because China is the most important market for the U.S., Brazil, and Argentina, these three soybean exporters compete with each other in the Chinese soybean import market to expand their soybean market shares. From a soybean suppliers' perspective, the competitive relationship among the U.S., Brazil, and Argentina in the Chinese soybean import market will be examined in the following section. To simplify the problem, Brazil and Argentina are considered as a group, the South America (SA)

soybean supplier. As shown in figure 8, the U.S. and South America (Brazil and Argentina) are competing in the leading soybean import market, China. However, the question is "what is the relationship between the U.S. and South America in the Chinese soybean import market?"

Are the U.S. and South America Substitutive Soybean Suppliers for China?

Figure 9 shows that Chinese annual soybean imports from South America were slightly lower than that from the U.S. before 2001 and in 2004. From 2001 to 2003 and 2005, Chinese annual soybean imports from South America surpassed the United States. In 2005, China imported 15.35 million metric tons of soybeans from SA with Brazil 7.95 million metric tons and Argentina 7.4 million metric tons. In contrast, China imported 11 million metric tons of soybeans from the United States. U.S. soybean exports to China were higher than the soybean exports from either Brazil or Argentina to China, but lower than the sum of Brazil's and Argentina's soybean exports to China.

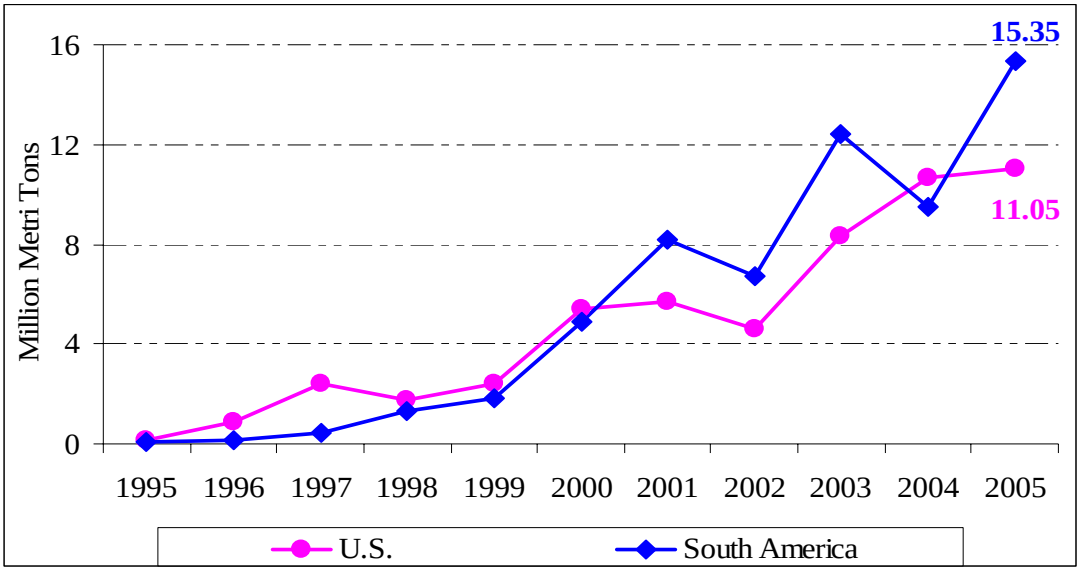


Figure 9. Chinese Soybean Imports from the U.S. and South America
Source: The Chinese Minister of Agriculture, 2006

Since soybeans produced in both the U.S. and South America contain biotech varieties, we can assume that soybeans exported to China from the U.S. and SA were homogeneous. If the U.S. chose to set higher export prices, China could reduce their imports from the U.S. and increase their imports from South America, provided that soybean stocks in the U.S. were enough to satisfy China's soybean demand, vice versa. However, by examining soybean export prices, figure 10 shows that the soybean export prices from the U.S., Brazil, and Argentina to China were similar. Observations indicate that the U.S. and SA chose to set their soybean export prices at similar levels, while Chinese soybean importers decided how much soybeans to buy from each soybean supplier. The next step is to investigate soybean stocks in the U.S. and SA to see whether their soybean stocks can satisfy China's soybean demand, which is a necessary condition for the U.S. and SA to be substitute suppliers to supply soybeans to China.

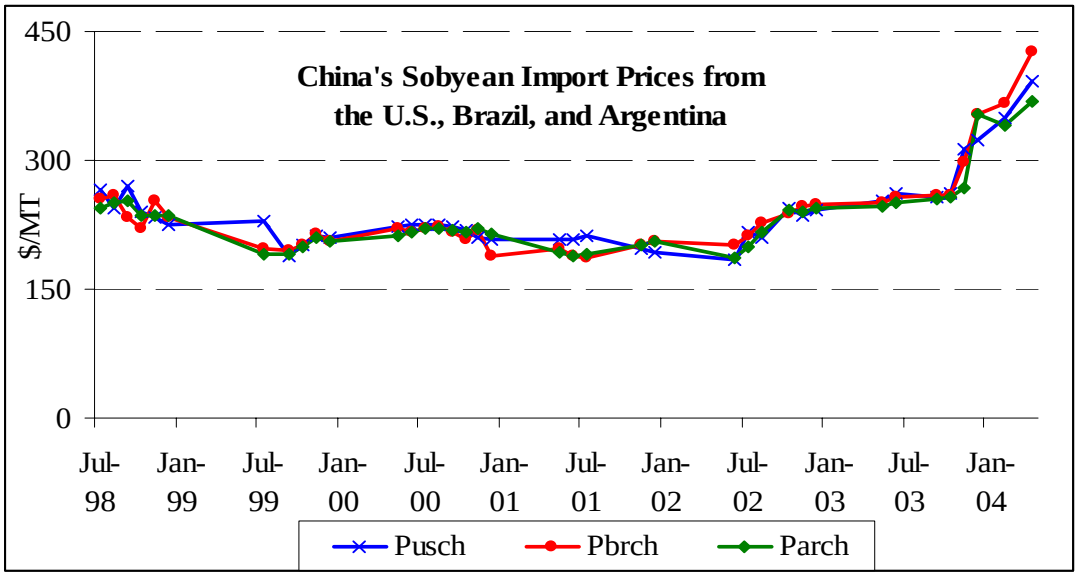


Figure 10. Chinese Soybean Import Prices from the U.S., Brazil, and Argentina*

*These export prices are derived CIF prices, divided export value by export quantity. Those observations that export quantity was zero were deleted; Pusch is the soybean export price from the U.S. to China, Pbrch is the soybean export price from Brazil to China, and Parch is the soybean export price from Argentina to China.

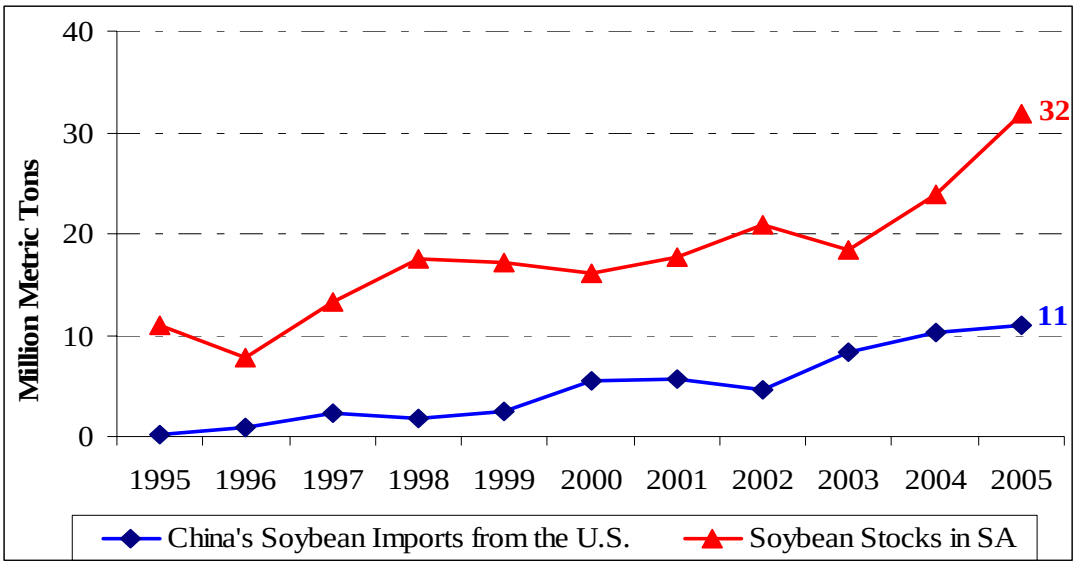


Figure 11. China's Soybean Imports from the U.S. and Soybean Stocks in SA

Source: USDA-FAS, 2006; the Chinese Minister of Agriculture, 2006.

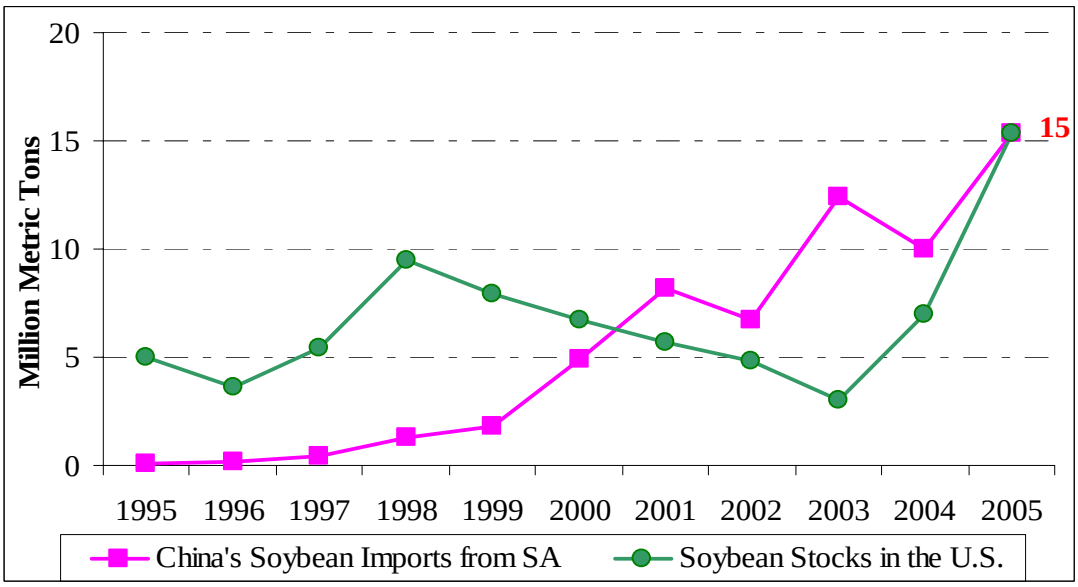


Figure 12. China's Soybean Imports from SA and Soybean Stocks in the U.S.

Source: USDA-FAS, 2006; the Chinese Minister of Agriculture, 2006.

Figure 11 shows China's soybean imports from the U.S. and soybean stocks in SA. If there is a production shock in the U.S. or U.S. soybean exporters raise their soybean export prices, soybean stocks in SA are more than enough to satisfy China's soybean demand. From this perspective, SA can be a substitute supplier for the U.S. to supply soybeans to China. In contrast, figure 12 shows China's soybean imports from SA and soybean stocks in the United States. If there is a production shock in SA or if SA soybean exporters raise their soybean export prices, soybean stocks in the U.S. are NOT enough to satisfy China's soybean demand from 2001 to 2004. Even in 2005, U.S. soybean stocks were just able to satisfy China's demand. From this perspective, the U.S. cannot serve as a complete substitute supplier for SA to supply soybeans to China. But the U.S. could be a partial substitute for SA to supply soybeans to China.

The U.S. and South America Are Seasonal Complementary Soybean Suppliers for China

Since the U.S. is located in the northern hemisphere and South America is located in the southern hemisphere, they have opposing growing seasons, i.e., different production time periods to supply soybeans to markets. Similar to China, the harvest season for U.S. soybeans is in October and November, and for South America, March and April. Figure 13 plots the U.S. monthly soybean stocks and figure 14 shows the monthly soybean stock levels in Brazil (Argentina data is not available). Figure 13 indicates that, generally, U.S. soybean stocks reach the highest level in November. Then due to consumption and exports, U.S. soybean stocks decrease to their lowest levels in August and September, with some years in October. For Brazil, the soybean stocks normally reach their highest level in April. Then due to consumption and exports, Brazilian soybean stocks decline gradually, and reach their lowest levels in January and February.

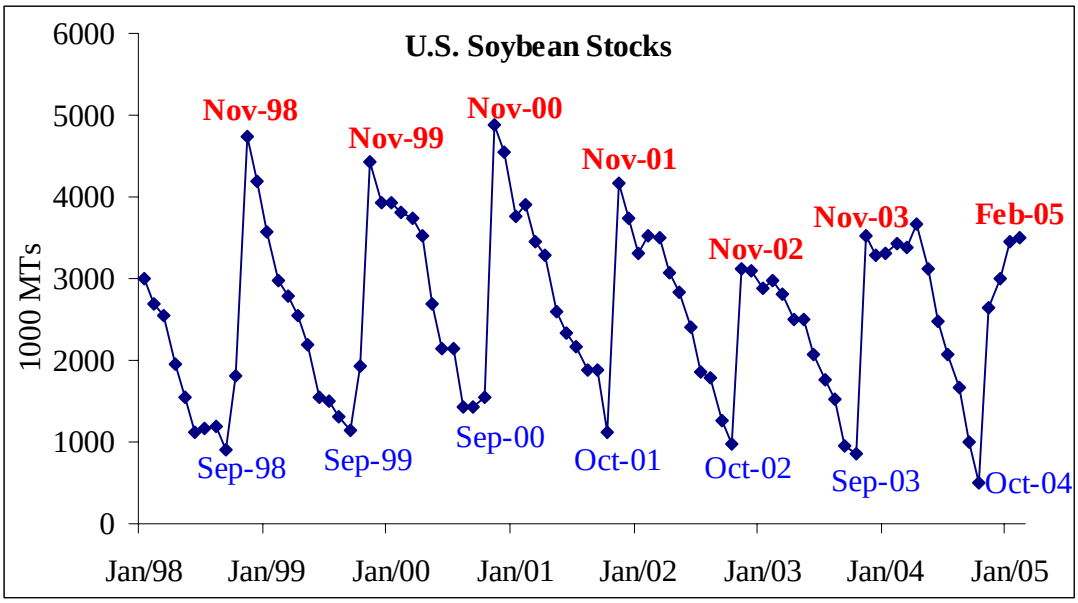


Figure 13. U.S. Soybean Stocks (1000MT)

Source: USDA-FAS, *Attache Report* (1998-2005).

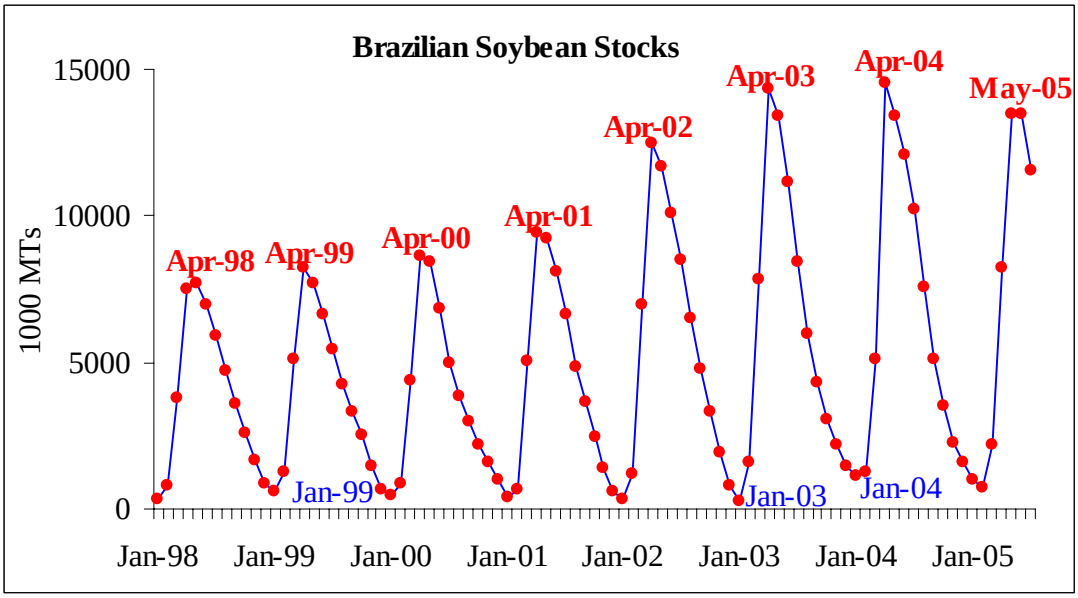


Figure 14. Brazilian Soybean Stocks (1000MT)

Source: USDA-FAS, *Attache Report* (1998-2005).

Because of the difference in soybean growing seasons for the U.S. and South America, their soybean export behaviors are different. Figure 15 depicts the U.S. and South America's average monthly soybean exports to China from 1999 to 2004. Figure 15 clearly shows that soybean trade in the Chinese import market can be divided into two periods. The first period is the South American period (period I), which includes June, July, August, September, and October. In period I, SA exports just harvested soybeans to China, without or with less storage costs, and the U.S. exports stocked soybeans to China with additional storage costs. South America has the seasonal advantage and results in a dominant position in the Chinese soybean import market and the U.S. is in a disadvantageous position because of the additional storage costs.

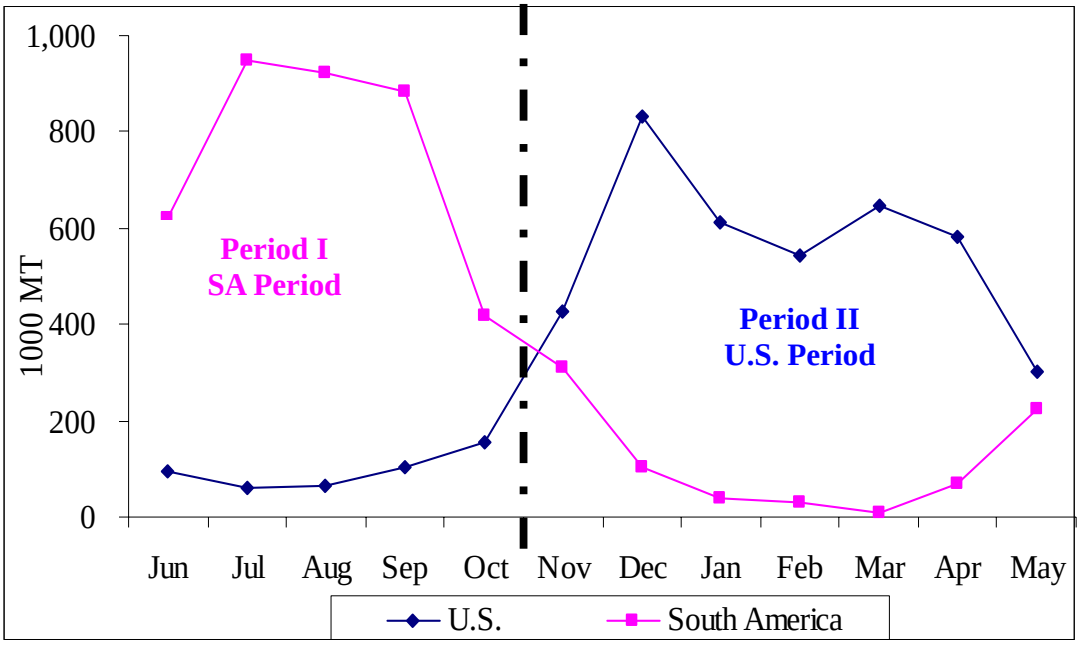


Figure 15. Average Monthly Soybean Exports from the U.S. and South America (Brazil and Argentina) to China (1999-2004)

Source: the Chinese Ministry of Agriculture, 2006.

The second period is the U.S. period (period II), which includes November, December, January, February, March, April, and May. In this period, the U.S. has just harvested their soybeans and becomes the main soybean supplier for China, and South America supplies only a small amount of soybeans for China from their soybean stocks during period II. In period II the U.S. exports just harvested soybeans to China without or with little storage costs and SA exports stocked soybeans with additional storage costs. Therefore, the U.S. has the seasonal advantage in this period, resulting in a dominant position in the Chinese soybean import market and SA is in a disadvantageous position due to the additional storage costs. The above analysis implies that South America and the U.S. are seasonal complementary soybean suppliers for China, with South America dominating period I and the U.S. dominating period II.

From the importers' side, Chinese soybean importers may have stronger market power relative to soybean exporters from both the U.S. and SA, and they will exercise their monopsony power to maximize their soybean import profits. Strategically, to reduce the risk of price increases, Chinese soybean importers will not rely on only one soybean supplying country. Chinese soybean importers will work with different soybean supplying countries to diversify their supply risk. Taking this seasonal factor into consideration, we hypothesize that Chinese soybean importers will import soybeans from SA in period I, and from the U.S. in period II. In that case, because of the market power of Chinese soybean importers and this seasonal difference, the U.S. and SA actually become seasonal complementary soybean suppliers for China, with SA dominating period I and the U.S. dominating period II.

Competitiveness Comparison among the U.S., Brazil, and Argentina in the Chinese Soybean Import Market

Competitiveness of soybean industries of the U.S., Brazil, and Argentina in the Chinese soybean import market can be evaluated by comparing their export costs. Schnepf, Dohlman, and Bolling (2001) compared soybean export costs of the U.S., Brazil, and Argentina. Schnepf, et al. divided export costs into three categories, including production costs, internal marketing and transportation costs, and international transportation costs. Production costs were further separated into variable costs and fixed costs. They used 1998/99 data and compared export costs of the heartland region from the U.S., the State of Parana and Moto Grosso from Brazil, and the northern Buenos Aires/southern Santa Fe area from Argentina. Table 1 shows the difference of export costs for the U.S., Brazil, and Argentina.

Table 1. Soybean Export Costs of the U.S., Brazil, and Argentina

Cost Item*	U.S.	Brazil				Argentina	
	Heartland	Parana		Mato Grosso		Buenos Aires/Santa Fe	
	$/bu.	$/bu.	% of U.S. Costs	$/bu.	% of U.S. Costs	$/bu.	% of U.S. Costs
Variable Costs	1.71	2.78	--	3.17		1.9	--
Fixed Costs	3.4	1.38	--	0.72		2.02	--
Total Production Costs	**5.11**	**4.16**	**81%**	**3.89**	**76%**	**3.92**	**77%**
Internal Transport & Marketing Costs	0.43	0.85	--	1.34	--	0.81	--
Cost at Border	**5.54**	**5.01**	**90%**	**5.23**	**94%**	**4.73**	**85%**
Freight Costs to China**	0.75	0.81	--	0.81	--	0.81	--
Export Tax***	--	--	--	--	--	1.11	--
Cost at Main China Ports	**6.29**	**5.82**	**93%**	**6.04**	**96%**	**6.65**	**106%**

* Data for production costs and internal transport and marketing costs are 1989/99 data from Schnepf, et al. (2001).

** The freight costs to China are 2005 data from USDA-AMS, "Grain Transportation Reports", February 2005.

*** Argentina imposed a 23.5% export tax and surcharge on soybean exports from 2001. (See Chapter three—Soybean Policies in Argentina).

From table 1, we can draw the following conclusions

1. The soybean production costs in Brazil were the lowest among the three countries, and soybean production costs in the U.S. were the highest with Argentina lying between them and close to Brazil;

2. The internal transport and marketing costs in the U.S. were the lowest among the three countries, and the internal transport and marketing costs in the Brazil were the highest with Argentina lying between them and close to Brazil;

3. The freight costs from the U.S. to China were the lower relative to the freight costs from Brazil and Argentina to China;

4. Export taxes and surcharges increased the soybean export costs for Argentina;

5. In aggregate, the total soybean export costs for Brazil were the lowest and the export costs for Argentina were the highest with the U.S. lying between them. The main reason for Argentina's high export costs is because Argentina currently imposes 23.5% export tax on soybean export (USDA-FAS, 2005). However, if the Argentinean government eliminates export taxes on soybeans, then the total soybean export costs for Argentina will be $5.54/bushel and becomes the lowest. Therefore, Argentina still has a

great potential to become the most competitive soybean supplier in the Chinese soybean import market.

Summary and Conclusions

As the number one soybean importer in the world, Chinese soybean importers may have stronger market power over soybean exporters from the U.S., Brazil, and Argentina. The top three soybean suppliers for China—the U.S., Brazil, and Argentina—compete with each other in the Chinese soybean import market. From a soybean stock level perspective, SA can be a complete substitute soybean supplier for the U.S. to supply soybeans to China. However, the U.S. cannot be a complete substitute supplier for SA to supply soybeans to China.

From China's side, Chinese soybean importers may have stronger market power over soybean exporters from the U.S. and South America (Brazil and Argentina). Chinese soybean importers can exercise their monopsony power to maximize their import profits by working with both the U.S. and SA to diversify their soybean suppliers to reduce the price risk. Due to Chinese soybean importers strategic choice and the seasonal difference for production, the U.S. and South America became seasonal complementary soybean suppliers for China, with South America dominating period I (June, July, August, September, and October) and the U.S. dominating period II (November, December, January, February, March, April, and May).

However, from their export costs' perspective, currently, Brazilian soybean export costs were the lowest and Argentinean soybean export costs were the highest with the U.S. in the middle. However, if the Argentinean government can eliminate export taxes

on soybeans, the soybean export costs in Argentina could be the lowest. With the fast development of infrastructures in Brazil and Argentina, the U.S. is losing its advantage gradually.

In terms of policy implications for the U.S. soybean industry, facing strong competition from South America, we cannot expect that U.S. market share in the Chinese soybean import market can be further expanded. If U.S. soybean production continues to grow, other sources of soybean consumption, like industrial usage for fuel transformation, will be required for maintaining stable farm incomes for U.S. soybean farmers. The U.S. soybean export advantage is its relatively low marketing and transportation costs both domestically and internationally. With the development of infrastructure in Brazil and Argentina, this U.S. advantage will become less and less.

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