

Cultivating Opportunity: The Benefits of Increased U.S. - China Agricultural Trade



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I. MESSAGE FROM THE U.S. CHAMBER OF COMMERCE



The U.S. Chamber of Commerce is committed to deepening mutually beneficial economic and trade ties between the United States and China. A bright spot in our trade relations has been our rich history of collaboration in the agriculture sector. Since at least the 1970s, and certainly over the last decade, agriculture has been a notably positive area in the commercial relationship. Over the last ten years, U.S. agriculture exports to China have grown by over 200%, or nearly \$20 billion. In 2015, U.S. agricultural exports to China reached \$25.9 billion— making China the second-largest market for American agriculture sector products.

Greater two-way agriculture trade benefits both countries. Increased agricultural exports from the United States provide high-quality food products to Chinese consumers and cutting-edge farming technologies to its farmers. Chinese exports to the United States help Chinese farmers reach new markets and reduce prices for consumers in the United States.

Despite impressive bilateral trade volumes, however, significant trade and behind-the-border barriers in both countries restrict access and prevent both countries from realizing the full benefits of open trade in agriculture products.

The U.S. Chamber of Commerce commissioned this report to determine the agricultural trade gains that would be realized by removing these barriers. Our report finds that lowering trade and other access barriers would result in gains of nearly 40% above baseline projections for both economies. For the United States, this means sustaining the openness of our market and addressing regulatory concerns, while ensuring product safety for imports. For China, this includes simplifying and speeding up the biotechnology approval processes, giving equitable treatment to animal vaccine imports, and eliminating subsidies to locally-produced agricultural products, equipment and machinery.

The Chamber is committed to promoting two-way openness in agricultural trade and investment in agriculture and a regulatory environment that enables enterprises to meet the growing food demands of both countries. We hope the analysis and recommendations in this report provide a useful framework for policy makers to accelerate efforts to realize the substantial opportunities that increased trade in agriculture can provide to both economies and peoples.



Myron Brilliant
Executive Vice President
Head of International Affairs
U.S. Chamber of Commerce

II. EXECUTIVE SUMMARY

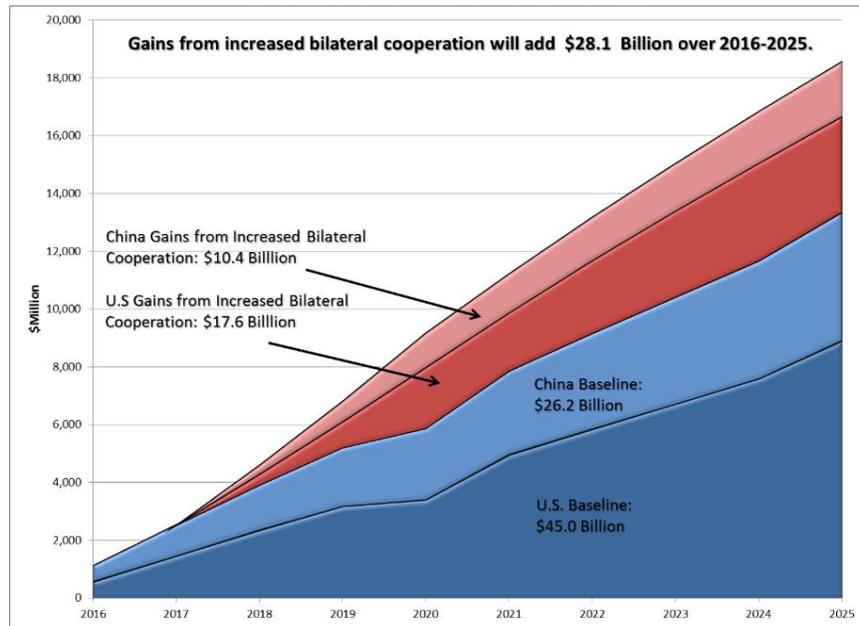
The United States and China are the world's two largest economies, and their economic performance and policies contribute substantially to the prosperity and stability of the global economy. Both countries combined account for about one-third of the world's GDP, one-third of the world's outward foreign direct investment, one-fifth of world agricultural product, fish, forest products and farm machinery imports and 16% of world exports of these products. These shares will likely rise through 2025.

The U.S. and China's sizeable two-way trade in agricultural products, fish and seafood, forest products and farm machinery is growing rapidly, reaching \$35.6 billion in 2015. U.S. exports to China increased eleven-fold while China's exports to the U.S. grew seven-fold from 2000-2015.

Bilateral trade between the U.S. and China is expected to continue to grow with cumulative gains over the 2016-2025 baseline period forecast at \$71.2 billion. However, these countries frequently challenge each other over trade disputes and sometimes retaliate against each other's trade barriers. This study finds that bilateral trade gains would be significantly larger through greater joint cooperation that resolve measures that restrict imports. Strengthening bilateral trade cooperation would be a win-win situation for both countries in terms of exports.

This study finds that resolving trade barriers between the two countries and ensuring science-based regulatory regimes would result in **additional cumulative gains of \$28.1 billion** in bilateral trade of agricultural products, fish and seafood, forest products and farm machinery over the 2016-2025 period (Exhibit 1).

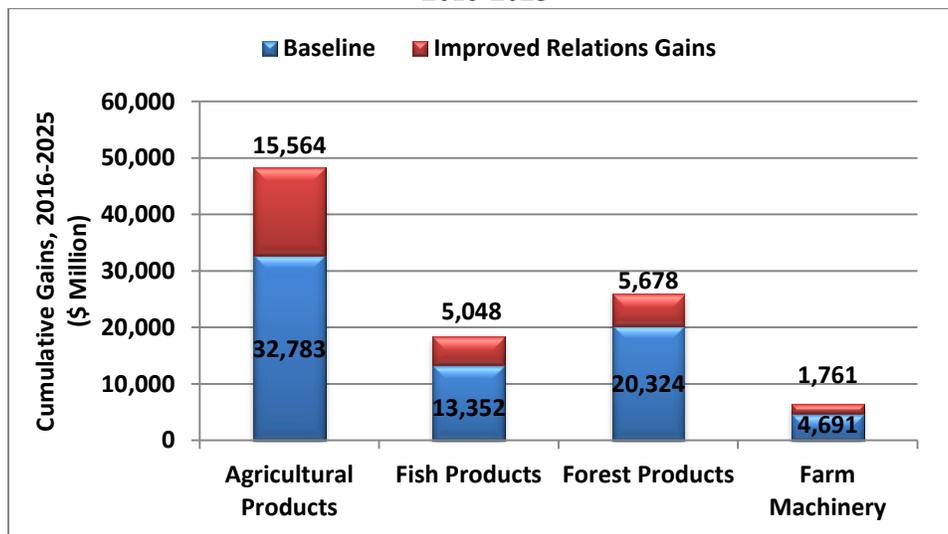
Exhibit 1. U.S.-China Bilateral Trade Cumulative Gains Forecast Over 2016-2025 Period



Source: Informa Economics IEG

The greatest potential cumulative gains from increased bilateral cooperation are expected to be in agricultural products followed by forest products, fish and seafood and farm machinery (Exhibit 2).

Exhibit 2. U.S.-China Cumulative Bilateral Trade Gains Forecast by Product 2016-2025



Source: Informa Economics IEG

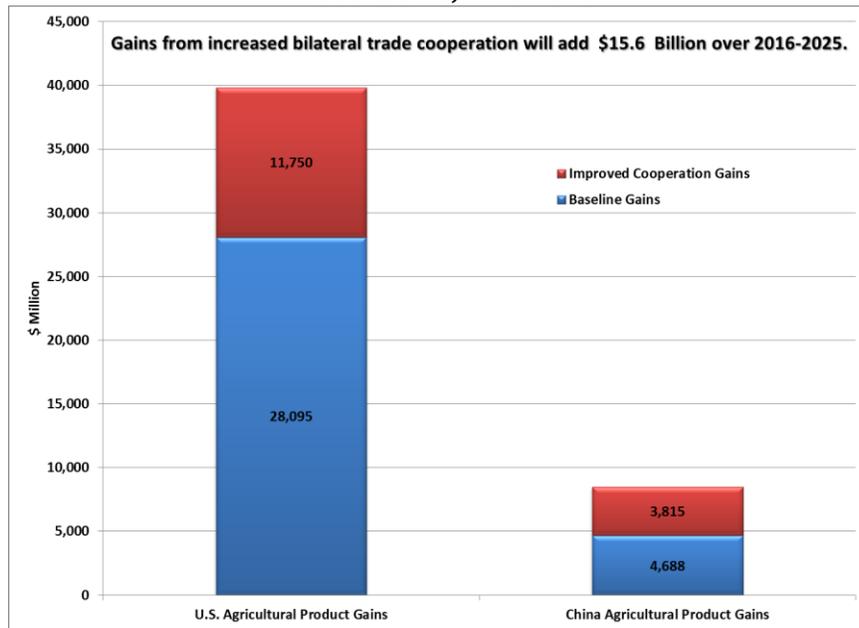
A. Agricultural Product Bilateral Trade Outlook

U.S.-China bilateral trade in agricultural products was \$24.6 billion in 2015 and has considerable potential to expand. Increasing incomes and urbanization are boosting China's food consumption. This growth is putting a strain on China's domestic production to keep up with growing food demand. At the same time, limited availability of water and land resources is restraining growth in domestic production. U.S. food imports comprise a growing share of food consumed by Americans. In addition, some foods imported by the U.S. cost less than food produced domestically. Demand for healthy and ready-made food is increasing as working families have less time to prepare meals.

Cumulative baseline bilateral trade gains in agricultural products over the 2016-2025 period are forecast at \$32.8 billion. Despite this strong growth potential, China's export gains are hampered by anti-dumping duties on various products and food safety concerns by U.S. consumers. U.S. agricultural product exports are hampered by tariff rate quotas, anti-dumping duties and behind-the-border barriers such as slow, unpredictable and inequitable approval and distribution processes for animal vaccines and biotechnology traits in imports, and lack of low level presence policy resulting in trade disruptions.

This study finds that increasing bilateral cooperation to address and resolve trade barriers between the two countries would result in **additional cumulative gains of \$15.6 billion in bilateral agricultural product trade over the 2016-2025 period** (Exhibit 3). The largest U.S. cumulative export gains are likely in soybeans, hides and skins, dairy products, pork products and poultry meat products. The largest cumulative export gains for China are likely in fresh and processed fruits and vegetables.

Exhibit 3. U.S.-China Forecast Cumulative Bilateral Agricultural Product Trade Gains, 2016-2025



Source: Informa Economics IEG

B. Fish and Sea Food Bilateral Trade Outlook

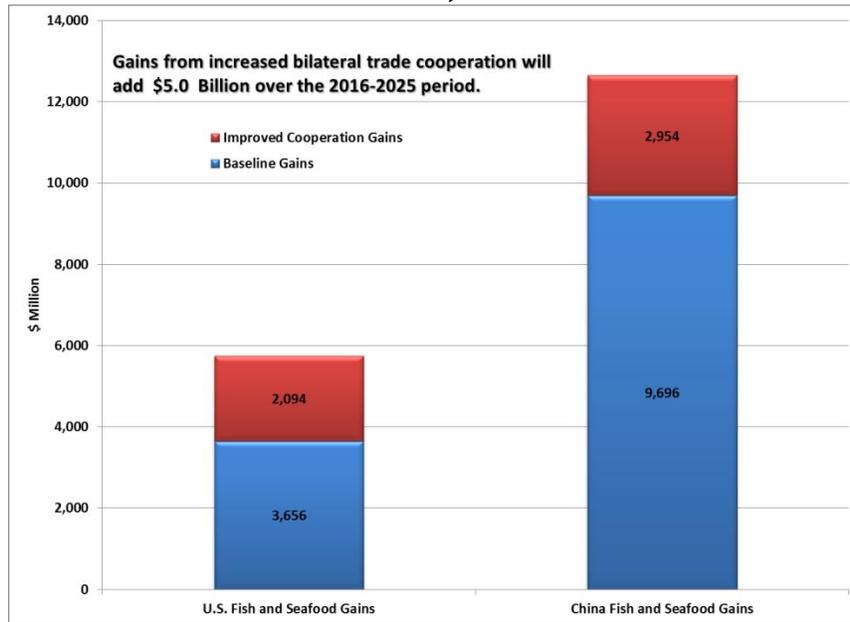
The U.S and China are the two largest seafood markets in the world. China’s fish and seafood exports to the U.S. were valued at \$3.1 billion in 2015, while U.S. exports to China totaled \$818 million. In general, the U.S. exports large quantities of raw, gutted fish to China for further processing into consumer-oriented seafood products and often exported back to the U.S. China is also a significant exporter of farm-raised fish and seafood. Consumer demand for fish is expected to grow in both countries and outpace production in the context of future declining global fish catches and expansion in aquaculture. As a result, bilateral trade will become even more important in the future to meet domestic demand for both countries.

Cumulative baseline bilateral trade gains in fish and seafood over the 2016-2025 period are forecast at \$13.4 billion. Despite this strong growth potential, food safety issues, anti-dumping duties, high tariffs and non-tariff barriers are limiting trade expansion.

This study finds that increasing bilateral cooperation to address and resolve trade barriers between the two countries would result in **additional cumulative gains of \$5.0 billion** in bilateral fish and seafood trade over the 2016-2025 period (Exhibit 4).

The largest U.S. cumulative export gains are likely in cod, flatfish, and Alaska Pollock. The largest cumulative export gains for China are likely in shrimp, crab, tilapia, and salmon.

Exhibit 4. U.S.-China Forecast Cumulative Bilateral Fish and Seafood Trade Gains, 2016-2025



Source: Informa Economics IEG

C. Forest Product Bilateral Trade Outlook

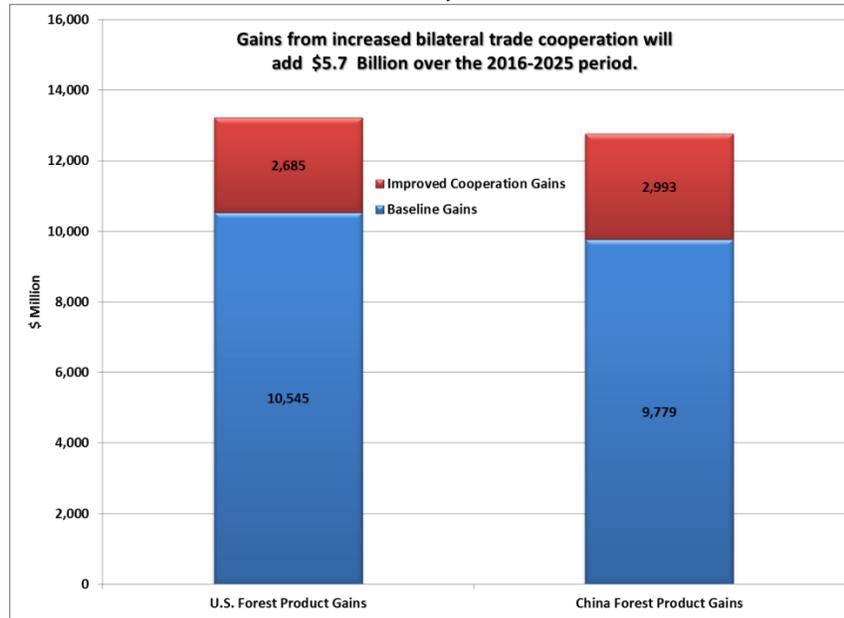
Currently the U.S. is a major supplier of raw forest products (hardwood and softwood lumber and logs) to China and China is a major supplier to the U.S. of value added forest products such as plywood, wood articles and wooden furniture. China’s forest product exports to the U.S. were valued at \$3.9 billion in 2015, while U.S. exports to China totaled \$2.1 billion.

The U.S. can leverage China’s efficient manufacturing infrastructure to provide ample low cost wood products to the U.S. With the U.S. as a primary supplier, China would be better able to meet its rising wood consumption demand as its growing urban and middle class continues to grow at increasing rates.

Cumulative baseline bilateral trade gains in forest products over the 2016-2025 period are forecast at \$20.3 billion. Although tariff barriers between the two countries are relatively small, non-tariff barriers are holding back growth in trade.

This study finds that increasing bilateral cooperation to address and resolve trade barriers between the two countries would result in **additional cumulative gains of \$5.7 billion** in bilateral forest product trade over the 2016-2025 period (Exhibit 5). The largest U.S. cumulative export gains are likely in softwood logs and hardwood lumber. The largest cumulative export gains for China are likely in plywood and articles of wood.

Exhibit 5. U.S.-China Forecast Cumulative Bilateral Forest Product Trade Gains, 2016-2025



Source: Informa Economics IEG

D. Farm Machinery Bilateral Trade

China is the world’s largest farm machinery market while the U.S. is an important exporter. Bilateral trade between the U.S. and China was \$1.1 billion in 2015. China’s current farm machinery imports are highly dependent on crop production economics, and China primarily imports high-technology products from the U.S. In turn, the U.S. currently imports low-technology farm equipment products such as parts for agricultural equipment, shovels, and other miscellaneous tools.

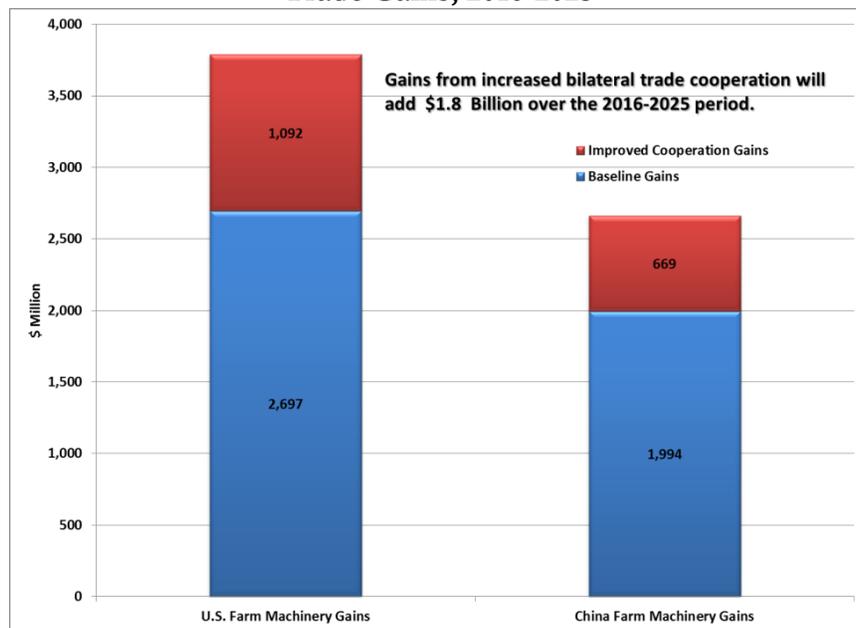
The benefits of increasing farm machinery trade between the U.S. and China extend beyond the sheer economics of trade. Increasing scale of farms and increasing mechanization in the agriculture sector will keep demand for farm equipment well supported.

Increased trade in farm machinery will benefit China in terms of improving efficiency of agricultural production and the safety of its food system. This is paramount for China because it is land-constrained and future increases in agricultural production will come from efficiency gains, rather than from area gains. Additionally, obtaining food processing equipment will help China ensure a safe food supply.

Cumulative baseline bilateral trade gains in farm machinery over the 2016-2025 period are forecast at \$4.7 billion. Despite this strong growth potential, trade barriers are limiting this expansion.

This study finds that increasing bilateral cooperation to address and resolve trade barriers between the two countries would result in **additional cumulative gains of \$1.8 billion** in bilateral farm machinery trade over the 2016-2025 period (Exhibit 6).

Exhibit 6. U.S.-China Forecast Cumulative Bilateral Farm Machinery Trade Gains, 2016-2025



Source: Informa Economics IEG

In summary, the study finds that there are a number of drivers that encourage greater bilateral trade cooperation to reduce trade barriers between the U.S. and China including:

- **Significant potential trade gains** – additional cumulative gains of \$28.1 billion from 2016 to 2025 from alleviating trade impediments.
- **Increasing food demand** – driven by increasing urbanization and higher income.
- **Improving and maintaining animal health** – vital to meet growing meat demand.
 - Veterinary pharmaceuticals, vaccines and improved health management are critical to preventing and controlling animal diseases.
 - Transparent and predictable animal health product approval and import processes will contribute to healthier animal herds.
- **Food safety** – Improved food safety processes encourage consumer trust in domestic production and imports.
- **Increasing farm mechanization** – drives the need for high-tech equipment.
 - Increases productivity, reduces post-harvest losses and decreases labor needs.
 - Improves the environment through more efficient use of inputs.
- **Increased biotechnology use** – improves yields, reduces production costs and provides relief from limited land and water resources as well as meeting growing food demand.
 - Adhering to a science-based policy on biotechnology approvals for agricultural cultivation and imports will ensure consumer confidence and avoid unnecessary trade disruptions.

III. BACKGROUND

A. Study Objective

Bilateral U.S.-China agricultural trade is significant, and improved trade relations will enhance trade flows between the two countries. Policymakers, exporters, traders, commodity analysts, researchers and the public need information about the opportunities for expanding agricultural trade between the two countries. The objective of this study is to identify those opportunities and quantify the gains in U.S. and China exports of agricultural products, forest products, fish and seafood and farm machinery.

B. Methodology Used

An analytical framework was used that includes delving deeply into specific sectors of interest and then applying quantitative analyses, market and business logic and industry insights to quantify impacts in each major product sector to provide a realistic picture of future export opportunities. This process is described below:

- Establish baseline trade pattern forecasts based on historic actual supply, domestic use and trade for the targeted agricultural sectors for both countries; and
- Examine the U.S. and China trade matrixes for the targeted product sectors to: (1) evaluate whether U.S. and China exports will become more competitive relative to other exporters and (2) estimate the incremental share (if any) the U.S. and China can gain through improved trade relations.

The above estimates will be based on:

- Analyses of U.S. and China import tariffs relative to other trade competitors;
- Review of behind-the-border barriers that limit trade between the U.S. and China.
- Analyses of U.S. and China historic supply, demand and trade and outlook to 2025. Negotiations regarding non-tariff barriers can take years, so gains will start slowly and pick up over the years.

Cumulative gains will be calculated over the 2016-2025 period to illustrate the significance of the impacts over that entire period.

- Quantitative and qualitative analysis of the market dynamics of each targeted product sector. Trade between countries is a function of factors including relative competitiveness, tariffs, logistics and other factors; these will be examined to estimate potential trade changes.

The study will target major agriculture related sectors in order to quantify potential increased trade between the U.S. and China over the 2016 to 2025 period.

IV. AGRICULTURAL PRODUCTS

China and U.S. trade of agricultural products has been growing rapidly since China joined the World Trade Organization (WTO). In 2015, value of China agricultural products exports to the U.S. totaled \$4.3 billion, a 578% growth or 13.6% compound annual growth rate (CAGR) from \$600million in 2000. In the same year, the U.S. sent \$20.4 billion value of agricultural products to China, a 1,065% growth (or 17.8% CAGR) from \$1.7 billion in 2000.

The products traded between the two countries vary. Bulk or land-intensive products account for 69% of U.S. agricultural product exports to China. Soybeans alone account for 52% of U.S. exports to China. Consumer oriented products such as fresh and processed fruit and vegetable products account for 40% of China's agricultural product exports to the U.S.

Exhibit 7: China and U.S. Historical Trade of Agricultural Products

China Exports to US (US\$ Million)			U.S. Exports to China (US\$ Million)		
Product	2000	2015	Product	2000	2015
Bulk	33	200	Bulk	1,112	14,117
Tea	14	91	Soybeans	1,008	10,523
Soybeans	0	31	Sorghum	4	2,118
Intermediate	295	1,056	Cotton	66	860
Animal Feed Preparations	12	122	Wheat	17	160
Consumer Oriented	302	3,017	Corn	0	187
Processed Fruits & Vegetables	135	1,190	Intermediate	413	4,389
Citrus Fruit Preparations including jam	41	191	Feeds & Fodders	15	2,343
Peaches Prepared Preserved	0	82	DDGS	0	1,632
Fruit and Vegetable Juices	38	330	Forage Products	0	359
Apple Juice	34	277	Bran, Sharps and Residues from Corn Processing	0	201
Fresh Fruit & Vegetables	7	173	Animal Feed Preparations	10	113
Garlic, Fresh or Chilled	0	118	Hides & Skins	237	1,268
Dog & Cat Food	0	251	Consumer Oriented	222	1,851
Snack Foods	16	157	Dairy Products	25	350
Sugar Confection	15	135	Whey & Modified Whey	8	151
Other	106	917	Red Meats Fresh/Chilled/Frozen	21	319
Ginger, neither crushed nor ground	0	54	Pork Meat Products	6	319
			Poultry Meat and Products	44	16
			Chicken Cuts & Offals	41	15
Agricultural Products Total	631	4,273	Agricultural Products Total	1,747	20,357

Note: Only selected important products or product categories are listed.

Source: Informa Economics IEG based on raw data from GTIS

China is the world's third largest importer of agricultural products in 2015 behind only the E.U. and the U.S. The major drivers of the import growth are:

1. Growing middle class/urban population

China's urban population has increased from 35.9% of total population in 2000 to 56.1% of total population in 2015. There is considerable room for China's share of urban population to increase if the U.S. is used as a proxy where the share of urban population is currently 81.6%.

2. Strong purchasing power from high economic growth and rising incomes.

China's per capita gross national income (purchasing power parity) has increased from \$2,880 in 2000 to \$14,160 in 2015.¹

China's food consumption patterns are changing because of the growing middle class/urban population with a shift from staple foods such as rice and wheat to more high value products such as fruits and vegetables, meats and dairy products.

China's grain and oilseed imports are large because livestock feed demand is growing faster. Although China focuses on grain security and grain self-sufficiency, policy makers there now recognize that grain production is constrained by limited land and water resources and give lower priority to self-sufficiency in feed grains than food grains. Moreover, environmental protection is being taken seriously in China now. This also constrains China's capacity to expand production and imposes steeper costs on Chinese producers.

A. Impact of Trade Barriers on U.S. – China Trade

Although trade between the U.S. and China has been growing sharply, expansion is limited by anti-dumping duties, tariffs and tariff rate quotas, and non-tariff barriers.

1. Tariff Barriers

Both the U.S. and China have complex tariff rate schedules that are updated annually or more frequently depending on domestic markets movements and national strategic objectives. Additionally, both countries employ ad-valorem duties, tariff rate quotas (TRQ) and other measures to administer trade flows. For example, the U.S. has TRQs for beef, cotton, dairy products and sugar. Similarly, China has TRQs for corn,

¹ Source: WDI indicators, World Bank

wheat, rice, cotton, sugar, etc. Such measures are used to protect vulnerable domestic industries and/or to facilitate domestic markets development. But at the same time, they create barriers for foreign exports to enter the market and compete with domestic products.

Along with strong economic benefits from trade, free trade agreements (FTAs) or other similar arrangements can result in asymmetric benefits for one country over another. Such asymmetry often occurs because preferential tariff rates offered in those agreements are below most favored nation (MFN) tariff rates (Exhibit 8). Both the U.S. and China are involved in a number of FTAs or similar arrangements. But the U.S. and China have so far not entered into any FTAs or similar arrangements with each other.

Exhibit 8: China and U.S. Tariff Rates on Key Products and Product Categories

U.S. Tariff Levied on China Exports		
Product	Rate	Note
Bulk		
Tea	0% ~ 6.4%	/3
Soybeans	0%	
Intermediate		
Animal Feed Preparations	0% ~ 1.4%	/3
Consumer Oriented		
Processed Fruits & Vegetables		
Citrus Fruit Preparations including jam	11.3¢/kg	
Peaches Prepared Preserved	16% ~ 17%	/3
Fruit & Vegetable Juices		
Apple Juice	0%	
Dog & Cat Food	0%	
Snack Foods		
Sugar Confection	0% ~ 12.2% or 40¢/kg + 10.4%	/3,4
Fresh Fruit & Vegetables		
Garlic, Fresh or Chilled	0.40¢/kg	
Other		
Ginger, neither crushed nor ground	0%	
China Tariff Levied on U.S. Exports		
Product	Rate	Note
Bulk		
Soybeans	3%	
Sorghum	2%	
Cotton	1%/40%	/1,2
Wheat	1%/65%	/1
Corn	1%/65%	/1
Intermediate		
Feeds & Fodders		
DDGS	5%	
Forage Products	0% ~ 9%	/3
Bran, Sharps and Resides from Corn Processing	5%	
Animal Fee Preparations	5% ~ 6.5%	/3
Hides & Skins	5% ~ 20%	/3

Consumer Oriented		
Dairy Products	6% ~ 20%	/3
Whey & Modified Whey	6%	
Red Meats Fresh/Chilled/Frozen	12% ~ 25%	/3
Pork Meat Products	12% ~ 20%	/3
Poultry Meat & Products	10% ~ 20% or 8.0 ~ 20.8¢/kg	/3,4,5
Chicken Cuts & Offals	20% or 8.0 ~ 20.8¢/kg	/3,4,5

Note: 1) X%/Y% refers to within quota tariff rate and above quota tariff rate for MFNs. 2) Additional requirements apply for above quota imports under HS Code 52010000 Cotton, Not Carded or Combed. 3) This product category includes a number of products with varying tariff rates. Only range is shown. 4) Some products apply non ad-valorem duties. 5) Use 2015 average exchange rate of 6.2827 CNY/USD to convert tariff rate. Source: China Customs and U.S. International Trade Commission

2. Anti-dumping Measures and Countervailing Duties

Anti-dumping (AD) and countervailing duties (CVD) are imposed by both China and the U.S. and depending on the size of the duties, can significantly impact trade.

- China is a major exporter of fresh garlic and has significant potential to expand exports to the U.S. but high AD duties have limited export gains for that commodity.
- The U.S. is looking to expand broiler chicken product exports to China but AD duties imposed by China are limiting that potential.

Both countries could significantly expand trade by improving trade relations that can focus on reducing or eliminating these anti-dumping actions.

Exhibit 9: U.S. Anti-Dumping Actions Against Select Imports from China

Product	Initial Investigation	Status
Crawfish Tail Meat	September 1997	Third Review April 28, 2014 91.5% - 223.01% for all forms
Fresh Garlic	1994	Third Review April 27, 2014: \$1.03 -\$4.71 per kilogram for all grades of garlic. Does not include: (a) Garlic that has been mechanically harvested and that is primarily, but not exclusively, destined
Frozen Warm-Water Shrimp and Prawns	February 2005	Review October 2013: 9.08% - 112.81% whether wild-caught (ocean harvested) or farm-raised (produced by aquaculture), head-on or head-off, shell-on or peeled, tail-on or tail-off, 2 deveined or not deveined, cooked or raw, or otherwise processed in frozen form.
Honey	September 2000	Second Review 2012: \$2.14-\$2.63 per kilogram for natural honey, artificial honey containing more than 50 % natural honey by weight, preparations of natural honey containing more than 50 % natural honey by weight and flavored honey.

Preserved mushrooms	February 1999	Third Review 2015: Weighted-average antidumping duty margin on the product is 75.67% - 308.33 %.
Non-frozen Apple Juice Concentrate	June 5, 2000	November 2010 ended the anti-dumping duty of non-frozen apple juice concentrate.
Hardwood Plywood	September 27th, 2012	U.S. International Trade Commission (USITC) ruled on November 5, 2013 that Hardwood plywood imported from China does not injure the U.S. industry and will not be subjected to antidumping duties

Sources: USITC, Ministry of Commerce PRC, and U.S. Customs Border Protection

Exhibit 10: China Anti-Dumping Actions Against Select Imports from the U.S.

Product	Initial Investigation	Status
Chicken Broiler (AD Measure)	Sep 27, 2009	In October 2015, case opened for re-investigation. On September 26, 2016, duties are extended for another five years at a range of: 46.6% - 73.8%
Chicken Broiler (CVD Measure)	Sep 27, 2009	On August 22, 2016, duties are extended for another 5 years with range of 4.0% - 4.2%
Distillers Dried Grains with Solubles (DDGs)	Jan 12, 2016	Under investigation

Sources: USITC, Ministry of Commerce PRC, and U.S. Customs Border Protection

3. Non-tariff Barriers

Non-tariff, behind-the-border barriers have an even greater direct and/or indirect impact on trade flows between the two countries.

(a) Biotechnology

The U.S. is the world largest biotech crop producer. In 2015, U.S. biotech crop area reached 70.9 million hectares (39% of global) with over 90% adoption for the principal crops of maize (92% adoption) soybean (94%) and cotton (94%).² The majority of U.S. grain and soybean exports are also biotech.

China is the world's sixth largest producer of biotechnology enhanced plants (primarily BT cotton) based on total area and a major importer of biotech products. The government of China has made significant investments in biotechnological research and development, and has highlighted biotechnology in the most recent 5-year plan.

² Source: The International Service for the Acquisition of Agri-biotech Applications (ISAAA).

However, the regulatory approval process for biotech products has been a barrier for both cultivation of GM crops in China and export of crops from the US. China's approval process for agricultural biotechnology cultivation and imports is asynchronous, slow, and unpredictable. Instead of allowing concurrent filing, China requires products to be approved from an exporting country before an approval application can be filed in China. This results in an immediate 1-2 year delay relative to approval in the US. The subsequent approval process in China is currently taking between 4-7 years to complete, resulting in cumulative delays in access to new technology of at least 5 years. China's regulatory requirements include many elements that are outliers among countries that regulate GM crops, such as requiring 2 years of in-country field testing for crops that will not even be grown in China. China also lacks a trade facilitative policy on low level presence (LLP) that would partially offset the problems created by the slow regulatory approval process. The current policy of a 0% threshold for unapproved biotechnology products in agricultural imports has created trade friction in the past. Additionally, China is encouraged to increase transparency in biotech regulations and approval procedures for new products.

The safety concern of Chinese consumers about biotech products is another important non-tariff barrier, which comes directly from the demand end and pressures government policy on agricultural biotechnology. China's government has begun to conduct public outreach and consumer education about agricultural biotechnology, but greater efforts are needed to change public perception. Similarly, establishing a transparent, predictable and science based regulatory approval process would build consumer confidence in the safety of imported products, and reinforce the government's role on food security.

China is expected to continue to be a major importer of biotech products and has the potential to become an exporter of biotechnology in the medium to long term.³ Resolving the above biotech issues will benefit both countries and their bilateral as well as global trade relations.

(b) Product Quality and Safety

Product quality and safety are important issues for both U.S. and Chinese agricultural product exporters but improvements are more urgent for China. In recent years, numerous food quality and safety scandals reported in China undermined confidence of both Chinese and U.S. consumers in products from China. As an example, in

³ Source: FAS/USDA Attaché reports.

2007, there was a wide recall of dog and cat food in the U.S. due to pet kidney failure problems after having pet food supplied by company from China. Chinese officials acknowledge that their domestic dairy industry still has not regained the confidence of domestic consumers since the melamine adulteration incident in 2008.

- The impact of product quality and safety issues is not likely to be short-lived, but rather long lasting. Consumer confidence must be restored in order for market share losses to be regained. Companies that had product quality and safety issues are also automatically recorded by the U.S. Food and Drug Administration (FDA), and may be subject to strict and extended future scrutiny.

Food safety is an important and urgent issue to China applying to products both domestically consumed and exported. China's government has been under great pressure to improve food safety and restore consumer confidence. The recent revised food safety law, which became in effect on October 1, 2015, is a major step that the government has taken to address this issue. The law is much stricter than the previous versions.

Another issue related to product quality and safety is livestock and poultry disease. Historically, animal disease outbreaks and issues have caused multiple trade interruptions between two countries. Examples are China's ban on U.S. beef in 2003 and ban on U.S. poultry in 2015. Historically, livestock and poultry trade has been largely unilateral, with the U.S. exporting to China. It has to be noted that compared with the U.S., China has a higher risk of avian influenza due to industry structure, production and slaughter methods as well as oversight mechanisms. If China plans to export its livestock and poultry products abroad, including the U.S., product quality and safety will be the first threshold to meet. In other words, improving product quality and safety will help increase potential trade.

China can address its major animal health problems by making its animal health product approval and import processes more transparent, predictable and equitable.

Although the pre-marketing approval requirements for imported vaccines are nominally similar to those for domestic vaccines, the registration process in China operates in a discriminatory manner in the registration, importation and distribution requirements applied to foreign companies.

China also maintains a ban on registering and marketing vaccines for diseases listed in the World Animal Health Organization's List A (e.g. foot-and-mouth disease), and applies a value-added-tax (VAT) over five times greater to imports over domestics (17% to 3%, respectively).

The ability of China to address its animal health diseases impacts the rest of the world in terms of the global spread of diseases, mutations of these diseases and food availability. Therefore, improving animal health will not only contribute to increased meat production in China and help meet growing consumer demand, but also ensure healthy herds and food security globally.

(c) Pesticides and Additives

Both pesticides and additives are frequently used in agricultural production. The usage of such products has to be registered with government and volume of usage and/or residue on products has to be within preset ranges. Unfortunately, each country has its own approved pesticide and additive list and volume/residue limits, which in most cases, do not reconcile with one another. This has created great difficulty for smooth trade flows and frequently causes shipment rejection and trade friction.

- An example is the application of ractopamine in pork production. Ractopamine is a feed additive used to promote leanness in animals raised for their meat. It is allowed in the U.S. but prohibited in China. As a result, any exports of pork products to China will be rejected at the China Customs if ractopamine is found.

(d) Administrative Barriers

Both the U.S. and China have their own processes to manage food systems and trade activities. Sometimes, however, government management can create additional trade barriers.

- **Example 1:** Both U.S. and China have their own national organic programs. But the U.S. and China have not established a mutual recognition relationship. Therefore, U.S. organic products have to be recertified in China to legally sell them as organic in China and vice versa. This has created great burden for organic product exporters in both countries. Besides, organic certification in both countries is valid only for one year and requires on-site inspection. This adds additional costs to organic product exporters.

- **Example 2:** U.S. FDA employs “Import Alert” (also known as “Automatic Detention List”) to manage imports. If a company or a product is on the list, the company may not find out until first shipment arrives at a U.S. port of entry. Then the company needs to file a petition based on clear, convincing, and documented evidence proving that the conditions that gave rise to the appearance of a violation have been resolved and the agency can be confident that future entries will be compliant with the law. The process may take one month or more which makes the import process more expensive for the importer and reduces the amount of money the importer is willing to pay for the product. It has to be noted that the detention is automatic because it does not require physical examination (this is therefore also called “Detain without physical examination,” or DWPE). When submitting a petition and evidence, a company may not use the examination reports from domestic examination agencies but have to submit reports and evidence from U.S. FDA accredited agencies which means double examination. Also, some products will later be proofed clear of violation but by the time the products are released, they have already had reduced product life and accrued costs.

B. Expected Policy Changes in China

Last year and this year are two important mileposts for China’s social and economic development. A number of agriculture related changes, initiatives and reforms have been introduced in 2015 and 2016 which will set the tone for the sector over the next decade.

Among various ongoing and expected changes, several key ones related to agriculture include: 1) crop mix adjustment, particularly corn, 2) land tenure reform and land use right circulation, 3) self-sufficiency, 4) reform of the commodity price formation mechanism and national temporary reserve programs, 5) agricultural product quality and safety, 6) agricultural finance, 7) crop rotation and cultivated land fallowing, 8) sustainable agriculture and environmental protection, 9) free trade agreements and “One Belt One Road” initiative, and 10) “Two Child” policy.

Ongoing and expected changes will likely cause 1) corn and cotton area decline in the near term and soybean, silage corn, alfalfa and other forage crop area slow expansion, 2) domestic crop price decline and narrower domestic and international price gaps, 3) production cost increase, 4) yield and efficiency improvement, 5) emergence and/or faster development of new agribusiness entities and professional farmers,

6) better agricultural product quality control and trade flow improvement, 7) better adoption of agricultural equipment and modern farming technologies, 8) stagnation or decline of fertilizer and pesticide usage, 9) further diversified supplier pool for grain, energy and other resources, and 10) additional demand for dairy products and baby food products.

1. Overall Policy Environment: The 13th Five-year Plan

Last year and this year are important mileposts for China's social and economic development, in that 2015 is the conclusion of the China's 12th five-year plan and 2016 is the beginning of the 13th five-year plan. The five-year plans in China are a series of national level comprehensive social, political and economic development initiatives. The 13th five-year plan, spanning from 2016 to 2020, sets growth targets, maps growth strategies and introduces various reforms.

- The 13th five-year plan was officially released in March 2016. Several key aspects related to agriculture include:
 - Adjust crop mix from “food crop + economic/cash crop” to “food crop + economic/cash crop + feed crop”. Optimize agricultural output structure and geographical distribution.
 - Deepen land tenure reform and promote legitimate land use right circulation; foster the development of new agribusiness entities and professional farmers.
 - Assure China is generally self-sufficient (95% or above) in grains, and 100% self-sufficient in staple foods like rice and wheat.
 - Reform the agricultural commodity price formation mechanism (i.e., moving from a floor price to a market-determined price while supporting farmers) and improve reserve programs for key agricultural commodities.
 - Improve agricultural product quality and safety.
 - Deepen agricultural finance reform and provide the agriculture sector with better access to financial services.
 - Introduce pilot programs in crop rotation and cultivated land fallowing.
 - Promote sustainable agriculture and enforce environmental protection.
 - Accelerate free trade agreement negotiations and discussions and further promote “One Belt, One Road” initiative.
 - Allow each family to have two children without parental restrictions.

2. Crop Mix Adjustment

- Given the price support and national temporary reserve programs, China has accumulated large scale corn and cotton stocks over the past several years, which have created significant financial burden and great difficulties for program management. Cotton is now already under adjustment following the introduction of “Target Price Program” in Xinjiang Province and the corresponding cotton acreage shift from South-Central China to Northwest China along with the domestic cotton price decline. China’s government holds a positive attitude towards the outcome of this program. Thus, this program will persist over the next several years without much change, and cotton area other than in Northwest China is likely to further decline due to removal of price support and subsidies previously available.
- Corn is now at the top of China’s government agenda for adjustment, due to large stocks and the associated heavy financial burden, as well as the negative environmental impact from multi-year corn-on-corn farming and explosive expansion of corn production in areas not suitable for corn farming. In February 2015, China unveiled the initiative to adjust the crop mix from “food crop + economic/cash crop” to “food crop + economic/cash crop + feed crop”. The key message is to switch existing grain corn acreage in some regions to silage corn, alfalfa and other forage crops.

The objectives are to avoid additional corn acreage and production expansion, to provide more feed to support China’s dairy industry restoration, and to reduce the level of dependency on forage product imports. Several recent moves have taken place to adjust corn area, which include:

- In October 2015, China announced national temporary reserve support price for 2015/16, which was lower than that of 2014/15, the first decline in 8 years.
- In November 2015, China’s Ministry of Agriculture announced a work plan to reduce corn area in 13 provinces by 3.47 million hectares (~8.57 million acres) over the next five years. The work plan encourages planting of alternative crops such as silage corn, soybeans, alfalfa and other forage crops, small grains and beans.
- In March 2016, China’s State Administration of Grain indicated the eight-year effort of stockpiling corn to boost domestic prices will end, instead opting to allow markets to set prices for corn in a move that will take effect with the start of the 2016/17 marketing year October 1. This will impact future corn imports into China.

3. Land Tenure Reform, New Agribusiness Entities and Professional Farmers

- Land in China is owned either by collectivities or by the state. China does not grant land ownership to individuals but allows individuals to obtain agricultural land use rights via contract. As a result, the majority of agricultural land is split into small and separate pieces.
- The land fragmentation makes it difficult for China's agriculture sector to improve efficiency and yield and to lower production costs. This situation has become more severe in recent years due to urbanization, rural labor force transfers from agriculture to other sectors (e.g., manufacturing) and the emerging decline in the total labor force.
- Recognizing these issues, China initiated a pilot project of agricultural land use right confirmation, registration and certification in 2014 in three whole provinces and selected counties of other provinces, and it plans to complete nationwide agricultural land use right confirmation, registration and certification in 5 years.⁴ This effort will facilitate land use right circulation, land consolidation and development of new agribusiness entities and professional farmers.
- This effort will also support crop productivity growth, encourage adoption of agricultural machinery and modern farming technologies, improve agricultural sector efficiency and lower certain production costs. For example, professional farming service providers and companies are growing rapidly in China, driven by land tenure reform.
- However, it has to be noted that overall production costs will likely increase even though there is potential efficiency gain and economy of scale. The major reasons are 1) fast growing land cost (rent), 2) labor cost and 3) field management cost. So far, cost increases have exceeded the cost savings, and profitability now and in the future has to rely on continuous yield improvement.

4. Self-Sufficiency

- Although China focuses on grain security and grain self-sufficiency, policymakers now recognize that grain production is constrained by limited land and water resources, and then give lower priority to self-sufficiency in feed grains than food grains.

⁴ This pilot project was first initiated in 2011 in small scale and covered only selected counties.

Moreover, environmental protection has been given much greater emphasis in China now. This will also constrain China's capacity to expand production and will impose steeper costs on Chinese producers.

- As indicated earlier, China employs TRQs to manage crop imports (corn, cotton, wheat, rice, etc.). The TRQs are likely to remain in effect but have the potential to expand over next decade. It has to be noted that the goals of China government in designing and adjusting agricultural policies are to enable the “market” to determine crop prices, maintain stable domestic supply and protect farmers' interests, not to bring large volumes of additional imports. Even though industry prefers more imported corn and cotton due to lower costs, the government finds it difficult to make that decision given large domestic corn and cotton reserves. By effectively lowering domestic crop prices and narrowing the domestic and international market price spreads, demand for imports will cool, the severe stock problem will greatly alleviate and downstream industries will revive. Thus, reforming the agricultural commodity price formation mechanism and improving ways to support and subsidize to farmers are key, and China's government has been making a number of efforts to address them. To successfully lower domestic prices while maintaining reasonable levels of profitability for farmers, the TRQs will still be important tools to manage the overall supply/demand balance and avoid shocks by large-scale cheaper imports. However, growing volumes of imports or larger TRQs are still possible as China domestic demand grows. As long as the imports account for a small percentage of total domestic demand, larger volumes per se will not be a serious issue; this is referred to as being “grain generally self-sufficient.”
- Starting from September 1, 2015, China requires import registration for barley, sorghum, DDGs and cassava with the stated aim of better monitoring trade flows. However, the rising imports of barley, sorghum and Distiller's Dried Grains with Solubles (DDGs) have created additional difficulty to the management of China national corn temporary reserve program. In January 2016, China Ministry of Commerce launched anti-dumping and countervailing duties investigations on U.S. DDGs imports. This case is currently open and under investigation. It is not unlikely that China may impose protective trade measures on other commodities above in the near future if large volumes of imports continue.

5. Commodity Prices and National Reserve Programs

- Recognizing that price distortion caused by price support and reserve programs is the root reason for a number of ongoing issues currently in the China agriculture sector, policymakers have made changes to commodity price formation mechanism and national temporary reserve programs and are expected to launch further reforms over the next several years.
- In 2014, China ended national temporary reserve programs for cotton and soybeans and introduced pilot “target price programs” in selected provinces. In mid-2015, China ended national temporary reserve programs for rapeseed and started to provide subsidies to processing companies when purchasing rapeseed. In October 2015, China announced national temporary reserve purchase price for 2015/16, which was lower than that of 2014/15, the first decline in 8 years. In March 2016, China announced its decision to end corn temporary reserve program and supportive floor price. Instead, corn price will be determined by market and government provides subsidies to corn growers in the four Northeast provinces. Following the announcements, China’s domestic corn price has declined noticeably. Although domestic price is still higher than import price, the gap is much narrower now.
- For wheat and rice, China has stated that the price support and national temporary reserve programs will stay, given their importance as staple foods.
- Given lack of full transparency in agricultural supply and demand information, the actual volume of China’s corn reserve is unknown with controversial estimates from various sources. Given frequent government announcements and news releases regarding corn over the past two years, China’s corn reserve is probably larger than estimates of most external research organizations. How to absorb the large volumes of corn stocks will remain a key issue to China government over the next several years. Other than initiatives and changes mentioned above, the government is also considering subsidies to the corn processing industry and evaluating applications for new grain based ethanol plants. Most recently, China Ministry of Finance announced that starting from September 1, 2016, tax rebate for exports of corn processed products such as corn starch and ethanol is restored to 13%.

- Similar to corn, China also has a large scale cotton reserve. To facilitate cotton reserve depletion, China government has reclassified the grade of cotton bales and discounted prices of cotton stocks, both of which have been successful so far in attracting textile industry purchase. But still, it will take a few years for China to lower cotton stocks to a reasonable level.

6. Improve Agricultural Product Quality and Safety

- Following the revision of food safety law, China government once again emphasized the importance and its determination to assure food quality and safety. A number of measures will be taken, which include:
 - Further improve agricultural production standards;
 - Implement product quality and safety verification at both origin and destination;
 - Establish agricultural product quality and safety full traceability system;
 - Enhance control over residues of pesticides and veterinary drugs and usage of agricultural product additives; and
 - Intensify supervision of quality and safety of agricultural product imports.
- Successful implementation of the measures listed above will help restore confidence of both domestic consumers and China trade partners and encourage more trade flows. The progress and outcomes will remain to be seen.

7. Agricultural Finance

- Lack of access to bank credit and other financial services is a lingering problem for China's agriculture sector, particularly individuals and small to medium agricultural operations. This situation is expected to improve over the next decade as China's government continuously introduces new measures. Some recent moves include:
 - Enable farmers to use land-use rights and rural property rights as collateral to apply for loans from banks.
 - Expand China Agriculture Bank's agricultural finance services to cover all counties and encourage other financial institutions to provide agricultural loans.
 - Launch agricultural equipment financial leasing pilot programs.

- The simplified and better access to bank credit and other financial services would contribute to the development of new agribusiness entities in China and adoption of agricultural machinery which, in turn, would support China agriculture sector efficiency and yield improvement.

8. Crop Rotation and Land Fallowing

- Because of the negative environmental impact caused by multi-year “corn-on-corn” farming and explosive expansion of corn production in areas not suitable for corn farming, China’s environment and natural resources have been under great stress to support production expansion. Therefore, China’s government has decided to promote via subsidies crop rotation and cultivated land fallowing.
- Soybeans are a major crop to be included in the crop rotation (mainly with corn). In 2015, China launched a corn-soybean rotation pilot program in Heilongjiang Province, and it is expected to expand the pilot program in the coming years. The corn price formation reform has narrowed the profitability gap between corn and soybeans and favors slow soybean area expansion.
- It has to be noted that the large imports of soybeans since the early 2000s have caused a significant shock to China’s domestic soybean industry and have so far essentially driven domestic soybeans out of crushing usage.⁵ China’s soybean industry has been slowly transitioning in this period. Now domestic soybeans are mainly used for food purposes given their non-genetically modified organism (GMO) nature, and this market segment is expanding. This trend, together with crop rotation initiatives, will encourage domestic soybean area to rebound, but it is not likely to get anywhere close to the levels from the early 2000s.
- Regarding land to be fallowed, China plans to launch pilot programs in areas that have 1) groundwater depression cones, 2) heavy metal pollution or 3) severe ecological degradation. Based on various information sources and news releases, total arable/cultivated land meeting these criteria is estimated to be 1) 47 million acres (of which, roughly 18 million acres being severe excessive groundwater extraction area), 2) 19 million acres (of which, roughly 6 million acres mid-high level heavy metal pollution) and 3) 11 million acres (land above grade 25°, vulnerable to soil erosion).

⁵ China does not allow oilseed crushers in major oilseed production regions to use imported oilseeds for crushing. So there are still certain volumes of domestic soybeans used for crushing. But due to higher cost than imported soybeans, the crushers in major oilseed production regions have been operating under capacity or completely forced out of business. As a result, the share of domestic soybeans used in crushing is relatively small.

These land areas, 77 million acres in total, jointly account for 25% of total cultivated land area (of which, 11% is under severe conditions). China's government in 2014 rejected a proposal by the Ministry of Finance regarding large scale cultivated land fallowing by stating that China's cultivated land resources are limited and are not suitable for large scale fallowing.

- On June 29, 2016, China Ministry of Agriculture, together with several other government agencies, jointly released “Work Plan for Pilot Programs of Cultivated Land Rotation and Land Fallowing”, which sets the goal to rotate 0.8 million acres and fallow 0.2 million acres over the next 3-5 years.

9. Sustainable Agriculture and Environmental Protection

- With China's consecutive increases of corn and other crop output over the past decade there has been rapidly growing fertilizer and pesticide usage, which has caused widespread and severe pollution to soil, water and the overall environment. China announced “Fertilizer Usage Zero Growth by 2020 Work Plan” and “Pesticides Usage Zero Growth by 2020 Work Plan” in February 2015 on Ministry of Agriculture's website and included these work plans in the 13th five-year plan.
- To accompany the Ministry of Agriculture's work plans, China reactivated a fertilizer value added tax of 13% starting September 1, 2015. Farmers are likely to bear the tax burden partially, and the remaining portion is likely to be absorbed in the agricultural inputs distribution system.
- Other important measures include introduction and popularization of soil testing based fertilizer application and precision pesticide application, as well as launching of water conservation programs in key irrigation areas.
- The sustainable agriculture and environmental protection measures, as well as tax arrangements, are expected to increase agricultural production costs in the short run but will promote efficiency improvement over the long run.

10. Free Trade Agreements and the “One Belt, One Road” Initiative

- China is not part of the Trans-Pacific Partnership (TPP) and so far has no intention to join the TPP. There are a number of potential conflicts between the TPP framework design and China's economic structure that make it difficult for China to join the TPP.

- Instead of joining the TPP, China will accelerate existing negotiation processes for FTAs (or similar arrangements) and pursue additional bilateral and regional FTAs to counter the negative impact of TPP on China. So far, China has entered into FTAs with 13 countries, regional organizations and special districts. There are also 7 FTAs under negotiation and 4 under consideration. China is also a member country of the Asia-Pacific Trade Agreement (Exhibit 58). Besides, China is actively pushing Bilateral Investment Treaty (BIT) negotiations with the E.U. and the U.S., which, once signed, will also stimulate flows of capital, goods and services.
- The “One Belt, One Road” initiative was announced in 2013 and consists of two main components, the land-based "Silk Road Economic Belt" (SREB) and oceangoing "Maritime Silk Road" (MSR). It mainly focuses on connectivity and cooperation among countries in Asia, Europe and East Africa. So far, this initiative is still in early stage, but it is given high priority by China’s government.
 - An important part of the “One Belt, One Road” initiatives to promote infrastructure construction to connect countries together. The countries involved are mainly in Southeast Asia, Central Asia, the Middle East, Europe and East Africa.
 - The initiative will help China export its excess domestic production for commodities such as steel and diversify the supplier pool for grain, energy and other resources. The emphasis of the initiative is not on agriculture, but it is likely to benefit agriculture eventually as China has better trade relationships with the countries involved. Countries in the covered regions are mostly second-tier producers and exporters of wheat, rice, cotton and corn.

11. End of the One-Child Policy

- On October 29, 2015, China announced the decision to allow each family to have two children without parental restrictions. The objective of this new policy is to alleviate China’s accelerated aging and low birth rate problems caused by the decades-long “one child policy.”
- The policy, however, is viewed by many as not being able to address effectively these issues or to have a large impact on China’s population structure. Major reasons include 1) the high cost to raise children in China, 2) working moms being unwilling to give up careers for a second child or not being able to do so due to intense social competition and increasing living expenses, and

3) the long-lasting “one child policy” gradually changed people’s perceptions of raising children to pay more attention to “quality” instead of “quantity”.

- While there is no consensus on the impact of “two child policy” on China’s birth rate, estimates from various sources suggest an additional 10-20 million births over the next five years.
- The new babies will generate additional demand for dairy products and baby food products, but they are not likely to have a major impact on China’s demand for grain and livestock products (other than dairy products and related feeding) over the next decade.

C. Long Term Supply and Demand Perspectives for Key Agricultural Products

1. Key U.S. export product potential to China

(a) Selected Bulk Products

Soybeans

China soybean acreage has been declining over the past decade. Domestically produced soybeans have lower oil content but high cost to procure than imported soybeans. As a result, crushers increasingly prefer imported soybeans to domestic soybeans which make domestic soybeans difficult to market. On the other hand, even with price support programs, soybean production has lower returns than other crops, such as corn, wheat and rice. Starting from 2014, China discontinued the previous national reserve and floor price program and introduced the pilot target price subsidy program for soybeans in four provinces. But the target price program has not so far been able to secure soybean acreage in those provinces and other provinces experienced further soybean area decline due to subsidy removal.

Over the next decade, China soybean production is expected to further decline from the 2015 level but gradually stabilize. Domestically produced soybeans are mainly used now for food purposes given the non-GMO nature and high protein levels. This market segment is expanding and will provide support to domestic soybean production. Crush is expected to grow rapidly driven by growing livestock feed demand. The increasing gap between domestic supplies and demand will be filled by imports, which is expected to grow from 83 million metric tonnes (MMT's) in 2015 to 127 MMT's by 2025 (Exhibit 45 in Appendix B).

The U.S. will be in a position to be a reliable supplier of soybeans to China as production over the next decade is expected to continue increasing and supplies will be adequate to meet growing Chinese demand. U.S. soybean acreage is expected to further increase, along with continued yield increases. This will lead U.S. soybean production to growing from 107 MMTs in 2015 to 118 MMTs by 2025 (Exhibit 46 in Appendix B). The production expansion is a response to growing demand from both domestic and export markets. As a result, U.S. soybean export availability is expected to grow from 53 MMTs in 2015 to 61 MMTs by 2025.

Corn

China corn acreage increased noticeably over the past 15 years given relatively higher returns over other crops and domestic growing feed demand. Expanded corn acreage, together with continuous yield improvement, led to a rapid increase of corn production in China. However, the domestic corn prices relative to imported corn prices provided strong incentives for industries that use corn as feedstock to import corn under the TRQ, which caused China to switch from a net exporter of corn to a net importer of corn in recent years and to keep building up corn stocks.

China corn production expansion in recent years was realized at the cost of large scale utilization of land and water resources. It will be more and more difficult for China natural resources to support further corn production expansion. Also, the just-retired China corn national temporary reserve program was very costly to operate. As a result, China decided to end the program and supportive floor price after the 2015/16 marketing year. Instead, corn price will be determined by market and government provides subsidies to corn growers in the four Northeast provinces. China domestic corn price has declined noticeably over the past year. Although domestic price is still higher than import price, the gap is much narrower now, which softens China corn import incentives.

Going forward, China corn production is expected to grow further driven mostly by yield increases. China consumption is likely to grow faster than production primarily driven by strong feed demand. But given the large scale corn stocks in hand, China will be able to maintain general self-sufficiency by adjusting stock level. China is expected to import more corn but still manage to keep imports a small portion of total usage.

Over the next decade, the U.S. corn acreage is expected to be lower than the 2014 level due to acreage shift toward soybeans. Expected sharply slower growth for corn used for ethanol is the reason for expected smaller corn planted acreage. However, despite the declining corn acreage, continued growth is expected in corn production because of the use of higher yield varieties (Exhibit 48 in Appendix B).

The U.S. domestic consumption is expected to grow over the next decade with most growth coming from feed use. Renewable fuel usage will only grow slowly. U.S. corn exports are expected to grow only marginally. U.S. corn exports to China were interrupted in 2014 mainly due to China Customs scrutiny for unapproved biotech corn event MIR162. Since then, Ukraine has replaced the U.S. as major corn exporter to China.⁶ Although the MIR162 issue was successfully resolved in December 2014, it will take several years for the U.S. corn exporters to recapture previous market shares.

Sorghum

Sorghum in China has historically been used mainly for food purposes. However, in 2014, China imported large volumes of sorghum mainly from the U.S. to use for feed purposes. The high domestic corn prices, corn TRQ and China Customs scrutiny of corn imports for unapproved biotech corn event MIR162 in 2014 forced China livestock industry to switch to sorghum, DDGs and feed grade barley for animal feeding, which are not subject to TRQs.

Over the next decade, China sorghum imports are expected to decline from the high levels seen in 2014 and 2015 (Exhibit 49 in Appendix B). The China government-led corn price reform has already achieved some favorable outcomes. As the gap between China domestic corn prices and import prices becomes narrower and narrower, China domestic corn usage for feeding purpose will increase. As a result, China sorghum consumption for feed use will be lower than the 2014 and 2015 levels.

U.S. sorghum acreage expanded rapidly in 2015 primarily due to demand from China. Going forward, U.S. sorghum acreage and production are expected to gradually decline beyond 2015 due to weaker demand from China (Exhibit 50 in Appendix B). Besides corn, feed grade wheat is also likely to substitute some sorghum consumption due to large stocks and deteriorating quality. However, China is expected to remain top buyer of U.S. sorghum. China's livestock industry has obtained experience over

⁶ Three major reasons behind are 1) China and Ukraine entered into an "loan for grain" agreement in 2012, 2) Having Ukraine as a new corn supplier is in line with China's grain sourcing diversity and security strategy and interest and 3) Ukraine corn is usually traded at a discount to U.S. corn due to quality difference. Lower price allows Ukraine corn to be more competitive in the international market.

the past several years about how to use sorghum properly in animal feed rations and will take advantage of price opportunities (relative to corn) whenever they are present.

Given the expected changes mentioned above, the U.S. sorghum exports will decline from the 2014 and 2015 peak levels. By 2025, the U.S. sorghum exports are expected to return to 4.6 MMT's.

Cotton

Until 2014, the cotton policy in China provided farmer support by implementing a TRQ on cotton, procuring the national production at an elevated cost compared to international values, and placing the cotton into a national reserve. However, the support policies encouraged more quantity increases and not as much quality increases. The high domestic prices, low cotton quality, and weak downstream demand forced China cotton mills to pursue cotton imports (within quota), reduce domestic purchase or shut down operations. As a result, large volumes of cotton were purchased by the national reserve program but sales of reserve cotton were difficult. As of 2015, China had very large cotton stocks with stocks to mill use ratio at 203% (Exhibit 51 in Appendix B). Starting from 2014, China discontinued the national reserve program and introduced a pilot target price program in one province (Xinjiang). But for all other provinces and China overall, prices plummeted because of large reserve stocks and the absence of the previous subsidies. Currently, China is striving to liquidate reserve stocks by auction. Although it is difficult to determine with accuracy the timeframe envisaged by the organizers of the program, it has been hinted it will take several years for the stocks to move to a more acceptable 35% to 45% stocks to mill use ratio.

As a result, China cotton production is expected to decline. The new farmer support policy favors Xinjiang over other provinces for cotton production, so the area shift from the Central and Eastern part of the country to the West will continue. With China government wanting to be food independent, the shift away from cotton area to food grains, and fruits and vegetables will likely be permanent. Yield improvement is expected to persist and likely to alleviate the negative impact of area decline on production.

Mill use is expected to begin a slow decline over the next decade as mill use moves on a global basis from the higher cost areas to lower cost areas. The increase in mill use is being realized in Vietnam with Chinese companies relocating to Vietnam, and then importing the yarn, which is not subject to TRQ, to knitting and weaving operations in China.

The logical progression as has been the case for decades is that the knitting, weaving, cutting and sewing operations move into the lower costs areas. China will finally become the destination for the higher valued products as China continues to develop economically, and its labor becomes less competitive than lesser developed countries. However, the abundance of competitively priced synthetic fibers will ensure a large part of the textile chain will remain in China for a longer period of time than has historically been the case. China's percentage of world cotton mill use is expected to slip from 29% in 2015 to about 25% in 2025.

Given the price difference between domestic cotton and international cotton, there will be incentive for China cotton mills to continue importing cotton. However, the large and growing volume of yarn imports will effectively replace a considerable amount of raw cotton imports. As a result, it is expected that China raw cotton imports will decline from previous years and stay within the TRQ toward the end of forecast period.

U.S. cotton production is expected to decline slowly over time, as U.S. farm policies favor grain and soybeans. Foreign countries are able to utilize a slightly better cost structure along with incorporating advanced seed and production technologies - diminishing the need for expanded U.S. production.

U.S. mill use is expected to increase modestly, but will continue to be rather insignificant because of chronic high labor costs that tend to favor lesser developed countries.

U.S. cotton exports are expected to decline following lower production. However, U.S. cotton exports will still stay fairly strong as technical improvements to textile equipment have made the U.S. quality, packaging and minimal fiber contamination more desirable.

Wheat

China wheat production increased noticeably over the past 15 years driven mainly by yield improvement. While food use did not vary much, feed use of wheat increased 40% from 2000 to 2015. The rapid increase was because low quality wheat was used when China domestic corn price was high.

In the longer term, more area is expected to switch from wheat to corn. However, driven by continued improvement in yields, wheat production will continue to increase. Food use of wheat will grow with the population of China. Feed use of wheat is forecast to grow further to meet growing feeding demand.

China is expected to remain a net importer of wheat over the next ten years.

Over the next decade, U.S. wheat production is expected to rebound from recent lows and reach 60.4 MMTs by 2025, driven mainly by yield improvement (Exhibit 54 in Appendix B). Larger U.S. production enables both higher domestic consumption and wheat exports, with the latter expected to grow from 24 MMTs in 2015 to 29 MMTs by 2025.

(b) Selected Intermediate Products

Feeds & Fodders

Starting from 2007, China began to import U.S. DDGs and imports have increased sharply since. Several major reasons for the dramatic increase include large and growing domestic feed demand, high domestic corn prices, competitive DDGs landed prices, limited domestic DDGs production, TRQ on corn and no TRQ on DDGs.

Over the past several years, China domestic DDGs production was relatively limited because 1) China government is concerned about competition between corn for ethanol and corn for food and feed so no new grain-based ethanol refineries were approved for construction, 2) China's high domestic corn prices hurt ethanol producer profit margins, and 3) DDGs imports had a great price advantage. For the next decade, China's domestic corn price is expected to continue declining until reaching comparable levels to international prices. China also restated tax rebate for exports of corn processed products such as corn starch and ethanol. So China feed and industrial usage of corn will increase and so will China DDGs production. Also, in January 2016, China Ministry of Commerce initiated anti-dumping and countervailing duties investigation on U.S. DDGs imports. This case is currently under investigation and likely to have a lingering impact on DDGs trade. As a result, China DDGs imports are expected to decline from 2015 level.

Globally, the United States is the single largest DDGs producer and will remain so over the next decade. Although U.S. DDGs production is not likely to increase much due to relatively stagnant ethanol production, U.S. has the capability to export more DDGs.

U.S. exports of bran, sharps and residues from corn processing was negligible until 2012, when trade increased over five times from \$37 million to \$201 million in 2015. Such products are used for feeding purposes and were favored by China feed manufacturing industry due to corn TRQ and domestic high corn prices. Going forward, China is expected to import fewer volumes of such products as domestic feed grain prices become more affordable. U.S. will remain an important supplier.

China's imports of forage products grew rapidly after 2008 when the melamine scandal was reported. China's government and consumers placed great pressure on China's dairy industry to improve product quality and safety. Use of high quality forage products, such as alfalfa, can greatly improve milk quality and milk yield. As a result, forage products received increasing attention.

To help the dairy industry restore and improve dairy product quality, China's central and local governments launched a number of programs and incentives to encourage alfalfa and other forage product production. China forage product supply did increase over the past several years but there is still a large gap between production and demand. Also, domestic forage products are of lower quality than imported forage products. As a result, China forage product imports increased sharply.

In the longer term, China's domestic forage product production is expected to increase and the quality of the product will improve. However, the industry as a whole is still in early development phases without a well-established supply chain. A number of issues are restricting the industry from faster growth, such as suitable and reliable seed supply, lack of forage production specialists, lack of good forage production and storage practices, grower preference of grain production to grass production, high initial investment and access to financial resources. On the other hand, China dairy product demand is expected to grow quickly due to rising incomes, growing middle class and changes in diet. As a result, China's domestic supplies are not expected to meet domestic forage product demand and China will have to import increasing volumes of high quality forage products. This should offer export opportunities for the U.S. The U.S. is one the largest forage product producers and exporters in the world and the largest supplier to China.

Hides & Skins

Hides and skins are used in a variety of industries in China, including shoes, clothing, gloves, furniture, automobile, pharmaceutical, food manufacturing, etc. Shoes, clothing and furniture are major industries using hides and skins, followed by automobile industry (car seats and interior decoration).

Over the next decade, U.S. hides and skins exports to China are expected to decline first but then gradually rebound. Demand for these products is impacted by economic growth of China and China's trade partners. U.S. is one of the largest hides and skins products exporter and largest supplier to China and the U.S. is expected to remain so over the next decade.

(c) Selected Consumer Oriented Products

Dairy Products

China dairy product consumption is expected to grow rapidly over the next decade driven by income growth, urbanization and changes in diet (Exhibit 55 in Appendix B). Domestic production, while expected to grow, will not be able to match consumption increases. As a result, China is expected to rely on larger imports to meet its domestic needs.

Milk powder and whey are major dairy products imported by China. Due to the melamine scandal in 2008, China consumer confidence in domestically produced milk powder was severely undermined. Consumers instead prefer imported milk powder to domestic milk powder. To restore consumer confidence, Chinese dairy companies actively source high quality milk powder globally to improve product quality. As a result, China milk powder imports have soared. China whey imports also increasing dramatically. Whey is in demand because it has a number of applications in agriculture, food and pharmaceutical industries. In particular, whey is a high protein animal feed widely used in hog industry. Whey protein concentrates are also commonly used in infant formula and other baby food products.

In the longer term, China imports of milk powder and whey will continue growing. For milk powder, consumer preferences and further quality improvement of domestically produced milk are two major obstacles for China's dairy companies to overcome. For whey, China domestic whey production is very small and is expected to remain so over the next decade due to lack of high quality milk supply. China whey consumption is expected to almost entirely rely on imports.

U.S dairy product production is expected to grow steadily over the next decade driven mainly by milk yield improvement. Expanded production will support both domestic dairy product consumption growth as well as increasing exports (Exhibit 56 in Appendix B). The U.S. is the third largest dairy product exporter to China after New Zealand and the E.U. Going forward, U.S. will remain an important supplier to China but will face increasing competition with other exporting countries.

Pork and Pork Products

China pork consumption is expected to increase from 55.6 MMT in 2015 to 68.5 MMT by 2025 (23% growth or 2.1% CAGR) (Exhibit 57 in Appendix B). The consumption increase will be mainly driven by income growth, population growth, urbanization and diet evolution.

China pork production is expected to grow as a result of increasing slaughter, improved genetics and larger carcass weights. However, production increases are expected to be slightly smaller than for consumption growth. As a result, larger imports will be needed. China pork imports in 2015 are estimated at 1.03 MMT and are expected to increase to 1.27 MMT by 2025.

It should be noted that the above imports in the supply and demand analysis include only carcass weight equivalent muscle cuts and do not include offal which account for more than half of China's pork and pork product imports. However, U.S. pork and pork product export value forecasts through 2025 included in this report are based on product weight and export forecasts of all pork and pork products (including offal).

The U.S. hog industry appears to have fully recovered from the devastating PED virus outbreak that started in April 2013 and resulted in the loss of several million pigs over a 12-15-month period. Death losses were primarily in baby pigs so the impact was primarily on market hog slaughter volumes rather than on the size of the breeding herd. Productivity of sows declined sharply but as the disease was brought under control and immunity in the sow herd was built up, productivity rebounded and is now back on trend and at record levels.

In the longer term, productivity of the breeding herd along with continued modest increases in live and hog carcass weights supports steady growth in hog slaughter and pork production levels to meet the increase in domestic demand and expanded exports (Exhibit 58 in Appendix B). There is no strong indication to suggest that per capita pork consumption will vary significantly so domestic consumption is expected to expand in line with population growth.

Long term growth in global pork consumption is expected to be partially met by expanded exports of U.S. pork. Over the next decade exports are expected to grow from 2.2 MMTs in 2015 to 3.3 MMTs by 2025. U.S. pork exports will be an important driver of the U.S. pork demand and will be a critical factor to sales values and margins for the U.S. hog industry.

Broiler Meat

China broiler consumption is expected to increase from 13.3 MMT in 2015 to 13.7 MMT by 2025. The consumption increase will be mainly driven by income growth, population growth, urbanization and changes in diet. However, China broiler meat consumption is expected to grow slower than pork consumption because 1) Chinese food culture has a preference for pork over broiler meat, 2) bird flu issues have been a lingering problem for China's broiler industry which results in lower consumption due to consumer health concerns and 3) food safety scandals and media reports of smuggled chicken meat sold to consumers are also restraining consumption.

China broiler production is expected to grow commensurately with domestic consumption with small imports growing steadily. China broiler imports in 2015 are estimated at 0.27 MMT and are expected to increase to 0.42 MMT by 2025.

It should be noted that the above imports in the supply and demand analysis include only carcass weight equivalent muscle cuts and do not include offal which account for half of China's poultry and poultry product imports. However, U.S. poultry and poultry product export value forecasts through 2025 included in this report are based on product weight and export forecasts of all poultry and poultry products (including offal).

The prospect of U.S. and China poultry and poultry product trade is full of uncertainty due to animal disease and trade friction. China banned all U.S. poultry and poultry products in January 2015 due to high pathogenic avian influenza outbreaks in the U.S. Broiler exporters such as Brazil and other South American countries have benefited from the absence of U.S. suppliers. In October 2015, China restarted AD and CVD investigation on U.S. poultry and poultry product imports. China Ministry of Commerce announced its decision to extend CVD and AD duties on U.S. poultry and poultry product imports for another five years in August 2016 and September 2016, respectively. The AD and CVD investigation is another hit to U.S. poultry and poultry product exports following the bird flu outbreak. Whether the trade between U.S. and China can restore depend largely on the attitude and cooperation of the two governments.

The U.S. broiler industry has been growing at a tepid pace over the past few years. Growth has been stunted by the recession and at least two major feed cost shocks. Over the next decade, U.S. broiler production is expected to grow modestly from 18.2 MMTs in 2015 to 19.9 MMTs by 2025 (Exhibit 60 in Appendix B). U.S. broiler production is expected to meet domestic demand with exports likely to steadily rise from 2.9 MMTs in 2015 to 4.1 MMTs by 2025.

Beef and Beef Products

On September 22, 2016, China announced its decision to remove the ban placed in 2003 on imports of U.S. bone-in beef and boneless beef for livestock under 30 months. Imports, however, must follow requirements under China’s traceability, inspection and quarantine systems. China is an important market for beef products. The U.S. was a major supplier to China until 2003 when bovine spongiform encephalopathy, or “mad cow” disease, was found in the U.S. Countries such as Australia, New Zealand, Uruguay and Brazil took over the market share of the U.S. since then and remain top beef suppliers to China. Over the past several years, increasing volume of U.S. beef made its way into China through Hong Kong and Vietnam. With the removal of the import ban, such shipments will likely be replaced by direct shipments to China. The U.S. will mainly compete with Australia and Canada in the high quality niche in China while Australia, New Zealand, Uruguay, and Brazil contend for the grass-fed and manufacturing beef market.

2. Key China Product Export Potential to U.S.

(a) Selected Consumer Oriented Products

Fruits and Vegetables

Fresh and processed fruits and vegetables offer China a significant opportunity to meet growing domestic demand and expand agricultural product exports to the U.S. Chinese authorities are currently focusing on ensuring supplies for domestic consumers before exports. Regardless, increasing production of fruits and vegetables will benefit farmers because they are high value crops which can raise farm income.

China is the world’s largest producer of fresh and processed fruits and vegetables. In 2014 China accounted for more than 25% of world exports of processed fruits and vegetables and 16% of fresh vegetable exports. China’s export competitiveness is its growing processing industry and policies that encourage fruit and vegetable production. However, labor costs are increasing and China’s limited cold storage and other infrastructure makes transporting perishable items difficult.

China's fruit and vegetable production is increasing based primarily on expanded area (Exhibit 61 in Appendix B). According to data from the Food and Agriculture Organization of the United Nations (FAO), China's fruit, vegetable and tree nut area expanded by nearly 14.0 million hectares from 2000 to 2014. However, area expansion in the longer term will be significantly less because of limited land availability. Nevertheless, area could expand by more than 4.0 million hectares from 2013 to 2025 further boosting production both for meeting domestic demand and increasing export earnings.

Expanding production area could boost exports by more than 5.0 million tonnes from 2013 to 2025. However, China's domestic consumption is expected to grow sharply as the increasing middle class/urban population demand more high value products such as fruits and vegetables. At the same time China's fruit and vegetable imports could increase substantially offering some export opportunities for the U.S.

U.S. fruit, vegetable and tree nut production is expected to increase modestly from 2014 to 2025. Increasing regulatory requirements in the U.S., especially in California could limit U.S. production potential of fruits and vegetables.

Although U.S. exports of fruits, vegetables and tree nuts are expected to increase by more than \$14 billion from 2014 to 2025, imports could increase more significantly by more than \$20 billion (Exhibit 62 in Appendix B) indicating opportunities for exports from China.

Dog and Cat Food

U.S. dog and cat population has been growing steadily over time. There are many reasons for the increase in pet ownership, such as more and more isolated interpersonal relationship, separation from farm animals and from nature due to busy urban life, older people and unmarried adults often living alone and sometimes security reasons. It is also believed that pets contribute to the well-being, both physical and psychological, of their owners. As a result, American families often treat their pets as family members and are willing to spend on pet products. Together with U.S. dog and cat population growth has been the rise of U.S. expenditure on pet products. Increasing U.S. pet food industry expenditures highlight the trend in growth potential for the pet food industry (Exhibit 63 in Appendix B)

In the longer term, U.S. pet food imports are expected to continue to increase. China used to be the largest pet food supplier to the U.S. but starting from 2013, China was surpassed by Canada and Thailand. Product quality was the major issue that plagued China exports to the U.S. China will continue being an important supplier to the U.S. but to gain back their previous market shares, China pet food producers have to commit to product quality to convince American families.

Snack Foods

China snack foods exports to the U.S. totaled \$157 million in 2015, up \$16 million from 2000. Sugar confection accounts for a significant portion of this category, valued at \$135 million in 2015. Over the next decade, this category is expected to further expand, albeit at a slower growth rate. People in the U.S. have a rising awareness of diabetes and the per capita sugar and sweetener consumption has been declining since 2000. But the U.S. still has a big appetite for such products (particularly children).

(b) Selected Bulk Products

Tea

U.S. is not a commercial producer of tea and U.S. consumption is supported by imports. U.S. is currently world largest tea importing country. Tea consumption in the U.S. grew fast over the last decade driven by increasing consumer awareness of the health benefits of tea. Over the past several years, U.S. tea re-exports, as further processed tea products, increased with major export destinations being Canada, Mexico and a few Latin American countries.

In the longer term, the U.S. is expected to increase imports of tea to support both domestic market and re-export business. U.S. per capita tea consumption is still lower than many other countries and therefore, there is still considerable potential for further consumption growth. In particular, green tea has been more and more popular in the U.S. and this trend is likely to persist.

China is world largest tea producer, second largest tea exporter and largest exporter to the U.S. Over the next decade China tea exports are expected to grow as U.S. tea market expands.

Soybeans

Even though China is a soybean net importer and U.S. is a major soybean exporter to China, China still exports soybeans to the U.S. The majority of China soybean exports to the U.S. are specialty soybeans, particularly organic and non-GMO soybeans.

Driven by increasing consumer demand for healthy food and concerns about impact of GMO crops on health and environment, U.S. organic and non-GMO markets grew rapidly over the past decade. Currently, U.S. organic soybean production is not able to meet domestic consumption and the gap is filled by imports. For non-GMO soybeans, the majority of U.S. production is dedicated to export markets and volume left for domestic markets is limited.

Going forward, U.S. organic soybean production will continue growing but consumption is expected to grow faster. U.S. has to keep importing organic soybeans for domestic consumption. U.S. non-GMO soybean market will remain demand driven. While U.S. has the capability to meet non-GMO soybean consumption growth, any major market movements can cause temporary domestic supply shortage and huge supply chain problems.

China currently does not allow commercial production of GMO soybeans. Therefore, China domestically produced soybeans are all non-GMO.⁷ Organic farming requires more field management and is more labor intensive than conventional farming. Given labor cost advantage, China historically has been an important supplier of organic products. Northeast China is particularly suitable for organic crop production due to fertile land and less pest pressure. China has the potential to export more organic soybeans to the U.S. going forward but China organic soybean producers have to continuously improve product quality and farming practices to convince U.S. buyers, since quality of product and failure to comply with the U.S. organic farming practices requirements have been lasting concerns of U.S. buyers.

⁷ Illegal production of GMO soybeans or GMO crops in general has been reported several times in China. However, there are no authoritative statistics on what percentage of soybean production is GMO.

(c) Selected Intermediate Products

China's prepared animal feed exports to the U.S. have increased significantly over the past 15 years. Major products include mixed feed and feed additives (e.g., amino acids, especially lysine and vitamins). China is a major producer and exporter of amino acids (especially lysine) and vitamins in the world. Domestic production capacity exceeds domestic consumption. Over the next decade, U.S. livestock and poultry production is expected to increase steadily through 2025, which will generate larger demand for animal feed preparation products. China has been the third largest supplier to the U.S. and is expected to remain an important supplier over the next decade.

D. Trade Barrier Removal and its Effect on Bilateral Exports

Given the trends and discussions in previous sections, over the next decade, both U.S. and China will benefit from further growth of agricultural product trade. Gains are expected to be even more significant with improved trade relations.

1. Key Agricultural Product Potential Exports: U.S. to China in 2025

Baseline projections suggest U.S. agricultural product exports to China could increase from \$20.4 billion in 2015 to \$26.0 billion in 2025 (Exhibit 11). However, improving trade relations and the relaxation of non-tariff barriers could increase U.S. agricultural products by an additional \$2.3 billion in 2025.

The largest U.S. export gains are expected in land-based products such as corn and soybeans to meet China's growing livestock and poultry feed demand. Additional U.S. export gains are also likely for dairy, pork and poultry meat products as growing consumer demand in China will continue to exceed domestic production.

Increased nonfood trade such as cotton and hides and skins will benefit both countries. As global economy recovers and China's textile apparel and footwear industries grow, increased U.S. exports of hides and skins will be used by China to produce products such as shoes, clothing and furniture for export back to the U.S.

More land-intensive crop imports will benefit China due to its limited land and water resources and ease the environmental strain of producing land-intensive crops. Limiting the environmental impact of food production is particularly important for China as the per capita arable land in China is only 0.82 hectares or about 40% of the world average.

Additionally, per capita water availability in China is only one-fourth of the world average and water is unevenly distributed across agricultural production areas. Indeed, North China accounts for 65% of farmland but only has 20% of national water resources.

2. Key Agricultural Product Potential Exports: China to U.S. in 2025

Baseline projections suggest China's agricultural product exports to the U.S. could increase from \$4.3 billion in 2015 to \$5.1 billion in 2025 (Exhibit 12). Current projections are that improving trade relations could increase China's agricultural exports to the U.S. by an additional \$701 million by 2025.

➤ The largest gains are expected to be in fresh and processed fruit and vegetables.

China's agricultural product export gains are primarily based on China's expanded production of fruits and vegetables. These crops often bring higher returns to producers in China. Additionally, increasing regulatory requirements in the U.S., and especially in California, could limit U.S. production potential of fruits and vegetables.

However, it will be vital for China to improve its compliance with food safety requirements relating to fruit and vegetable production to satisfy both Chinese and U.S. consumer food safety and phytosanitary concerns.

**Exhibit 11: U.S. Agricultural Select Products Exports to China
in 2000, 2010, 2015 & Forecast 2025 (In US\$ Million)**

Product	2000	2010	2015	2025 Forecast		
				Baseline	Improved Trade Relations	Gains from Improved Trade Relations
Agricultural Products	1,747	17,601	20,357	26,044	28,299	2,255
Bulk	1,112	13,632	14,117	20,595	22,204	1,608
Soybeans	1,008	10,864	10,523	18,423	19,273	851
Sorghum	4	0	2,118	790	395	-395
Cotton	46	2,214	860	658	724	66
Wheat	17	41	160	52	77	25
Corn	0	288	187	281	1,312	1,031
Intermediate	413	2,712	4,389	3,038	2,907	-131
Feeds & Fodders	15	738	2,343	1,253	1,021	-232
Brewing & Distilling Dregs & Waste	0	504	1,632	608	304	-304
Forage Products NESOI	0	54	359	418	442	25
Bran Sharps	0	0	201	65	96	31
Animal Feed Preparations	10	98	113	162	178	16
Hides & Skins	237	971	1,268	1,245	1,370	125
Consumer Oriented	222	1,257	1,851	2,411	3,189	778
Dairy Products	22	188	350	558	614	56
Whey & Modified Whey	8	114	151	242	266	24
Pork and Pork Products	6	145	319	548	603	55
Poultry Meat and Products	44	172	16	101	381	279

Source: GTIS (trade history) and Informa Economics IEG (forecast)

Exhibit 12: China Agricultural Select Products Exports to U.S.
In 2000, 2010, 2015 and Forecast 2025 *(In US\$ Million)*

Product	2000	2010	2015	2025 Forecast		
				Baseline	Improved Trade Relations	Gains from Improved Trade Relations
Agricultural Products	630	3,277	4,273	5,096	5,798	701
Bulk	33	134	200	291	306	15
Tea	14	56	91	113	118	6
Soybeans	0	0	31	90	94	4
Intermediate	295	575	1,056	1,113	1,169	56
Animal Feed Preparations	12	71	122	133	140	7
Consumer Oriented	302	2,568	3,017	3,692	4,323	631
Processed Fruits & Vegetables	135	952	1,190	1,350	1,710	360
Citrus Fruit Preparations including jam	41	154	191	270	300	20
Peaches Prepared Preserved	0	49	82	135	140	5
Fruit and Vegetable Juices	38	412	330	450	480	30
Apple Juice	34	371	277	400	420	20
Fresh Fruit & Vegetables	7	156	173	180	240	60
Garlic, Fresh or Chilled	0	120	118	100	135	35
Dog & Cat Food	0	343	251	377	415	38
Snack Foods	16	139	157	186	204	19
Sugar Confection	15	122	135	160	176	16
Other	106	566	917	1,500	1,520	20
Ginger, neither crushed nor ground	6	53	54	110	115	5

Source: GTIS (trade history) and Informa Economics IEG (forecast)

3. Cumulative Gains to 2025 Substantial

U.S.-China bilateral trade in agricultural products was \$24.6 billion in 2015 and has considerable potential to expand. Increasing incomes and urbanization are boosting China's food consumption. This growth is putting a strain on China's domestic production to keep up with growing food demand. At the same time, limited availability of water and land resources is restraining growth in domestic production. U.S. food imports comprise a growing share of food consumed by Americans. In addition, some foods imported by the U.S. cost less than food produced domestically. Demand for healthy and ready-made food is increasing as working families have less time to prepare meals.

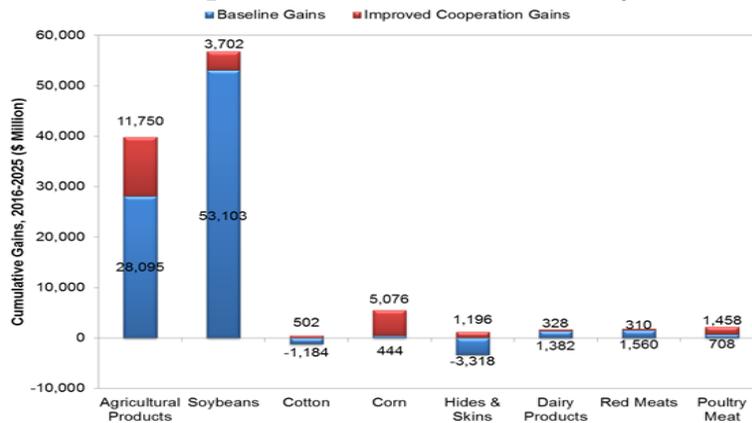
Cumulative baseline bilateral trade gains in agricultural products over the 2016-2025 period are forecast at \$32.8 billion.

- Despite this strong growth potential, China's export gains are hampered by AD duties on various products and food safety concerns by U.S. consumers. U.S. agricultural product exports are hampered by TRQs, AD duties and non-tariff barriers such as slow and unpredictable and frequently inequitable approval process for animal vaccines and biotechnology traits in imports, and lack of low level presence policy resulting in rejected grain shipments and trade disruptions.

This study finds that increasing bilateral cooperation to address and resolve trade barriers between the two countries would result in an additional \$15.6 billion in bilateral agricultural product trade gains over the 2016-2025 period. Additional gains will be smaller in the first couple of years and grow faster as bilateral relations improve and trade barriers are modified and/or removed.

The U.S. is expected to capture \$11.8 billion of the above additional gains in agricultural product exports. The largest product gains are expected in corn, soybeans, hides and skins, and poultry meat products.

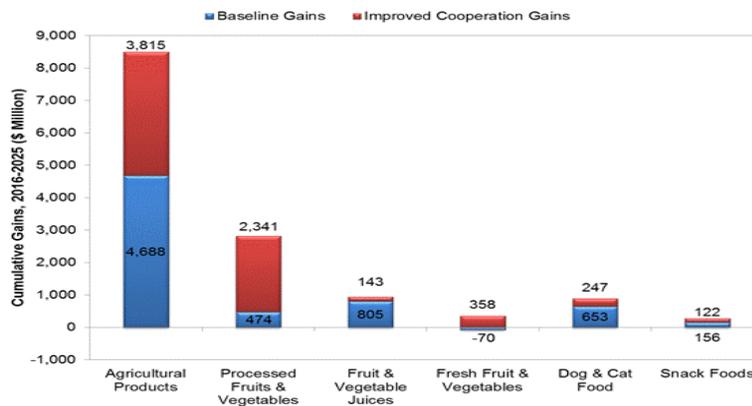
Exhibit 13. US Cumulative Export Gains to China Forecast by Select Product 2016-2025



Source: Informa Economics IEG

China cumulative export gains from improved bilateral trade relations to resolve trade barriers are forecast at \$3.9 billion. The largest cumulative export gains for China are expected to be in fresh and processed fruits and vegetables.

Exhibit 14. China Cumulative Export Gains to U.S. Forecast by Select Product 2016-2025



Source: Informa Economics IEG

V. FISH AND SEAFOOD PRODUCTS

China and the U.S. are the two largest seafood markets in the world and the two countries are important strategic trading partners. Fish and seafood trade between the U.S. and China is economically important, totaling \$3.9 billion in 2015, and trade has been expanding rapidly since China's accession to the WTO. Between 2000 and 2015, fish and seafood trade between the two countries grew at a CAGR of 12.6%, adding more than \$3.2 billion in trade. Trade between the two countries has helped bolster China's food security and has aided consumers in both countries in adding diversity to their diets and driving economic growth through middle class expenditures.

In general, the U.S. exports large quantities of raw or head-on, gutted fish to China for further processing into filets or other consumer-oriented seafood products. China in turn often processes the raw fish into filets or other consumer-oriented products and exports the products back to the U.S. China is also a significant exporter of farm-raised fish and seafood, particularly tilapia, mollusks, and shrimp.

U.S. exports of Cod and Cod products, Flatfish, Alaska Pollock, lobster and crabs are the most significant exports to China. In 2015, Cod exports totaled \$169 million, Flatfish exports \$115 million, lobster \$86 million and crabs \$74 million. The U.S. exports fish meal to China, accounting for about 9% of China's fish meal imports in 2015 in terms of quantity. Fishmeal is critically important to China for the maintenance of its aquaculture industries, especially in the farming of carnivorous fish like salmon. China's import volume has remained steady near 1 MMT per year since 2000 but import values have risen dramatically with global fish meal prices. China's fish meal import quantity has increased roughly 6% from 2000 to 2014 reaching 1.03 MMT.

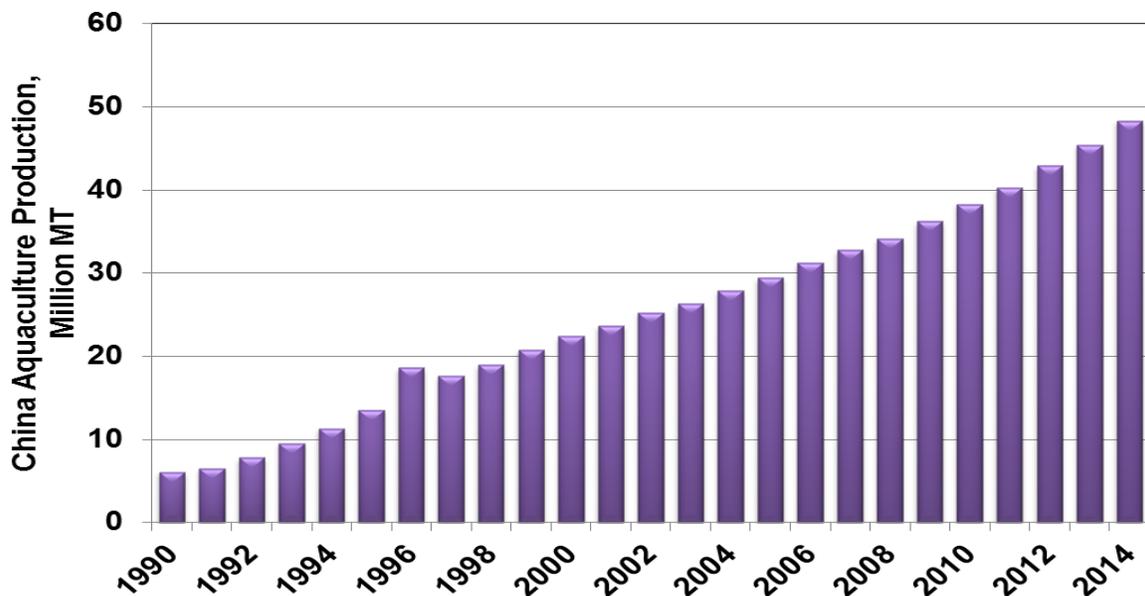
China is the world's fourth largest fish and seafood import market, with \$6.2 billion of imports in 2015. Russia, the U.S, Canada, New Zealand and Norway were the top suppliers, accounting for 52% of China's import value. The U.S. is either the number one or number two supplier of each of China's top ten most imported fish products, making it a strategically important trading partner, even more so than even Russia (China's largest seafood supplier). China's preference for premium fish is growing as evidenced by the growth in U.S. crab exports to China (15% CAGR) and lobster exports (98% CAGR for frozen lobster and 117% CAGR for live lobster).

China adds significant value to the seafood industry by processing raw fish, often imported from the U.S., Russia, Norway, or Canada and exporting frozen filets and farm-raised fish and seafood (notably, tilapia and various shrimp) to consumer markets in the U.S., Thailand, Hong Kong, Japan, and European countries.

China is also a major exporter of fish and seafood products. China is the second largest supplier (by product value) of fish and seafood products to the United States after Canada (Exhibit 69). China supplied \$3.1 billion of fish and seafood to the U.S. in 2015.

In part due to its growing consumer demand, China has built the world’s largest and most productive aquaculture system (Exhibit 15). As a result, China imports large quantities of fish meal, as indicated earlier, to supply its expanding aquaculture industry.

Exhibit 15: Chinese Aquaculture Production (MMT_s)



Source: UN Fish Stat and Informa Economics IEG

China’s largest exports are tilapia, shrimp, and cuttlefish products. The U.S. is the second largest export destination for China’s exports. China exported \$3.1 billion of fish and seafood to the U.S. in 2015. China exported \$393 million worth of tilapia to the U.S. along with \$358 million of shrimp. The majority of the tilapia sent to the U.S. was raised in Chinese fish farms.

- China's tilapia industry has been a huge beneficiary of U.S. demand and China's exports of the mild-tasting fish have grown sharply. However, good trade relationships will be needed to maintain this success as Vietnamese fish similar to tilapia is gaining popularity in the U.S.

The U.S. will continue to rely upon China to supply consumer-oriented products and especially farm-raised products like tilapia and shrimp, while China will continue to rely upon the U.S. for supplies of wild-caught and premium seafood products (like lobster and crabs from the Northern U.S. waters) and fish meal.

- Globally, fishmeal production is expected to remain flat due to steady anchovy catches. Demand for fishmeal, however, is forecasted to steadily rise as global demand for seafood continues to increase. Therefore, trade relationships will be vital for the continued procurement of fishmeal and the support of aquaculture industries.

In the future, Russia may be a less reliable trading partner supplying China with raw fish. The Russian government has vowed to increase domestic seafood consumption to bolster its fishing industry. Additionally, efforts are in place to export less raw fish products and more consumer-oriented products to add additional value to the Russian economy. Russia's policy changes may create greater opportunities for the U.S. to become China's number one supplier and increasing trade relationships and reducing tariff and non-tariff barriers will be a key component of such opportunities.

A. Impact of Trade Barriers on U.S. – China Trade

In contrast to other products which are traded between the U.S. and China, fish and seafood face comparatively fewer and smaller tariff and non-tariff barriers. Because both the U.S. and China have access to Most Favored Nation (MFN) tariff rates, the largest share of trade expansion due to tariff reductions has already occurred. After China's accession to the WTO, both countries face comparatively small tariffs on seafood products with the average U.S. tariff imposed on Chinese products falling at 0.5% and the average Chinese tariff imposed on U.S. products estimated at 10%.⁸ Additionally, the reduced tariff rates obtained through the WTO Doha Round in 2001 further lowered fish and seafood tariffs for China and the U.S. Accordingly, gains from further tariff reductions will be limited, though tariff reductions will still be positive for both countries.

⁸ WTO and Informa Economics IEG

Of more relevance are the non-tariff barriers to trade between the U.S. and China. Again, non-tariff barriers such as phytosanitary concerns are limited, particularly due to the absence of GMO concerns in fish.

- Non-tariff barriers in seafood trade are more focused on food safety and production practices, particularly in China, and in Chinese aquaculture production subsidies which may overwhelm U.S. markets due to over-supply. Resolution of these issues holds further potential to increase trade in seafood products.

U.S. Barriers

China's fish and seafood exports to the U.S. skyrocketed after China's accession to the WTO which allowed China to ship seafood to the U.S. at the MFN rate. Exports grew from \$516 million in 2000 to \$3.1 billion in 2015, an increase of 600%.

Shrimp exports from China to the U.S. represent a special case in the history of seafood trade between the two nations. Following China's accession to the WTO and large increase in shrimp export to the U.S., the U.S. imposed stringent AD duties on Chinese shrimp. The duties amounted to tariffs of 112.81% on imported Chinese shrimp.

Similar to the shrimp market, the U.S. imposes large AD duties on crayfish imported from China. The duties were renewed in 2014 and will expire, in accordance with Uruguay Round agreement, after 5 years in 2017.⁹ Chinese crayfish recently cost around \$6 per pound while U.S. crayfish cost between \$10 and \$16 per pound.

Removal of U.S. anti-dumping duties imposed on crayfish and shrimp imports would give China a larger export market and help the struggling shrimp industry. Food safety and phytosanitary concerns are likely to be at the forefront of any such discussion so efforts by China to modernize its food safety and aquaculture industries would assuage U.S. quality concerns.

Additionally, removing the U.S. AD duties would benefit countries beyond the U.S. and China. The U.S. AD duties have been found to be market-distorting for other countries engaged in significant shrimp trade (Vietnam, Thailand, the EU, and others).¹⁰ Removal of these duties could help move global shrimp markets toward equilibrium and maximize the economic welfare of importing and exporting countries.

⁹ Livingston International, 2014. Available [here](#).

¹⁰ Wang and Reed, 2015. Available [here](#).

Phytosanitary concerns exist for seafood and fish products imported from China as Chinese fish farmers are allowed to use chemicals and substances banned in the U.S. This combined with the poor and often polluted waters in which the fish are raised (a 2007 report from the Organization for Economic Cooperation and Development noted that all of China's rivers and three-fourths of its lakes are "severely polluted") raises health concerns for U.S. consumers of Chinese fish¹¹.

The World Wildlife Fund is continuing to promote its international aquaculture certification which is gaining popularity with U.S. consumers. Enforcement of such standards by U.S. or other importers could restrict China's ability to export product to certain markets. However, Chinese producers meeting such criteria could face added acceptance in foreign markets.

Chinese Barriers

While relatively low tariffs exist for most seafood products exported from the U.S. to China, processed products face much higher tariffs. Smoked, salted, and otherwise prepared fish products face tariffs of 14-17%, depending on the product. Such tariffs are likely imposed to protect the Chinese fish processing industry. However, reduction of these tariffs may provide China with additional benefits as Chinese consumers continue demanding value-added fish products. Reducing tariffs would allow greater exports of U.S. value-added products to enter the Chinese marketplace.

B. Trade Agreements and Relationships

Both the U.S. and China are engaged in numerous FTAs with other seafood trading countries. China has engaged 20 countries in FTAs which specifically deal with seafood products while the U.S. has also engaged 20 countries in seafood-including FTAs. Additionally, both countries offer lower tariff rates of other Non-MNF trading partners, largely those countries in WTO Least Developed Country status but also countries covered by various economic development acts, such as the African Growth and Opportunity Act. The following section outlines some of the major FTA agreements signed by the U.S. and China and the implications on seafood trade.

Chinese Trade Agreements

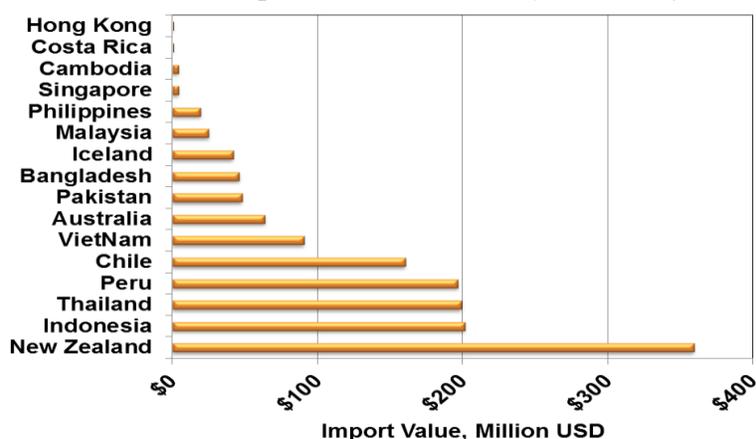
- The Australian and Chinese governments signed an FTA which will include seafood products. Australia-based seafood company Petuna notes it has increased its production of salmon and trout to meet increasing consumer demand in China for fish products.

¹¹ U.S.-China Economic and Security Review Commission, 2008. Available [here](#).

- In 2014, China and Iceland signed an FTA whereby China agreed to reduce tariffs to 0% for 7,800 items imported from Iceland, nearly all of which are fish and seafood products.¹²
- China has free trade agreements with Chile, Peru, Singapore, Thailand, Vietnam and New Zealand, all of which are important seafood suppliers to China. In 2014, these countries collectively exported over \$1 billion dollars of seafood products to china (Exhibit 16). The FTAs are clearly beneficial to Chinese seafood imports and China imported \$1.4 billion of seafood products from FTA countries in 2014.

The U.S. directly competes against these countries in several fish products, notably salmon from Chile, crabs from Bangladesh, Indonesia, and the Philippines; lobster from Australia and New Zealand; and fish meal from Vietnam. The FTAs which China holds with these countries put the U.S. at a disadvantage to supply quality seafood to the Chinese market.

Exhibit 16: Countries with China Free Trade Agreement and 2014 Seafood Export Value to China (*Million \$USD*)



Source: UN FSA GATS and Informa Economics IEG

U.S. Trade Agreements

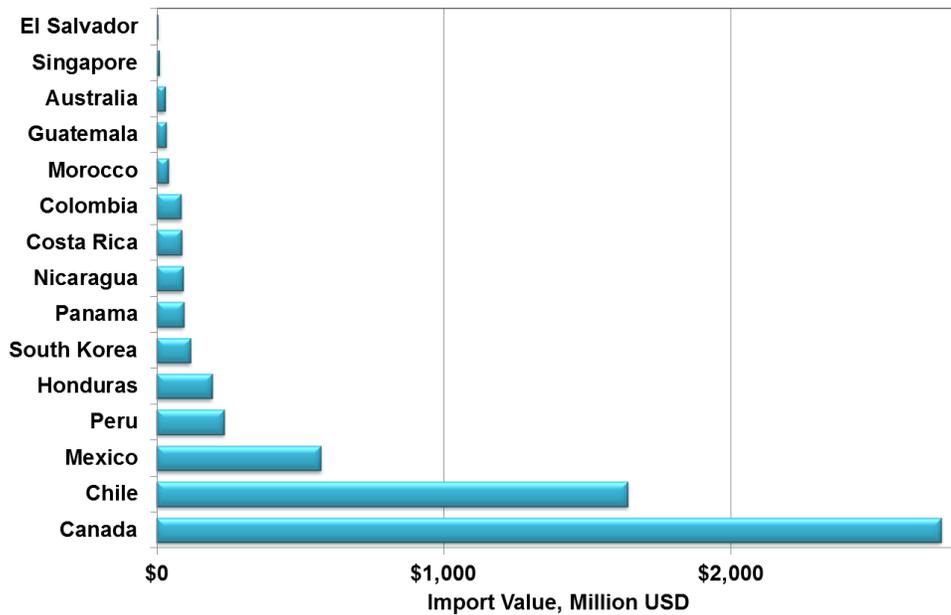
The U.S. is also a substantial beneficiary of FTAs for seafood imports, importing nearly \$6.0 billion dollars in 2014 from counties with which it has FTAs. Canada and Chile are the two largest FTA countries which supply seafood to the U.S., respectively sending \$2.7 and \$1.6 billion dollars of seafood to the U.S. Some of Canada’s exports

¹² Seafood News, 2014. Available [here](#).

are processed in the U.S. and re-exported, making estimations of Canadian exports to the U.S. for consumption difficult to quantify. Canada is a major supplier of lobster, crabs, salmon, and scallops to the U.S. while Chile exports salmon fillets, trout filets, and shrimp to the U.S.

- The U.S. top imported seafood products are shrimp, salmon, tuna, crabs, and lobster and the countries with which it has FTAs are major suppliers.

Exhibit 17: Top 15 Free Trade Agreement Countries Exporting Seafood to U.S. (Million \$USD)



Source: USDA FAS GATS and Informa Economics IEG

- The FTAs which the U.S. holds with these countries put China at a disadvantage to export seafood products to the U.S. Notably, Chile has an advantage shipping salmon to the U.S. over China and Honduras faces lower tariff rates than China does on tilapia exports to the U.S. Mexico, Peru, Panama, Nicaragua, and Guatemala have lower duties imposed on shrimp imports than China does, and these countries are further absolved from the AD duties imposed on Chinese shrimp imports.

C. Long Term Supply and Demand Perspectives for Key Fish and Seafood Products

Globally, the supply situation for fish and seafood is composed of two diverging factors:

- Steady to declining capture supplies¹³ and
- Increased aquaculture production.

The FAO Fish to 2030 report, issued in 2013, forecasts capture supplies will remain largely steady to 2030 at 93.2 million tons.

- The FAO report noted that the Fish to 2020 report issued in 1997 projected capture fish supply growth of 0.8% globally while actual supplies from 1997 – 2007 (according to the Fish to 2030 report) grew at only 0.5% annually.
- The lack of historic supply growth together with the potential for global over-fishing and climate change combine to create projections of steady to slightly declining global fish catches over the coming fifteen years.

Juxtaposed to the steady nature of global fish catches is the rapid increase of global consumption of fish and seafood.

- The Fish to 2030 report projects global fish consumption of 151.771 million tons by 2030, leaving a capture supply to consumption deficit of 58 million tons.
- Aquaculture is expected to fully meet this deficit, growing by 77% to 93.6 million tons (exceeding capture supplies) by 2030.
- Industry projections suggest a 5.1% growth in the value of aquaculture production globally by 2019 with the production hitting \$195 billion.¹⁴

China and the U.S. have very different supply situations when placed into the context above. The U.S. aquaculture industry is relatively small producer (\$1.3 billion in sales in 2013) and is a small player in the global aquaculture market. However, the U.S. has access to some of the world's greatest ocean fisheries off the Alaskan coast and the New England coast. Accordingly, the U.S. supply scenario is heavily influenced by ocean catch supplies and less by aquaculture.

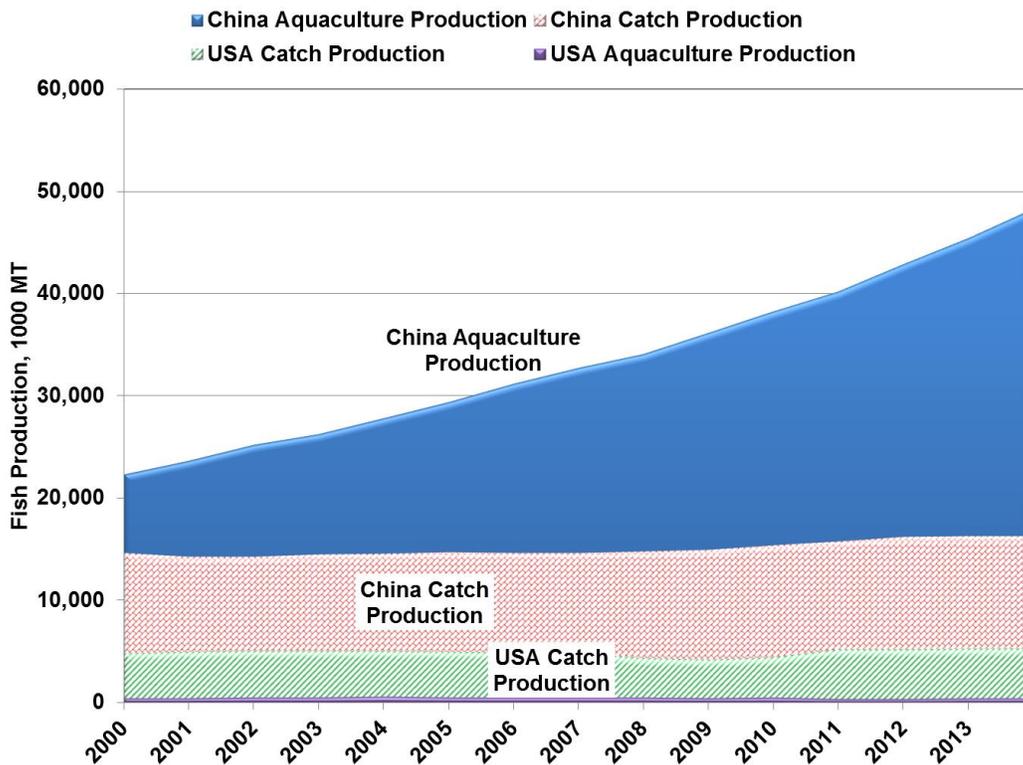
¹³ Supplies of fish caught from oceans, lakes, or rivers.

¹⁴ Aquatic Solutions, 2014. Available [here](#).

China, on the other hand, has access to significant volume of ocean catch fish and has been increasing its long distance fishing fleet for decades. The Chinese long distance fleet is of strategic importance to the nation and was among the first industries to receive support for China’s overseas investment strategy. China apparently has the world’s largest fishing fleet, giving the nation a strategic position in ocean fish supplies. Additionally, China has an extremely large aquaculture system that has been expanding for decades. China can be characterized as being well supplied with farm raised fish and seafood and as having excellent access to ocean fisheries.

China’s production easily overwhelms the U.S. in both catch production and aquaculture (Exhibit 18). China accounts for approximately 65% of the world’s aquaculture production and is nearly 130 times as large as the U.S. industry. Despite its smaller size, the U.S. remains an important trading partner for China and supplies high value, high quality wild-caught fish to premium Chinese markets. The U.S. coastline off Alaska and the Northeast U.S. also provides access to fish species mostly unavailable to Chinese fishing fleets.

Exhibit 18: China and USA Fish and Seafood Production by Type, 2000 to 2013



Source: FAO FishStat and Informa Economics IEG

1. United States Supply and Demand Forecasts

(a) Supply

U.S. seafood supplies will follow the trend of global capture fishery supplies: steady to lower. U.S. aquaculture will remain a minor portion of the U.S. seafood supply picture. Despite a 40% projected growth from 2010 to 2030,¹⁵ the North American aquaculture industry will still account for only 0.9% of the global aquaculture production. Accordingly, capture fisheries will account for the largest share of U.S. domestic supplies. The FAO projects North American capture fishery supplies to decrease by 0.1% by 2030 to 5.589 million tons.

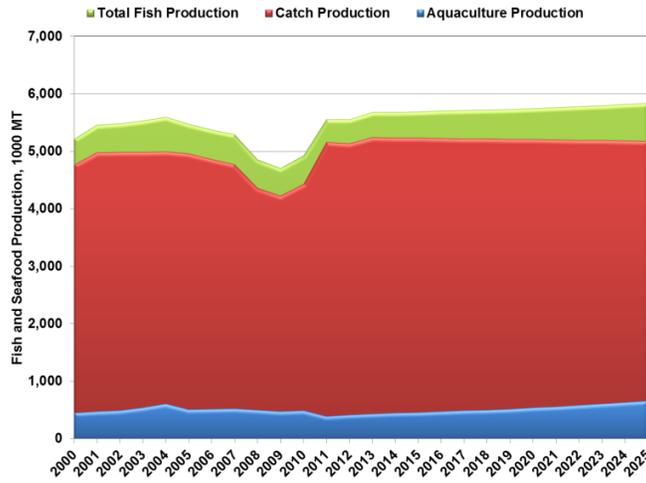
According to the Fisheries division of the National Oceanic Atmospheric Administration (NOAA), U.S. aquaculture meets only 5-7% of U.S. fish and seafood consumption, annually.¹⁶ Marine aquaculture accounts for only 20% of U.S. aquaculture with the remaining aquaculture being dedicated to freshwater species. Marine aquaculture is dominated (roughly 65%) by production of mollusk species such as oysters, clams, and mussels, with the remainder being largely shrimp, salmon, seabass, and barramundi. U.S. freshwater aquaculture is dominated by catfish, trout, and tilapia production which account for 75% of freshwater fish aquaculture.

U.S. fish and seafood production is expected to stay relatively flat to 2025. Catch production will continue to account for the vast majority of the U.S. seafood supplies, though catch production will decrease by 1% to 5.179 million tons in 2025. U.S. aquaculture will likely expand to partially fill the gap between catch production and U.S. consumption, but the projected 47% increase in aquaculture production will still only account for 11% of U.S. domestic supplies.

¹⁵ World Bank *Fish to 2030* report.

¹⁶ NOAA Fisheries Division. Available [here](#).

Exhibit 19: U.S. Fish and Seafood Supplies, 2000 to Forecast 2025

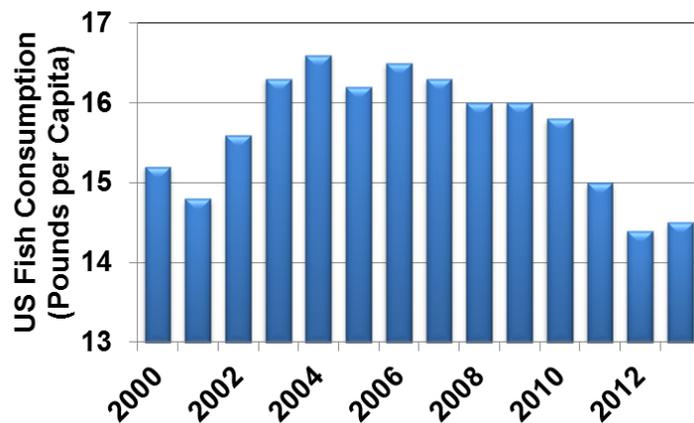


Note: 1/ Production is estimated as the weight of live fish and seafood.
 Source: FAO FishStat and Informa Economics IEG

(b) Demand

U.S. seafood consumption has been steady to declining for nearly a decade, according to the NOAA Fisheries of the United States 2013 report. The report noted U.S. consumption of fish and seafood per capita was 14.5 pounds, down from a record high of 16.6 pounds per capita in 2004 (Exhibit 20). U.S. consumers have been steadily shifting towards higher proportions of fresh and frozen seafood in their diets, avoiding canned products on beliefs of product safety and quality. In 2013, consumption of canned fishery products was 3.7 pounds per capita, roughly 38% of per capita seafood consumption.

Exhibit 20: U.S. per Capita Consumption of Fish and Seafood Products



Source: NOAA Fisheries Division and Informa Economics IEG

Domestic fish consumption has been falling for several reasons, but price and food safety are two primary drivers. Seafood prices have experienced steady increases since 2009, driven by volatile catch supplies and ever expanding world demand. NOAA reports Ex-Vessel Price Index increases of 40% in edible finfish from 2009 to 2013. Shellfish and fish for industrial use experienced similar price increases over the same time period. These price increases have discouraged consumers from increasing seafood consumption. Additionally, health concerns, particularly those of mercury and other heavy metals in fish, have dampened consumer willingness to consumer fish products.

America's top choices for seafood are shrimp, salmon, tuna, and tilapia; all species which can be raised in aquaculture systems.¹⁷ Approximately 91% of the seafood consumed in the U.S. is imported from trading partners and half of imports are produced from aquaculture systems.

The outlook for U.S. seafood demand remains neutral to mildly positive. The FAO Fish to 2030 report forecasts North American seafood consumption CAGR of 0.7% from 2010 to 2030, with per capita consumption rising to 26.4 kilograms. Consumption of seafood in North America is projected to reach 10.674 million tons in 2030, a 34% increase from 2010. Continued economic recovery in the U.S. will further increase consumer willingness to pay for high priced seafood items, like crabs and lobster.

- Specifically for the U.S., fish and seafood consumption¹⁸ is expected to increase 12% by 2025 to 3.768 million tons. This represents a CAGR of 1%, nearly equal to the rate observed from 2000 to 2014. The detailed forecasts for the U.S. seafood market are shown in Exhibit 73. Notably, U.S. seafood exports are set to increase by 14% in part due to re-exports. Supply and demand for key seafood products traded between the U.S. and China are shown in (Exhibit 74, Exhibit 75, and Exhibit 76)

¹⁷ Tuna are a relatively new addition to aquaculture species and Bluefin tuna have been called the "Holy Grail" of aquaculture species.

¹⁸ Consumption here is estimated as the residual remaining after estimating production and imports less exports.

2. China Supply and Demand Forecasts

(a) Supply

China's fish and seafood production totaled an estimated 64 million tons in 2014¹⁹ and was nearly evenly split between seawater production and freshwater production. Within each of those two production categories, however, aquaculture production maintained a larger share than catch production with aquaculture equating to nearly 71% of total aquatic production.

In the coming decade, China's aquaculture industry will play a larger role in supplying the nation with aquatic products. Like the rest of the world, China's fish catch is expected to remain extremely stable thus leaving the burden of increasing supplies to the aquaculture industry. China boasts the largest aquaculture industry in the world, with nearly 7.83 million hectares of area dedicated to aquaculture. China's aquaculture industry accounts for between 60-70% of the world aquaculture total.²⁰ China's aquaculture industry utilizes comparatively low-intensity production systems relative to other aquaculture systems with low-value mollusks and carp accounting for 26% and 45% of aquaculture production, respectively.²¹

Despite its current orientation towards low-value product production, the future of Chinese aquaculture lies in higher value fish and seafood products, driven by changing consumer preferences in China and the U.S.

- Rising consumer incomes are driving demand for premium seafood products like crab, lobster and sea cucumbers.
- Changing Chinese and foreign consumer preferences are expected to increase demand for another group of products including white shrimp, tilapia, and scallops.

These products are becoming increasingly popular within China and are already staple seafood products for many foreign markets, including the U.S. China's aquaculture farmers will tailor production to market needs and premium products for Chinese consumers and products popular in domestic and foreign markets are likely to experience continued production and export growth in the future.

¹⁹ China National Bureau of Statistics, 2014.

²⁰ USDA FAS and Rabobank.

²¹ Rabobank, 2012. *The Dragon's Changing Appetite*.

While aquaculture has been a booming industry for China, it is not without its challenges. Investment in aquaculture facilities has been slowing since the early 2010's, following the rapid expansion during the late 2000's.

- Investment in tilapia alone has fallen 46% in 2015 as competing fish from foreign sources, notably the Vietnamese Pangasius catfish, are crowding out Chinese exports.
- China's tilapia industry, like many aquaculture products, is facing disease issues due to high bacteria counts from overcrowded production conditions and polluted water. Ongoing industry research on disease resistance and other production-enhancing topics will be one step in the solution to improving China's aquaculture industry.
- Greater focus on climate change and pollution control will also be needed to ensure the future growth of China's expansive aquaculture industry.

China's aquaculture industry also faces problems expanding not only from factors internal to the industry (disease, for example) but also from competition with other scarce resources.

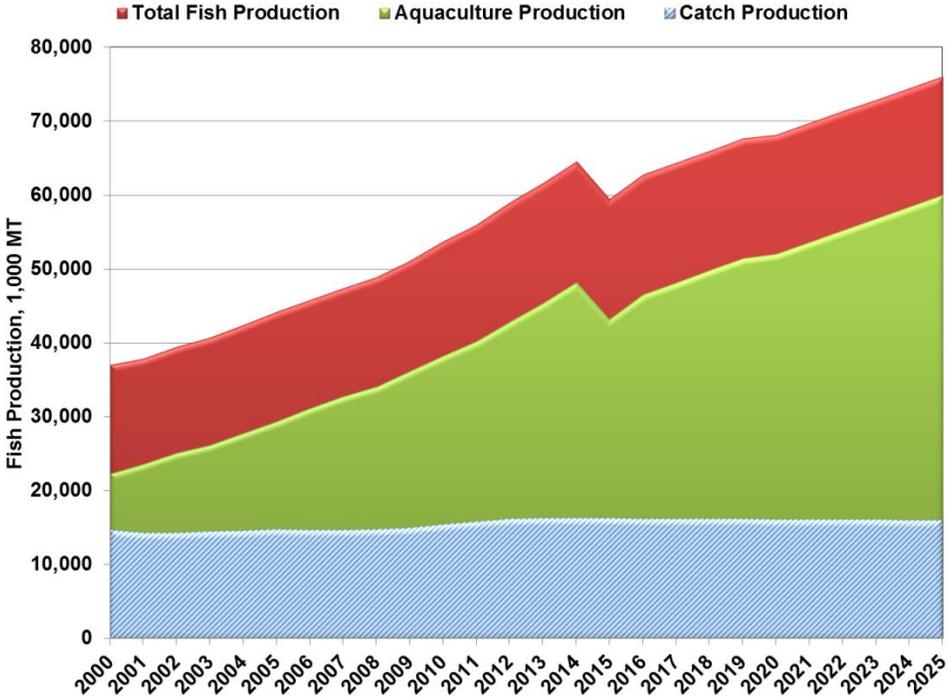
- China's aquaculture systems are beginning to be limited by land and area development by other industries, including housing and urban growth. The limitations on area expansion will likely drive renovations of existing aquaculture infrastructure and continued focus on improved industry efficiency, rather than area expansion.

Despite its vast aquaculture industry and long distance fishing (LDF) fleet, China's demand is expected to increase at a higher rate than will be obtained by aquaculture and catch production.

- Imports will be the missing key to ensure supplies of quality, diverse seafood products for the Chinese consumers.
- The size of the U.S. fishing industry and the quality of its products make the U.S. an ideal partner to supply China with imported seafood products.

Chinese fish and seafood supplies are forecast to increase 18% by 2025 to 76 million tons (Exhibit 21). Despite its large LDF fleet, China capture fish supplies will suffer the same fate as the world, decreasing production. Catch production in China will decrease 2% to 16.262 million tons in 2025, down from 16.5 million in 2014. China’s aquaculture will continue to expand, albeit at a slower pace, growing 24% by 2025 to over 60 million tons. The CAGR in China’s aquaculture is expected to slow from 5% annually observed from 2000 to 2013 to 1.8% from 2014 to 2025.

Exhibit 21: China Fish Production 2000 to Forecast 2025



Note: Production is estimated as the weight of raw or live fish and seafood.
 Source: FAO FishStat and Informa Economics IEG

(b) Demand

Demand for seafood and fish products has been increasing dramatically in China. China now accounts for nearly one-quarter of the world’s seafood consumption and per-capita consumption has increased three-fold from 1990 to 2013. Seafood is considered healthy, includes many premium products, and has more efficient feed conversion ratios than other types of animal proteins. Consumption of seafood products within China is concentrated in urban areas, with urban dwellers consuming three times as much seafood as their rural-dwelling counterparts.²²

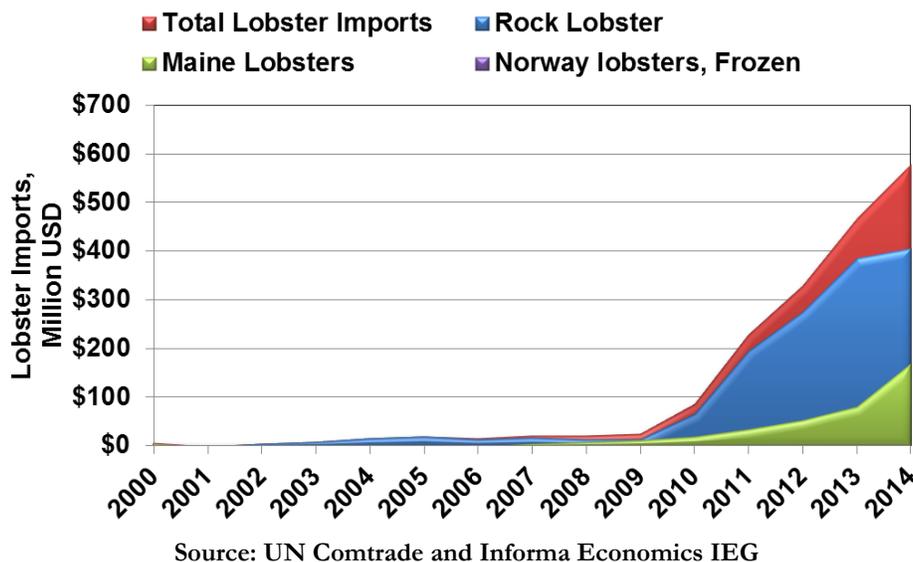
²² UN FAO.

Rising incomes and labor wages across the entire country are expected to lift seafood demand and strong growth potential exists in rural China. The FAO’s Fish to 2030 report forecasts China’s fish and seafood consumption to grow from 32.6 kg per person to 37.8 kg per person by 2020 and to 41 kg per person by 2030 (approximately 1.4% CAGR from 2010 to 2030).²³

In contrast to much of the rest of the world, China consumes less saltwater seafood products, favoring fresh water products such as carp, shells, clams, mussels, and other mollusks. The vast majority of China’s aquaculture is freshwater-based, creating higher supply and lower prices to attract consumption of fresh-water species.

While Chinese consumers traditionally preferred pork as their primary protein, increasing purchasing power of consumers, improving supply chains and the availability of imported fish and seafood is driving higher seafood consumption. A large portion of this effect is driven by China’s expanding middle class income as seafood consumption is known to have high income elasticity. Premium seafood products, such as crab, lobster and sea cucumbers have very high income elasticities and are expected to experience strong demand growth in the future. The demand for premium seafood products is partially illustrated in Exhibit 22 which depicts the 38% CAGR growth by lobster imports from 2000 to 2014.

Exhibit 22: China’s Lobster Imports 2000 to 2014 *(In US\$ Million)*



²³ The FAO’s estimate for 2010 Chinese consumption of fish was near 32 kg per person.

Chinese consumer demand for fish and seafood has created shifts in China's seafood industry. Once almost solely a processing and re-export industry, China's seafood processing industries are gradually shifting towards marketing their products to Chinese consumers. One such example is that of Chang International, a Qingdao-based company originally built to process and re-export U.S. fish products. By 2013, however, Chang International was marketing 15% of its products within China and expected to market 23% of their product in China in 2014.²⁴

Details of China's supply and demand forecasts for all seafood products are shown in Exhibit 77. Supply and demand forecasts for specific seafood products are shown in Exhibit 78, Exhibit 79, Exhibit 80, and Exhibit 81. Detailed supply and demand forecasts for seafood products important in China's exports to the U.S. are shown in Exhibit 78, Exhibit 79, and Exhibit 80.

D. Mutual Export Opportunities

The growth in consumer demand for seafood and the rise of aquaculture have important implications for seafood trade between the U.S. and China. This report previously estimated the baseline growth in exports (part of the supply and demand analysis earlier in this chapter) for seafood trade between the U.S. and China. This section provides an analysis of potential gains in U.S.-China seafood trade that could be obtained through improved trade relationships. Improved trade relationships here include possibilities such as lower tariffs, removed or reduced AD duties, formal commitments to improved environmental quality, stewardship, and sustainability.

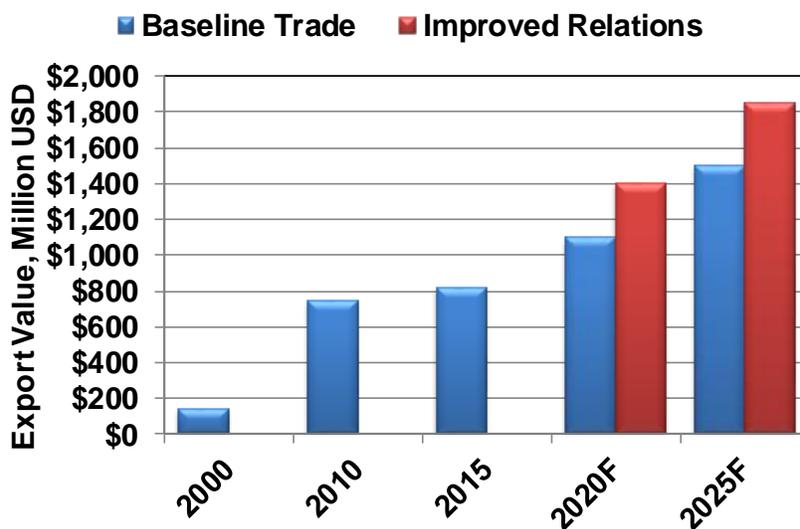
Our current baseline trade projections suggest China's consumption of seafood could grow by 36% in 2025. While production will also increase it will be outpaced by consumption increases, leaving imports to fill the gap.

Our baseline projections are for China's seafood imports to grow 152% to 2025. U.S. exports to China are also expected to play an important role in China's increased imports, though U.S. market share will be stifled by tariffs, steady catch production, and slow expansion of the aquaculture industry. The value of U.S. exports to China is expected to more than double from \$818 million in 2015 to \$1.5 billion in 2025 (Exhibit 23 and Exhibit 25).

²⁴ Han, A. and Bean, R. 2014. *Building the Chinese Market for U.S. Seafood*. USDA GAIN Report.

However, under improved trade relationships, incentives to expand U.S. aquaculture and re-direct exports from other countries to China would increase the U.S. share of China’s imports. Under improved trade relations and lower tariffs, U.S. exports to China could increase to \$1.85 billion dollars in 2025 (Exhibit 23 and Exhibit 25).

Exhibit 23: U.S. Fish and Seafood Exports to China under Baseline and Improved Trade Conditions

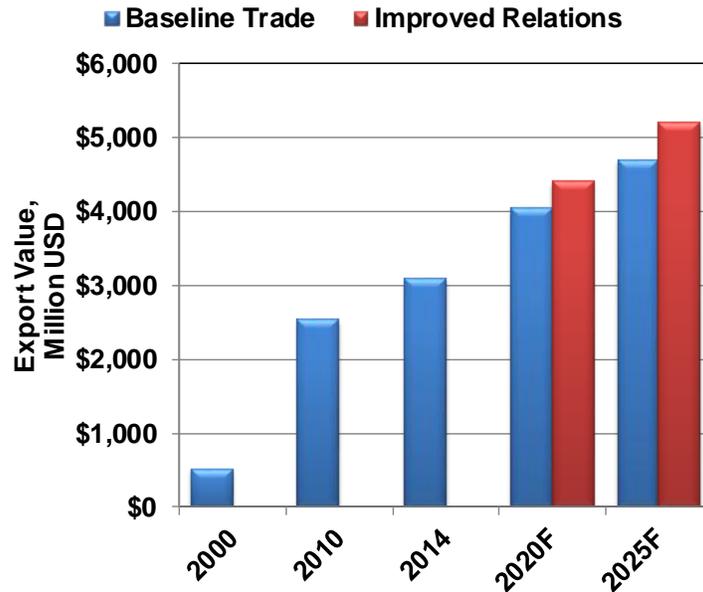


Source: USDA FAS, FAO, and Informa Economics IEG

Similarly, baseline projections call for China’s exports of seafood products to the U.S. to increase from \$3.1 billion in 2015 to \$4.7 billion in 2025. However, improved trade relations and reduced trade barriers on the part of the U.S. could boost China’s exports to the U.S to \$5.2 billion in 2025 (Exhibit 24 and Exhibit 26).

- U.S. seafood consumption is expected to grow 12% (1% CAGR) by 2025 and imports will make up for the lack of supply response from the U.S. fishing and aquaculture industries; increasing by 23% by 2025. China can play an increasingly large role in U.S. imports with commitments to responsibility and sustainably raising fish and seafood and by increasing the safety of its seafood processing sector.

Exhibit 24: China Fish and Seafood Exports to U.S. under Baseline and Improved Trade Relations



Source: USDA FAS, FAO, and Informa Economics IEG

E. Fish and Seafood Products Trade Summary

China and the U.S. are the two largest seafood markets in the world and the two countries are important strategic trading partners. Fish and seafood trade between the U.S. and China is economically important, totaling \$3.9 billion in 2015. Trade between the two nations will take place in the context of steady or mildly declining global fish catches and a global expansion of aquaculture. The production increases that will occur from aquaculture expansion will directly support the world's expanding seafood and fish demand which could reach 151 million tons by 2030.

The supply situation of the U.S. and China will differ greatly. While both countries are constrained by constant seafood catches, China's aquaculture will likely continue to dominate global seafood production. China's seafood production could expand nearly 30% by 2025 to over 90 million tons produced annually; production which will be needed to support the growing demand for fish and seafood by Chinese consumers. Chinese demand could increase by 55% to 2025 as China expands its middle class and as the urban (and often wealthy) population grows.

Trade barriers between the U.S. and China are not as extensive in fish and seafood as in other products but their existence remains a hindrance to seafood trade. Notably, The U.S. imposes AD duties on Chinese shrimp and crayfish while U.S. products sent to China face tariffs nearly 10 times higher than those imposed by the U.S. on Chinese products. Other barriers are concerns about environmental sustainability of aquaculture in China and the quality and food safety of fish farms in China (due to pollution concerns).

Baseline projections suggest China and U.S. fish and seafood bilateral trade could grow from \$3.9 billion in 2015 to \$6.2 billion in 2025. However, improve trade relations between the two countries could increase bilateral trade to \$7.0 billion in 2025.

Exhibit 25: U.S. Exports to China in 2000, 2010, 2015 and Forecasts to 2025 *(In US\$ Million)*

Product	2000	2010	2015	2025 Forecast		
				Status Quo	Improving Trade Relations	Gains from Improving Trade
Fish Products	143	745	818	1,500	1,850	350
Cod Products	4	63	169	300	330	30
Flat fish	20	93	115	220	245	25
Alaska Pollock Frozen	0	0	93	190	210	20
Cuttle fish & Squid Fresh	34	106	54	200	220	20
Crabs	11	42	88	170	195	25
Lobster	2	8	86	180	205	25

Source: Informa Economics

Exhibit 26: China Exports to the U.S. in 2000, 2010, 2015, and Forecasts to 2025 *(In US\$ Million)*

Product	2000	2010	2015	2025 Forecast		
				Status Quo	Improving Trade Relations	Gains from Improving Trade
Fish Products	516	2,525	3,087	4,700	5,200	500
Tilapia Products	0	0	393	600	650	50
Salmon Products	0	10	205	550	600	50
Cuttle Fish	13	158	292	500	540	40
Cod Products	2	1	231	500	530	30
Shrimp Products	127	322	358	470	510	40
Crab Products	21	179	194	330	370	40

Source: Informa Economics

F. Trade Barrier Removal and its Effect on Bilateral Exports

Given the trends and discussions in previous sections, over the next decade, both U.S. and China will benefit from further growth of fish and seafood trade. Gains are expected to be even more significant with improved trade relations as indicated above.

1. Key Fish and Seafood Potential Exports in 2025

China's seafood production in the long term is not expected to keep up with demand as the middle class grows. Although China's tariffs for fish and seafood imports are relatively low, they are higher for processed products likely to protect the Chinese fish processing industry. Reducing tariffs for U.S. value added fish product imports will help China meet its growing food demand.

China could substantially expand its fish and seafood exports to the U.S. and better meet domestic demand if it established science-based regulations for aquaculture production which currently use chemicals and other substances banned in the U.S. Additionally, increased transparency and regulations regarding the processing of fish and seafood products would enhance China's reputation as a global producer of high quality, safe seafood products.

U.S. AD duties on shrimp and crayfish imported from China are partly due to phytosanitary concerns regarding China's shrimp and crayfish production and to a greater extent on the large price differential between U.S. and China's shrimp and crayfish. Resolving these concerns can boost China's exports of these products.

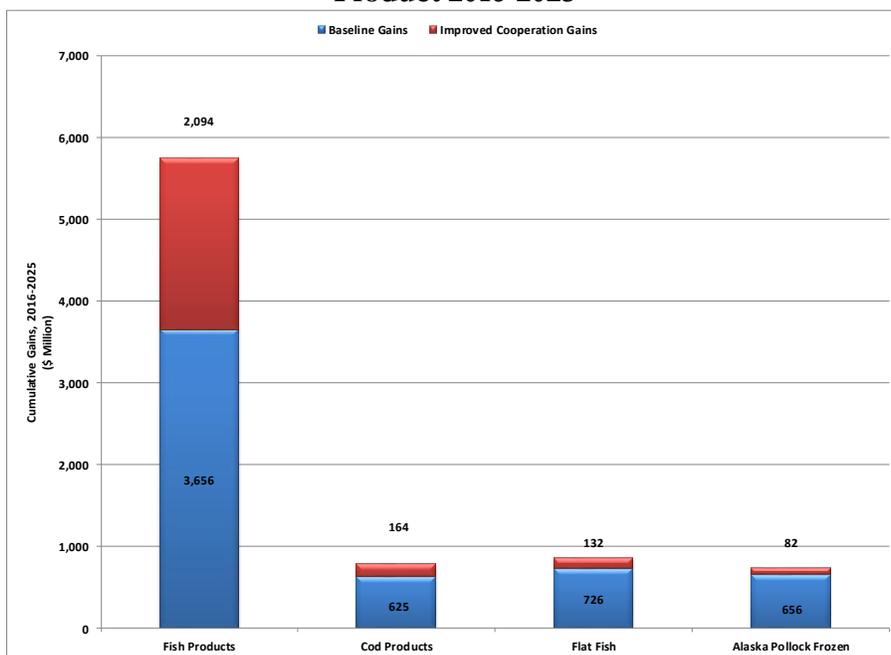
U.S.-China bilateral trade in fish and seafood products was \$3.9 billion in 2015 and has considerable potential to expand. The greatest U.S. export gains will likely be in cod, lobster, crabs, flatfish, cuttlefish and Alaska Pollock. The greatest Chinese export gains to the U.S. will likely be in salmon, tilapia, cuttle fish, shrimp, crab, and cod.

2. Cumulative Gains to 2025 Substantial

Cumulative baseline bilateral trade gains in fish and seafood over the 2016-2025 period are forecast at \$13.4 billion. This study finds that increasing bilateral cooperation to address and resolve trade barriers between the two countries would result in an additional \$5.0 billion in cumulative bilateral fish and seafood trade gains over the 2016-2025 period. Additional gains will be smaller in the first couple of years and grow faster as bilateral relations improve and trade barriers are modified and/or removed.

The U.S. is expected to capture additional cumulative gains of nearly \$2.1 billion in fish and seafood exports through improved trade relations. The largest product gains are expected in Cod products, Flatfish and frozen Alaska Pollock.

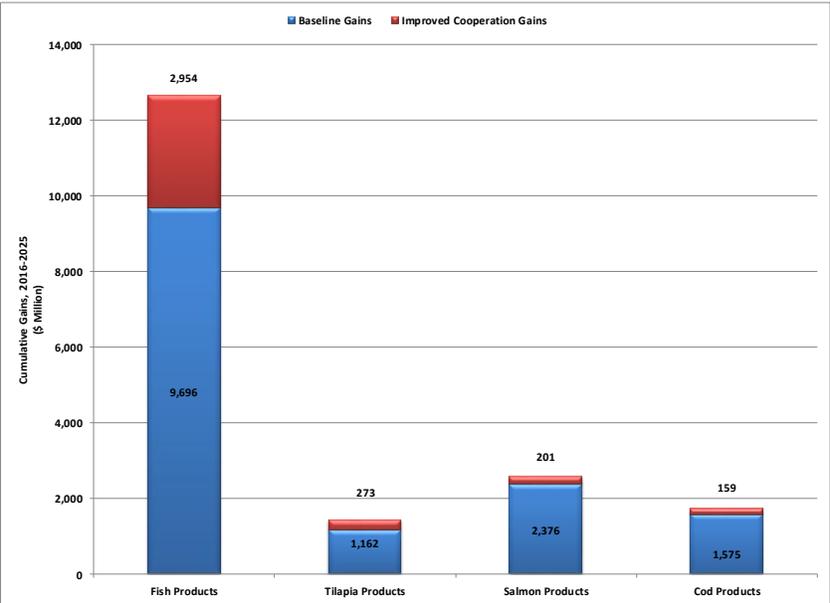
Exhibit 27. US Cumulative Fish and Seafood Export Gains to China Forecast by Select Product 2016-2025



Source: Informa Economics IEG

China cumulative export gains from improved bilateral trade relations to resolve trade barriers are forecast at nearly \$3 billion. The largest cumulative export gains for China are expected to be in cod, salmon and tilapia products.

Exhibit 28. China Cumulative Fish and Seafood Export Gains to U.S. Forecast by Select Product 2016-2025



Source: Informa Economics IEG

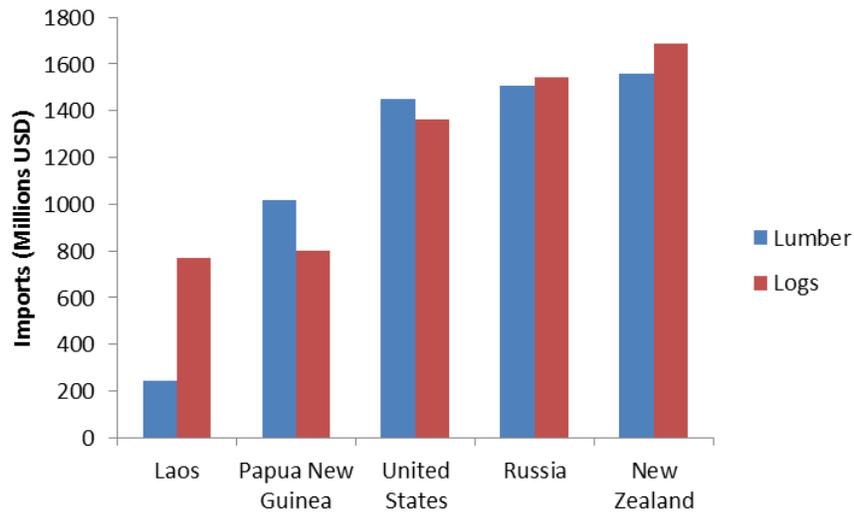
VI. FOREST PRODUCTS

Global timber demand is growing, supported by rising world population, increasing per capita consumption, especially in Asia, and new timber uses that make wood an increasingly important raw material. Compared to other agricultural commodities, forest products are more sensitive to short term economic movements, which depressed exports during the financial crisis. However, most forest products saw dramatic changes in their growth trajectory after 2008. North American lumber markets are rebounding, in line with the anticipated gradual U.S. housing recovery. Recovery in forest products to pre-financial crisis levels are expected around 2018.²⁵ In the global forest market, both China and the U.S. are significant players. China is the world leader in forest product exports and the U.S. ranks fourth.

China does not have the domestic supply of raw forest products necessary to meet its strong growth in domestic demand; as a result, China must rely on imports in order to satisfy domestic consumption. In 2015 the U.S., Russia, New Zealand, and Canada were the main suppliers of demand for raw unprocessed forest products (Exhibit 29). In FY 2015, The U.S. top exports to China were hardwood lumber and softwood logs, accounting for nearly three-quarters of all U.S. forest product exports. In contrast to the U.S., China exports mainly value added products such as plywood, wooden furniture, and other value added wood products to the U.S. China has developed a meaningful infrastructure of forest mills and refineries. Leveraging their lower cost and plentiful labor force, China is able to refine forest products at a competitive world price. From an environmental efficiency point of view, Chinese “supermills” are some of the largest and most efficient in the world.

²⁵ Timberland Investment Outlook, July 1, 2015, by New Forest. Available: [Here](#)

Exhibit 29: 2015 Chinese Lumber and Log Imports by Country



Source: GTIS and Informa Economics IEG

In short, the U.S. supplies raw materials to China which in turn mills and refines those same materials for re-export in the form of furniture, plywood and other value added products. Total forest product trade between the two countries has been significant totaling \$6 billion in 2015.

As mentioned earlier, the main U.S. exports to China are hardwood lumber and softwood logs. Plywood is China's largest export product into the U.S. Hardwood lumber and logs, one the United States largest exports to China, are mainly used to create wooden furniture, hangers, and other consumer oriented wood products. It is estimated that 70-80% of all imported softwood log and lumber in China are used in the construction market. U.S. imports of plywood are also predominantly used in construction markets. As a result, Chinese and U.S. forest product markets are often highly correlated with changes in each other's housing markets.

Looking forward, future forest product trade between the two countries will be highly contingent on positive trends in broad based macroeconomic indicators like GDP, interest rates, housing starts, and inflation. If the global economy continues to recover from the 2008 crash, China will remain import dependent for logs and lumber from both the U.S. and world. Likewise, the U.S. will rely on China and Canada for its forest product needs.

A. Impact of Trade Barriers on U.S. – China Trade

Tariff barriers are not a major obstacle for trade for either country (Exhibit 82 in Appendix B). So-called non-tariff barriers are the greater concern. Illegal forestry, volatility in Chinese markets, uncertainty over Chinese government policies, and safety and reliability concerns regarding Chinese product are all hurting Chinese forest product exports to the U.S.

China's unabated demand for wood products combined with their limited domestic supply has incentivized illegal forestry, as there is scramble to meet domestic demand for luxury furniture and other high value wood products. China's significant involvement in illegal forestry has severely damaged their export potential to the EU and the U.S. because of legislation those economies passed aimed at stopping illegal forestry. In 2008, the U.S. Congress passed an amendment to the Lacey Act to include forestry into its jurisdiction. Prior to the 2008 amendment, some economists estimated that illegal logging provides manufacturing companies an immediate 15-20% cost advantage.²⁶

Upon its passage, the 2008 Lacey Act amendment required due diligence for wood products imported into the U.S. to insure the legality of their sourcing. The due diligence requirements mandate that importers must declare the species, country of origin and other relevant information to determine the products origin in order to insure that all wood products imported to the U.S. are legally sources. Obviously, this policy has increased costs for both the Chinese manufacturing and U.S. construction markets as they now bear the administrative cost of tracking and reporting their products' origin information. The Lacey Amendment has also resulted in reducing supply in countries that previously relied on illegal timber since they can no longer export those products with the U.S. Reports have since concluded that the 2008 Lacey Act amendment created higher prices and lower quantities for exports in countries suspected of distributing illegal wood.²⁷

China's WTO accession significantly contributed to its export boom and is a perfect example of how uncertainty negatively affects trade and markets.²⁸ While tariff uncertainty has been largely eliminated as a result of China's WTO status, China's markets still bear a lot of unanswered questions. Many key stakeholders have

²⁶ Not All Wood Products Created Equal, C.T. Howlett JR, March 10, 2010, Hardwood Plywood & Veneer Association.

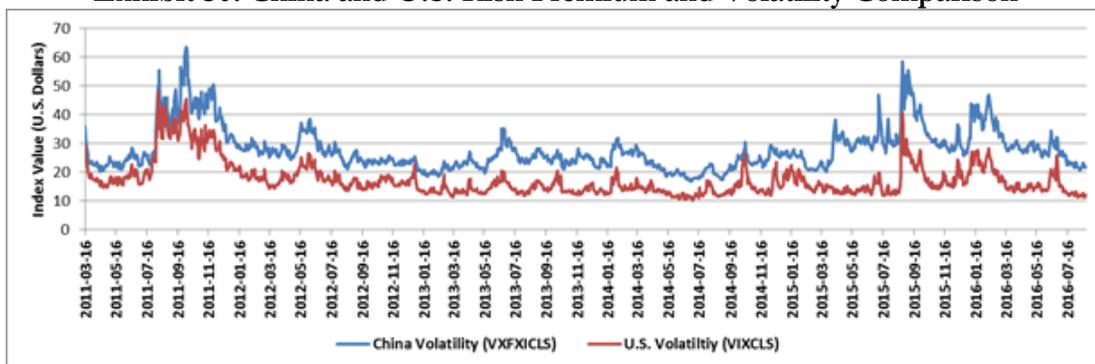
²⁷ 2008 Lacey Act Successful in Reducing U.S. Imports of Illegally Logged Wood, Zoe Hoyle, CompassLive, November 20 2014

²⁸ Policy Uncertainty, Trade and Welfare: Theory and Evidence for China and the United States, Kyle Handley, Nuno Limao, December 2014.

concerns about the legitimacy of Chinese growth statistics; they question the effects of currency manipulation, and continue to fear government intervention in China’s markets. All of these factors significantly damage forestry trade, because they discourage meaningful long term investment in Chinese real estate markets.

As mentioned previously, forestry trade is largely a function of real estate market performance. Investors in the U.S. and other developed markets would benefit from tapping into China’s vast and growing population by setting up networks and building long term relationship, but these types of investments require significant upfront costs. Without confidence in China’s markets in the future, investors are hesitant to increase their holdings. With incredibly high levels of volatility in Chinese markets throughout 2015, uncertainty peaked at a three-year high, with risk premiums in China consistently and significantly higher relative to the U.S. markets. However, since the first quarter of 2016, volatility in both the U.S. and Chinese markets has tempered off, but China still maintains a significantly higher risk premium than the U.S. markets (Exhibit 30).

Exhibit 30: China and U.S. Risk Premium and Volatility Comparison



Source: Federal Reserve Bank of St. Louis (FRED)

Reliability and quality assurance standards are also a huge non-tariff barrier for Chinese wood exports, specifically plywood. U.S. and Canadian manufacturers have national consensus standards for hardwood plywood and engineered wood flooring that address formaldehyde emissions, delaminating, and thickness which are major concerns if you are a consumer. When buying from producers in North America, who certify to these standards, the consumer manages their risk and is more frequently satisfied by the product they receive. Unfortunately, many uncertified Chinese plywood products fail domestic tests on flat wise bending properties, adhesive bond quality, and formaldehyde emission (Exhibit 31),²⁹ which can be a significant hindrance to Chinese exports.

²⁹ Uncertified Plywood vs U.S. Certified Plywood, APA, Available: [Here](#)

Exhibit 31: Adhesive Performance of Uncertified Chinese Plywood and Certified U.S. Plywood

Batch	Type and No. of panels	PS 1 Vacuum-soak wood failure result	PS 1 Boil cycle wood failure result	Formaldehyde emission (mg/ L)
1	Chinese birch 18-mm 13-ply (2)	50% (Fail)	Delam (Fail)	7.0
2	Chinese birch 18-mm 13-ply (2)	35% (Fail)	Delam (Fail)	11.8
3	Chinese birch 18-mm 13-ply (2)	77% (Fail)	Delam (Fail)	7.3
4	Chinese birch 18-mm 13-ply (2)	36% (Fail)	Delam (Fail)	14.5
5	Chinese birch, poplar core 18-mm 13-ply (2)	72% (Fail)	Delam (Fail)	5.6
6	Chinese okoume 18-mm 13-ply (2)	26% (Fail)	Delam (Fail)	30.2
7	Chinese okoume 18-mm 11-ply (2)	31% (Fail)	Delam (Fail)	8.6
8	Chinese okoume 18-mm 13-ply (2)	54% (Fail)	Delam (Fail)	2.8
9	Chinese poplar 18-mm 13-ply (1)	54% (Fail)	Delam (Fail)	1.5
10	Chinese poplar 18-mm 13-ply (1)	98% (Pass)	Delam (Fail)	5.3
11	U.S. PS 1 so. pine (47)	93% (Pass)	93% (Pass)	0.1

Source: The Engineered Wood Association (formerly American Plywood Association (APA))

It's important to note that Chinese plywood has a much lower cost than the domestic product and because of that one would expect relatively lower quality, but that does not bypass the need for formal standards. U.S. and other global consumers of plywood need to know the quality of the product they are purchasing so that they can weigh the costs and benefits of buying a lower or higher quality product. The U.S. has clearly defined third party tested certification of product performance which allows its consumer to be content with the product they purchase. Adapting a similar quality management process in China would alleviate many U.S. consumer concerns. Furthermore, quality standards will open up new markets, by providing small businesses and individual consumers the confidence, in respect to performance and reliability, to shop overseas.

Removing these barriers to trade will have significant impact on exports from China into the United States. China has made significant strides toward improving their market conditions, but there is still more work to done.

B. Trade Agreements and Relationships

Imports of raw forest materials are relatively low or duty free in most countries. In China, for example, softwood and hardwood logs and lumber are traded without a duty. In contrast, tariffs are usually a bigger barrier for processed wood products like plywood, wooden furniture, other consumer and construction oriented value added products.

Trade agreements benefit both the U.S. and Canada in terms of trade in forest products. The U.S. imported more than \$4.4 billion in softwood lumber from Canada in 2015. U.S. imports of oriented standard board (OSB) are competitive with Chinese exports of plywood to the U.S. OSB and plywood share the same exposure durability classifications and model building codes typically use the phrase “wood structural panel” to describe the use of plywood and OSB. Building codes consider these two materials as the same. Likewise, APA - the Engineered Wood Association, the standards-setting trade association responsible for approving more than 75% of the structural panels used in residential construction, treat OSB and plywood as the same in their published performance guidelines.³⁰

Performance between OSB and plywood are the same, but their tariff situations are different. Chinese plywood faces an MFN rate of 4.6% into the United States while the comparable Canadian OSB only faces a 1% tariff. With product performance essentially identical, the added tariff cost for choosing Chinese plywood could be pushing some U.S. construction companies to substitute away from Chinese plywood and accept the relatively cheaper Canadian OSB product. In 2014, Canada exported \$947 million in OSB to the United States. If trade/tariff relations between China and the U.S. were improved, Chinese plywood could see marketable increase in U.S. demand for their plywood products, as construction companies switch to the cheapest product.

C. Long Term Supply and Demand Perspectives for Key Forest Products

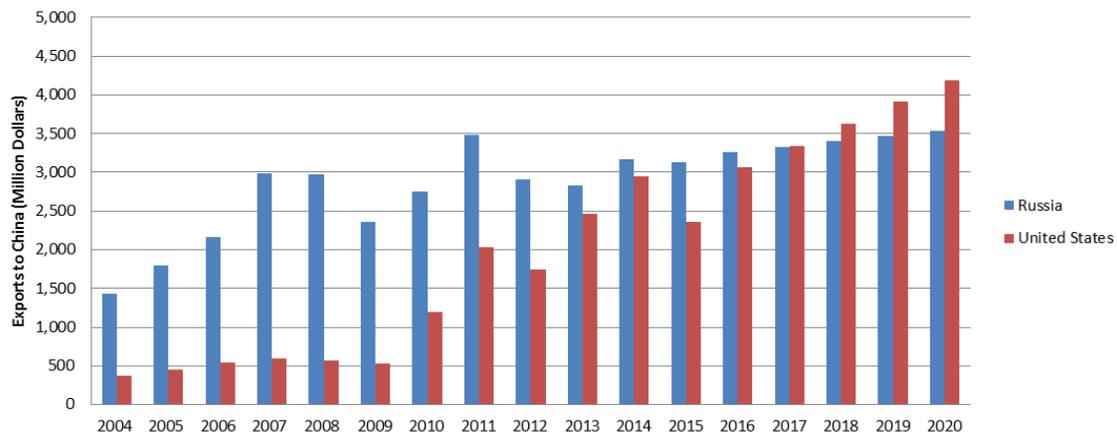
United States Lumber and Wood Products

Prior to 2009, China was a relatively minor market, accounting for less than 5% of U.S. forest product exports; however, since 2009, U.S. exports to China have grown, in value, by more than 400%. With exports of \$2.1 billion to China in 2015, China accounted for more than 20% of all U.S. forest product shipments. U.S. market share in China had previously hovered around 7%, but following China’s sudden demand for wood imports, the U.S. nearly doubled its market share to 13% in 2014. In comparison, during this same time period, Russia (the top exporter to China) saw its market share decline 23 percentage points. If current trends continue, the U.S. is poised to overtake Russia as China’s top wood supplier (Exhibit 32).³¹

³⁰ Choosing Between Oriented Strandboard and Plywood, UMass Amherst, Available: [Here](#)

³¹ Money Does Grow on Trees as U.S. Forest Product Exports Set Record, April 16 2015, Abraham Inouye

Exhibit 32: Exports of Forest Products to China



Source: GTIS and Informa Economics

Strong softwood log and hardwood lumber demand from China has continued to shape global forest markets, but U.S. dollar strength has reduced competitiveness of all domestic forest products which has bolstered market share for U.S. competitors, Russia, New Zealand, and Canada. The U.S. dollar index rose nearly 8% in value in 2015, and although it may not increase as much in 2016, the dollar index is still valued higher than most recent years. Further increases in interest rates are likely to provide further support for the U.S. dollar in the future. This rise in U.S. currency could also pave the way for marginal competitors like Ukraine and Australia to increase their market share.³²

U.S. exports of forest products are forecast to increase 94% from 2015 to \$4.1 billion in 2025. This represents a 7% CAGR. Growth rates have decreased since 2009 as the China U.S. relationship exits its rapid expansion and enters a more sustainable growth phase. Other issues, such as uncertainty surrounding China's future economic situation, and the appreciating U.S. dollar have also impacted growth.

Softwood logs

China's rapidly increasing timber consumption has directly led to enormous gains for U.S. softwood exporters. Since 2000, softwood export values have been growing at a CAGR of 32%. Due to the slower than expected domestic housing expansion, U.S. production to consumption ratios for softwood logs have been increasing since 2008 which is paving the way for increased softwood exports to China, as excess supplies head primarily to their market.

³² Timberland Investment Outlook, July 1, 2015, by New Forest. Available: [Here](#)

Domestic softwood supply is strong and Chinese softwood log production is trending downward (Exhibit 85 in Appendix B). As a result, if China continues to follow their current trend in consumption, they will be increasingly reliant on foreign imports. U.S. exports of softwood logs to China in 2025 will depend heavily on China's future demand and consumption of softwood products.

It is estimated that 70-80% of all imported softwood log and lumber is used in the construction market, which implies export demand to China is closely tied to levels of construction and real estate sales (Exhibit 33).³³ The tremendous growth of U.S. softwood log exports to China is driven primarily by China's expanding real estate market and growth of these middle class. China's growing middle class is improving its standard of living, changing their diets, and most importantly living in urban populations. This change in lifestyle is creating an increase in housing construction as the new middle class moves to urban locations with modern buildings. The increasing trend in China's middle class population and demand for housing is expected to continue at an increasing rate until well past 2025.³⁴ This is expected to result in higher softwood consumption, a positive signal for U.S. to China softwood export growth.

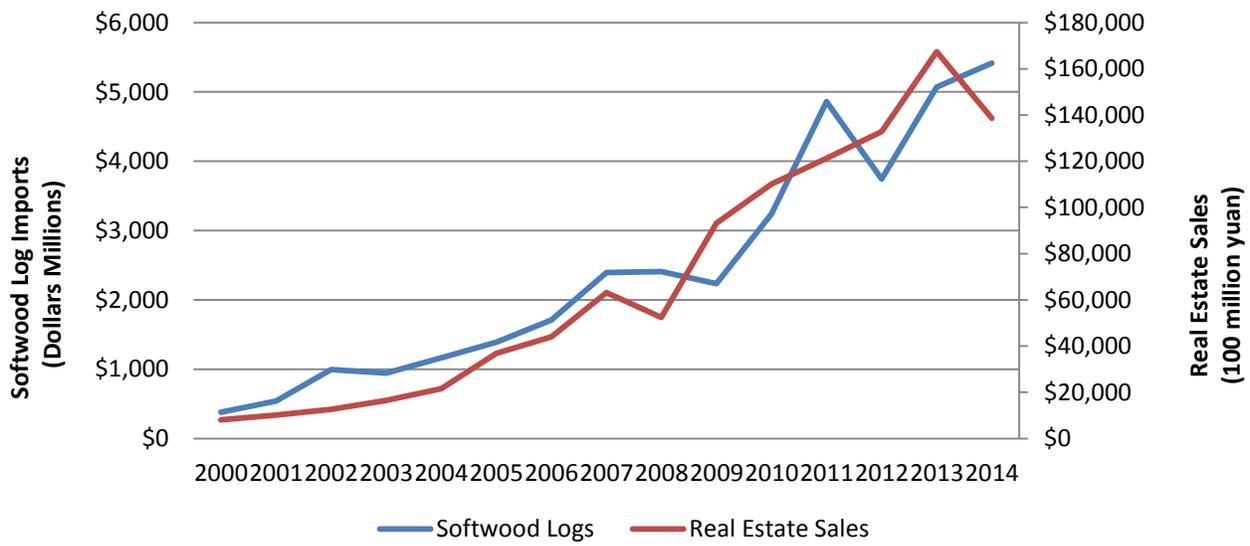
There are some concerns about China's housing demand heading into the future. After the 2008 global recession, China's central bank eased credit conditions for construction loans which allowed China's commercial and residential housing markets to expand exponentially. However, this market intervention might have temporarily spurred significant growth that outpaced demand. This could potentially result in excess supplies. According to The Nation Bureau of Statistics unsold area of commercial buildings rose from 130 million square meters in 2013 to nearly 620 million by the end of 2014. In response to increasing unsold real estate, China announced a policy to tighten credit requirements and increase interest rates. China's restrictive credit policies are an attempt to curb overbuilding, which they hope will allow demand to catch up to supply. While in the long term this policy should create a more sustainable Chinese real estate market, short term effects signal slower growth in construction starts, affecting the outlook of softwood exports to China looking towards 2025.

Based on supply and demand trends, we expect slower but continued expansion of softwood log exports with CAGRs of 4% through 2025.

³³ Timberland Investment Outlook, July 1, 2015, by New Forest. Available: [Here](#)

³⁴ Money Does Grow on Trees as U.S. Forest Product Exports Set Record, April 16 2015, Abraham Inouye

Exhibit 33: China Softwood Log Imports and Real Estate Sales



Source: GTIS and National Bureau of Statistics

Hardwood Lumber

Hardwood lumber has been a top U.S. export to China for quite some time, but in 2009 exports to China began to surge, increasing at a 29% CAGR between 2009 and 2015. In 2015 the U.S. exported slightly less than \$1 billion in hardwood lumber, up more than 360% from 2009. While most of this increase was due to increased volume, prices have remained steadily increasing as well.

U.S. hardwood lumber consumption and production was already trending downward, before declining by over 35% between 2007 and 2009. The decline in the U.S. market began as domestic furniture manufacturers could no longer compete with East Asian imports. After the crash of the housing market, hardwood consumption and production were at their lowest levels since 1960's. The probability that U.S. hardwood lumber consumption will reach post 2000 levels in the near future is low, however the outlook for hardwood lumber production is better because the U.S. has a large and sustainable hardwood resource base and an infrastructure to access that large base allowing, it to remain the world's largest exporter of hardwood lumber.³⁵ With a large production surplus domestically (Exhibit 86), supply side complications seem relatively unlikely. Future prospects for U.S. hardwood lumber exports will hinge on Chinese demand for furniture, cabinets, and wooden flooring, products predominantly manufactured with hardwood lumber.

³⁵ Markets and Market Forces for Lumber, 2014, Matt Bumgardner, Steven Johnson, William Luppold, Available: [Here](#)

On March 17th 2015, China's State Forestry Administration announced plans aimed at more sustainable forest policy. Commercial logging of state forests in Northeast China (hardwood forests) will be reduced by about 20% and forested areas increased by more than 6.6 million hectares by 2020, an area more than twice the size of Belgium, and forest growing stock will increase by more than 1 billion cubic meters.³⁶ These policies should create a short-term spike in import demand, at least until 2020 when presumably logging will resume at a slower and more sustainable rate. The increase in Chinese stocks will impact U.S. exports of hardwood lumber beyond 2020, and into the long-term as China relies more on domestic supplies. The result, a tapering off growth rates of hardwood lumber once the program takes full effect in 2020.

Imports of hardwood logs have also been increasing in the past three years (about 24% CAGR between 2012 and 2015). This suggests Chinese mills are expanding their capacity to mill hardwood logs into lumber and other value added products. This could produce a potential and gradual import preference shift, from lumber to logs, as China attempts to leverage its cheap labor force by milling and processing raw hardwood logs domestically. Resulting in relatively higher softwood log import demand compared to softwood lumber import demand.

We forecast increasing exports of hardwood lumber in the short term as Chinese reliance on foreign lumber increases due to the restrictive forest policies outlined above. Based on supply and demand forecasts in 2025, we expect 4% CAGR, a relatively lower growth rate due to China's increasing reliance on domestically sourced lumber, substitution for hardwood logs, and the age and maturity of the product.

China Lumber and Wood Products

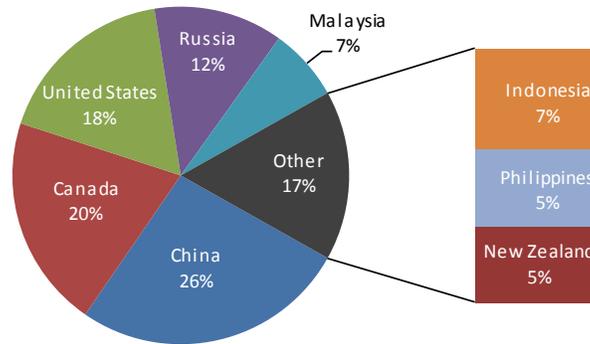
Between 1997 and 2004, China tripled its forest product export volumes, increasing from 12.7 million to 26.2 million cubic meters. This expansion in China's wood product exports created a structural shift in global forest markets. Today, China is both the largest importer and exporter of forest products (Exhibit 34). China specializes in low-cost export oriented timber processing with top products including plywood, wood furniture, and other value added exports.

China's meteoric rise as a wood processing powerhouse can be tracked back to their efficient manufacturing infrastructure. Low cost labor, government subsidies, and liberal forest policies allowed the Chinese forestry market to become a major player in the global forest product market. However, that competitive advantage is starting to

³⁶ ChinaDaily.com. Available: [Here](#)

decline, slightly. Studies indicate that when the most important economic factors are considered (total labor costs, energy expense, productivity growth, and currency exchange rates) China is virtually even with the U.S. in terms of manufacturing costs.³⁷ As labor costs rise in China and U.S. energy costs fall, it is likely market share of Chinese “low cost” wood products to the United States will slip.

Exhibit 34: 2015 World Exports of Forest Products



Source: GITS and Informa Economics

On a positive note, significant construction activity, adequate raw material supplies, and a slight increase in the number of Chinese processors, are supporting Chinese forest products.³⁸ Production of plywood and other value added products continues to be strong. The largest threat for 2015 plywood demand continues to be the forecast for housing. It seems likely, jobs will be added, income growth will accelerate, and household formations will grow faster. The biggest question is at what rate.³⁹

We expect total forest product exports to increase, following their current trend. In 2025, growth could decrease slightly as competitors enter the market as a result of increasing manufacturing costs in China. Value of Chinese exports of forest products to the U.S. in 2025 should be about \$5.5 billion, in line with the U.S. housing market’s continued recovery.

³⁷ China vs. the U.S.: It's Just as Cheap to Make Goods in the USA, Harold L. Sirkin, April 25 2014, Available: [Here](#)

³⁸ Current Situation in the Global Plywood Industry, Indufor Forest Intelligence, May 18 2015

³⁹ Structural Panel Dashboard January 2015, RISI, March 11 2015.

Plywood

Historically, plywood has been a fast-growing segment for Chinese forest product exports, growing exponentially between 1997 and 2015. Currently, China is now the largest producer of plywood in the world and since 2001 China has been a net exporter of plywood products (Exhibit 88 in Appendix B). Today, Chinese production of plywood remains strong, as a result of their significant domestic construction activity and their steady supply of imported raw lumber and logs, from the United States, Russian, and New Zealand.⁴⁰ In the U.S. demand for plywood should be increasing as a result of a slight decline in production capacity, in the short term, due to idling plants and capacity reductions in the short term.⁴¹ These domestic supply side limitations, for plywood, should pave the way for increased U.S. imports in the short run, as U.S. plywood distributors try to meet demand for low cost plywood.

End use of plywood is still predominantly consumed by the construction industry; therefore, Chinese exports of plywood are closely tied to U.S. construction markets. With housing starts up nearly 11% in 2015, the U.S. housing market is continuing to improve as confidence strengthens and economic growth continues to increase. Fannie Mae and Freddie Mac have announced changes that should improve access to credit. Even a marginal improvement in credit access will be a net plus for plywood exporters.⁴² This is particularly important since industry experts observe that younger people consume more hardwood products.⁴³

A recent ruling by the United States International Trade Commission (ITC) came down in favor of Chinese plywood exporters. The USITC concluded that the U.S. industry was not materially injured by imports of hardwood plywood from China. Ultimately, the USITC determined that while Chinese plywood supplied 35% of the market, it only supplied the low-end product; plywood used for interiors backs and drawers bottoms of cabinets, while the domestic product is used for cabinet fronts and sides.⁴⁴ As a result, all duties were removed. The conclusion of this legal battle removes some uncertainty around the availability of Chinese plywood imports for U.S. construction distributors, which should insure stable exports. This ruling may even increase Chinese plywood exports as U.S. business leaders develop more long term relationships with Chinese producers now that the fear of a looming antidumping finding has been removed.

⁴⁰ Current Situation in the Global Plywood Industry, Indufor Forest Intelligence, May 18 2015

⁴¹ Structural Panel Dashboard January 2015, RISI, March 11 2015.

⁴² Structural Panel Dashboard January 2015, RISI, March 11 2015.

⁴³ Markets and Market Forces for Lumber, 2014, Matt Bungardner, William Luppold, Available: [Here](#)

⁴⁴ U.S. plywood industry's plea for help rejected, Dan D'Ambrosio, USA Today

On the downside, plywood requires high quality logs, whereas fiberboard and particle board can be produced from lower quality logs. In the case of fiberboard, large amounts of fiber can even be recovered and re-used from waste wood products, such as furniture industry waste. As environmental pressures have increased, the governments of many countries have taken measures to reduce roundwood exports which have restricted the supply of the logs that are needed for plywood production. This situation is likely to become more difficult in the future.⁴⁵

We expect significant growth in Chinese plywood exports to the U.S. With the U.S. housing market improving and relatively younger consumers entering the market, U.S. demand for Chinese plywood should become stronger. We forecast export values to U.S. from China \$1.6 billion for 2025.

D. Mutual Export Opportunities

We forecast baseline growth projections for various forest products based on existing market conditions such as supply and demand factors. The following section forecasts additional gains in trade, above baseline supply and demand forecasts, if the U.S. and China were to improve trade relations such as removing tariffs and non-tariff barriers.

Currently the U.S. is a major supplier of raw forest products to China and China is a major supplier to the U.S. of value added forest products like plywood, wood articles, and wooden furniture. With a strong domestic hardwood log supply, the U.S. can increase raw material supplies to China, if trade relations are improved. China could then use its established production and manufacturing infrastructure to mill and refine U.S. raw forest products into various low cost value added wood based products. These refined U.S. logs, in the form of furniture, plywood, and other building materials could then be re-exported back to the U.S. at a cheaper cost to distributors. While this relationship already exists⁴⁶, to some degree, today most of U.S. lumber is consumed in China, because the Chinese barely have enough supply to fill domestic demand; however, improved trade relations between the two countries would expand this re-export relationship by reducing uncertainty on the quantity of raw materials imported year by year. As a result, Chinese plywood, wooden furniture, and other wood producers could then expand and grow more rapidly with relatively less risk.

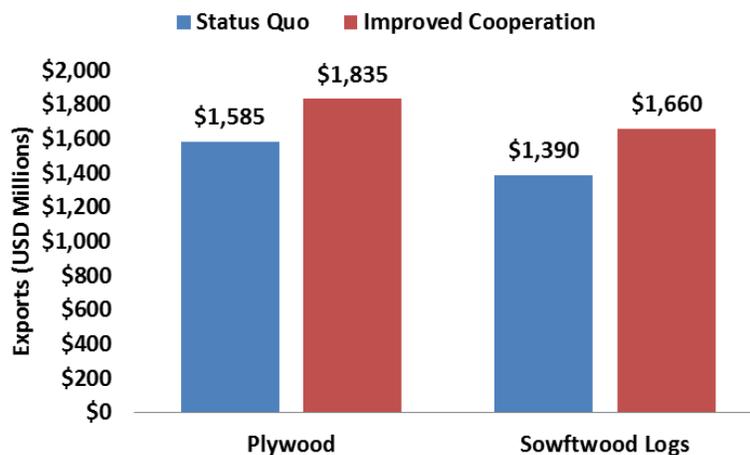
⁴⁵ The Importance of China's Forest Products to UNECE Region, UNECE, Available: [Here](#)

⁴⁶ Money Does Grow on Trees as U.S. Forest Product Exports Set Record, April 16 2015, Abraham Inouye

Improved trade relations will benefit both countries in forest products trade. Increased exports of U.S. logs and lumber to China would reduce pressure on China producing wood products from illegal forestry by providing China with a stable, plentiful, and reliable source of both softwood and hardwood forest products. In addition, less reliance on illegal forest products will further open U.S. markets to Chinese exporters with restricted market access under the 2008 Lacey Act Amendment.

- If the U.S. gains softwood log market share, from countries like New Zealand and Russia, due to the increased re-export relationship described previously, U.S. softwood log exports to China could expand an additional \$270 million (Exhibit 35). For China, plywood exports to the U.S. could increase an additional \$250 million, as previously illegal vendors now resume trade in the U.S. using legal U.S. raw materials.

Exhibit 35: 2025 Gains from Improved Trade Relations



Source: Informa Economics IEG

Furthermore, China’s increased interest in “green building” as a way to reduce carbon emissions could create opportunities for the U.S. lumber market. Currently “green building”, which incorporate designs and construction by using sustainable materials to achieve energy efficiency, only represents a small portion of China’s construction industry. Buildings account for roughly 25% of all energy consumed and carbon released in China,⁴⁷ so improving building construction practices will significantly reduce China’s carbon footprint. Studies have indicated that green construction practices can reduce emissions by 156% per capita.⁴⁸

⁴⁷ China’s Green Building Future, Christina Nelson, April 1,2012, Available: [Here](#)

⁴⁸ Green Building and Climate Change, Nora Knox, March 4 2015.

Solid wood lumber, a common wood product used in building construction, sequesters carbon for the life of the building, thus reducing wood total carbon emissions.⁴⁹ In comparison to using steel in building construction, wood is clearly the preferred option, environmentally (Exhibit 83 in Appendix B). Increasing interest in the use of wood in construction within Chinese markets will further increase demand for U.S. wood products.

E. Forest Products Trade Summary

China and the U.S. are two major players in world forest products markets. With relatively healthy supply and production for both countries, trade between the two will be largely dependent on economic growth, housing starts, and other key macroeconomic indicators. With global macro-economic trends for both countries pointing upward from the 2008 financial crash, expect a steady and continued rise in forest product trade as the U.S.-China forest trade relationship matures and exits its 2009-2014 super natural growth phase.

Tariff barriers between the two countries are small. Non-tariff barriers on the other hand, are an impediment. For China, eliminating product reliability and safety concerns by implementing third party certification standards as well as stopping illegal forestry in order to eliminate the negative effects of the 2008 Lacey Act Amendment on exporters are keys to increasing forest product trade from China to the U.S. For the U.S., China's adoption of "green" construction could offer significant opportunities for U.S. wood products.

Both the U.S. and China are set to gain from improved trade relations. The U.S. can leverage China's efficient manufacturing infrastructure to provide ample low cost wood products to United States. With the U.S. as a primary supplier, China can better meet its rising wood consumption as its growing urban and middle class continues to grow at increasing rates.

⁴⁹ Wood as a Sustainable Building Material, Robert Falk, Available: [Here](#)

Exhibit 36: Outlook for U.S. Forest Product Exports to China *(In US\$ Million)*

Product	2000	2010	2015	2025 Forecast		
				Baseline	Improved Trade Relations	Gains from Improved Trade Relations
Forest Products	100	1,174	2,115	4,110	4,620	510
Hardwood Lumber	54	359	965	1,465	1,630	165
Hardwood Logs	13	228	317	710	735	25
Softwood Lumber	2	101	158	400	415	15
Softwood Logs	6	415	523	1,390	1,660	270

Source: Informa Economics IEG

Exhibit 37: Outlook for China Forest Product Exports to U.S. *(In US\$ Million)*

Product	2000	2010	2015	2025 Forecast		
				Baseline	Improved Trade Relations	Gains from Improved Trade Relations
Forest Products	413	2,475	3,873	5,508	6,070	562
Panel Products	37	1,115	1,701	2,590	3,030	440
Plywood	21	750	1,267	1,585	1,835	250
Other Value Added Wood Products	374	1,338	2,143	2,890	3,012	122
Articles of Wood	243	669	1,049	1,315	1,360	45

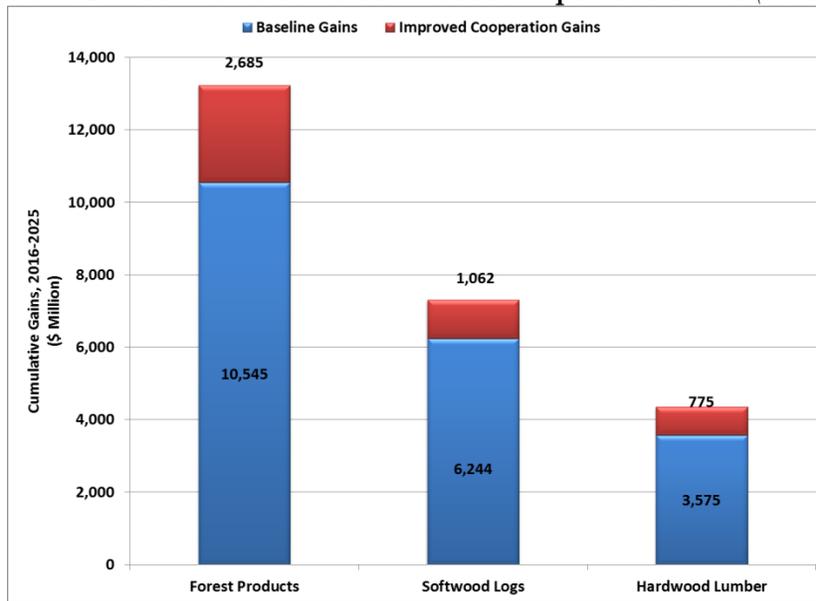
Source: Informa Economics IEG

1. Cumulative Gains to 2025 Substantial

Cumulative baseline bilateral trade gains in forest products over the 2016-2025 period are forecast at \$20.3 billion. This study finds that increasing bilateral cooperation to address and resolve trade barriers between the two countries would result in an additional \$5.7 billion in cumulative bilateral forest product trade gains over the 2016-2025 period. Additional gains will be smaller in the first couple of years and grow faster as bilateral relations improve and trade barriers are modified and/or removed.

The U.S. is expected to capture additional cumulative gains of \$2.7 billion in forest product exports. The largest forest product gains are expected in softwood logs and hardwood lumber.

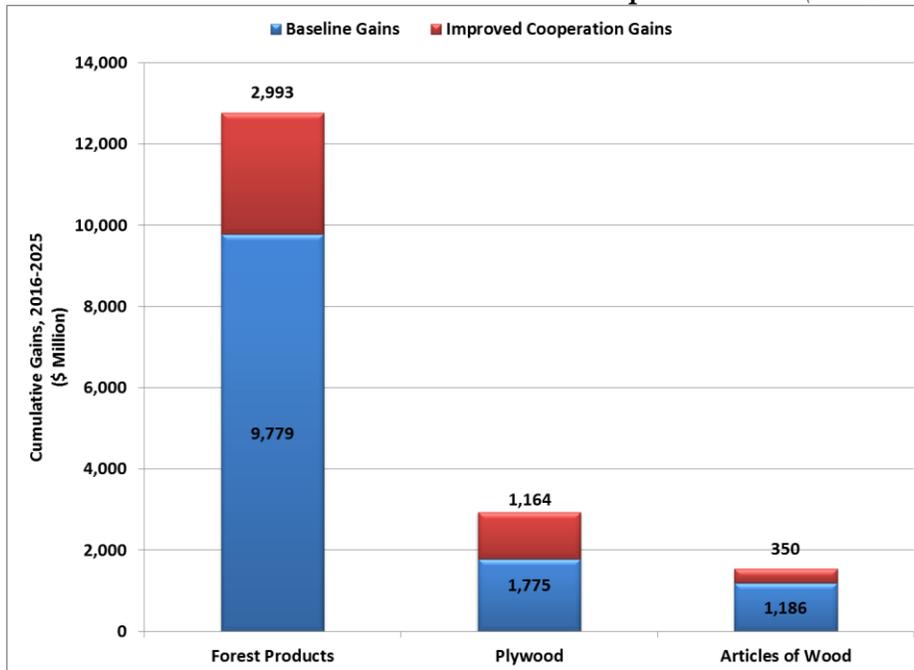
Exhibit 38: Outlook for U.S. Forest Product Exports to China (In US\$ Million)



Source: Informa Economics IEG

China is expected to capture additional cumulative gains of \$3 billion in forest product exports. The largest forest product gains are expected in plywood and articles of wood.

Exhibit 39: Outlook for China Forest Product Exports to U.S. (In US\$ Million)

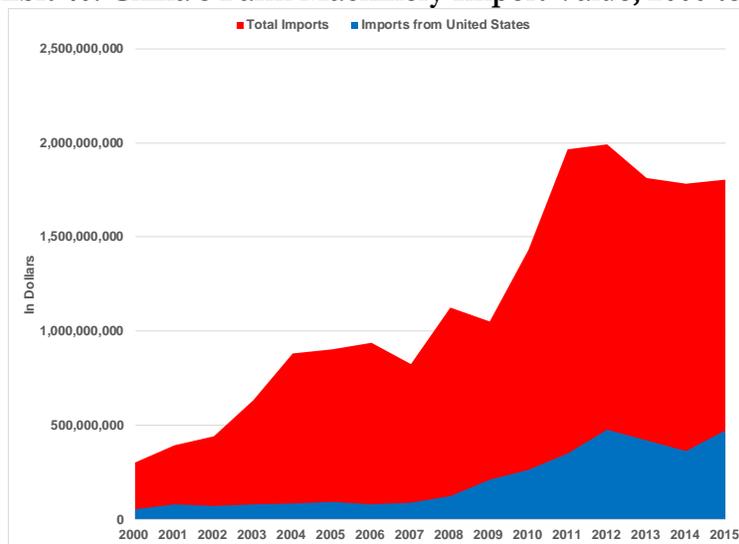


Source: Informa Economics IEG

VII. FARM MACHINERY

China's expanding agricultural production has led to increased imports of farm machinery from the world. China is the world's largest farm machinery market, importing \$1.8 billion of farm machinery products in 2015 with \$469 million coming from the U.S. (Exhibit 40). China's farm machinery imports have increased at an annual rate of 12.7% from 2000 to 2015 and the U.S. held 26% of the China's import market share in 2015. Total shipments to China are down in the past two years as lower crop prices and poor production economics across the globe have impacted farm machinery trade and purchases.

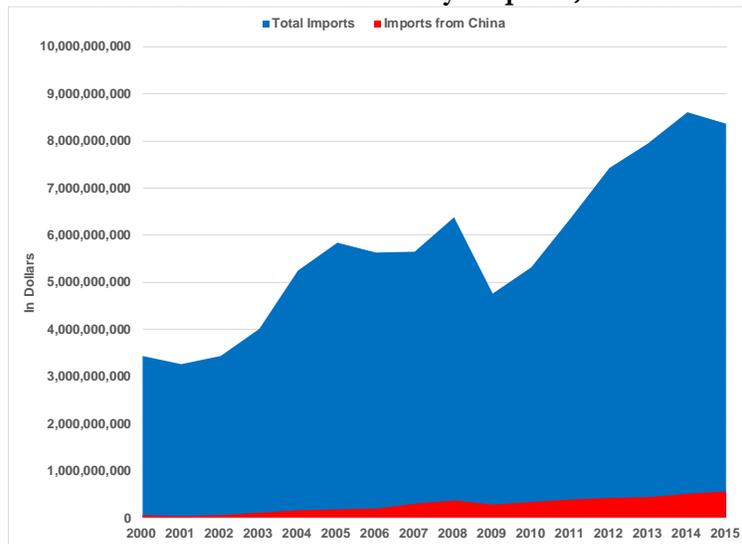
Exhibit 40: China's Farm Machinery Import Value, 2000 to 2015



Source: GTIS and Informa Economics IEG

The U.S. has a strong farm implement manufacturing industry but also is a significant importer of farm machinery. In 2015, the U.S. imported \$8.4 billion in farm equipment, with China supplying \$561 million in farm equipment (6.7% market share). U.S. imports have grown steadily, recovering from the global economic recession in 2008-2009 to grow 31% from 2008-2014. U.S. farmer purchases of farm equipment are highly dependent on the economics of crop production, and low commodity prices observed in 2014 and 2015 likely negatively impacted U.S. imports.

Exhibit 41: U.S. Farm Machinery Imports, 2000 to 2015



Source: GTIS and Informa Economics IEG

Though the U.S. and China are significant trading partners in farm machinery, the goods exported differ greatly. In general, U.S. firms export large, complex, high-tech products to China, such as advanced harvesting equipment, large tractors, and equipment for food processing. China is a large supplier of farm machinery parts, products for soil cultivation (shovels, hoes, etc.), and other agricultural machinery. The top products (to the extent they can be classified) are also shown in Exhibit 90 in Appendix B.

Like the U.S., China's imports of farm machinery, especially large farm implements, combines, and tractors are very dependent on the production economics of various crops in China. China's domestic machinery production industry has occasionally been characterized as using low technology to produce low technology products; equivalent to U.S. production and manufacturing in the 1970's. The difference between the technology capabilities of farm equipment manufacturing between China and the U.S. provides significant opportunities for both countries to gain from trade. China can gain by importing high-technology equipment to further its goal of self-sufficiency by increasing food and processing productivity and ensuring a safe food supply for its citizens. Additionally, the technology and production practices that can be gained from importing U.S. farm equipment can help China reduce its environmental impact and improve its reputation for environmental/agricultural sustainability.

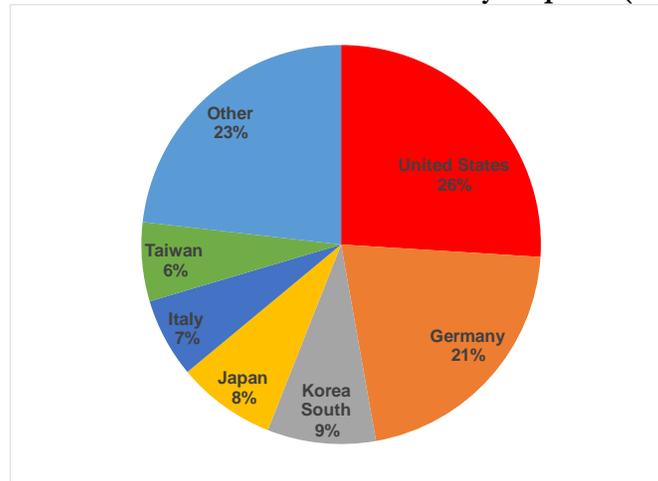
In 2010, China passed a milestone in its agricultural industry: the overall agricultural mechanization rate⁵⁰ passed 50%. The mechanization rate shows that, for the first time in history, China now uses mechanization for more processes in agricultural production and processing than animal or human power. The mechanization rate also shows the progress that is still available to be made and the potential market remaining for agricultural equipment.

Indeed, merely noting the presence of potential in the farm machinery market is a gross understatement. China’s farm equipment, food processing, and laboratory testing equipment market is poised for dramatic growth in the future. Chinese officials are encouraging mechanization through subsidies which, along with incentives to increase the scale of farming operations, leaves a huge and expanding market opportunity for U.S. and Chinese equipment manufacturers. Some specific areas of interest for the Chinese are no-till agricultural equipment which can help improve China’s low-carbon farming efforts and their environmental impact. Increased focus on environmentally friendly agriculture, irrigation, and modernization of the livestock industries are major market opportunities for U.S. and Chinese firms. The ongoing revolution in China’s agriculture and food system will offer profound opportunities for both the U.S. and China to increase trade and reap environmental and economic benefits.

Dynamics of U.S. and China Farm Machinery Trade

- The U.S. was China’s largest farm machinery supplier, accounting for 26% of China’s farm machinery imports in 2015 (Exhibit 42).

Exhibit 42: Share of China’s Farm Machinery Imports (Value), 2015



Source: GTIS

⁵⁰ The percentage of processes throughout the agricultural industry supply chains that are conducted via mechanized equipment or processes.

- In 2015 China was the United States' fourth largest farm machinery supplier, behind Canada, Germany and Japan. China accounted for 6.7% of U.S. imports in 2015.

U.S. exports of machinery to China totaled a record \$564 million in 2015. Combine harvesters-threshers accounted for 46% of all U.S. machinery exports to China. Other top U.S. exports to China in 2015 included pneumatic elevators and conveyors (\$64 million), parts for harvesters, grass mowers and sorting eggs, etc. (\$55 million) and tractors (\$41.0 million). The U.S. is also an important supplier of livestock equipment, fresh produce and high-value food processing equipment and to some extent, other crop machinery.

- U.S. manufactures hold 26% of China's import market for agricultural equipment. However, after accounting for domestic production, U.S. farm machinery may only account for less than 2% of China's farm machinery market that is potentially worth \$8.8 billion.⁵¹ Typically, U.S. machinery is designed for large, technologically advanced farms where farming in China remains dominated by smaller, low technology farms. The exception lies in Northwestern and Western China where farms are larger in size and are rapidly expanding their technology use in farming.
- The U.S. is China's primary supplier of dairy equipment (excluding milk machines), combines, other harvesters, and sprayers, and is the second largest supplier of conveyers, soil preparation machines, and milk machines.

China's expanding dairy herd gives a positive outlook for U.S. exports of dairy equipment and milk machines in the future. Growth in the dairy industry will drive the volume of dairy equipment and machines imported but China's goal of improving food safety will also play a role. As China's efforts to improve food safety grow, importing equipment from countries with sophisticated manufacturing and equipment technology will be essential to lifting China's milk safety to 21st century standards.

- China's farm equipment marketed is marked with competition from domestic companies and international firms. The top five international firms with manufacturing capability in China include two U.S. firms (John Deere and AGCO), one German firm, an Italian firm, and one Japanese firm (Kubota).

⁵¹ U.S. International Trade Administration, 2015. *2015 Top Markets Report: Agricultural Equipment*.

- From a U.S. perspective, the enforcement of the Food Safety Modernization Act (FSMA) may force China to update their food processing equipment. Given the increased technology and food safety requirements imposed by FSMA, there is opportunity for U.S. firms to export higher volumes and values of high-tech food processing equipment, especially for vegetable and dairy products.

However, China's new food safety law, announced in April 2015 and effective beginning October 1, 2015, will have more profound impacts on China's food processing systems. The law mandates risk monitoring and assessments, food safety standards, and food inspection beyond what has ever been required before. The enforcement of the new food safety law will lend much greater compatibility between Chinese and U.S. food safety requirements and will likely allow for easier trade of food products between the two countries.

A. Impact of Trade Barriers on U.S. – China Trade

- China's imports of agricultural machinery have experienced stronger growth rates than other machinery industries due to government influence and support.
- China imposes a value-added tax (VAT) on the value of products at each point in the production and distribution chain.⁵² The VAT is set at 17% for all manufactured items. In effort to stimulate domestic production of farm machinery, the State Council has exempted farm inputs from the VAT, including agricultural machinery. The direct effect of the policy is that purchasers of farm equipment are able to deduct the value of the VAT from the sales price, giving domestically produced agricultural products a cost advantage over imported products.
- China also supports a farm machinery purchase subsidy which covers 20-40 % of the purchase price of new agricultural machinery. The subsidy varies in size according to the type of machinery purchased, and the largest subsidies go to harvesting and packing machinery. The USITC reports the subsidies have been successful in spurring the transition from non-mechanized to mechanized production and packing in recent years.⁵³

⁵² USITC 2011. *China's Agricultural Trade: Competitive Conditions and the Effects on U.S. Exports.*

⁵³ USITC 2011. *China's Agricultural Trade: Competitive Conditions and the Effects on U.S. Exports.*

- o China supports large subsidies at the national level for over 175 farm machinery products, with total support reaching at least \$3.5 billion. Additionally, regional and local governments may include additional items in the list of products eligible for subsidies and add additional subsidy monies as needed
- China imposes average tariffs of 6.8% on agricultural equipment imported from the U.S. The largest tariffs, 10% on the imported value, are imposed on milking machines and dairy equipment. Most tractors, threshers, combines, and sprayers face tariffs between 6-10%.

In contrast, the U.S. assesses no tariff on most Chinese farm machinery imports, though tariffs are imposed on 18 items imported from China. Farm machinery products facing mild U.S. tariffs are led by semi-tractor trailers at a 4% tariff, followed by brewing equipment, machinery for meat preparation, some tractor types, and miscellaneous machinery and parts.

- China's FTAs are of limited help in procuring farm machinery as the only significant exporter of farm machinery that has a FTA with China is New Zealand. In 2014, New Zealand exported \$11 million in farm machinery to China, approximately 1% of China's total farm machinery imports.
- The U.S., on the other hand, is a significant beneficiary of FTAs in importing farm machinery. Canada and Mexico, both free trade countries under the North American Free Trade Agreement (NAFTA), are the number one and number five foreign suppliers of farm machinery to the U.S., due largely to their geographic proximity and transportation cost advantages.
- Differing from the classical trade barriers like subsidies and import taxes are the trade barriers around intellectual property rights. Historically, China has been less stringent enforcing intellectual property rights than the U.S., though President Xi recently said China would start improving intellectual property rights and protections.^{54,55}

⁵⁴ Salt Lake Tribune, available here: <http://www.sltrib.com/home/2984478-155/story.html>

⁵⁵ CNBC, available here: <http://www.cnbc.com/2015/09/25/us-china-agree-to-not-conduct-cybertheft-of-intellectual-property-white-house.html>

Though it is extremely difficult to quantify, China's intellectual property rights has very likely discouraged U.S. investment and trade in high-technology commodities, including farm machinery. Though suppressed trade has a direct effect on U.S. manufactures, it also impacts China's economy.

B. Farm Machinery Products Trade Summary

China is the world's largest market for farm machinery and strong growth is expected in the coming decade as Chinese authorities emphasize increased scale of farms, upgrading of food processing, and other initiatives that substitute mechanized equipment for human and animal power. Increasing mechanization of China's agricultural sector, driven partly by subsidies for the production and purchase of agricultural equipment, will keep demand for farm equipment well supported. China's comprehensive agricultural mechanization rate has surpassed the 50% milestone, following decades of extreme growth. China's demand for and growth in farm machinery industries is far from over however, as rising consumer incomes in China are driving increased dietary diversity and placing added burden on farms and food processors to increase product offerings and safety.

The further mechanization of Chinese agricultural production and the modernization of China's food processing industry will provide ample opportunities for Chinese and domestic companies to supply the growing market.

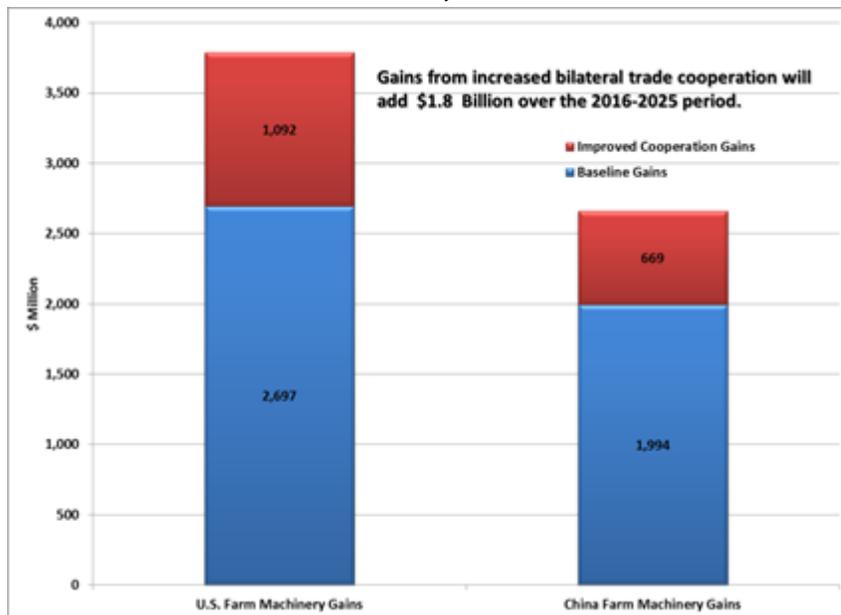
The U.S. is China's largest farm equipment supplier, providing primarily harvesting machinery and combines, some tractors, and other various parts and implements. The U.S. currently accounts for 26% of China's market share for imported farm equipment, though U.S. exports are expected to remain on the defensive in the short term as China's economy and farm product prices struggle. In the long-run, China will likely remain a key export market for the U.S. and U.S. companies are likely to continue investing in operations within China.

There are many opportunities for improved trade relationships and domestic policy changes to increase farm machinery trade between the U.S. and China. Specifically, China's subsidies for domestically produced equipment and their import taxes enforced on farm machinery imports may be restricting trade and changes would allow U.S. and foreign companies to export high-technology equipment to further growth in the Chinese food and agriculture industry. Similarly, increased protections and enforcement of intellectual property rights would greatly encourage further exports of equipment and further investment into Chinese industries by U.S. companies.

The benefits of increasing farm machinery trade between the U.S. and China extend beyond the sheer economics of trade. China especially can benefit from increased trade in farm machinery as doing so will improve the efficiency of agricultural production and the safety of its food system. Increasing the efficiency of crop and livestock production systems is paramount for China as the country is land-constrained and future increases in agricultural production will come from efficiency gains, rather than production area gains. Additionally, obtaining food processing equipment will help China ensure a safe food supply for its growing population. Trade between the U.S. and China will be critical to helping China achieve its goals of self-sufficiency and providing high-quality, safe foods for its growing population.

This study finds that increasing bilateral cooperation to address and resolve tariff and behind-the-border trade barriers between the U.S. and China would result in an additional \$1.8 billion in farm machinery trade gains over the 2016-2025 period.

Exhibit 43. U.S.-China Forecast Cumulative Bilateral Farm Machinery Trade Gains, 2016-2025



Source: Informa Economics

VIII. CONCLUSION

The U.S. and China's two-way trade in agricultural products, fish and seafood, forest products and farm machinery is sizeable, totaling \$35.6 billion in 2015. U.S. exports to China increased eleven-fold while China's exports to the U.S. grew seven-fold from 2000-2015. Although growth in trade has been substantial and sustained since 2000, trade of some major categories declined in 2015, there are strong reasons to believe both U.S. and Chinese markets will return to robust growth in the future.

Bilateral trade between the U.S. and China is expected to continue to grow with cumulative gains over the 2016-2025 baseline period forecast at \$71.2 billion. Additional trade gains are possible, however, by eliminating key barriers that currently restrict trade. This study shows that additional gains in trade can be attained by alleviating tariff and non-tariff trade barriers that limit trade in certain goods between the two countries. Specifically, complex tariff rates, AD actions, biotechnology approval processes, food safety requirements, animal health and disease prevention, and limited focus on trading strategically important commodities are key issues that need to be resolved for further expansion in trade between the U.S. and China. Strengthening bilateral trade cooperation by addressing the above issues would be a win-win situation for both countries.

There are a number of drivers that encourage greater bilateral trade cooperation to reduce trade barriers between the U.S. and China including:

1. **Growing food demand** – Driven by increasing urbanization and higher income.
 - a. As income grows consumers shift from staple foods to more high value foods such as meat, fish, eggs and dairy products.
 - b. Consumers want healthier more nutritious foods such as fruits and vegetables.
2. **Maintaining food safety** – Encourages consumer trust in domestic production and imports.
 - a. Meeting product quality and food safety requirements are vital to protecting consumers.
 - b. Regulations need to be transparent and science-based so both the U.S. and China can reasonably meet each other's expectations and regulatory requirements.

3. **Improving and maintaining animal health** – Reduces animal disease outbreaks, increases animal herd sizes and helps meet growing consumer meat demand.
 - a. Veterinary pharmaceuticals, vaccines and improved health management and are critical to preventing and controlling animal diseases.
 - b. Transparent and predictable animal health product approvals, and equitable import processes for foreign brands contribute to healthier animal herds.
4. **Increasing farm mechanization** – Drives the need for high-tech equipment.
 - a. Increase productivity, reduce post-harvest losses and decrease labor needs.
 - b. Improves the environment through more efficient use of inputs.
5. **Increasing biotechnology use** – Improves yields, reduces production costs, provides relief to limited land and water resources and helps meet growing food demand.
 - a. Adhering to a science-based policy on biotechnology approvals for agricultural cultivation and imports helps ensure consumer confidence and avoids unnecessary trade disruptions.

This study finds that resolving trade barriers through bilateral discussions, substantial additional trade gains from baseline expectations can be realized by both countries. On an aggregate level, the cumulative trade gains resulting from bilateral negotiations could total an additional \$28.1 billion over the 2016 to 2025 period. The greatest potential cumulative gains from increased bilateral cooperation to reduce trade barriers are expected to be in agricultural products followed by forest products, fish and seafood and farm machinery. The U.S. is expected to make the largest additional gains in agricultural products and farm machinery while China has the largest additional increases in forest products and fish and seafood.

- In regard to agricultural products, **eliminating additional tariff and behind-the-border barriers to trade could cumulatively add \$15.6 billion in agricultural product trade between the U.S. and China from 2016 to 2025.**
 - Chinese exports of fresh and processed fruits and vegetables could register the largest gains. Growth in fruit and vegetable exports to the U.S. is likely as rising U.S. labor costs could increase the cost of domestic production for U.S. fruits and vegetables.

- o U.S. additional export gains to China are most likely in soybeans, hides and skins, and dairy, pork, and poultry meat products.
- By focusing on eliminating behind-the-border barriers to trade and increasing trust and transparency in forest products harvesting and processing, bilateral trade between the U.S. and China could expand by a cumulative \$5.7 billion between 2016 and 2025.
 - o The U.S. is expected to capture additional cumulative gains of \$2.7 billion in forest product exports, largely in the form of higher softwood logs and hardwood lumber exports.
 - o China is expected to capture additional cumulative gains of \$3.0 billion in forest product exports as increased trust and transparency boosts exports of plywood and articles of wood.
- Additional gains in trade in fish and seafood products are also likely by reducing tariff and behind-the-border barriers. Bilateral trade in fish and seafood products could cumulatively expand by additional \$5.0 billion over the 2016-2025 period.
 - o Chinese shipments of shrimp, crab, tilapia, and salmon to the U.S. are poised for the strongest increases, if additional U.S. trade barriers are removed.
 - o In turn, U.S. shipments of Cod, Flatfish, and Alaska Pollock to China could expand, bringing a cumulative \$1.8 billion in export revenue to the U.S.
- Farm machinery trade between the U.S. and China could expand by a cumulative \$1.8 billion between 2016 and 2025 if specific policies and trade barriers are resolved.
 - o Currently, tariffs and government policies supporting domestic machinery production are dampening trade in machinery products between the U.S. and China. Moreover, issues such as intellectual property rights protections are limiting foreign direct investment and trade between the two countries. By addressing these issues and mutually improving export opportunities, both the U.S. and China can acquire significant gains.
 - o The economic benefits of improving trade terms are not limited to the value of exports, however, and both countries, particularly China, will benefit as agricultural practices become more efficient and mechanized. Such a process will boost food production and food security for both countries.

Exhibit 44. U.S.-China Forecast Cumulative Bilateral Trade Gains in Agricultural Products, Forest Products, Fish and Seafood and Farm Machinery 2016-2025 *(In \$Billion)*

	Baseline Gains	Improved Relations Gains	Total Gains
U.S. Trade Gains			
Agricultural Products	28.1	11.8	39.8
Forest Products	10.5	2.7	13.2
Fish and Seafood	3.7	2.1	5.8
Farm Machinery	2.7	1.1	3.8
Total	45.0	17.6	62.6
China Trade Gains			
Agricultural Products	4.7	3.8	8.5
Forest Products	9.8	3.0	12.8
Fish and Seafood	9.7	3.0	12.7
Farm Machinery	2.0	0.7	2.7
Total	26.2	10.4	36.6
Bilateral Trade Gains			
Agricultural Products	32.8	15.6	48.3
Forest Products	20.3	5.7	26.0
Fish and Seafood	13.4	5.0	18.4
Farm Machinery	4.7	1.8	6.5
Total	71.2	28.1	99.2

Source: Informa Economics IEG

IX. APPENDIX A – ACRONYMS

AD	Anti-dumping
APA	The Engineered Wood Association, formerly American Plywood Association
CAGR	Compound Annual Growth Rate
CVD	Countervailing Duty
DDGs	Distillers Dried Grains with Solubles
FAO	Food and Agriculture Organization of the United Nations
FTA	Free Trade Agreement
GMO	Genetically Modified Organism
LDF	Long Distance Fishing
MFN	Most Favored Nation
MMT's	Million Metric Tonnes
NOAA	National Oceanic and Atmospheric Administration
OSB	Oriented Standard Board
TPP	Trans-Pacific Partnership
TRQ	Tariff Rate Quota
USITC	U.S. International Trade Commission
VAT	Value Added Tax
WTO	World Trade Organization

X. APPENDIX B – REPORT TABLES

Soybeans

Exhibit 45: China Soybean Supply and Demand

	2000	2010	2015	2020	2025
Area (000 ha)	9,307	8,516	6,500	7,050	7,300
Yield (mt/ha)	1.66	1.77	1.82	1.80	1.80
Beginning Stocks (000 mt)	3,170	13,209	17,034	17,450	20,950
Production	15,409	15,080	11,800	12,690	13,140
Imports	13,245	52,339	83,400	105,300	127,260
Total Supply	31,824	80,628	112,234	135,440	161,350
Crush	18,900	55,000	81,500	103,400	125,700
Other Domestic	7,806	10,900	13,000	13,390	13,500
Exports	208	190	115	200	200
Total Disappearance	26,914	66,090	94,615	116,990	139,400
Ending Stocks	4,910	14,538	17,619	18,450	21,950

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Exhibit 46: U.S. Soybean Supply and Demand

	2000	2010	2015	2020	2025
Planted Area (000 ha)	30,054	31,324	33,447	34,398	34,398
Harvested Area	29,303	31,003	33,109	33,994	33,994
Harvested Yield (mt/ha)	2.56	2.92	3.17	3.29	3.47
Beginning Stocks (000 mt)	7,897	4,106	5,792	9,964	9,684
Production	75,055	90,663	106,934	111,584	118,115
Imports	109	384	544	1,089	1,089
Total Supply	83,061	95,153	112,061	122,637	128,888
Crush	44,625	44,851	51,710	53,751	54,839
Other Domestic	4,591	3,492	2,653	3,673	3,888
Exports	27,103	40,959	52,526	55,111	60,555
Total Disappearance	76,319	89,302	102,268	112,535	119,282
Ending Stocks	6,743	5,852	5,778	10,102	9,607

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Corn

Exhibit 47: China Corn Supply and Demand

	2000	2010	2015	2020	2025
Area (000 ha)	23,056	32,500	38,120	36,380	37,840
Yield (mt/ha)	4.60	5.45	5.89	6.42	6.98
Beginning Stocks (000 mt)	124,959	52,462	100,464	91,935	73,935
Production	106,000	177,245	224,580	233,600	264,300
Imports	89	979	3,900	3,950	5,350
Total Supply	231,048	230,686	328,944	329,485	343,585
Domestic Use	120,240	180,000	215,000	242,500	268,100
Feed Use	92,000	128,000	150,000	170,900	190,400
Food & Other	28,240	52,000	65,000	71,600	77,700
Exports	7,276	111	5	50	50
Total Disappearance	127,516	180,111	215,005	242,550	268,150
Ending Stocks	103,532	50,575	113,939	86,935	75,435

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Exhibit 48: U.S. Corn Supply and Demand

	2000	2010	2015	2020	2025
Planted Area (000 ha)	32,193	35,690	35,612	36,017	35,612
Harvested Area	29,315	32,960	32,678	32,982	32,577
Harvested Yield (mt/ha)	8.59	9.58	10.57	11.13	11.81
Beginning Stocks (000 mt)	43,628	43,380	43,974	53,368	50,199
Production	251,854	315,618	345,486	367,047	384,828
Imports	173	703	1,778	1,016	1,016
Total Supply	295,655	359,701	391,238	421,431	436,043
Domestic Use	198,103	284,549	299,021	319,800	335,421
Feed Use/Residual	147,887	121,334	132,086	146,819	155,455
Food/Seed/Ind	50,216	163,216	166,935	172,981	179,966
(of which Fuel Alcohol)	15,998	127,482	132,086	138,437	145,422
Exports	49,313	46,508	48,897	48,897	50,167
Total Disappearance	247,415	331,057	347,919	368,697	385,589
Ending Stocks	48,240	28,644	43,319	52,734	50,454

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Sorghum

Exhibit 49: China Sorghum Supply and Demand

	2000	2010	2015	2020	2025
Area (000 ha)	886	548	620	625	625
Yield (mt/ha)	2.91	4.48	4.84	4.32	4.48
Beginning Stocks (000 mt)	126	275	706	500	500
Production	2,582	2,456	3,000	2,700	2,800
Imports	22	4	8,700	4,025	4,025
Total Supply	2,730	2,735	12,406	7,225	7,325
Domestic Use	2,561	2,200	11,800	6,700	6,800
Feed Use	477	200	9,600	4,485	4,569
Food & Other	2,084	2,000	2,200	2,215	2,231
Exports	19	68	21	25	25
Total Disappearance	2,580	2,268	11,821	6,725	6,825
Ending Stocks	150	467	585	500	500

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Exhibit 50: U.S. Sorghum Supply and Demand

	2000	2010	2015	2020	2025
Planted Area (000 ha)	3,721	2,173	3,423	2,796	2,744
Harvested Area	3,127	1,945	3,177	2,351	2,299
Harvested Yield (mt/ha)	3.82	4.51	4.77	4.28	4.31
Beginning Stocks (000 mt)	1,643	1,038	458	1,016	1,016
Production	11,954	8,775	15,158	10,033	9,906
Imports	0	0	116	0	0
Total Supply	13,597	9,813	15,733	11,050	10,923
Domestic Use	6,518	5,263	6,350	5,461	5,334
Feed Use/Residual	5,629	3,104	2,921	2,413	2,286
Food/Seed/Ind	889	2,159	3,429	3,048	3,048
(of which Fuel Alcohol)	277	631	254	254	254
Exports	6,010	3,861	8,636	4,572	4,572
Total Disappearance	12,528	9,124	14,987	10,033	9,906
Ending Stocks	1,069	689	746	1,016	1,016

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Cotton

Exhibit 51: China Cotton Supply and Demand

	2000	2010	2015	2020	2025
Harvested Area (000 ha)	4,058	5,250	3,050	2,650	2,900
Yield (Kg/ha)	1,089	1,265	1,606	1,631	1,667
Beginning Stocks (000 480 lb bales)	22,378	14,246	67,920	33,078	10,995
Production	20,300	30,500	22,500	19,849	22,204
Imports	230	11,979	4,500	4,500	4,500
Supply	42,908	56,725	94,920	57,427	37,699
Mill Use	23,500	46,000	31,300	30,820	28,720
Exports	442	122	175	250	500
Ending Stocks	18,966	10,603	63,445	26,357	8,479

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Exhibit 52: U.S. Cotton Supply and Demand

	2000	2010	2015	2020	2025
Harvested Area (000 ha)	5,282	4,330	3,268	2,961	2,840
Yield (Kg/ha)	708	910	859	947	980
Beginning Stocks (000 480 lb bales)	3,915	2,947	3,860	2,743	2,409
Production	17,188	18,102	12,888	12,880	12,784
Imports	16	9	40	15	15
Supply	21,119	21,058	16,788	15,638	15,208
Mill Use	8,862	3,900	3,550	4,001	4,527
Exports	6,740	14,376	9,250	9,060	8,460
Ending Stocks	5,517	2,782	3,988	2,576	2,221

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Wheat

Exhibit 53: China Wheat Supply and Demand

	2000	2010	2015	2020	2025
Area (000 ha)	26,650	24,257	24,140	22,990	22,920
Yield (mt/ha)	3.74	4.75	5.39	5.61	5.98
Beginning Stocks (000 mt)	102,943	54,425	76,105	110,578	113,078
Production	99,640	115,180	130,190	128,904	137,084
Imports	195	927	3,450	1,500	1,000
Total Supply	202,778	170,532	209,745	240,982	251,162
Domestic Use	110,278	110,500	115,500	129,400	137,600
Feed Use	10,000	13,000	14,000	23,500	27,200
Food & Other	100,278	97,500	101,500	105,900	110,400
Exports	623	941	540	504	504
Total Disappearance	110,901	111,441	116,040	129,904	138,104
Ending Stocks	91,877	59,091	93,705	111,078	113,578

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Exhibit 54: U.S. Wheat Supply and Demand

	2000	2010	2015	2020	2025
Planted Area (mil. ha)	25,313	21,295	22,114	20,639	21,651
Harvested Area	21,474	18,973	19,058	17,402	18,413
Harvested Yield (mt/ha)	2.82	3.10	2.95	3.14	3.28
Beginning Stocks (mil. mt)	25,848	26,552	20,483	18,369	13,879
Production	60,636	58,867	55,840	54,703	60,419
Imports	2,444	2,638	3,091	3,919	4,191
Total Supply	88,928	88,057	81,463	76,992	78,489
Domestic Use	37,207	30,054	34,082	33,747	35,108
Feed Use/Residual	8,184	2,297	3,715	4,082	4,082
Food/Milling and Seed	29,023	27,758	27,843	29,665	31,026
Exports	27,876	34,516	24,494	27,896	28,712
Total Disappearance	65,083	64,570	58,576	61,643	63,820
Ending Stocks	23,846	23,487	26,707	15,349	14,668

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Dairy Products

Exhibit 55: China Milk Equivalent Supply and Demand

	2000	2010	2015	2020	2025
Production (000 MT)	11,154	32,627	36,005	39,191	44,764
Imports	477	5,774	10,202	14,286	16,284
Exports	90	68	47	150	267
Domestic Disappearance	11,541	38,144	46,211	53,327	60,781
Inventories	0	257	2,731	2,711	2,711

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Exhibit 56: U.S. Milk Equivalent Supply and Demand

	2000	2010	2015	2020	2025
Production (000 MT)	75,928	87,474	94,634	103,599	112,524
Imports	1,953	1,894	2,742	1,734	1,697
Exports	2,299	9,639	12,082	15,692	19,414
Domestic	75,261	79,472	84,460	89,641	94,807
Inventories	3,843	5,675	7,023	7,911	7,911

Note: Shaded years represent forecasts.

Source: Informa Economics IEG

Pork

Exhibit 57: China Pork Supply and Demand *(In Carcass Weight Equivalent)*

	2000	2010	2015	2020	2025
Total Hog Inventory (000 head)	431,442	469,000	466,043	500,145	537,527
Sow Inventory (000 head)	35,500	49,580	42,890	40,575	43,069
Pig Crop (000 head)	506,573	666,817	636,796	746,485	826,965
Pigs per Sow/Per Year	14.3	13.4	14.8	18.4	19.2
Total Hog Slaughter (000 head)	518,623	666,860	708,256	746,485	835,234
Sow Slaughter (000 head)	25,931	33,343	35,413	37,324	41,762
Market Hog Slaughter (000 head)	492,692	633,517	672,843	709,161	793,472
Live Hog Imports (000 head)	3	6	4	14	20
Pork Production (000 tonnes)	39,660	51,070	54,870	58,970	67,650
Carcass Weight (kg)	76.5	76.6	77.5	79.0	81.0
Pork Imports (000 tonnes)	65	415	1,029	1,127	1,265
Pork Exports (000 tonnes)	144	278	231	290	325
Pork Consumption (000 tonnes)	39,581	51,157	55,668	59,747	68,530
Per Capita Consumption (kg)	31.3	38.3	40.7	42.9	48.7
Population (Million)	1,264	1,337	1,367	1,394	1,407

Notes: 1) Shaded years represent forecasts; 2) This S&D does not include offal.

Source: Informa Economics IEG

Exhibit 58: U.S. Pork Supply and Demand *(In Carcass Weight Equivalent)*

	2000	2010	2015	2020	2025
Total Hog Inventory (000 head)	59,336	64,687	67,776	72,000	74,000
Sow Inventory (000 head)	6,233	5,850	5,939	5,925	5,925
Pig Crop (000 head)	100,742	113,128	121,411	126,000	128,869
Pigs per Sow/Per Year	16.2	19.3	20.4	21.3	21.8
Total Hog Slaughter (000 head)	97,976	110,260	115,425	122,850	126,180
Sow Slaughter (000 head)	3,054	2,991	2,871	3,025	3,030
Market Hog Slaughter (000 head)	94,922	107,268	112,554	119,825	123,150
Live Hog Imports (000 head)	4,359	5,749	5,741	5,900	6,000
Pork Production (000 tonnes)	8,586	10,177	11,114	11,702	12,191
Carcass Weight (kg)	88	92	96	95	97
Pork Imports (000 tonnes)	438	390	504	376	372
Pork Exports (000 tonnes)	584	1,916	2,241	2,948	3,311
Pork Consumption (000 tonnes)	8,442	8,649	9,357	9,130	9,256
Per Capita Consumption (kg)	29.9	27.9	29.1	27.3	26.7
Population (Million)	282	310	322	334	346

Note: 1) Shaded years represent forecasts; 2) This S&D does not include offal.

Source: Informa Economics IEG

Broilers

Exhibit 59: China Broiler Supply and Demand *(In Carcass Weight Equivalent)*

	2000	2010	2015	2020	2025
Beginning Stocks (1000 MT)	0	0	0	0	0
Production (1000 MT)	9,269	12,550	13,400	13,156	13,750
Total Imports (1000 MT)	588	286	268	386	416
Total Exports (1000 MT)	9,857	379	401	388	422
Total Supply (1000 MT)	464	12,836	13,668	13,542	14,166
Total Domestic Consumption (1000 MT)	9,393	12,457	13,267	13,154	13,745
Per Capita Consumption (kg/person/year)	7.4	9.3	9.7	9.4	9.8
Ending Stocks (1000 MT)	0	0	0	0	0
Population (million)	1,264	1,337	1,367	1,394	1,407

Note: 1) Shaded years represent forecasts; 2) This S&D does not include offal.

Source: Informa Economics IEG

Exhibit 60: U.S. Broiler Supply and Demand *(In Carcass Weight Equivalent)*

	2000	2010	2015	2020	2025
Beginning Stocks (1000 MT)	361	286	322	262	286
Production (1000 MT)	13,832	16,742	18,166	19,180	19,906
Total Imports (1000 MT)	6	48	59	61	69
Total Exports (1000 MT)	14,199	3,069	2,866	3,571	4,113
Total Supply (1000 MT)	2,231	17,077	18,547	19,503	20,260
Total Domestic Consumption (1000 MT)	11,606	13,646	15,293	15,636	15,840
Per Capita Consumption (kg/person/year)	41.1	44.0	47.5	46.8	45.7
Ending Stocks (1000 MT)	362	362	387	297	308
Population (million)	282	310	322	334	346

Note: 1) Shaded years represent forecasts; 2) This S&D does not include offal.

Source: Informa Economics IEG

Fruits and Vegetables

Exhibit 61: China Fruit & Vegetable Situation *(In Hectares & Tonnes)*

	2000	2013	2020F	2025F
Fruit				
Area	9,220,199	13,863,920	14,500,000	16,000,000
Production	66,530,138	154,363,610	195,750,000	232,000,000
Imports	2,718,334	5,699,971	7,250,000	9,000,000
Exports	2,143,240	7,980,476	9,000,000	11,000,000
Apparent Consumption	67,105,232	152,083,105	194,000,000	230,000,000
Vegetables/Melons				
Area	17,913,429	24,422,301	26,000,000	27,500,000
Production	360,019,852	583,327,760	665,600,000	715,000,000
Imports	1,121,962	1,673,610	3,400,000	10,000,000
Exports	4,153,010	12,918,556	14,000,000	15,000,000
Apparent Consumption	356,988,804	572,082,814	655,000,000	710,000,000
Tree Nuts				
Area	317,200	807,180	900,000	950,000
Production	994,239	3,620,750	4,860,000	5,415,000
Imports	149,131	580,832	1,040,000	1,985,000
Exports	153,578	495,034	500,000	525,000
Apparent Consumption	989,792	3,706,548	5,400,000	6,875,000
Total Fruit, Vegetables, Nuts				
Area	27,450,828	39,093,401	41,400,000	44,450,000
Production	427,544,229	741,312,120	866,210,000	952,415,000
Imports	3,989,427	7,954,413	11,690,000	20,985,000
Exports	6,449,828	21,394,066	23,500,000	26,525,000
Apparent Consumption	425,083,828	727,872,467	854,400,000	946,875,000

Sources: FAOSTAT for 2000 and 2013 and Informa Economics IEG for 2020 and 2025

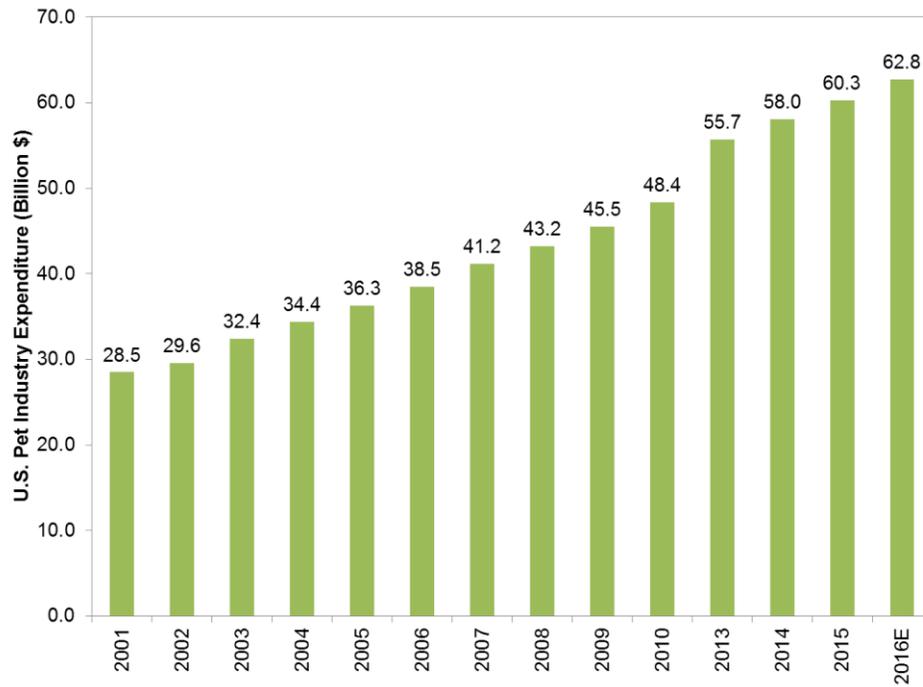
Exhibit 62: U.S. Fruit & Vegetable Situation *(In Hectares & Tonnes)*

	2013	2014	2020F	2025F
Fruit & Tree Nuts				
Area 1,000 Acres	4,194	4,202	4,281	4,364
Production Mil lbs	66,311	61,682	63,765	65,180
Exports \$Mil	15,051	16,143	21,729	26,228
Imports \$ Mil	14,873	16,261	22,985	29,770
US Vegetables				
Area 1,000 Acres	5,035	5,038	5,079	5,142
Production Mil lbs	120,815	126,360	129,825	132,869
Exports \$Mil	6,588	7,020	9,182	11,276
Imports \$ Mil	10,768	10,992	14,413	17,735
TotalVegetables, Fruit & Tree Nuts				
Area 1,000 Acres	9,229	9,240	9,360	9,506
Production Mil lbs	187,126	188,042	193,590	198,049
Exports \$Mil	21,639	23,163	30,911	37,504
Imports \$ Mil	25,641	27,253	37,398	47,505

Sources: USDA for 2013, 2014 and 2020 and Informa Economics IEG for 2025

Dog and Cat Food

Exhibit 63: U.S. Pet Industry Expenditures



Source: American Pet Products Association

Other Tables

Exhibit 64: China Trade Agreements

FTAs	FTAs Under Negotiation	FTAs Under Consideration	Preferential Trade Agreement
ASEAN	GCC	India	APTA
Brunei	Bahrain	Columbia	Bangladesh
Cambodia	Kuwait	Georgia	India
Indonesia	Oman	Moldova	Laos
Laos	Qatar		Mongolia
Malaysia	Saudi Arabia		South Korea
Myanmar	United Arab Emirates		Sri Lanka
Philippines	Norway		
Singapore	China-Japan-South Korea		
Thailand	RCEP		
Vietnam	ASEAN		
Australia	Australia		
Chile	India		
Costa Rica	Japan		
Iceland	South Korea		
South Korea	New Zealand		
New Zealand	ASEAN Upgrade Negotiation		
Pakistan	Sri Lanka		
Peru	Maldives		
Singapore			
Switzerland			
China - Hong Kong			
China - Macao			

Note: ASEAN = Association of Southeast Asian Nations, APTA = Asia-Pacific Trade Agreement, GCC = Gulf Cooperation Council, RCEP = Regional Comprehensive Economic Partnership.

Exhibit 65: U.S. Trade Agreements

FTAs	
Australia	Israel
Bahrain	Jordan
Canada	Korea
Chile	Mexico
Colombia	Morocco
Costa Rica	Nicaragua
Dominican Republic	Oman
El Salvador	Panama
Guatemala	Peru
Honduras	Singapore
Agreements Under Negotiation	
TPP	T-TIP

Exhibit 66: China Competitors in the U.S. Market (2014)

Product	No. 1 Partner		No. 2 Partner		No. 3 Partner		No. 4 Partner		No. 5 Partner		Share in Total	
	Name	Value	Name	Value	Name	Value	Name	Value	Name	Value	China	Top 5
Bulk	Canada	3,078	Brazil	2,108	Indonesia	1,391	Colombia	1,036	Thailand	775	1%	61%
Tea	China	83	Argentina	83	India	58	E.U.	48	Japan	33	20%	74%
Soybeans	Brazil	538	Canada	281	India	96	China	58	Paraguay	46	6%	98%
Intermediate	Canada	7,661	E.U.	5,537	India	1,989	Mexico	1,820	Malaysia	1,270	4%	76%
Animal Feed Preparations	E.U.	171	Canada	140	China	122	Malaysia	15	Thailand	7	24%	91%
Consumer Oriented	Mexico	15,354	E.U.	13,318	Canada	13,253	Australia	3,373	China	2,912	4%	71%
Processed Fruits & Vegetables	Canada	1,522	Mexico	1,230	E.U.	1,135	China	1,082	Thailand	468	15%	75%
Citrus Fruit Preparations including jam	China	200	Mexico	56	Thailand	21	E.U.	9	Argentina	2	68%	99%
Peaches Prepared Preserved	China	79	E.U.	25	Thailand	13	Chile	6	South Africa	2	61%	97%
Fruit and Vegetable Juices	Brazil	459	China	367	Mexico	300	Thailand	180	Argentina	147	18%	72%
Apple Juice	China	301	Chile	76	E.U.	58	Argentina	20	Brazil	14	59%	92%
Dog & Cat Food	Canada	277	China	272	Thailand	211	E.U.	18	New Zealand	12	33%	97%
Snack Foods	Canada	2,355	Mexico	1,281	E.U.	1,127	China	179	Switzerland	88	3%	92%
Sugar Confection	Mexico	483	Canada	447	E.U.	262	China	156	Turkey	55	10%	89%
Fresh Fruit & Vegetables	Canada	1,579	Chile	1,087	Guatemala	976	Costa Rica	880	Peru	671	2%	67%
Garlic, Fresh or Chilled	China	91	Mexico	10	Argentina	7	E.U.	4	Canada	0	80%	99%
Other	E.U.	10,722	Canada	7,454	Mexico	4,830	Australia	3,334	New Zealand	2,416	2%	76%
Ginger, neither crushed nor ground	China	87	Peru	12	Brazil	5	Thailand	3	Costa Rica	2	77%	96%
Agricultural Products Total	Canada	23,993	E.U.	19,259	Mexico	17,813	China	4,133	Australia	3,832	4%	65%

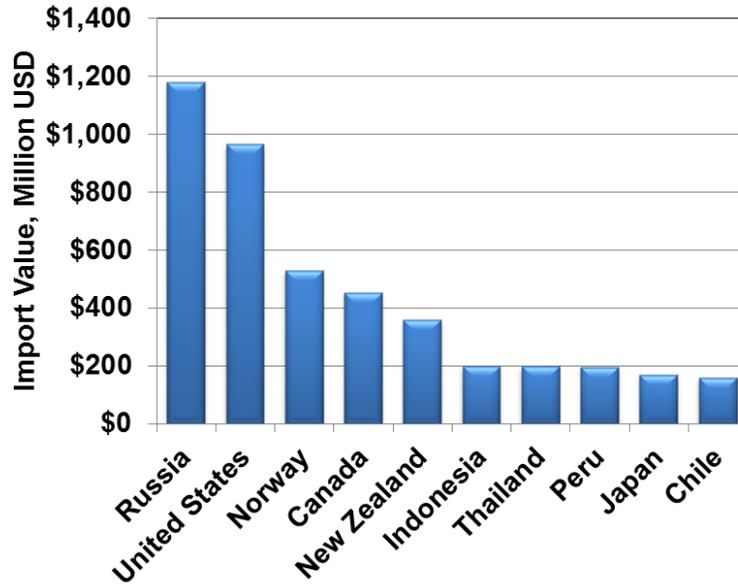
Note: Value in million US dollars. Shaded countries have FTAs with the U.S. Source: GTIS

Exhibit 67: U.S. Competitors in China Market (2014)

Product	No. 1 Partner		No. 2 Partner		No. 3 Partner		No. 4 Partner		No. 5 Partner		Share in Total	
	Name	Value	Name	Value	Name	Value	Name	Value	Name	Value	U.S.	Top 5
Bulk	Brazil	18,207	U.S.	17,634	Thailand	3,343	Argentina	3,149	Canada	3,079	33%	85%
Soybeans	Brazil	16,615	U.S.	14,476	Argentina	3,025	Uruguay	507	Canada	267	41%	100%
Sorghum	U.S.	1,467	Australia	103	Brazil	0.32	Mexico	0.00002			93%	100%
Cotton	India	2,819	Hong Kong	1,963	U.S.	1,229	Australia	1,035	Brazil	336	22%	84%
Wheat	Australia	354	U.S.	194	Canada	97	Kazakhstan	58	E.U.	15	27%	100%
Corn	Ukraine	331	U.S.	101	Thailand	60	E.U.	45	Russia	5	18%	98%
Intermediate	U.S.	4,225	Indonesia	3,290	Australia	2,770	Malaysia	2,744	E.U.	2,493	19%	70%
Feeds & Fodders	U.S.	1,931	E.U.	130	Australia	43	Indonesia	20	Thailand	19	73%	81%
DDGS	U.S.	1,247	E.U.	1.5	Hong Kong	0.9	Taiwan	0.2	Philippines	0.01	100%	100%
Forage Products	U.S.	370	Australia	42	E.U.	29	Canada	19	New Zealand	3.6	79%	99%
Bran, Sharps and Residues from Corn Processing	U.S.	166	Thailand	2							99%	100%
Animal Feed Preparations	U.S.	148	E.U.	99	Malaysia	16	Japan	11	Singapore	7	48%	91%
Hides & Skins	U.S.	1,498	E.U.	1,263	Australia	776	Hong Kong	736	Canada	369	31%	96%
Consumer Oriented	E.U.	6,245	New Zealand	4,939	U.S.	2,430	Thailand	2,264	Hong Kong	2,123	10%	71%
Dairy Products	New Zealand	3,560	E.U.	1,134	U.S.	617	Australia	227	Argentina	79	11%	97%
Whey & Modified Whey	E.U.	356	U.S.	251	Argentina	44	Australia	12	Uruguay	4	37%	99%
Red Meats Fresh/Chilled/Frozen	E.U.	1,282	Australia	1,057	New Zealand	883	U.S.	398	Uruguay	339	8%	84%
Pork Meat Products	E.U.	1,252	U.S.	398	Hong Kong	326	Canada	181	Chile	63	18%	98%
Poultry Meat and Products	Brazil	519	U.S.	299	Argentina	56	E.U.	30	Chile	29	32%	99%
Chicken Cuts & Offals	Brazil	519	U.S.	248	Argentina	55	Chile	25	E.U.	18	29%	100%
Agricultural Products Total	U.S.	24,289	Brazil	19,288	E.U.	9,462	Australia	7,426	Thailand	6,504	24%	68%

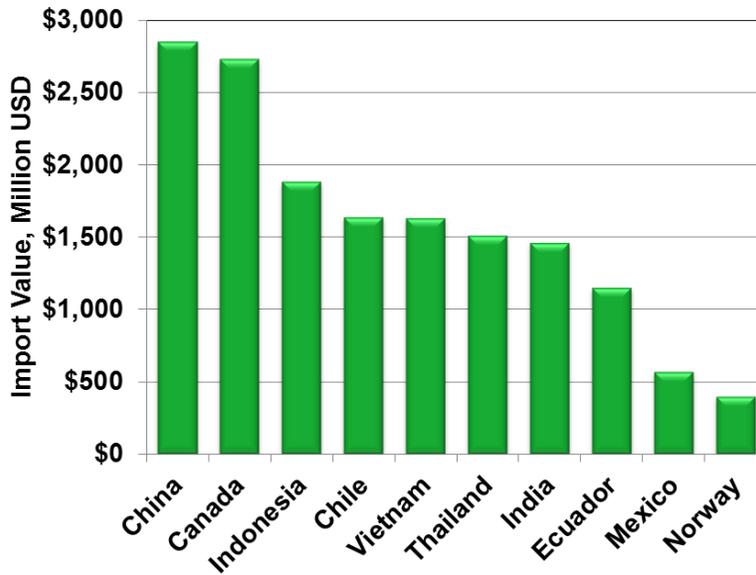
Note: Value in million US dollars. Shaded countries have FTAs with China. Source: GTIS

Exhibit 68: Top Ten Fish and Seafood Exporters to China, 2014 (In US\$ Million)



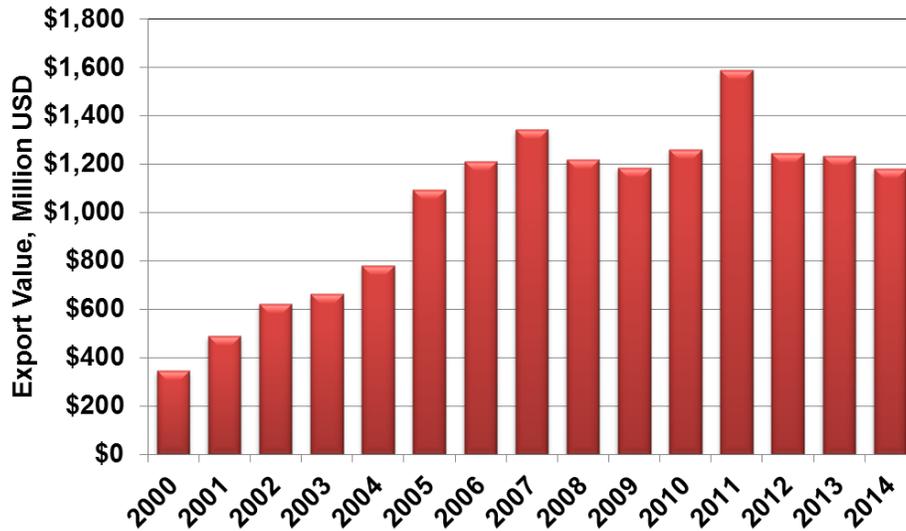
Source: USDA FAS GATS and Informa Economics IEG

Exhibit 69: Top Ten Fish and Seafood Exporters to the U.S., 2014 (In US\$ Million)



Source: USDA FAS GATS and Informa Economics IEG

Exhibit 70: Russian Fish and Seafood Exports to China (In US\$ Million)



Source: USDA FAS GATS and Informa Economics IEG

Exhibit 71: Top Seafood Species Consumed in the U.S., 2013

Product	Pounds per Capita
Shrimp	3.6
Salmon	2.7
Tuna	2.3
Tilapia	1.4
Alaska pollock	1.2
Pangasius	0.8
Cod	0.6
Catfish	0.6
Crab	0.5
Clams	0.4

Source: NOAA National Marine Fisheries Service

Exhibit 72: NOAA Ex-Vessel Fish Price Index Changes, 2009 to 2013

Fish	% Change 2009 - 2013
Edible Finfish	40%
Edible Shellfish	53%
Industrial Fish	41%

Source: NOAA National Marine Fisheries Service

Exhibit 73: USA Seafood Supply/Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	2,174	2,225	2,189	2,479	2,505	2,545
Import	1,826	2,358	2,480	2,493	2,812	3,061
Export	1,182	1,588	1,447	1,611	1,734	1,837
Consumption	2,819	2,994	3,223	3,360	3,583	3,769

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 74: USA Crab Supply/Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	35,290	24,075	16,912	19,753	20,968	22,038
Import	31,553	50,014	44,269	41,738	49,236	57,766
Export	9,682	8,381	11,373	13,415	16,063	18,270
Consumption	57,161	65,708	49,808	48,076	54,141	61,534

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 75: U.S. Flatfish Supply and Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	20,062	15,249	30,809	23,180	24,914	26,359
Import	10,058	7,659	4,832	4,815	5,423	5,987
Export	22,435	16,796	33,934	25,532	27,441	29,033
Consumption	7,685	6,112	1,707	2,464	2,896	3,314

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 76: U.S. Cod Supply and Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	85,993	126,093	122,540	122,173	121,442	120,836
Import	73,869	67,114	51,692	78,973	86,633	93,016
Export	76,078	92,533	88,935	88,668	88,138	87,698
Consumption	83,784	100,674	85,297	112,478	119,937	126,153

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 77: China Seafood Supply/Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	5,202	8,870	13,652	17,245	18,197	20,314
Import	2,514	3,651	3,806	3,156	6,108	7,953
Export	1,515	2,545	3,566	4,296	5,446	6,405
Consumption	6,201	9,976	13,892	16,105	18,859	21,862

Consumption is estimated as the residual between production and imports less exports.

Production is estimated as weight of processed products.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 78: China Shrimp Supply/Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	90,322	210,712	255,600	283,909	292,424	319,828
Import	57,423	59,392	57,560	50,483	48,984	50,974
Export	93,881	223,221	274,946	290,188	281,569	293,009
Consumption	53,864	46,883	38,214	44,205	59,840	77,794

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 79: China Tilapia Supply/Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	N/A	112,132	344,417	335,755	357,964	368,134
Import	N/A	43	1	137	203	259
Export	N/A	106,792	321,885	313,790	334,546	344,050
Consumption	N/A	5,383	22,533	22,102	23,622	24,342

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 80: China Crab Supply/Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	23,948	49,482	52,460	77,909	98,318	115,326
Import	18,067	32,416	50,118	63,617	83,069	99,280
Export	26,470	59,269	56,021	81,198	98,947	113,738
Consumption	15,545	22,629	46,557	60,328	82,441	100,868

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 81: China Cod Supply/Demand

	1,000 Metric Tons					
	2000	2005	2010	2014	2020	2025
Production	5,499	11,300	11,410	15,614	19,723	23,147
Import	392,494	670,779	150,594	232,444	246,744	259,331
Export	5,630	17,822	15,100	20,311	25,206	29,285
Consumption	392,363	664,257	146,904	227,748	241,262	253,193

Consumption is estimated as the residual between production and imports less exports.

Source: FAO FishStat and Informa Economics IEG forecasts in bold.

Exhibit 82: China Tariff Schedule

Exhibit 7: China		
Product	Tariff Number	MFN Rate
Wood and articles of wood	44	3.5%
Softwood Sawn	440710	0%
Hardwood Sawn	440791	0%
Softwood logs	440320	0%
Hardwood Logs	440391	0%

United States Tariff Schedule		
Product	Tariff Number	MFN Rate
Wood and articles of wood	44	2.3%
Plywood	4412	4.6%
Articles of wood	4421	3.2%

Source: WTO Tariff Database

Exhibit 83: Net Carbon Emissions Output

Material	Net Carbon Emissions (kg C/t)	Near-term net carbon emissions including carbon storage within material (kg C/t)
Framing lumber	33	-457
Medium-density fiberboard (virgin fiber)	60	-382
Brick	88	88
Glass	154	154
Recycled steel (100% from scrap)	220	220
Concrete	265	265
Concretee	291	291
Recycled aluminum (100% recycled content)	309	309
Steel (virgin)	694	694
Plastic	2502	2502
Aluminum (virgin)	4532	4532

*Values are based on life-cycle assessment and include gathering and processing of raw materials, primary and secondary processing, and transportation.

*Source: EPA (2006)

Exhibit 84: U.S. Softwood Log Supply and Demand (*Cubic Meters (m³)*)

Year	2000	2010	2014	2020F	2025F
Production	282,340,000	249,533,000	261,320,000	332,484,353	384,546,190
Imports	2,137,000	553,000	459,658	493,189	434,555
Exports	9,358,000	7,515,662	11,734,000	16,654,654	22,081,644
Consumption*	275,119,000	242,570,338	250,045,658	316,322,889	362,899,101

*Apparent Consumption

Source: FAO and Informa Economics IEG

Exhibit 85: China Softwood Log Supply and Demand (*Cubic Meters (m³)*)

Year	2000	2010	2014	2020F	2025F
Production	61,814,200	31,500,000	29,508,900	22,039,320	17,255,920
Imports	6,499,115	24,607,421	35,208,746	47,964,305	61,747,368
Exports	4,000	2,140	4,099	3,625	3,288
Consumption*	68,309,315	56,105,281	64,713,547	70,000,000	79,000,000

*Apparent Consumption

Source: FAO and Informa Economics IEG

Exhibit 86: U.S. Hardwood Sawn Supply and Demand (*Cubic Meters (m³)*)

Year	2000	2010	2014	2020F	2025F
Production	29,932,000	17,850,000	21,000,000	27,853,657	33,450,514
Imports	1,682,000	662,000	1,040,989	1,504,585	1,938,695
Exports	2,950,000	2,544,000	3,901,234	6,156,666	7,235,823
Consumption*	28,664,000	15,968,000	18,139,755	23,201,577	27,349,233

*Apparent Consumption

Source: FAO and Informa Economics IEG

Exhibit 87: China Hardwood Sawn Supply and Demand (*Cubic Meters (m³)*)

Year	2000	2010	2014	2020F	2025F
Production	2,799,000	22,320,000	39,619,000	50,750,333	63,853,266
Imports	4,893,060	5,987,775	8,596,937	10,264,470	12,032,410
Exports	1,622,638	579,847	241,760	193,408	154,726
Consumption*	6,069,422	27,727,928	47,974,177	60,821,395	75,730,950

*Apparent Consumption
Source: FAO and Informa Economics IEG

Exhibit 88: U.S. Plywood Supply and Demand (*Cubic Meters (m³)*)

Year	2000	2010	2014	2020F	2025F
Production	17,271,000	9,396,930	9,451,725	8,900,000	9,300,000
Imports	2,385,033	2,550,803	2,872,000	3,750,000	4,300,000
Exports	673,000	871,100	827,748	850,000	900,000
Consumption*	18,983,033	11,076,633	11,495,977	11,800,000	12,700,000

*Apparent Consumption
Source: FAO and Informa Economics IEG

Exhibit 89: China Plywood Supply and Demand (*Cubic Meters (m³)*)

Year	2000	2010	2014	2020F	2025F
Production	10,764,000	50,915,000	101,169,000	123,924,220	150,000,000
Imports	2,170,411	1,325,834	1,271,754	1,122,397	1,100,000
Exports	763,865	7,535,992	11,370,211	16,046,618	21,100,000
Consumption*	12,170,546	44,704,842	91,070,543	109,000,000	130,000,000

*Apparent Consumption
Source: FAO and Informa Economics IEG

Exhibit 90: Top Ten Farm Machinery Product Imports, 2015 (In US\$)

US Exports to China		China Exports to US	
Product	Value	Product	Value
Combine Harvester-Threshers	\$257,611,940	Parts For Harvester, Grass Mowers, Sorting Egg Etc	\$175,772,066
Pneumatic Elevators And Conveyors	\$64,123,965	Agricultural Or Horticultural Mech Sprayers Etc	\$112,435,545
Parts For Harvester, Grass Mowers, Sorting Egg Etc	\$54,986,801	Agric Hort/Forest Machy & Lawn/Ground Roller Parts	\$63,451,335
Tractors, Nesoi	\$41,231,165	Cont-Act Elev & Convey,Fr Goods Or Materls, Nesoi	\$37,030,105
Cont-Act Elev & Convey,Fr Goods Or Materls, Nesoi	\$27,272,075	Pts For Agric, Hort, Forest, Bee-Keep Mach Nesoi	\$24,024,994
Straw Or Fodder Balers, Including Pick-Up Balers	\$16,206,027	Harrows Ex Disc, Scarifiers Cultivators Hoes Etc	\$23,246,943
Parts Of Milking Machines And Dairy Machinery	\$12,675,216	Agric, Hort, Forest, Bee-Keeping Machinery Nesoi	\$22,876,050
Agricultural Or Horticultural Mech Sprayers Etc	\$12,624,542	Agril,Hort,Forsty Mach For Soil Prep Or Cultivate	\$22,350,011
Agric Hort/Forest Machy & Lawn/Ground Roller Parts	\$12,429,287	Tractors, Nesoi	\$14,406,646
Agric, Hort, Forest, Bee-Keeping Machinery Nesoi	\$8,470,838	Parts Of Mach F Clean,Sort, Mill Grain,Veg,Ex Farm	\$7,996,092

Source: GTIS and Informa Economics IEG



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