U.S.-China Economic and Security Review Commission

Monthly Analysis of U.S.-China Trade Data

August 5, 2015

Highlights of this Month's Edition

- **Bilateral trade:** Weak U.S. exports lead to a $170 billion deficit in the first half of 2015; U.S. maintains surplus in services trade despite slowing exports growth.
- **Bilateral policy issues:** WTO members reach deal to expand the Information Technology Agreement.
- **Quarterly review of China's economy:** China maintains 7 percent GDP growth in the second quarter; stock market sell-off prompts government interference, threatens to derail reforms.
- **Sector spotlight – Semiconductors:** Chinese government sets sights on semiconductor industry, placing pressure on U.S.-based multinationals.

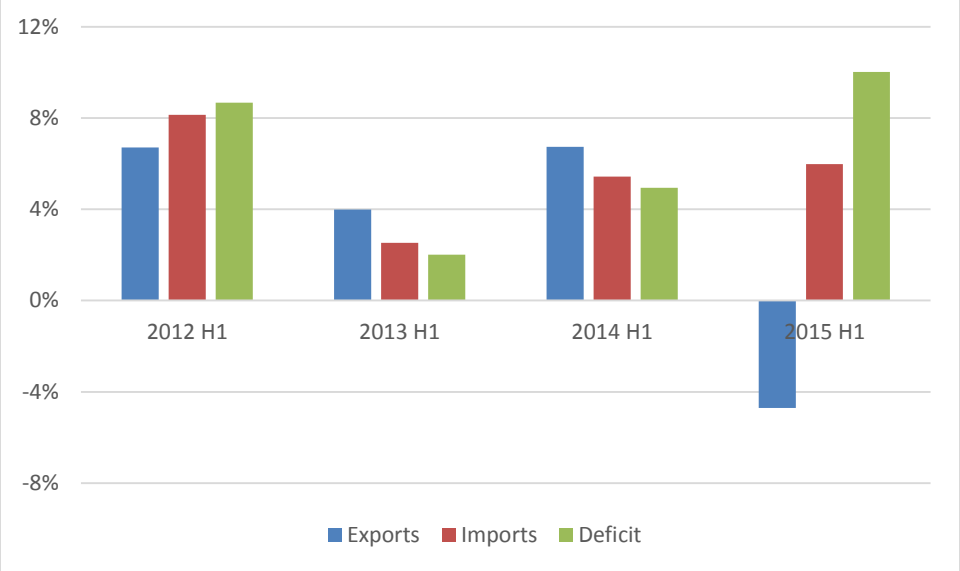
Bilateral Trade

U.S. Goods Deficit Grew 10 Percent Year-on-Year in the First Half of 2015

The U.S. trade deficit in goods with China reached $170.8 billion in the first six months of 2015, a $15.5 billion, or 10 percent, increase over the same period in 2014 (see Figure 1). U.S. exports to China declined 4.7 percent in the first half of 2015, while imports rose 6 percent year-on-year.

Figure 1: U.S. Trade Balance with China in Goods, 2012–2015

(percent change)



Source: U.S. Census Bureau, NAICS database (Washington, DC: U.S. Department of Commerce, Foreign Trade Division, August 2015). *http://www.census.gov/foreign-trade/balance/c5700.html.*

In June 2015, U.S. imports from China reached $41.1 billion, up 4.9 percent over May 2015, and 4.4 percent year-on-year. U.S. exports to China in June 2015 were $9.7 billion, up 10.6 percent over May, and 3.6 percent year-on-year. The deficit in June was $31.5 billion—the highest so far this year—up 4.7 percent year-on-year (see Table 1).

Table 1: U.S. Goods Trade with China, January–June 2015

(US$ billions)

	Jan	Feb	Mar	Apr	May	Jun
Exports	9.6	8.7	9.9	9.3	8.8	9.7
Imports	38.2	31.2	41.1	35.8	39.2	41.1
Balance	(28.6)	(22.5)	(31.2)	(26.5)	(30.5)	(31.5)
Total	47.7	39.9	51.0	45.1	48.0	50.8
Balance YTD						
2014	(27.8)	(48.7)	(69.1)	(96.4)	(125.2)	(155.2)
2015	(28.6)	(51.1)	(82.4)	(108.9)	(139.3)	(170.8)

Source: U.S. Census Bureau, NAICS database (Washington, DC: U.S. Department of Commerce, Foreign Trade Division, August 2015). *http://www.census.gov/foreign-trade/balance/c5700.html.*

Top Exports and Imports

Transportation equipment, primarily aerospace and automotive products, led U.S. exports to China once again in June (see Table 2). At $2.9 billion, these shipments accounted for over one quarter of total exports, increasing by 33 percent year-on-year. According to the Bureau of Economic Analysis, U.S. passenger car exports to China totaled $4.3 billion in the first half of 2015, ranking China second behind Canada ($7.9 billion) and ahead of Germany ($2.9 billion).[1] Many other top U.S. exports to China decreased year-on-year from the first half of 2014. The most notable example was a decrease of 18.7 percent year-on-year in exports of non-electrical machinery.

Table 2: U.S. Trade with China: Top Five Exports and Imports

(US$ thousands)

U.S. Top-Five Exports to China				**U.S. Top-Five Imports from China**			
	Exports	Share of total (%)	Change over June'14 (%)		Imports	Share of total (%)	Change over June'14 (%)
Monthly (June 2015)				*Monthly (June 2015)*			
Transportation Equipment	2,880,816	29.7%	33.0%	Computer and Electronic Products	14,338,032	34.8%	1.8%
Computer and Electronic Products	1,447,112	14.9%	-3.5%	Electrical Equipment	3,597,116	8.7%	7.7%
Chemicals	1,253,471	12.9%	-1.9%	Miscellaneous Manufactures	2,971,064	7.2%	14.4%
Machinery, Except Electrical	765,720	7.9%	-18.7%	Apparel and Accessories	2,917,407	7.1%	4.2%
Waste and Scrap	586,353	6.1%	-0.4%	Machinery, Except Electrical	2,669,307	6.5%	4.3%
Other	2,754,339	28.4%	-	Other	14,652,206	35.6%	-
Total	9,687,811	**100.0%**		**Total**	41,145,132	**100.0%**	
Year-to-date (thru June 2015)				*Year-to-date (thru June 2015)*			
Transportation Equipment	12,393,403	22.2%		Computer and Electronic Products	77,547,158	34.2%	
Computer and Electronic Products	8,218,079	14.7%		Electrical Equipment	19,849,852	8.8%	
Chemicals	6,834,875	12.2%		Miscellaneous Manufactures	16,199,768	7.1%	
Agriculture Products	6,058,746	10.8%		Machinery, Except Electrical	15,995,627	7.1%	
Machinery, Except Electrical	4,759,998	8.5%		Apparel and Accessories	13,970,384	6.2%	
Other	17,637,384	31.6%	-	Other	83,109,002	36.7%	-
Total	55,902,485	**100.0%**		**Total**	226,671,791	**100.0%**	

Source: U.S. Census Bureau, NAICS database (Washington, DC: U.S. Department of Commerce, Foreign Trade Division, August 2015). *http://censtats.census.gov/naic3_6/naics3_6.shtml.*

Computer and electronic products remained the largest import category, making up nearly 35 percent of total U.S. imports from China. Other top categories of U.S. imports from China also grew, some by double digits.

Advanced Technology Products

The U.S. trade deficit with China in advanced technology products (ATP) reached $54.5 billion in the first half of 2015, unchanged from the same period in 2014 (see Table 3). The deficit is driven primarily by imports of information and communication products (ICT), which accounted for nearly 90 percent of all ATP imports from China in the first six months of 2015.

Table 3: Advanced Technology Products trade, January–June, 2015

(US$ millions)

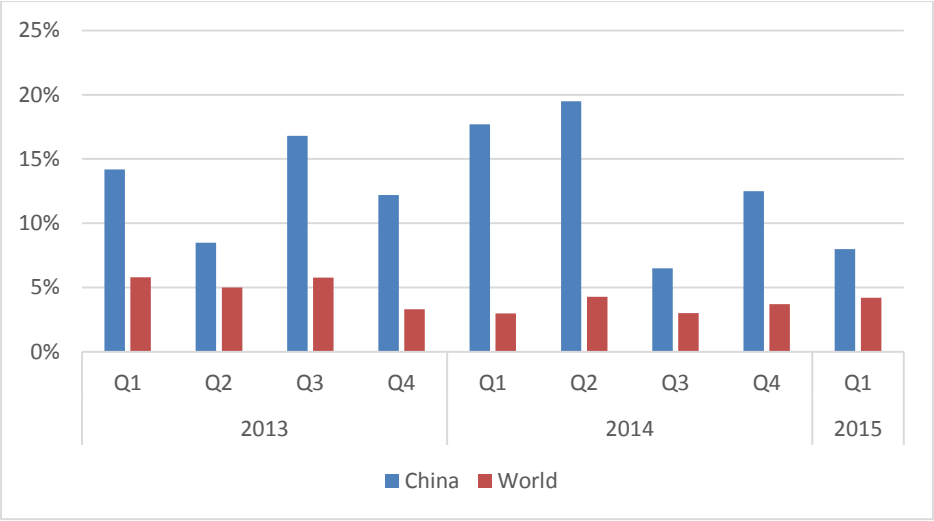
	Monthly			Cumulative year-to-date			
	Exports	Imports	Balance June 2015	Exports	Imports	YTD Balance June 2015	YTD Balance June 2014
TOTAL	**3,529**	**13,079**	**-9,550**	**16,225**	**70,768**	**-54,543**	**-54,534**
(01) Biotechnology	120	11	109	399	56	343	186
(02) Life Science	292	194	98	1,578	1,176	402	432
(03) Opto-Electronics	37	648	-611	236	2,880	-2,644	-2,843
(04) Information & Communications	424	11,706	-11,282	2,357	63,679	-61,322	-59,417
(05) Electronics	491	289	202	2,840	1,765	1,075	960
(06) Flexible Manufacturing	184	74	110	1,252	460	792	688
(07) Advanced Materials	17	37	-20	99	215	-116	-45
(08) Aerospace	1,957	77	1,880	7,285	449	6,836	5,553
(09) Weapons	0	11	-11	1	58	-57	-54
(10) Nuclear Technology	6	30	-24	178	30	148	6

Source: U.S. Census Bureau, U.S. Trade with China in Advanced Technology Products (Washington, DC: U.S. Department of Commerce, Foreign Trade Division, August 2015).
http://www.census.gov/foreigntrade/statistics/product/atp/2014/12/ctryatp/atp5700.html.

U.S.-China Trade in Services

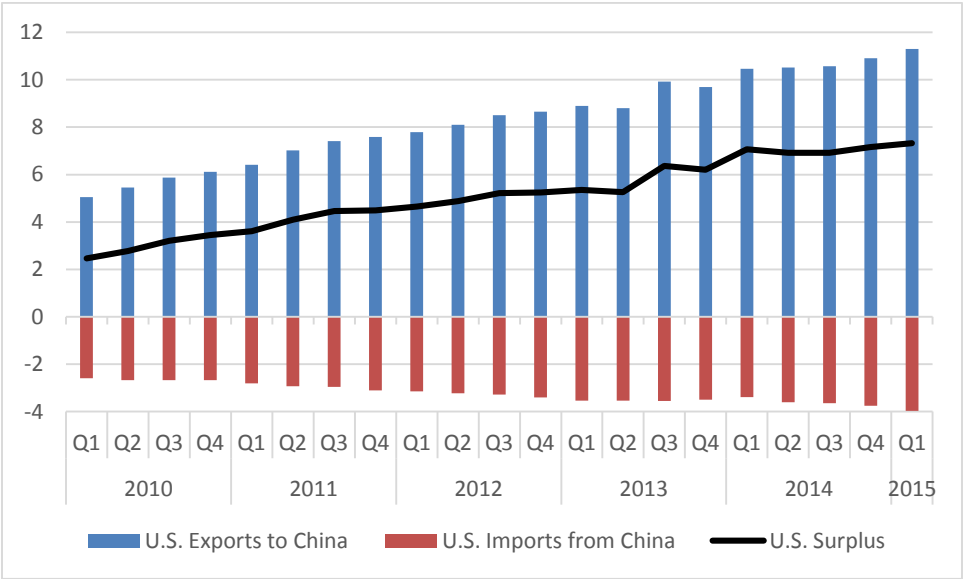
U.S. services exports to China grew by 8 percent year-on-year in the first quarter of 2015, down from nearly 13 percent year-on-year in the fourth quarter of 2014. China accounted for 6.2 percent of total U.S. services exports, increasing its share 0.2 percent compared to the first quarter of 2014. Services exports to China continue to grow faster than services exports to the rest of the world, which grew by 4 percent in the first quarter (see Figure 2). The $7.3 billion first quarter U.S. services trade surplus with China grew less than $300 million, or 2 percent, from the fourth quarter of 2014. This is due in part to the strong services imports from China, which outpaced services exports to China in the first quarter by 9 percent—marking the first time imports have grown more than exports year-on-year since early 2013.[2] As Figure 3 shows, the U.S. services trade surplus with China has been flat over the past year.

Figure 2: Growth in U.S. Services Exports to China and to the World
(year-on-year, %)



Source: U.S. Department of Commerce – Bureau of Economic Analysis, *U.S. Trade in Goods and Services by Selected Countries and Areas, 1999–Present* (Washington, DC: U.S. Department of Commerce, Foreign Trade Division, July 2015).

Figure 3: U.S.-China Trade in Services, 2010–2015 Q1
(US$ billions)



Source: U.S. Department of Commerce – Bureau of Economic Analysis, *U.S. Trade in Goods and Services by Selected Countries and Areas, 1999–Present* (Washington, DC: U.S. Department of Commerce, Foreign Trade Division, July 2015).

China had a global services deficit of $41.2 billion in the first quarter of 2015, led in large part by a $40.6 billion spending gap between Chinese and foreign tourists.[3] The first quarter deficit marks a decrease in the deficit from the fourth quarter of 2014, when China's global trade deficit in services was at $73.3 billion.[4]

Bilateral Policy Issues

Information Technology Agreement (ITA)

On July 28, 2015, the World Trade Organization (WTO) announced that negotiations to revise the Information Technology Agreement (ITA) had concluded. Taiwan and Thailand, the last holdouts, accepted the product coverage list previously approved by other negotiating parties.[5] The agreement covers 201 tariff lines, including new-generation semiconductors, global positioning system (GPS) navigation systems, telecommunications satellites, touch screens, and tools for manufacturing printed circuits.[*]

By the end of October 2015, each participant will submit a draft implementation schedule, with the goal of finalizing the agreement in time for the December ministerial conference in Nairobi. The participants agreed to reduce tariffs on the covered goods in four equal annual reductions of customs duties, beginning on July 1, 2016, and concluding on July 1, 2019.[6]

The original ITA went into effect in 1997 among the United States and 28 other WTO members, not including China (which did not join the WTO until 2001).[†] Negotiations for a revised ITA were begun in 2012 and slated for conclusion at the WTO Bali Summit in December 2013; however, the process stalled because Beijing devised a long list of items it wanted either to exclude completely or subject to tariff phaseout periods longer than those permitted under the original ITA framework.[7] The talks were suspended in November 2013. In November 2014, the U.S. Administration announced it convinced China to table a more acceptable offer. Specifically, China agreed to: (1) revise its ITA list to include disputed tariff lines, notably advanced semiconductors known as MCOs (multicomponent semiconductors), magnetic resonance imaging (MRI) machines, and high-tech testing equipment; and (2) ensure its tariff phaseout periods comply with the ITA framework's three staging categories of immediate, three years, and five years.[8] Based on the U.S.-China agreement, the other ITA participants reopened the ITA talks.

Since 1997, information technology (IT) has proliferated, IT product trade has risen threefold, and China has become a dominant producer and consumer of technology goods. As Table 4 demonstrates, the United States currently runs trade deficits with China in several key technology product lines (e.g., static converters, video game consoles, and semiconductors). In some cases, China accounts for the largest share of U.S. imports of these goods.

[*] For the full list, see Office of the U.S. Trade Representative, *ITA-Expansion Product List*, July 2015. *https://ustr.gov/sites/default/files/ITA-expansion-product-list-2015.pdf*.

[†] The ITA currently includes 81 participants, including the United States, China, South Korea, and the EU member states. For a full list, see World Trade Organization, "Information Technology: Schedule of Concessions." *https://www.wto.org/english/tratop_e/inftec_e/itscheds_e.htm*.

Table 4: U.S.-China Trade in Select Technology Products
(US$ millions; share %)

U.S. Imports						
	U.S. global imports			China's share		
	2002	*2008*	*2014*	*2002*	*2008*	*2014*
Static converters	3,594	6,517	9,060	30.7%	45.0%	49.5%
Video game consoles	5,893	12,849	6,106	45.0%	90.2%	87.9%
Diodes, transistors, and semiconductors	3,289	5,549	9,447	8.5%	17.2%	31.3%
CT scanners	387	455	526	1.0%	20.8%	20.6%
MRI machines	514	530	444	0.7%	4.0%	7.5%
U.S. Exports						
	U.S. global exports			China's share		
	2002	*2008*	*2014*	*2002*	*2008*	*2014*
Static converters	1,505	2,815	4,004	3.3%	6.3%	6.6%
Video game consoles	1,161	4,567	2,939	0.4%	0.4%	0.7%
Diodes, transistors, and semiconductors	4,020	8,555	7,466	5.4%	5.1%	4.8%
CT scanners	240	656	430	8.0%	6.0%	17.9%
MRI machines	478	441	722	4.1%	7.4%	20.8%

Source: U.S. International Trade Commission.
Note: HS Codes used for this table are static converters (850440); video game consoles (9504); diodes, transistors, and semiconductors (8541); CT scanners (9022120000); and MRI machines (9018130000).

While the conclusion of the WTO negotiations is important, it does not guarantee success. China has not consented to including tariff elimination on several key products, including liquid crystal displays (LCDs). More important, maximum phaseout periods for the covered items remain subject to negotiation.[9] Although China may not go beyond the maximum phaseout period, it could require the longest phaseouts for many products. If China succeeds in doing so, it could use those years to establish nontariff barriers that protect sensitive products from foreign competition. Examples of such barriers include discriminatory value-added taxes on imports, hidden subsidies for domestic producers, standards that favor indigenous products, and control over procurement of key technologies by state-owned entities (China is still not a signatory to the WTO Government Procurement Agreement, which generally bans discrimination against foreign goods).

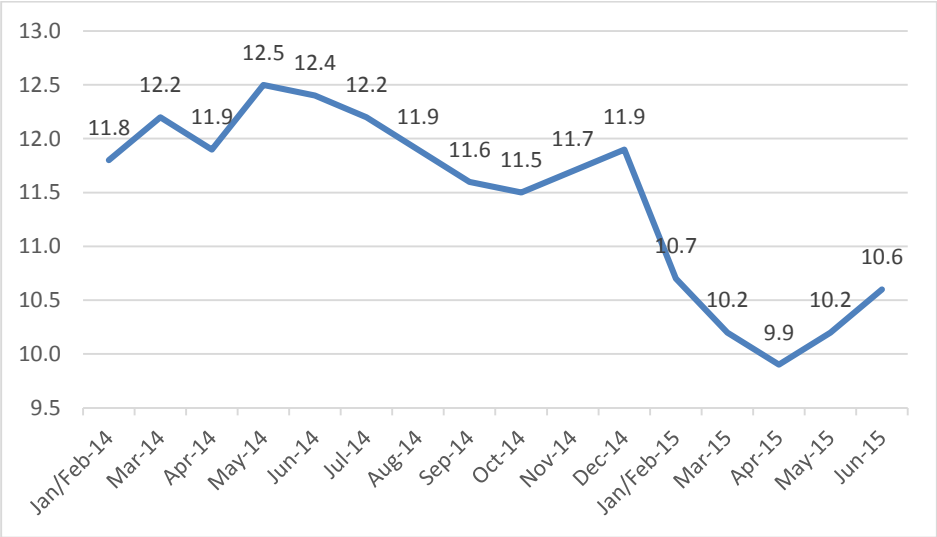
Quarterly Review of China's Economy

China's GDP Growth Higher than Expected, but Still Historically Sluggish

In the second quarter of 2015, China maintained real gross domestic product (GDP) growth of 7 percent on an annualized basis, surpassing economists' predictions.[10] Other proxy indicators of economic growth also increased. Electricity consumption increased from 1.3 percent growth year-on-year in the first quarter to about 1.6 percent year-on-year in the second quarter (finishing strong at 1.8 percent year-on-year growth in June).[11] China's value-added of industry increased 6.8 percent year-on-year in June, up from 5.6 percent year-on-year in March.[12] The earnings of state-owned enterprises (SOEs) declined 0.1 percent in the first half of the year compared to the same period last year, but reflect a recovery in the second quarter following a 3.3 percent decline from January to May.[13] Despite the apparent success of government measures to maintain growth, however, China is still facing its slowest period since early 2009.

The stronger-than-anticipated second quarter was supported in large part by improved consumption and real estate sales. China's National Bureau of Statistics (NBS) reported that consumption contributed nearly 60 percent of GDP growth this quarter, up from around 50 percent a year ago.[14] Retail sales of domestic goods and services, a proxy figure for overall consumption, grew at 10.6 percent year-on-year in June 2015, up from just 9.9 percent in April 2015 and 10.2 percent in May 2015 (see Figure 4). The real estate market saw a significant upturn, recording positive home sales growth for the first time since December 2013; after housing sales fell 2.2 percent year-on-year in the first four months of 2015, sales rose 16 percent year-on-year in April 2015.[15] Average new home prices also began to rise for the first time since April 2014, with a 0.2 percent increase in May and a 0.4 percent increase in June.[16]

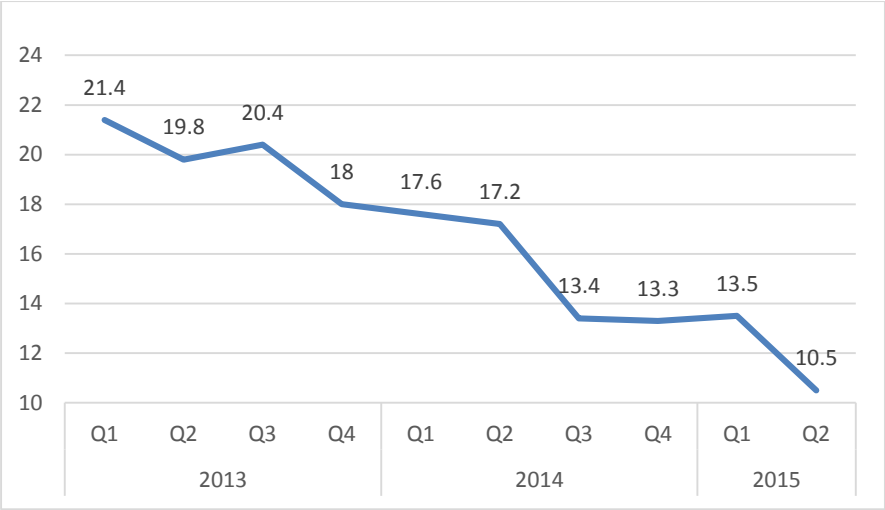
Figure 4: China Retail Sales of Consumer Goods
(monthly, year-on-year, %)



Source: National Bureau of Statistics, via CEIC data.

While improved consumption and real estate sales were enough to boost China's GDP growth, the effects have not trickled down into the rest of the economy, with other key indicators falling below target. Expansion of fixed asset investment (FAI), for example, is a key pillar of China's traditional growth model, including spending on infrastructure, factory equipment, and property construction. After falling to 13.5 percent rate of growth in the first quarter of 2015 compared to the same period last year, China's FAI growth rate declined to just 10.5 percent year-on-year in the second quarter (see Figure 5). In addition, China's disposable income per capita increased just 7.6 percent year-on-year in the second quarter, down from the 8.1 percent rate in the first quarter.[17]

Figure 5: Growth in Fixed Asset Investment
(quarterly, year-on-year, %)



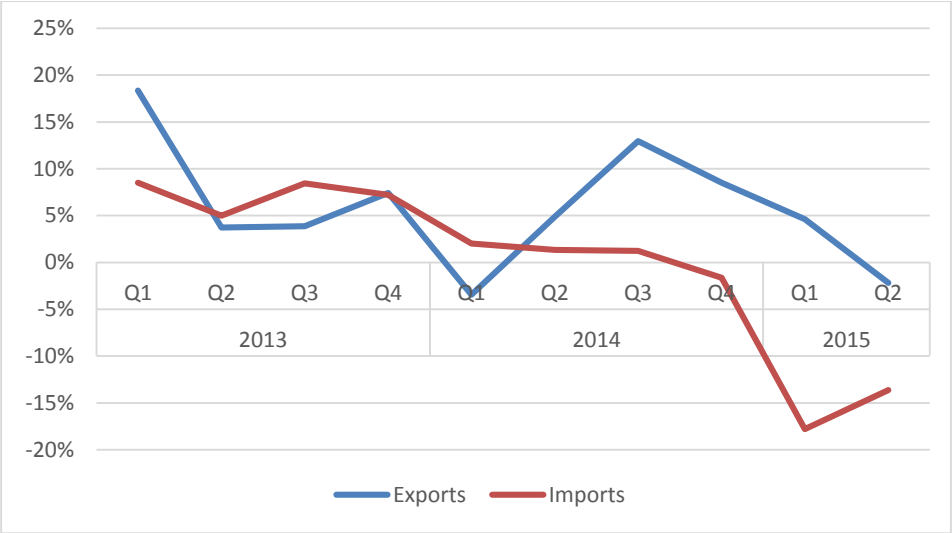
Source: National Bureau of Statistics, via CEIC data.

China's manufacturing sector remained stagnant in the second quarter. HSBC's unofficial estimate shows China's manufacturing purchasing managers' index (PMI) at 50.2 percent in May and June, just above the 50 percent mark distinguishing growth from contraction.[18] Though it represented a slight improvement from March 2015 (49.6 percent) and April 2015 (48.9 percent), China's middling manufacturing PMI led to major staffing cuts by manufacturers, resulting in the country's sharpest employment reduction in six years.[19] Following HSBC's decision to end its sponsorship of China's market indexes in June, Caixin has taken over reporting China's PMI, providing an unofficial estimate of 47.8 for July—a two-year low.[20] Mitigating somewhat problems in China's manufacturing sector is China's services sector, which showed expansion according to Caixin's estimate of services PMI, going from 52.8 in June to 53.8 in July.[21]

Like production, Chinese exports continue to paint a discouraging picture, with a stronger currency and low global demand causing a contraction of around 2.5 percent year-on-year (see Figure 6). Coupled with a contraction of nearly 14 percent for imports compared to the second quarter of last year, China's production rate is unlikely to increase in the short term; typically, declining import growth suggests a lack of demand from factories.

In an effort to increase imports and spur domestic consumption, the government cut tariffs on consumer goods—including clothing, shoes, and cosmetics—in June. The government hopes that by slashing duties in half (on average), demand for imports will rise.[22] Foreign analysts, meanwhile, remain skeptical about the effects of the policy, projecting that its impact will be marginal.[23]

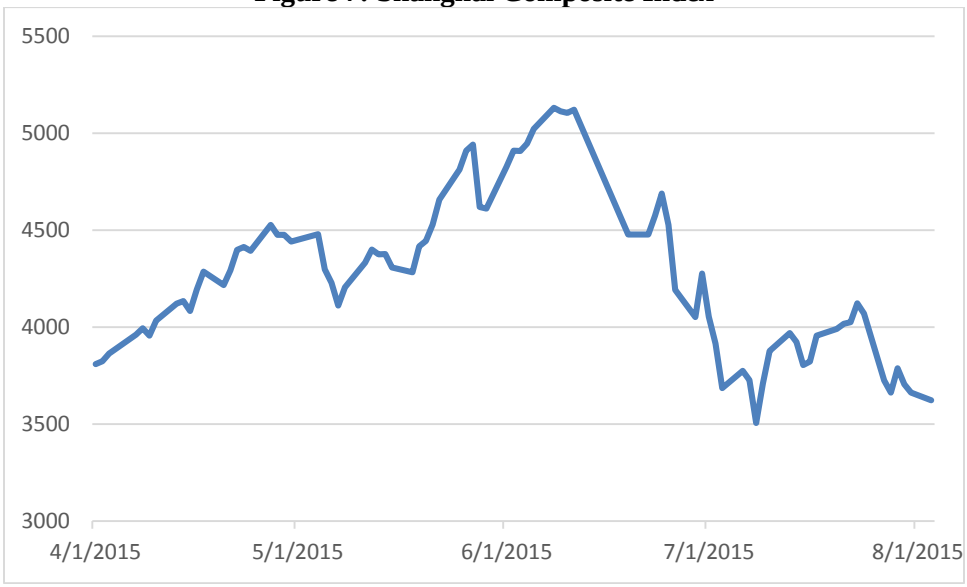
Figure 6: Growth in China's Exports and Imports
(quarterly, year-on-year, %)



Source: China Administration of Customs, via CEIC data.

Stable GDP growth is coming at a much-needed time for the Chinese leadership shaken by the turmoil in the stock market, a major driver of Chinese growth throughout the economic reform process. Attempts by the government to mitigate the stock market crash[*] have been met with inconsistent results, with the Shanghai Composite Index surpassing 4,000 points on July 21, up from just 3,507 on July 8 before dropping to as low as 3,662 on August 3 (see Figure 7). The stock market crash may well set back reforms, as promises by Chinese leaders to open up the market have been lost amid the scramble to stop the sell-off.[24]

Figure 7: Shanghai Composite Index



Source: Bloomberg. *http://www.bloomberg.com/quote/SHCOMP:IND*.

[*] For a description of the measures used by the Chinese government to prop up the stock markets, see Nargiza Salidjanova, "China's Stock Market Collapse and Government's Response," *U.S.-China Economic and Security Review Commission*, July 13, 2015. *http://origin.www.uscc.gov/sites/default/files/Research/China%E2%80%99s%20Stock%20Market%20Collapse%20and%20Government%E2%80%99s%20Response.pdf*.

Sector Spotlight: China Aims to Boost Domestic Semiconductor Industry

The recent conclusion of the ITA negotiations has put the spotlight on China, a key player in the international IT manufacturing chain currently trying to work its way up from assembler of imported components to designer and producer. China is the largest assembler and manufacturer of ICT and other electronic equipment in the world with over half of the world's electronics production.[25] In 2013, China accounted for the global production of roughly 81 percent of mobile phones, 63 percent of personal computers, and 57 percent of color televisions.[26] But foreign contract electronics manufacturing firms like Taiwan multinational Hon Hai Precision Industries (FoxConn),[*] the world's largest contract manufacturer of electronics goods and largest private employer in China, compose a majority of China's electronics exports.[27] As a result, the country's electronics industry lags far behind its foreign competitors in the design and production of innovative, high-tech goods. This gap is particularly evident in semiconductors—the most valuable components in most electronic products—where foreign producers dominate in terms of market share and revenue. Yang Xueshan, deputy minister of China's Ministry of Industry and Information Technology (MIIT), emphasized the development of the semiconductor industry as both strategic to China's national security and defense needs and fundamental to meeting its rising market demand and higher value-added development and economic competitiveness objectives.[28]

Semiconductors, which include diodes, transistors, integrated circuits (IC), and printed circuit boards, are an important component in nearly all modern electronic products, including mobile devices, computers, automobiles, aviation equipment, medical equipment, industrial and commercial machinery, cloud computing, and networking.[29] Since 2005, China has been the largest semiconductor market in the world driven by companies doing assembly in China, and in 2014 accounted for half of $335.8 billion global market.[30] However, according to the accounting firm PWC, more than 90 percent of China's consumption of IC came from foreign IC producers in 2013.[31] Furthermore, nearly three-quarters of these semiconductors are re-exported as components in electronics produced in China by foreign firms—in effect creating a closed-loop supply chain that Chinese firms are not a part of.[32]

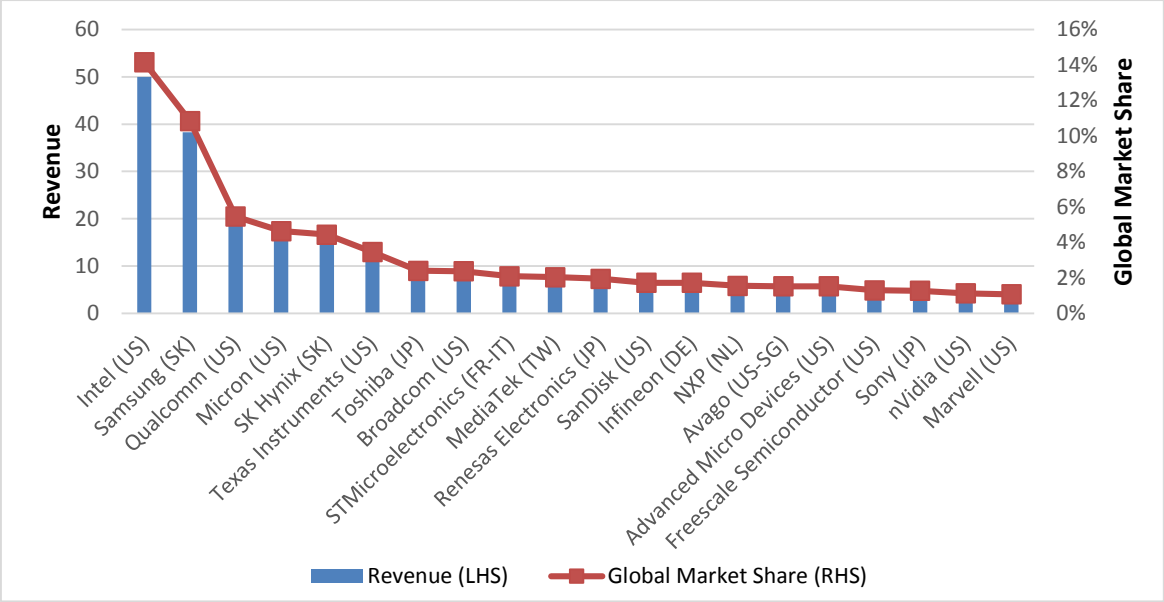
Semiconductor firms can be separated into three distinct types (fabs, foundries, and fabless) based on their operations. Fab firms—such as the U.S. multinational Intel or South Korean multinational Samsung—design, manufacture, and sell their own semiconductors. Foundry firms, largely controlled by Taiwan Semiconductor Manufacturing Company (TSMC), are factories that manufacture semiconductors based on customers' specifications. Fabless firms, for example the U.S. multinational Qualcomm, design semiconductors and then contract out manufacturing to either foundries or fabs.[33]

U.S. multinational firms dominate the semiconductor industry, accounting for 11 of the top 20 global semiconductor suppliers in 2014 (see Figure 8).[34] According to IHS Technology, in 2014 Intel was the largest supplier of semiconductors and the world's largest supplier of microprocessors, with 14.1 percent of global market share based on revenue. Samsung was the second largest at 10.8 percent, and Qualcomm was the third largest at 5.5 percent.[35] These leading firms maintain near monopolies in specific segments of this industry. For example, Qualcomm is the largest manufacturer of smartphone chips, while Samsung is the largest producer of dynamic random access memory chips used in personal computers.[36]

[*] Foxconn is the world's largest contract manufacturer of electronics goods and is expected to be the largest contract manufacturer of smartphones, tablets, and desktop computers by the end of 2015. It is also the largest private employer in China with 1.4 million workers. Kishalaya Kundu, "Foxconn Plans to Become Largest Smart-Device OEM in 2015," *Android Headlines*, June 26, 2015. *http://www.androidheadlines.com/2015/06/foxconn-plans-to-become-largest-smart-device-oem-in-2015.html*.

Figure 8: Top 20 Semiconductor Suppliers in 2014

(US$ billions; %)



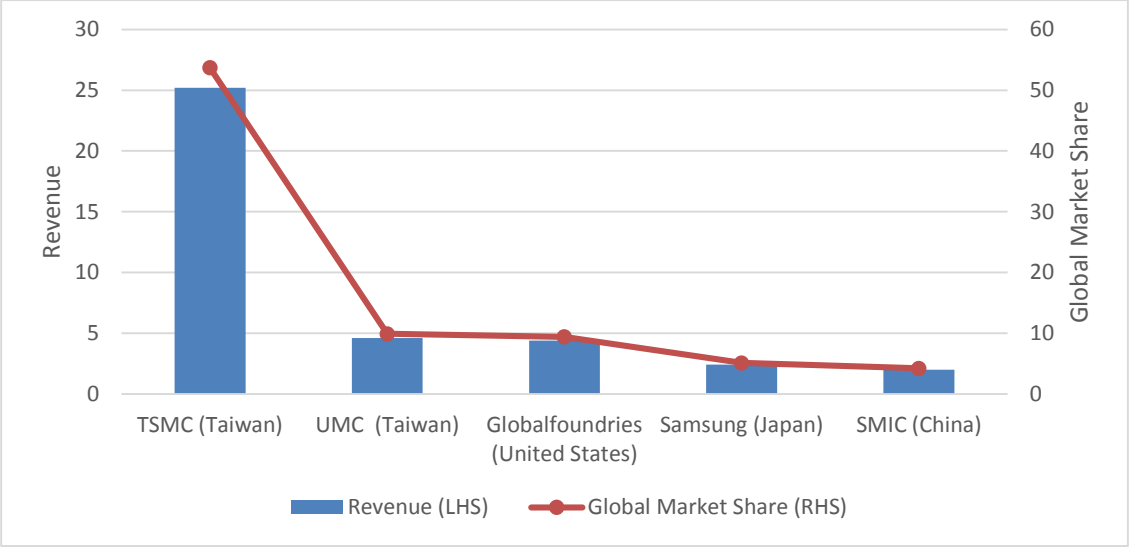
Note: US refers to the United States, SK is South Korea, JP is Japan, FR is France, IT is Italy, TW is Taiwan, DE is Germany, NL is Netherlands, and SG is Singapore.
Source: IHS Technology, "Competitive Landscaping Tool." *https://technology.ihs.com/526941/competitive-landscaping-tool-clt-annual-detail-q1-2015*.

Semiconductor components were the third largest U.S. manufacturing exports over the last five years, totaling $43 billion in 2014.[37] However, this figure underrepresents U.S. share of this market because there is a high volume of re-exports with U.S. firms manufacturing and designing the chips in the United States then exporting the chips for testing and packaging/final assembly abroad.[38] More tellingly, U.S. firms made up 51 percent of the $335.8 billion global market in 2014, with firms such as Intel and Qualcomm the leading global manufacturers, based on World Semiconductor Trade Statistics.[39] In 2014, U.S. firms accounted for nearly 60 percent of China's $91.6 billion semiconductor market.[40] John Neuffer, president and CEO of Semiconductor Industry Association, expects the recent ITA deal to boost semiconductors exports with the reduction of an estimated $150–$300 billion in annual tariffs, particularly next-generation semiconductors (MCOs) not included in the original ITA.[41] Beyond chips, U.S. firms are the largest semiconductor manufacturing equipment (SME) producers with 44 percent of global market share followed by Japanese firms with 32 percent.[42]

While U.S. firms dominate the more profitable design and equipment side, Taiwan firms lead the world in semiconductor manufacturing or foundry capacity (see Figure 9). According to IT research firm Gartner, TSMC and United Microelectronics Corporation (UMC) together accounted for more than 60 percent of global foundries based on revenue in 2014.[43] By comparison, China's leading foundry, Semiconductor Manufacturing International corporation (SMIC), is the world's fifth-largest foundry, but its revenues are less than half that of UMC.[44] What's more, SMIC lags approximately two generations behind in process technology and wafer size, a huge disadvantage in this rapidly evolving industry.[45] Taiwan is further adding capacity to widen the divide and meet growing global demand. Taiwan has been the largest SME market for the last few years composing more than a quarter of the global market and, predictably, was the largest market for U.S. SME exports from 2009 to 2013 followed by South Korea, China, and Japan.[46] Taiwan is expected to continue as the world's largest SME market with an 18 percent annual increase in purchases of SME in 2016.[47]

Figure 9: Top Five Semiconductor Foundries in 2014

(US$ billions; %)



Source: Gartner, "Worldwide Semiconductor Foundry Market Grew 16.1 Percent in 2014, According to Final Results by Gartner," April 13, 2015. *http://www.gartner.com/newsroom/id/3027717*.

China's Push for Microchip Independence

The Chinese government is seeking to break China's dependence on imports from foreign producers for two reasons: First, it wants to build globally competitive domestic semiconductor firms, which will capture the revenue currently accruing to foreign companies.[48] Second, it wants to ensure China's national security by breaking "the technological dominance of the West and [strengthening] the country's position in the cybersecurity war."[49]

Under the 12th Five-Year Plan (2010–2015), the Chinese government provided significant tax and other financial support to create firms able to compete globally and set technological standards.[50] In November 2013, the State Council announced it would establish the IC Industry Support Small Leading Group, led by Vice Premier Ma Kai, to ensure high-level support and interagency cooperation.[51] In June 2014, the Chinese government established the *Guidelines to Promote National Integrated Circuit Industry Development* that outlined its development targets for its IC design and IC foundry services.[*] These 2014 guidelines set targets including: achieving greater than $57 billion (renminbi [RMB] 350 billion) in annual sales by 2015; maintaining a more than 20 percent compound annual industry-wide revenue growth rate through 2020; and becoming a global leader in the primary semiconductor IC supply chain by 2030.[52] The guidelines also established a $19.5 billion (RMB 120 billion) 2014–2017 National Industry Investment Fund to provide high-level support and funding, establish national champions, and facilitate consolidation and global competitiveness of its national champions.[53]

The Chinese government expects to invest as much as $161 billion (RMB 1 trillion) over the next ten years—a significant boost for its nascent semiconductor industry.[54] By comparison, U.S. firms spend more than $400 billion on R&D and capital expenditures for 2004–2014.[55] The National Industry Investment Fund is expected to provide $19.5 billion while local governments and private equity investment funds are expected to provide an additional $97.5 billion (RMB 600 billion) by 2020.[56] As of December 2014, the national fund had raised $15.9 billion (RMB 98.7 billion), and the Beijing and Shanghai municipalities established local industry investment funds together worth $6.5 billion (RMB 40 billion).[57] Taiwan's Ministry of Economic Affairs (MOEA) noted that Chinese semiconductor manufacturers are using these national funds to acquire foreign technology and leveraging joint ventures with established global leaders for technology transfer.[58]

[*] For the full text, see: Ministry of Industry and Information Technology, *Guidelines to Promote National Integrated Circuit Industry Development*, June 24, 2015. *http://www.miit.gov.cn/n11293472/n11293832/n11293907/n11368223/16044261.html*.

The concerted government efforts have had some effect. In 2003, there were only 11 Chinese semiconductor companies out of 200 worldwide (or 6 percent of the world's total); by 2013, the number of Chinese companies grew to 32 out of 288 (or 11 percent).[59] Still, Chinese companies play only a marginal role in international semiconductor production. Only 8.2 percent of China's semiconductor consumption in 2013 came from domestic firms, and China accounted for only 14 percent of global semiconductor-focused patents.[60]

China's failure to become a semiconductor superpower by diktat stems from systemic weaknesses including a lack of core technology and innovative capacity, low levels of investment, a shortage of local talent, and failure to take into account the needs of the market.[61] Realizing the limitations of the top-down approach, the Chinese government has shifted its focus to acquiring technology from foreign firms through mergers and acquisitions (M&As) and technology transfer. As Handel Jones, president of the Silicon Valley consultancy International Business Strategies, noted, "They [the Chinese government] have decided that they really have to buy somebody because they can't deliver the intellectual property themselves."[62]

Mergers and Acquisitions

Chinese firms are following the growing consolidation trend within the industry to increase their economies of scale. Based on data from Thomson Reuters, China was the fourth-largest acquirer (at 6.7 percent) and the third-largest target nation (at 7.7 percent) for semiconductor M&A between 2005 and 2013.[63] Of the 127 M&A deals conducted by Chinese companies for 2005–2013, 24 involved the acquisition of foreign assets, with the United States as the largest investment target, with ten deals.[64] In 2014, at least 3 M&A deals occurred in the IC design sector and 7 M&A deals in the assembly and test field involving both foreign and domestic firms.[65]

The state-owned Tsinghua Unigroup acquired two competing Chinese smartphone chip firms, Spreadtrum Communications in 2013 and RDA Microelectronics in 2014, to become China's largest semiconductor design company.[66] In May, Tsinghua Unigroup acquired a controlling stake in U.S. firm Hewlett-Packard's China networking equipment affiliate for $2.3 billion after revelations by former National Security Agency (NSA) contractor Edward Snowden that the U.S. government used technology company infrastructure for surveillance. These exposures confirmed the Chinese government's fears of using foreign technology and accelerated its industrial policy.[67] In mid-July, Tsinghua Unigroup made a $23 billion bid for U.S. memory chip manufacturer Micron, the fourth-largest semiconductor supplier in 2014. This deal is unlikely to go through because it significantly undervalues Micron's market worth—estimated at around $35 billion last year.[68] While low, the bid represents an entry onto the global M&A stage for Chinese firms and a testing of the U.S. government's tolerance for semiconductor M&A.[69]

Market Access for Technology

China is the world's largest and fastest growing semiconductor market.[70] In order to gain and maintain market access to the world's largest market, U.S. and other foreign firms are acceding to Chinese demands to transfer technology and form joint ventures with its firms. In essence, foreign companies are helping China grow domestic competitors in exchange for short-term market access. Rajiv Ramaswami, head of networking chips at the U.S. semiconductor firm Broadcom, further cautioned that, "They [Chinese companies] use us not because they love us, but because they need us. The minute that stops, we're out."[71] Recent examples of China leveraging market access in exchange for technology include:

- *Qualcomm*: In February 2015, the National Development and Reform Commission, China's chief industrial policymaking agency and regulatory body, filed an antimonopoly case against Qualcomm—the world's largest producer of smartphone chips—over unfair pricing allegations. This case resulted in the largest penalty ever imposed on a company by the Chinese government, and reductions in Qualcomm's patent royalties below its global prices.[72] Reliant on the Chinese market for nearly half its revenue last year, Qualcomm launched a "globalization" unit in May 2015 to assist Chinese smartphone makers—such as Huawei and Xiaomi—in expanding abroad, and allocated $150 million for investments in Chinese startups to regain access to its most important market.[73] Furthermore, a subsidiary of Qualcomm partnered with Huawei, IMEC research institute, and SMIC in June 2015 to create an equity joint-venture to develop 14

nanometer chips, representing a significant step forward for SMIC's ability to challenge TSMC's market dominance.[74]

- *Intel*: In September 2014, Intel, dependent on China for one-fifth of its revenues, signed a $1.5 billion joint-venture deal to get a 20 percent stake in Chinese state-owned subsidiary Spreadtrum in an effort to break Qualcomm's near monopoly over smartphone chips.[75] Analysts have suggested this deal is in part to avoid the regulatory heartache its competitors such as Qualcomm are facing.[76] In October 2014, Intel's venture capital firm invested $28 million in five Chinese mobile device companies, and in April 2015, Intel announced a $19.4 million (RMB 120 million) investment to support Chinese high-tech startups.[77] These partnerships offer Chinese firms financial, product design, manufacturing, and sales and marketing support to weaken its main competitor, Qualcomm, and ensure market access by the Chinese government.[78]

While there is no guarantee the efforts of the Chinese government to advance China's semiconductor industry will be successful, limits on market access, preferential policies for domestic firms, and intellectual property theft disadvantage U.S. firms in its largest, fastest-growing market. Forced technology transfer and joint ventures are creating new competitors that are seeking to dislodge U.S. market leaders. While U.S. firms are likely to maintain its technological edge in the short-run due to enormous R&D expenditures and high barriers to entry, they will face growing competition from Chinese firms in the long-run.[79]

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