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- Executive Summary -

China's Economy	The Re-evaluation of China by Japanese Companies as an Area for Business Expansion

In February 2018, Mizuho Research Institute conducted the "Questionnaire Survey of Japanese Corporate Enterprises Regarding Business in Asia" with member companies (manufacturers with capital of at least JPY 10 million). When the respondents were asked about their preferred area of focus for future business expansion, the number of respondents mentioning China rose. This good news was spurred in part by the improved earnings at business bases in China associated with China's economic recovery in 2017. As for the Chinese economy in 2018, attention has to be given to concerns over economic slowdown due to monetary tightening and the emergence of U.S.-China trade frictions. However, Japanese companies are re-evaluating China in terms of local market expansion and the ease of parts & materials procurement, while the growing momentum toward the normalization of Japan-China relations should provide a tailwind.

Industrial and Regional Policies	New trends in China's solar photovoltaic sector against the rising tide of a new industrial revolution

This report offers an overview of the current state of the solar energy sector in China, which is the world's largest producer of solar photovoltaic cells and its leading installer of solar photovoltaic generation facilities, introduces the central themes and goals of an action plan to develop a smart solar photovoltaic industry during the 2018-2020 period, which was issued by six government ministries with a view to eliminating the demand-supply gap caused by dispersed energy sources and promoting efficient use of solar photovoltaic energy, and looks at the direction China is taking in its efforts to upgrade and optimize the domestic renewable energy industry through 'smartification' (the integration of energy and information) during the Fourth Industrial Revolution and its effects on the (solar photovoltaic) market.

News from the China Advisory Department	Challenging the "Trilemma" in International Economics: Future Economic Policy Management in China

In April 2018 at the Politburo meeting held by Chinese President Xi Jinping, the Chinese monetary authorities emphasized the importance of supporting domestic demand and cutting corporate fund procurement costs. Even though the general objective remains the compression of leverage for the purpose of averting monetary risks, it is possible that the Chinese authorities are making small adjustments in economic policy management as a result of the heightened risk of the recently observed trade friction between the U.S. and China. This article will explore key points in foreseeing the future Chinese yuan exchange market by comparing policy management at the time of the devaluation of the Chinese yuan in 2015, known as the "China Shock," with the current policy situation in China.

The Re-evaluation of China by Japanese Companies as an Area for Business Expansion

-The 18th Questionnaire Survey of Japanese Corporate Enterprises Regarding Business in Asia (February 2018)-

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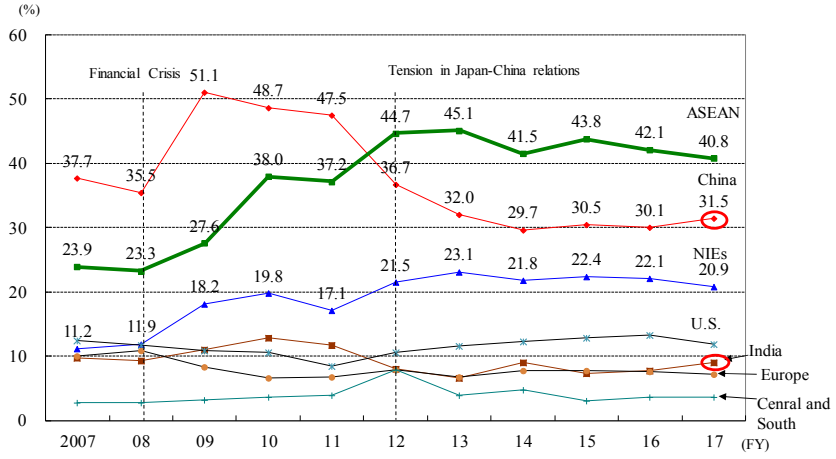
Mizuho Research Institute conducts the "Questionnaire Survey of Japanese Corporate Enterprises Regarding Business in Asia" with our member companies every fiscal year. In the FY2017 survey, conducted in February 2018, questionnaires were sent to manufacturers with capital of at least JPY 10 million, and valid responses from 1,052 companies were collected. Of these, 177 companies have bases in China. As "Geographic areas prioritized by Japanese companies for the greatest future focus," China was overtaken by ASEAN and dropped down to No. 2 from the top position in the FY2012 survey. The situation remained the same in the latest survey. However, the response rate for ASEAN declined, while China rose, with the difference between the two was narrowed. This suggests that Japanese companies are re-evaluating China (Fig. 1). Earnings satisfaction rates at business bases in China are on an uptrend after bottoming out in FY2012. By industry, the index increased for most industries in China. The significant increase in earnings satisfaction rates appears to be the main reason for Japanese companies to re-evaluate China as an area for business expansion.

1. Turning around of response rates for China

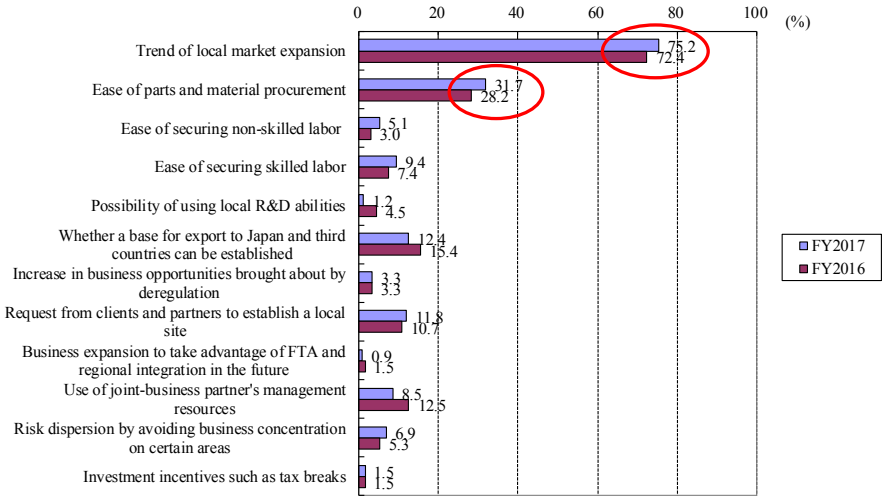
One of the reasons for Japanese companies putting emphasis on China is the rising response rate for "Trend of local market expansion." The result is in contrast with the decline in the response rate for ASEAN (Fig. 2 and Fig. 3). Furthermore, the response rate for "Ease of parts and material procurement" also rose in China.

Fig. 1: Geographic areas prioritized by Japanese companies for the greatest future focus (multiple answers)



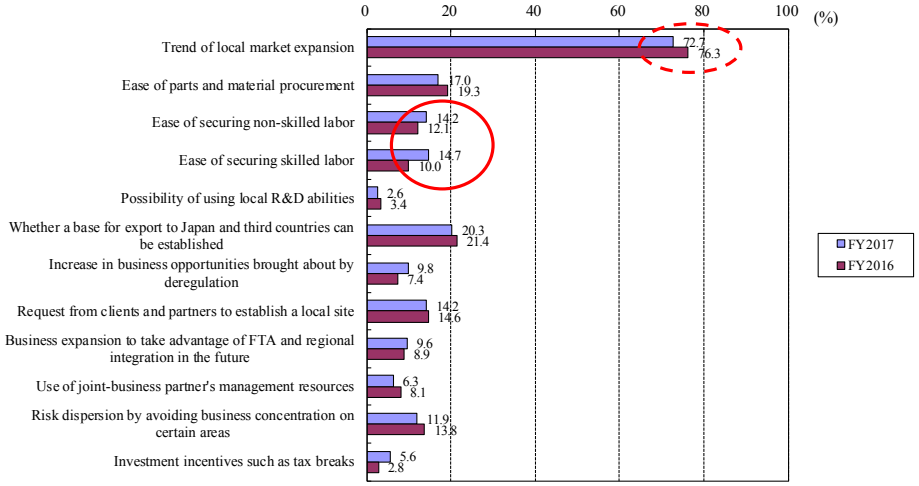
Source: MHRI, *Survey Regarding Business in Asia*

Fig. 2: Most important factors for future decisions (China, multiple answers)



Source: MHRI, *Survey Regarding Business in Asia*

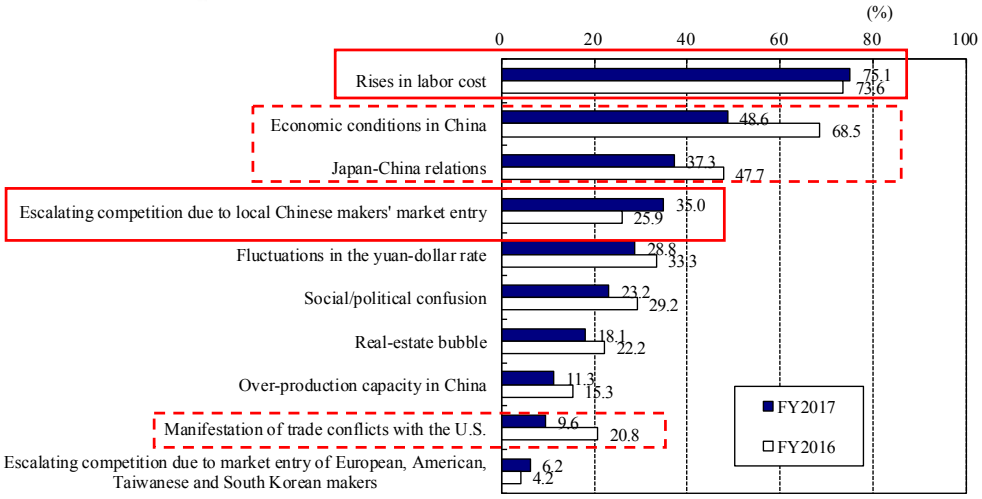
Fig. 3: Most important factors for future decisions (ASEAN, multiple answers)



Source: MHRI, *Survey Regarding Business in Asia*

Behind the rise in the response rate for China and the increase in the response rate for "Trend of local market expansion" is China's recent economic recovery. In 2017, China's real GDP growth rate rose for the first time in seven years, and China's economic recovery is becoming clear. This is also proven by the large decline in the percentage of respondents citing "Economic conditions in China" as "Events likely to pose concerns in the coming 2-3 years for China business" (Fig. 4). In addition, a growing momentum toward the normalization of Japan-China relations appears to help ease concerns over "Japan-China relations."

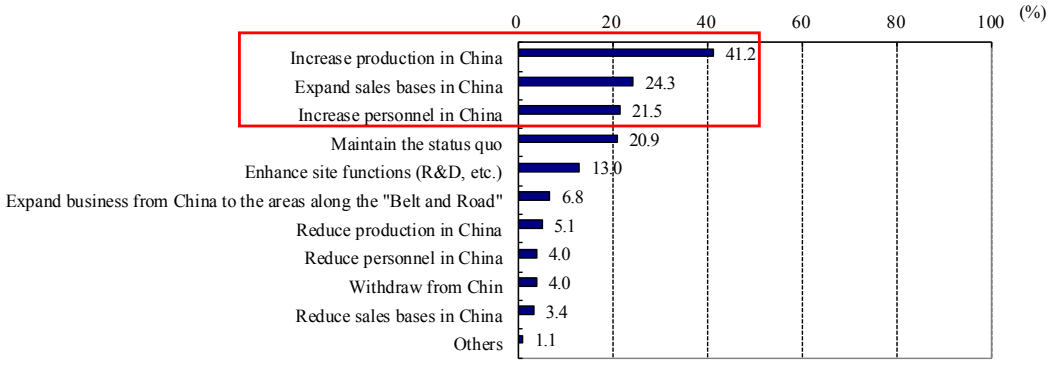
Fig. 4: Events likely to pose concerns in the coming 2–3 years for China business (multiple answers)



Source: MHRI, *Survey Regarding Business in Asia*

As a result, as for "China business in the coming 2-3 years," the percentages of companies choosing "Increase production in China," "Expand sales bases in China," and "Increase personnel in China" all exceeded the percentage of companies choosing "Maintain the status quo" of their bases. This suggests that Japanese companies are more positive about business in China (Fig. 5).

Fig. 5: China business in the coming 2–3 years (multiple answers)



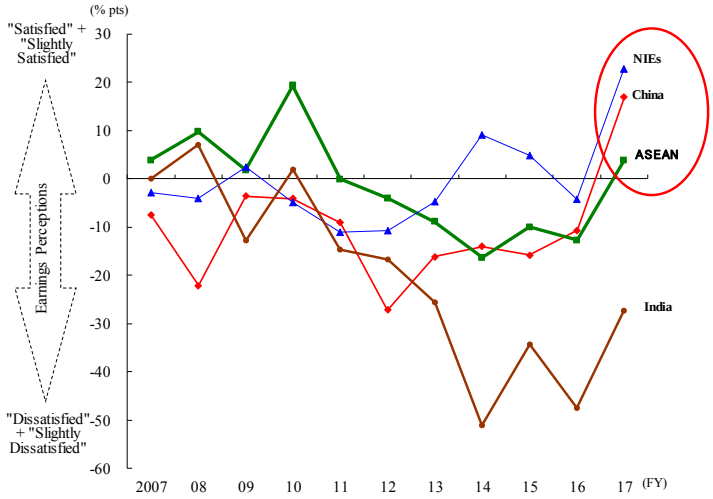
Source: MHRI, *Survey Regarding Business in Asia*

2. Considerable improvements in earnings satisfaction rates at business bases in China

In fact, the earnings perception of Japanese companies at their Chinese bases has improved. Concerning current earnings situations, the survey asked respondents with business bases in Asia to choose one of the following five assessments: "Satisfied," "Slightly Satisfied," "Neither Satisfied Nor Dissatisfied," "Slightly Dissatisfied," or "Dissatisfied." The earnings satisfaction DI was calculated by deducting the sum of respondents choosing "Dissatisfied" and "Slightly Dissatisfied" from the sum of those choosing "Satisfied" and "Slightly Satisfied." Compared to the previous survey, the earnings satisfaction DI improved for China (up 27.6% points), NIEs (up 27% points), ASEAN (up 16.5% points), and India (up 20.2% points), thanks to global economic recovery in FY2017. Among these, China marked the largest amount of increase because its situation surrounding both domestic and external demand was favorable (Fig. 6).

When looking at earnings satisfaction DIs by industry in China, negative figures were posted for all 10 industries in FY2012, while positive figures were seen for most industries in the latest survey (Fig. 7).

Fig. 6: The earnings satisfaction DI of Japanese companies by local business base



Source: MHRI, *Survey Regarding Business in Asia*

Fig. 7: The earnings satisfaction DI by industry for business bases in China of Japanese companies

(Unit: % pts)

	2011	2012	2013	2014	2015	2016	2017
Textiles	23.1	- 28.6	- 25.0	- 57.1	- 53.3	0.0	63.6
Transportation equipment	13.4	- 23.1	0.0	30.7	- 44.4	21.4	40.0
Nonferrous metals	- 83.3	- 66.7	100.0	- 66.7	- 100.0	- 100.0	33.4
General machinery	1.9	- 19.1	- 6.9	5.6	16.4	6.4	31.6
Chemicals	- 17.4	- 4.4	8.7	5.5	20.1	19.1	23.0
Foods and beverages	- 43.8	- 47.0	- 43.0	- 70.6	- 14.3	- 30.7	18.2
Precision machinery	57.2	- 11.1	- 14.3	42.8	0.0	20.0	16.7
Electrical machinery	- 42.9	- 40.7	- 36.1	- 26.4	- 41.6	- 31.8	9.1
Iron and steel	33.3	- 50.0	40.0	0.0	- 42.8	0.0	0.0
Processed metals	10.0	- 30.8	- 12.0	- 23.5	- 7.4	- 17.4	- 16.7

Source: MHRI, *Survey Regarding Business in Asia*

3. Major business challenges of expanding sales shares and increasing the unit prices of products

As business challenges at Chinese bases, the largest proportion of companies cited "Expanding sales share in the Chinese market," followed by "Training personnel at Chinese bases," "Promoting cost reduction by improving productivity," and "Promoting cost reduction by enhancing local procurement."

Meanwhile, in the latest survey, attention is necessary for the response rate for "Increasing the unit prices of products sold in the Chinese market," which follows the above items, as this topic grew by 10% points to 39.6% from 29.6% in the previous survey (Fig. 8). In China, concern over economic conditions has eased. However, the concern over "Rises in labor costs" remains high, while more and more companies are concerned about "Escalating competition due to local makers' market entry" (previously shown in Fig. 4). These results indicate that Japanese manufacturers are trying to increase the unit prices of products sold in the Chinese market in order to pass on labor costs and other production costs to consumers and to differentiate themselves from local manufacturers. Given that the income levels of consumers have increased in China, Japanese manufacturers apparently need to make a shift in sales strategies from a focus on quantity to a focus on quality.

Fig. 8: Business challenges at business bases in China (multiple answers)

(Unit: %, % points)

		High priority	Relatively high priority	Neither high or low priority	Relatively low priority	Low priority	DI
FY 2017	**1. Expanding sales share in the Chinese market**	40.7	38.4	12.4	2.8	4.0	72.3
	2. Training personnel at Chinese bases	27.1	49.7	14.7	2.3	2.8	71.7
	3. Promoting cost reduction by improving productivity	31.1	44.1	12.4	2.8	5.1	67.3
	4. Promoting cost reduction by enhancing local procurement	20.9	42.4	20.9	4.5	6.2	52.6
	5. Increasing the unit prices of products sold in the Chinese market	9.6	39.0	39.5	3.4	5.6	39.6
	6. Building an organization for dealing with compliance	9.0	41.2	33.3	7.9	2.8	39.5
	7. Disseminating one's own brand throughout the Chinese market	21.5	33.9	24.3	9.6	7.3	38.5
	8. Expanding production lines of products sold in the Chinese market	10.2	37.3	32.8	8.5	8.5	30.5
	9. Dealing with exchange risks	6.2	36.7	37.9	7.3	7.9	27.7
	10. Expanding labor management structures, such as reviewing the treatment of employees	7.3	35.6	34.5	12.4	6.2	24.3
	11. Dealing with environmental and energy-saving measures	11.3	28.8	37.9	11.3	5.6	23.2
	12. Increasing exports of products produced in China	10.2	26.6	34.5	7.3	15.8	13.7
	13. Instructing and training suppliers	5.6	27.7	38.4	11.9	10.2	11.2
	14. Understanding situations regarding violations of intellectual property rights and taking countermeasures for such violations	7.9	23.2	41.8	12.4	9.6	9.1
	15. Communicating with stakeholders	3.4	18.6	49.2	15.8	7.3	- 1.1
FY2016	**1. Expanding sales share in the Chinese market**	45.4	33.3	13.0	1.4	2.8	74.5
	2. Training personnel at Chinese bases	26.4	48.6	18.1	1.9	1.9	71.2
	3. Promoting cost reduction by improving productivity	31.5	42.1	14.8	0.5	4.2	68.9
	4. Promoting cost reduction by enhancing local procurement	19.0	41.2	19.9	7.9	5.6	46.7
	5. Disseminating one's own brand throughout the Chinese market	26.4	32.9	22.7	5.6	7.4	46.3
	6. Building an organization for dealing with compliance	8.8	34.7	37.5	7.4	4.6	31.5
	7. Expanding labor management structures, such as reviewing the treatment of employees	3.2	38.4	41.7	6.9	4.6	30.1
	8. Increasing the unit prices of products sold in the Chinese market	12.5	27.8	42.6	5.1	5.6	29.6
	9. Dealing with exchange risks	13.4	23.6	42.6	7.9	6.0	23.1
	10. Expanding production lines of products sold in the Chinese market	8.3	30.1	38.9	8.8	6.5	23.1
	11. Instructing and training suppliers	6.9	25.0	43.5	10.2	6.9	14.8
	12. Understanding situations regarding violations of intellectual property rights and taking countermeasures for such violations	7.9	20.4	50.5	8.3	6.5	13.5
	13. Dealing with environmental and energy-saving measures	7.4	23.6	42.6	9.7	8.8	12.5
	14. Increasing exports of products produced in China	6.5	27.8	31.5	7.9	18.5	7.9
	15. Communicating with stakeholders	3.2	22.7	46.3	11.1	9.3	5.5

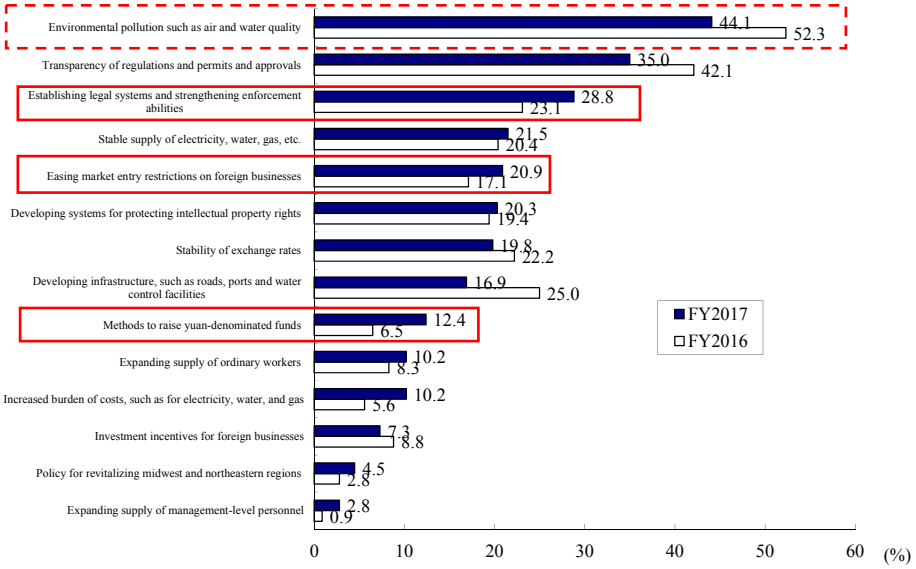
Source: MHRI, *Survey Regarding Business in Asia*

4. Expectations of companies that the Chinese government will "establish legal systems," "ease market entry restrictions," and "relax regulations on methods to raise yuan-denominated funds"

A look at requests from Japanese companies to the Chinese government reveals that "Environmental pollution such as air and water quality" came first, but the response rate for this declined. This apparently reflects the fact that the Chinese government began fully working on environmental measures. Meanwhile, the response rates for "Establishing legal systems and strengthening enforcement abilities," "Easing market entry restrictions on foreign businesses," and "Methods to raise yuan-denominated funds" all increased. The latest survey indicates that requests from Japanese companies to the Chinese government are increasing (Fig. 9).

All of these requests correspond to reforms that are being carried out by the Chinese government. As for deregulation, China announced that it would relax restrictions on foreign automakers' ownership of joint ventures and on investment restrictions on foreign financial institutions. In order to improve the investment environment, the Chinese government is required to steadily implement these deregulation measures under transparent rules.

Fig. 9: Policies that the Chinese government should give priority to (multiple answers)



Source: MHRI, *Survey Regarding Business in Asia*

5. Conclusion

As mentioned previously, the response rate increased for China as an area for business expansion in the future, thanks to China's economic recovery and the momentum toward the normalization of Japan-China relations. Furthermore, it is good news that Japanese companies showed positive attitudes toward increasing production at their business bases in China, expanding their number of sales bases, and increasing personnel, etc. The questionnaire survey suggests that Japanese companies are re-evaluating China both as a market and a supplier. In addition, the investment environment is expected to be further improved in terms of political stability and environmental pollution countermeasures under the leadership of the Chinese government. This also could be a positive factor. Furthermore, the Japan-China-South Korea

trilateral summit was held in Japan on May 9, 2018, marking the first visit to Japan by a Chinese premier in seven years. Under such circumstances, Japan-China relations are expected to be improved going forward.

Meanwhile, when the questionnaire survey was conducted in February, the United States had not yet imposed higher tariffs on steel & aluminum imports, and not so many companies expressed concern over the emergence of U.S.-China trade frictions (previously shown in Fig. 4). However, after that, U.S. President Donald Trump has stepped up pressure on China to correct the trade imbalance. China hopes to avoid friction through dialogue with the United States. However, there is a smoldering concern that the United States will increase pressure ahead of midterm elections in November. Given these, Japanese companies are likely to continue to be careful about the risks of being affected by U.S.-China trade friction.

New trends in China's solar photovoltaic sector against the rising tide of a new industrial revolution

The achievements and challenges of industry growth and China's attempt to shift its smart grid development into high gear

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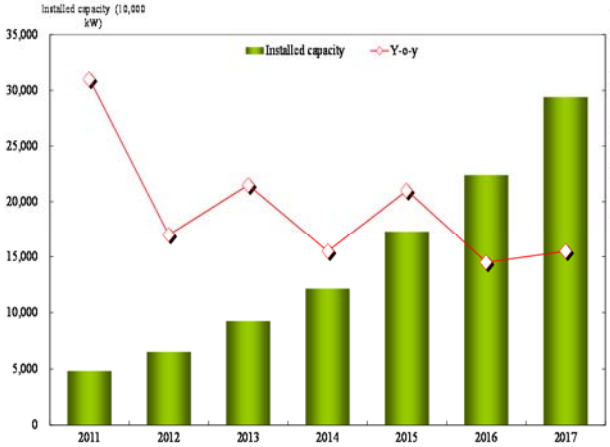
1. Introduction: The achievements and challenges of new energy sector development

The rising tide of the Fourth Industrial Revolution presents both a major challenge to and an opportunity for the development of China's energy sector. Energy production in China has long been fueled by coal, but in 2016, the ratio of energy production from coal sources (as a percentage of total generation) finally dropped below 70 percent (69.6%), which is still a little higher than the 69.4 percent recorded for 1980 and argues that China will struggle to bring this figure below 60 percent. The share of coal in China's primary energy consumption mix, however, declined to 62 percent in 2016 (compared to 70.2% in 2011), which is well below the coal production ratio and suggests that Chinese consumers are leaning increasingly toward clean energy sources. In fact, China's clean energy consumption increased from 15.5 percent in 2013 to 20.8 percent in 2017, and this points to a growing preference for clean energy – among consumers, if not producers – that is presumably based on concerns about air pollution and for the environment. Since coal forms the base of energy production in China, it will not be possible for the government to transform the structure of the industry overnight, but it has been attaching enormous weight to this issue for several years now and some achievements have been made as a result.

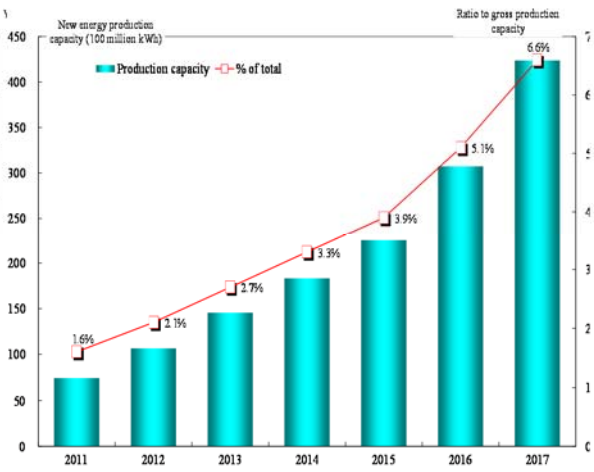
These are apparent from **Figure 1**, which illustrates recent trends in installed generation capacity from new energy sources. Production of energy from new energy sources has been growing by the year and increased from 1.6 percent of total installed generation capacity in 2011 to 6.6 percent (which equates to a more than four-fold increase) in 2017 (**Figure 2**). This is partly attributable to the scaling up of existing nuclear and hydro power generation but is also the result of government efforts to promote the use of wind and solar photovoltaic energy.

Figure 1: Recent trends in installed generation capacity from new energy sources in China



Source: "White Paper on Promoting the Development of New Energy 2018", State Grid Corporation of China

Figure 2: Transitions in production capacity from new energy sources and its ratio to gross production capacity in China (2011–2017)



Source: "White Paper on Promoting the Development of New Energy 2018", State Grid Corporation of China

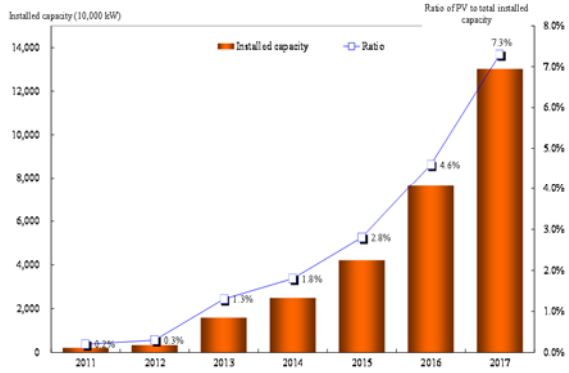
China is already the world's largest provider of both wind and solar energy. Since the construction of generation infrastructure in these sectors has been highly dispersed, however, and wastage rates are also high, making the development and expansion of an internet (IoT)-enabled smart grid – one of the guiding ideas behind the Fourth Industrial Revolution that would also encourage more efficient power utilization – is an urgent priority and one that the Chinese government has been striving to develop policy for in recent years. For the solar energy sector, the government has been working on both generation and distribution and has unveiled policy goals and project plans for the construction of smart solar PV generators. In April this year, six government ministries issued a three-year action plan targeting the 'smartification' of China's entire energy sector that starts with solar power generation and overlaps with the implementation of "Made in China 2025" – China's grand plan to bolster its high-tech industries. Based on this, this report offers an overview of the current state of the solar energy sector in China, which is now the world's leading installer of solar PV generation facilities, examines the new policy goals that have been introduced with a view to making China's solar industry smarter and looks at the prospects for future developments.

2. China's massively expanded solar energy sector and the evolution of multiple government measures to support it

One recent feature of China's new energy industry is the rapid growth in wind and solar photovoltaic capacity, which is outpacing that of both hydro and nuclear power – two sectors that, until recently, had attracted widespread attention, with the speed of growth in solar photovoltaics being particularly rapid.

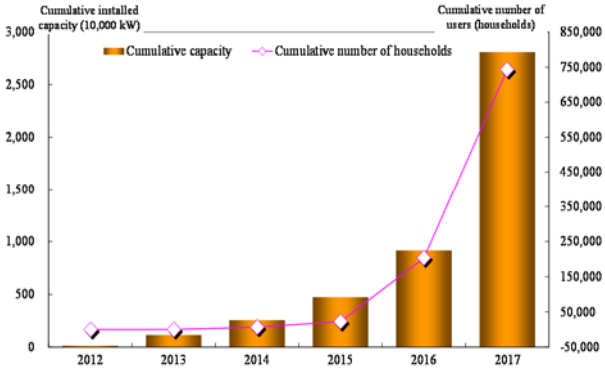
Figure 3 illustrates this trend in installed solar power capacity. In 2017, China added approximately 130 million kW of new solar capacity, bringing the ratio of power production from solar sources to 7.3 percent of gross, or growth rates of 61.4-fold and 36.5-fold against the figures for 2011, respectively. Whilst off-grid, dispersed solar power remains limited, construction of grid-connected solar systems is increasing at an exponential rate, with the surge seen in 2017 being particularly staggering (**Figure 4**). This graphically reflects the historical background to solar power in China and conditions in this sector.

Figure 3: Recent Trends in Installed Solar Energy Capacity in China



Source: "White Paper on Promoting the Development of New Energy 2018", State Grid Corporation of China

Figure 4: Grid-connected Solar System Capacities and User Numbers (cumulative)



Source: "White Paper on Promoting the Development of New Energy 2018", State Grid Corporation of China

Like wind power, the solar photovoltaic sector has been positioned as a strategic emerging industry and since it is also an inherently high-tech industry it was an early recipient of government backing and support and grew rapidly as a result. China began utilizing solar energy, including solar-thermal power, around the year 2000, but the first solar power plant was built as far back as the 1970s. The focus on promoting the development of this industry can be traced back to 2006 – the first year of China's 11th Five-Year Plan (**Table 1**). That year also saw the enactment of the Renewable Energy Law, whilst the "Medium and Long-Term Development Plan for Renewable Energy in China" was issued the following year (2007), with this legislation providing the legal basis for promoting the utilization of solar energy and establishing it as a development goal over the mid- to long-term.

The RMB 4 trillion stimulus package that China later launched to counter the effects of the global financial crisis included measures to adjust and promote traditional manufacturing (in 10 major industries), as well as plans for accelerating growth in new and renewable energy and the other strategic emerging industries. The year 2009 saw the release of multiple measures aimed at providing political support for the solar photovoltaic industry (see items 4–6 in the table below), and the subsequent boom in the development of both wind power and solar power, and specifically in solar cells, is attributed to these legislative moves by the government.

Table 1: A Chronology of Policy to Promote China's Solar Photovoltaic Industry

No.	Issuing Agency	Name of Policy or Plan, etc.	Year of issue
1	Standing Committee of the NPC	Renewable Energy Law	2006
2	State Council	Administrative Regulations on the Renewable Energy Development Special Fund	2006
3	National Development and Reform Commission (NDRC)	Medium and Long-Term Development Plan for Renewable Energy in China	2007
4	Ministry of Finance, Ministry of Housing and Urban-Rural Development	Guiding Opinion on Promoting the Construction and Application of Solar Photovoltaic Construction	2009
5	Ministry of Finance	Administrative Measures on Financial Subsidies for Solar Photovoltaic Construction and Application	2009
6	Ministry of Finance, Ministry of Science and Technology, National Energy Administration	Notice on the Implementation of the Golden Sun Demonstration Project	2009
7	State Council	Decision on Accelerating the Fostering and Development of Strategic Emerging Industries	2010
8	NDRC	Notice on Improving the Pricing Policy for On-Grid Solar Photovoltaic Power Prices	2011
9	NDRC	Interim Measures on the Administration of Off-Grid Power Generation	2013
10	NDRC	Notice on Promoting the Healthy Development of the Solar Photovoltaic Industry using the Price Leverage Effect	2013
11	Ministry of Finance	Notice on Several Issues relating to Policy on Subsidizing Off-Grid Power based on Capacity	2013
12	National Energy Administration, China Development Bank	Notice on the Provision of Financial Services Support for Off-Grid Solar Photovoltaic Power	2013
13	Ministry of Finance	Notice on VAT Policy for Solar Photovoltaic Power	2013
14	Ministry of Industry and Information Technology (MIIT)	Interim Measures on the Administration of Solar Photovoltaic Manufacturing Industry Specification Announcements	2013
15	Ministry of Finance	Notice of Exemption from Government Levies on Self-generated, Off-Grid Solar Energy	2013
16	National Energy Administration	Notice on the Downgrading of the 2015 Plan for Solar Photovoltaic Construction	2015
17	National Energy Administration	Working Plan on the Implementation of a Trial Program of Solar Energy for Poverty Alleviation	2015
18	MIIT	Opinions on Leveraging Market Needs to Promote Solar Photovoltaic Technologies and the Upgrading of the Industry	2015
19	NDRC, National Energy Administration	Guiding Opinions on Promoting Smart Grid Development	2015
20	NDRC	Notice on Standard On-Grid Electricity Pricing Policy for Onshore Wind and Solar Photovoltaic Power	2015
21	National Energy Administration	Administrative Measures on Fully Guaranteed Purchases of Renewable Energy (Draft for Soliciting Opinions)	2015
22	National Energy Administration	Implementation Opinions on Accelerating Energy Development and Construction in Poverty-stricken Areas and Promoting Poverty Alleviation	2016
23	NDRC	13th Five-Year Development Plan for Solar Energy	2016
24	NDRC	Notice on Solar Photovoltaic Energy Pricing Policy for 2018	2017
25	Six government agencies, including MIIT, Ministry of Transport, Ministry of Agriculture, National Energy	Action Plan for the Development of a Smart Solar Photovoltaic Industry (2018–2020)	2018

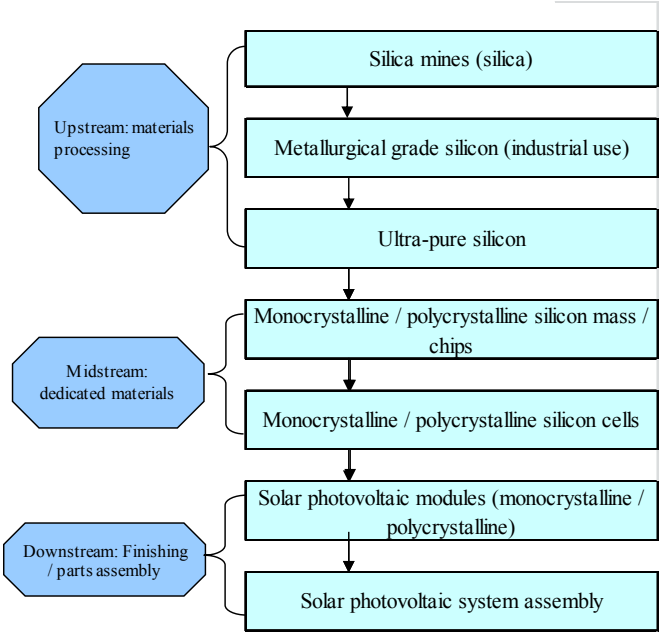
	Administration, State Council Leading Group of Poverty Alleviation and Development		

Source: Compiled from Chinese governmental websites and various news sources

Note: The policies, etc. listed in this table represent only a portion of Chinese government policy on the domestic solar photovoltaic industry, which is multifarious and covers numerous areas including new and renewable energy, strategic emerging industries, investment, land use, poverty alleviation, and the Industrial Internet. For example, the "China Renewable Energy Catalogue (2013–2017)" (national edition), which is published by the China National Renewable Energy Centre, records close to 50 national policy documents on the industry, and when the regional edition's policy documents are included, more than 100 related policies are recorded, which should give some indication of how important and representative the solar photovoltaic industry is in terms of the enactment and implementation of industrial policy in China.

Solar photovoltaics, however, works on different principles to both the solar thermal power that is produced by solar systems and solar thermal power generation, in that it utilizes solar cells to convert solar energy into electrical energy and, despite its extremely long industrial chain (production process) (**Figure 5**), has, for many years, been expensive to introduce and utilize in China. In consequence, China has focused on consignment processing industries, such as silicon materials processing, solar cells manufacture and the fabrication of solar photovoltaic modules, rather than the installation and use of solar photovoltaic systems, with companies entering the market and expanding their operations predominantly in mid-stream and upstream sectors of the industry chain.

Figure 5: A Schematic Overview of the Solar Photovoltaic System Manufacturing Process



Source: Compiled and adapted from the "Report on the Development of the Photovoltaic Industry in China (2006–2007)", National Development and Reform Commission, World Bank, etc.

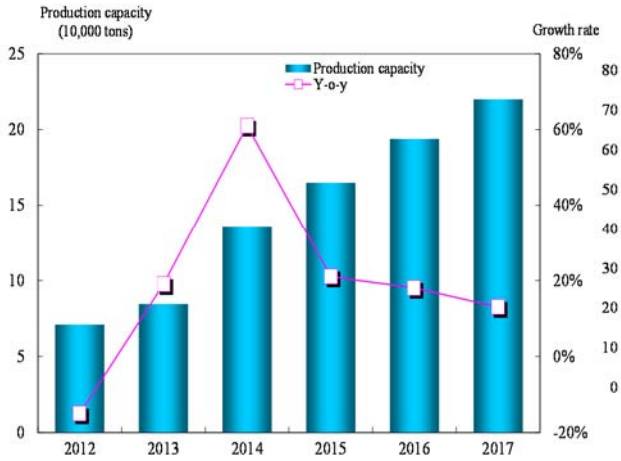
Domestic shortages in polycrystalline silicon, which is a key component in solar photovoltaic systems, for example, led to an increase in imports and a surge of corporate investment, including cross-industry participation, and conditions within the industry that resembled a bubble of sorts. There followed a period of polysilicon overproduction during which China

emerged as the world's largest producer of this commodity (**Figure 6**), following which it became the world's largest producer of solar cells and solar cell modules (**Figure 7**), and since 2012, both the United States and Europe have been imposing anti-dumping and anti-subsidy duties on Chinese solar panels along with other retaliatory measures, which led numerous companies into either bankruptcy or financial difficulties. In response, in 2013 the Chinese government issued its largest number of policies on the solar photovoltaic industry to date and shift towards policy promoting the introduction and installation of domestically manufactured solar photovoltaic equipment over exports. This shift in the direction of policy proved successful and triggered extraordinary growth in installed solar photovoltaic capacity in China beginning that year, with China now accounting for almost half of new solar capacity installed and coming to epitomize the global momentum in solar photovoltaic energy (**Figure 8**).

Under the guidance of the Ministry of Industry and Information Technology, the China Photovoltaic Industry Association and the China Electronic Information Industry Development Research Institute created a "Roadmap for the Development of China's Photovoltaic Industry (2016)", which states that as of 2015 China held the largest share of the global market for overall solar photovoltaic system manufacture, with Chinese manufacturers accounting for more than half of the top-ten suppliers of photovoltaic components that year. China has now eclipsed Germany to emerge as the world's largest producer of photovoltaic power, with the domestic photovoltaic industry now standing as China's most internationally competitive strategic emerging industry[1].

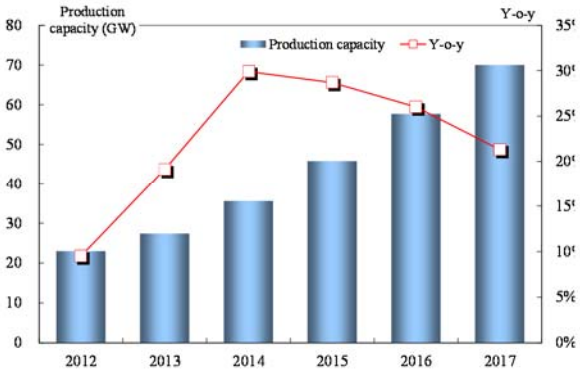
[1] According to the "Roadmap for the Development of China's Photovoltaic Industry (2016)", as of 2015, China accounted for 48%, 76%, 65%, 68%, and 40%, respectively of the global markets for polycrystalline silicon, silicon wafers, solar cells, photovoltaic modules and inverters. Having emerged as a photovoltaic industry powerhouse, growth in installed solar photovoltaic capacity averaged 179% annually between 2011 and 2015, with cumulative grid-connected capacity reaching 43.18 million kW, making China the world leader in terms of installed solar photovoltaic capacity (in 2015). That year, four of China's polysilicon manufacturers, seven solar cell manufacturers and six solar photovoltaic module manufacturers made it into the global top-ten supplier rankings.

Figure 6: Trends in polycrystalline silicon production in China (2012–2017)



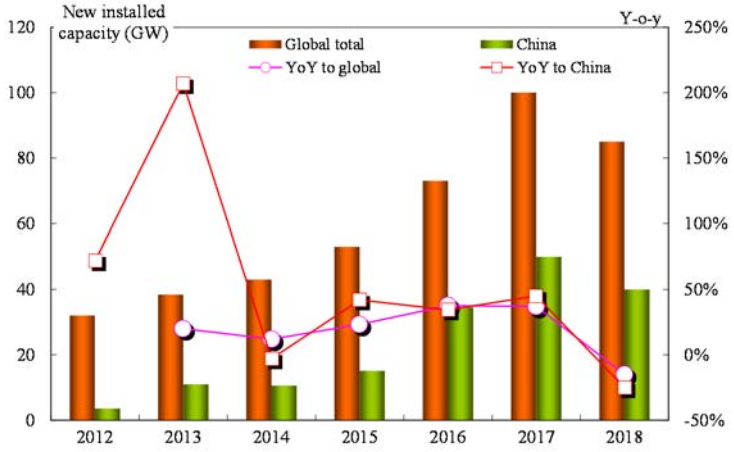
Source: "Development Prospects for China's Solar Photovoltaic Industry 2018", CCID Wise – an MIIT-administered think tank

Figure 7: Trends in solar cell module production in China



Source: "Development Prospects for China's Solar Photovoltaic Industry 2018", CCID Wise – an MIIT-administered think tank

Figure 8: A comparison of global installed solar photovoltaic capacity with China



Source: "Development Prospects for China's Solar Photovoltaic Industry 2018", CCID Wise – an MIIT-administered think tank

3. A new period of growth for China's solar photovoltaic industry and the directions it is taking

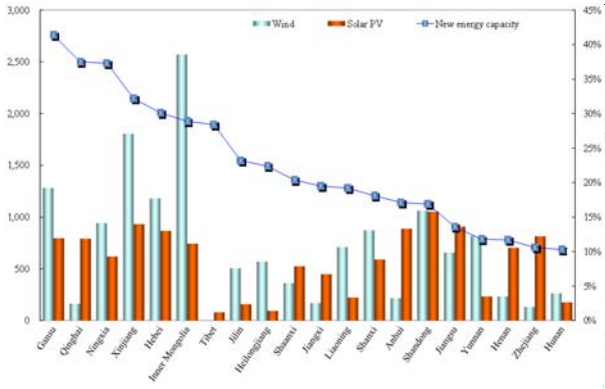
As discussed above, the development of China's solar photovoltaic industry, like that of wind power, is helping to expand the use of new energy and to strengthen efforts aimed at curbing air pollution. Moreover, China's solar (and wind) resources and its achievements in terms of new capacity installed are concentrated in the "Three-North" (i.e. Northeast China, North China and Northwest China) shelterbelt, a region in which economic development has been comparatively slow and where environmental and poverty-related issues are particularly severe [2], meaning that they carry particular significance in terms of efforts to promote the development of these

[2] According to the State Grid Corporation of China's "White Paper on Promoting the Development of New Energy 2018", 67 percent of installed new energy capacity, 74 percent of installed wind power capacity, and 58 percent of installed solar photovoltaic capacity was

regions and to achieve stable economic growth for China as a whole (since promoting the development of this industry will serve as an economic measure for expanded employment growth).

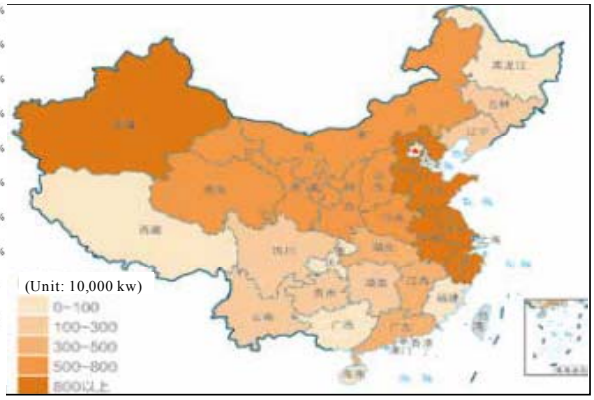
As **Figure 9** and **Figure 10** illustrate, there is more available capacity for regional solar photovoltaic development (latent demand) than wind power. Given the economic effects enumerated above, China's solar photovoltaic sector is thought to have entered a new phase in its evolution, something that is evidenced by the emphasis that is being placed on promoting the introduction of "downstream" generation systems in the Roadmap for the Development of China's Photovoltaic Industry (2016)" (**Figure 11**).

Figure 9: Installed solar photovoltaic and wind energy capacity in major regions of China as a percentage of new energy resources (2017)



Source: "White Paper on Promoting the Development of New Energy 2018", State Grid Corporation of China

Figure 10: Regional distribution of China's installed solar photovoltaic capacity in 2017



Source: Excerpted and adapted from the "White Paper on Promoting the Development of New Energy 2018", State Grid Corporation of China
Note: Data for Taiwan Province has not been aggregated.

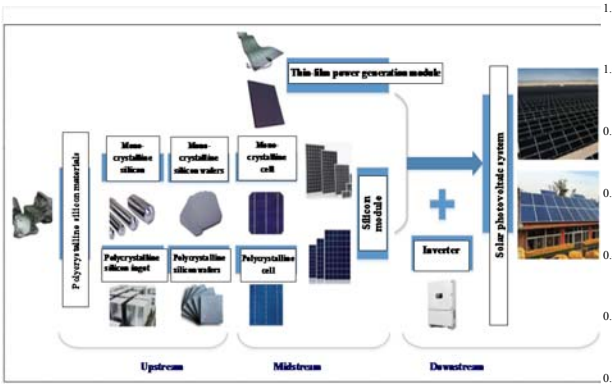
The trade friction over Chinese exports of solar photovoltaic generation system components has yet to be fully resolved, but new issues relating to China's trade imbalance with the United States and the disputes over semiconductor technologies could provide the external pressure needed to tap into domestic demand for solar photovoltaic energy in China.

Expanded government support and almost two decades worth of industry development have served to dramatically reduce the cost of installing solar photovoltaic systems. According to a May 28 article in "Beijing Business Today", the cost of solar photovoltaic systems fell to RMB 0.6 per kilowatt hour in 2017 from a high of RMB 1 (approximately ¥17.1) in 2012, which equates to an average yearly decrease of RMB 0.08. Added to which, government subsidies mean that electricity prices for solar photovoltaic energy have been decreasing in recent years (**Figure 12**).

With the conditions favoring industry development and market infrastructure now looking more favorable than ever, China's solar photovoltaic sector is thought to have embarked upon a new phase of growth. According to "Made in China 2025", which was issued in 2015, further development of new energy sources and smartification of the energy sector based on internet use, are also now key elements of the nation's energy strategy.

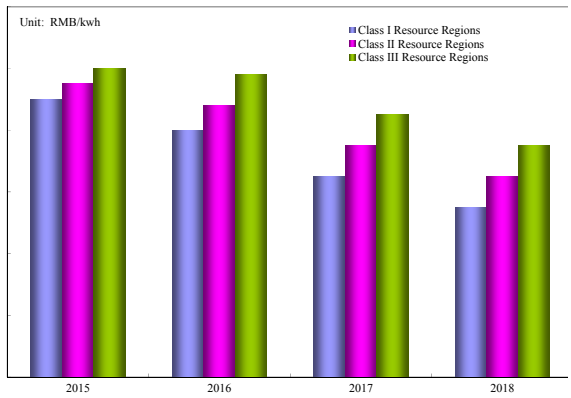
located in the "Three-North" shelterbelt region as of 2017.

Figure 11: Roadmap emphasis domestic introduction of solar photovoltaic generation systems



Source: Compiled and adapted from the "Roadmap for the Development of China's Photovoltaic Industry (2016)", Department of Electronic Information of MIIT and the China Photovoltaic Industry Association

Figure 12: Price of grid-connected solar photovoltaic energy by region



Source: Compiled from NDRC press releases
Class I regions: Ningxia, Haixi (Qinghai), Jia Yu Guan, Wu Wei, Zhangyi, Jiuquan; Jinchang (Gansu), Hami, Tacheng, Aletai, Kelamayi (Xinjiang Inner Mongolia excluding Chifeng); Tonglia, Xinganmeng, Hulunbeier, etc.
Class II regions: Beijing, Tianjin, Heilongjiang, Jilin, Liaoning, Sichuan, Yunnan, Chifeng (Inner Mongolia), Chengde, Zhangjiakou, Tangshan, Qinhuangdao (Hebei), Datong, Shuozhou, Xinzhou, Yangquan (Shanxi), Yulin, Yanan (Shaanxi), Qinghai, Gansu, Xinjiang, and other regions not listed as Class I.
Class II regions: Any regions not included in the Class I and Class II categories.

4. Implementation of the "Action Plan for the Development of a Smart Solar Photovoltaic Industry" and Prospects for the Future

On April 19 this year, six government agencies, including China's Ministry of Industry and Information Technology, released a three-year "Action Plan for the Development of a Smart Solar Photovoltaic Industry (2018–2020)" (item 25 in **Table 1**; the "Action Plan" hereunder). Its opening paragraphs describe the solar photovoltaic industry as "an industry magnificent as the rising sun that is based on semiconductor technologies and demand for new energy" and position it as a sector with the potential to predominate global competition. The Action Plan calls for raising the quality and efficiency of solar photovoltaic industry development, efforts to accelerate the cultivation of new products and new business, an innovation drive in the field of solar photovoltaics, the realization of sustainable industry growth, and measures to support the upgrading and utilization of clean energy sources. It additionally presents the following development goals for 2020.

The collection of data on outstanding achievements in the construction of smart solar photovoltaic power plants; clear progress towards the realization of an automated, digitized, intelligent industry; breakthroughs in smart manufacturing technologies and equipment manufacture; significantly greater competitiveness in the software and equipment, etc., used

in smart solar photovoltaic system manufacture; increased capacity to supply smart solar photovoltaic system components; and the creation of a powerful brand identity. It also calls for efforts to accelerate the pace of overseas expansion, improvement in smart generation system maintenance standards, and widespread application (of smart solar photovoltaic systems) in numerous fields of industry. The cultivation of competitive solutions providers, ongoing improvements in the smart solar photovoltaic industry development environment, better human resource management, standardized systems, and consistent improvements in measurement and authentication platforms are additionally cited as goals.

The upgrading of smart manufacturing, improvements in the supply capacity of smart solar photovoltaic system components and technologies, field testing of distinctive smart solar photovoltaic systems, and improvements in the environment for smart solar photovoltaic industry development are further presented as missions to be achieved within the three-year timeframe (**Table 2**).

Table 2: The Four Main Missions of the "Action Plan for the Development of a Smart Solar Photovoltaic Industry"

[Upgrading of smart manufacturing]
➢ Efforts to improve the level of smart manufacturing; smarter, upgraded production of solar photovoltaic base materials, high-end solar cells and other components; the digitization of the solar photovoltaic system components production cycle and improvements in management standards.
[Enhanced capacity to supply smart solar photovoltaic system components and technologies]
➢ Improvements in the capacity to supply smart solar system components and technologies; the application of smart photovoltaic products; efforts to improve capabilities in the smart integration and operation and maintenance of solar photovoltaic systems; efforts to increase installed capacity and reduce construction, operation and maintenance costs.
[Field testing of distinctive smart solar photovoltaic systems]
➢ Field testing of distinctive smart solar photovoltaic systems: specifically, the competent government agencies are to guide the construction of smart solar photovoltaic industrial parks, field testing of smart photovoltaic architecture and cities, field testing of smart photovoltaic transport system, field testing of smart photovoltaic farming, field testing of smart photovoltaic power plants, and field testing of smart photovoltaic systems for poverty alleviation, in an effort to promote the development of the smart photovoltaic industry by joining forces across multiple divisions of government.
[Improvements in the environment for smart solar photovoltaic industry development]
➢ Improvements in the environment for smart solar photovoltaic industry development; the creation of a system of standards for smart solar photovoltaic technologies; and efforts to accelerate the construction of platforms for research and development and measurement and authentication work technical services and incubators for the smart photovoltaic industry.

Source: Compiled from the "Action Plan for the Development of a Smart Solar Photovoltaic Industry (2018–2020)" (MIIT, etc.) and a press briefing given by the competent government departments on the regulatory background to this plan.

The "General Requirements" section of the Action Plan establishes a basic policy of strengthening "Made in China 2025" implementation and promoting supply side innovation, targeting the construction of an ecosystem for the solar photovoltaic industry, with efforts to

make the solar photovoltaic industry smarter that are market-driven and government-led, drive innovation and serve to integrate production and utilization, efforts to deepen the integration of manufacturing processes with information technologies such as big data, the internet of things and artificial intelligence, support for the application of distinctive smart solar photovoltaic systems, and the raising of China's solar photovoltaic industry to the high-end and mid-range sections of the global supply chain. The Action Plan goes on to specify the names of the government agencies that will be responsible for promoting the various projects and has all the characteristics of a genuine plan of action. The plan emphasizes the need for interregional and interdepartmental cooperation and exchange in the development of the six major demonstration projects (i.e. industry parks, architecture and cities, transport systems, agriculture, power plants and poverty alleviation), as well as the leadership effects of top runners, etc., and efforts to ensure that the projects are politically effective. The latter section of the Action Plan proposes the development of an integrated and standardized technology system for solar photovoltaic industry participants, the establishment of a public service platform (for the industry), and diverse funding, including public-private partnerships. These moves coincide with the strategy on the development of an "industrial internet", which was discussed in last month's issue, and is an attempt to capture solar photovoltaic users, and achieve more effective development and use of solar photovoltaic energy. The Action Plan represents an aggressive attempt by China to improve its existing coal-reliant electricity system and achieve decarbonization.

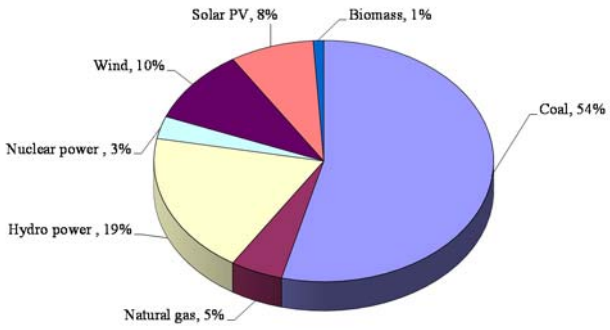
The State Grid Corporation of China's "White Paper on Promoting the Development of New Energy 2018", moreover, contains numerous plans that include construction investment in the power grid and additional investment in smart grid pilot projects with a view to resolving the issue of insufficient solar and wind power usage due to uneven distribution across regions (wind and solar wastage rates remain high at around 10-something percent). Forecasts predict that demand for solar energy (particularly that for off-grid solar photovoltaic systems, an area in which latent demand is particularly large) will continue expanding at an even faster rate heading towards 2020 based on higher standards in the solar photovoltaic industry and efforts to promote its application in the domestic market (the development goals for solar energy use given in the National Energy Administration's 13th Five-Year Plan are also high; see **Table 3**), which is expected to help promote job creation and economic growth, and to facilitate the formation of a more rational energy mix for China (**Figure 13**).

Table 3: Development Goals for the Solar Photovoltaic Industry in China's 13th Five-Year Plan

[I] KPI for Solar Energy Use in the 13th FYP period			
Category	KPI	2015	2020
Installed capacity (10,000 kW)	Solar photovoltaic energy	4318	10500
	Solar thermal energy	1.39	500
	Total	4319	11000
Electric power generation (100 million kWh)	Total generation	396	1500
Solar thermal use (100 million m²)	Heat collection area	4.42	8
[II] Installed solar photovoltaic capacity in key regions in 2020			
Region (province/autonomous area)		Installed capacity (10,000 kW)	
Hebei Province		1200	
Shanxi Province		1200	
Inner Mongolia Autonomous Region		1200	
Jiangsu Province		800	
Zhejiang Province		800	
Anhui Province		600	
Shandong Province		1000	
Guangdong Province		600	
Shaanxi Province		700	
Qinghai Province		1000	
Ningxia Autonomous Region		800	

Source: "13th Five-Year Development Plan for Solar Energy (2015–2020)", National Energy Administration of China (December 2016)

Figure 13: China's Energy Mix in 2020 (as given in the 13th Five-Year Development Plan)



Source: "Guiding Opinions on the Implementation of the 13th Five-Year Development Plan for Renewable Energy", National Energy Administration

According to the latest research (Chunxia Li, "Industrial Development in China and its Policy on Innovation", Senshu University Press, February 2018, in Japanese), the growth of China's solar photovoltaic industry can be attributed to five factors: (1) the existence of external demand from Europe; (2) government backing; (3) preferential finance; (4) imports of production equipment; and (5) tax incentives, though factors (2), (3) and (5) can all be ascribed to government policy. In other words, whilst China's solar photovoltaic industry grew rapidly into a leading exporter based on heavy demand from overseas and the importing of production equipment, which facilitated cross-industry participation, China must now concentrate on the domestic market in promoting the installation of new capacity and highly

efficient operational management, with the utilization of the internet of things, artificial intelligence and other new technologies that are being produced by the Fourth Industrial Revolution and new innovation being key, and the enactment and implementation of the Action Plan holding major significance.

China's solar photovoltaic industry could well encounter challenges over the coming years as it broadens its horizons ever further (in securing land, for example, or arising from conflicts of interest between the need for growth to be both 'market-driven' and 'government-led', or as the result of new trade friction, etc.), but there can be no doubting that it will ride the tide of the Fourth Industrial Revolution, becoming ever-more advanced through smartification and greater efficiency. This is expected to trigger both business expansion by domestic companies and the development of new business based on joint ventures between Chinese companies and foreign companies (Japanese, European, etc.) with their advanced technologies and experience, with the expansion of solar photovoltaic and other new energy sources into the "One Belt, One Road" region also conceivable, which in turn would facilitate greater international cooperation by Sino-foreign joint ventures in the field of new energy.

Challenging the "Trilemma" in International Economics: Future Economic Policy Management in China

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1. Introduction

In October 2017, the quinquennial National Congress of the Communist Party of China was held. Then, in March 2018 at the 13th People's Congress of China, China showed its resolve that it would make further efforts to tackle monetary risks by accepting an economic slowdown in order to realize the "high-quality development" declared at the Central Economic Work Conference in 2017. On the other hand, financial and economic measures recently taken include the discontinuation of the foreign currency reserve system, the discontinuation of the use of counter-cyclical factors in setting the People's Bank of China (PBOC; the central bank of China) central parity rate, and the liberalization of the Chinese monetary market and the reserve requirement ratio cut, which are all related to the liberalization of the market and the reform of the liquidity structure. Even though it seems that the general direction of leverage ratio compression remains unchanged, it is possible that the Chinese monetary authorities are adjusting their policies in order to carry out the internationalization of the Chinese yuan by controlling downward risks on the economy that have resulted from excessive leverage ratio compression and growing trade friction, as the Chinese yuan has been relatively stable.

Such measures can be evaluated positively as a step toward liberalizing the potential of China for high-quality growth. However, at the same time, the author associates the repetition of the tightening of regulations and deregulation with the actions taken by the Chinese monetary authorities at the time of the devaluation of the Chinese yuan in 2015, also known as the "China Shock," which is one of the major events related to China that affected the world monetary market. This article will look back at the situation at the time, in order to examine the important points in forecasting trends in the future Chinese yuan market.

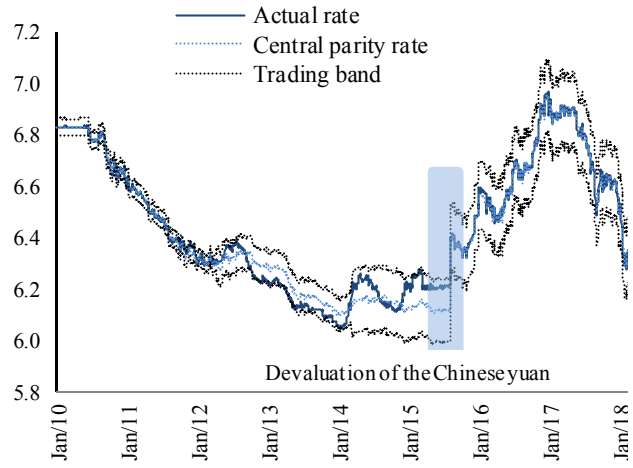
2. Devaluation of the Chinese yuan in 2015

On August 11, 2015, the PBOC set the Chinese yuan's central parity rate against the U.S. dollar (a rate set every business day) at a level almost 2% lower than the previous day's rate. The PBOC explained that this decision was taken in order to reflect the actual market trends in the exchange rate in a more-appropriate manner. However, market participants saw this as a measure to recover the export competitiveness of China, which had been low at that time. As a result, concerns grew over the possibility for China to take an overt strategy to keep its currency weak, leading the Chinese yuan, which had remained flat so far, to start sharply depreciate (Figure 1). This is the general movement in the exchange market, and the conditions before and after this movement are as follows.

At that time, the U.S. was taking measures to normalize its monetary policy, as the economic outlook started to look more optimistic. Thus, while other major developed countries were taking measures of monetary easing, global funds were flowing into the U.S. dollar market. Indeed, in terms of the percentage change against the U.S. dollar from 2014 to 2015, it is clear that all the major currencies depreciated against the U.S. dollar (Figure 2).

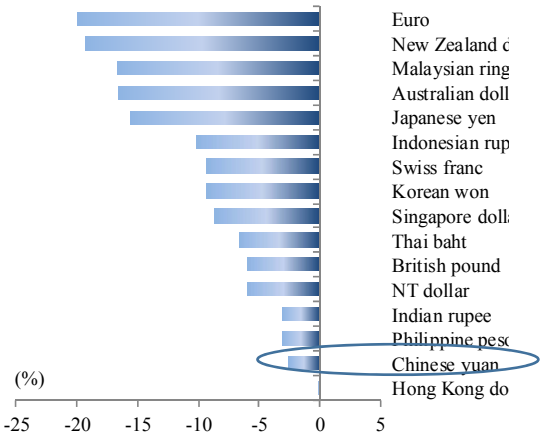
Under such circumstances, the Chinese government continued its gradual measures to expand the fluctuation band of the Chinese yuan exchange rate, along with promoting delegation in capital transactions. In doing so, China saw the excessive depreciation of the Chinese yuan against the appreciating U.S. dollar as a negative factor and intermittently continued market interventions in order to slow down the depreciation of the Chinese yuan. As a result of this action, the Chinese yuan had the lowest depreciation ratio against the U.S. dollar among the major currencies, apart from the Hong Kong dollar, which is pegged to the U.S. dollar. Thus, the Chinese yuan nominal effective exchange rate became significantly higher.

Figure 1: U.S. dollar/Chinese yuan exchange rate



Source: Bloomberg

Figure 2: Percentage change against the U.S. dollar from 2014 to 2015



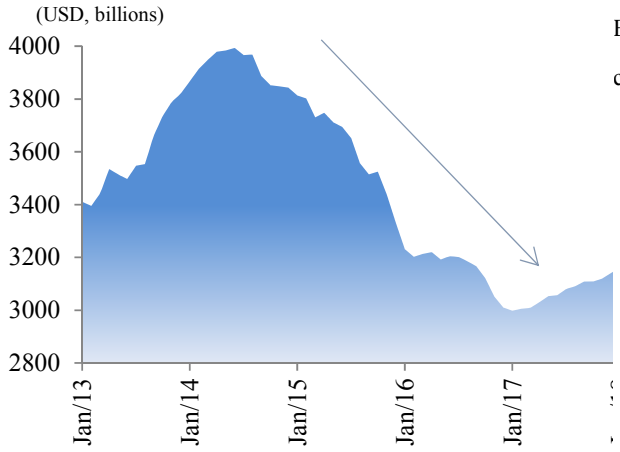
Source: Bloomberg

Needless to say, this appreciation of the effective exchange rate strengthened downward pressure on the export competitiveness of China while also leading to a decline in foreign currency reserves (Figure 3). As a result, the Chinese monetary authorities had to devaluate the Chinese yuan thereafter. At the same time, the Chinese monetary authorities liberalized the foreign exchange market in order to emphasize the liberalization of the Chinese yuan, aiming to introduce the yuan into the Special Drawing Rights (SDR) basket maintained by the International Monetary Fund (IMF). However, capital outflow as a result of an economic slowdown in China accelerated, in the end (Figure 4). Thereafter, downward pressure on the Chinese yuan persisted until the beginning of 2017. The depreciation of the Chinese yuan slowed down in 2017, mainly thanks to the fact that market participants were globally selling the U.S. dollar in order to adjust their positions after a long period of U.S. dollar-buying, along with the fact that the Chinese monetary authorities intermittently strengthened their regulations related to capital outflow, making it obligatory to report transactions in Chinese yuan in advance while stipulating an upper limit for transaction volume.

Thus, the Chinese monetary authorities felt that they had to take measures to protect the yuan after taking a measure of monetary easing in the form of the devaluation of the Chinese yuan. It is somewhat difficult to see the true problem in this event only with superficial facts. Thus, the following section will summarize the key points once

again based on a basic concept involving international economics—the "trilemma" (also known as the "impossible trinity")—in order to understand the relationship between the Chinese yuan exchange market and the monetary and economic policy management of the PBOC.

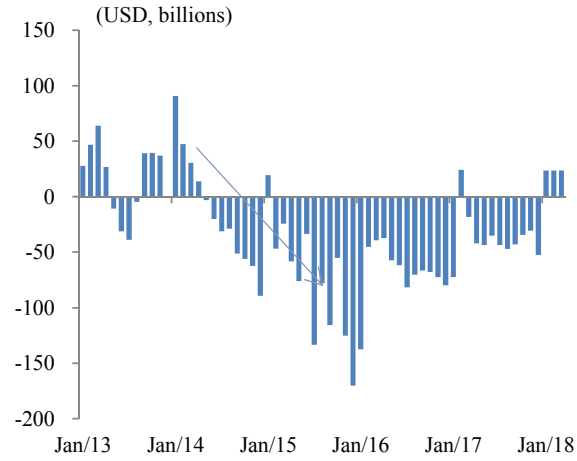
Figure 3: Foreign currency reserves in China



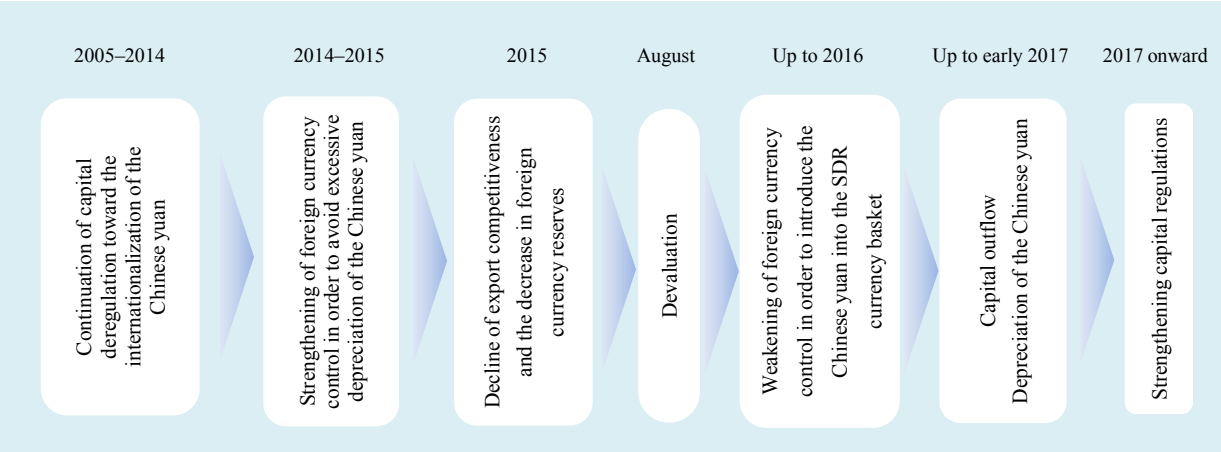
Source: Bloomberg

Figure 4: Estimated amount of capital outflow

Trade balance – Foreign currency transactions by the People's Bank of China (Net) – Change in the amount of foreign currency deposits



Source: National Bureau of Statistics of China, General Administration of Customs of China, and Bloomberg

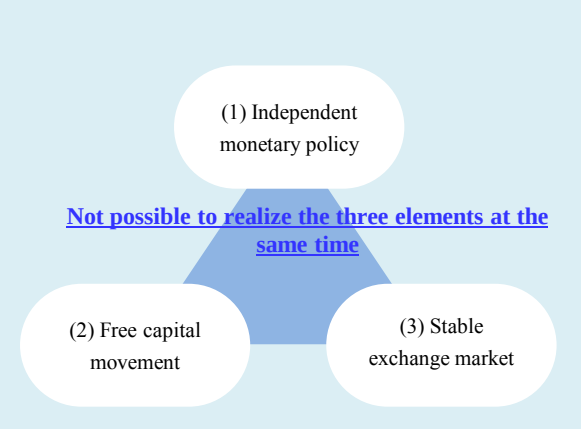


3. "Trilemma" in international economics

The "trilemma" is a concept in international economics that states that it is impossible to have all three of the following at the same time: (1) an independent monetary policy, (2) free capital movement, and (3) a stable foreign exchange market. Whether or not this is true, the U.S. and Japan have given up on trying to achieve (3), while various countries in Europe, which is home to a unified currency, the euro, have given up on (1). China has set (2) aside while securing (1) and (3). Since the shift to the managed floating exchange rate system in 2005, China was

trying to achieve an exception to this "trilemma" by increasing (2) as much as possible. However, in 2015, this challenge to achieve all three elements ended in failure through the devaluation of the Chinese yuan followed by capital outflow and then the sharp depreciation of the Chinese yuan. Summarizing what happened with this challenge from the point of view of international economics, the PBOC carried out measures of monetary easing (interest rate cuts, supply of liquidity, and deposit requirement ratio cuts) as an "independent monetary policy" when facing a domestic economic slowdown. At the same time, such measures of monetary easing tended to lead to capital outflow and the depreciation of the Chinese yuan under a "free capital movement" system. Thus, the PBOC also carried out market intervention by buying the Chinese yuan and selling the U.S. dollar in order to secure a "stable foreign exchange market." Nonetheless, no matter how high the amount of foreign currency reserves goes, there is always a limit. Therefore, in the end, the monetary authorities of China had to devaluate the Chinese yuan, and this led to the outcome mentioned above.

Figure 5: "Trilemma" in international economics

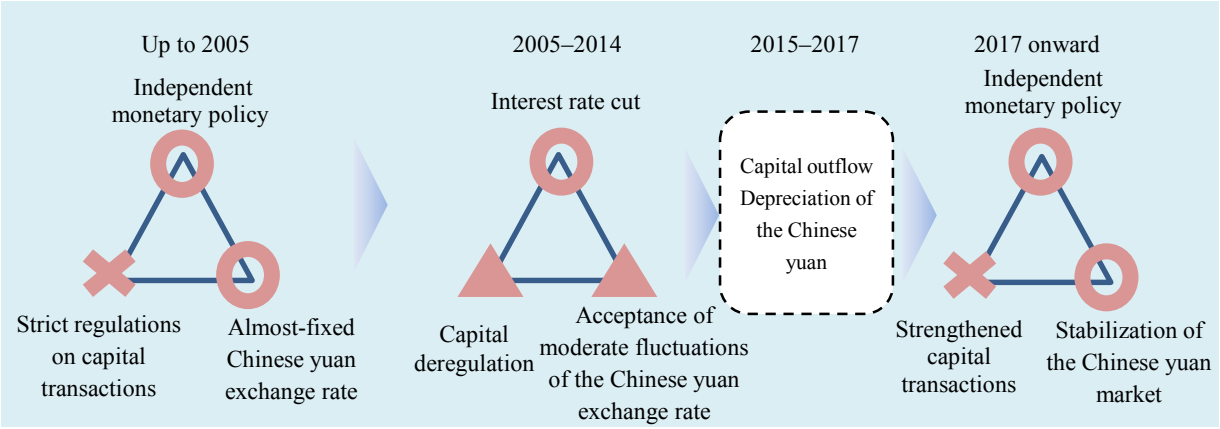


Source: Compiled by the author

Thereafter, the Chinese monetary authorities intermittently strengthened regulations through the PBOC. For example, they asked companies to submit foreign currency purchase plans, made it obligatory to carry out advance inspection for large-scale overseas M&A cases, and introduced the "counter-cyclical factors" in the calculation method for the base rate for the U.S. dollar/Chinese yuan exchange market. In other words, from the point of view of the "trilemma" in international economics, (2) was put aside again in order to secure (1) and (3). As a consequence, as Figure 6 shows, direct investment (net) moved to capital inflow, stabilizing the Chinese yuan exchange market from the second half of 2016.

Figure 6: Direct investment (net)

Source: People's Bank of China, CEIC, and Bloomberg

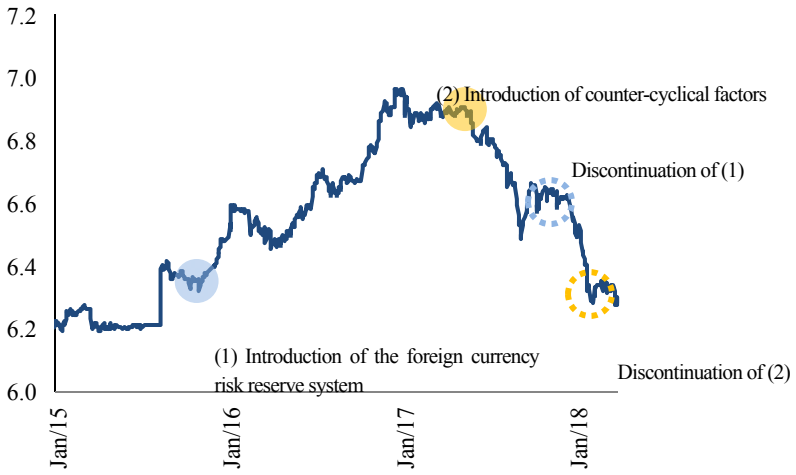


4. Internationalization of the Chinese yuan since 2017

Under such conditions in the market, the Chinese monetary authorities announced their decisions to discontinue the foreign currency risk reserve system and the use of counter-cyclical factors from the second half of 2017, as was discussed at the beginning of this article. Furthermore, the Chinese monetary authorities have started easing foreign exchange controls and capital regulations, as was seen before the "China Shock," easing window guidance for banks for the purpose of limiting overseas remittances of Chinese yuan (Figure 7). In addition, since 2018, China has been announcing more measures of economic liberalization while taking measures of monetary easing through the reserve requirement ratio cut, in order to pre-emptively avert downward risks on the economy, facing the difficult trade policy of the U.S. toward China. The situation in China is therefore similar to that before the "China Shock" discussed above, as China is trying to realize free capital movement in a moderate manner while taking an independent monetary policy stance. The difference between this time and the previous time is that it is

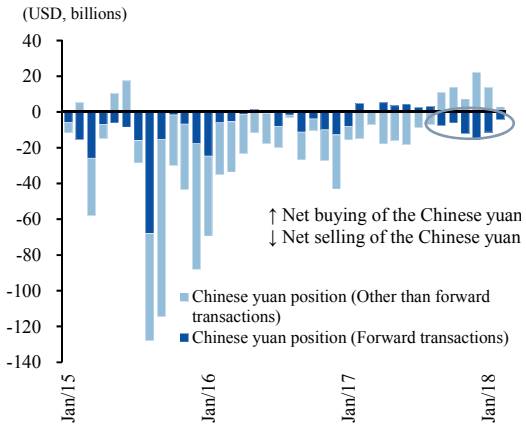
now not necessary to intervene in the market, thanks to the strength of the Chinese yuan. However, this is only because of the fact that market participants are globally buying currencies other than the U.S. dollar, along with the process of the worldwide normalization of the monetary policy in order to adjust the appreciation of the U.S. dollar, which continued for a while. Therefore, in reality, if market participants start buying the U.S. dollar again, for example, as a result of the appreciation of the U.S. interest rates, we should remain attentive to see what actions will be taken by the Chinese monetary authorities. When we only pay attention to the factual outcome of the easing of the foreign exchange control, as can be seen in Figure 8, Chinese companies have been selling the Chinese yuan more than buying, in forward transactions, since the discontinuation of the foreign currency risk reserve system. It thus seems that there is still a general trend in which deregulation will lead to the depreciation of the Chinese yuan. Furthermore, as can be seen in Figure 9, the Chinese yuan effective exchange rate has been strengthening since the second half of 2017, as there were moments in which market participants bought the Chinese yuan as a result of U.S. dollar-selling, thanks to domestic political stability in China. It can be said that such a situation is also similar to that before the "China Shock." Therefore, in the times ahead, one may expect the Chinese monetary authorities to either take actions to realize all three elements in the "trilemma" in international economics again or to start seriously considering measures to lead the Chinese yuan to depreciate, in order to recover the export competitiveness of China while controlling the trade friction toward the U.S. The decision is to be taken by the Chinese monetary authorities.

Figure 7: U.S. dollar/Chinese yuan exchange rate (2015 onward)



Source: Bloomberg

Figure 8: Chinese yuan transactions by Chinese companies



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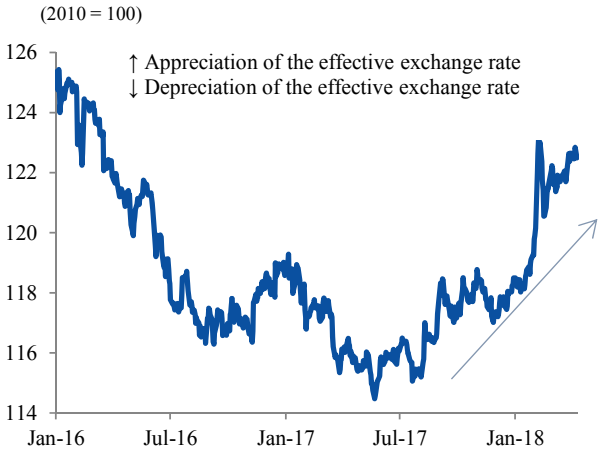
Source: Bloomberg and the State Administration of Foreign Exchange of China

Figure 9: Chinese yuan nominal effective exchange rate



Source: Bloomberg

5. Conclusion

This article has reviewed key points in examining the measures to be taken by the Chinese monetary authorities in the times ahead by investigating similarities between the current conditions and those at the time of the "China Shock" in 2015. As history shows, it is not realistic to seek all three elements in the "trilemma" in international economics. Under such a condition, what measures will China take as the world's second-largest economy? It is also evident from history that free capital movement is essential in developing a national economy. China would also have to seek to improve domestic monetary policy while enhancing the level of flexibility in capital movement. The Chinese monetary authorities are certain to face difficulty, with the internationalization of the Chinese yuan, trade frictions with the U.S., and downward risks on the domestic economy, resulting from monetary leverage compression. We should therefore remain attentive regarding what actions will be taken in the times ahead.

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