Report on Operation of Iron Ore Spot Market

(2018)

In 2018, the prices of iron ore showed a relatively stable trend, with the rebar-ore ratio remaining high. On the supply side, the supply of imported iron ore was sufficient, the inventories at the ports were comparatively high, and the outputs of domestic ore fell sharply. On the demand side, the outputs of crude steel increased, and the steel mills preferred to purchase the SFCJ fines in the middle of the year, resulting in significant premiums for the SFCJ fines. In the future, the growth rate of iron ore supply is expected to slow down, and the steel consumption is likely to improve.

I. The iron ore prices were stable, and played a more important role in guiding the steel prices, with the increases lower than those of steel.

(1) The spot price fluctuations of iron ore were relatively stable

By the end of October, the spot price of iron ore was RMB 605 / tonne, up by 9.8% from the beginning of the year. Compared with 2017, the spot price of iron ore did not fluctuate much in the year, with the annual price fluctuation range at 30.39%, and the annualized daily volatility at 17.35%, which was a significant drop from 2017.

Chart 1: Trends of Iron Ore Spot Prices in 2017 and 2018

Table 1: Iron Ore Spot Price Fluctuation Ranges and Annualized Daily Volatilities

Year	Spot Price Fluctuation Ranges	Spot Price Daily Volatilities
2014	89.58%	14.78%
2015	71.67%	20.62%

2016	112.5%	42.96%
2017	62.22%	25.11%
January to October 2018	30.39%	17.35%

(2) The spot prices of rebar and iron ore guided each other.

The total supply of iron ore was still relatively sufficient in the year. The prices of iron ore were mainly affected by the downstream steel mills' demands and preferences in use. After the end of the heating season starting from the previous year, although the capacity utilization rate of steel mills rebounded, the policy of production restriction for environmental protection did not end yet, but was changed into the irregular introduction of the normalized policy according to weather conditions. For example, when the Environmental Protection Group stayed in Xuzhou for surprise inspection in April, the steel mills stopped production completely, and all the coking enterprises had the production reduced by 70%; in July, to control weather pollution, most steel mills in Changzhou lowered the production by more than 50%. In the year, the Environmental Protection Inspection Group launched the "Review" action, the intensified supervision for the blue sky defense battle and the "Three-year Action Plan for Winning the Blue Sky Defense Battle", making the policy of production restriction for environmental protection still strict in the year. In the second half of the year the production limitation for environmental protection in the heating season also had an important impact on the steel prices, thus further affecting the demands for iron ore and other raw materials.

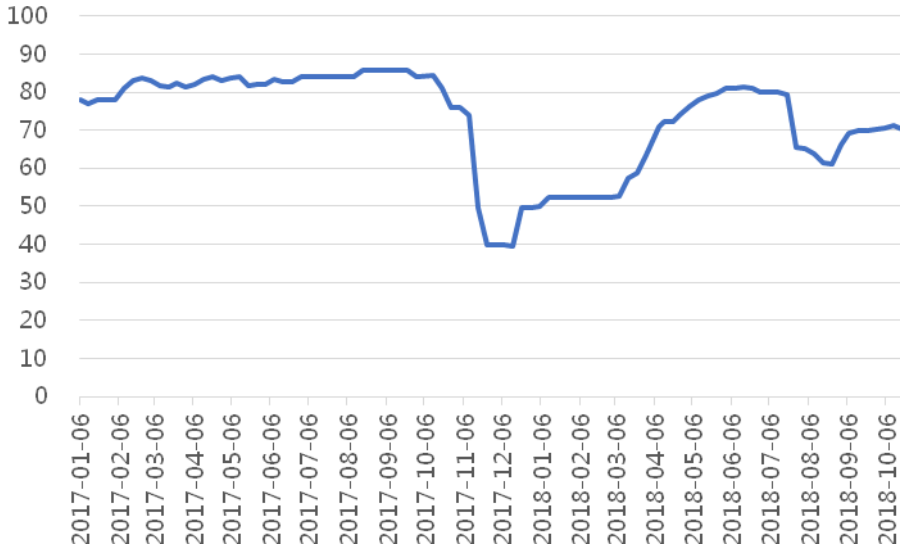

Chart 2: Capacity Utilization of Steel Mills in Tangshan in 2017 and 2018

At the 95% confidence interval, from January to October 2018, the spot prices of rebar had a mutual guiding effect on the spot prices of iron ore, and this year, the guiding effect of the spot prices of rebar on those of iron ore will be weakened.

Table 2: Spot Prices of Rebar Granger Cause Those of Iron Ore Unilaterally

Null Hypothesis:	Obs	F-Statistic	Prob.
IRONORE does not Granger Cause STEEL	205	4.51929	0.0120
STEEL does not Granger Cause IRONORE		3.58103	0.0296

Table 3: Causal Relationship of Spot Prices of Rebar and Iron Ore from 2014 to 2017

Year	Null Hypothesis	F-statistic	Prob	Conclusion
2014	Rebar does not Granger Cause Iron Ore.	6.49087	0.0018	Rebar and iron ore are mutually causal.
	Iron ore does not Granger Cause rebar.	5.75081	0.0036	
2015	Rebar does not Granger Cause Iron Ore.	3.02912	0.0502	Rebar causes iron ore.
	Iron ore does not Granger Cause rebar.	0.85077	0.4284	
2016	Rebar does not Granger Cause Iron Ore.	101.067	1.00E-32	Rebar and iron ore are mutually causal.
	Iron ore does not Granger Cause rebar.	3.4357	0.0338	
2017	Rebar does not Granger Cause Iron Ore.	49.5432	9.00E-19	Rebar causes iron ore.
	Iron ore does not Granger Cause rebar.	0.78622	0.4567	
2018[1]	Rebar does not Granger Cause Iron Ore.	3.58103	0.0296	Rebar and iron ore are mutually causal.
	Iron ore does not Granger Cause rebar.	4.51929	0.012	

(3) The rebar-iron ore price ratio was continuously at a high level.

Before 2017, the reasonable range of the spot price ratios for rebar and iron ore was around 5. However, as the supply-side reform has led to the withdrawal of backward production capacity since 2017, the rebar prices have risen sharply. The iron ore prices have followed the uptrend, but recorded small increases. As result, the price ratio of rebar and iron ore have continued to expand since 2017, and stayed at a high level for a long time in 2018. This year, the average price ratio of rebar and iron ore is 8.09, which is higher than the average of 6.83 in 2017. The deviation between the prices of rebar and iron ore tends to be expanded.

[1] The data are from January to October, 2018

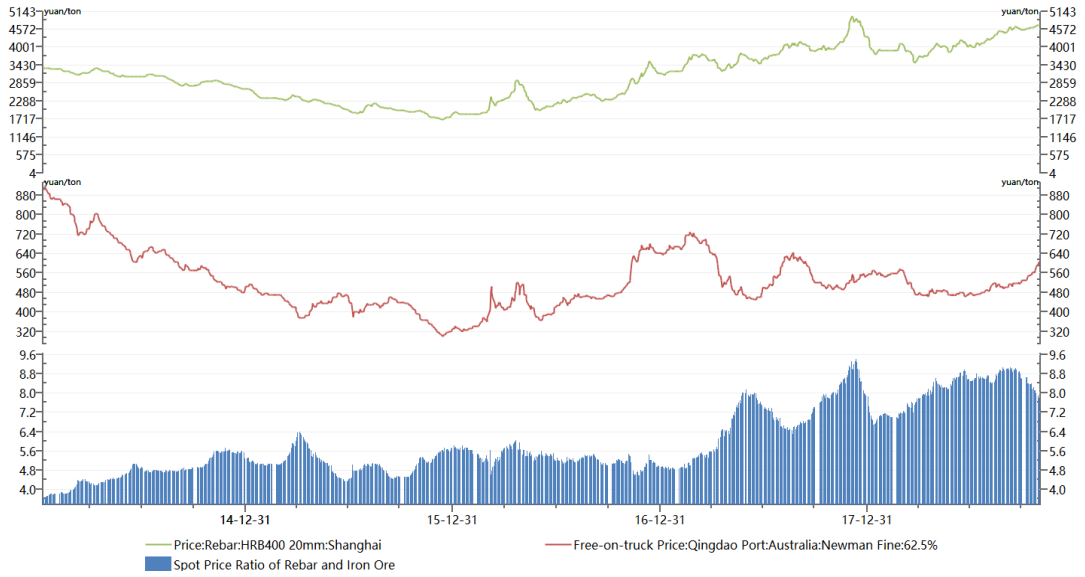

Chart 3: Price Ratio of Rebar and Iron Ore

II. Operation of Iron Ore Spot Market

(I) Iron ore supply was sufficient, and inventories continued to be at a high level.

1. Imported iron ore: The total import volume remained stable, and the mainstream ore products were more competitive.

(1) Imports of iron ore were basically the same as the previous year, and the imports were more concentrated.

China's imports of iron ore have been increasing for a long time. During the 11 years from 2006 to 2017, the iron ore imports increased from 326 million tonnes to 1.075 billion tonnes, up by 2.3 times. Since the autumn of 2017, due to the impact of domestic production restriction for environmental protection, the iron ore demand has been suppressed, and imports have begun to decline. From January to October 2018, China imported 892 million tonnes of iron ore, a decrease of 0.51% compared with the same period of last year. Specifically, from January to August, imports from Australia were 469 million tonnes, up by 4.07% year-on-year; from January to October, imports from Brazil stood at 189 million tonnes, up by 5.08% year-on-year, which means that iron ore imports from non-mainstream regions declined compared with the last year, and the concentration of the imports from Australia and Brazil further increased to 87.14%.

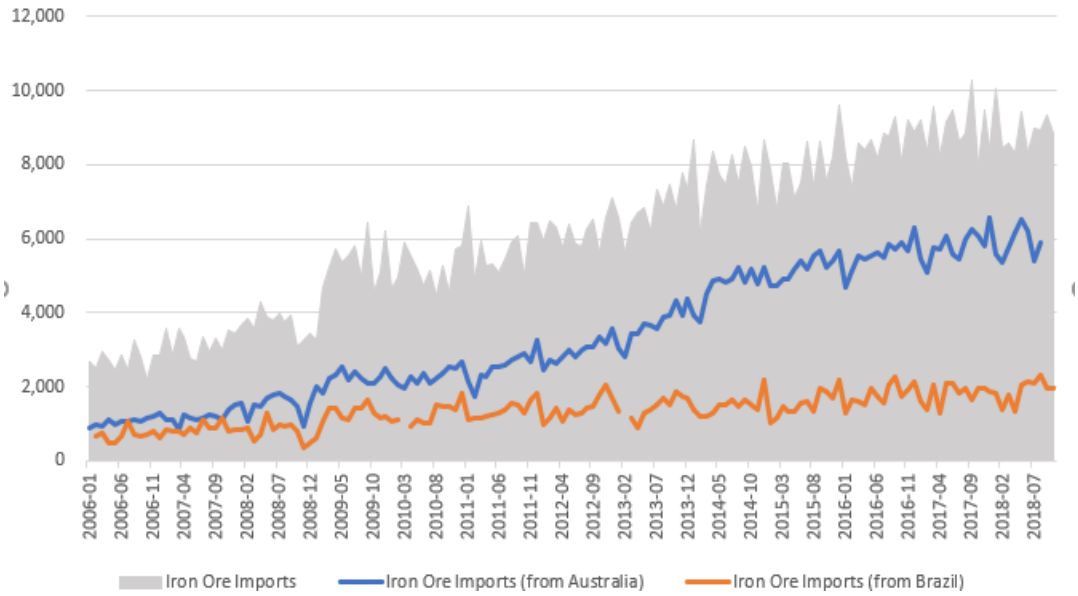

Chart 4: China's Iron Ore Imports (Unit: 10,000 tonnes)

(2) The iron ore supplies of the worlds' four major mines increased.

In the first three quarters of 2018, the iron ore output of the world's four major mines amounted to 825 million tonnes, an increase of 4.06% year on year. The output of the mines is expected to reach 1.145 billion tonnes in 2018. Specifically, Rio Tinto's annual production is expected to be 340 million tonnes, BHP Billiton 280 million tonnes, CVRD 360 million tonnes, and FMG 165 million tonnes.

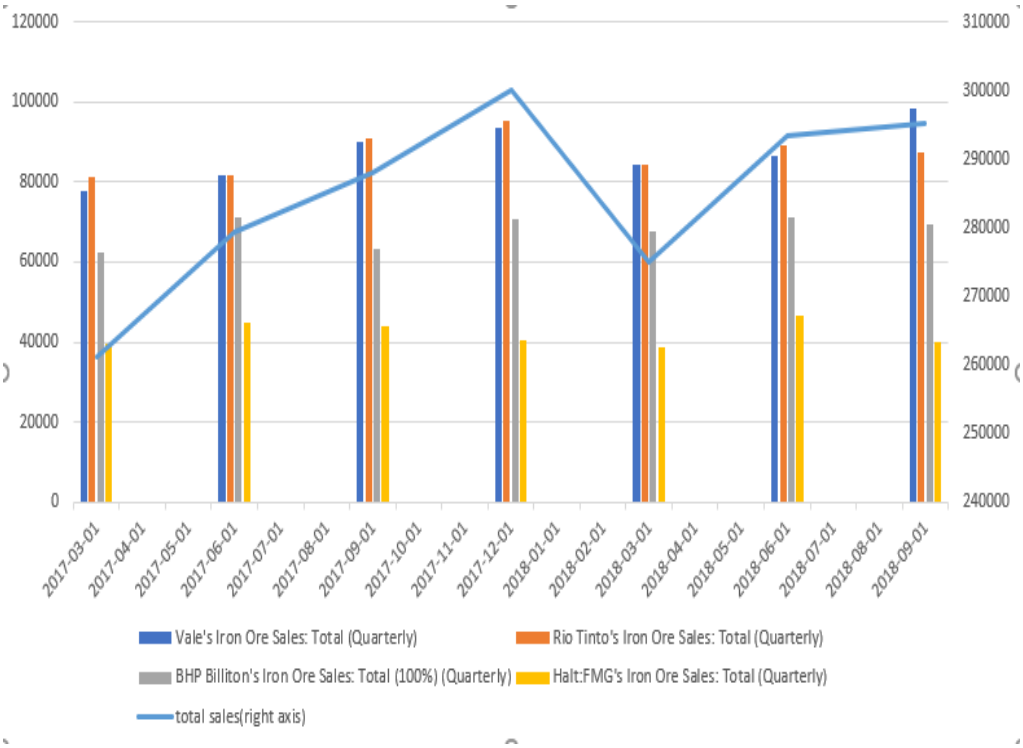

Chart 5: Iron Ore Sales of 4 Major Mines (Unit: 10,000 tonnes)

(3) The production costs of the four major mines remained at a low level.

After years of efforts to reduce costs, currently the room for the cost reduction at the four major mines has become smaller and smaller, and the costs of the mines remain basically stable. In 2018, the average cash cost of the four major mines was US$13.48 / tonne, only down by 7.23% from the end of 2015. The production costs of the major mines have been low, and the cost differences have been narrowed, with limited space for the cost to be further reduced.

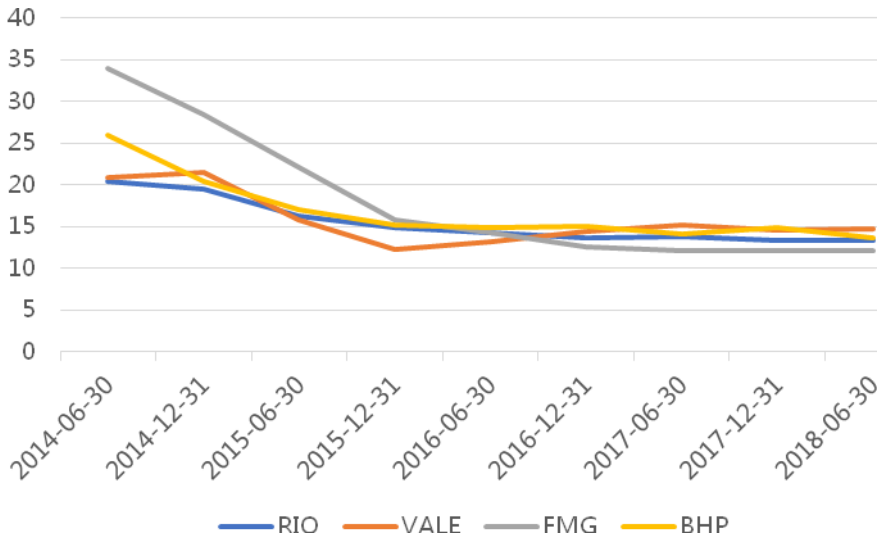

Chart 6: Cash Costs for Iron Ore Production of the 4 Major Mines

2. Domestic iron ore: Demand improved, but the production declined instead of increasing.

(1) The demand for domestic iron ore was relatively high, with the prices going up.

In the case of better market conditions, the steel mills mostly use the ore products with high grades and low impurities. In the year, the low-alloy indicator was especially preferred. The domestic iron powder is characterized by high iron grades, and low contents of silicon, sulfur, phosphorus and aluminum. In addition, domestic iron powder is mainly used for sintering and pelletizing. Driven by the factors of the high prices of imported pellets, the domestic pellet prices following the increases and the steel mills preferring high-quality domestic ore, the demand for domestically produced iron powder was high in the year, with the prices remaining high firmly.

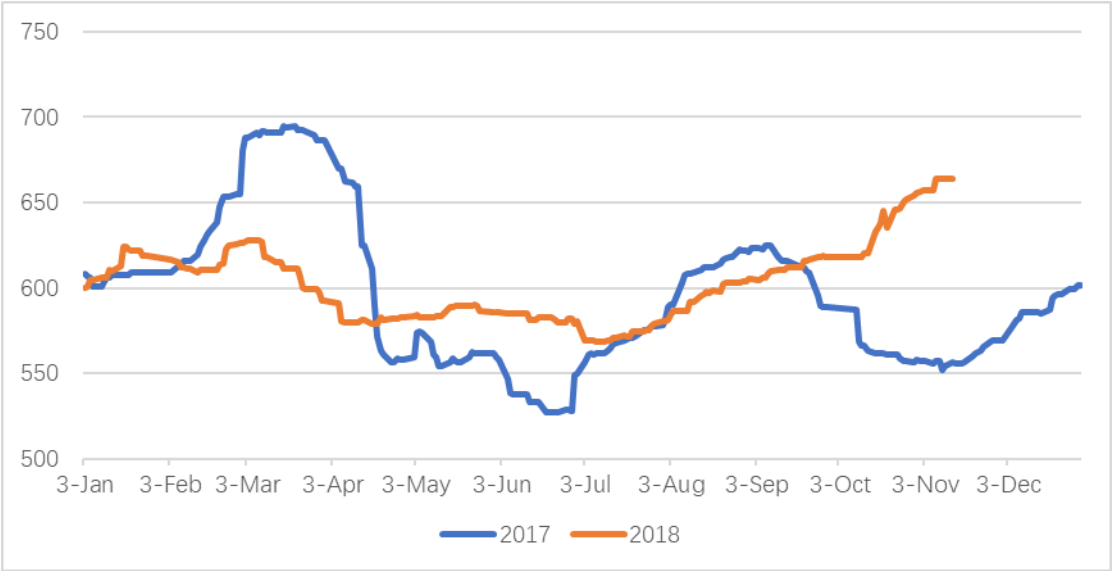

Chart 7: Tax-included Prices of 62% Grade Domestic Dry-basis Iron Ore Concentrates

(2) The outputs of domestic iron ore decreased, mainly because of the inspections for environmental protection and safety.

In the first three quarters of 2018, the output of raw iron ore was 580 million tonnes, down by 40.56% from the same period a year earlier. In terms of the regions, Hebei, Anhui and Inner Mongolia recorded drops of more than 50%, and specifically, Hebei's output shrank by 246 million tonnes, a decrease of 58.14%, ranking first nationwide. The main causes for the output reduction of domestic ore are as follows. The inspections for environmental protection were stricter, and some mines reduced productions or were shut down for rectification; some mines suspended production, relocated or conducted equipment overhaul for corporate upgrading, resulting in a decline in production. However, Liaoning and some other regions registered some output increases as some mines started the plan for expanding outputs after the completion of the rectification, coupled with the impacts of the price preference in the pellet market and the issuance of the mining licenses.

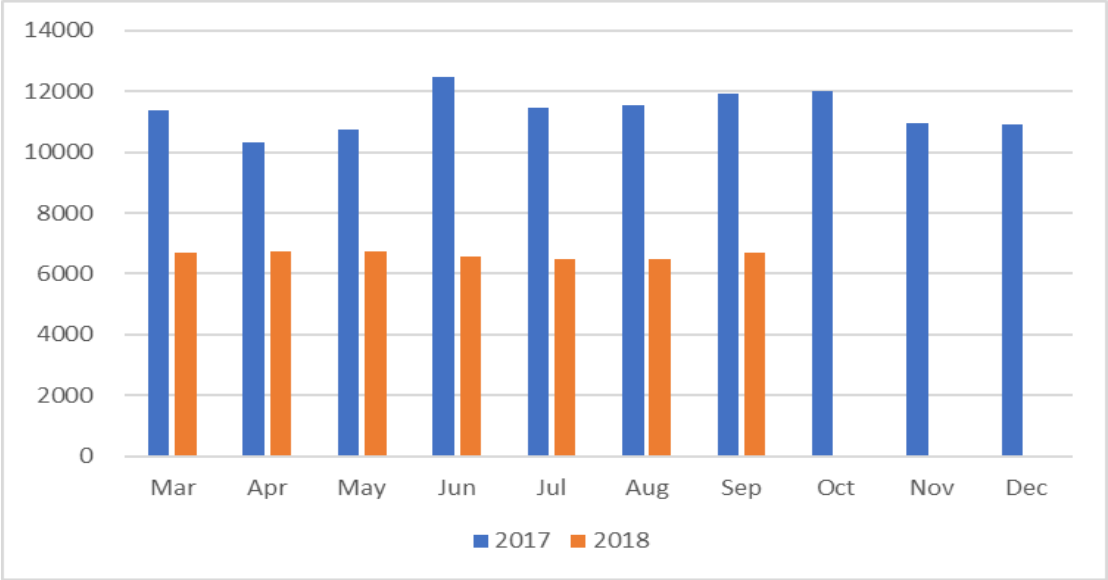

Chart 8: Domestic Monthly Outputs of Raw Iron Ore (Unit: 10,000 tonnes)

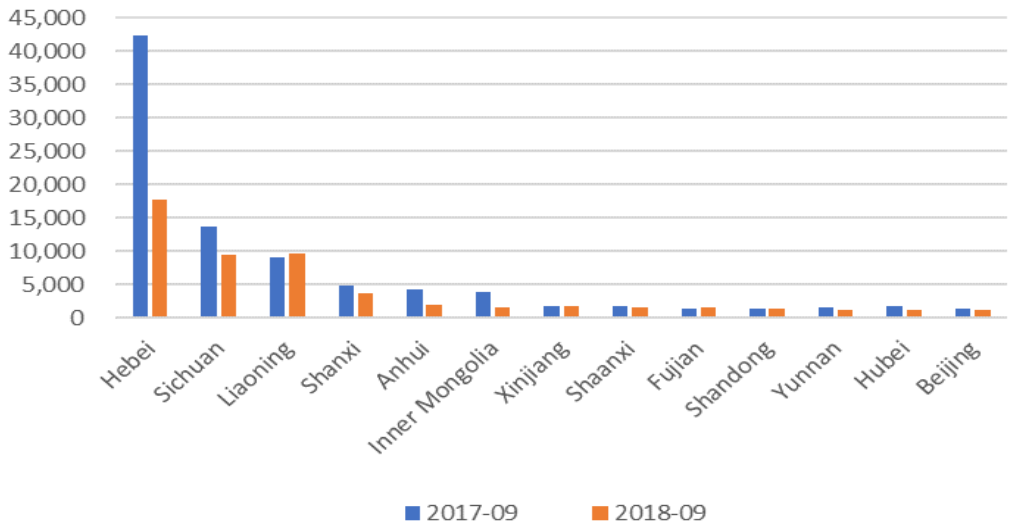

Chart 9: Regional Distribution of Domestic Iron Ore Outputs (Sizes of Over 10 million tonnes, Unit: 10,000 tonnes)

3. The total inventory at the ports was at a high level, the proportion for Australian ore increased before declining, and that for Brazilian ore decreased before expanding.

Since the beginning of the year, the iron ore inventories at the ports continued to be at a high level and reached an all-time high of 16,300 tonnes at the end of March. Specifically, due to the increase in supply, the inventory of Australian ore at ports accounted for a maximum of 64.56% in July, while Brazilian ore declined because of increased market demand and other factors, showing a year-on-year downtrend and dropping to 15.64% at the lowest. The proportion of trade ore was relatively stable, slightly higher than last year, and remained at around 40%.

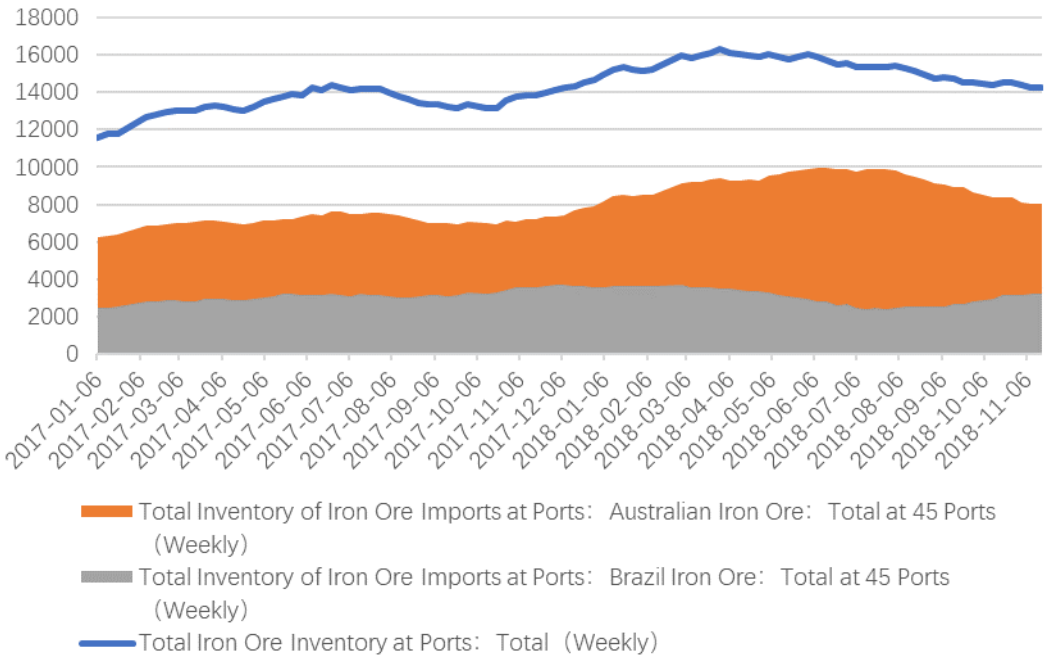

Chart 10: Iron Ore Inventories at Ports (Unit: 10,000 tonnes)

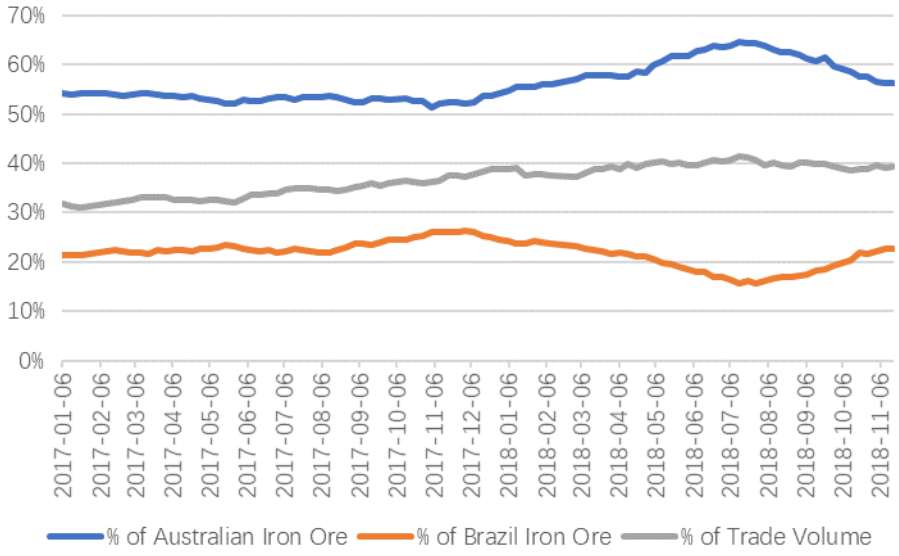

Chart 11: Structure of Iron Ore Inventories at Ports

(II) Steel inventories remained low and demand for high-quality iron ore increased.

1. Increase in crude steel production

Under the influence of the cyclical policies such as production restrictions for

environmental protection, the output of crude steel was gradually rising after the end of the heating season. By the end of October, China's crude steel output amounted to 782 million tonnes, an increase of 10.28% year on year. The average daily steel output stood at 2,544,100 tonnes / day, an increase of 8.69% year on year.

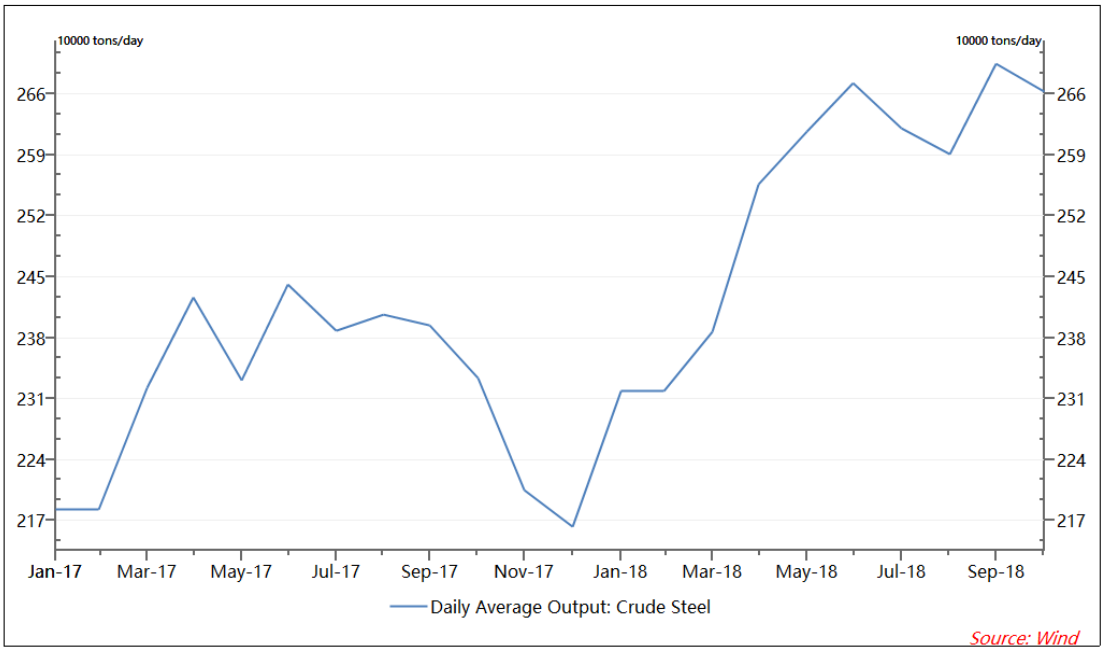

Chart 12: Average Daily Output of Crude Steel (Unit: 10,000 tonnes / day)

2. Rebar inventory was at a low level

Starting in December 2017, the social inventory of steel was at a historical low. In mid-January 2018, the social inventory of rebar decreased by 25.84% year-on-year. However, by the end of February, the social inventory of rebar directly rose to a year-on-year decrease of 0.7% after the Spring Festival from a year-on-year drop of 28.9% before the Chinese New Year. The inventory went up very quickly, and reached the peak in mid-March, when the social inventory expanded by 42.51% year on year. Subsequently, due to higher-than-expected demand in the second quarter, destocking was very fast, and the steel mills were more inclined to the production mode with low inventories of rebar. As a result, the inventory declined by 16.72% year on year at the end of October, a historical low, providing guarantee for the uptrend of the rebar prices.

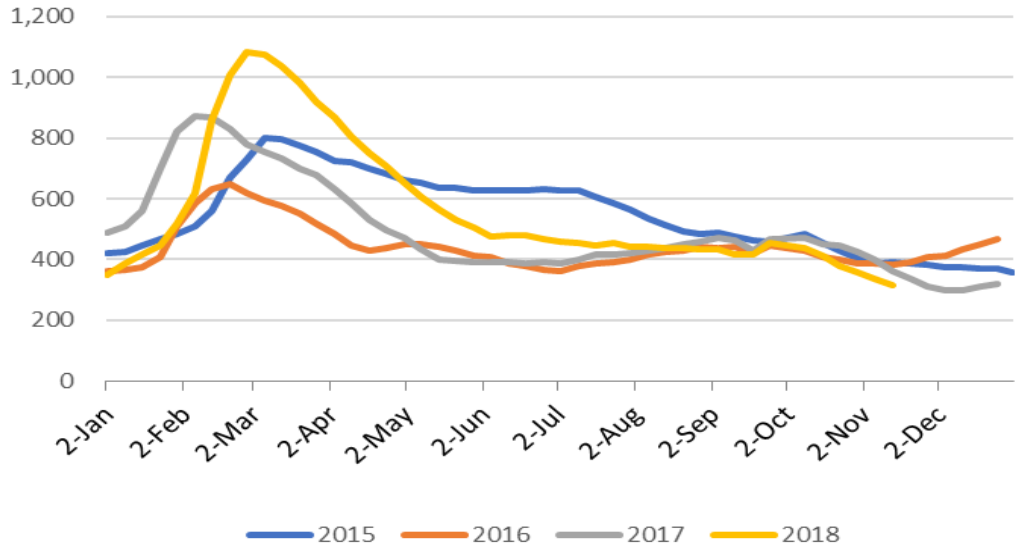

Chart 13: Rebar Inventories (Unit: 10,000 tonnes)

3. Steel mills preferred to purchase high-quality iron ore.

In the case of higher demand in the middle of the year, coupled with the demand of steel mills for accelerating production before the introduction of policies of production restriction for environmental protection for the heating season in the winter, the capacity utilization rate increased from 50.09% at the beginning of the year to 81.18% in early June. The demand of the steel mills for high grade iron ore also increased further. At the beginning of August, the price difference between the SFCJ fines (65%) and Yandi fines (57.5%) at Qingdao Port reached a maximum of RMB 316 / tonne, which was at a historical high level.

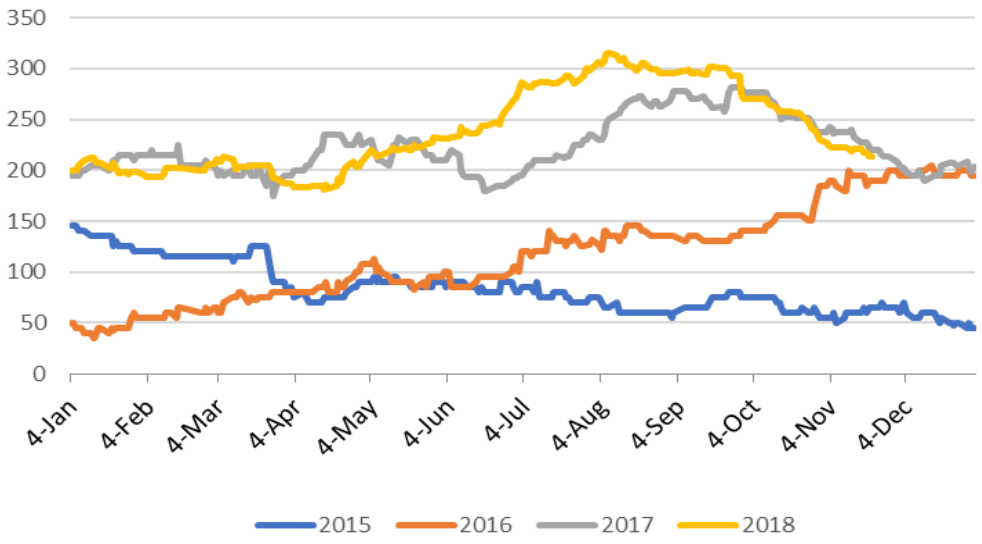

Chart 14: Price Differences Between SFCJ Fines and Yandi Fines at Qingdao Port

(Unit: 10,000 tonnes)

III. Market Outlook

(I) Demand: The real estate industry will grow slightly and steadily and the growth of infrastructure construction will slow down.

From January to October 2018, the investment in real estate development totaled RMB 9.93 trillion, an increase of 9.7% over the same period of the last year, with the growth rates generally higher than the previous year. Specifically, although the area for the sales of commercial housing in the first, second and third-tier cities decreased year-on-year, there has been the tendency toward bottoming out and picking up, and the growth rate in second-tier cities has rebounded slightly, with that in the third-tier cities basically remaining flat in the downward trend; the sales have basically formed a bottom level and started to heat up. It is expected that the sales of commercial housing at the end of the year would extend the trend of small and steady growths.

Chart 15: Total Volumes and Growth Rates of Investments in Real Estate Development (Unit: trillion yuan, %)

From January to October 2018, the fixed asset investment totaled RMB 54.76 trillion, an increase of 5.7% over the same period of the last year, with the growth rate significantly slower than the last year. Specifically, the year-on-year growth rate of the wholesale and retail industry declined the fastest, at -19.3%, while the comprehensive utilization of waste resources increased the fastest, at 39.1%. Under the general circumstances of financial deleveraging, turning the off-balance sheet assets into balance sheet assets, and the restriction on the non-standard financing channels, the decline in infrastructure investment growth is inevitable; however, due to China-US

trade frictions, it is urgent to expand domestic demand and transform the economic structure. It is expected that the infrastructure investment will bottom out and pick up instead of further losing speed to decline.

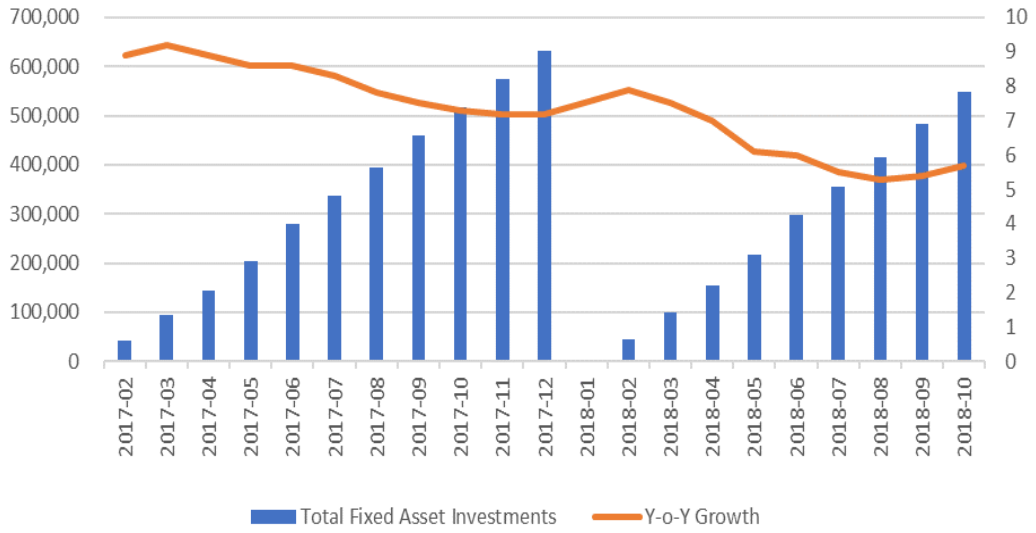

Chart 16: Total Volumes and Growth Rates of Fixed Asset Investments

(II) Supply: As the four major mines' plans for production expansion have been basically completed, the output growth rate will slow down.

At present, Rio Tinto's mines and ports already have a shipping capacity of 360 million tonnes. The shipments from 2019 to 2020 will depend on the auto haul of the exiting railway system. It is expected that the shipments will increase slightly from 345 million to 350 million tonnes from 2019 to 2020.

In June 2018, BHP Billiton's long-awaited South Flank project was finally approved, and it is mainly to replace the increasingly depleted Yandi mining area, with the first batch of ore expected to be produced in 2021. In addition, BHP Billiton plans to increase the capacity of ports and railways to 290 million tonnes in the next two years, but the improvement of the capacity of Port Hedland is limited. The production is expected to remain stable between 280 and 285 million tonnes in 2019 and 2020.

CVRD has been expanding production at a significant rate since 2013. Although the production in 2016 declined due to the Samarco tailings dam incident, the expansion and production of the S11D project again pushed up the total production. At present, the annual output has reached 360 million tonnes. According to its expansion plan, it is estimated that the annual output will amount to 400 million tonnes in 2020;

FMG approved the Eliwana iron ore mine and railway project in May of the year. The first batch of ore is expected to be produced in December 2020. The annual production of FMG is expected to remain at 165 million tonnes from 2019 to 2020.

Table 4: 2018 Production and Long-term Capacity Plans of 4 Major Mines (Unit: 100 million tonnes)

	18Q1	**17Q1**	**Year -on -year**	**18Q2**	**17Q2**	**Year -on -year**	**18Q3**	**17Q3**	**Year -on -year**	**18Q1-3**	**17Q1-3**	**Year -on -year**	**Medium and long-term Annual Capacity Plan**
CVRD	0.82	0.86	-4.92%	0.97	0.92	5.34%	1.05	0.95	10.35%	2.62	2.56	2.08%	4
Rio Tinto	0.87	0.82	6.85%	0.87	0.84	3.14%	0.87	0.90	-3.23%	2.09	1.96	6.30%	3.5
BHP Billiton	0.67	0.62	7.83%	0.72	0.70	3.49%	0.69	0.64	7.86%	1.43	1.44	-0.42%	2.85
FMG	0.42	0.45	-6.94%	0.50	0.54	-6.92%	0.52	0.46	13.57%	8.15	7.83	4.06%	1.65
Total of 4 Mines	**1.96**	**1.88**	3.91%	**3.06**	**2.99**	2.10%	**3.14**	**2.95**	6.15%	8.15	7.83	4.06%	12