Core ideas

The world is rich in ilmenite resources, and China's ilmenite reserves are the first in the world. Titanium is widely used in chemical, aviation, military and other industries, is the production of titanium dioxide and other products of raw materials, mainly used for the production of titanium mineral for ilmenite
and rutile. In 2022, China's titanium ore production will be the first in the world, and Australia's rutile production will be the highest.

China's own titanium ore grade is low, and high-quality titanium ore relies on imports. China's demand for high-grade high-quality titanium ore mainly relies on imports. In 2023, the increase in overseas titanium ore supply is limited, and the domestic titanium ore leading enterprises are located in the Panxi area, with high capacity concentration, and Longbai Group is the main contribution to the increase of titanium ore in China in the next few years.
The supply increment is limited and the demand is growing steadily, and the price of titanium ore has generally fluctuated upward in the past five years.

Titanium dioxide is the most important downstream area of titanium ore, followed by sponge titanium. China's titanium dioxide production capacity ranks first in the world, mainly rutile type, but the proportion of chlorination method is low. The largest downstream of titanium dioxide is the coating and plastic industry, and the prosperity of the real estate industry has a certain impact on the market demand for titanium dioxide. In 2022, China's titanium dioxide production capacity will reach
5 million tons, ranking first in the world. Since 2022, the supply of titanium dioxide production capacity is sufficient and the weak downstream demand has led to a decline in the price of titanium dioxide, and the industry's earnings have recovered slightly after bottoming out.

The sponge titanium market has a high growth rate, and the demand in emerging fields is expanding. In 2022, China's sponge titanium production capacity will be 181,000 tons, and the output will be 175,000 tons, both of which are the first in the world. From 2016 to 2022, China's sponge titanium production continued to increase
And the year-on-year growth rate exceeded 20% after 2020, the development speed was faster, the number of imported sponge titanium decreased, and exports increased. With the gradual increase in the supply of sponge titanium, and long-term demand is also expected to continue to expand, the sponge titanium market has developed stably and the price support is strong.

China's titanium dosage is increased, mainly used in the chemical and aerospace fields. From 2016 to 2022, the output of titanium ingots and titanium processing materials in China has shown a continuous improvement trend. In 2022, the largest area of titanium consumption in China is chemical industry (73,000 tons, a year-on-year increase of 24%), followed by aerospace (33,000 tons, a year-on-year increase

Industry research and industry topics

50%）。 In 2022, although the amount of titanium processing materials used in the pharmaceutical and marine fields is relatively low, the year-on-year growth rate will reach 50% and 25%, respectively. The demand for titanium in various fields is growing.

Longbai Group has the advantages of the whole titanium industry chain, and the production capacity of titanium dioxide ranks first in the world. Longbai Group is the world's leading producer of titanium dioxide and one of the enterprises with the richest titanium ore reserves in China. In 2022, the growth rate of the company's revenue and net profit attributable to the parent will be 17%/-27%, respectively, and the compound growth rate of the company's revenue from 2018 to 2022
23.7%, with a compound growth rate of 11.6% in net profit attributable to parents. The company has a complete titanium industry chain, rich titanium ore reserves, and continuous expansion of product capacity. At present, the company's annual production capacity of titanium concentrate, titanium dioxide and sponge titanium is 140, 151 and 50,000 tons, respectively, ranking among the best in the industry.

Risk warning: titanium ore price fluctuations, industry policy changes, environmental protection policies, intensified competition, technological innovation and product upgrading, geological exploration, supply chain, international trade frictions, exchange rate risks, etc.

Investment advice: optimistic about industry leaders and grasp long-term value.

In the titanium industry chain, titanium ore resources are the core resources. Although titanium dioxide is in a downward cycle, it is expected that the price of titanium ore will still fluctuate at a high level under the background of weak supply and demand, optimistic about Longbai Group, which has the advantages of the whole titanium

industry chain.

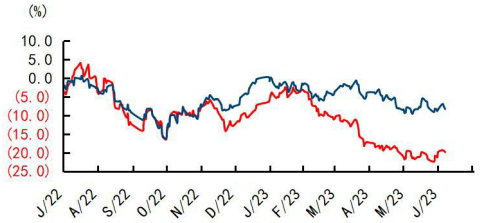
Earnings forecasts and investment ratings of key companies

Basic chemicals

Overweight, maintain rating

Titanium ore industry in-depth report

Ove



Source: Wind, Guosen Securities Economic Research Institute

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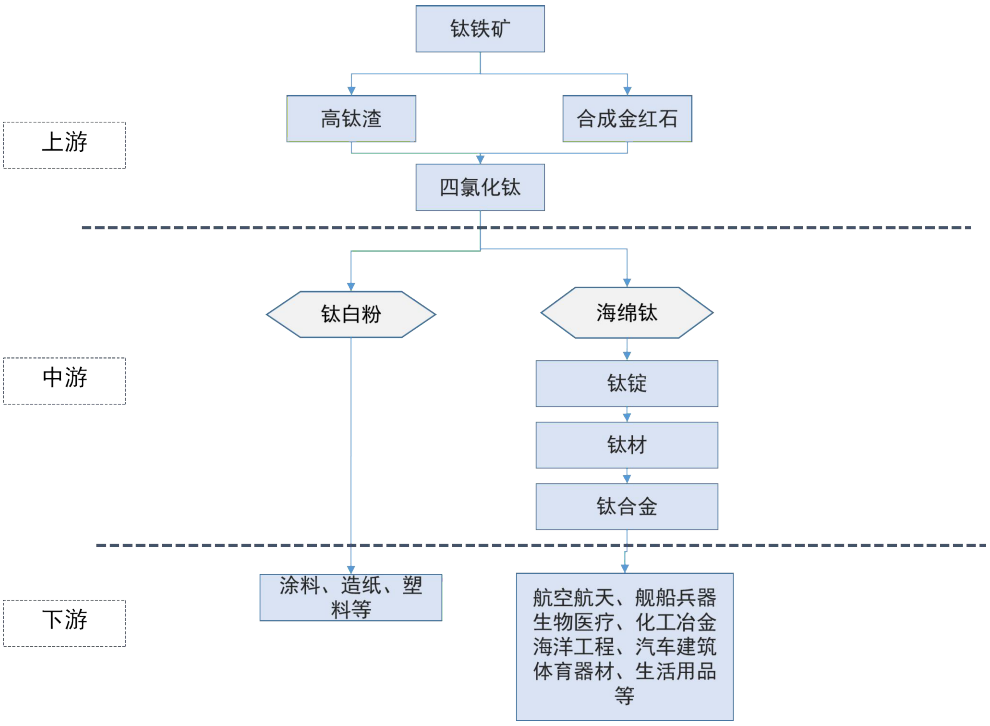
1. China's titanium reserves rank first in the world, and the low grade needs to be optimized and developed

1.1. The world is rich in ilmenite resources, and China's ilmenite reserves are the first in the world

Titanium is an important metal element, widely used in chemical, aviation, military and other industries, is the production of titanium dioxide, titanium alloy and other products of raw materials. The titanium industry chain includes the whole process from titanium mining, smelting, processing to the application of titanium products, involving many industries and fields. The upstream is mainly the mining and smelting of titanium ore, including ilmenite and golden red
Stone, etc., is the source of raw materials for the titanium industry chain. The midstream is mainly the manufacture and processing of titanium products, including sponge titanium, titanium dioxide, titanium processing materials and titanium alloys, etc., which is the core link of the titanium industry chain. The downstream is mainly the application and consumption of titanium products, including aerospace, ship and military industry, chemical metallurgy, medicine and biology, sporting goods, etc., which is the terminal market of the titanium industry chain.

Figure 1: Titanium industry chain



Source: Longbai Group Annual Report, compiled by Guosen Securities Economic Research Institute

The titanium minerals mainly used in the production are ilmenite and rutile. There are many kinds of titanium minerals, and there are more than 80 kinds of titanium minerals with TiO2 content greater than 1% that have been discovered, but only a few minerals with utilization value at this stage, mainly ilmenite and rutile, followed by pyrite, anatase, red ilmenite, plate titanium and perovskite.

Table 1: Major titanium minerals in nature

mineral	chemical formula	TiO_2%	remark
ilmenite	Vetting$_3$	45-53	Symbiotic by-minerals in most igneous and metamorphic rocks. The crystal shape is mostly semi-self-shaped granular, thick plate,

rutile	TiO_2	95-100	The particle size is similar to that of anatase and rutile. Medium to high-grade symbiotic by-mines. Variation of symbiotic crushed stone ore and ilmenite and other titanium ores. Rutile and anatase and plate titanium are homogeneous anomalies, and the minerals are brown, brown, and even under single polarization to black.
Anatase	TiO_2	95-100	Low-temperature polycrystalline ore of rutile. Usually secondary, formed by variations of other ilmenite.
Plate titanium ore	TiO_2	95-100	metastable polycrystalline ore of rutile and anatase. Common in caves, fractures and dikes. Other titanium
Fake Rutile	$Fe2Ti_{309}$	60-65	The weathering of the mine, relatively small. Variation of ilmenite in sedimentation. It is common in variable ilmenite concentrates.
Ilmenite variation	$FeTiO3-Fe2TiO_9$	53-70	Refers to ilmenite variant ore containing ilmenite mixtures, false rutile, and white titanite. In heavy ore sands Common.
Titanium stone	高 TiO_2	70-100	Ilmenite is a mutant ore with a high titanium dioxide content. Occasionally there are perovskites, often containing microcrystals
Rock	$CaTiSiO_5$	40	Rutile, or anatase, less commonly pseudorutile, ilmenite, hematite or goethite. Secondary ores widely distributed in metamorphic rocks and low-grade igneous rocks can be regarded as symbiotic gravel mines.
perovskite	$CaTiO_3$	58	It is a common by-mineral in many unsaturated alkaline rocks and carbonate rocks, often due to cooling processes Phase changes to form complex double crystals.
Fake plate titanium ore	$Fe2TiO_5$	33	Secondary minerals present in igneous rocks. Formation of an oxide of ilmenite and titanium magnetite.
Titanium spinel	$FeTiO_4$	36	Secondary minerals present in alkaline igneous rocks. It usually manifests as a thin layer of desolubilization in magnetite.
Titanium magnetite	$(Tis,Ti)_{304}$	0-34	Refers to optically homogeneous Fe-Ti spinel and, in a solid solution, contains hematite and titanium spinel. Secondary minerals present in alkaline igneous rocks.
Titanium hematite	$(Tis,Ti)_{203}$	0-30	Refers to optically homogeneous hematite-ilmenite. Exists in acidic low-grade plagioclase sleeves.

Source: "Types of Titanium Minerals", compiled by Guosen Securities Economic Research Institute

Figure 2: Ilmenite and rutile illustrations

ilmenite

rutile

Source: MINDAT, collated by Guosen Securities Economic Research Institute

The TiO2 content of titanium concentrate varies from 40% to 52%.

Titanium ore often refers to titanium concentrate, titanium concentrate is

after beneficiation, containing less impurities ilmenite, is also an important raw material for the production of titanium dioxide, titanium alloy and other products. Other titanium Minerals, such as rutile, ferrite, anatase, etc., although they also contain higher TiO2, but have less reserves in the earth's crust and are not the main titanium resources. According to the "Ilmenite Concentrate" industry standard (YS/T 351-2015), ilmenite concentrate is divided into 10 grades according to TiO2 content, and its TiO2 content varies from 40% to 52%.

Table 2: Ilmenite concentrate grades

Product level	TiO_{2+Fe} TiO_2 含量 02+FeO (mass content fraction)/% (mass fraction not less than number)/% No Less than		Impurity content (mass fraction) / % is not greater than					
			Tall	MgO	P	Fe2O3	Al2O3	It's not$_2$
Level	52	94	0.1	0.4	0.030	27	1.5	1.5

Level 2	50	93	0.3	0.7	0.050	27	1.5	2.0
Level 3A A	49	92	0.6	0.9	0.050	17	2.0	2.0
Level 3 B	48	92	0.6	1.4	0.050	17	2.0	2.5
Level IV	47	90	1.0	1.5	0.050	17	2.5	2.5
Level five	46	88	1.0	2.5	0.050	17	2.5	3.0
Level 6	45	88	1.0	3.5	0.080	17	3.0	4.0
Level seven	44	88	1.0	4.0	0.080	17	3.5	4.5
Level eight	42	88	1.5	4.5	0.080	17	4.0	5.0
Level nine	40	88	1.5	5.5	0.080	17	5.0	6.0

Source: "Ilmenite Concentrate", collated by Guosen Securities Economic Research Institute
Note: The U+Th content is not more than 0.015%, and the Cr 2O3 content is not more than 0.1%. The S content is not more than 0.02% in class I, 0.2% in class II, and 0.5% in class III.

China's titanium ore deposits are mainly magmatic type, and the identified titanium resource reserves account for 88.3% of the national total. According to different causes, titanium ore deposits can be divided into magmatic type, weathering type, metamorphic type, and sedimentary titanium ore deposit, of which magma type is the heaviest in China

To the type of titanium ore, it is found that the reserves of titanium resources account for 88.3% of the national total, such as the Panxi metallogenic belt with 4 large mining areas of Taihe, Baima, Panzhihua and Hongge.

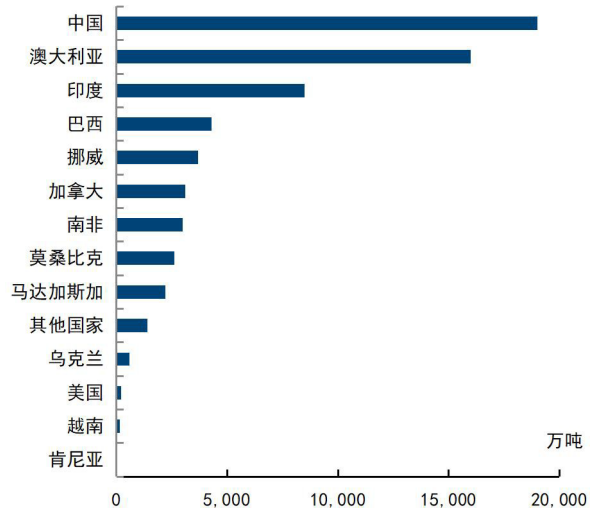
Table 3: Titanium deposit type classification

type		peculiarity
Titanium deposits (by genesis)	Magmatic type	Ilmenite magnetite (titanium magnetite) formed by magmatic differentiation. The most important type of titanium ore in China, identifying titanium resources Source reserves account for 88.3% of the national total. The Panxi metallogenic belt is the most important vanadium-titanium magnetite metallogenic belt in China He, Baima, Panzhihua, Hongge 4 large mining areas.
	Weathered type	Due to weathering, the ore structure of the primary titanium deposit is loosened, resulting in changes in some gangue minerals, and the ore minerals ilmenite and rutile are left in situ as weathering residues to form minerals, and the identified resource reserves of such deposits in China account for 6.5%.
	metamorphic type	Formation is often associated with high-pressure/ultra-high-pressure metamorphism, which occurs mainly at orogenic belts and at the edges of converging plate margins. The mineral composition and TiO2 content of metamorphic titanium ore deposits are greatly affected by the composition of metamorphic rough rocks and the degree of metamorphism. The proportion of identified resource reserves of such deposits in China is 2.9%.
	morphic type	All are Quaternary sedimentary placers. In China, it is mainly coastal sedimentary type, and this type of deposit is mainly distributed in the southeast coast, especially the east coast of Hainan Province. From the global statistics, this type of mineral is an important type of titanium mineral, but China's river alluvial titanium ore reserves are not very large, accounting for only 2.3% of the national identified resource reserves.
	Sedimentary type	

Source: "Evaluation of Geological Characteristics and Resource Potential

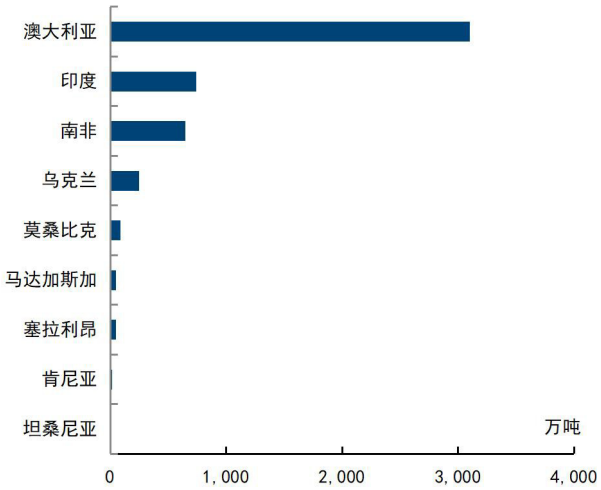
The world is rich in ilmenite resources, China's ilmenite reserves are the first in the world, and rutile reserves are low. The world is rich in ilmenite resources and reserves, according to data from the United States Geological Survey (USGS), global titanium resources in 2022 The reserves (in terms of TiO2) are about 700 million tons, mainly ilmenite. Ilmenite resource reserves are 650 million tons, accounting for about 93%, and rutile resource reserves are 49 million tons, accounting for about 7%. Australia and China have the richest reserves of titanium resources. China's ilmenite reserves of 190 million tons, accounting for 29% of global reserves, ranking first in the world, followed by Australia's ilmenite reserves of 160 million tons, accounting for 25% of global reserves. The country with the world's largest rutile reserves is Australia, with reserves of 31 million tons in 2022, accounting for about 63% of global rutile reserves. China has low rutile reserves and relies on imports.

Figure 3:Global ilmenite reserves in 2022 (10,000 tons)



Source: USGS, Guosen Securities Economic Research Institute

Figure 4:Global Rutile Reserves in 2022 (10,000 tons)



Source: USGS, Guosen Securities Economic Research Institute

After 2018, global ilmenite reserves began to decrease, and titanium ore production increased. With the continuous discovery and development of titanium ore resources, the global ilmenite reserves reached a peak in 2018, with a total of 940 million tons, and then few major new titanium ore resources were discovered in the world, and titanium ore production increased year by year, so the corresponding titanium ore reserves began to decrease.

Figure 5:Global titanium ore reserves 1995-2022 (10,000 tons)

Source: USGS, Guosen Securities Economic Research Institute

Figure 6:Global titanium ore production from 1995-2022

Source: USGS, Guosen Securities Economic Research Institute

In 2022, China's titanium ore production will be the first in the world, and Australia's rutile production will be the highest. In 2022, China produced 3.144 million tons of titanium ore (in terms of TiO2), accounting for 36% of the world's total production. and UM, which produces the highest amount of rutile

Leah, rutile production in 2022 was 190,000 tonnes (in terms of TiO2),

representing 32% of the global total. Among the major foreign titanium ore producers in 2022, Rio Tinto ranked first with 1.086 million tons (in terms of Ti02) of titanium ore production, followed by Kenmare with 577,000 tons (in terms of Ti02), and Iluka company had the highest rutile production of 132,000 tons (in terms of Ti02).

Figure 7: Global titanium ore and rutile production (in terms of TiO2, 10,000 tons) in 2022

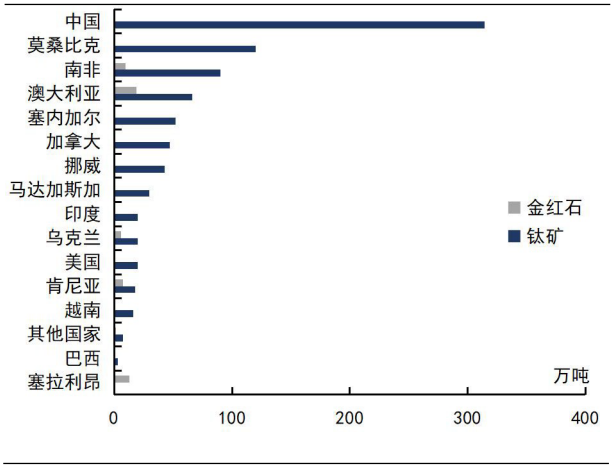
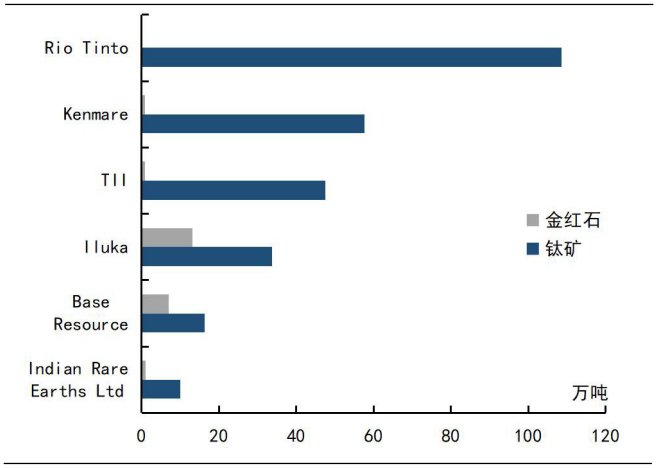


Figure 8: Production of titanium ore and rutile (in terms of TiO2, 10,000 tons) of major foreign titanium ore producers in 2022



Source: USGS, Guosen Securities Economic Research Institute Source: China Nonferrous Metals Industry Association Titanium Zirconium Hafnium Branch, Company Announcement, Guosen Securities Collated by the Institute of Economic Research

Overseas titanium ore increment is limited. According to the company's official website, Rio Tinto expects its titanium slag production in 2023 to change between -8.3%~+16.7% year-on-year; Kenmare expects its ilmenite production to change year-on-year in 2023 Rutile production varies between -3.5%~+5.7% year-on-year and -10.1%~+1.1% year-on-year; Iluka expects its rutile production in 2023 to be flat year-on-year, with synthetic rutile production increasing by 28% to 305,000 tonnes. In general, the increase in overseas titanium ore supply in 2023 is limited.

Table 4: Major overseas titanium ore manufacturers

firm	Brief introduction	country	2022 production Expected for 2023
Rio Tinto founded in 1873	Multinational minerals and Resources Group, which also operates Gold, diamonds, aluminum, energy and other businesses. One of the suppliers and the world's second largest iron ore producer	Australia (headquartered in UK) is the world's largest resource extraction and minerals	Titanium slag 1.2 million tons 110~1.4 million tons
Iluka	1998 by RGC Ltd Westralian Sands Ltd 合并而 Cheng, the world's largest rutile producer		Titanium slag 100% owned in K
Kenmare	The company and its subsidiaries are engaged in the operation and further development of the Moma titanium mine, which is located on the northern coast of Mozambique		
Base Resources	The company is engaged in ownership in Kenya		

nds The operation of business	Australia	Rutile 55,000 tons; 238,000 tons of synthetic rutile	Rutile 55,000 tons; 305,000 tons of synthetic rutile
			ilmenite 1.05 million tons;
	Ireland	ilmenite 1.088 million tons;	Rutile 8000 tons
		Rutile 8900 tons	/
	Australia	ilmenite 325,000 tons; rutile 74,000 tons; Low-grade rutile 11,000 tonnes	

Source: Company official website, Wind, Guosen Securities Economic Research Institute

1.2. China's titanium ore has high concentration, low grade and high foreign dependence

The domestic titanium ore leading enterprises are located in the Panxi area, and the production capacity concentration is high. China's titanium ore production enterprises are mainly the following four leading enterprises: Pangang Vanadium Titanium, Longbai Group, Anning Co., Ltd., Heavy Steel Xichang, the main mining area All are located in the Panxi area. The total titanium concentrate capacity of the four enterprises is about 3.9 million tons, of which Longbai Group's acquisition of Fengyuan Mining is further enriched by mineral resources, which is the main contribution to the increase of titanium ore in the next few years.

Table 5: Major domestic titanium ore production enterprises

firm areas	Major mining	Titanium ore energy	Titanium concentrate production in 2022
Pangang Group	Panzhihua, Hakuba	1.5 million tons of titanium concentrate; 240,000 tons of titanium slag	/
Longbai Group	Hongge, Miaozigou, Xujiagou, etc	Titanium concentrate 1.4 million tons/year	1,168,900 tons
Anning shares	Pan Jiatian	Titanium concentrate 550,000 tons/year	493,000 tons
Heavy steel Xichang	Wo	Titanium concentrate 450,000 tons/year	/

Source: Company announcement, Baichuan Yingfu, Guosen Securities Economic Research Institute

China's titanium ore has a high degree of dependence on foreign countries, and its own titanium ore grade is low. Although China's titanium resources have large reserves and wide distribution, most of them are low-grade primary ores, associated with a variety of minerals, and the comprehensive utilization rate is low, which cannot meet the domestic demand for titanium ore. Therefore, China's demand for high-grade high-quality titanium ore mainly relies on imports, and the external dependence is as high as 40%.

The comprehensive utilization of low-grade titanium ore and the technology of improving grade still need to be further developed and applied. The disadvantages of titanium ore in China are:

1) Rutile TiO2 content is higher and the availability is better, but China's ilmenite is more (97.34%), and rutile ore is less (2.66%);

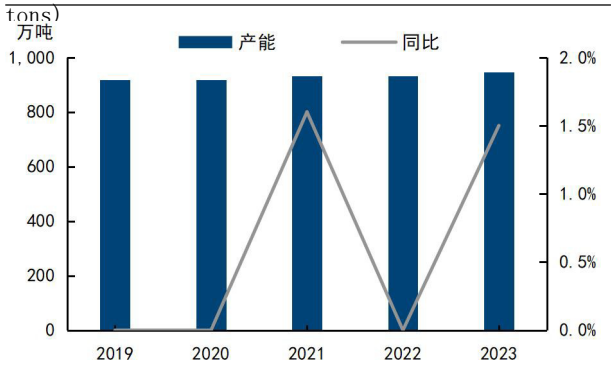
2) There are many primary ores and few placer deposits. Placer ore is loosely stacked, shallow and does not need to be crushed and processed, but rutile placer ore in China only accounts for 14% of rutile resources, and ilmenite sand ore only accounts for 3%.

3) The grade of titanium ore in China is generally low. The average grade of ilmenite is generally 5%~10%, and the average grade of rutile is generally 1%~5%, mostly 1%~2%.

4) China's titanium ore is mostly polymetallic symbiotic ore, and there is no single titanium ore deposit. Although the co-associated minerals have comprehensive utilization value, they are difficult to sort, the recovery rate is low, and the comprehensive utilization rate of resources is low.

From 2016 to 2022, China's titanium ore production has increased year by year, and China's titanium ore production in 2022 will increase by 10% year-on-year. Since 2020, China's weekly titanium ore production has mainly fluctuated between 100,000-140,000 tons, and the current production is relatively high, while the inventory level is in the middle decile of three years.

Figure 9:China's titanium mineral energy (10,000 tons)

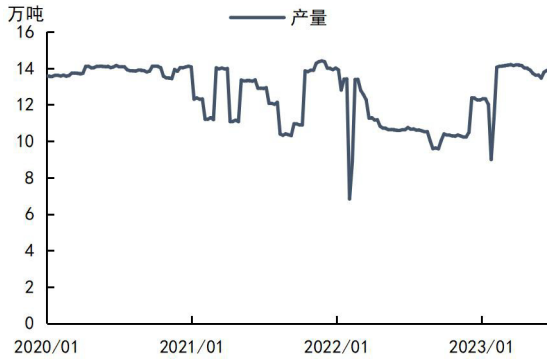


Source: Baichuan Yingfu, compiled by Guosen Securities Economic Research Institute

Figure 10:China's titanium ore production (in TiO_2 Count, 10,000 tons)

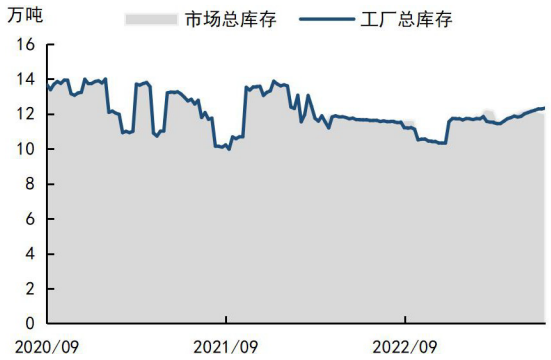
Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

Figure 11:China's weekly output of titanium ore (10,000 tons)



Source: Baichuan Yingfu, compiled by Guosen Securities Economic Research Institute

Figure 12:China's titanium ore inventory (10,000 tons)

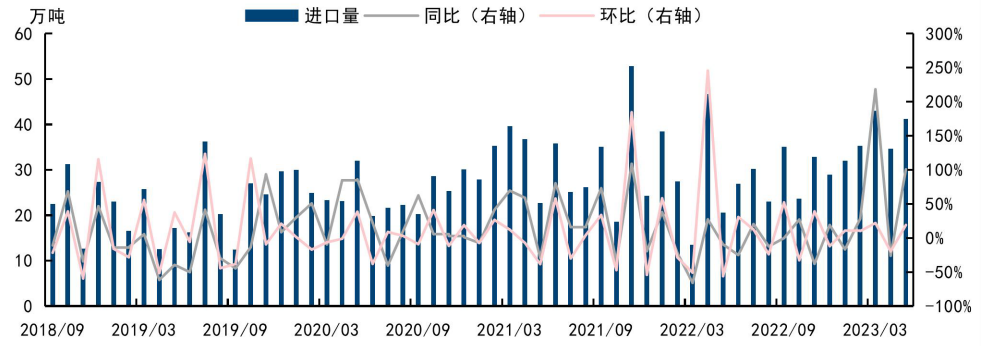


Source: Baichuan Yingfu, compiled by Guosen Securities Economic Research Institute

China's titanium ore is mainly imported, and the export volume is relatively small. **The overall amount of imported titanium ore** increased slightly in fluctuations, and the amount of exported titanium ore was stable at a low level. Since 2023, China's monthly imports of titanium ore and its concentrate have been around 300,000-400,000 tons, which is at a relatively high level; the export volume is mainly in addition to a few months that are higher (09,000 tons).

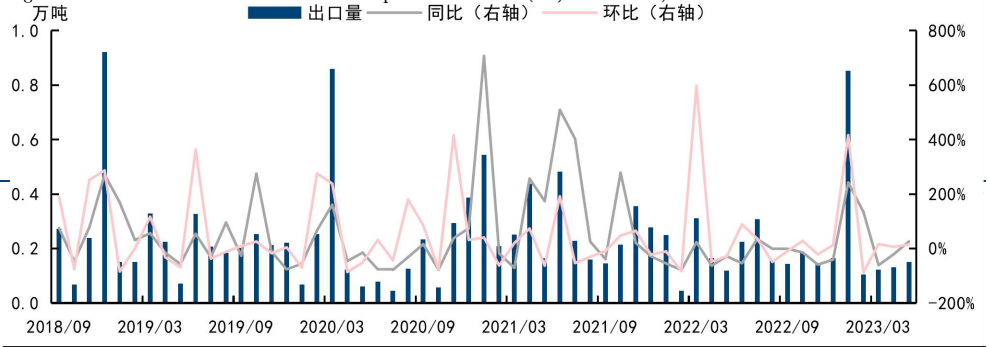
To be around 0.1-0.15 million tons. The overall import volume of titanium ore and its concentrate in China is high, and the export volume is low.

Figure 13: China's titanium ore imports (10,000 tons).



Source: General Administration of Customs, Guosen Securities Economic Research Institute Note: The customs commodity name is "titanium ore and its concentrate"

Figure 14: China's titanium ore export volume (10,000 tons).



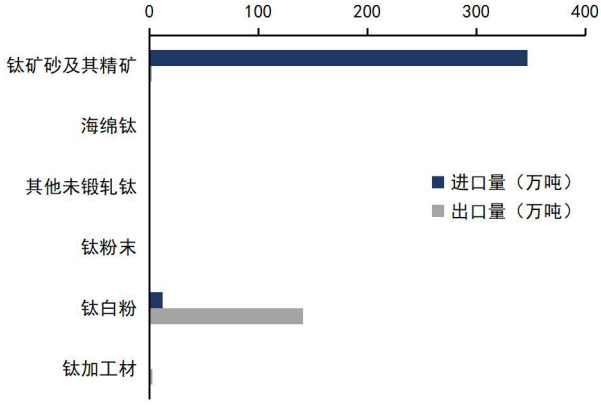
Source: General Administration of Customs, Guosen Securities Economic Research Institute Note: The customs commodity name is "titanium ore and its concentrate"

In 2022, China's trade surplus in titanium products will be $2.15 billion.

According to the statistics of the General Administration of Customs, China's titanium product imports in 2022 mainly include titanium ore, various titanium processing materials, titanium dioxide and sponge titanium; exports are mainly titanium dioxide and various titanium processing materials. The total import value of various titanium products was 2.52 billion US dollars, and the total export value was 4.67 billion US dollars

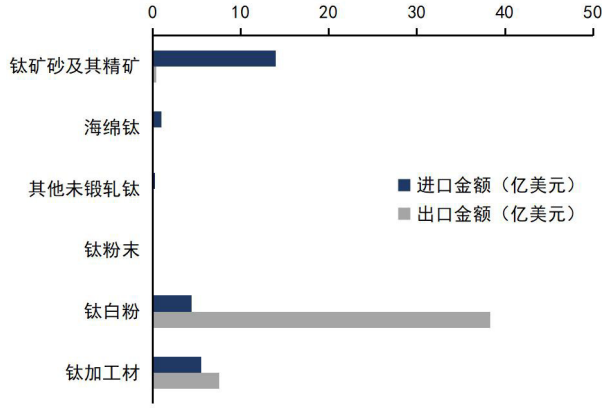
This resulted in an overall surplus of $2.15 billion. From the category of imported products, it is mainly titanium ore and its concentrate, followed by high-end titanium processing materials and titanium dioxide.

Figure 15:Import and export volume of China's main titanium products in 2022 (10,000 tons)



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

Figure 16:Import and export [illegible] billion US dollars)



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

In 2023, the import and export price of titanium ore will increase slightly year-on-year, and the concentration of import source countries will be high. 2022 to date in our country

The import and export titanium ore price index is almost all above 100, reflecting the import and export prices of titanium ore and its concentrate

The year-on-year increase was the mainstay. In 2022, China's main import sources of titanium ore are Mozambique, Kenya, Vietnam, the United States and Norway. The top five import source countries accounted for 78% of imports, with a high degree of concentration.

Figure 17:China's import and export titanium ore price index (the same month of last year = 100)

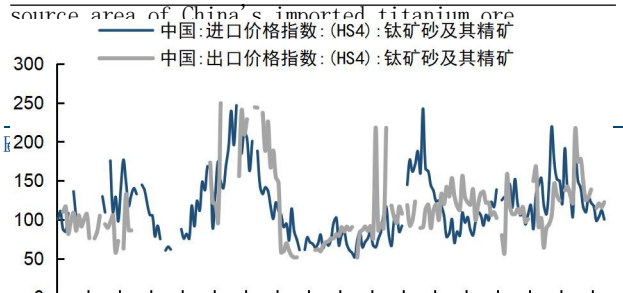
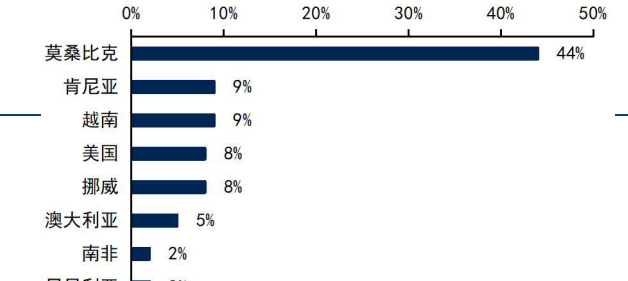


Figure 18:The main source area of China's imported titanium ore

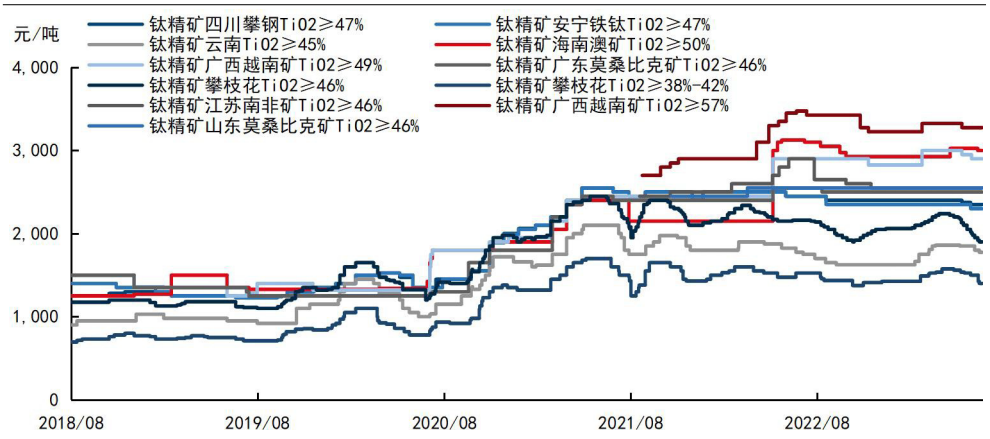


Source: General Administration of Customs, Guosen Securities Economic Research Institute Note: The customs commodity name is "titanium ore and its concentrate"

Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

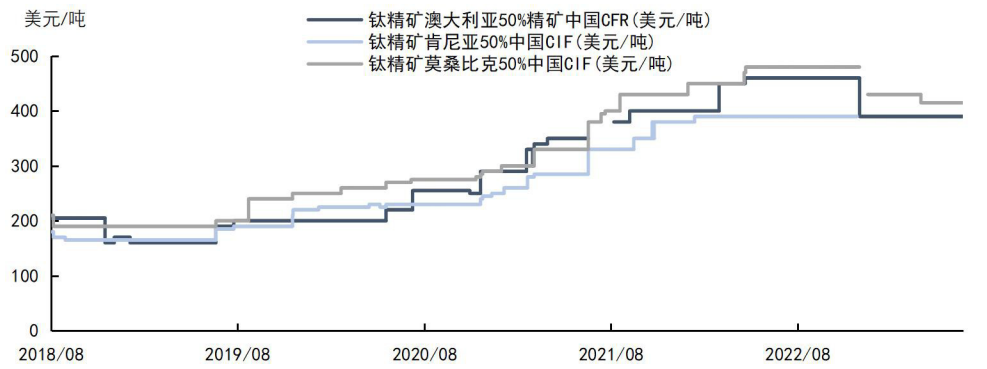
In the past five years, the price of titanium ore has generally fluctuated upward. From 2018 to 2023, the prices of domestic titanium ore, imported titanium ore and rutile all showed an overall upward trend, and the average price of domestic titanium ore rose from about 1000 yuan / ton to about 2000 yuan / ton
tons, the price of imported titanium ore rose from about $200 / ton to about $400 / ton, and the price of rutile rose from 4000
Yuan/ton rose to about 13,000 yuan/ton. It is mainly affected by the recovery of demand for titanium ore downstream products such as titanium dioxide at home and abroad, and the depletion of overseas titanium ore resources. At the same time, environmental protection policies and other factors have led some countries to restrict mining activities, and new production capacity is scarce.

Figure 19: Domestic titanium ore price (yuan/ton).



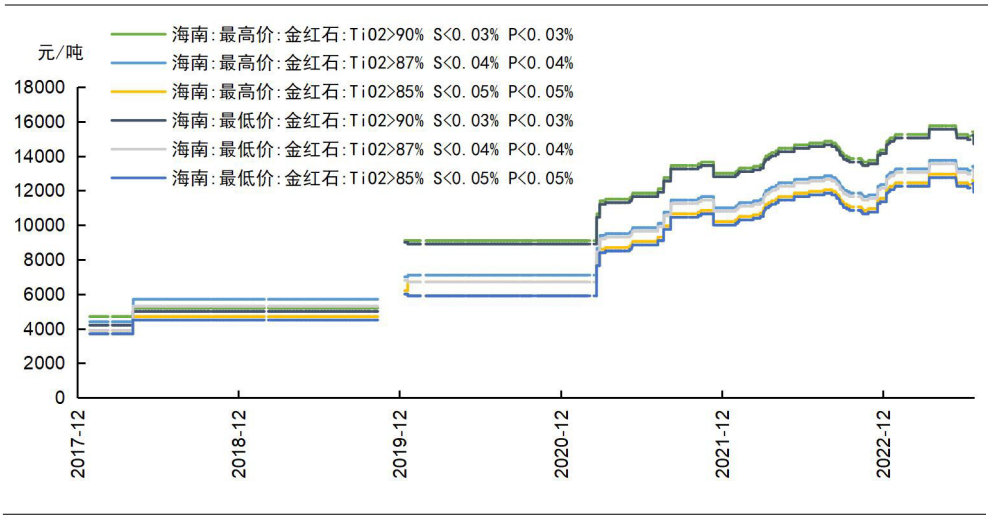
Source: Baichuan Yingfu, compiled by Guosen Securities Economic Research Institute

Figure 20: Imported titanium ore prices ($/tonne).



Source: Baichuan Yingfu, compiled by Guosen Securities Economic Research Institute

Figure 21: Rutile prices (RMB/tonne).



Source: Wind, collated by Guosen Securities Economic Research Institute

It is expected that in the next three years, China's titanium ore self-sufficiency is still insufficient, and it needs to rely on imports. We assume that the import and export volume of titanium ore in 2023-2025 will remain at the level of 2022, and the growth rate of domestic titanium ore production will remain at 5% from 2023 to 2025, and titanium

The growth rate of white powder production is 2%, the growth rate of sponge titanium production is 23%/20%/15%, the unit consumption of titanium dioxide and sponge titanium to titanium concentrate is 2.4 and 5, respectively, the average grade of titanium concentrate is 46%, and the total domestic demand for titanium ore in 2023-2025 is about 491.8/510.6/5.285 million tons (in terms of TiO2), and there are still 2.2/4.5/50,000 tons (in TiO2 Demand depends on the increase in imports.

Table 6: China's titanium ore supply and demand balance table (10,000 tons).

	2022	2023E	2024E	2025E
Total supply in TiO2	**473.9**	**489.6**	**506.1**	**523.4**
Production (in TiO2).	314.4	330.1	346.6	364.0
Imports (in TiO2).	159.5	159.5	159.5	159.5
Import volume	346.7	346.7	346.7	346.7
Supply gap (in TiO2).		2.2	4.5	5.0
Total demand in TiO2	**473.9**	**491.8**	**510.6**	**528.5**
Domestic consumption in TiO2	472.9	490.8	509.5	527.4
Titanium dioxide demand for titanium concentrate (in terms of TiO2).	432.6	441.3	450.1	459.1
Titanium dioxide production	391.4	399.2	407.2	415.4
Titanium sponge demand for titanium concentrate (in TiO2).	40.3	49.5	59.4	68.3
Sponge titanium production	17.5	21.5	25.8	29.7
Export volume (in TiO2).	1.0	1.0	1.0	1.0
Export volume	2.2	2.2	2.2	2.2

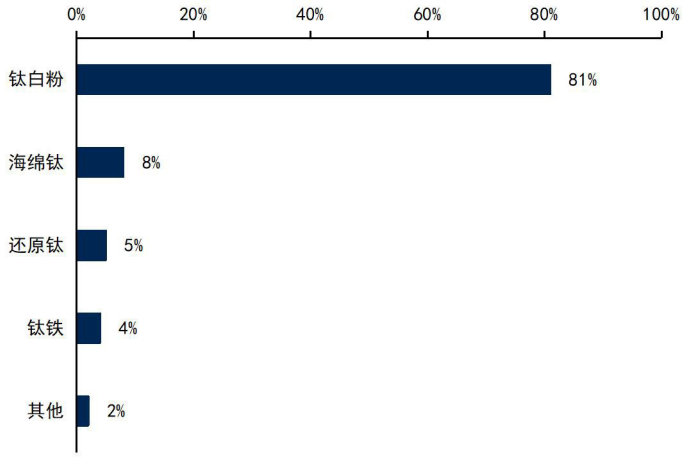
Source: USGS, General Administration of Customs, Guosen Securities Economic Research Institute forecast

2. Titanium dioxide is the downstream of the titanium core, followed by sponge titanium

Titanium dioxide is the most important downstream area of titanium ore, followed by sponge titanium. According to statistics from the Titanium-Zirconium Hafnium Branch of the China Nonferrous Metals Industry Association, China's titanium ore consumption in 2022 will be about 4.82 million tons (in terms of TiO2), a year-on-year increase of 5.6%.

Among them, the titanium dioxide industry is the most important downstream field, accounting for 81%; followed by sponge titanium, accounting for 8%. Titanium dioxide is an important white pigment and functional material, which is widely used in coatings, plastics, paper, rubber, ceramics and other industries. The growth in demand for titanium dioxide is mainly affected by the development and demand of these industries. In addition, the excellent whiteness, hiding power and weather resistance of titanium dioxide also make it widely used in high-end products. Sponge titanium refers to porous titanium metal material with low density and good corrosion resistance. Sponge titanium is mainly used in aerospace, shipbuilding, chemical industry and other fields. In the aerospace field, titanium sponge can be used to manufacture aero-engine components, structural parts, etc. In the chemical industry, titanium sponge can be used to prepare catalysts, electrolyzers and electrodes. With the development of the aerospace and chemical industries, the demand for sponge titanium is also increasing.

Figure 22: Downstream proportion of titanium ore in China in 2022



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

2.1. China's titanium dioxide production capacity ranks first in the world, and the proportion of chlorination method is low

Titanium dioxide is widely used and often has three classification methods. Titanium dioxide is an important inorganic chemical product, the main component is titanium dioxide white pigment, in coatings, inks, papermaking, plastic rubber, chemical fiber, ceramics and other industries
important uses. There are many types of titanium dioxide, and there can

be different classification methods according to different standards, and the common ones are as follows:

(1) According to the production process, it can be divided into sulfuric acid titanium dioxide and chlorinated titanium dioxide. Sulfuric acid titanium dioxide is extracted from titanium ore by sulfuric acid method, and then prepared by hydrolysis, washing, calcination and other processes. Chlorination titanium dioxide is prepared by chlorination to extract titanium dioxide from titanium ore, and then through reduction, oxidation, hydrolysis and other processes.

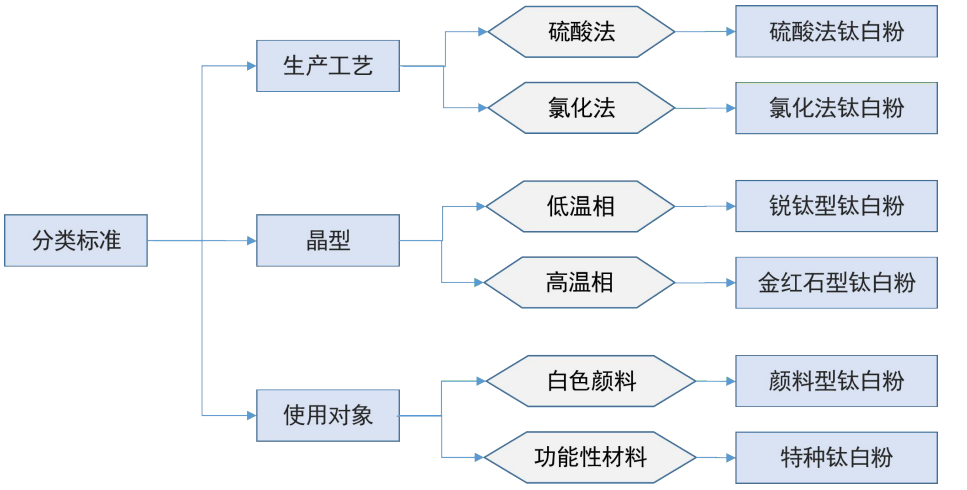
(2) According to the crystal form, it can be divided into anatase titanium dioxide and rutile titanium dioxide. Anatase titanium dioxide is the low-temperature phase of titanium dioxide, which has high photocatalytic activity and low weather resistance. Rutile titanium dioxide is the high-temperature phase of titanium dioxide, which has high hiding power and weather resistance, and has a strong shielding effect on ultraviolet rays.

(3) According to the object of use, it can be divided into pigment-type titanium dioxide and special titanium dioxide. Pigmented titanium dioxide is a white pigment used in coatings, plastics, papermaking and other industries, with good hiding power, coloring strength and gloss. Special titanium dioxide is a functional material used in cosmetics, food, medicine and other industries, with good ultraviolet absorption ability, antibacterial ability and biocompatibility.

China's titanium dioxide is mainly rutile type. China's titanium dioxide production capacity structure is mainly rutile type, accounting for about eighty percent of the total production capacity. Rutile titanium dioxide has higher market demand and profit margins, and is currently the mainstream titanium in the world
White powder products. In recent years, China has continuously expanded the production scale and market share of rutile titanium dioxide, and has become the world's largest producer and exporter of rutile titanium dioxide.

The proportion of chlorinated titanium dioxide in China is low.
Chlorination method is the main production process of high-quality rutile titanium dioxide, which has the advantages of high resource utilization, good product quality and environmental protection, but high investment cost and technical door
High thresholds and high raw material requirements. China's titanium dioxide industry started late, based on sulfuric acid method, the development of chlorination method is constrained by technology, capital, raw materials and other aspects, the current chlorination production capacity accounted for rutile production capacity only about one percent, far lower than the global average. Due to the stricter environmental protection requirements and the encouragement of advanced and clean production processes, the environmental protection policy requires that the new production capacity cannot be produced by the sulfuric acid process, and the chlorination process needs to be further developed.

Figure 23: Classification of titanium dioxide



Source: Jingyan Chemical, collated by Guosen Securities Economic Research Institute

The largest downstream of titanium dioxide is the coating and plastic industry. Since the coating industry ranks first in the consumption of

titanium dioxide, the real estate industry will have a certain impact on the market demand for titanium dioxide. However, in addition to the need for coatings for new houses, secondary decoration also needs to be repainted, or to a certain extent, increase the demand for titanium dioxide. In the domestic production of titanium dioxide

For enterprises, export promotion and application field expansion can provide incremental demand for the titanium dioxide market. Technology improvement has improved product quality, or can seize some overseas high-end markets; titanium dioxide application scenarios can be continuously enriched, in addition to traditional coatings, paints, plastics and other downstream industries, can also be gradually expanded to cosmetics, toys, food, medicine and other fields, titanium dioxide application fields will be more abundant and diverse. At the same time, under the current low profit level, the supply side of China's titanium dioxide industry may appear small production capacity clearing, poor product quality, high cost, environmental protection unfriendly backward production capacity or will be eliminated, promoting the entire industry to achieve supply balance, capacity concentration increased.

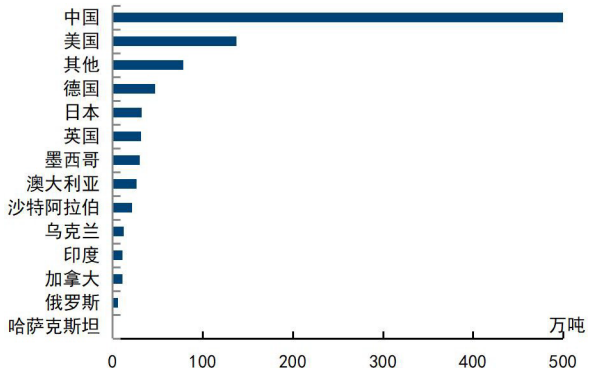
Table 7: Titanium dioxide applications

Application areas	detail
paints	At present, the largest application field of China's titanium dioxide industry is coatings, and the annual consumption of titanium dioxide in global coatings accounts for about 55%-60%. This compares with 60%-65% in China. In the pigments used in coatings, the content of titanium dioxide >80%, and the white pigments used in coatings >85%, The proportion of coating raw materials is between 5% and 20%.
	The applications of titanium dioxide in plastics include polypropylene, polyvinyl chloride, polystyrene, etc. Almost all thermoset and thermoplastic plastics All materials use titanium dioxide as a colorant, and the general dosage is 0.5%-10%. Some special plastics use higher amounts of titanium dioxide and color
	The titanium dioxide content in the masterbatch is 40%-70%.
Paper	The paper industry is the third largest user of titanium dioxide, accounting for 7% of the total amount of titanium dioxide.
Chemical fiber	The chemical fiber industry is also an important application field of titanium dioxide, accounting for 2%-3% of the total amount of titanium dioxide.
printing ink	In the ink production process, titanium dioxide plays a very important role, and its dosage accounts for 4% of the total amount of titanium dioxide.

Source: "Analysis of Titanium Dioxide Industry Status and Market Operation in 2021", compiled by Guosen Securities Economic Research Institute

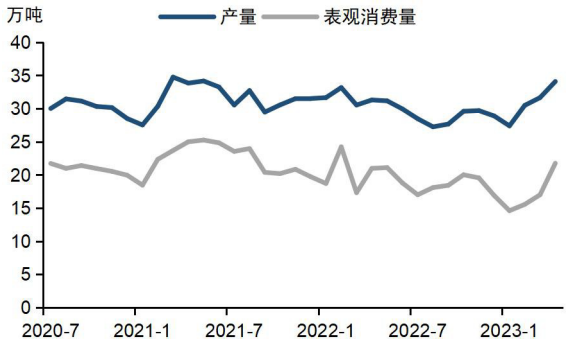
China's titanium dioxide production capacity ranks first in the world, and the monthly output is relatively stable. According to USGS, China's titanium dioxide production capacity reached 5 million tons in 2022, ranking first in the world and far surpassing the second place in the United States (1.37 million tons). Since 2020, the monthly production of titanium dioxide in China has fluctuated around 300,000 tons, which is generally stable. From the perspective of the distribution of provincial production capacity, four Sichuan ranks first in the country with a production capacity of 1.04 million tons, followed by Shandong and Henan with 800,000 tons and 760,000 tons respectively, and the total production capacity of the three provinces accounts for about half of the national production capacity.

Figure 24: Global titanium dioxide production capacity (10,000 tons) in 2022



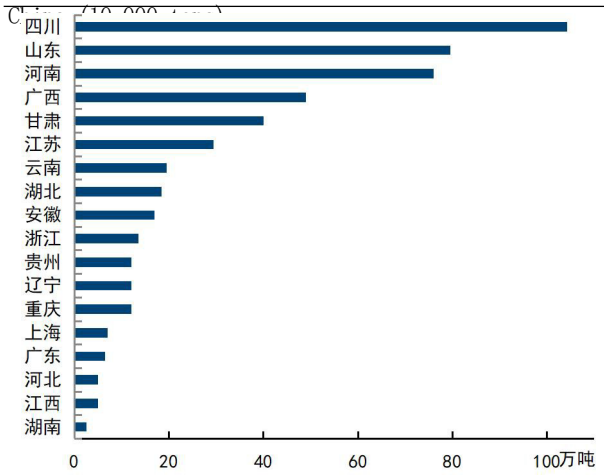
Source: USGS, Guosen Securities Economic Research Institute

Figure 25:China's monthly production and apparent consumption of titanium dioxide (10,000 tons)



Source: Baichuan Yingfu, compiled by Guosen Securities Economic Research Institute

Figure 26:Regional distribution of titanium dioxide production capacity in China (10,000 tons)



Source: Baichuan Yingfu, compiled by Guosen Securities Economic Research Institute

China's titanium dioxide export volume increased, import volume declined, the average unit price of imports is higher than exports.

China is the world's largest producer and consumer of titanium dioxide, and also the world's largest exporter of titanium dioxide. China's titanium dioxide exports show a continuous growth trend, mainly benefiting from the maturity of domestic production technology and equipment, and the expansion of foreign demand markets

Big, etc. The import volume shows a trend of fluctuation and decline, and China's titanium dioxide imports are relatively low, mainly high-end products. China's titanium dioxide import price is higher than the export price, mainly because the imported products are mainly high-end rutile products, while the export products are mainly low-end products.

Figure 27:China's titanium dioxide import and export volume (10,000 tons)

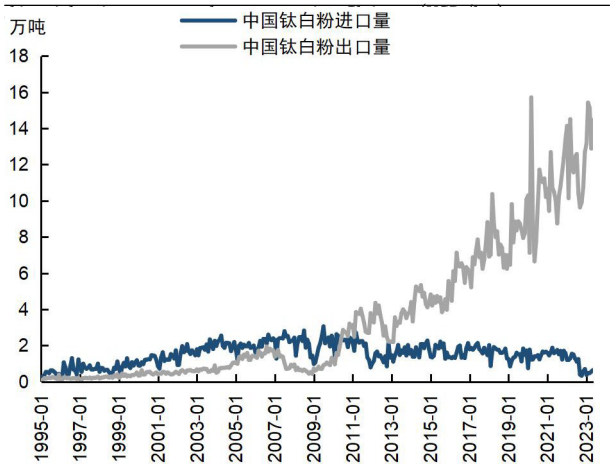
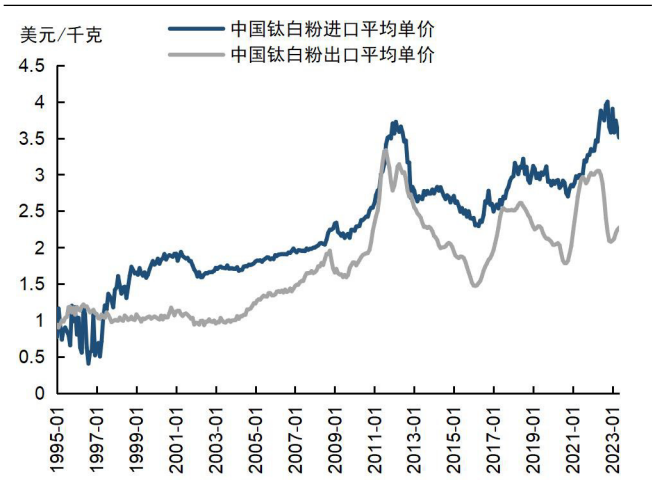


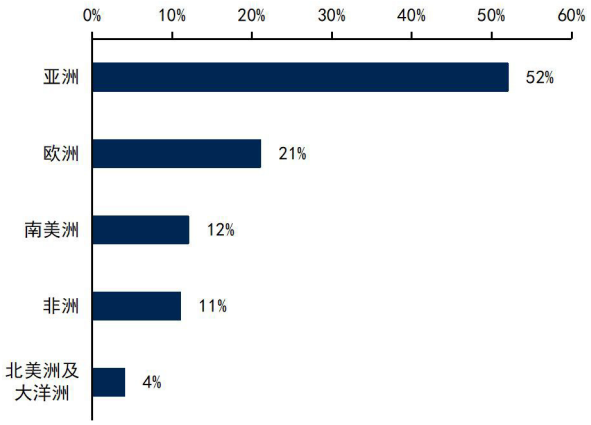
Figure 28:Average unit price of titanium



Source: Wind, collated by Guosen Securities Economic Research Institute Source: Wind, collated by Guosen Securities Economic Research Institute

China's titanium dioxide export areas are mainly in Asia, and the European and American markets need to be expanded. China's titanium dioxide export area is dominated by Asia, accounting for more than half, followed by Europe (accounting for 21%). With the continuous improvement of the quality of titanium dioxide products in China, high-end models are gradually expanding, and the European and American markets are expected to further expand and increase exports.

Figure 29: Export distribution of titanium dioxide in China in 2022



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

The concentration of titanium dioxide industry is high. According to the annual report of Gimpo Titanium Industry, the effective total capacity of 43 titanium dioxide production capacity in the titanium dioxide industry in 2022 is 4.7 million tons, and the total output of that year is 3.914 million tons, and the average capacity utilization rate of the industry is 83.28%。 The 7 companies counted here have a total production capacity of 2.755 million tons of titanium dioxide in 2022, with a total output of 2.111 million tons, accounting for 54% of the total domestic production in 2022, and the industry concentration is high.

Table 8: Production capacity of major manufacturers of titanium dioxide in China and output in 2022 (10,000 tons).

Manufacturers	Capacity (10,000 tons)	Production in 2022 (10,000 tons)
Longbai Group	151	98.98
Mesonuclear titanium dioxide	40	33.43
Lubei Chemical	26	19.14
Vanadium titanium shares	23.5	24.35
Gimpo Titanium	16	15.66
Huiyun Titanium Industry	11	9.37
Anada	8	10.17

Source: Company announcement, collated by Guosen Securities Economic Research Institute

Since 2016, titanium dioxide prices have experienced the following fluctuations:

1) From 2006 to 2012, the price of titanium dioxide in China fluctuated upward, and the upward range was small, mainly driven by the downstream demand for coatings and plastics at home and abroad, as well as the tight supply and price increase transmission of

foreign titanium dioxide manufacturers.

2) From 2012 to 2016, the price of titanium dioxide entered a downward cycle, falling from more than 20,000 yuan / ton to about 20,000 yuan 10,000 yuan / ton, mainly affected by factors such as macroeconomic and weakening downstream demand, and domestic environmental protection policies leading to the suspension or limitation of production of some manufacturers.

3) From 2016 to 2017, the price of titanium dioxide rose again, from about 10,000 yuan / ton to about 18,000 yuan / ton, then entered a downward cycle to 2020, mainly affected by domestic and foreign downstream demand and supply fluctuations of overseas titanium dioxide manufacturers.

4) In 2021, the price of titanium dioxide once again reached a small high of 20,000 yuan / ton, mainly affected by domestic coatings and plastics

The continuous growth of downstream demand such as materials, as well as the continuous high cost of titanium dioxide raw materials. At the same time, factors such as the new crown pneumonia epidemic, tight international shipping capacity, and political turmoil in some countries have also had an impact on supply and demand.

5) Since 2022, the supply of titanium dioxide production capacity is sufficient and the weak downstream demand has led to a decline in the price of titanium dioxide, and the industry's earnings have recovered slightly after bottoming out.

Figure 30: Titanium dioxide price (yuan/ton).

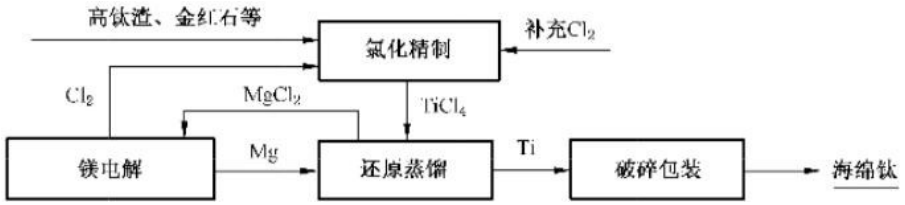
Source: Wind, collated by Guosen Securities Economic Research Institute

2.2. The sponge titanium market has a high growth rate, and the demand for emerging fields is expanding

Sponge titanium is a titanium element, mainly prepared by magnesium reduction distillation. Sponge titanium is a porous pure titanium, an intermediate product reduced from titanium ore, generally light gray particles or sponge-like, which usually requires further melting
Transformation or alloying can make titanium products. The appearance of sponge titanium is similar to sponge, there are many small pores and impurities, its purity is generally between 99.5% ~ 99.7%, the density is about 1.6 ~ 1.8 grams / cubic centimeter, than the density of metallic titanium
(4.5 g/cm³) much lower. The main production method of sponge titanium is the Kroll method, that is, the reaction of chlorine gas and titanium ore to generate titanium tetrachloride, and then magnesium reduction to generate sponge titanium and magnesium chloride. The Kroll method is

currently the most widely used method, accounting for more than 90% of global titanium sponge production. Other production methods include the Hunter method, electrolysis method, etc., but the scale is smaller and the technology is more complex.

Figure 31: Process flow of magnesium reduction distillation to produce sponge titanium



Source: "Energy Consumption Limits per Unit Product of Sponge Titanium and Titanium Ingot Resources" (GB 29448-2022), compiled by Guosen Securities Economic Research Institute

Sponge titanium products are generally divided into 7 grades. Sponge titanium products are divided into 7 grades according to chemical composition and Brinell hardness
(牌号):MHT-95、MHT-100、MHT-110、MHT-125、MHT-140、MHT-160、MHT-200。
Due to the low yield rate, high-end aircraft-grade sponge titanium is still in short supply in the domestic market. This provides opportunities for domestic production enterprises, but it is also necessary to increase technological innovation and improve product quality to meet market demand.

Table 9: Chemical composition and Brinell hardness of titanium sponge

Product grade	Product	Ti is not less than	Chemical composition (mass fraction) / %											Brinell hardness
			Faith	Yes	Cl	C	N	Or	Minutes	Mg	H	Is	CR	Other impurities, each not greater than	30 is not greater than
Class 0A	MHT-95	99.8	0.03	0.01	0.06	0.01	0.01	0.05	0.01	0.01	0.003	0.01	0.01	0.02	95
Level 0	MHT-100	99.7	0.04	0.01	0.06	0.02	0.01	0.06	0.01	0.02	0.003	0.02	0.02	0.02	100
Level 1	MHT-110	99.6	0.07	0.02	0.08	0.02	0.02	0.08	0.01	0.03	0.005	0.03	0.03	0.03	110
Level 2	MHT-125	99.4	0.10	0.02	0.10	0.03	0.03	0.10	0.02	0.04	0.005	0.05	0.05	0.05	125
Level 3	MHT-140	99.3	0.20	0.03	0.15	0.03	0.04	0.15	0.02	0.06	0.010	-	-	0.05	140
Level 4	MHT-160	99.1	0.30	0.04	0.15	0.04	0.05	0.20	0.03	0.09	0.012	-	-	-	160

Source: China Nonferrous Metals Industry Association, standard number: GB/T 2524-2019, Guosen Securities Economic Research Institute Note: Other impurity elements generally include (but are not limited to) Al, Sn, V, Mo, Zr, Cu, Er, Y, etc.; Al, Sn The content of each impurity element of grade 1 and above shall not be greater than 0.030%, which is not included in the sum of other impurities specified in this table

Table 10: Sponge titanium application areas

industry	Application areas	Specific application site
Aerospace	Jet engine parts, airframe parts, rockets, Sputnik, missiles and other components	Compressor and fan blades, discs, receivers, guide vanes, shafts, take-off and landing frames, flaps, spoilers, engine compartments, partitions, spars, fuel tanks, Boosters
Chemical, petroleum		Heat exchangers, reaction tanks, reaction columns, pressure kettles, distillation columns, condensation
Chemical and general industry	Urea, acetic acid, acetone, soda, chlorine, meter, centrifugal separator, agitator, blower, valve, pump, pipeline, Surface treatment, metallurgy, environmental protection	Meter, electrode substrate, electrolytic cell, electroplating fixture, copper foil roll
Power generation and desalination		Cylinder, electrolytic refining electrode, EGL electroplating electrode, fecal and urine treatment equipment

Marine development and energy	Nuclear power, thermal power, geothermal power generation, evaporative seawater turbine condenser, condenser, tube sheet, turbine blade, heat transferor desalination device
	Oil & Gas Extraction, Oil Refining, LNG, Risers, Heat Exchangers, Pressure-Resistant Shells, Fishing Nets, Centrifugal Separators, Deep-Sea Vessels, Ocean Temperature Differential Power Generation, Aquaculture, Magnet Jacket
	Nuclear waste treatment/reprocessing/enrichment
buil	Roofs, building exteriors, harbor facilities, bridges, Undersea tunnels
	Roofs, exterior walls, decorations, small accessories, column decorations, etc
Transportation facilities	Automotive parts, marine parts, railway spare parts
	Connecting rods, valves, retairs, springs, bolts, nuts, oil tanks, heat exchangers, jet reeds, hydrofoils, snorkels, propellers, pantographs, cryostats, superconductive machines
Medical and others	Communications, optical instruments, audio equipment, medical, Health, welfare
	Cameras, exposure devices, printing devices, batteries, submarine repeaters, Vibrating plates, artificial joints, dental materials, surgical instruments, wave starters, Wheelchairs, walking sticks, alkali ion water purifiers
Sporting goods and other	Bicycle parts, decorations, wearing parts, sports frames, beads, spokes, pedals, watches, glasses frames, decorations
	Recreational goods and others etc., golf heads, tennis rackets, climbing tools, woks, etc

Source: "China Titanium Mineral Product Demand Forecast 2021-2035", compiled by Guosen Securities Economic Research Institute

In 2022, China's sponge titanium production capacity and output will be the first in the world. Since 2017, the global sponge titanium production capacity and production Volume continues to increase, and the growth rate has slowed since 2020. In 2022, China's sponge titanium production capacity will be 181,000 tons, ranking high The world's first, followed by Japan with a capacity of 69,000 tons. In 2022, China's sponge titanium production will be 175,000 tons, a year-on-year increase of 25%.

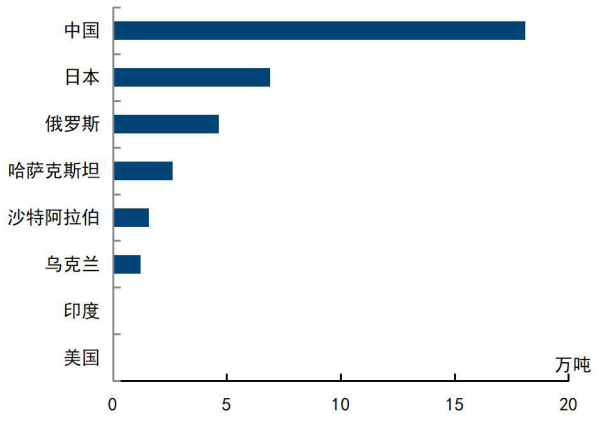
Figure 32:Global sponge titanium production capacity (10,000 tons)

Source: USGS, Guosen Securities Economic Research Institute

Figure 33:Global sponge titanium production (10,000 tons)

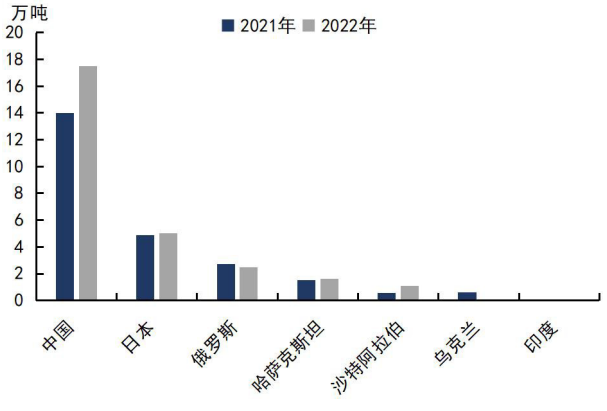
Source: USGS, Guosen Securities Economic Research Institute

Figure 34:Global sponge titanium production capacity in 2022 (10,000 tons)



Source: USGS, Guosen Securities Economic Research Institute

Figure 35:Sponge titanium production by country in 2021-2022 (10,000 tons)



Source: USGS, Guosen Securities Economic Research Institute

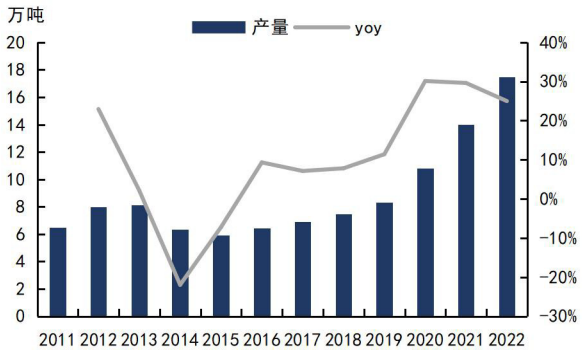
China's sponge titanium production growth rate is high. According to

the data of the 2022 China Titanium Industry Development Report, from 2016 to 2022, China's sponge titanium production continued to increase, and the year-on-year growth rate exceeded 20% after 2020, and the development speed was relatively fast.

Figure 36:China's sponge titanium production capacity (10,000 tons)

Source: USGS, Guosen Securities Economic Research Institute

Figure 37:China's sponge titanium production (10,000

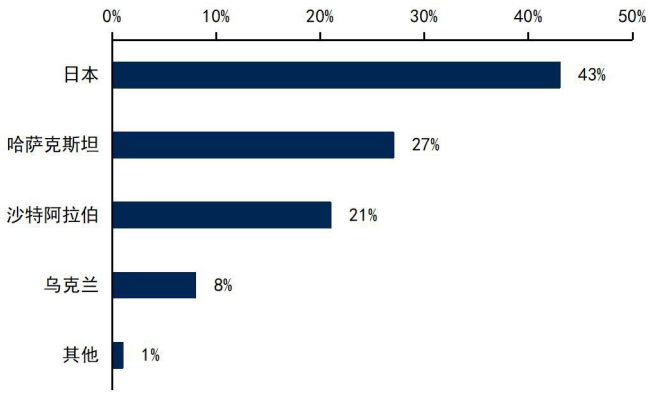


Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

The amount of titanium sponge imported in China has decreased, and exports have increased. According to statistics from the General Administration of Customs, the main import sources of titanium sponge in China in 2022 are Japan, Kazakhstan and Saudi Arabia. The import of sponge titanium is mainly concentrated in the first half of the year, with the sharp rise in foreign sponge titanium prices, the number of imported sponge titanium in China in the second half of the year has decreased rapidly

Few. Correspondingly, China's sponge titanium exports will increase rapidly in 2023. The change benefited from the rapid development of China's sponge titanium industry and the successful expansion of production capacity. In 2023, the average unit price of China's sponge titanium imports will decrease, while the average unit price of exports will increase.

Figure 38: China's main import source of sponge titanium in 2022



Source: General Administration of Customs, Guosen Securities Economic Research Institute

Figure 39:China's sponge titanium import and export volume (tons)

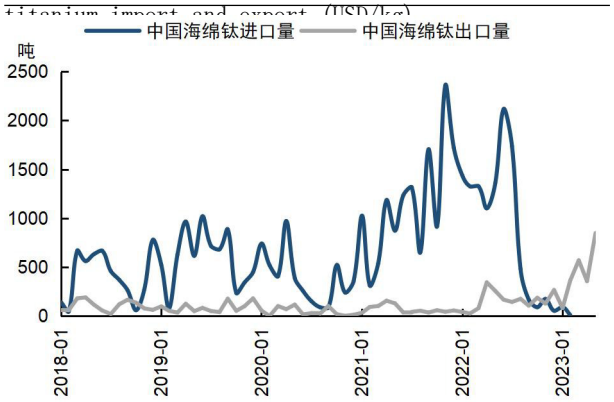
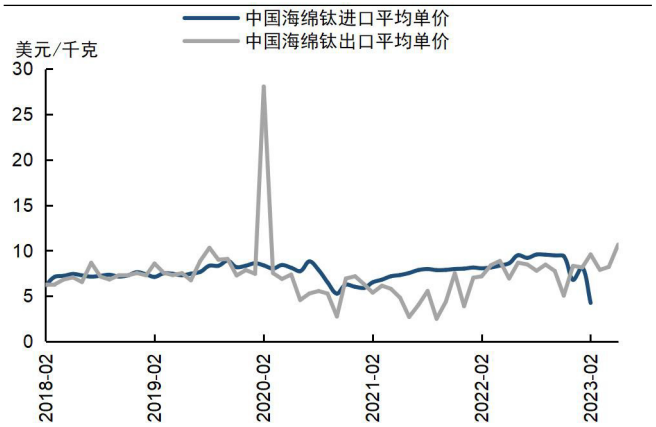


Figure 40:Average unit price of China's sponge titanium import and export (USD/kg)



Source: Customs Statistics Platform, compiled by Guosen Securities Economic Research InstituteSource: Customs Statistics Platform, compiled by Guosen Securities Economic Research Institute

Sponge titanium price support is strong. China's sponge titanium price has reached the highest point of 235,000 yuan / ton in 2006, with the development of the domestic sponge titanium industry, production capacity increase, supply and demand relationship eased, in recent years China's sponge titanium price is stable below 80,000 yuan / ton, and in June 2023 down to the level of 65,000 yuan / ton. With the sponge titanium supply Gradually increase, and long-term demand is also expected to continue to expand, sponge titanium market has been stable development, price support is strong.

Figure 41: China's sponge titanium price (million yuan/ton).

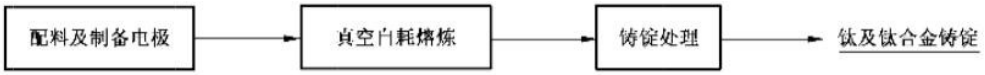
Source: Wind, collated by Guosen Securities Economic Research Institute

2.3. China's titanium dosage is increased, mainly used in

chemical and aerospace fields

Titanium ingots refer to the metal titanium block formed by the melting of sponge titanium (or sponge titanium plus alloying elements), which is the raw material for the production of titanium and various titanium alloys. Titanium processing materials refer to various forms of titanium processed into titanium ingots through forging, rolling, extrusion and other plastic processing methods, such as bars, wires, pipes, plates, profiles, etc.

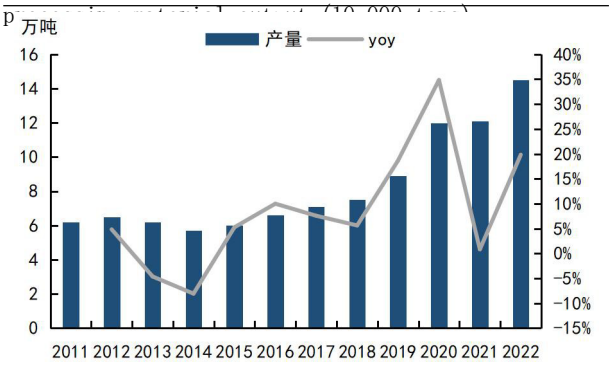
Figure 42: Vacuum self-consumption melting process of titanium ingots



Source: "Energy Consumption Limits per Unit Product of Sponge Titanium and Titanium Ingot Resources" (GB 29448-2022), compiled by Guosen Securities Economic Research Institute

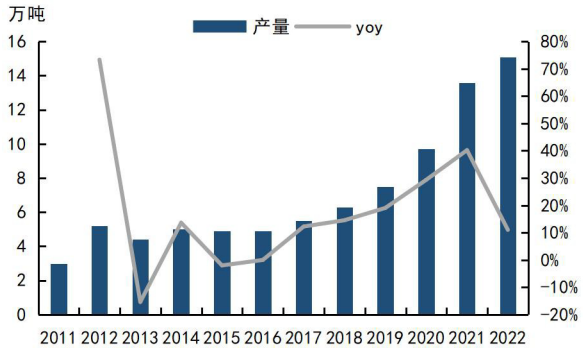
From 2016 to 2022, the output of titanium ingots and titanium processing materials in China has shown a continuous improvement trend. Titanium materials are widely used in aerospace, shipbuilding, chemical, medical devices and other industries, and the growing demand in these industries has promoted the increase in the production of titanium ingots and titanium processing materials. With economic development and technological progress, it is important for lightweight, high strength, The increasing demand for corrosion-resistant materials, and titanium as an ideal choice to meet these requirements has also contributed to the upward trend in its production. The production technology of titanium materials has been continuously improved and innovated, and new smelting, refining and processing technologies have been introduced, which has also improved its production efficiency and output.

Figure 43:China's titanium ingot production from 2011 to 2022 (10,000 tons)



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

Figure 44:2011-2022 China's titanium



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

China's import and export titanium material volume is increasing in fluctuations, and the average unit price of export is lower than that of

imports. The increase in export volume has benefited from the development of China's titanium processing materials industry and the continuous improvement of output. However, since 2006, the unit price of China's titanium exports has been lower than the unit price of imports, and the quality and grade of China's titanium products may still have greater room for development.

Figure 45:China's titanium import and export volume (tons)

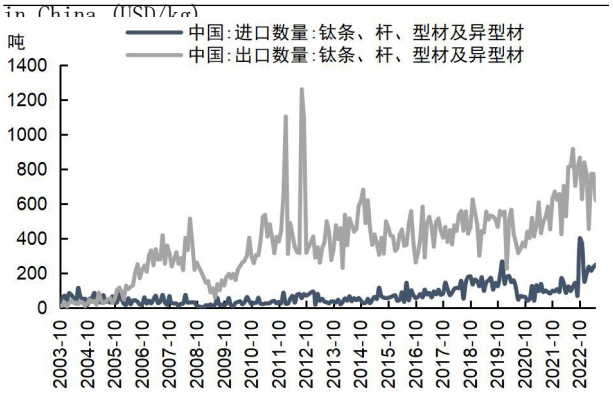
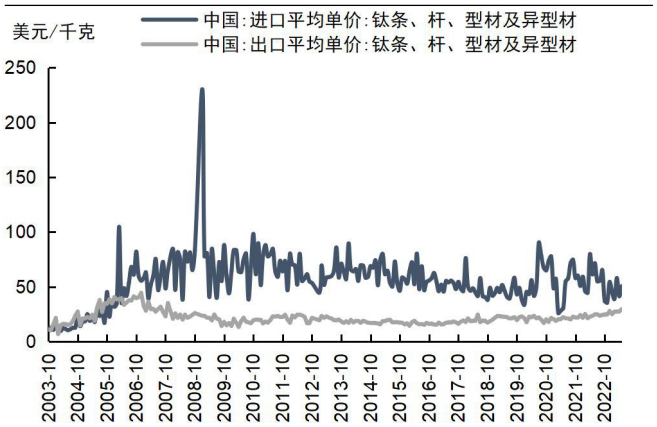


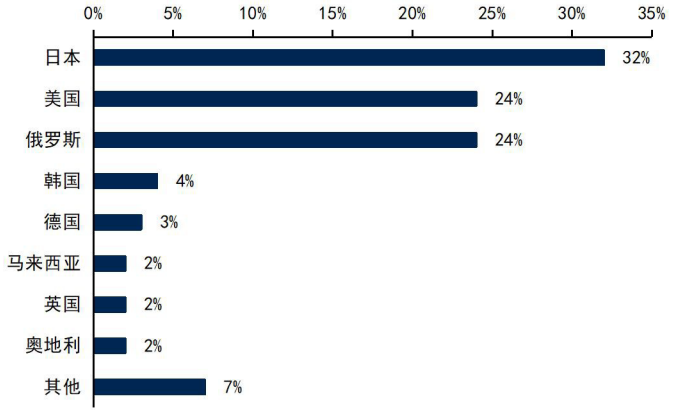
Figure 46:Average unit price of titanium imports and exports in China (USD/kg)



Source: Customs Statistics Platform, compiled by Guosen Securities Economic Research InstituteSource: Customs Statistics Platform, compiled by Guosen Securities Economic Research Institute

According to the 2022 China Titanium Industry Development Report, the main import sources of titanium forgings in China in 2022 are Japan, Russia and the United States. China's titanium forgings import volume is low (820 tons), accounting for about 10% of all titanium processing material imports, but the import amount accounts for 54.4% of all titanium processing materials.

Figure 47: China's main import source of titanium forgings in 2022



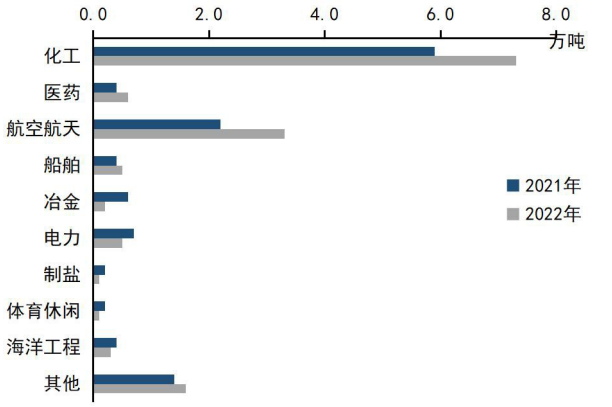
Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

The chemical and aerospace sectors use the largest amount of titanium. According to the statistics of the Titanium Zirconium Hafnium Branch of the China Nonferrous Metals Industry Association, the largest area of titanium used in China in 2022 is the chemical industry (73,000 tons, a year-on-year increase of 24%)

This was followed by aerospace (33,000 tons, up 50% year-on-year). In 2022, although the amount of titanium processing materials used in the

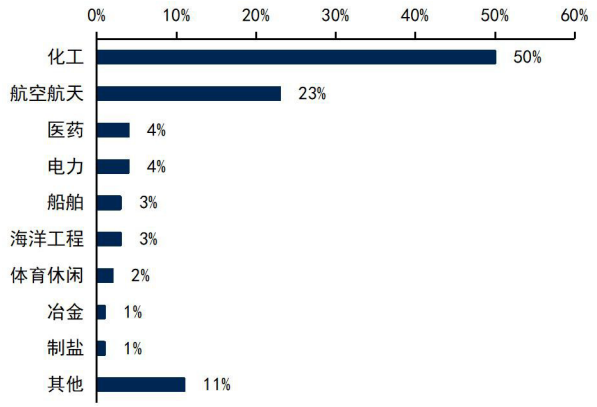
pharmaceutical and marine fields is relatively low, the year-on-year growth rate will reach 50% and 25%, respectively. The high growth rate of titanium consumption in the aerospace field is mainly due to the continuous growth of domestic demand. The increase in titanium consumption in the medical field is due to the improvement of China's production capacity in related fields, such as the substitution of imports and reverse exports of domestic titanium capillaries and other products. The amount of titanium in metallurgy, electric power, salt production, sports and leisure and marine engineering fields has declined to varying degrees, in addition to fluctuations caused by the industry cycle, but also because the amount of titanium in these fields is relatively small, it is easy to be affected by the change in the construction demand of a small number of large-scale projects.

Figure 48: The amount of titanium processing materials in China in different fields from 2021 to 2022 (million tons)



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

Figure 49:In 2022, the proportion of titanium processing materials in China in different fields will be used



Source: 2022 China Titanium Industry Development Report, collated by Guosen Securities Economic Research Institute

The demand for titanium in many fields is growing. From 2018 to 2022, the use of titanium in China's chemical and aerospace fields continued to increase, of which the growth rate of titanium in the chemical industry slowed down, while the growth rate of the aerospace field increased, with a year-on-year growth rate of 47% in 2022. The excellent properties of titanium make it useful in various fields

Function: Excellent corrosion resistance, can be used in extreme environments such as strong acid, strong alkali, salt water, etc., suitable for chlor-alkali industry, soda ash industry, petrochemical fiber, vacuum salt production and other fields; high strength, low density, high toughness and other characteristics, improve the safety and reliability of chemical equipment, reduce operating costs and maintenance costs; can be combined with other metal or non-metallic materials to form composite materials; good biocompatibility and biological activity, in the medical and biochemical fields used in human implants, medical devices, Pharmaceutical packaging, etc., excellent optical properties and catalytic performance, used in the field of fine chemicals, coatings, dyes, catalysts and other aspects.

Figure 50:The amount of titanium used in China's chemical industry from 2018 to 2022 (10,000 tons)

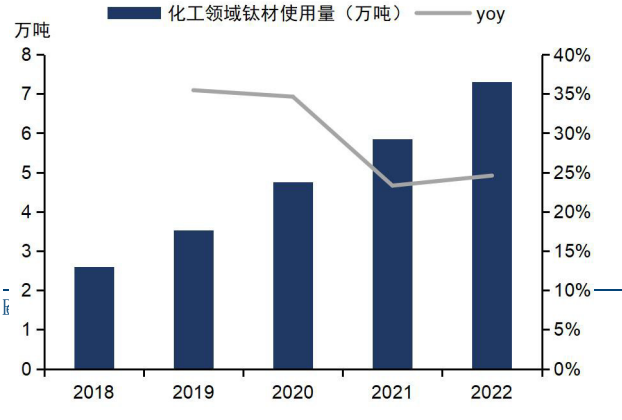
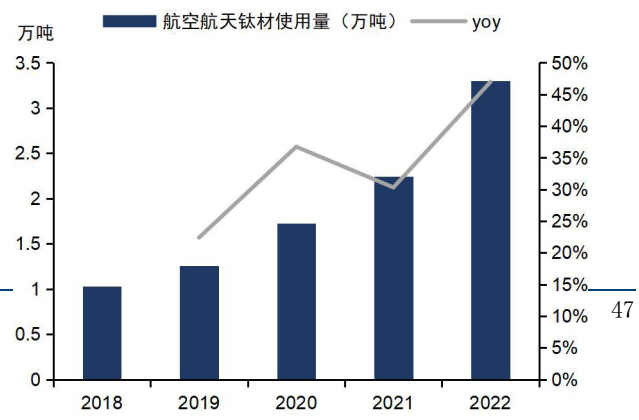


Figure 51:The use of



titanium in China's aerospace field from 2018 to 2022 (10,000 tons)

Source: Nonferrous Metals Industry Association Titanium, Zirconium Hafnium Branch, Guosen Securities Economic Research Institute

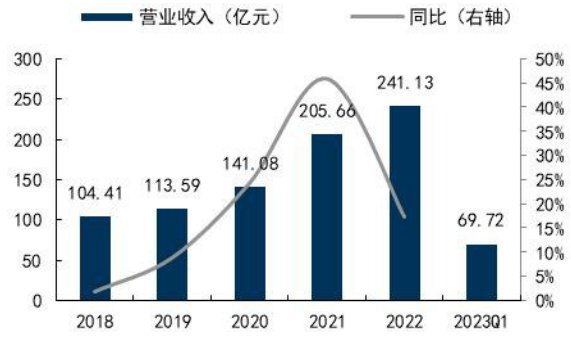
Source: Nonferrous Metals Industry Association Titanium, Zirconium Hafnium Branch, Guosen Securities Economic Research Institute

3. Typical company analysis: Longbai Group

3.1. Longbai Group has the advantages of the whole titanium industry chain, and the production capacity of titanium dioxide ranks first in the world

Longbai Group is the world's leading producer of titanium dioxide and one of the enterprises with the richest titanium ore reserves in China. In 2022, the company's revenue and net profit attributable to the parent will grow at a compound rate of 17%/-27%, respectively, and the compound growth rate of the company's revenue from 2018 to 2022 will be 23.7%, and the compound growth rate of net profit attributable to the parent will be 11.6%.

Figure 52:Longbai Group's revenue (100 million yuan) and growth rate



Source: Wind, collated by Guosen Securities Economic Research Institute

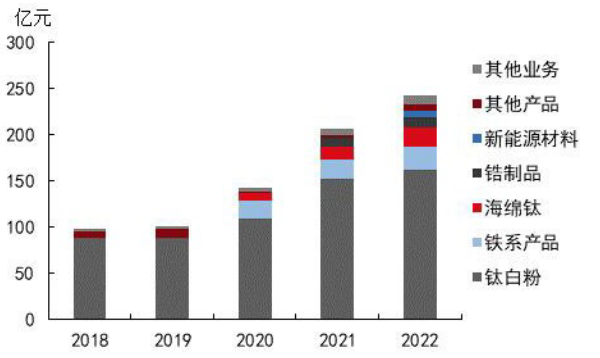
Figure 53:Longbai Group's net profit attributable to the parent (100 million yuan) and growth rate

Source: Wind, collated by Guosen Securities Economic Research Institute

Titanium dioxide is the company's main source of revenue. The company's main business is titanium dioxide, iron products, sponge titanium, zirconium products, new energy materials business, of which titanium dioxide business accounted for 67% of revenue in 2022, iron products business accounted for 10%, and sponge titanium business revenue accounted for 9%. In 2022, the gross profit margin of the company's sponge titanium and zirconium products business is the same Compared with the increase, the gross profit margin of titanium dioxide and iron products business declined, especially the titanium dioxide business decreased significantly, resulting in a year-on-year decline in overall sales gross margin and net profit margin. Mainly due to the low price of titanium dioxide, while the cost is still high, the downstream demand is weak and other factors. With the gradual recovery of downstream demand and the increase in the price of titanium dioxide, the gross profit margin of the business is expected to recover. 20232Q1 data shows that the company's management and sales expense ratio have declined, and internal management and operation have been more optimized.

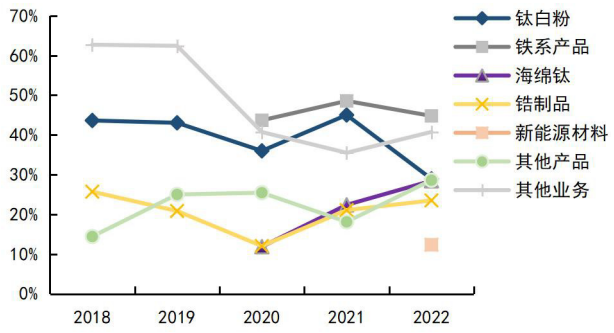
The company has a complete titanium industry chain, rich titanium ore reserves, and continuous expansion of product capacity. The stable supply of upstream raw materials supports the continuous expansion of production capacity, and in the process of industry supply-side optimization, the company benefits from its own raw materials Scale, brand advantages, etc., are expected to continue to increase market share, increase overseas exports, and improve the overall revenue scale and profitability.

Figure 54:Longbai Group's main business income (100 million yuan)



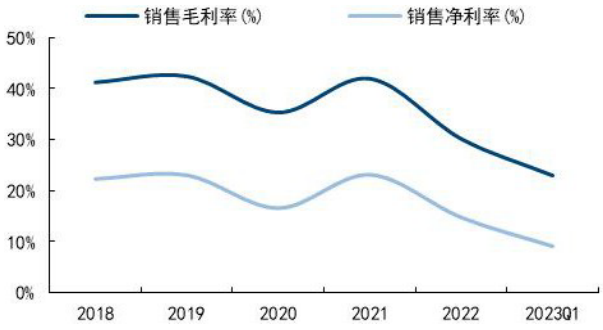
Source: Wind, collated by Guosen Securities Economic Research Institute

Figure 55:The gross profit margin of each main business of Longbai Group



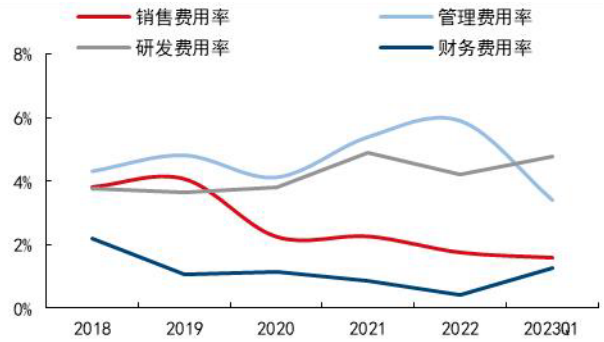
Source: Wind, collated by Guosen Securities Economic Research Institute

Figure 56:Longbai Group's sales gross margin and net profit margin



Source: Wind, collated by Guosen Securities Economic Research Institute

Figure 57:Longbai Group's expense ratio



Source: Wind, collated by Guosen Securities Economic Research Institute

Risk Warning

Titanium ore price fluctuation risk: titanium ore price is affected by international market supply and demand, exchange rates, tariffs and other factors. If the price of titanium ore falls, it will affect the profitability of titanium mining enterprises.

Risk of changes in industry policies: Government policies and regulations on the mining industry may change, including tax policies, mining licensing requirements, environmental protection standards, etc. Policy changes could negatively impact the operations and profitability of the titanium ore industry.

Environmental protection policy risk: The production process of the titanium ore industry involves a large number of chemical reactions and the discharge of wastewater, waste gas and waste residue. If the environmental protection policy is tightened or the implementation is strengthened, it will increase the environmental protection input and cost of the titanium ore industry, which in turn will affect the operating efficiency and profit margins of enterprises.

Risk of increased competition: As competition in the global market intensifies, the titanium ore industry faces competitors from other countries and regions. Price competition and market share competition may put pressure on the profit margin and market position of the titanium ore industry.

Technological innovation and product upgrade risks: The development of the titanium ore industry requires continuous improvement of product quality and performance to meet the diversified needs of downstream customers. If enterprises lack the ability to innovate and upgrade products, they will face market competition pressure and lose their core competitive advantages.

Geological exploration risks: The search for new titanium mines requires geological exploration and prospecting activities, which involve costly and risky work. Failure to accurately locate deposits of commercial value can result in wasted exploration investment.

Supply chain risk: The supply chain of the titanium ore industry involves multiple links such as ore mining, processing, transportation and sales. Problems in any part of the supply chain, such as supply disruptions, transportation issues, or fluctuations in market demand, can adversely affect the normal operation of the titanium ore industry.

Risk of international trade friction: Some products in the titanium ore industry need to be exported to the international market. If it encounters international trade frictions or trade barriers, it will affect the export revenue and market share of the titanium ore industry and increase the business risks of enterprises.

Exchange rate risk: International trade in the titanium ore industry may be affected by exchange rate fluctuations. If the national currency depreciates, it will lead to an increase in the cost of imported raw materials, while the competitiveness of exported products may be affected.

Appendix 1: Earnings forecasts and valuations of key companies

Appendix: Earnings forecasts and valuations of key companies

firm code	firm name	investment Rating	Closing	EPS			ON			PB
				2023E	2024E	2025E	2023E	2024E	2025E	2023
002601.SZ	Longbai Group	Buy	16.53	1.36	1.68	1.99	12.2	9.8	8.3	1.8

Source: Wind, Guosen Securities Economic Research Institute forecast

disclaimer

Analyst statement

The author warrants that the data used in the report come from compliant sources, that the analytical logic is based on the author's professional understanding, and that the conclusions are independent, objective and impartial through reasonable judgment and conclusions, and that the conclusions are not directed or influenced by any third party, and that the author has not received any remuneration directly or indirectly in the past, present or future for the specific advice provided or opinions expressed in his research report.

Guosen Securities Investment Rating

category	level	illustrate
Stocks Investment ratings	Buy	Stock prices outperformed market indices by more than 20%.
	Overweight	Stock prices outperform market indices by between 10%-20%.
	neuter	Stock price performance is between ±10% of the market index
	Sell	The stock price underperformed the market index by more than 10%.
Industry Investment rating	Overmatched	Industry indices outperformed market indices by more than 10%.
	neuter	The performance of the industry index is between 10% of the market index ±
	Low fiset	Industry indices underperformed market indices by more than 10%.

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钛矿行业深度报告

把握钛矿核心资源，看好龙头长期价值

超配

核心观点

全球钛铁矿资源丰富，中国钛铁矿储量全球第一。钛广泛应用于化工、航空、军工等行业，是生产钛白粉等产品的原料，主要用于生产的钛矿物为钛铁矿和金红石。2022年中国钛矿产量世界第一，澳大利亚金红石产量最高。

我国自有钛矿品位低，优质钛矿依赖进口。我国对高品位优质钛矿的需求主要依赖进口。2023年海外钛矿供给增量有限，国内钛矿龙头企业矿区均位于攀西地区，产能集中度较高，龙佰集团是国内未来几年钛矿增量的主要贡献。供给增量有限而需求稳步增长，近五年钛矿价格总体震荡上行。

钛白粉是钛矿最主要的下游领域，其次为海绵钛。中国钛白粉产能全球第一，以金红石型为主，但氯化法比例低。钛白粉最大下游为涂料和塑料行业，房地产行业景气度对钛白粉市场需求产生一定影响。2022年中国钛白粉产能达500万吨，位居全球第一。2022年至今，钛白粉产能供应充足而下游需求疲弱导致钛白粉价格下行，行业盈利触底之后略有所回升。

海绵钛市场增速高，新兴领域需求拓展。2022年中国海绵钛产能18.1万吨，产量17.5万吨，均为全球第一。2016-2022年，我国海绵钛产量持续提升，且同比增速在2020年之后均超过20%，发展速度较快，进口海绵钛数量减少，出口提升。随着海绵钛供给逐渐提升，而长期需求也有望持续拓展，海绵钛市场得以稳定发展，价格支撑力较强。

我国钛材用量提升，主要用于化工和航空航天领域。2016-2022年，我国钛锭、钛加工材产量均呈现持续提升态势。2022年我国钛材用量最大的领域是化工（7.3万吨，同比增长24%），其次是航空航天（3.3万吨，同比增长50%）。2022年医药和船舶领域的钛加工材用量虽然相对较低，但同比增速分别达到50%和25%。各领域对钛材的需求量不断增长。

龙佰集团拥有钛全产业链优势，钛白粉产能全球第一。龙佰集团是全球领先的钛白粉生产商，同时也是国内钛矿储量最丰富的企业之一。2022年公司的营收和归母净利润增速分别为17%/-27%，2018-2022年公司收入复合增速23.7%，归属母净利润复合增速11.6%。公司拥有完备的钛产业链，钛矿储量丰富，产品产能持续扩张。目前公司钛精矿、钛白粉、海绵钛年产能分别为140、151、5万吨，行业内均名列前茅。

风险提示：钛矿价格波动、行业政策变化、环保政策、竞争加剧、技术创新和产品升级、地质勘探、供应链、国际贸易摩擦、汇率风险等。

投资建议：看好行业龙头，把握长期价值。在钛产业链中，钛矿资源为核心资源。尽管钛白粉正处于下行周期，供需双弱背景下预计钛矿价格仍将高位震荡，看好具备钛全产业链优势的龙佰集团。

重点公司盈利预测及投资评级

公司代码	公司名称	投资评级	昨收盘（元）	总市值（百万元）	EPS 2023E	EPS 2024E	PE 2023E	PE 2024E
002601.SZ	龙佰集团	买入	16.53	39,494.58	1.36	1.68	12.2	9.8

资料来源：Wind、国信证券经济研究所预测

行业研究·行业专题

基础化工

超配·维持评级

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资料来源：Wind、国信证券经济研究所整理

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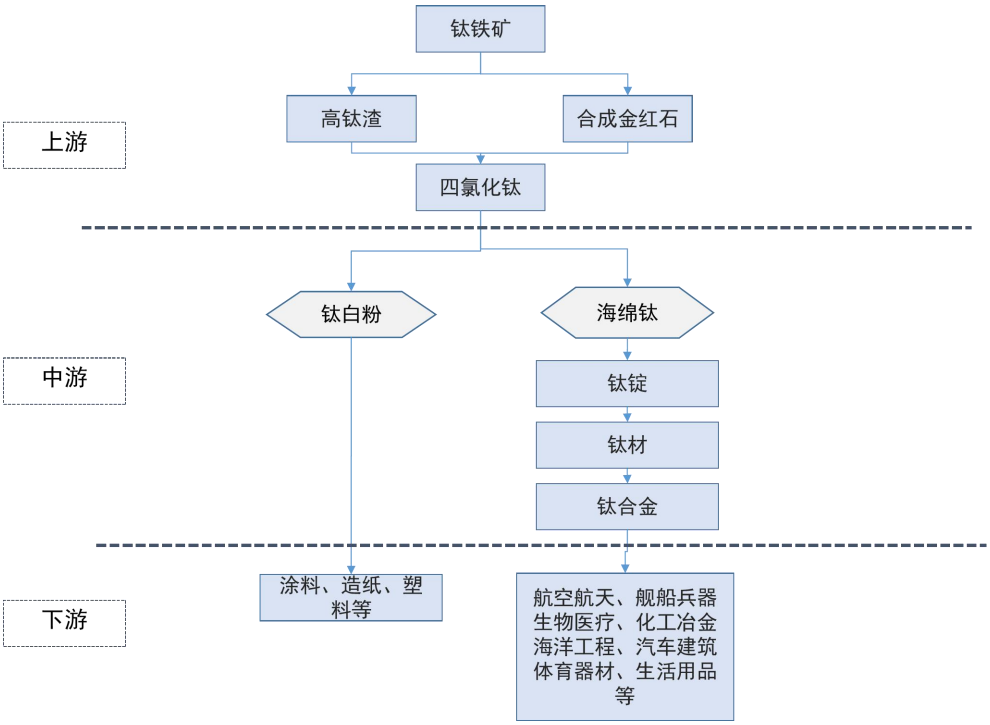
1.1. 全球钛铁矿资源丰富，中国钛铁矿储量全球第一

钛是一种重要的金属元素，广泛应用于化工、航空、军工等行业，是生产钛白粉、钛合金等产品的原料。钛产业链包括从钛矿开采、冶炼、加工到钛产品应用的全过程，涉及多个行业和领域。上游主要是钛矿的开采和冶炼，包括钛铁矿和金红石等，是钛产业链的原材料来源。中游主要是钛产品的制造和加工，包括海绵钛、钛白粉、钛加工材和钛合金等，是钛产业链的核心环节。下游主要是钛产品的应用和消费，包括航空航天、船舶军工、化工冶金、医药生物、体育用品等，是钛产业链的终端市场。

图1：钛产业链



资料来源：龙佰集团年报，国信证券经济研究所整理

主要用于生产的钛矿物为钛铁矿和金红石。钛矿物种类繁多，目前已经发现的 TiO_2 含量大于 1%的钛矿物有 80 多种，但现阶段具有利用价值的只有少数几种矿物，主要是钛铁矿和金红石，其次是白铁矿、锐钛矿、红钛铁矿、板钛矿和钙钛矿等。

表1：自然界主要钛矿物

矿物	化学式	TiO_2%	备注
钛铁矿	$FeTiO_3$	45-53	大多数火成岩和变质岩中的共生副矿。晶形多为半自形粒状、厚板状，

			粒径与锐钛矿、金红石的粒径相似。
金红石	TiO_2	95-100	中高级的共生副矿。共生碎石矿和钛铁矿的变异以及其它钛矿。金红石和锐钛矿、板钛矿是同质异象，在单偏光下矿物为褐色、棕色，甚至黑色。
锐钛矿	TiO_2	95-100	金红石的低温多晶矿。通常为次级，由其它钛铁矿变异形成。
板钛矿	TiO_2	95-100	金红石和锐钛矿的亚稳定多晶矿。常见于洞穴，断口和岩脉。其它钛矿的风化物，相对较少。
假金红石	$Fe_2Ti_3O_9$	60-65	钛铁矿在沉积中的变异。在变异钛铁精矿中常见。
钛铁矿变异	$FeTiO_3$-Fe_2TiO_9	53-70	指含钛铁矿混合物，假金红石，白钛石的钛铁矿变异矿。在重矿砂中常见。
白钛石	高 TiO_2	70-100	钛铁矿的变异矿，二氧化钛含量较高。偶尔有钙钛矿，通常含有微晶金红石，或锐钛矿，较少的假金红石，钛铁矿，赤铁矿或针铁矿。
榍石	$CaTiSiO_5$	40	在变质岩、低级火成岩中广泛分布的副矿，可看作共生碎石矿。
钙钛矿	$CaTiO_3$	58	是许多不饱和碱性岩和碳酸盐岩中的常见副矿物，常因冷却过程发生相变而形成复杂双晶。
假板钛矿	Fe_2TiO_5	33	在火成岩中存在的副矿。形成一种钛铁矿和钛磁铁矿的氧化物。
钛尖晶石	$FeTiO_4$	36	在碱性火成岩中存在的副矿。通常在磁铁矿中表现为脱溶薄层。
钛磁铁矿	$(Fe,Ti)_3O_4$	0-34	指光学均匀的 Fe-Ti 尖晶石，在固溶物中，含有赤铁矿和钛尖晶石。在碱性火成岩中存在的副矿。
钛赤铁矿	$(Fe,Ti)_2O_3$	0-30	指光学均匀的赤铁矿—钛铁矿。在酸性低级斜长岩套内存在。

资料来源：《钛矿物种类》，国信证券经济研究所整理

图2：钛铁矿和金红石图示

钛铁矿

金红石

资料来源：mindat，国信证券经济研究所整理

钛精矿的 TiO_2 含量从 40%到 52%不等。钛矿常指钛精矿，钛精矿即经过选矿后，含有较少杂质的钛铁矿，也是生产钛白粉、钛合金等产品的重要原料。其他的钛矿物，如金红石、白铁矿、锐钛矿等，虽然也含有较高的 TiO_2，但是在地壳中储量较少，不是主要的钛资源。根据《钛铁矿精矿》行业标准（YS/T 351-2015），钛铁矿精矿按 TiO_2 含量分为 10 个级别，其 TiO_2 含量从 40%到 52%不等。

表2：钛铁矿精矿级别

产品级别	TiO_2 含量（质量分数）/%不小于	TiO_2+FeO+Fe_2O_3 含量（质量分数）/%不小于	杂质含量（质量分数）/%，不大于					
			CaO	MgO	P	Fe_2O_3	Al_2O_3	SiO_2
一级	52	94	0.1	0.4	0.030	27	1.5	1.5

二级	50	93	0.3	0.7	0.050	27	1.5	2.0
三级 A	49	92	0.6	0.9	0.050	17	2.0	2.0
三级 B	48	92	0.6	1.4	0.050	17	2.0	2.5
四级	47	90	1.0	1.5	0.050	17	2.5	2.5
五级	46	88	1.0	2.5	0.050	17	2.5	3.0
六级	45	88	1.0	3.5	0.080	17	3.0	4.0
七级	44	88	1.0	4.0	0.080	17	3.5	4.5
八级	42	88	1.5	4.5	0.080	17	4.0	5.0
九级	40	88	1.5	5.5	0.080	17	5.0	6.0

资料来源：《钛铁矿精矿》，国信证券经济研究所整理　注：U+Th 含量不大于 0.015%，Cr_2O_3 含量不大于 0.1%。S 含量 I 类不大于 0.02%，II 类不大于 0.2%，III 类不大于 0.5%。

我国钛矿床以岩浆型为主，查明钛资源储量占全国总量的 88.3%。按成因不同，钛矿床可分为岩浆型、风化型、变质型、沉积型钛矿床，其中岩浆型是中国最重要的钛矿类型，查明钛资源储量占全国总量的 88.3%，比如分布着太和、白马、攀枝花、红格 4 个大矿区的攀西成矿带即为该种类型。

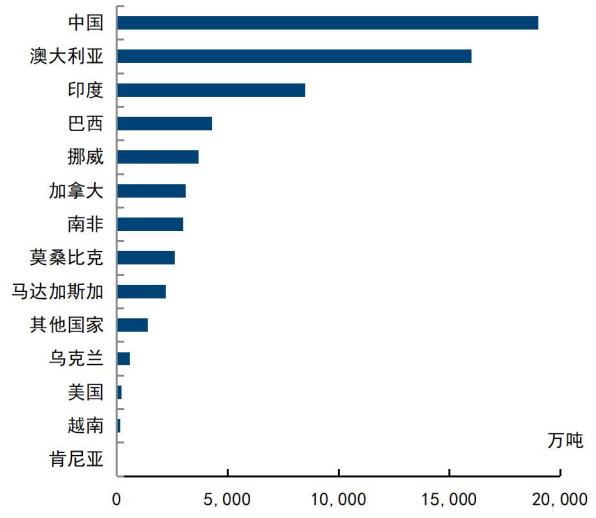
表3：钛矿床类型划分

	类型	特点
钛矿床（按成因分类）	**岩浆型**	由岩浆分异作用形成的钛铁矿磁铁矿（钛磁铁矿）。中国最重要的钛矿类型，查明钛资源储量占全国总量的 88.3%。攀西成矿带是中国最重要的钒钛磁铁矿成矿带，分布着太和、白马、攀枝花、红格 4 个大矿区。
	风化型	是由于风化作用使得原生钛矿床的矿石结构发生松散，导致部分脉石矿物发生变化，矿石矿物钛铁矿、金红石作为风化残余物留在原地而成矿，中国该类矿床的查明资源储量占比为 6.5%。
	变质型	形成往往与高压/超高压的变质作用有关，这类变质作用主要发生在造山带以及汇聚板块边缘的边缘。变质型钛矿矿床的矿物成分以及 TiO2 含量的高低受变质原岩的成分以及变质程度的高低影响很大。中国此类矿床的查明资源储量占比为 2.9%。
	沉积型	均为第四纪沉积型砂矿。在中国主要以滨海沉积型为主，该类矿床主要分布在东南沿海一带，尤其是海南省的东海岸。从全球范围的统计数据看，本类矿产是钛矿产的重要类型，然而中国的河流冲积型钛矿储量并不是很大，仅占了全国查明资源储量的 2.3%。

资料来源：《中国钛矿成矿地质特征与资源潜力评价》，国信证券经济研究所整理

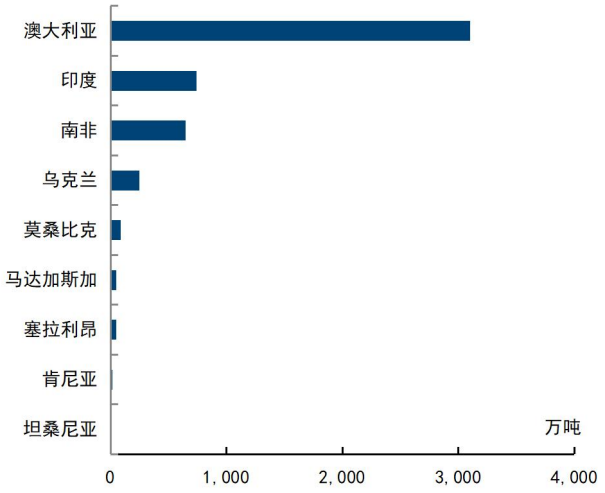
全球钛铁矿资源丰富，中国钛铁矿储量全球第一，金红石储量低。全球有丰富的钛铁矿资源和储量，据美国地质调查局（USGS）数据显示，2022 年全球钛矿资源储量（以 TiO_2 计）约为 7 亿吨，以钛铁矿为主。钛铁矿资源储量 6.5 亿吨，约占 93%；金红石资源储量 0.49 亿吨，约占 7%。澳大利亚和中国拥有最丰富的钛资源储量。中国钛铁矿储量 1.9 亿吨，占全球储量的 29%，位居全球第一；其次是澳大利亚钛铁矿储量 1.6 亿吨，占全球储量的 25%。而全球金红石储量第一的国家为澳大利亚，2022 年储量为 3100 万吨，约占全球金红石储量的 63%。我国金红石储量低，依赖进口。

图3：2022 年全球钛铁矿储量（万吨）



资料来源：USGS，国信证券经济研究所整理

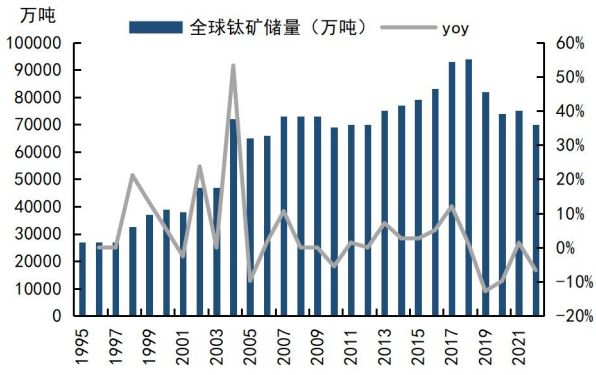
图4：2022 年全球金红石储量（万吨）



资料来源：USGS，国信证券经济研究所整理

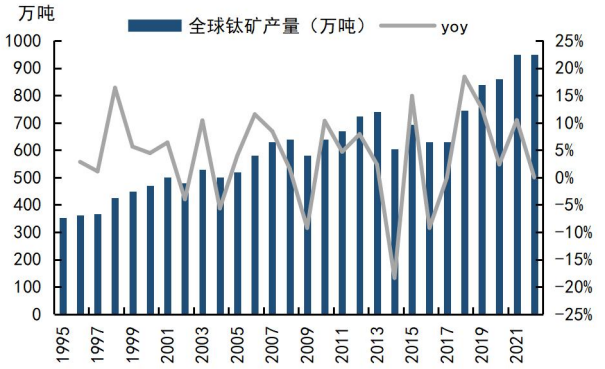
2018 年之后，全球钛铁矿储量开始降低，钛矿产量提升。随着钛矿资源不断被发现并开发，2018 年全球钛铁矿储量达到顶峰，总量 9.4 亿吨，之后全球少有发现重大新钛矿资源，同时钛矿产量逐年提升，于是对应的钛矿储量开始减少。

图5：1995-2022 年全球钛矿储量（万吨）



资料来源：USGS，国信证券经济研究所整理

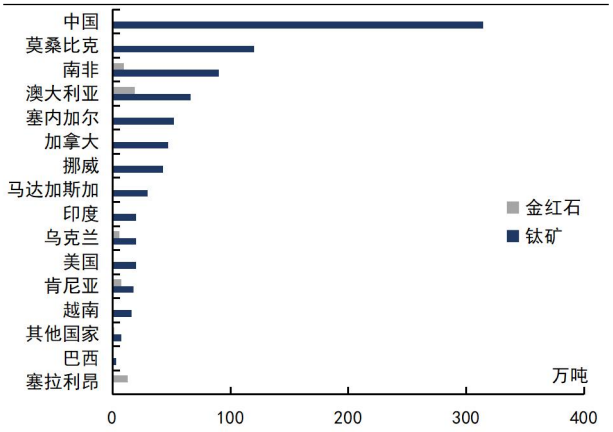
图6：1995-2022 年全球钛矿产量（以 TiO_2 计，万吨）



资料来源：USGS，国信证券经济研究所整理

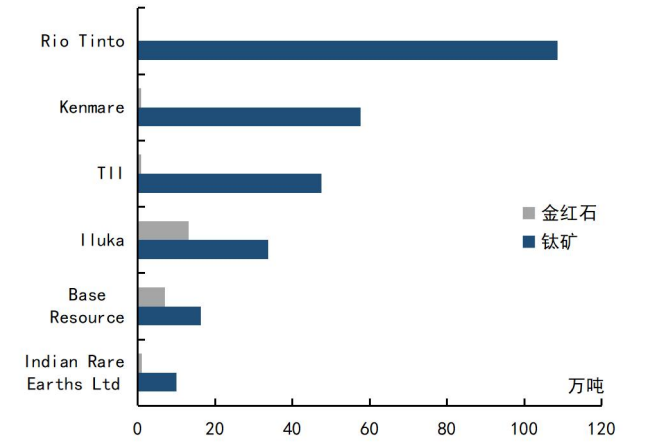
2022 年中国钛矿产量世界第一，澳大利亚金红石产量最高。2022 年，中国钛矿产量 314.4 万吨（以 TiO_2 计），占全球总产量的 36%。而金红石产量最高的澳大利亚，2022 年金红石产量为 19 万吨（以 TiO_2 计），占全球总产量的 32%。2022 年国外主要钛矿生产商中，Rio Tinto 公司以 108.6 万吨（以 TiO_2 计）的钛矿产量位居首位，其次是 Kenmare 公司 57.7 万吨（以 TiO_2 计）；Iluka 公司的金红石产量最高，达 13.2 万吨（以 TiO_2 计）。

图7：2022 年全球钛矿、金红石产量（以 TiO_2 计，万吨）



资料来源：USGS，国信证券经济研究所整理

图8：2022 年国外主要钛矿生产商钛矿及金红石产量（以 TiO_2 计，万吨）



资料来源：中国有色金属工业协会钛锆铪分会，公司公告，国信证券经济研究所整理

海外钛矿增量有限。据公司官网信息，Rio Tinto 公司预计其 2023 年钛渣产量同比变化在-8.3%～+16.7%之间；Kenmare 公司预计其 2023 年钛铁矿产量同比变化在-3.5%～+5.7%之间，金红石产量同比变化在-10.1%～+1.1%之间；Iluka 公司预计其 2023 年金红石产量同比持平，合成金红石产量增加 28%至 30.5 万吨。总体而言，2023 年海外钛矿供给增量有限。

表4：海外主要钛矿生产企业

公司	简介	国家	2022 年产量	2023 年预期
Rio Tinto	成立于 1873 年的跨国性矿产及资源集团，兼营煤、铁、铜、黄金、钻石、铝、能源等业务。全球最大的资源开采和矿产品供应商之一，世界第二大铁矿石生产商	澳大利亚（总部位于英国）	钛渣 120 万吨	钛渣 110~140 万吨
Iluka	1998 年由 RGC Ltd 和 Westralian Sands Ltd 合并而成，全球最大的金红石生产商	澳大利亚	金红石 5.5 万吨；合成金红石 23.8 万吨	金红石 5.5 万吨；合成金红石 30.5 万吨
Kenmare	该公司及其子公司从事 Moma 钛矿的运营和进一步开发，该矿位于莫桑比克的北部海岸	爱尔兰	钛铁矿 108.8 万吨；金红石 8900 吨	钛铁矿 105 万吨；金红石 8000 吨
Base Resources	该公司在肯尼亚从事拥有 100%股权的 Kwale 矿物砂业务的运营	澳大利亚	钛铁矿 32.5 万吨；金红石 7.4 万吨；低品位金红石 1.1 万吨	/

资料来源：公司官网，Wind，国信证券经济研究所整理

1.2. 我国钛矿集中度高，品位低，对外依存度高

国内钛矿龙头企业矿区均位于攀西地区，产能集中度较高。我国钛矿生产企业主要为以下四家龙头企业：攀钢钒钛、龙佰集团、安宁股份、重钢西昌，主要矿区均位于攀西地区。四家企业合计钛精矿产能约 390 万吨，其中，龙佰集团收购丰源矿业，矿资源进一步丰富，是未来几年钛矿增量的主要贡献。

表5：国内主要钛矿生产企业

公司	主要矿区	钛矿产能	2022 年钛精矿产量
攀钢集团	攀枝花、白马	钛精矿 150 万吨；钛渣 24 万吨	/
龙佰集团	红格、庙子沟、徐家沟等	钛精矿 140 万吨/年	116.89 万吨
安宁股份	潘家田	钛精矿 55 万吨/年	49.3 万吨
重钢西昌	太和	钛精矿 45 万吨/年	/

资料来源：公司公告，百川盈孚，国信证券经济研究所整理

我国钛矿对外依存度高，自有钛矿品位低。虽然我国钛资源储量大、分布广，但多为品位较低的原生矿，伴生多种矿种，综合利用率低，无法满足国内的钛矿需求。因此，中国对高品位优质钛矿的需求主要依赖进口，对外依存度高达 40%。对于低品位钛矿的综合利用和提高品位的技术仍有待进一步研发和应用。我国钛矿劣势在于：

1）金红石 TiO_2 含量较高且可利用性更好，但我国钛铁矿多（97.34%），金红石矿少（2.66%）；

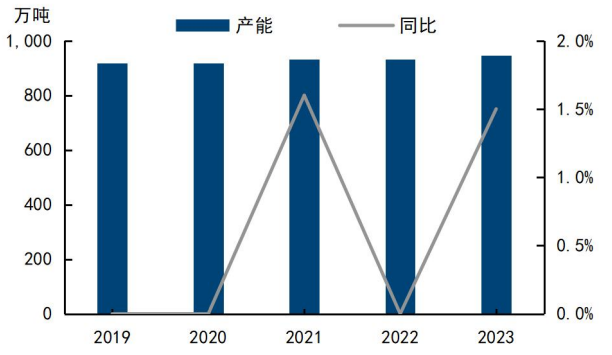
2）原生矿多，砂矿少。砂矿松散堆积、埋藏浅、不需破碎加工，但我国金红石砂矿仅占金红石资源的 14%，钛铁矿砂矿仅占 3%。

3）我国钛矿品位普遍偏低。钛铁矿平均品位一般为 5%~10%，金红石平均品位一般为 1%~5%，多在 1%~2%。

4）中国钛矿多为多金属共生矿，无单一钛矿矿床。虽然共伴生矿种有综合利用价值，但分选难度大，回收率低，资源综合利用率低。

2016-2022 年，我国钛矿产量逐年攀升，2022 年中国钛矿产量同比提升 10%。2020 年以来，我国钛矿周度产量主要在 10-14 万吨之间波动，目前产量相对较高，而库存水平处于三年来的中等分位。

图9：我国钛矿产能（万吨）

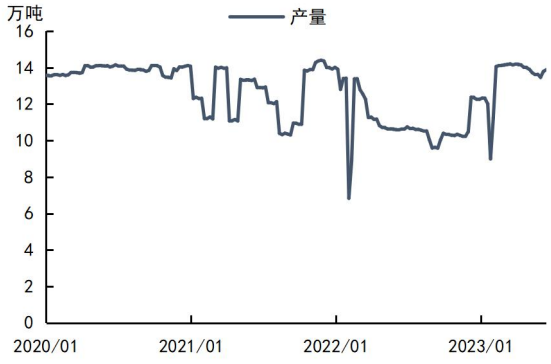


资料来源：百川盈孚，国信证券经济研究所整理

图10：我国钛矿产量（以 TiO_2 计，万吨）

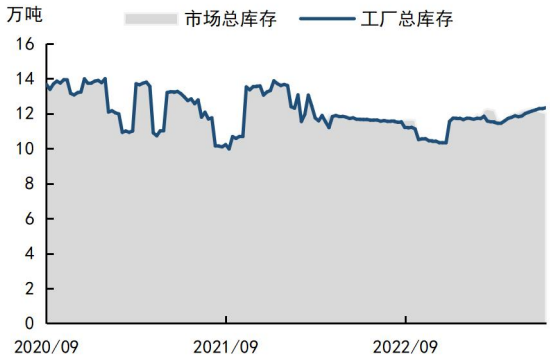
资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

图11：我国钛矿周度产量（万吨）



资料来源：百川盈孚，国信证券经济研究所整理

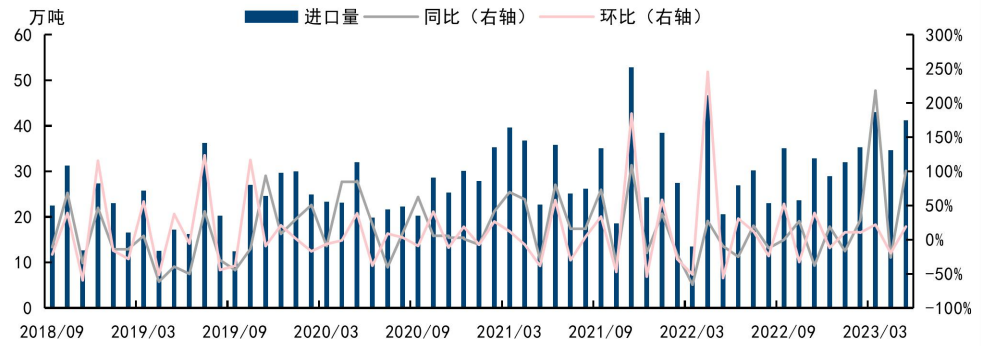
图12：我国钛矿库存（万吨）



资料来源：百川盈孚，国信证券经济研究所整理

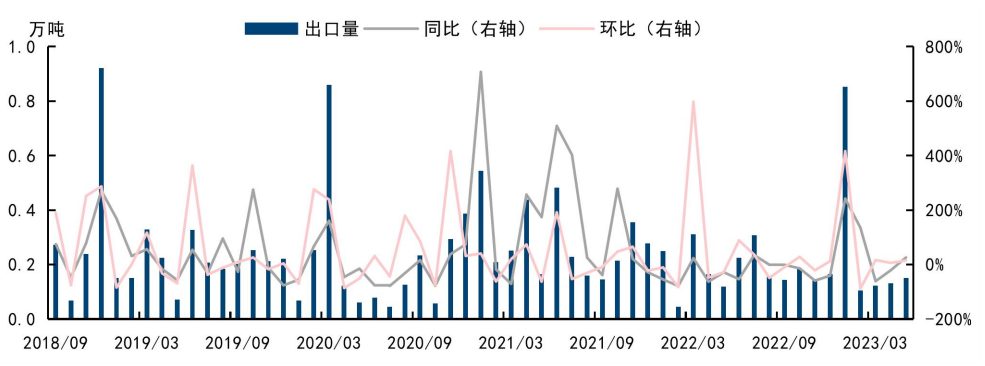
我国钛矿以进口为主，出口量相对较小。进口钛矿量整体在波动中略提升，出口钛矿量稳定在较低水平。2023 年以来，我国钛矿砂及其精矿月度进口量在 30-40 万吨左右，处于相对较高的水平；出口量除个别月份较高（0.9 万吨）之外，主要在 0.1-0.15 万吨左右。我国钛矿砂及其精矿总体进口量较高，出口量偏低。

图13：我国钛矿进口量（万吨）



资料来源：海关总署，国信证券经济研究所整理　注：海关商品名称为“钛矿砂及其精矿”

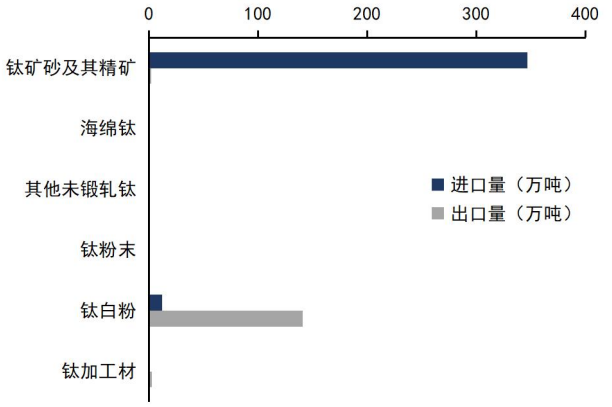
图14：我国钛矿出口量（万吨）



资料来源：海关总署，国信证券经济研究所整理　注：海关商品名称为“钛矿砂及其精矿”

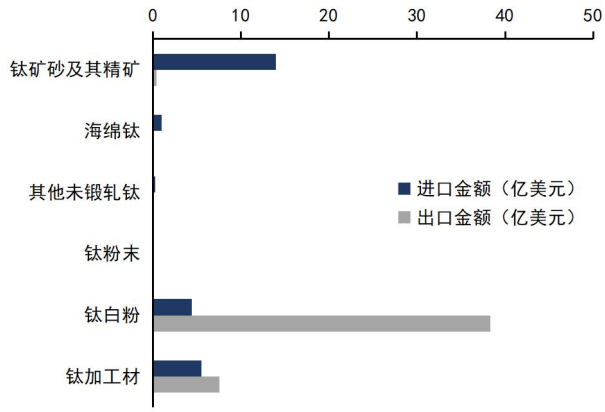
2022 年我国钛产品贸易顺差 21.5 亿美元。据海关总署统计数据，2022 年我国钛产品进口主要包括钛矿、各类钛加工材、钛白粉和海绵钛；出口主要为钛白粉和各类钛加工材。各类钛产品的进口总额为 25.2 亿美元，出口总额为 46.7 亿美元，形成整体顺差 21.5 亿美元。从进口产品的类别来看，主要是钛矿砂及其精矿，其次是高端钛加工材和钛白粉。

图15：2022 年中国主要钛产品进出口量（万吨）



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

图16：2022 年中国主要钛产品进出口金额（亿美元）



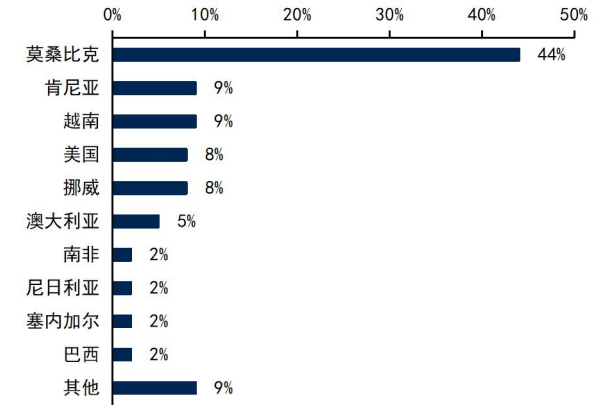
资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

2023 年钛矿进出口价格同比略提升，进口来源国集中度较高。2022 年至今我国进出口钛矿价格指数几乎都在 100 以上，反映了钛矿砂及其精矿进出口价格均以同比增加为主。2022 年我国钛矿主要进口来源国是莫桑比克、肯尼亚、越南、美国和挪威等。前五个进口来源国的进口量占比为 78%，集中度较高。

图17：我国进出口钛矿价格指数（上年同月=100）

资料来源：海关总署，国信证券经济研究所整理　注：　海关商品名称为“钛矿砂及其精矿”

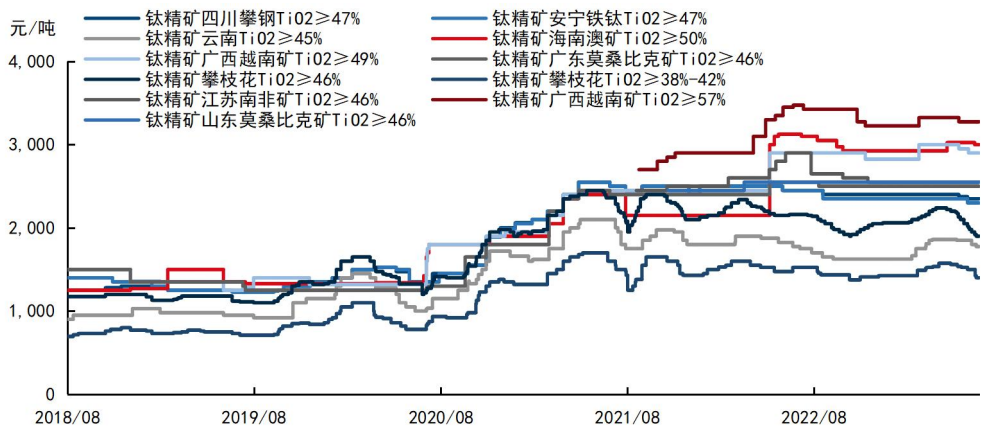
图18：我国进口钛矿主要来源地区



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

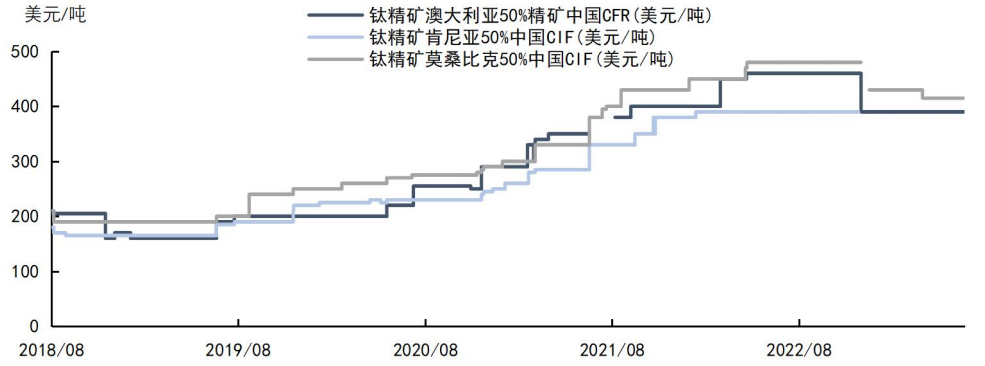
近五年钛矿价格总体震荡上行。2018 年至 2023 年，国产钛矿、进口钛矿、金红石价格均总体呈现上行趋势，国产钛矿平均价格从约 1000 元/吨涨到约 2000 元/吨，进口钛矿价格从 200 美元/吨左右涨到 400 美元/吨左右，金红石价格从 4000 元/吨左右涨到 13000 元/吨左右。主要受到国内外钛白粉等钛矿下游产品需求的恢复，以及海外钛矿资源面临枯竭的影响。同时，环保政策等因素导致部分国家限制采矿活动，新增产能稀缺。

图19：国产钛矿价格（元/吨）



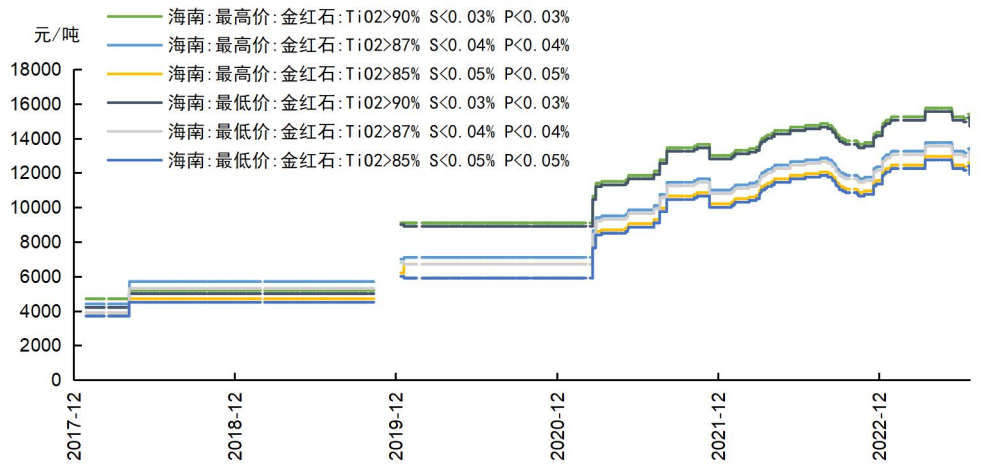
资料来源：百川盈孚，国信证券经济研究所整理

图20：进口钛矿价格（美元/吨）



资料来源：百川盈孚，国信证券经济研究所整理

图21：金红石价格（元/吨）



资料来源：Wind，国信证券经济研究所整理

预计未来三年内我国钛矿自给仍然不足，还需依赖进口。我们假设 2023-2025 年钛矿进出口量维持 2022 年的水平，2023-2025 年国内钛矿产量增速保持在 5%，钛白粉产量增速 2%，海绵钛产量增速 23%/20%/15%，钛白粉、海绵钛对钛精矿单耗分别为 2.4 和 5，钛精矿平均品位 46%，预测得到 2023-2025 年国内钛矿总需求约为 491.8/510.6/528.5 万吨（以 TiO_2 计），仍有 2.2/4.5/5.0 万吨（以 TiO_2 计）需求需要依靠进口量的增加获得。

表6：我国钛矿供需平衡表（万吨）

	2022	2023E	2024E	2025E
总供给（以 TiO_2 计）	**473.9**	**489.6**	**506.1**	**523.4**
产量（以 TiO_2 计）	314.4	330.1	346.6	364.0
进口量（以 TiO_2 计）	159.5	159.5	159.5	159.5
进口量	346.7	346.7	346.7	346.7
供给缺口（以 TiO_2 计）		2.2	4.5	5.0
总需求（以 TiO_2 计）	**473.9**	**491.8**	**510.6**	**528.5**
国内消费量（以 TiO_2 计）	472.9	490.8	509.5	527.4
钛白粉对钛精矿需求（以 TiO_2 计）	432.6	441.3	450.1	459.1
钛白粉产量	391.4	399.2	407.2	415.4
海绵钛对钛精矿需求（以 TiO_2 计）	40.3	49.5	59.4	68.3
海绵钛产量	17.5	21.5	25.8	29.7
出口量（以 TiO_2 计）	1.0	1.0	1.0	1.0
出口量	2.2	2.2	2.2	2.2

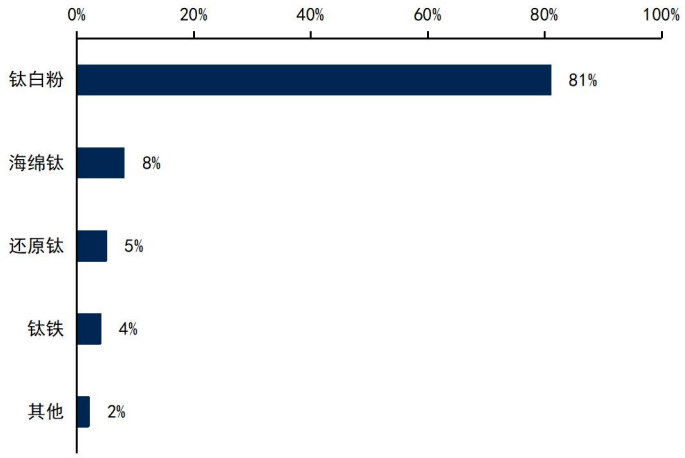
资料来源：USGS，海关总署，国信证券经济研究所预测

2. 钛白粉为钛矿核心下游，海绵钛其次

钛白粉是钛矿最主要的下游领域，其次为海绵钛。据中国有色金属工业协会钛锆铪分会统计，2022 年我国钛矿消费量约为 482 万吨(以 TiO_2 计)，同比增长 5.6%。

其中，钛白粉行业是最主要的下游领域，占比达到 81%；其次是海绵钛，占比 8%。钛白粉是一种重要的白色颜料和功能性材料，广泛应用于涂料、塑料、纸张、橡胶、陶瓷等行业。对钛白粉需求的增长主要受到这些行业的发展和需求的影响。此外，钛白粉的优良白度、遮盖力和耐候性等特性也使其在高端产品中得到广泛应用。海绵钛是指多孔的钛金属材料，具有较低的密度和良好的耐腐蚀性能。海绵钛主要应用于航空航天、船舶、化工等领域。在航空航天领域，海绵钛可用于制造航空发动机部件、结构件等。在化工领域，海绵钛可用于制备催化剂、电解槽和电极等。随着航空航天和化工行业的发展，对海绵钛的需求也在增加。

图22：2022 年我国钛矿下游比例



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

2.1. 中国钛白粉产能全球第一，氯化法比例低

钛白粉用途广，常有三种分类方式。钛白粉是一种重要的无机化工产品，主要成分为二氧化钛的白色颜料，在涂料、油墨、造纸、塑料橡胶、化纤、陶瓷等工业中有重要用途。钛白粉的种类有很多，根据不同的标准可以有不同的分类方法，常见的有以下几种：

（1）根据生产工艺，可以分为硫酸法钛白粉和氯化法钛白粉。硫酸法钛白粉是用硫酸法从钛矿石中提取二氧化钛，再经过水解、洗涤、煅烧等工序制得。氯化法钛白粉是用氯化法从钛矿石中提取二氧化钛，再经过还原、氧化、水解等工序制得。

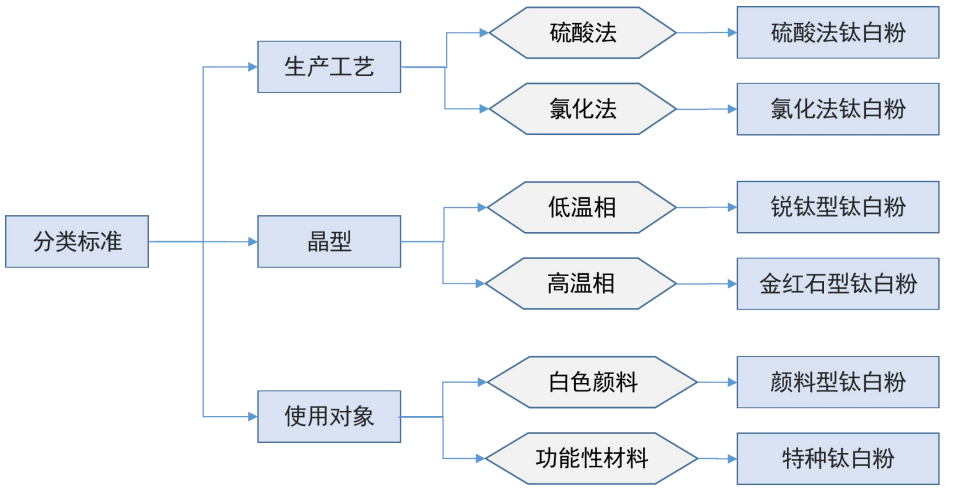
（2）根据晶型，可以分为锐钛型钛白粉和金红石型钛白粉。锐钛型钛白粉是二氧化钛的低温相，具有较高的光催化活性和较低的耐候性。金红石型钛白粉是二氧化钛的高温相，具有较高的遮盖力和耐候性，对紫外线有较强的屏蔽作用。

（3）根据使用对象，可以分为颜料型钛白粉和特种钛白粉。颜料型钛白粉是用于涂料、塑料、造纸等行业的白色颜料，具有良好的遮盖力、着色力和光泽度。特种钛白粉是用于化妆品、食品、医药等行业的功能性材料，具有良好的紫外线吸收能力、抗菌能力和生物相容性。

我国钛白粉以金红石型为主。我国钛白粉产能结构以金红石型为主，占总产能比重约为八成。金红石型钛白粉的市场需求和利润空间更高，是目前全球主流的钛白粉产品。我国近年来不断扩大金红石型钛白粉的生产规模和市场份额，已经成为全球最大的金红石型钛白粉生产国和出口国。

我国氯化法钛白粉比例较低。氯化法是目前高品质金红石型钛白粉的主要生产工艺，具有资源利用率高、产品质量好、较为环保等优点，但投资成本高、技术门槛高、原料要求高。我国钛白粉产业起步较晚，以硫酸法为主，氯化法的发展受到技术、资金、原料等多方面的制约，目前氯化法产能占金红石型产能比重仅为一成左右，远低于全球平均水平。而由于环保要求趋严，鼓励先进清洁的生产工艺，环保政策要求新建产能不可以采用硫酸法工艺生产钛白粉，氯化法工艺有待进一步发展。

图23：钛白粉分类



资料来源：精颜化工，国信证券经济研究所整理

钛白粉最大下游为涂料和塑料行业。由于涂料行业对钛白粉消耗量位居所有行业之首，房地产行业对钛白粉市场需求会产生一定影响。但除新房需要涂料以外，二次装修也需要建筑重涂，或在一定程度上增加钛白粉需求。于国内钛白粉生产企业而言，出口提升、应用领域扩展可以为钛白粉市场提供增量需求。技术提升使得产品质量得以提高，或可抢占部分海外中高端市场；钛白粉应用场景可以不断丰富，除了传统的涂料、油漆、塑料等下游行业外，还可逐渐扩大至化妆品、玩具、食品、医药等领域，钛白粉的应用领域将更加丰富多样。同时，在目前的低盈利水平之下，我国钛白粉行业供给端可能出现小产能出清，产品质量不佳、成本过高、环保不友好的落后产能或将淘汰，促使整个行业达到供给平衡，产能集中度提升。

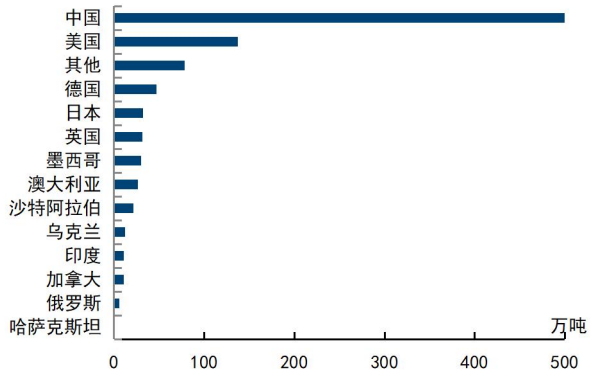
表7：钛白粉应用

应用领域	详情
涂料	目前，我国钛白粉工业最大应用领域为涂料，全球涂料每年消耗的钛白粉占比约为 55%-60%，而中国则为 60%-65%。在涂料用的颜料中，钛白粉含量＞80%，在涂料中使用的白色颜料＞85%，在涂料原料中占比在 5%-20%之间。
塑料	钛白粉在塑料中的应用包括聚丙烯、聚氯乙烯、聚苯乙烯等。几乎所有热固性和热塑性的塑料都使用钛白粉作为着色剂，一般用量为 0.5%-10%。某些特种塑料对钛白粉使用量更高，色母粒中的钛白粉含量在 40%-70%。
造纸	造纸工业是钛白粉的第 3 大用户，占钛白粉总用量的 7%。
化纤	化学纤维行业也是钛白粉重要的应用领域，占钛白粉总用量的 2%-3%。
油墨	在油墨生产过程中，钛白粉起到非常重要的作用，其用量占钛白粉总用量的 4%。

资料来源：《2021 年钛白粉行业状况与市场运行分析》，国信证券经济研究所整理

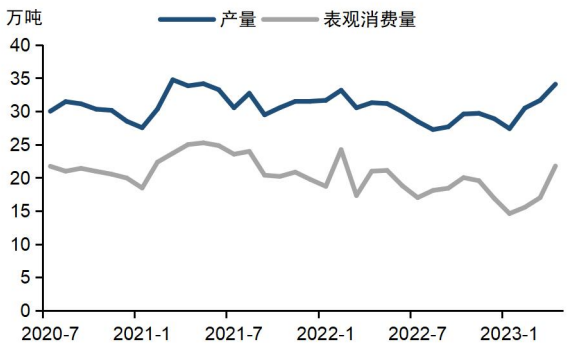
中国钛白粉产能全球第一，月度产量较为稳定。据 USGS，2022 年中国钛白粉产能达 500 万吨，位居全球第一，远超第二位的美国（137 万吨）。2020 年以来，我国钛白粉月度产量在 30 万吨上下波动，总体较为稳定。从省区产能分布来看，四川以 104 万吨的产能位居全国第一，其次是山东和河南，分别为 80 和 76 万吨，三省总产能占据全国产能的一半左右。

图24：2022 年全球钛白粉产能（万吨）



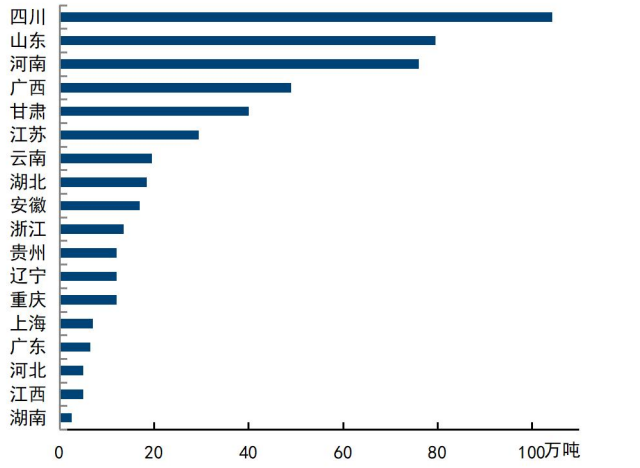
资料来源：USGS，国信证券经济研究所整理

图25：我国钛白粉月度产量、表观消费量（万吨）



资料来源：百川盈孚，国信证券经济研究所整理

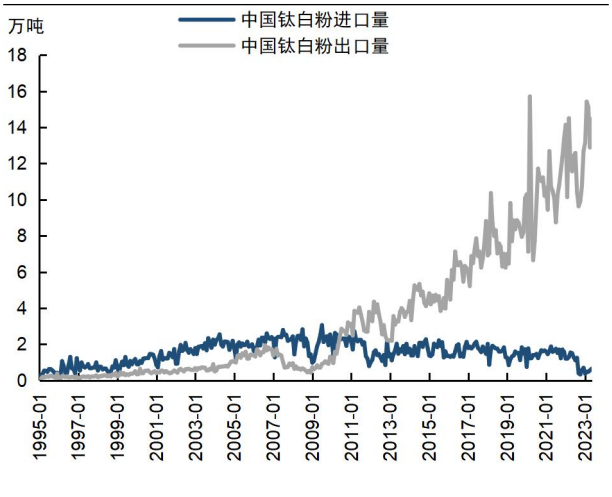
图26：我国钛白粉产能地区分布（万吨）



资料来源：百川盈孚，国信证券经济研究所整理

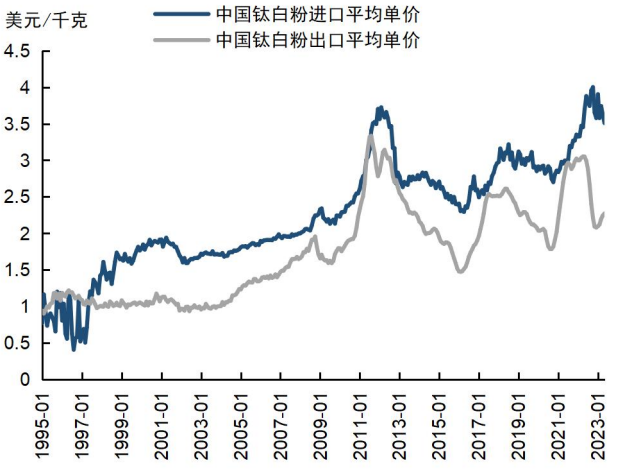
我国钛白粉出口量提升，进口量下降，进口平均单价高于出口。我国是全球最大的钛白粉生产国和消费国，也是全球最大的钛白粉出口国。我国钛白粉出口量呈现持续增长的趋势，主要受益于国内生产技术和设备的成熟，国外需求市场的扩大等。进口量呈现波动下降的趋势，我国钛白粉进口量相对较低，主要以高端产品为主。我国钛白粉进口价格高于出口价格，主要是因为进口产品以高端金红石型产品为主，而出口产品以中低端产品为主。

图27：我国钛白粉进出口量（万吨）



资料来源：Wind，国信证券经济研究所整理

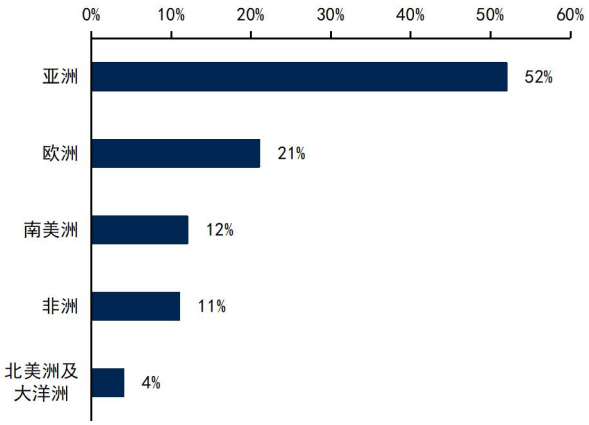
图28：我国钛白粉进出口平均单价（美元/千克）



资料来源：Wind，国信证券经济研究所整理

我国钛白粉出口地区以亚洲为主，欧美市场有待拓宽。我国钛白粉出口地区以亚洲为主，占到一半以上，其次是欧洲（占 21%）。随着我国钛白粉产品质量的不断提升，高端型号逐步拓展，欧美国家市场有望进一步拓宽，提高出口量。

图29：2022 年我国钛白粉出口分布



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

钛白粉行业集中度较高。据金浦钛业年报，2022 年钛白粉行业 43 家钛白粉产能的有效总产能为 470 万吨，当年总产量为 391.4 万吨，行业平均产能利用率为 83.28%。在此统计的 7 家公司 2022 年钛白粉总产能为 275.5 万吨，总产量为 211.1 万吨，占 2022 年国内总产量的 54%，行业集中度较高。

表8：我国钛白粉主要厂商产能及 2022 年产量（万吨）

厂商	产能（万吨）	2022 年产量（万吨）
龙佰集团	151	98.98
中核钛白	40	33.43
鲁北化工	26	19.14
钒钛股份	23.5	24.35
金浦钛业	16	15.66
惠云钛业	11	9.37
安纳达	8	10.17

资料来源：公司公告，国信证券经济研究所整理

2016 年至今，钛白粉价格经历了以下波动：

1） 2006 至 2012 年，我国钛白粉价格震荡上行，上行幅度较小，主要受到国内外涂料、塑料等下游需求的拉动，以及国外钛白粉厂商的供应紧张和涨价传导等。

2） 2012 至 2016 年，钛白粉价格进入下行周期，从约 20000 元/吨以上跌到约 10000 元/吨，主要受到宏观经济、下游需求减弱，以及国内环保政策导致部分厂家停产或限产等因素影响。

3） 2016 至 2017 年，钛白粉价格再次上行，从约 10000 元/吨涨到约 18000 元/吨，随后进入下行周期至 2020 年，主要受到国内外下游需求及海外钛白粉厂商的供应波动影响。

4） 2021 年，钛白粉价格再次达到小高点 20000 元/吨，主要受到国内涂料、塑

料等下游需求的持续增长，以及钛白粉原料成本的持续走高影响。同时，新冠肺炎疫情、国际海运运力紧张、部分国家政局动荡等因素也对供需关系产生影响。

5） 2022 年至今，钛白粉产能供应充足而下游需求疲弱导致钛白粉价格下行，行业盈利触底之后略有所回升。

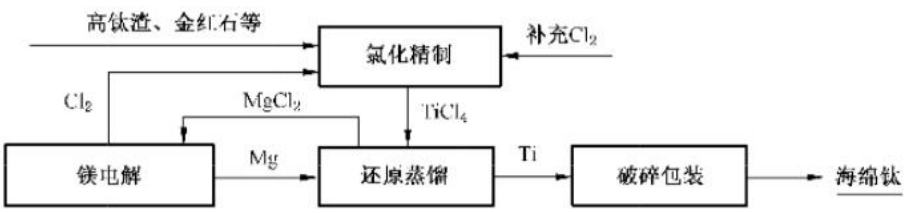
图30：钛白粉价格（元/吨）

资料来源：Wind，国信证券经济研究所整理

2.2. 海绵钛市场增速高，新兴领域需求拓展

海绵钛是钛金属单质，主要通过镁还原蒸馏法制取。海绵钛是一种多孔的纯钛，从钛矿中还原出来的中间产品，一般为浅灰色颗粒或海绵状，通常需要进一步熔化或合金化才能制成钛产品。海绵钛的外观类似于海绵，有许多小孔和杂质，其纯度一般在 99.5%~99.7%之间，密度约为 1.6~1.8 克/立方厘米，比金属钛的密度（4.5 克/立方厘米）低很多。海绵钛的主要生产方式是克罗尔法，即用氯气和钛矿反应生成四氯化钛，再用镁还原生成海绵钛和氯化镁。克罗尔法是目前最广泛使用的方法，占全球海绵钛产量的 90%以上。其他生产方式还有亨特法、电解法等，但规模较小，技术较复杂。

图31：镁还原蒸馏法生产海绵钛工艺流程



资料来源：《海绵钛和钛锭单位产品能源消耗限额》（GB 29448-2022），国信证券经济研究所整理

海绵钛产品通常分为 7 个等级。海绵钛产品按化学成分及布氏硬度分为 7 个等级（牌号）：MHT-95、MHT-100、MHT-110、MHT-125、MHT-140、MHT-160、MHT-200。由于成品率较低，高端航空级海绵钛在国内市场仍然紧缺。这为国内生产企业提供了机会，但也需要加大技术创新和提升产品质量，以满足市场需求。

表9：海绵钛的化学成分及布氏硬度

产品等级	产品牌号	化学成分(质量分数)/%												布氏硬度
			杂质元素，不大于											
		Ti 不小于	Fe	Si	Cl	C	N	O	Mn	Mg	H	Ni	Cr	其他杂质总和	HBW10/1500/30 不大于
O_A级	MHT-95	99.8	0.03	0.01	0.06	0.01	0.01	0.05	0.01	0.01	0.003	0.01	0.01	0.02	95
0 级	MHT-100	99.7	0.04	0.01	0.06	0.02	0.01	0.06	0.01	0.02	0.003	0.02	0.02	0.02	100
1 级	MHT-110	99.6	0.07	0.02	0.08	0.02	0.02	0.08	0.01	0.03	0.005	0.03	0.03	0.03	110
2 级	MHT-125	99.4	0.10	0.02	0.10	0.03	0.03	0.10	0.02	0.04	0.005	0.05	0.05	0.05	125
3 级	MHT-140	99.3	0.20	0.03	0.15	0.03	0.04	0.15	0.02	0.06	0.010	-	-	0.05	140
4 级	MHT-160	99.1	0.30	0.04	0.15	0.04	0.05	0.20	0.03	0.09	0.012	-	-	-	160
5 级	MHT-200	98.5	0.40	0.06	0.30	0.05	0.10	0.30	0.08	0.15	0.030	-	-	-	200

资料来源：中国有色金属工业协会，标准号：GB/T 2524-2019，国信证券经济研究所整理　注：其他杂质元素一般包括(但不限于)Al、Sn、V、Mo、Zr、Cu、Er、Y 等；Al、Sn 各杂质元素含量 1 级及以上品不得大于 0.030%，不包括在本表规定的其他杂质总和中

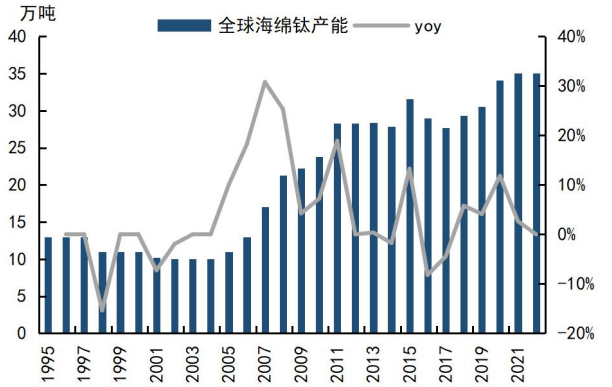
表10：海绵钛应用领域

行业	应用领域	具体应用部位
航空航天	喷气发动机部件、机身部件、火箭、人造卫星、导弹等部件	压气机和风扇叶片、盘、机匣、导向叶片、轴、起落架、襟翼、阻流板、发动机舱、隔板、翼梁、燃料箱、助推器
化学、石油化工和一般工业	尿素、乙酸、丙酮，苏打、氯气，表面处理，冶金，环保	热交换器、反应槽、反应塔、压力釜、蒸馏塔、凝缩器、离心分离机、搅拌器、鼓风机、阀、泵、管道、计测器，电极基板、电解槽，电镀用夹具、铜箔用滚筒、电解精炼电极、EGL 电镀电极，粪尿处理设备
发电和海水淡化	核电、火电、地热发电、蒸发式海水淡化装置	透平冷凝器、冷凝器、管板、透平叶片、传热器
海洋开发和能源	石油天然气开采，石油精炼、LNG，深海艇，海洋温差发电，水产养殖，核废物处理/再处理/浓缩	提升管，热交换器，耐压壳体，渔网，离心分离机、磁体外套
建筑	屋顶、大厦外装、港湾设施、桥梁、海底隧道	屋顶、外壁、装饰物、小配件类、立柱装饰等
交通运输设备	汽车部件，船用部件，铁路	连杆、阀门、护圈、弹簧、螺栓、螺母、油箱，热交换器、喷射簧片、水翼、通气管、螺旋桨，架式受电弓、低温恒温器、超导电机
医疗及其他	通信、光学仪器，音响设备，医疗、保健、福利	照相机、曝光装置、印相装置、电池、海底中继器，振动板，人工关节、齿科材料、手术器具、起波器、轮椅、手杖、碱离子净水器
体育用品及其他	自行车零件，装饰品、佩戴件，体育娱乐用品及其他	构架、胎圈、辐条、脚踏，手表、眼镜框架、装饰品等，高尔夫球头、网球拍、登山工具、炒锅等

资料来源：《2021-2035 年中国钛矿产品需求预测》，国信证券经济研究所整理

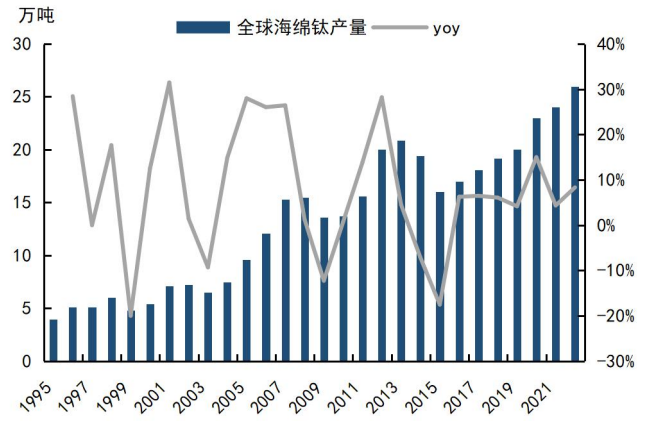
2022 年中国海绵钛产能、产量均为全球第一。2017 年至今，全球海绵钛产能、产量持续提升，自 2020 年之后增速趋缓。2022 年中国海绵钛产能 18.1 万吨，位居全球第一；其次是日本，产能 6.9 万吨。2022 年我国海绵钛产量为 17.5 万吨，同比增长 25%。

图32：全球海绵钛产能（万吨）



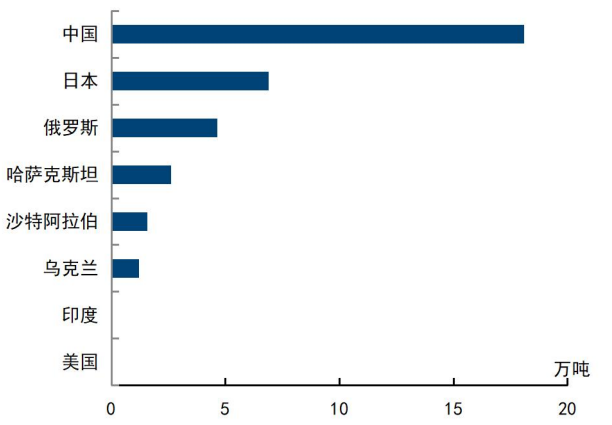
资料来源：USGS，国信证券经济研究所整理

图33：全球海绵钛产量（万吨）



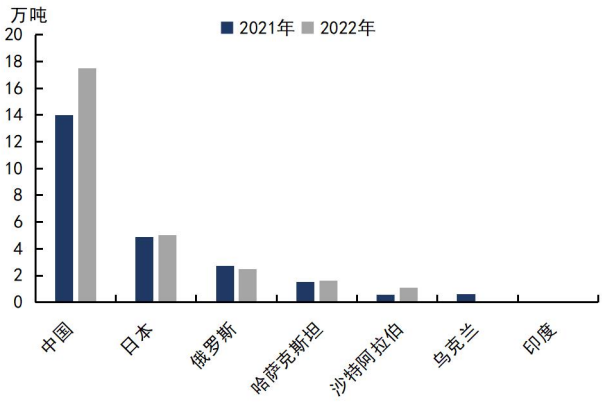
资料来源：USGS，国信证券经济研究所整理

图34：2022 年全球海绵钛产能（万吨）



资料来源：USGS，国信证券经济研究所整理

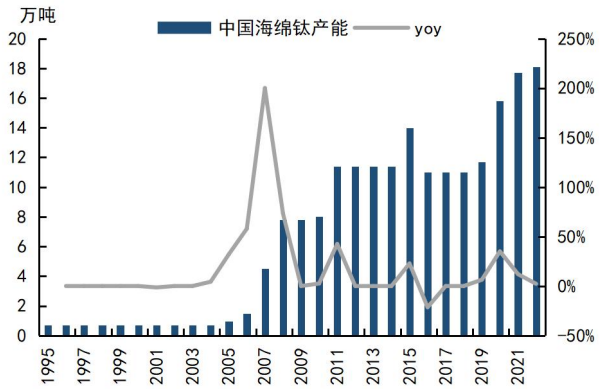
图35：2021-2022 年各国海绵钛产量（万吨）



资料来源：USGS，国信证券经济研究所整理

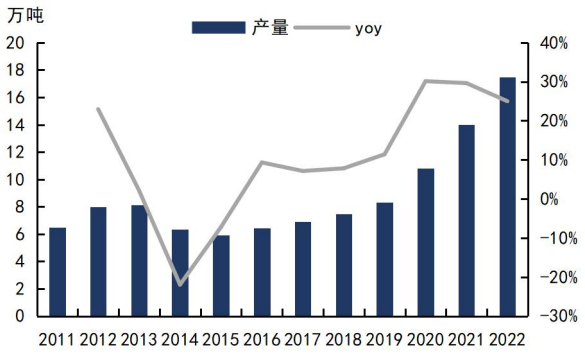
我国海绵钛产量增速较高。据 2022 年中国钛工业发展报告数据，2016-2022 年，我国海绵钛产量持续提升，且同比增速在 2020 年之后均超过 20%，发展速度较快。

图36：我国海绵钛产能（万吨）



资料来源：USGS，国信证券经济研究所整理

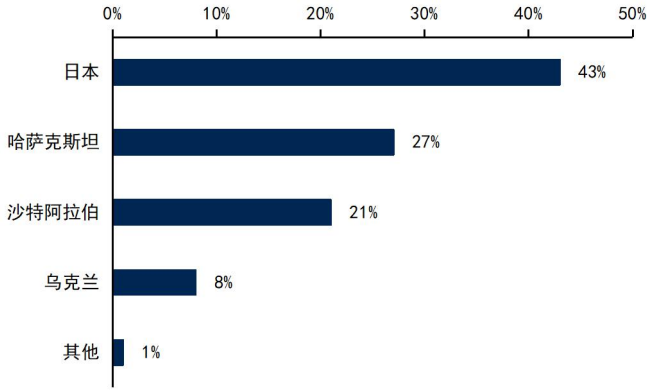
图37：我国海绵钛产量（万吨）



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

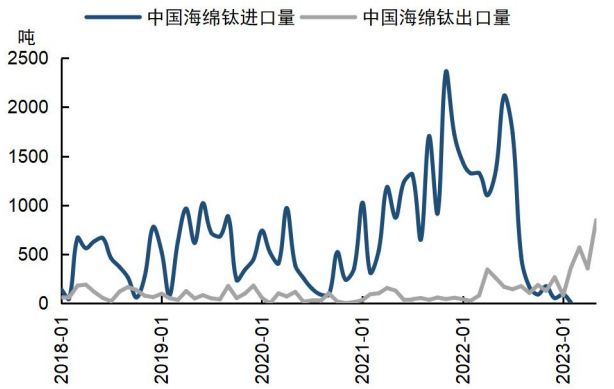
我国进口海绵钛数量减少，出口提升。据海关总署统计数据，2022 年我国海绵钛的主要进口来源国是日本、哈萨克斯坦和沙特阿拉伯。海绵钛的进口主要集中在上半年，随着国外海绵钛价格的大幅上涨，下半年我国进口海绵钛的数量迅速减少。与之对应的是，2023 年我国海绵钛出口量迅速提升。该变化得益于我国海绵钛产业的迅速发展，产能扩张成功。2023 年我国海绵钛进口平均单价下降，而出口平均单价提升。

图38：2022 年我国海绵钛主要进口来源国



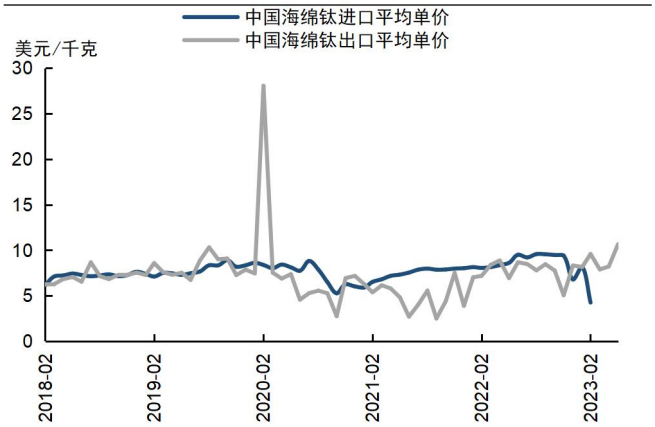
资料来源：海关总署，国信证券经济研究所整理

图39：我国海绵钛进出口量（吨）



资料来源：海关统计数据平台，国信证券经济研究所整理

图40：我国海绵钛进出口平均单价（美元/千克）



资料来源：海关统计数据平台，国信证券经济研究所整理

海绵钛价格支撑较强。我国海绵钛价格曾在 2006 年达到最高点 23.5 万元/吨，随着国内海绵钛产业的发展，产能提升，供需关系缓和，近年来我国海绵钛价格稳定在 8 万元/吨以下，且 2023 年 6 月下探到 6.5 万元/吨的水平。随着海绵钛供给逐渐提升，而长期需求也有望持续拓展，海绵钛市场得以稳定发展，价格支撑力较强。

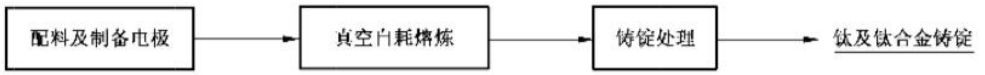
图41：中国海绵钛价格（万元/吨）

资料来源：Wind，国信证券经济研究所整理

2.3. 我国钛材用量提升，主要用于化工和航空航天领域

钛锭是指海绵钛（或海绵钛加合金元素）经熔炼形成的金属钛块，是生产钛材及各种钛合金的原料。钛加工材是指将钛锭经过锻造、轧制、挤压等塑性加工方法加工成的各种形态的钛材，如棒材、丝材、管材、板材、异型材等。

图42：钛锭真空自耗熔炼工艺流程



资料来源：《海绵钛和钛锭单位产品能源消耗限额》（GB 29448-2022），国信证券经济研究所整理

2016-2022 年，我国钛锭、钛加工材产量均呈现持续提升态势。钛材料在航空航天、船舶、化工、医疗器械等行业具有广泛应用，这些行业的需求不断增长，推动了钛锭和钛加工材的产量增加。随着经济发展和技术进步，对轻量、高强度、耐腐蚀材料的需求不断增加，钛材料作为满足这些要求的理想选择，也促使其产量呈现上升趋势。钛材料的生产技术不断改进和创新，新的冶炼、精炼和加工工艺被引入，也提高了其生产效率和产量。

图43：2011-2022 年中国钛锭产量（万吨）

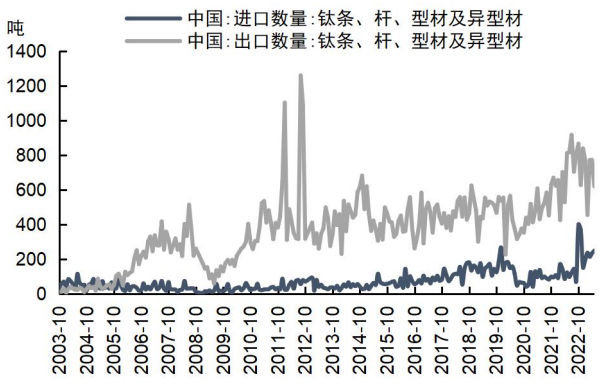
资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

图44：2011-2022 年中国钛加工材产量（万吨）

资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

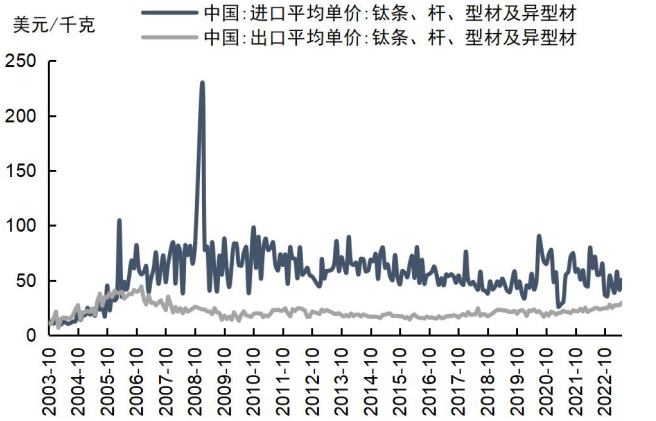
我国进出口钛材量在波动中提升，出口平均单价低于进口。出口量的提升得益于我国钛加工材产业的发展，产量的不断提升。然而 2006 年以来，我国钛材出口单价一直低于进口单价，我国的钛材产品质量、等级可能还有较大发展空间。

图45：我国钛材进出口量（吨）



资料来源：海关统计数据平台，国信证券经济研究所整理

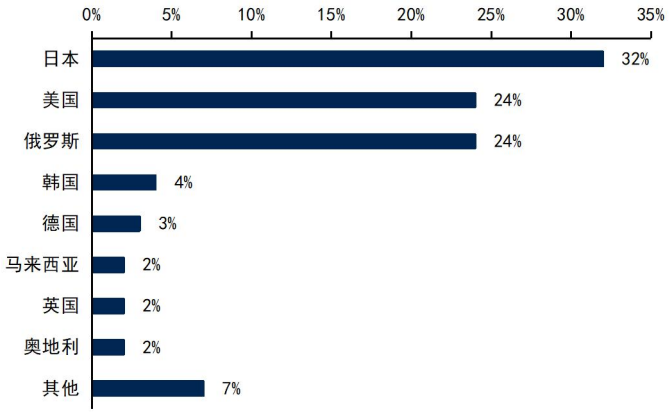
图46：我国钛材进出口平均单价（美元/千克）



资料来源：海关统计数据平台，国信证券经济研究所整理

据 2022 年中国钛工业发展报告，2022 年我国钛锻件的主要进口来源国是日本、俄罗斯和美国。我国钛锻件的进口量较低（820 吨），占所有钛加工材进口量的 10%左右，但进口金额占全部钛加工材的 54.4%。

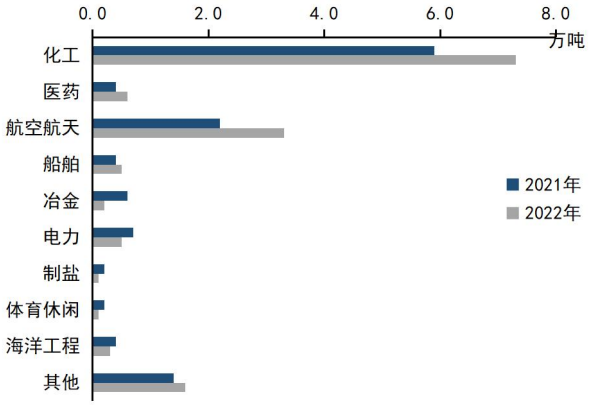
图47：2022 年我国钛锻件主要进口来源国



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

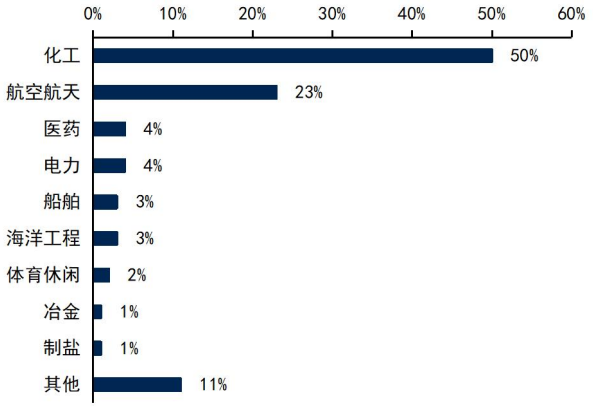
化工和航空航天领域钛材用量最大。根据中国有色金属工业协会钛锆铪分会的统计数据，2022 年我国钛材用量最大的领域是化工（7.3 万吨，同比增长 24%），其次是航空航天（3.3 万吨，同比增长 50%）。2022 年医药和船舶领域的钛加工材用量虽然相对较低，但同比增速分别达到 50%和 25%。航空航天领域的钛用量增速高主要是因为国内需求持续增长。医疗领域的钛用量增加是由于我国在相关领域的生产能力提高，例如国产钛毛细管等产品的替代进口和反向出口。冶金、电力、制盐、体育休闲和海洋工程领域的钛材用量均出现不同程度的下滑，除行业周期引发的波动之外，也因为这些领域钛用量相对较小，易受到少数大型项目的建设需求变化影响。

图48：2021-2022 年我国钛加工材在不同领域中的用量（万吨）



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

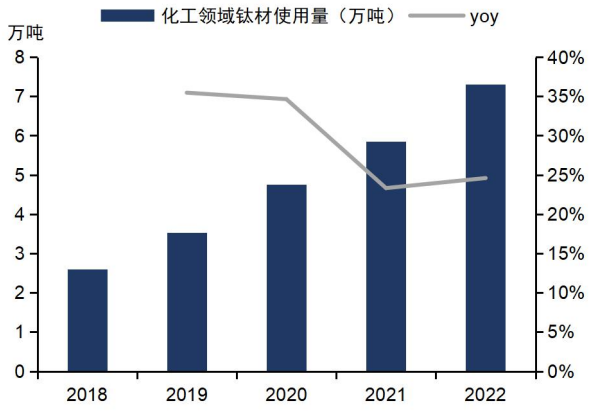
图49：2022 年我国钛加工材在不同领域中的用量占比



资料来源：2022 年中国钛工业发展报告，国信证券经济研究所整理

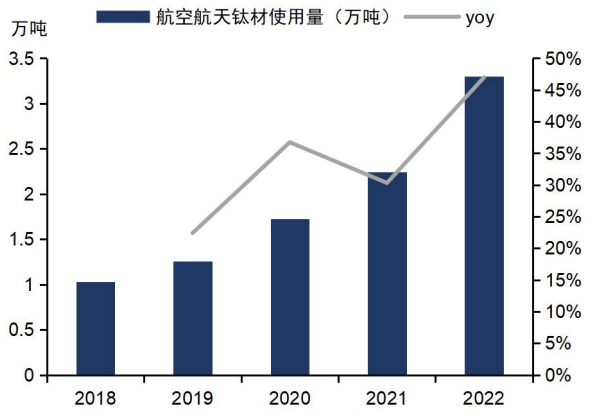
多个领域对钛材的需求量在增长。2018-2022 年，我国化工、航空航天领域钛材使用量均持续提升，其中，化工领域钛材使用量增速有所放缓，而航空航天领域增速有所提升，2022 年同比增速达 47%。钛材优异的属性使得其在各领域中发挥作用：优异的耐腐蚀性能，可以在强酸、强碱、盐水等极端环境中使用，适用于氯碱行业、纯碱行业、石油化纤、真空制盐等领域；高强度、低密度、高韧性等特点，提高化工设备的安全性和可靠性，降低运行成本和维护费用；能与其他金属或非金属材料复合，形成复合材料；良好的生物相容性和生物活性，在医疗和生物化工领域应用于人体植入物、医疗器械、药品包装等方面；优良的光学性能和催化性能，在精细化工领域应用于涂料、染料、催化剂等方面。

图50：2018-2022 年我国化工领域钛材使用量（万吨）



资料来源：有色金属工业协会钛锆铪分会，国信证券经济研究所整理

图51：2018-2022 年我国航空航天领域钛材使用量（万吨）



资料来源：有色金属工业协会钛锆铪分会，国信证券经济研究所整理

3. 典型公司分析：龙佰集团

3.1. 龙佰集团拥有钛全产业链优势，钛白粉产能全球第一

龙佰集团是全球领先的钛白粉生产商，同时也是国内钛矿储量最丰富的企业之一。2022 年公司的营收和归母净利润增速分别为 17%/-27%，2018-2022 年公司收入复合增速 23.7%，归属母净利润复合增速 11.6%。

图52：龙佰集团营收（亿元）及增速

资料来源：Wind，国信证券经济研究所整理

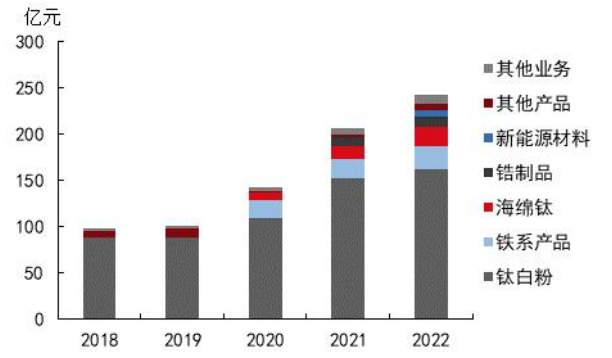
图53：龙佰集团归母净利润（亿元）及增速

资料来源：Wind，国信证券经济研究所整理

钛白粉是公司收入主要来源。公司主营业务为钛白粉、铁系产品、海绵钛、锆制品、新能源材料业务，其中钛白粉业务 2022 年营收占比 67%，铁系产品业务营收占比 10%，海绵钛业务营收占比 9%。2022 年，公司海绵钛、锆制品业务毛利率同比提升，钛白粉、铁系产品业务毛利率下降，尤其是钛白粉业务下降幅度较大，导致整体销售毛利率、净利率均同比下跌。主要是由于钛白粉价格走低，而成本依旧较高，下游需求疲弱等因素的影响。随着下游需求逐步复苏，钛白粉价格提升，该业务毛利率有望回升。2023Q1 数据显示，公司管理、销售费用率有所下滑，内部管理、运营更加优化。

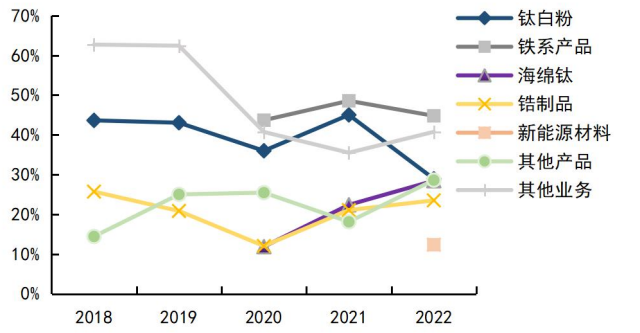
公司拥有完备的钛产业链，钛矿储量丰富，产品产能持续扩张。上游原材料的稳定供应支撑持续扩张的产能，在行业供给端优化的过程中，公司受益于自身原料、规模、品牌优势等，有望持续提升市占率，加大海外出口，提升整体营收规模和盈利水平。

图54：龙佰集团各主营业务收入（亿元）



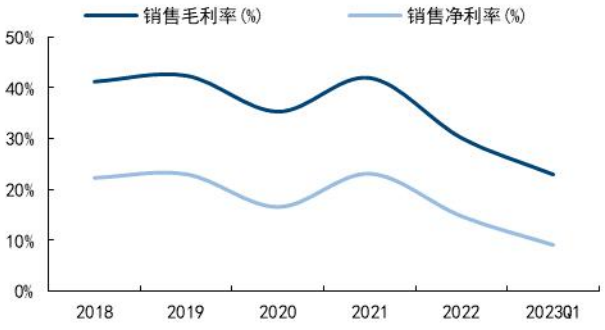
资料来源：Wind，国信证券经济研究所整理

图55：龙佰集团各主营业务毛利率



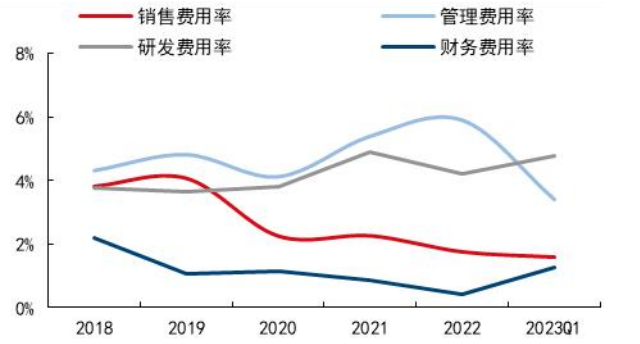
资料来源：Wind，国信证券经济研究所整理

图56：龙佰集团销售毛利率、净利率



资料来源：Wind，国信证券经济研究所整理

图57：龙佰集团费用率



资料来源：Wind，国信证券经济研究所整理

风险提示

钛矿价格波动风险：钛矿价格受到国际市场供需、汇率、关税等因素的影响。若钛矿价格下跌，将影响钛矿开采企业的盈利能力。

行业政策变化风险：政府对矿业行业的政策和法规可能会发生变化，包括税收政策、采矿许可要求、环境保护标准等。政策变化可能会对钛矿行业的运营和盈利能力产生负面影响。

环保政策风险：钛矿行业的生产过程涉及到大量的化学反应和废水、废气、废渣的排放。如果环保政策收紧或执行力度增强，将增加钛矿行业的环保投入和成本，进而影响企业的经营效率和利润空间。

竞争加剧风险：随着全球市场的竞争加剧，钛矿行业面临来自其他国家和地区的竞争对手。价格竞争和市场份额争夺可能会对钛矿行业的利润率和市场地位造成压力。

技术创新和产品升级风险：钛矿行业的发展需要不断提高产品质量和性能，以满足下游客户的多样化需求。若企业缺乏技术创新和产品升级的能力，将面临市场竞争压力，失去核心竞争优势。

地质勘探风险：寻找新的钛矿矿山需要进行地质勘探和探矿活动，这涉及到投资高昂且风险较大的工作。无法准确找到具有可商业开采价值的矿床可能导致勘探投资的浪费。

供应链风险：钛矿行业的供应链涉及到矿石开采、加工、运输和销售等多个环节。供应链中的任何一个环节出现问题，如供应中断、交通运输问题或市场需求波动，都可能对钛矿行业的正常运作产生不利影响。

国际贸易摩擦风险：钛矿行业的部分产品需要出口到国际市场。若遭遇国际贸易摩擦或贸易壁垒，将影响钛矿行业的出口收入和市场份额，增加企业的经营风险。

汇率风险：钛矿行业的国际贸易可能受到汇率波动的影响。如果本国货币贬值，将导致进口原材料成本增加，而出口产品的竞争力可能受到影响。

附表一：重点公司盈利预测及估值

附表：重点公司盈利预测及估值

公司代码	公司名称	投资评级	收盘价	EPS			PE			PB
				2023E	2024E	2025E	2023E	2024E	2025E	2023
002601.SZ	龙佰集团	买入	16.53	1.36	1.68	1.99	12.2	9.8	8.3	1.8

数据来源：Wind、国信证券经济研究所预测

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类别	级别	说明
股票投资评级	买入	股价表现优于市场指数 20%以上
	增持	股价表现优于市场指数 10%-20%之间
	中性	股价表现介于市场指数 ±10%之间
	卖出	股价表现弱于市场指数 10%以上
行业投资评级	超配	行业指数表现优于市场指数 10%以上
	中性	行业指数表现介于市场指数 ±10%之间
	低配	行业指数表现弱于市场指数 10%以上

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