

RECONSIDERING ECONOMIC DEVELOPMENT AND FREE TRADE
TAKING CHINA’S RARE EARTH INDUSTRY AS AN EXAMPLE

Ge Zheng; trans., by Yan Pan*

Abstract: Free Trade is shaped by a system of rules made by WTO and other international organizations initially dominated by the United States and other developed countries. The seemingly fair rules are based on the status quo and designed to consolidate it, in which the “trade barriers” for the developing countries to export their raw materials and cheap labor should be removed and the high added-value manufactured goods should be free to enter the domestic markets of every country. After China joined the WTO, it emerged as a game-changer by following the rules. How China escaped the “resource curse” experienced by many developing countries and became an industrialized developing country capable of competing with the developed countries on fair terms? This paper uses China’s rare earth industry and related industrial policy and law as an example to formulate a narrative in which relationship between law and development can be reconsidered from the perspective of the developing world.

Keywords: Rare Earth; Free Trade; Law and Development; Resource Curse; Industrial Policy

* Ge Zheng, KoGuan School of Law, Shanghai Jiao Tong University, China; Yan Pan, KoGuan School of Law, Shanghai Jiao Tong University, China.

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I. FREE TRADE AND DEVELOPMENT: FROM MUTUALLY RESTRICTING TO MUTUALLY REINFORCING

The concept of a “developing country” was the product of the Post-World War II international order, dominated by the United States and represented by the World Bank, the International Monetary Fund, and other international organizations. The series of development theories that evolved from this concept—from the earlier dependency theory to the later international division of labor theory and the global value chain theory—all assume that the main function of developing countries in the world market is to offer raw materials and cheap labor, with the developed countries completing the high value-added production and processing activities and then selling the products to developing countries. The underlying mainstream theoretical basis is the theory of “comparative advantage” attributed to David Ricardo, wherein a country’s comparative advantage in the world economy lies with their efficacious utilization of the “peculiar powers bestowed by nature”.¹ This unequal distribution of natural resources creates important opportunities for countries that trade with each other; each country focuses on using its unique combination of factor endowments to develop specific products and services, and the efficacious resource allocation is achieved through trade. Under this theoretical framework, as the first countries to industrialize have far more advanced manufacturing and processing technologies, higher production organization efficiency, and higher economies of scale than the latecomer countries, the industrialized countries have comparative advantage in raw materials processing. While in case of the processing of raw materials by developing countries with poor technologies, it is believed that it will result in a great deal of waste in the process. Therefore, developing countries should instead export raw materials directly to industrialized countries, or let industrialized countries invest in developing countries to build factories, which allows industrialized countries to utilize local raw materials and cheap labor immediately, and then put the high value-added finished products into the international market. Drawing support from the research result of McKinsey Global Institute, Paul Samuelson introduced direct investment, learning/imitation, and fair competition factors, and pointed out that the foreign direct investments made by the countries with the highest productivity (such as Japan’s car production transferred to the United States) contributes to a dramatic increase in productivity by introducing advanced technology and stimulating competition. The inevitable path leading up to high productivity and, thus, a high standard of living is to open the developing market to trade, capital, and ideas from the most advanced countries, and allow strong competition with the companies that use the most advanced technologies.² This theory’s conclusion is based on the empirical study of the respective comparative advantages of the United States and Japan, both industrialized countries, therefore completely ignores the inescapable defeat dooming developing countries if they participate in international competition with absolutely no industrial basis. Samuelson specifically warned that the government should refrain from using industrial policy to foster a domestic market of everything:

Government must play a leading role in investments in social overhead capital—in education, health, communications, energy, and transportation—but it should look to the private sector where it has no comparative advantage. Government should resist

¹ See David Ricardo, *On the Principles of Political Economy, and Taxation* 93 (3rd ed. 1821).

² Paul A Samuelson & William D Nordhaus, *Economics* 341–348 (19th ed. 2010).

the temptation to produce everything at home. A firm commitment to openness to trade and foreign investment will help ensure that a country moves quickly toward the best world practices in different sectors.³

Of course, the development model of the Post-World War II international order also emphasizes the assistance provided by international organizations and developed countries to developing countries, and increasingly emphasizes that the countries receiving assistance should carry out institutional reforms and introduce the system of trade liberalization, privatization, and judicial independence, which reflect the European and American ideological value of liberalism. Therefore, development projects come with very obvious political and economic intentions- trying to incorporate the aided developing countries into the US-dominated world order, wherein developing countries are unable to maintain their own unique political and legal systems, nor can they grasp the pace and rhythm of their own development. Under this international development model, only a few developing countries can develop to a level where they are able to compete with developed countries on an equal footing. China's development experience is an exception. It was not swayed by this "international order". In order to not become a permanent supplier of raw materials and cheap labor by entering the world trading system dominated by the industrialized countries when the country's own industrial foundation was weak, China deliberately adopted the closed-door policy and refused to join the world trading system for a period of time after the founding of the People's Republic of China. Meanwhile, China focused on building its own industrial foundation and controlling its own rhythm of development. It was not until China had the basic ability to learn advanced technology that it began to gradually open up and join the world economic system. At the beginning, it focused on the introducing foreign direct investment, then it gradually allowed technology transfer of the enterprises investing in China, and, lastly, it officially accessioned to the World Trade Organization (WTO) in 2001. President Xi Jinping stated in his speech at the G20 summit meeting in Osaka: all kinds of challenges facing the world today are related to development gap and development deficit, when tracing back to their root causes."⁴ The model of free trade plus development assistance failed to solve the problems of developing countries- in eliminating poverty and achieving sustainable development. But China has provided the world with a proven successful development model by neither jumping into the world trading system when its industrial foundation was weak, nor relying on foreign aid. Thus, it was able to independently control its development rhythm and reform pace.

In fact, Mr. Sun Yat-sen was one of the pioneers in incorporating development into the domain of international relations. In February 1919, when "the Armistice was declared recently", Sun Yat-sen, as the Prime Minister of the Chinese Nationalist Party, sent a letter to the US Secretary of Commerce, William C. Redfield, the United States Minister to China, Paul S. Reinsch, and other US dignitaries. The letter was accompanied by a six-and-a-half-page document in English titled "Sketch Project for the International Development of China", which was intended to call on the Post-World War I world system established under the leadership of the United States, of which the

³ Id. at 533.

⁴ Xinhua News Agency, Xi Jinping's Speech on the World Economic Situation and Trade Issues at the G20 Leaders' Summit (full text), June 28, 2019, http://www.xinhuanet.com/politics/leaders/2019-06/28/c_1124684186.htm. (last visited Feb 15, 2022).

organizational mechanism was the League of Nations, to provide funds and technical assistance to help China develop modern industries. This document held that this would be beneficial to world peace and also in the interests of European and American countries.⁵ It read: "Since President Wilson has proposed a League of Nations to end military war in the future, I desire to propose to end the trade war by cooperation and mutual help in the Development of China. This will root out probably the greatest cause of future wars."⁶ Confronted by a cold response from the United States, Sun Yat-sen further expanded this outline into the book "The International Development of China", which was published in China as a strategy to guide the country's industrialization. A hundred years post, an American scholar commented that the concept of industrialized countries aiding developing countries that have not yet achieved industrialization, put forward by Sun Yat-sen during World War I, finally became an international consensus after World War II. "The extent to which the post-World War II expansion of development assistance actually did improve the world is open to debate, but it is impossible to deny that that assistance has played and continues to play a vital role in international relations. There is no better example of this than China. The nation that in the first half of the twentieth century played a leading role in the effort to convince the international community of the necessity of embracing development in the hope of getting aid became in the twenty-first century one of the world's most influential aid donors."⁷

Objectively speaking, China's accession conditions to the WTO were extremely unfair. China agreed to many WTO-plus obligations that neither the developed countries nor many developing countries had promised when they joined the WTO. For instance, in terms of the export trade of raw materials associated with Article 11.3 of *Protocol on the Accession of the People's Republic of China*, China commits to eliminate all export duties, while the GATT rules only prohibit quantitative restrictions on exports, but permit the use of export tariffs.⁸ As for the European and American countries that dominate the design of the WTO rules, out of lack of natural resources or for the purpose of protecting their own exhaustible natural resources have, on one hand, passed legislations to restrict the exploitation of their own resources, but have also imported large amounts of natural resources needed by their domestic industries through international trade on the other. Therefore, they had certainly hoped that China, as a major natural resource supplier, would not impose any restrictions on resource exports. However, even if the accession conditions to the WTO were as unfair as this, China still earnestly fulfills its obligations under the Protocol. China has abolished and revised a significant number of laws, regulations and policies that conflict with the Protocol and the WTO rules, trained a large group of professionals specializing in WTO-related matters, and made full use of the free trade system established by the WTO to realize the take-off of China's import and export trade. In the first decade after joining WTO, China's foreign trade volume grew at a high rate of 22% per year,

⁵ Sun Yat-sen, *The International Development of China* xi, 8–9 (2nd ed. 1929); C. Martin Wilbur, *Sun Yat-sen: Frustrated Patriot* 96–111 (1976).

⁶ Sun Yat-sen, *The International Development of China (En-Cn Version)* xv (2011). Bold added by the author of this article.

⁷ Amanda Kay McVety, *Wealth and Nations: The Origins of International Development Assistance*, in *The Development Century* 21–39, 39 (Stephen J. Macekura & Erez Manela eds., 1 ed. 2018).

⁸ J. Y. Qin, *The Predicament of China's "WTO-Plus" Obligation to Eliminate Export Duties: A Commentary on the China-Raw Materials Case*, 11 *Chinese Journal of International Law* 237–246, 238 (2012).

increasing from USD 474.3 billion in 2000 to USD 2.97276 trillion by the end of 2010.⁹ By 2013, China's total volume of import and export of goods was USD 4.16 trillion, of which export volume was USD 2.21 trillion and import volume USD 1.95 trillion, making China the world's largest trader in goods.¹⁰ Though China was overtaken by the United States in 2016, it returned to the number one position in 2017.¹¹

In this regard, an international trade law scholar commented: "In the WTO context, the U.S. and E.U. dominated the design and drafting of the WTO and its rules. China was not accepted into the WTO until seven years later, and, when it was, it appeared to get a terrible deal. China had to agree to China-specific rules that granted other WTO members greater rights against China, and China fewer rights against them, compared to the standard provisions of the WTO treaties. And yet, through China's investment in legal capacity, it was able to become a legal rival to the U.S. and Europe, who now suggest that the rules favor China. China successfully moved from being a 'rule taker' to a 'rule shaker' to a 'rule maker'."¹² Nowadays, China is an active advocate of free trade and a rule-based multilateral trading system. As President Xi Jinping stated at the opening ceremony of the 1st China International Import Expo (CIIE): "Multilateralism is an effective way to maintain peace and promote development. The world needs multilateralism more than ever. China should firmly safeguard free trade and a rule-based multilateral trade system, and support necessary reforms to the WTO."¹³ In the process of actively participating in the promotion and creation of WTO reforms and multilateral trade rules, China is committed to representing developing countries and taking the responsibility of narrowing the development gap.

Multiple factors cause the widening of the development gap. One of them is that the current international trade rules, dominated by developed countries, fail to fully consider the reality that countries are in different stages of development and require different development conditions. Yet, more consideration is given to developed countries, for their steady stream of demand for raw materials without damaging their domestic environment. On one hand, developed countries restrict resource extraction in order to protect their own environment, and at the same time take measures to reserve strategic resources for themselves. On the other hand, developed countries oppose developing countries' restriction measures on resource export. In fact, many developing countries with abundant natural resources "got into trouble because of its [their] wealth". Under the hijacking of the "right to trade" by developed countries, these developing countries are permanently fixed in the status of resource exporting countries, and cannot achieve industrial upgrading. This is what scholars call the "resource curse". In 1970, 80.4% of the export trade income of the developing world came from the export of raw materials, which dropped to 34.2% in 1993. However, this was mainly attributed to the

⁹ Xiaofu Wu, Sun Zhenyu, the First Chinese Ambassador to the WTO, on the Tenth Anniversary of China's Accession to the WTO, *China Economic and Trade* 16–17, 16 (2011).

¹⁰ Ministry of Commerce, China Became the World's Largest Trader of Goods in 2013, March 1, 2014, <http://www.mofcom.gov.cn/article/ae/ai/201403/20140300504001.shtml> (last visited Feb 16, 2022).

¹¹ Shanshan Luo, China's Status as a Major Trading Country Has Been Consolidated, *People's Daily Overseas Edition*, December 4, 2018, at 03.

¹² Gregory Shaffer & Henry Gao, China's Rise: How it Took on the U.S. at the WTO, 2018 *UNIVERSITY OF ILLINOIS LAW REVIEW* 115, 118–119 (2018).

¹³ Jinping Xi, Building an Innovative and Inclusive Open World Economy--Keynote Speech at the Opening Ceremony of the First China International Import Expo, *People's Daily*, November 6, 2018.

development of manufacturing in East Asia and a few Latin American countries. Other resource-rich developing countries are still relying on exporting raw materials to obtain foreign exchange income.¹⁴ Among the thirty-six countries of the World Bank's "most troubled" countries category (i.e., highly indebted low-income countries), twenty-seven are exporters of raw materials.¹⁵

As a latecomer to industrialization, It was possible for China to fall prey to the "resource curse" as well. In 2014, the European Union released the revised *List of Critical Raw Materials for the EU*. 20 raw materials were identified as critical for modern industries out of 54 candidate materials. China is the main global supplier of 14 out of 20 of these critical raw materials, specifically rare earths. China supplies 99% of the heavy rare earth elements and 87% of the light rare earth elements for the global industry. However, by 2018, China imported 98,400 tons of various rare earth products, among which, the total imported amount of rare earth compounds (including mixed rare earth carbonates) and rare earth metals was 69,400 tons, with a year-on-year growth of 102%. One particular concern is the fact that the import volume of rare earths is far greater than the export volume (53,000 tons exported during the same period). Meanwhile, the import volume of rare earth concentrates and mixed rare earth carbonates has increased significantly, accounting for about 60% of import volume of rare earths. China has become a major importer of rare earth resource products for the first time.¹⁶ How did China get rid of the fate of relying on raw material exports to maintain economic operations and become a major manufacturing country that processes rare earths and uses rare earth raw materials as important raw materials? How do current international trade rules and trade war beyond these rules affect China's policies and laws on rare earth import and export? What inspiration can the story of China's rare earth industry give to other developing countries? How should China's experience be reflected in the new international trade order establishment that China is participating in? Through rare earths, we can catch sight of the changes that the world economic order is currently undergoing or will undergo, in the face of the fact that China is rising.

¹⁴ United Nations Conference on Trade and Development (UNCTAD), *Commodity Yearbook 1995* (1995).

¹⁵ See Michael L. Ross, *The Political Economy of the Resource Curse*, 51 *World Pol.* 297–322, 297–322 (1999).

¹⁶ China Rare Earth Industry Association, Baotou Research Institute of Rare Earths, & Editorial Department of Rare Earth Information, *Ten Major Events in China's Rare Earth Industry in 2018*, *Rare Earth Information* 4–5, 5 (2019).

Raw materials	Main producers (2010, 2011, 2012)	Main sources of imports into the EU (mainly 2012)	Substitutability index*	End-of-life recycling input rate**
Antimony (Stibium)	China 86%	China 92% (unwrought and powdered)	0.62	11%
	Bolivia 3%	Vietnam (unwrought and powdered) 3%		
	Tajikistan 3%	Kyrgyzstan 2% (unwrought and powdered); Russia 2% (unwrought and powdered)		
Beryllium	USA 90%	USA, China and Mozambique	0.85	19%
	China 9%			
	Mozambique 1%			
Borates	Turkey 41%	Turkey 98% (natural borates) and 86% (refined borates)	0.88	0%
	USA 33%	USA 6%, Peru 2% (refined borates); Argentina 2% (natural borates)		
Chromium	South Africa 43%	South Africa 80%	0.96	13%
	Kazakhstan 20%	Turkey 16%		
	India 13%	Others 4%		
Cobalt (Cobaltum)	DRC 56% ↑	Russia 96% (cobalt ores and concentrates)	0.71	16%
	China 6%; Russia 6%; Zambia 6%	USA 3% (cobalt ores and concentrates)		
Coking coal	China 53%	USA 41%	0.68	0%
	Australia 18%	Australia 37%		

	Russia 8%; USA 8%	Russia 9%		
Fluorspar (Fluorite)	China 56%	Mexico 48% ↑	0.80	0%
	Mexico 18%	China 13% ↓		
	Mongolia 7%	South Africa 12% ↓		
Gallium	China 69% (refined)	USA 49%	0.60	0%
	Germany 10% (refined)	China 39%		
	Kazakhstan 6% (refined)	Hong Kong 8%		
Germanium	China 59% ↓	China 47% ↓	0.86	0%
	Canada 17%	USA 35%		
	USA 15%	Russia 14%		
Indium	China 58%	China 24% ↓	0.82	0%
	Japan 10%	Hong Kong 19% ↑		
	Korea 10%	Canada 13%		
	Canada 10%	Japan 11%		
Magnesite	China 69%	Turkey 91%	0.72	0%
	Russia 6%; Slovakia 6%	China 8%		
Magnesium	China 86% ↑	China 91% ↓	0.64	14%
	Russia 5%	Israel 5%		
	Israel 4%	Russia 2%		
Natural graphite	China 68%	China 57% ↓	0.72	0%
	India 14%	Brazil 15%		
	Brazil 7%	Norway 9%		
Niobium	Brazil 92%	Brazil 86% (Ferro- Niobium)	0.69	11%
	Canada 7%	Canada 14% (Ferro-Niobium)		
Phosphate rock	China 38%	Morocco 33%	0.98	0%
	USA 17%	Algeria 13%		

	Morocco 15%	Russia 11%		
Platinum Group Metals	South Africa 61% ↓	South Africa 32% ↓	0.83	35%
	Russia 27% ↑	USA, 22% ↑		
	Zimbabwe 5%	Russia 19% ↓		
Heavy Rare Earth Elements	China 99%	China 41% (all REEs) Russia 35% (all REEs)	0.77	0%
	Australia 1%			
Light Rare Earth Elements	China 87%	USA 17% (all REEs)	0.67	0%
	USA 7%			
	Australia 3%			
Silicon metal (Silicium)	China 56%	Norway 38%	0.81	0%
	Brazil 11%	Brazil 24%		
	USA 8%; Norway 8%	China 8%		
	France 6%	Russia 7%		
Tungsten (Wolframium)	China 85%	Russia 98% ↑	0.70	37%
	Russia 4%	Bolivia 2%		
	Bolivia 2%			

Figure 1: The Distribution Map of the Global Supply Sources of the 20 Critical Raw Materials for the EU¹⁷

II. CHANGES IN THE GLOBAL RARE EARTH INDUSTRY PATTERN AND THE WORLD TRADE ORDER

“Rare Earth” is the general term of a set of 17 metallic elements in the periodic table, including lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, scandium and yttrium. Among them, the group of 15 chemical elements running from lanthanide to lutetium, with atomic numbers 57 through 71 of the periodic table are collectively referred to as lanthanide element. Rare earth is relatively abundant in the Earth's crust, but the rare earth ores minable for enrichment that have been discovered are relatively fewer than most other ores. Rare earth resources primarily exist in four geological environments: carbonatites, alkaline igneous systems, ion-adsorption clay deposits, and monazite-xenotime-bearing placer deposits. Carbonatites and placer deposits are the primary sources of light rare earths, while ion-adsorption clay deposits are the primary sources of heavy rare earths. Rare

¹⁷ Ad Hoc Working Group on Defining Critical Raw Materials, Report on Critical Raw Materials for the EU, 5 (2014).

earth ores mining technology is very demanding. India is rich in monazite reserves, which contain abundant radioactive metal-thorium, but the rare earth industry in India has failed to progress rapidly because it cannot solve the problem of clean production technologically.

Rare earths play a vital role in modern industry. They are essential materials for renewable energy and green energy technologies (such as wind turbines, solar panels and energy efficient lighting), high-tech products (such as computers, smartphones and energy efficient lighting), and defense industry (such as missile guidance systems, smart bombs, and submarines, including Tomahawk cruise missiles and Abrams tanks of the United States).¹⁸ So, without rare earths, the new energy industry, high-tech industry, and defense industry will be unable to make any progress. For instance, permanent magnet technology is one of the primary application areas of rare earths currently. Different from electromagnetism, permanent magnets can independently produce strong magnetic fields without relying on power supply systems. The neodymium iron boron (NdFeB) magnet is the strongest permanent magnet in the world, so it is vital to multiple weapon systems, such as the power generation equipment in jet fighter engines and parts, missile cruise systems, precision-guided weapons and smart bombs, mine detection systems, antimissile defense systems, laser, satellite and communication systems, and radar systems. Permanent magnet technology can produce strong fields in small parts and at ultra-high temperature without external power supplies. This attribute of permanent magnet allows computers, smartphones, and weapons to be smaller and more efficient. At present, there are only five NdFeB companies outside of China in the world. They are Vacuum Schmelze (VAC) of Germany, Hitachi Metals, TDK, Shin-Etsu Chemical, and the joint venture established jointly by Molybdenum Corporation of America and Mitsubishi in Japan. On the other hand, China has more than 200 NdFeB companies, which contribute almost 80% of the global NdFeB production.¹⁹

Several major changes have occurred in the pattern of the global rare earth industry, having impacted the global value chain each time. At the time when the industrial value of rare earths was first realized, India was the world's largest supplier of rare earths. In 1941, India supplied 80% of the rare earths used by the US industry. By 1943, it supplied 100%. In 1946, the nascent Indian government restricted the export of rare earths for the sake of its own industrial development, forcing the United States to seek alternative solutions. In 1947, the Ames Laboratory was established at Iowa State University by the Atomic Energy Commission of the United States, with chemist Frank Spedding, specializing in rare earth research, appointed as its director. This laboratory developed ion exchange chromatography to separate and extract high-purity single rare earth metals. It is therefore called the "cradle of the modern rare earth industry" and the "Mecca of rare earths". With the support and encouragement of the United States government, the Ames Laboratory transferred related patents to enterprises, which promoted the rapid development of rare earths in the United States. By the early 1980s, an American company called Molycorp supplied 70% of rare earths in the global market. However, unlike the petroleum industry, the rare earth industry of the United States has not achieved a comprehensive breakthrough in research and development, nor has it achieved vertical integration in industrial organization. Even in

¹⁸ See Marc Humphries, *Rare Earth Elements: The Global Supply Chain*, *Rare Earth Elements* 31, 2–4.

¹⁹ *Id.* at 4.

its prime, the United States' exports were mainly to sell raw materials such as ores. "The U.S. rare earth industry remained relatively diffused during its lifetime. Molycorp's operation concentrated on the mining and production of raw materials rather than extending its reach to encompass higher-level manufacturing. The expanded supply of rare earth stocks certainly stimulated and supported advancements in domestic rare earth technologies, but it left Molycorp itself vulnerable to the discovery of "the next lucrative source" of rare earths (just as the United States had grown dependent on India's supply in the 1940s and China in the 2000s). One can argue that by vertically integrating, it might have had more options to pursue once China entered the picture. China has deliberately avoided such dependence as much as it ultimately intended to use its own rare earth reserves to produce finished goods rather than sell raw materials to the international market."²⁰ Due to this competitive disadvantage, Molycorp's rare earth mining operations plummeted after a mining accident at the Mountain Pass mine in the 1990s, which resulted in a leak of radioactive liquid, and it ceased operations completely in 2002. In 2017, Shenghe Resources, a Chinese A-share listed company headquartered in Chengdu, successfully acquired the Mountain Pass mine for USD 20.5 million. This mine resumed production in 2018.

Though China entered the world's rare earth trade industry relatively late, its speed of development is astonishing. In 1927, the famous Chinese geologist Ding Daoheng discovered rich metallic deposits in Bayan Obo, Inner Mongolia, China. In 1935, Professor Zuolin He studied the fluorite specimens collected by Professor Daoheng, and discovered two rare earth minerals, "Bayan ore" and "Obo ore". Later, through analysis and identification, they turned out to be "bastnaesite" and "monazite".²¹ Bayan Obo iron ore began its mine building in 1956. From 1957, the main mine started temporary mining. In 1958 and 1959, both the main mine and the east mine started mechanized mining as large-scale open-pit iron ores. In 1963, the Baotou Research Institute of Metallurgy, specializing in rare earths research, was established and affiliated to the Ministry of Metallurgical Industry. Since then, China's rare earth resource mining has been steadily proceeding. Large-scale rare earth deposits have been discovered in Weishan County, Shandong (in the 1960s) and Mianning County, Sichuan (in the 1980s). From 1978 to 1989, China's rare earth production increased at an annual rate of more than 40%. By the 1990s, China had become the world's largest rare earth producer. Bayan Obo is the world's largest rare earth ore vein. Its iron ore reserves are estimated to be 1.4 billion tons, with 35% iron content; and its industrial reserves of rare earth ore are estimated to be 48 million tons, accounting for 45% of the world's rare earth production and 47% of China's in 2005.²²

In the middle of the 1970s, the world became aware that China has the world's largest rare earth reserves for the first time, which was then estimated to be 36 million tons or 50% of the world's reserves, followed by the United States, with 17% of the world's reserves. However, at that time, China had neither exploited rare earth deposits on a large scale, nor had it developed related processing industries. From the 1980s,

²⁰ Joanne Abel Goldman, *The U.S. Rare Earth Industry: Its Growth and Decline*, 26 *J. POLICY HIST.* 139–166, 164 (2014).

²¹ Changyou Zhao, *Discovery and Deposit Mining in the Bayan Obo Mining Area*, *Metal Mines* 55–56, 55 (1982).

²² U.S. Geological Survey, 2005 *Minerals Yearbook: Rare Earths*, http://minerals.usgs.gov/minerals/pubs/commodity/rare_earth/rareemyb05/pdf.

China started to develop its own rare earth industry in a planned and systematic manner, and created corresponding knowledge innovation and industrial structures. “The father of rare earths in China”, Professor Guangxian Xu founded the State Key Laboratory of Rare Earth Materials Chemistry and Application at Peking University. Through unified deployment on a national level, the layout of the rare earth industry, with the integration of industry, academia, and research, came into being in a very short time. By 2010, more than 90% of the world's rare earths came from China. Meanwhile, the rare earth industry in the United States had declined to near nothing, and the United States depended entirely on rare earths imports. Monopoly on rare earth supply has reinforced China's right to speak on international affairs. For example, in the morning of September 7, 2010, a patrol boat of Japan Coast Guard collided with a Chinese fishing boat in the waters near the Diaoyu Islands and seized the captain of the fishing boat. In the course of the negotiations, China at one time exerted pressure on the Japanese government by restricting the total amount of rare earths exported to Japan. In the meantime, the then U.S. Secretary of State Hillary Clinton visited Japan, and rare earths were also an important topic in her talks with the Japanese Foreign Minister.

Due to the upgrading and transformation of China's industry, the domestic demand for rare earths has increased gradually. Therefore, China had implemented quotas on exporting rare earth elements since 2006. This measure had led to a surge in rare earth prices on the international market. On March 13, 2012, the United States (which later requested the European Union and Japan to join on March 22, 2012) requested consultations with China with respect to “the restrictions on the export of three forms of raw materials—rare earths, tungsten and molybdenum”. Having failed to reach any settlement amicably, these three parties requested the DSB of WTO to compose a panel on June 27, 2012, to officially charge China's restriction measures on exports of rare earths and other raw materials (export duties, export quotas and trading rights restrictions) with breaching the “*General Agreement on Tariffs and Trade (GATT)*” and the special commitments made by China in the “*Protocol on the Accession of the People's Republic of China*” and “*Report of the Working Party on the Accession of China*”. Both the panel report and the Appellate Body's final report were unfavorable to China. The main reason for the findings is that the rare earth export quota mechanism adopted by China had not reduced the total amount of domestic rare earth mining and utilization, so it did not fall into the exception as agreed in Article 20 of the GATT for certain specific purposes (supposing the exception is applicable in the China—Rare Earths case, but the DSB of WTO considered not applicable in the first place). These purposes include the protection of human, animal or plant life or health mentioned in *Article XX (b)*, and the conservation of exhaustible natural resources mentioned in *Article XX (g)*.²³ China objected to the findings of the DSB of WTO in this case, so did many international trade law experts in China and abroad, who believes that the findings were questionable. But China still obeyed the findings and canceled the export quotas in 2015.

To mitigate the tension between the increasing domestic demand for raw materials and trade compliance is challenging. According to the Constitution of China, natural resources like rare earths are owned by the State (i.e., by the whole people), and the development and utilization of these resources is part of the socialist state-owned

²³ Appellate Body Report, China – Measures Related to the Exportation of Rare Earths, Tungsten, and Molybdenum, WTO Doc. WT/DS431, 432, 433/AB/R (Adopted August 29, 2014)

economy. Therefore, it is constitutional for the State to promote the vertical integration between upstream and downstream enterprises in the development and utilization of natural resources through industrial policies and administrative measures. What the international trade rules focus on is the raw materials that enter the market, but the market mechanism is not the sole way to effectively allocate resources. As early as in 1937, Coase had stated in the article "The Nature of the Firm", which later earned him the Nobel Memorial Prize in Economic Sciences, that operation of the market is not costless, which is the main reason why firm exists. If the administrative cost of the effective allocation of resources within the firm is lower than the market cost, then the firm will replace the market. The most obvious cost of organizing production through market "price mechanism" is the information cost, followed by negotiation cost and contract signing cost. The characteristic of a firm is to replace the price mechanism with internal organization and management.²⁴ In the 1980s and 1990s, China's rare earth industry was diffused and insufficiently scaled. "Digging and selling the soil" was the main business model of upstream mining companies. But in recent years, the vertical integration of China's rare earth companies has been completed generally, with six major group companies coming into existence, including China Minmetals, Chinalco, Northern Rare Earth, Xiamen Tungsten, Guangsheng Nonferrous, and Southern Rare Earth. Each group company has the full chain production capacity from mining to downstream high-end product manufacturing. And the supply of raw materials has become a division of labor between different departments of the group company, with no need to rely on the market price mechanism any longer. The so-called vertical integration refers to the strategic actions of firms in the same industry chain to expand existing businesses along the upstream and downstream of the industry chain, through mergers and reorganizations, equity swaps, capital injections, etc., to internalize external market transactions. There is forward integration (upstream control downstream) and backward integration (downstream control upstream).²⁵ Vertical integration allows mining companies not to throw rare earth ore into the market cursorily. Rather, the full-chain production is completed within the firm, including the stage of mining, smelting, and separation, the stage of material processing, such as rare earth permanent magnet, laser, hydrogen storage, fluorescent, and catalysts superconducting material processing, and further stage of manufacturing of the high-end products, such as smart phone accessories, new energy auto parts, wind turbine parts, aircraft and spacecraft parts, and defense industry product parts. The firms have turned rare earths into high value-added products before selling them to the market. In this way, the firms participate in international competition.

As a socialist country, the Chinese government does not aim to serve the market or capitalists, but to actively guide and regulate the market to make it serve the whole people. Therefore, the government is capable of applying various policies and legal instruments in a comprehensive manner to promote industrial upgrading. As for the relationship between economics and politics, Mr. Shuming Liang had stated clearly in the Expansion Meeting of the CPPCC on September 11, 1953, "I have such a thought about the transformation of society: China's political reform must be done with economic reform; once the economy has one step forward, the politics should have one

²⁴ R. H. Coase, *The Nature of the Firm*, 4 *Economica* 386–405 (1937).

²⁵ Yujia Wang, *Energy Industry Chain Integration and Enterprise Production Efficiency: Taking the Vertical Integration of Coal Power as an Example*, 21 *Journal of Beijing Institute of Technology (Social Science Edition)* 29–38, 30 (2019).

step forward too, and so on in a circular manner.”²⁶ To adjust the industrial policies in time according to the industrial development level and the national economic development status, and apply the policies and legal instruments from various governance perspectives in a comprehensive manner, including regional planning, urban planning, finance, taxation, environmental protection, corporate governance, etc. to facilitate industrial upgrading and economic restructuring, is China's successful experience, which an American scholar called “economic statecraft”.²⁷ In the book “China and the Geopolitics of Rare Earths”, this scholar summarized the international political landscape surrounding rare earths as follows: first, with the steady increase of world population (estimated to grow to 9 billion by 2050), especially the countries with large populations, including Brazil, Russia, India, and China (BRICS), joining the ranks of the middle-income countries, more and more people will want a high-quality style of life (also means energy intensive). Second, as shown by the growing resource nationalism, developing countries are no longer satisfied with being the exporters of cheap raw materials and labors. For one thing, they seek to achieve higher prices for their raw materials; for another thing, they are developing downstream high value-added industries at home. Third, the emergence of nanotechnologies and other new technologies makes the utilization of materials at an unprecedentedly extensive level, which also increases the demand for rare earth elements. Fourth, a few countries hold an exclusive position in production of certain vital raw materials. This can be most obviously reflected in China's absolute advantage in rare earth resources.²⁸

The effects of combining vertical integration of enterprises and national and regional development strategies are clearly demonstrated in the examples of the Northern Rare Earth Group and Baotou. In 2017, China's rare earth production volume was 160,000 tons, accounting for 89.79% of the world's production (178,200 tons). Among them, the rare earth production in the Bayan Obo mining area of Baotou, Inner Mongolia was 85,000-90,000 tons, accounting for about half of the world's production.²⁹ Baotou is therefore known as the “rare earth capital” of the world. In 2015, Baotou was determined to be the pilot city for national rare earth industry transformation and upgrading. In the following three years, Baotou successfully obtained a total of RMB 0.7 billion fund for the national rare earth industry transformation and upgrading pilot, and brought along RMB 14 billion investments from enterprises. Under the guidance of policy funds, Baotou has implemented about one hundred rare earth industry transformation and upgrading projects, to promote the continuous extension of the industrial chain of functional materials, such as permanent magnets, hydrogen storage, polishing, and catalysts. Significant quantities of rare earth application products with independent intellectual property rights have been created in the fields of aerospace, magnetic refrigeration, permanent magnet motor, hydrogen batteries, and energy saving and environmental protection. The local conversion rate of rare earth raw materials has increased from less than 40% to 85%; the proportion of

²⁶ Shuming Liang, Draft speech at the enlarged meeting of the Chinese People's Political Consultative Conference on September 11, 1935, VII in Liang Shuming's Complete Works, 3.

²⁷ SOPHIA KALANTZAKOS, CHINA AND THE GEOPOLITICS OF RARE EARTHS 4 (2018).

²⁸ *Id.* at 7.

²⁹ Side Liu, World supply of rare earth minerals in 2018, Rare Earth Information, 28 (2018), <https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFDLAST2019&filename=XTXX201901010&uniplatform=NZKPT&v=UyYUuvvJdsbEaw4g39k18bb8rf-nngbcUINPsk5GzjnzjPI22WUQijkZX4yoOGsG> (last visited Feb 11, 2022).

rare earth functional materials and application industry to the city's rare earth industry has increased from 20% to 51.2%, accounting for more than half for the first time.³⁰ Northern Rare Earth Group operates the entire rare earth industrial chain in Baotou, it has established a complete rare earth industrial system, including rare earth beneficiation, smelting and separation, deep processing, applied products, scientific research, etc., and is capable of producing a complete range of rare earth products including rare earth raw materials (concentrates, rare earth carbonates, oxides, salts, metals), rare earth functional materials (polishing materials, hydrogen storage materials, magnetic materials, luminescent materials), and rare earth application products (nickel-hydrogen power batteries, rare earth permanent magnetic resonance instruments). This model of in-depth cooperation between local government and enterprises, with the government providing policy and financial support, and enterprises leveraging to achieve industrial upgrading and system integration, is a unique element of China's economic development model.

In addition, a new model of not relying on the market has emerged among the six major rare earth group companies, giving way to cooperation between them. For example, on November 1, 2017, Northern Rare Earth and Xiamen Tungsten announced that the two parties had entered into a strategic cooperation framework agreement which would involve rare earth products supply security, hydrogen storage materials industrial cooperation, lanthanum, cerium, praseodymium, neodymium metal production cooperation, research and development cooperation, and rare earth group general cooperation. As shown by the content of the agreement publicized, Northern Rare Earth would guarantee Changting Jinlong, a subsidiary of Xiamen Tungsten, a monthly procurement of 30-50 tons of neodymium praseodymium oxide and 10-30 tons of neodymium oxide, which could be increased gradually in the future; Northern Rare Earth would guarantee Xiamen Tungsten a monthly procurement of 40-50 tons of lanthanum and 30-40 tons of lanthanum-cerium for hydrogen storage alloy powder, which could be increased gradually in the future; Northern Rare Earth would guarantee Xiamen Tungsten procurement of 40-60 tons/month praseodymium-neodymium metals or 30-80 tons per month of alloy strips, which would be adjusted based on the increase in production capacity and the adjustment of the national rare earth total amount control scheme. At the same time, Changting Jinlong, a subsidiary of Xiamen Tungsten, would guarantee Northern Rare Earth's procurement needs of medium and heavy rare earth products (such as dysprosium iron metal, terbium metal, gadolinium iron metal, holmium iron metal, and special rare earth metals) for magnetic materials. Xiamen Tungsten lacked praseodymium and neodymium, and Northern Rare Earth lacked heavy rare earths. The two parties complemented each other with their advantages.³¹

The abovementioned developments have created a major demand for rare earth raw materials in China. In 2018, China imported 98,400 tons of various rare earth products, of which the total amount of imported rare earth compounds (including mixed rare earth carbonates) and rare earth metals was 69,400 tons, with a year-on-year growth of 102%. One particular concern is that China's import volume of rare earths is far greater than the export volume (53,000 tons exported in 2018). Meanwhile, the import

³⁰ Baotou Economic and Information Commission, Ten "New Deals" to Help the Development of Baotou Rare Earth New Material Industrial Park, Rare Earth Information 7, 7 (2018).

³¹ China Securities Journal, Two Rare Earth Groups, Northern Rare Earth and Xiamen Tungsten Industry, Join Forces to Complement Each Other's Advantages, Rare Earth Information 7, 7 (2017).

volume of rare earth concentrates and mixed rare earth carbonates has increased significantly, accounting for about 60% of import volume of rare earths. China has become a major importer of rare earth resource products for the first time.³² It can be seen that although China has the largest rare earth reserves in the world, it still has huge demand for rare earth raw materials because it is also a major producer of rare earth functional materials and finished products. The rumors that China can utilize the rare earth embargo to stifle the throats of countries that have trade frictions with China are incredibly simplified and whimsical. What the story of China's rare earths tells us is not how a country with an absolute advantage in a certain resource makes use of this advantage to take unilateral actions to seek benefits for itself, but how this country grasps the pace of its own development, transforms its resource advantages into technological and industrial advantages, and after gaining the ability to dominate its own destiny, actively participates in the shaping of a new multilateralist free trade order.

III. THE CHRONOLOGICAL ORDER BETWEEN DEVELOPMENT AND FREE TRADE

Historically, the advocates of free trade initially were those who benefited from it first, i.e., the capitalists of those countries that were the first to realize industrialization. By virtue of their comparative advantages in capital and technology, they forced the undeveloped countries to open up markets by claiming the "right to trade". So, they could obtain raw materials and cheap labor, as well as move high-polluting manufacturing plants to these countries, thereby circumventing the home country's increasingly high environmental standards. The GATT and the subsequent WTO were international organizations established by these first-mover countries to safeguard their right to trade. As China entered the rank of industrialized countries through self-reliance efforts, on the basis of which, it actively participates in the existing world trade system and engages in fair competition in accordance with its rules. However, the creators and rule-setters of this system feel threatened, and do not spare efforts to destroy the rules established by them to maintain their own interests. The story of rare earth helps us understand the following:

First of all, only when a country grasps its own development rhythm and gets rid of the fate of being deliberately misled by external mechanisms, such as the world trading system, can it truly achieve development. Because these seemingly fair and reciprocal international rules serve the interests of their creators, the established system of legal rules has a conservative character, with its premise being that the existing imbalanced development between developed and developing countries is part of the world order, developing countries should respect the rules of the market, letting the resources move to the place where they can be more effectively utilized (such as developed countries), and developed countries complete the high value-added manufacturing and processing, and then buy the finished products at high price. This set of rules does not take into account the domestic industrial policies demand for developing countries to achieve development and thus become capable of completing effective processing of raw materials, in other words, the need for developing countries to grasp their own development pace and dominate their own destiny. The development of China's rare earth industry fully illustrates this point: in the early stages of

³² China Rare Earth Industry Association, Baotou Research Institute of Rare Earths, and Editorial Department of Rare Earth Information, *supra* note 16 at 5.

developing rare earth resources and rare earth processing technologies, China had not joined the WTO and was not subject to the unfair international trade rules. Therefore, it can adopt domestic industrial policies and corresponding law arrangements to ensure the all-round development of China's rare earth industry, from mining, refining to finished product processing, until China becomes the world's most important producer of rare earth ores and rare earth products.

Second, a clear understanding of the substantive factors under the form does not mean to belittle and abandon the form, or even abandon the rules and procedures. As Thucydides narrated through the mouth of the Athenians, justice only exists between equal powers. In case of disparity in power, the basic fact is: the stronger does what they can, and the weaker will accept what they receive.³³ When a country has the power to participate in shaping and interpreting rules, its choice becomes very important, whether to join hegemonic alliance to bully the weak, or to defeat other strong powers to dominate the world, or to unite the weak to shape a fairer global order. These are the choices that China is currently confronting. Yet, China has made its own choice, which is to adhere to the stance of multilateralism where all countries can participate equally, whether strong or weak. In this regard, President Xi Jinping made a very clear statement, "The G20 should continue to play a leading role to ensure that the world economy is open, inclusive, balanced, and beneficial for all. We must strengthen the multilateral trading system and carry out necessary reforms to the WTO. The purpose of the reform is to keep pace with the times, enabling the WTO to realize its purpose of opening markets and promoting development more effectively. The results of the reform should be conducive to maintaining free trade and multilateralism, and narrowing the development gap."³⁴ With the backdrop of the construction of an innovative country, domestic industrial upgrading, and the construction of an ecological civilization having been determined as national tasks by the Constitution, China's domestic demand for rare earths has gradually increased, while the production of rare earths remains stable. Therefore, the arrangements with regard to the export of rare earths needs to be made through bilateral or multilateral agreements, on the basis of mutual benefit and equal consultation.

Third, setting out from Marxist internationalism, after achieving independent development, China still positions itself as a developing country and is committed to participating in the construction of a fairer global order together with other developing countries. In recent years, on the basis of the defensive foreign policy built on "Five Principles of Peaceful Coexistence", China has put forward an active initiative to "build a community with a shared future for mankind", which manifests China's courage to assume the responsibility as a great power. With respect to the supply of rare earths, China did not continue to restrict the export of rare earths out of the growing domestic demand and increasing environmental protection standards. Instead, in compliance with WTO rules and findings, China canceled the export quotas that had been implemented for several years in 2015. However, if the United States continues to impose various duties, embargoes, and sanctions on China recklessly in order to maintain its hegemony, China will not rule out the possibility of imposing a rare earth embargo on the United States. As Confucius replied, "requite evil with good, with what will you requite good? Requite evil with fairness and honesty, requite virtue with virtue." The formation of

³³ Thucydides, *The War of the Peloponnesians and the Athenians* 380 (Jeremy Mynott ed & tran., 2013).

³⁴ Xinhua News Agency, *supra* note 4.

rules in international relations depends on mutual reciprocity on the premise of abiding by the rules. It is absolutely impossible to rely on hegemonic unilateral actions. In the face of the United States' constant threats of "retreating", leading to the disintegration of the existing world trading system, for one thing, China may cooperate with other member states sharing the same intent to "save" the dispute settlement mechanism of WTO, and in the process of which, facilitate WTO to realize reforms and enhance its impartiality and efficiency; for another thing, China may also seek to establish alternative bilateral and multilateral trade agreements and related dispute settlement mechanisms to reshape the world trade order.

China is "one country, multiple worlds" in itself. Huge regional divergences exist in resource reserves, economic development levels, technological development levels, and industrial structures among different regions. So, China can sustain differentiated inter-regional division of labor and domestic trade. To a certain extent, international trade is no longer a matter of survival for China, which is significantly different from the resource-poor EU countries. For example, Germany, with a developed manufacturing industry, is almost completely dependent on imports for critical raw materials. Although to a certain extent, the United States can achieve resource self-sufficiency as well, the inertia cultivated by the long-term dividends of the Post-World War II international order has made it a must to leave the comfort zone and adjust the industrial policies in order to achieve this. In 2017, Michael Nathan Silver, the CEO of American Elements, met with Trump's strategic advisor Steve Bannon and proposed to nationalize the only rare-earth mine in the United States.³⁵ On December 20, 2017, US President Trump signed an executive order, requesting an increase in the local production of critical mineral raw materials in the United States. These minerals are mainly used in high-end manufacturing, including 23 critical minerals such as platinum, manganese, rare earths, etc. The impact covers high-end manufacturing fields ranging from smartphones to aero engines.³⁶ The "Raw Materials Initiative" (RMI) launched by the European Commission in 2008 embodies three principles: (1) ensure a fair competition environment to obtain raw materials from third-party countries; (2) cultivate raw material sources for the Europe and ensure sustainable supplies; (3) improve the material utilization efficiency and promote recycling use.³⁷ These developments all show that as China enters the rank of industrialized countries and actively participates in the shaping of fairer international trade on behalf of developing countries, European and American countries have to adjust their industrial policies, pick up the raw materials mining industry that they have given up for long, and bear the corresponding environmental consequences on their own, rather than passing such consequences to developing countries altogether. This fact in itself is an important step towards a fair world order. The establishment of the new order necessarily means the disintegration of the old order, and will inevitably touch the interests of those with vested interests. Conflicts and struggles are unavoidable. However, as can be seen from the story of rare earths, it is impossible for any country to take unilateral actions to

³⁵ Bloomberg, This CEO Wants Trump to Nationalize the Only Rare-Earth Mine in the United States (2017), <https://www.bloomberg.com/news/articles/2017-07-18/trump-urged-by-ceo-to-nationalize-the-only-u-s-rare-earths-mine> (last visited Feb 15, 2022).

³⁶ White House, Presidential Executive Order on a Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals (2017), <https://www.govinfo.gov/content/pkg/FR-2017-12-26/pdf/2017-27899.pdf> (last visited Feb 15, 2022).

³⁷ Ad Hoc Working Group on Defining Critical Raw Materials, *supra* note 17 at 9.

protect its own interests and seek unfair terms of trade by relying on its superiority in resources or technology. Because it is impossible for any country to take the lead in all resources or technologies, and a temporary lead does not mean that it can lead forever. The long-term solution is the mutual benefit and win-win approach of “one who wants to stand up and others, and one who wants to achieve them”.