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Pricing the Future: China's Ambitions for Commodity Derivatives Markets

Panel II: China's Efforts to Promote Benchmark Alternatives and Industry Deep Dives

Background on Mineral Markets

The mineral industry is divided into three sectors:

1. **Upstream:** This sector involves locating mineral deposits, mapping their properties, designing mines, and conducting preliminary ore separation. It is often what people envision when they think of mining—large-scale excavation or underground mining.
2. **Midstream:** In this sector, ores and dirt are separated and processed into relatively pure products. This may include further refinement into the form needed for consumer products. Midstream operations resemble manufacturing sites, where heat and chemicals are used to process ore-rich dirt.
3. **Downstream:** The downstream sector uses refined ores or concentrates to manufacture goods. Major companies in this sector include household names like GM, Panasonic, and Lockheed Martin.

Although mineral markets are becoming increasingly critical not industrial progress and national security, they remain relatively small in terms of value compared to other commodity markets. The largest mineral markets, such as those for base metals like iron ore, copper, and bauxite (aluminum), are still order of magnitude smaller than the oil and gas markets. Oil and gas market size is in the trillions of dollars compared to billions or even tens of millions for critical minerals.

Battery minerals are expected to see substantial growth include lithium, cobalt, nickel, manganese, and graphite.¹ Other minerals anticipated to rise in demand due to their role in specific technologies include neodymium (used in rare earth magnets), gallium (for semiconductors), and antimony (for munitions). While these minerals are projected to experience significant growth, their current market sizes are very small compared to other commodities.

Further, many minerals that we consider critical are by-products of larger market minerals. For example, gallium is found with bauxite (aluminum) and zinc. The size and by-product nature of the gallium market means that it is an after thought in the mining and processing sectors. Numerous reports have shown that the United States mines a relatively large amount of most of the critical minerals, however they are never separated from the overburden, or dirt, that occurs with large market metals like platinum².

A final point of note on mineral markets is that China dominates most of the midstream, processing and refining, sector. The United States has few operating midstream assets relative to China. Interestingly, China relies on the many other countries for their upstream supply to these midstream assets³. However, it is this excess capacity that allows China to exert economic power over mineral markets and the related downstream industries. For example,

¹ https://ideas.repec.org/a/spr/minecn/v37y2024i2d10.1007_s13563-024-00424-3.html

² <https://www.mining.com/americas-mineral-blind-spot-the-trillion-dollar-opportunity-hiding-in-plain-sight/>

³ <https://www.sciencedirect.com/science/article/pii/S2667378925000082>

China has used its power as a large supplier or buyer of materials to push transactions to be traded with the renminbi, as opposed to the dollar. This is happening on exchanges⁴ and with bilateral contracts⁵.

Background on Futures Markets for Minerals

The main futures markets for minerals are the London Metals Exchange (LME), Chicago Mercantile Exchange (CME), and the Shanghai Futures Exchange (SHFE)⁶. Futures markets for minerals will not solve the current mineral market challenges. Booms and busts are integral to commodities markets and exchanges allows for speculation that can, at times, even exacerbate volatility. Nevertheless, futures markets role in price transparency, facilitating investment, and hedging is very important.

Figure 1 below shows where the major metals (and their forms) that are traded on major exchanges. Often times the different forms of the minerals traded can act as a hedge to allow firms to make investments further downstream. Exchanges are constantly evaluating the profitability of adding new minerals to their portfolio based on new technologies and consumer demands. Additionally, new exchanges are formed to provide regional hubs or a different type of product, such as Abaxx.

Figure 1: Minerals Traded on an Exchange⁷

		Concentrates	Intermediates & Chemicals ¹	High Purity Metals
Aluminum	Primary	N/a	Alumina (LME)	Aluminum (CME, LME, MCX, PMEX, SHFE)
Cobalt	By-product	N/a	Cobalt Hydroxide (CME, SGX)	Cobalt (CME, ICE, LME, SGX)
Lithium	Primary	Spodumene (CME, ICE)	Lithium Hydroxide (CME, ICE, LME, SGX); Lithium Carbonate (Abaxx, CME, ICE, GFEX, SGX)	N/a
Nickel	Primary	N/a	Nickel Sulphate (Abaxx)	Nickel (LME, MCX, SHFE)
Palladium	By/Co-Product	N/a	N/a	Palladium (Borsa Istanbul, CME, OSE, PMEX)
Platinum	Primary	N/a	N/a	Platinum (Borsa Istanbul, CME, OSE, PMEX)
Tin	Primary	N/a	N/a	Tin (LME, SHFE)
Zinc	Primary	N/a	N/a	Zinc (CME, LME, MCX, SHFE)

Sources: USGS, Abaxx, Borsa Istanbul, CME, ICE, LME, GFEX, MCX, OSE, PMEX, SGX, SHFE, ICE (see Slide 35 for full exchange names)
 1. Chemical compounds may be high purity, specialty products (e.g. battery grade) or intermediate products

Physical versus cash settlement is an important metric to consider when thinking of the role industrial policy can play. Domestic mineral sourcing eases the onshoring of the industrial base, to bring jobs and economic activity. Physical settlement helps the ensure that the product will actually be available should a consumer require it. Given the current structure of the downstream industries in consumer goods, almost all physical settlement occurs in China. If demand for certain minerals grows meaningfully over the next 20 years, it would be reasonable to expect more minerals will be handled on exchange. For the majority of minerals traded off-exchange, price discovery has improved significantly via the development of price benchmarks published by Price Reporting Agencies (PRAs).

⁴ <https://www.bloomberg.com/news/articles/2024-01-16/china-cobalt-buyers-use-global-glut-to-challenge-pricing?embedded-checkout=true>

⁵ <https://www.abc.net.au/news/2025-10-17/what-bhp-china-iron-ore-dispute-means-to-australia/105901692>

⁶ <https://payneinstitute.mines.edu/the-functioning-and-trade-of-minerals-and-metals-on-exchanges-vs-chemical-markets/>

⁷ <https://payneinstitute.mines.edu/payne-introduces-a-critical-mineral-markets-primer/>

PRA track most of the 50 minerals designated as “critical” by the USGS, publishing multiple prices along the value chain for minerals with larger, mature markets with a broad range of products. Some PRA benchmarks are used in settling futures contracts that are not physically settled. Cash settlement is common in a number of recently launched minerals futures contracts such as lithium.

Commission Considerations for Minerals

While mineral criticality is an important topic, it is enlightening to see changes in what mineral was thought to be critical over time to understand that mineral market behavior may change. Something that is deemed important today, and thus might benefit from the initiation of a new traded product or protection from foreign influence, can quickly become less important as technology evolves. A prime example is that of europium, used in compact florescent lighting (CFL). The 2011 DOE Critical Materials Strategy listed europium as “Critical” for both the 2011-2015 and 2015-2025 time frame due to the expected increase in CFL technology in lighting.⁸ The 2023 DOE Critical Materials Assessment does not consider europium as CFL technology has largely been overtaken by light emitting diode (LED) technology overtook CFLs.⁹

Technological advances and consumer preferences change the needs of the firms to meet economic demands and ensure value addition. Understanding when society is better served with a formal trading contract relative to a price reporting agencies off-exchange contract is difficult to determine. The current situation around cobalt is a prime example. The battery market at this stage is dominated by two main chemistries: Nickel Manganese Cobalt (NMC) and Lithium Iron Phosphate (LFP). As their names suggests, LFP batteries do not contain cobalt while NMC do contain cobalt. The Cobalt Institute’s 2023 Cobalt Report has EVs accounting for 45% of total demand of cobalt and batteries of all kind accounting for 93% of the growth in cobalt demand for 2023¹⁰. Should LFP batteries become the dominant chemistry for batteries in the near future, the demand for cobalt would likely subside along with the open interest in a futures contract.

Recommendations for Policymakers

Subsidy schemes should focus on operational support over capital/investment incentives. Due to the pricing power that China commands, capital support is unlikely to allow production of these minerals in the United States. A contract for differences or price floor can ensure actual production.

Lack of demand for US-produced minerals is a strong hinderance to new production assets. Whether for consumer or defense products, the downstream industry is very price sensitive even if many of the minerals are a small portion of the overall costs. Defense Federal Acquisition Regulation Supplement (DFARS) 252.225-7052 aims to ensure the defense industrial base uses domestic or allied rare earths, tungsten, and tantalum by January 1, 2027. Policies that support the enforcement of these regulations and encourage compliance can help funnel demand for domestic or allied produced minerals.

⁸ DOE, Critical Materials Strategy, 2011, https://www.energy.gov/sites/prod/files/DOE_CMS2011_FINAL_Full.pdf

⁹ DOE, Critical Materials Assessment, 2023, https://www.energy.gov/sites/default/files/2023-07/doe-critical-material-assessment_07312023.pdf

¹⁰ Cobalt Institute, Cobalt Market Report 2023. https://www.cobaltinstitute.org/wp-content/uploads/2024/05/Cobalt-Market-Report-2023_FINAL.pdf