William Blair

EMERGING MARKETS DEBT

Investment Management
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Metals of the Future Drive Opportunities in Frontier Markets

Emerging markets (EM) hard-currency bonds could remain volatile given the challenging global macroeconomic backdrop, but we see pockets of opportunities. In particular, metal exporters in the frontier markets space are underappreciated, in our opinion. That's because regulation and consumer preferences are creating demand for clean transportation, and we believe this demand will drive strong growth in what we call the metals of the future: copper, aluminum, nickel, cobalt, and lithium. This could bolster the outlook for commodity exporters, and could also improve the prospects for markets with burgeoning mining investments.

July 2022

Portfolio Manager
Yvette Babb

Rising Demand Supports Commodity Exporters

We believe frontier markets should fare well this year, thanks to compelling valuations and sizable improvements in their terms of trade. But that doesn't mean we can expect smooth sailing. In the short term, hard-currency bonds could remain volatile given the challenging global macroeconomic backdrop.

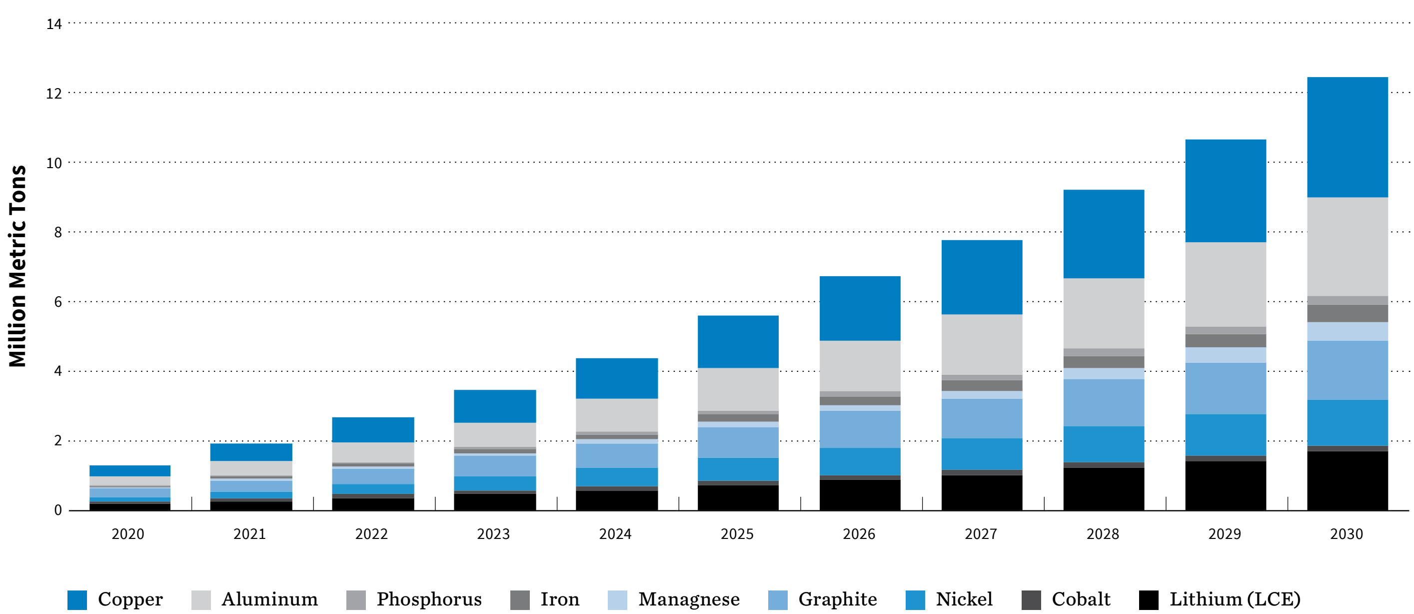
That said, we see potential for oil-exporting countries to outperform commodity importers. Furthermore, metal exporters in the frontier markets space are in our view underappreciated. The constructive outlook for base metal prices is likely to bolster the outlook for copper exporters such as Zambia, and could also improve the prospects for markets with burgeoning mining investments.

That's because, as Alexandra Symeonidi and Luis Olguin described in their 2021 paper, *"Rise of Electric Vehicles: Impact on Commodities and Emerging Markets,"* regulation and consumer preferences are creating demand for clean transportation, and we believe this demand will drive strong growth in what we call the commodities of the future: copper, aluminum, nickel, cobalt, and lithium. Other raw materials used in the lithium-ion batteries that are critical to electric vehicles—manganese and graphite—could also see strong demand growth.

Just how strong is demand potential? BloombergNEF believes total metal demand from lithium-ion batteries will reach 13.5 million metric tons by 2030. This implies that overall cobalt demand from the lithium-ion industry will grow 1.5 times between 2021 and 2030. Over the same time, demand for nickel is expected to be five times its 2021 level, and demand for both copper and aluminum is expected be six times the 2021 level, according to BloombergNEF. Exhibit 1 illustrates.

EXHIBIT 1

Growth in Lithium-Ion Batteries Is Driving Metal Demand



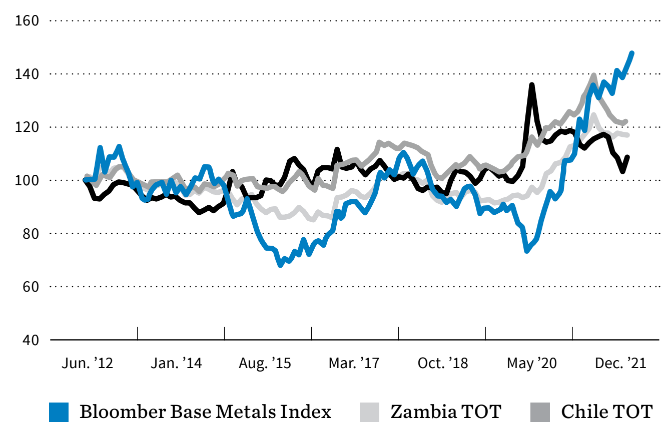
Source: BloombergNEF, as of 2021.

This growing demand could present an enormous opportunity for EMs—frontier markets in particular. Strong demand for commodities of the future contributed to higher prices for these metals in 2021, and this demand strength has continued thus far in 2022. For example, nickel prices rose by 18% in the first two months of 2022 alone, reaching close to $25,000 per metric ton. And copper prices are now close to $10,000 per metric ton, their highest level since 2011. Exhibit 2 illustrates.

Rising prices, in turn, have supported terms of trade in emerging and frontier markets, improving foreign exchange for many countries in early 2022. The currencies of established copper exporters such as Zambia and Chile, for instance, showed resilience against a backdrop of tightening financial conditions and higher import prices—oil in particular. Exhibit 3 illustrates.

EXHIBIT 3

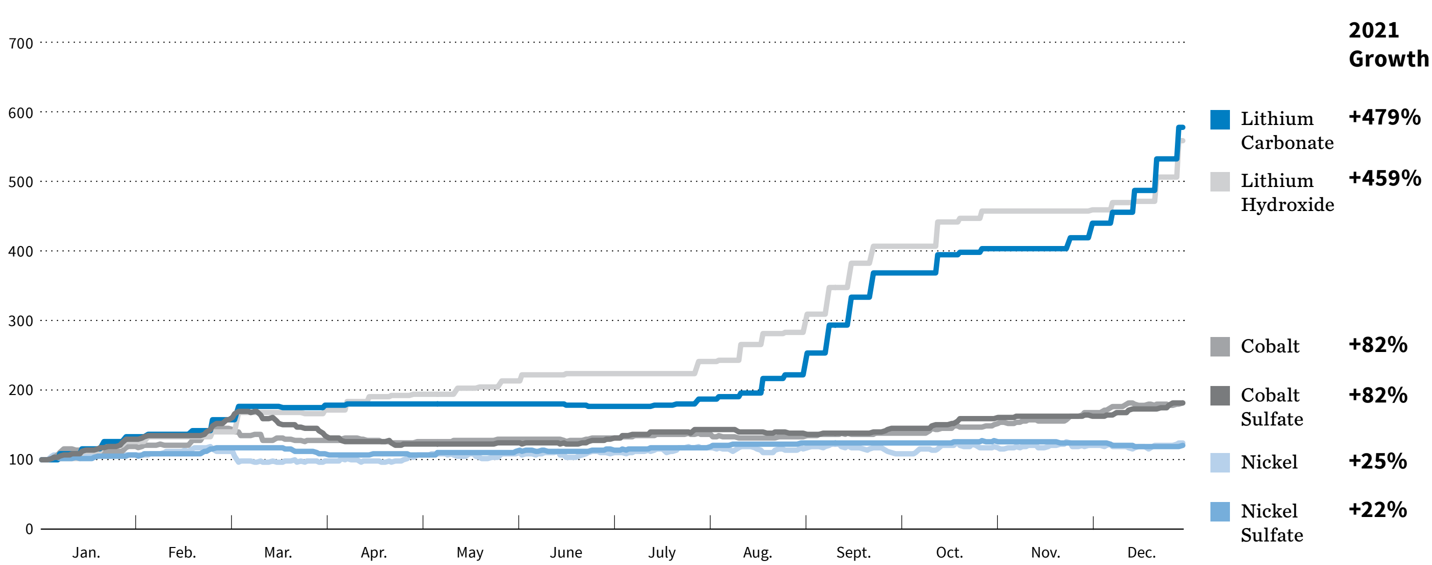
Terms of Trade Show Resilience in Chile and Zambia



Sources: Bloomberg, IMF, and William Blair, as of April 2022. June 2012 = 100.

EXHIBIT 2

Demand Drove Commodity Prices Higher in 2021



Sources: Asian Metal Inc., Antaike, London Metal Exchange, Fastmarkets, BloombergNEF, as of January 2022. Data is indexed to 100 as of January 1, 2021.

Impact of Russia-Ukraine Conflict on Commodity Markets

As a side note worthy of discussion given current events, the sanctions imposed on the Russian government and companies, along with countermeasures by Russian authorities, caused further disruption to commodity markets and contributed to rising prices.

Commodity markets are reeling because of Russia's attack on Ukraine, with the price of a wide range of commodities reaching record levels. Sanctions against Russia, along with countermeasures by Russian authorities and self-sanctioning by buyers, has led to severe supply disruption in the energy, metals, and grain markets.

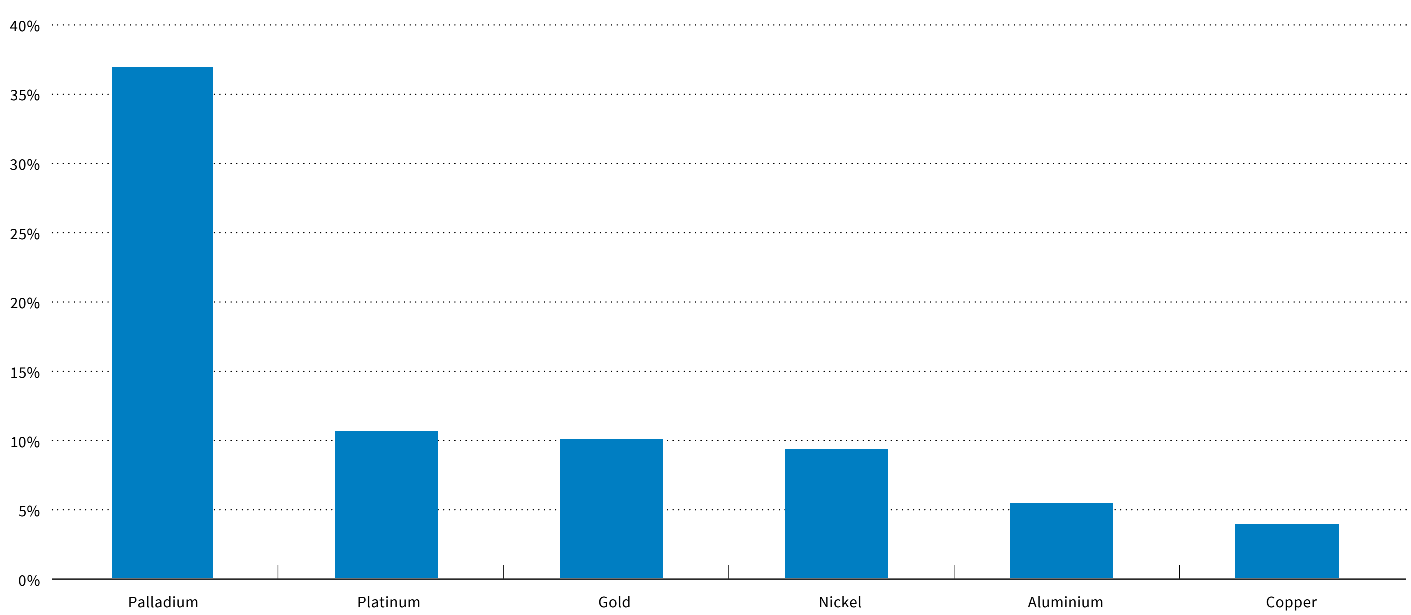
In the metals complex, Russia's contribution to the global supply of platinum-group metals (PGM, which includes ruthenium, rhodium, palladium, osmium, iridium, and platinum) is most significant, as exhibit 4 illustrates. However, nickel and aluminum saw the most significant volatility in price action, with nickel prices surging more than 90% on a single day in March 2022, reaching a peak $100,000 per metric ton.

A changing legislative backdrop and shifts in consumer preferences in development markets are driving the demand for alternative sources of metals. This will likely be associated with structural shifts in trade patterns, in our opinion. In the short term, this could benefit established metal exporters such as South Africa (a major PGM producer); Zambia, Brazil, Chile, and Peru in Latin America; and Indonesia and the Philippines in Asia. We believe this may further spur exploration and production activity in nations with the potential to grow output.

Disruptions in the supply of Russian energy have also caused natural gas and oil prices to soar, but the effect on emerging and frontier markets is unlikely to be uniform. Net energy importers are clearly experiencing a deterioration in terms of trade and current account balances. However, the opposite is true for net energy exporters.

EXHIBIT 4

Russia Has a Significant Share of Global Metal Production (2021)



Source: United States Geological Survey Mineral Commodities Summary 2022.

Impact of Russia-Ukraine Conflict on Commodity Markets (continued)

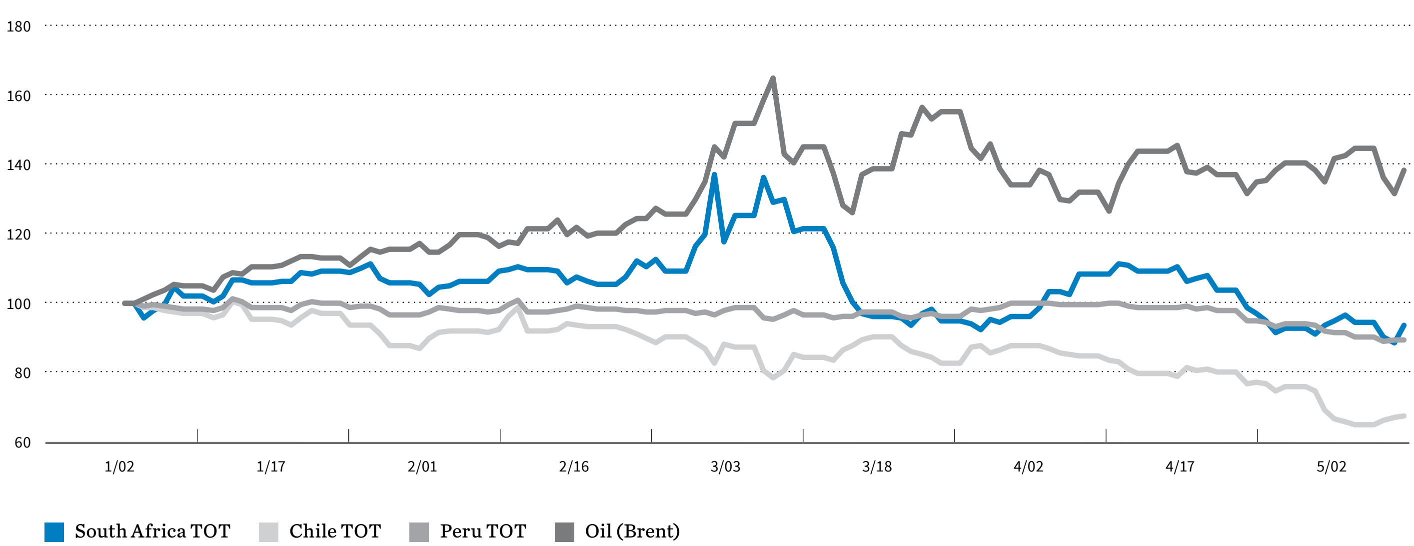
We classify 40% of the JP Morgan Emerging Markets Bond Index (EMBI) Global Diversified as oil exporters and thus net beneficiaries of the rise in prices, from both an external sector and public finance perspective. Specifically, we consider the following countries as oil exporters: Angola, Azerbaijan, Bahrain, Cameroon, Colombia, Ecuador, Gabon, Ghana, Iraq, Kazakhstan, Kuwait, Malaysia, Mexico, Nigeria, Oman, Qatar, Russia, Saudi Arabia, Trinidad & Tobago, and the United Arab Emirates. (Malaysia and Mexico are included because a large share of their index weight comes from national oil companies.)

Because of these dynamics, significant metal exporters such as Chile (where metals make up 62% of total exports), Peru (63%), and South Africa (24%) have not seen a meaningful improvement in terms of trade year-to-date. The sharp rise in oil prices that ensued after Russia's invasion of Ukraine has offset the impact of higher metal prices.

As exhibit 5 illustrates, for example, Peru's terms of trade have only marginally improved since the start of the year. In Chile's case, the rise in copper prices was partly offset by increasing oil prices. And in South Africa, the deterioration in terms of trade as oil prices moved higher and peaked on March 8, 2022 (reflected by the line moving higher), is even more striking, highlighting the country's reliance on imported energy. The rise in oil prices, however, has (partly) been offset by increasing export prices.

EXHIBIT 5

Terms of Trade (TOT) Resilient Amid Fluctuating Oil Prices



Sources: Bloomberg, Citi, and William Blair, as of May 2022. January 2022 = 100.

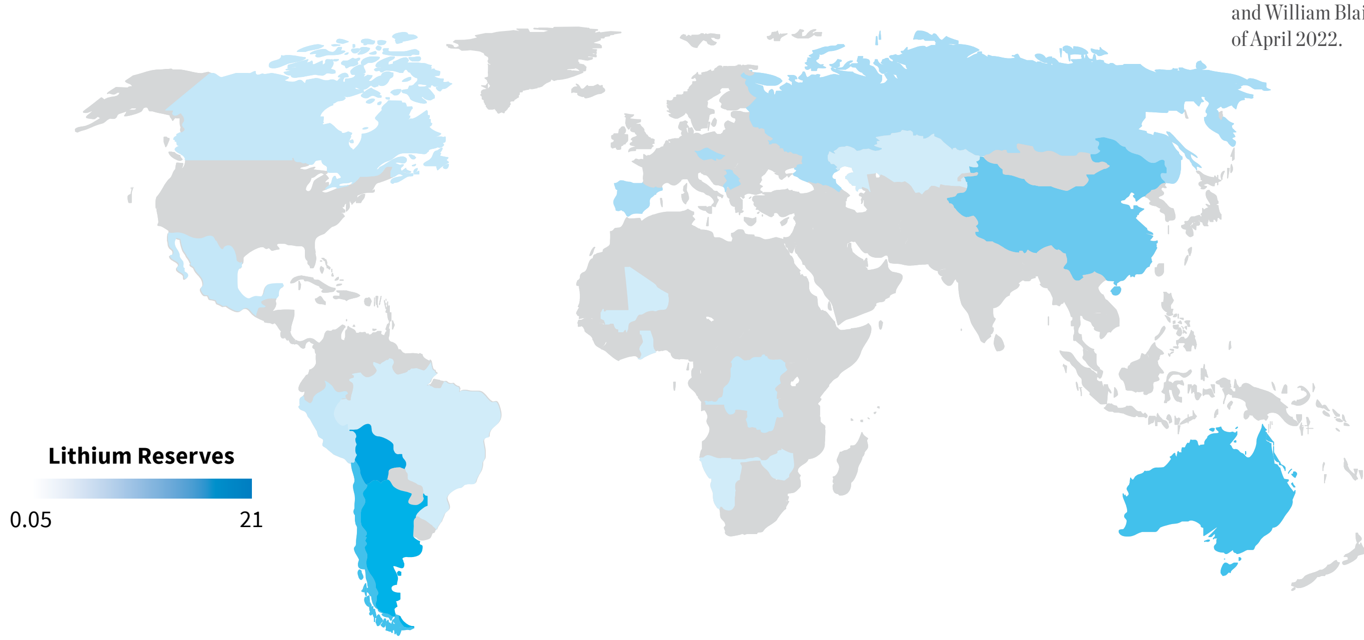
Seeking Opportunities in Metals of the Future

The contribution of emerging and frontier markets to global trade in clean-energy metals has steadily grown in recent years. In 2020, EMs were the source of 44.3% of exports of big-five transition metals, which are those metals heavily needed in renewable energy infrastructure, mainly in electrification activities: copper, nickel, aluminum, cobalt, and lithium. This was up from 42.6% in 2016. Exhibit 6 illustrates.

EXHIBIT 6

EM Production and Reserves of Transition Metals Are Up

Sources: USGS, BP, IMF, national sources, and William Blair, as of April 2022.



2021 National Share of Estimated World Production	Copper	Nickel	Lithium	Cobalt
Mexico	3.4	—	—	—
Panama	2.1	—	—	—
Peru	10.5	—	—	—
Chile	26.7	—	23.9	—
Morocco	—	—	—	1.4
Zambia	4.0	—	—	—
Brazil	—	3.7	7.2	—
Argentina	3.4	—	2.2	—
Kazakhstan	2.5	—	—	—
Russia	3.9	9.3	—	4.5
China	8.6	4.4	16.2	1.3
Papua New Guinea	—	—	—	1.8
Indonesia	—	37.0	—	1.2
Philippines	—	13.7	—	2.6
	100%	100%	100%	100%

China is an important source and destination of the metals of the future, consuming about half of all major base metals in 2022, according to Standard & Poor's. The other largest global exporters of these metals include Chile, Russia, and Indonesia.

Notably, the value of transition metal exports by frontier markets grew by 45% over the past five years, with production emerging in new countries such as Namibia, Côte d'Ivoire, and Pakistan. Clean energy metal mining projects are becoming more valuable, which is likely to drive the search for new reserves and mining projects. Over and above the support the hunt for metals provides to prices and terms of trade, it also offers the potential for increased export proceeds and foreign direct investment inflows to key emerging and frontier markets.

Latin America: Dominates Global Supply of Copper With Significant Potential in Lithium

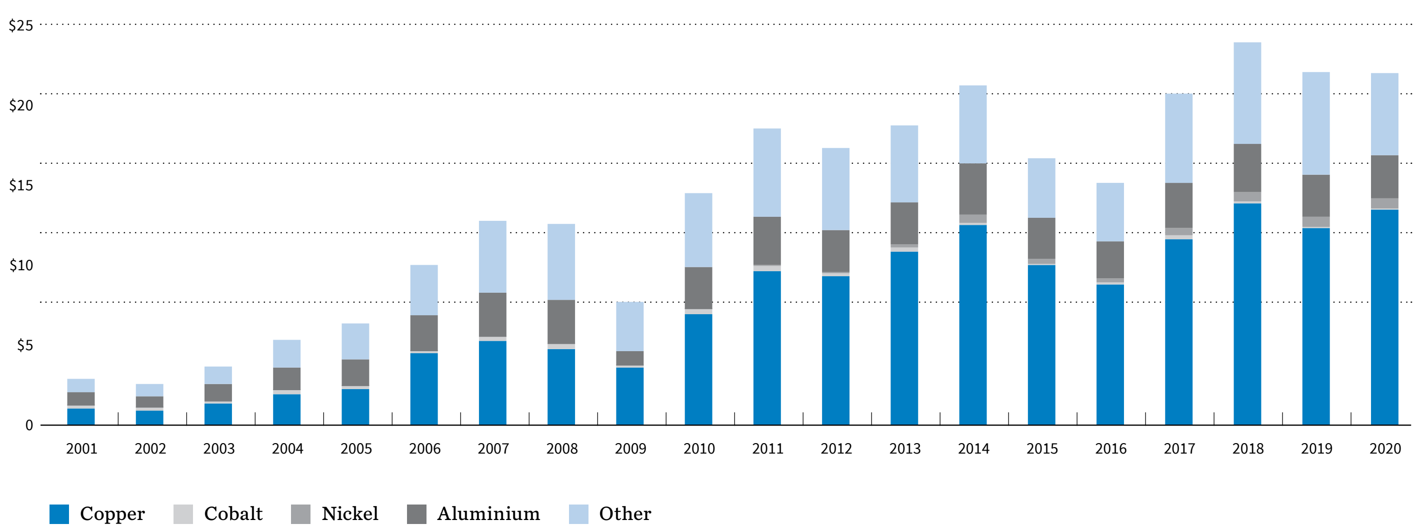
The copper mining industry is a critical component of both the Chilean and Peruvian economy, contributing meaningfully to exports (62% to 63% of total) and fiscal revenue (5% to 6% of total). And production is developing in both emerging and frontier markets.

Copper production started in Panama in 2019, and its contribution to fiscal revenues and exports is set to expand further in line with new tax arrangements, growing volumes, and supportive prices. We believe Panama's annual copper ore exports are likely to grow from $1 billion (11% of goods exports) in 2020 to more than $4 billion in coming years as production ramps up at a new mine, which will be one of the largest in the world.

Critically, as Panama's copper export volumes increased and copper prices moved higher, the country's current account shifted from a deficit to a surplus, sharply improving the performance of the external sector and allowing for considerable accumulation of international reserves.

EXHIBIT 7

Frontier Market Exports of Transition and Other Base Metals Growing (In Billions)



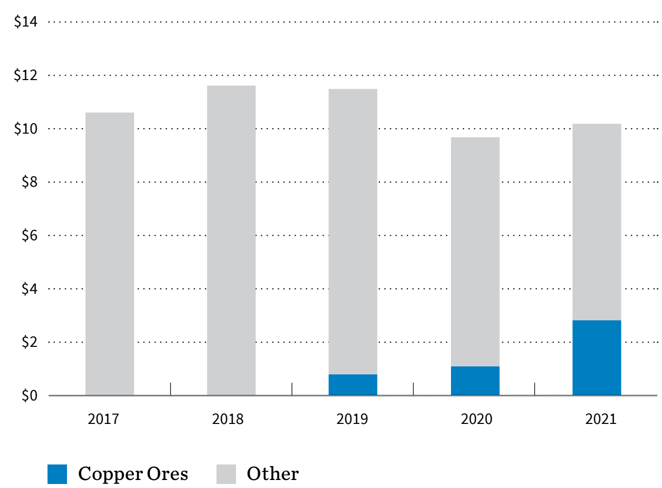
Source: UN Comtrade, as of April 2022. Frontier markets include the 36 countries that are eligible for the JP Morgan Next Generation Emerging Markets (NEXGEM) Index.

Meanwhile, Bolivia, Argentina, and Chile dominate global lithium reserves, with 56% of identified lithium resources in what the U.S. Geological Survey calls the "lithium triangle." The contribution of lithium carbonate exports to overall exports is currently small (0.3% and 0.9% of total 2021 exports for Argentina and Chile, respectively). However, it has potential to grow significantly under the right policy mix.

> "China is an important source and destination of the metals of the future, consuming about half of all major base metals in 2022."
>
> **Yvette Babb, Portfolio Manager**

EXHIBIT 8

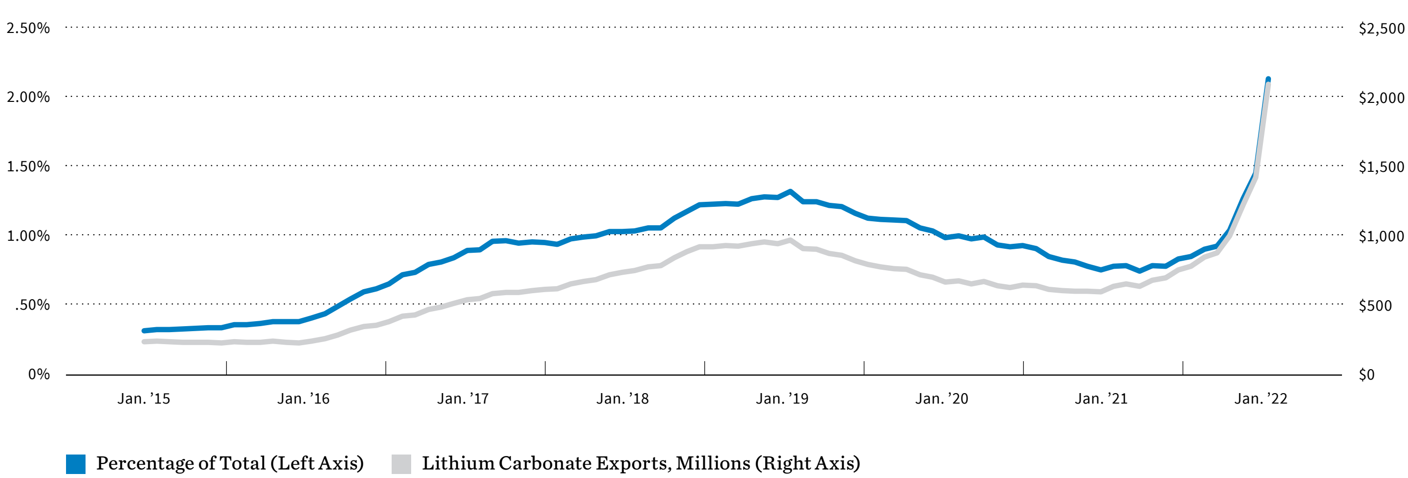
Copper Exports Rising in Panama (In Billions)



Source: Instituto Nacional de Estadística y Censo, as of January 2022.

EXHIBIT 9

Chilean Lithium Carbonate Exports Set to Grow



Source: Central Bank of Chile, as of April 2022. Exports are 12-month rolling sum.

EXHIBIT 10

Contribution of Metal Mining Sector in Key Latin American Countries

	Mining Industry (% of GDP)	Employment in Mining Sector (Thousand PPL)	Employment in Mining Sector (% of Employed)	Mining Taxes (% of Fiscal Revenue)	Mining Exports (Billions)	Mining Exports (% of Total)	Main Metal Mining Exports
Argentina	3.3%	31.3	0.3%	—	$4.9	6.3%	Gold, Silver
Brazil	4.7%	237.0	0.6%	6.0%	$73.4	26.1%	Iron Ore, Gold
Chile	14.7%	236.9	2.7%	5.9%	$57.8	62.0%	Copper
Mexico	1.5%	396.5	0.4%	0.8%	$9.6	1.9%	Copper, Iron
Panama	0.1%	5.1	0.3%	5.3%	$2.8	27.6%	Copper
Peru	12.6%	102	2.0%	—	$39.6	62.8%	Copper, Gold

Source: Central banks, national statistics offices, and ministries of finance, as of December 2021. Chilean mining taxes covers large-scale private mining company (GMP-10) taxes paid and contribution of publicly owned mining companies to public treasury. Argentina mining exports include mining metals and lithium. Brazil mining taxes includes mineral royalty taxes (CFEM) as reported by the Brazilian Mining Association (IBRAM). Mexico employment data covers quarrying and electricity. Mining exports from Mexico include non-oil extractive industry exports, while mining taxes are estimated.

Governments Bid to Increase Public Sector Rent From Mining Industry

Commodity-rich emerging and frontier markets have adopted an array of policy measures in a bid to boost the public sector rent from mining activities in their countries. This has included changes in tax regimes and the imposition of export bans on unprocessed ores.

In recent years, proposals to increase taxes were considered in Peru, Chile, and Zambia. Some of these plans could put marginal mines at risk while discouraging investment in new mines. With the resurgence of populist and left-leaning politics in Latin America, we believe there is risk of natural resources being targeted opportunistically.

In Chile, for example, proposals under consideration in the senate and the constitutional review process are likely to present challenges to the development of the mining sector as well as existing investment. And in Peru, the Castillo administration is looking for ways to maximize the government's rent from the mining sector in a way that risks private investment in the sector.

In our view, a healthy tax regime gives governments the opportunity to increase revenues from the mining sector as mineral prices rise, but also protects investors' return on investment. This can include features such as a variable/progressive mineral royalty tax that is deductible from the corporation income tax calculation. Countries such as Liberia have adopted even more innovative taxes, which are imposed once a rate of return exceeds a set threshold.

Sub-Saharan Africa: Home to Largest Cobalt Producer With Meaningful Output of Copper

The Democratic Republic of Congo (DRC) is the world's largest producer of cobalt, providing more than 70% of the world's production. Other producers, including Russia and the Philippines, account for less than 4.5% of production.

The processing capacity for both copper and cobalt is largely concentrated in Asia, but the DRC and other countries in the region are seeking to adopt policies that will stimulate a regional battery manufacturing industry. This could enable an integrated value chain to emerge across Gabon, Angola, Zambia, the DRC, and Mozambique given the presence of critical inputs in these countries.

Zambia, for example, already has a well-established mining sector that contributes more than 11% to GDP, 28% to government revenues, and almost 80% of export revenues, as exhibit 11 shows.

Manganese is used in lithium-ion battery cathodes. South Africa and Gabon account for about 43% of global manganese ore production. A new project in Gabon is under development, which will increase the mine's annual capacity from 4 million tons to 7 million tons by 2023. Paramount to these efforts will be an overall improvement in infrastructure and the stability in the political legislative and fiscal regime.

EXHIBIT 11

Contribution of Metal Mining Sector in South Africa and Zambia

	Mining Industry (% of GDP)	Employment in Mining Sector (Thousand PPL)	Employment in Mining Sector (% of Employed)	Mining Taxes (% of Fiscal Revenue)	Mining Exports (Billions)	Mining Exports (% of Total)	Main Metal Mining Exports
South Africa	7.8%	464.0	4.8%	4.8%	$29.8	24.0%	PGM, Gold
Zambia	11.1%	62.2	7.9%	26.0%	$8.6	77.0%	Copper

Sources: Central banks, national statistics offices, and ministries of finance, as of December 2021. South Africa mining industry reflects contribution in 2021. Employment figures cover the third quarter of 2021. Mining taxes include pay-as-you-earn (PAYE) income tax paid by mining employees (2%), company taxes, and royalties reported by the Minerals Council for fiscal year 2019-2020. In Zambia, mining taxes for fiscal year 2021 are proxied from 2021 total revenue numbers based on actual contribution from the first through third quarters, Mining taxes include company income taxes paid by mining companies and mineral royalties. Employment in the mining sector is as reported by Chamber of Mines (percentage of formal employment as reported by the statistics authority in the 2020 labor force survey).

Asia: Indonesia Betting on Moving Up the Electric Vehicle Value Chain

Nine countries globally account for 75% of global nickel reserves. In the emerging world, two of the four countries with the highest nickel reserves are Asian: Indonesia and the Philippines. (The other two are Brazil and Russia.)

Indonesia's policies toward natural resource development (which have included export bans on ores) have faced criticism given the rapid pace of change in policies over a decade ago. However, Indonesia overall is seen as successful in achieving a well-diversified export base that has moved beyond the exportation of basic commodities to processed goods and increasingly manufactured goods.

The Center for Strategic and International Studies expects Indonesia alone to account for around half of global nickel production growth through 2025, thanks in part to a joint venture with a Chinese firm set to play a key role in the global nickel supply for batteries in the future.

EXHIBIT 12

Contribution of Metal Mining Sector in Indonesia

	Mining Industry (% of GDP)	Employment in Mining Sector (Thousand PPL)	Employment in Mining Sector (% of Employed)	Mining Taxes (% of Fiscal Revenue)	Mining Exports (Billions)	Mining Exports (% of Total)	Main Metal Mining Exports
Indonesia	2.9%	1,443.4	1.1%	—	$0.1	4.4%	Copper

Sources: Central banks, national statistics offices, and ministries of finance, as of May 2022.

Sustainability Critical in Extractive Industries

The development of the extractive industry is inevitable considering global demand for energy and mobility. As mentioned above, efforts to move to less carbon-intensive forms of transportation are driving the demand for an array of base metals, with mining capacity emerging in developing countries. This is economically an appealing prospect given the potential revenue that can be generated from the exportation of natural resources. However, policies must seek to ensure that any potential adverse implications on environmental, social, and governance (ESG) considerations are addressed.

Environmental

As Alexandra Symeonidi and Luis Olguin described in their 2021 paper, *"Rise of Electric Vehicles: Impact on Commodities and Emerging Markets,"* mining can have adverse environmental consequences. It often requires large surface areas, which can damage biodiversity, and processing can cause high emissions as well as water and soil pollution.

There are legislative, regulatory, and policy tools available to national governments to help address the four main areas of environmental management in mining: water, biodiversity, waste, and emergency preparedness and response. Governments can seek to implement strict policies regarding the disposal of waste and mine tailings, and regulations can give authorities the ability to end operations if environmental protection, pollution mitigation, and waste management systems are not in place. But as with all national development policies, the implementation and enforcement of these measures requires adequate resources and institutional support success.

Social

Host communities of the natural resource sector are vulnerable to potential adverse implications of mining activity through displacement (of indigenous communities) and harm from safety incidents.

More broadly, when the expansion of the natural resource sector is not accompanied by diversified economic growth and employment expansion, it can be associated with increased poverty and inequality. This, in our view, undermines a country's growth potential and in turn its medium- to long-term creditworthiness. And in conjunction with the other adverse implications, it can undermine the social support for mining activity in the short term.

Over the past year, there have been a notable number of public protests against mining operations in Latin America. As societal support for the sector has diminished, the political response has been populist policies that promise to maximize government revenue from the sector in the short term through increased taxes or nationalization of assets.

Governance

Strong governance is, in our view, critical for the prudent exploitation of natural resource wealth. In this vein, we believe that robust public finance management and corporate governance systems assist in bolstering transparency and accountability in the sector.

We believe opportunistic exploitation of natural resource wealth can be limited through enhanced transparency in the way contracts and licenses are awarded; the volume and value of natural resources extracted and exported; and how much revenue is collected by governments on the back of produced and exported resources. This requires disclosures on the part of both governments and mining companies.

Corporate issuers in the mining industry should, in our view, uphold global best standards in their financial reporting. While we acknowledge that mining companies have the right to protect certain licensing and taxation information for competitive reasons, we believe that companies should disclose information by jurisdiction at a granular level to further anticorruption goals.

Equally so, poor or insufficient disclosure by governments and state-owned enterprises serves as a red flag presenting inherent risks to public finances through the potential ineffective or inefficient use of resources. Public frustration and distrust of the natural resource sector is, in our view, fueled by lack of transparency and accountability.

Conclusion

We believe the demand for metals of the future could contribute to stronger export revenues, fiscal proceeds, and investment flows in nascent producers—not the least in Sub-Saharan Africa and Latin America.

However, there is a risk that governments seek to opportunistically target the mining sector to temporarily maximize rent (particularly in Latin America), while considerable investments (in infrastructure) will be necessary to develop the sector (particularly in Africa).

> "The contribution of the metals of the future could allow for further diversification over the medium term; however, the developments could prove more transformative in less developed parts of the world."

Yvette Babb, Portfolio Manager

Many of the established producers of the metals of the future we have discussed (including China, Chile, and Indonesia) are categorized as low-beta countries, which generally have strong macroeconomic fundamentals and present investment-grade opportunities. The contribution of the metals of the future could allow for further diversification over the medium term; however, the developments could prove more transformative in less developed parts of the world.

We believe there is significant scope to generate alpha in frontier markets. In our investment process, we seek to unlock alpha by positioning in markets where the scope for fundamental improvements is inadequately reflected in the pricing of assets.

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