

MERCHANTS OF INTEGRITY?

Maha Rafi Atal, Stephanie Trapnell,
and Dieter Zinnbauer

OCTOBER 17, 2022



COMMODITY
TRADING AND
CORRUPTION RESEARCH
FOR A WORLD IN
TRANSITION



RESEARCHED AND AUTHORED BY:

MAHA RAFI ATAL

LECTURER IN GLOBAL ECONOMY, UNIVERSITY OF GLASGOW

STEPHANIE TRAPNELL

AFFILIATE FACULTY, GEORGE MASON UNIVERSITY

DIETER ZINNBAUER

POSTDOCTORAL RESEARCHER, COPENHAGEN BUSINESS SCHOOL

Research for this paper was conducted under the Global Integrity Anti-Corruption Evidence Programme. This document is an output from a project funded by UK Aid from the UK Government. The views expressed are not necessarily those of the UK government's official policies.

EXECUTIVE SUMMARY

The commodity trading sector has historically presented particular corruption risks. From the extraction of raw materials to the final sale of refined goods, commodities pass along complex supply chains with multiple overlapping intermediaries. For each firm along the chain, commodity trading is a low-margin, high-volume activity, where profits depend on arbitrage. In this market, offshore financial centers (OFC), minimally-regulated global financial hubs and professional “enablers” facilitate everything from questionable deals to outright theft. Corruption at this cross-national scale does not simply distort competition and prices. It can erode political stability, exacerbate conflict, and jeopardize national security by allowing powerful actors to behave with impunity.

Commodity trading, as a form of international trade, is subject to trade-related corruption, such as trade-based money laundering and mispricing. Events, such as the 2022 war in Ukraine and resulting trade sanctions, further aggravate these risks. In addition to the disruptions caused by conflict, the commodity trading sector is currently being transformed by two broader transformations of the global economy: the climate crisis, and policy responses to it, and the digitalization of trade enabled by new technologies like blockchain. This report provides an overview of anti-corruption evidence, as well as evidence gaps and opportunities, in the commodities trading sector. It does this by contextualizing these emerging developments—food insecurity, the climate transition and the rise of blockchain—in relation to long-standing corruption trends.

The report draws on a multidisciplinary review of the academic and policy literature on trade-related corruption in the commodities sector, an analysis of incidents of enforcement and other litigation against the largest commodities trading firms over the past two decades and elite informant interviews. The report draws these sources together thematically. An introductory section sets out overall corruption risks and patterns in the commodity trading industry, while three topical sections consider how these overall patterns are reflected in the food, energy and cryptocurrency commodity sectors.

These topical sections additionally highlight emerging corruption risks, opportunities for further research and avenues for policy intervention in each sector.

We find that the empirical body of evidence on food is strongest when documenting corruption risks at the level of domestic consumption or production, and that domestic trade measures, despite their vulnerability to corruption, remain the prevalent toolset to manage acute food security issues.

In the energy sector, evidence trends point to two major corruption risks that are neither new nor unknown: the production of raw materials needed for new green technologies, which are subject to the same pressures as other raw extractive commodities; and the emerging voluntary markets for carbon offsets, which saw collapse a decade ago under the weight of fraud and weak regulation, problems that our analysis finds remain unresolved.

In the emerging sector of blockchain, our analysis finds that evidence pulls in two directions. Blockchain-supported cryptocurrency, which can evade the reach of established financial regulation, carries new corruption risks, including trade in illicit goods and sanctions evasion. At the same time, blockchain record-keeping has been elevated as a possible solution to forms of trade-based corruption in global supply chains, but evidence of their efficacy is not yet robust, and more research is needed to justify their adoption.

A final concluding section highlights patterns arising across the three sectors. These include local and regional variation in corruption risks, corruption risks in periods of upheaval and economic transition, the anti-corruption potential of emerging private and inter-governmental integrity standards—and new risks from efforts to subverting them—, and the rise of new enforcement tools that extend beyond anti-corruption statutes. The concluding section sets out the implications of these trends for researchers and policymakers.

INTRODUCTION

The past two decades have witnessed growing concern about aligning the opportunities from global trade with the challenges governments face in regulating multinational commerce. Pressing social and environmental challenges necessarily require holding accountable businesses whose operations straddle the jurisdiction of multiple states. In the commodities sector, this challenge is compounded by the states in which trading takes place: resource-rich countries with weak rule of law and limited state accountability. This has made the sector fertile soil for multiple forms of corruption. It has also become a haven for so-called professional “enablers” (bankers, lawyers, accountants, agents, and realtors) who facilitate everything from questionable deals to outright theft, and who operate in relative opacity. Corruption at this cross-national scale does not simply distort competition and prices: it can erode political stability, exacerbate conflict, and jeopardize national security by allowing powerful actors to behave with impunity.

From the extraction of raw materials to the final sale of refined goods, commodities pass along complex supply chains with multiple overlapping intermediaries. For each firm along the chain, commodity trading is a low-margin, high-volume activity, where profits depend on arbitrage between purchase and sale prices. In this market, offshore financial centers (OFC) and minimally-regulated global financial hubs (such as Geneva, Singapore or Dubai) facilitate the low-cost transfer of large sums of money for the many transactions required along the chain.

Although commodity trading is exposed to several types of corruption, bribery is the most widely studied, in part because it is the easiest offense to prosecute.¹ Bribery is a concern in both upstream (extraction) and downstream (distribution), and increasingly in midstream operations (processing and storage). Most relevant for commodity trading, bribery is used to secure the purchase and re-purchase of goods in supply chains between private investors, traders, and government actors. Given the level of opacity in the trade of both conventional energy commodities and clean energy minerals, all of these actors are susceptible to corruption.

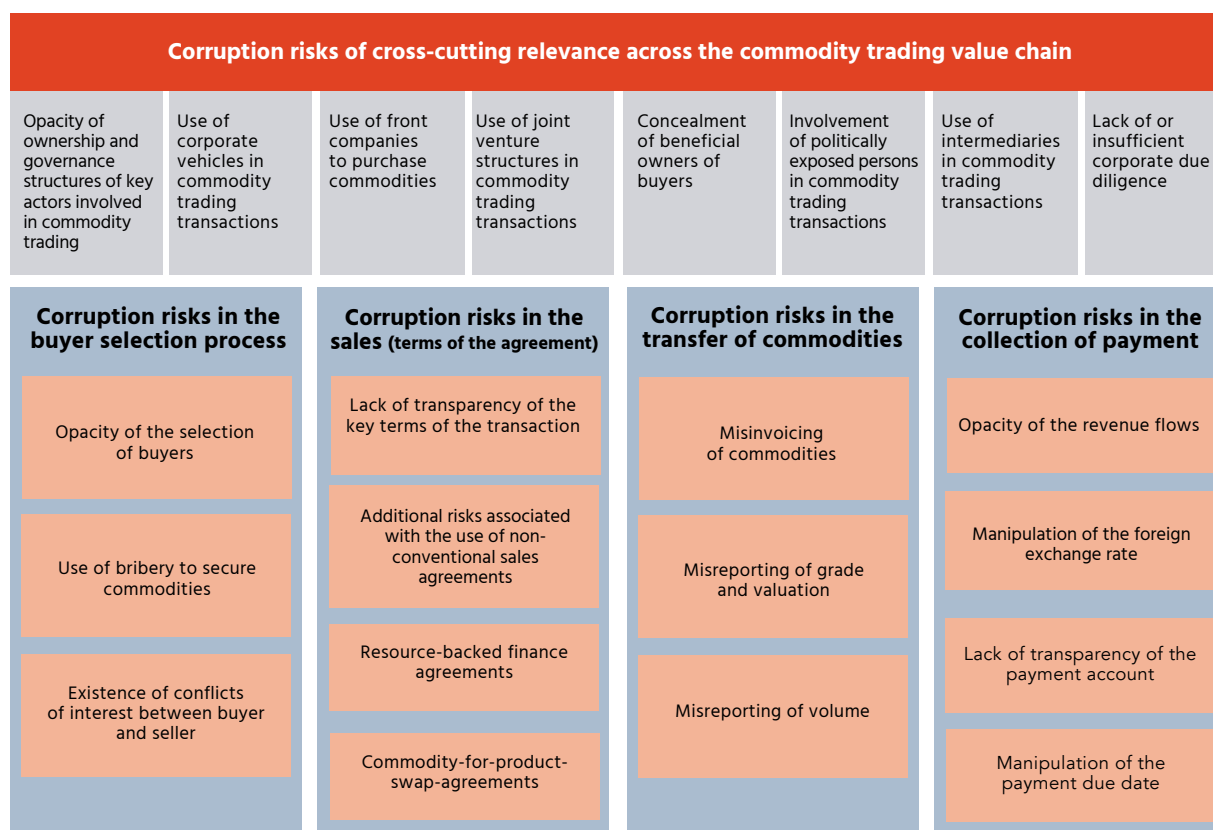
The last decade has seen increased competition amongst trading firms, and the rise of independent, transnational traders neither attached to any one national economy, nor vertically integrated across upstream, midstream and downstream operations. These independent firms trade a range of commodities, including food, conventional energy, and green energy minerals, though they may focus on one stage of the transport chain. These firms are deeply enmeshed in offshore finance, with 97% of their subsidiaries owned via OFC-based holding companies.²

¹ The most well-known instrument designed for this purpose is the U.S. Foreign Corrupt Practices Act, employed by the Department of Justice (DOJ), the Securities and Exchange Commission (SEC), and much more recently (beginning in 2022), the Commodities and Futures Trading Commission (CFTC). The U.K.’s 2010 Bribery Act is also notable, enforced by the newly established Serious Fraud Office (SFO).

² D. Porter and C. Anderson, “Illicit Financial Flows in Oil and Gas Commodity Trade: Experience, Lessons and Proposals” (Paris: OECD, 2021), <https://www.oecd.org/dac/accountable-effective-institutions/illicit-financial-flows-oil-gas-commodity-trade-experience.pdf>.

Independent commodity traders also regularly engage in joint ventures with national governments or firms as a means of mitigating risk. This is a localization trend borne out of new banking regulations following the 2008 global financial crisis. National governments view joint ventures as a mechanism for safeguarding their financial interests, with access to the technology, capital, shipping resources, and market knowledge of commodity trading firms. But there is a high risk of rent seeking behavior: joint ventures are subject to lower reporting requirements, provide greater latitude for discretionary decisions, and fragment the lines of compliance.³ Such joint ventures may also involve politically exposed persons (PEPs), who are more susceptible to being involved in bribery or corruption through their prominent position or influence.⁴

FIGURE 1: Typology of corruption risks in commodity trading⁵



³ Anastasia Nesvetailova et al., "IFFs and Commodity Trading: Opportunities for Identifying Risks in Energy Traders' Financial Conduct Using Groups' Corporate Filings," CITYPERC Working Paper (London: University of London, 2021), https://researchcentres.city.ac.uk/_data/assets/pdf_file/0005/583565/IFFs-AND-COMMODITY-TRADING-financial-oct-2020.pdf.

⁴ OECD, "Thematic Dialogue on Commodity Trading Transparency: Corruption Risks in the Commodity Trading Value Chain," Fifteenth Plenary Meeting of the Policy Dialogue on Natural Resource-Based Development (Paris: Organisation for Economic Co-operation and Development, 2020), https://www.oecd.org/dev/DAY_5_Policy_Paper_Corruption_Risks.pdf.

⁵ OECD. 2016. Corruption in the Extractive Value Chain: Typology of Risks, Mitigation Measures and Incentives. Paris: Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/development/corruption-in-the-extractive-value-chain_9789264256569-en

Commodity trading is also subject to other forms of corruption that are more difficult to prevent and prosecute, and are thus less well understood. This includes inappropriate participation by political elites, who are able to control licensing and sales agreements, collect portions of the sales amounts, and determine the use of proceeds, oftentimes in the absence of (enforceable) national conflict of interest provisions or beneficial ownership regulations. Industry actors also exercise influence over policymaking and regulatory decisions, compromising the ability of political actors to serve the public interest. Additionally, industry actors may enable human rights violations by doing business with political elites in countries characterized by such abuses. Industry actors complicit in such enabling include incorporation agents, lawyers, realtors, accountants, and investment advisors, as well as private companies that buy and sell commodities sourced from such regimes. These firms are usually found in high-income nations in Europe and North America.⁶

FIGURE 2: Actors engaged in buying and selling of extractive commodities



^[1] Schwartz, Franklin W., Sangsuk Lee, and Thomas H. Darrah. 2021. "A Review of the Scope of Artisanal and Small-Scale Mining Worldwide, Poverty, and the Associated Health Impacts." *GeoHealth* 5(1). Experts estimate there are 255,000 diggers at work in DRC mining cobalt, including 35,000 children, see Kara, Siddharth. 2018. "Is Your Phone Tainted by the Misery of the 35,000 Children in Congo's Mines?" *The Guardian*.

^[2] Plüss, Jessica Davis. 2021. "Commodity Giants Race to Clean up Mineral Supply Chains amid Green Energy Boom." *SWI swissinfo.ch*.

^[3] Pegg, David et al. 2022. "Revealed: Credit Suisse Leak Unmasks Criminals, Fraudsters and Corrupt Politicians." *The Guardian*.

^[4] Blas, Javier, and Jack Farthy. 2021. "Big Oil's Secret World of Trading." *Bloomberg*.

^[5] Stanford Law School. 2022. "Third-Party Intermediaries Disclosed in FCPA-Related Enforcement Actions." *Foreign Corrupt Practices Act: Statistics & Analytics*.

⁶ Frank Vogl, *The Enablers: How the West Supports Kleptocrats and Corruption: Endangering Our Democracy* (Lanham, Maryland: Rowman & Littlefield, an imprint of The Rowman & Littlefield Publishing Group, Inc, 2022). Also see Figure 2 for examples of these actors.

Finally, commodity trading, as a form of international trade, is subject to trade-related corruption, such as trade-based money laundering and mispricing. Recent events further aggravate these risks. For example, in spring 2022, after Switzerland (a major trading hub) announced penalties for firms trading with Russian entities following the invasion of Ukraine, some traders shifted operations towards Dubai. As a result of the ongoing conflict, new mid-sized traders have entered the competition for Russian foodstuffs, oil, and minerals.

In addition to the disruption caused by the conflict in Ukraine, the commodity trading sector is currently being transformed by two broader transformations of the global economy: the climate crisis, and policy responses to it, and the digitalization of trade enabled by new technologies like blockchain. In order to ensure that the analysis in this report is maximally relevant and forward-looking in a changing world, the subsequent chapters focus on these emerging developments - food insecurity, the climate transition and the rise of blockchain - while contextualizing them in relation to long-standing corruption trends.

In doing so, we draw on three key sources of evidence. First, we conducted a multidisciplinary review of the academic and policy literature on trade-related corruption, including both sources explicitly focused on corruption and sources on transnational business and trade economics. Second, we conducted an inductive incidence analysis, using both media and regulatory databases, for corruption incidents in the commodities trading sector. This analysis included a comprehensive survey of corruption incidents involving the 15 largest CTC firms in legal records from the US, UK and Europe over the past two decades. Third, we conducted 11 elite informant interviews, with practitioners in global trade governance bodies, business, and the nonprofit sector.

This report draws these sources together to examine corruption in the commodity sector. The subsequent three sections present long-standing trends and new risks and opportunities in each of the three verticals. The concluding section highlights themes common across the three verticals, as well as avenues for future research and potential means of effective intervention.

A GLOBAL FOOD SYSTEM IN CRISIS

The global food system is in a deep and acute crisis. Structural problems with inequitable access, unsustainable agricultural practices and the unfolding effects of climate change have combined to put the food security of millions at risk: the number of people who go hungry has been increasing steadily since 2014.⁷ As of August 2022, more than 860 million people across 91 countries suffer from insufficient food intake.⁸ This surpasses the scale of previous crises, with dire consequences for lives, livelihoods and the broader political economy of development.

This global food crisis is also a crisis in commodity trading. Trade in agricultural inputs and commodities is the backbone of the global food system. Foodstuffs are the tenth most traded product in the world.⁹ Food value chains are among the most globally integrated: more than 20% of agricultural exports are further re-exported by the recipient country.¹⁰ Global food trade has nearly quadrupled in nominal value between 2000 and 2020 and grown its share in global merchandise export by 30% during the same period.¹¹ Yet supply chain disruptions in the wake of the Covid-19 pandemic have ushered in new uncertainty and price fluctuations to these global markets and the assault on the Ukraine adds another layer of turmoil.

Together, these forces have pushed the global food system into uncharted territory, with significant implications and feedback dynamics for corruption and designing anti-corruption interventions.

The agro-food corruption risk landscape – what we know

Trade in agricultural commodities carries a number of well-established corruption risks.

- **Advanced regulatory requirements – driven by quality and food security concerns – can be undermined by corruption.**

Agricultural value chains carry more non-tariff regulatory measures than other globally traded products, primarily aimed at quality assurance.¹² In addition, the current crisis has prompted countries to introduce over 130 trade-related measures affecting up to 20% of

⁷ Cheikh Mbow et. al., “Special Report on Climate Change and Land, Chapter 5 : Food Security” (IPCC), accessed September 4, 2022, <https://www.ipcc.ch/srccl/chapter/chapter-5/>.

⁸ World Food Programme, “HungerMap: Global Insights and Key Trends,” September 6, 2022, <https://static.hungermapdata.org/insight-reports/latest/global-summary.pdf>.

⁹ Observatory of Economic Complexity Dataset. Available at: <https://oec.world/en/profile/hs/foodstuffs> Accessed: 6 September 2022

¹⁰ OECD, “Thematic Dialogue on Commodity Trading Transparency: Corruption Risks in the Commodity Trading Value Chain.”

¹¹ Food and Agriculture Organization of the United Nations, “Trade of Agricultural Commodities 2000–2020,” Food and Agriculture Organization of the United Nations, May 10, 2022, <http://www.fao.org/food-agriculture-statistics/data-release/data-release-detail/en/c/1507740/>.

¹² OECD, “Thematic Dialogue on Commodity Trading Transparency: Corruption Risks in the Commodity Trading Value Chain.”

CASE STUDY: The war in Ukraine: a propellant of the global food crisis

Russia and Ukraine are among the top agricultural commodity producers and exporters in the world. Together they supply 12% of all traded calories, which includes more than 25% of globally traded wheat and 75% of the world's sunflower oil. The two countries are the main suppliers of staples to many emerging markets¹³, accounting jointly for more than 80% of wheat imports for countries from Armenia, Georgia and Azerbaijan to Sudan, Egypt, Lebanon and Nicaragua. Severe harvest and supply chain disruptions are further aggravated by the impact on food production elsewhere as Russia is one of the main fertilizer producers in the world, covering 15% of all fertilizer exports.¹⁴

globally traded calories.¹⁵ The resulting price differentials between world and domestic prices can attract evasive and extortionary practices often linked to corruption.¹⁶ These include large leakage rates, political patronage and asymmetric mistargetting to channel subsidies to ineligible recipients and the circumvention of export restrictions.¹⁷ Higher leakage rates are often associated with a large price differential between market and subsidized price.¹⁸

The interaction between corruption and trade-related measures is a matter of charged debate. While some view corruption as an unambiguous harm, others assume that it might help to increase food access in the face of trade barriers.¹⁹ The empirical reality is nuanced: where trade restrictions are unequivocally harmful, purely evasive corruption can provide some temporary relief and net gains. Yet there is a much broader range of contexts where corruption contains extortionary elements and where regulation furnishes salutary objectives, e.g. food quality standards or measures to lower prices for poor

¹³ "The Coming Food Catastrophe," *The Economist*, accessed September 5, 2022, <http://www.economist.com/leaders/2022/05/19/the-coming-food-catastrophe>.

¹⁴ OECD, "The Impacts and Policy Implications of Russia's Aggression against Ukraine on Agricultural Markets," OECD Policy Responses on the Impacts of the War in Ukraine, OECD Policy Responses on the Impacts of the War in Ukraine, August 5, 2022, <https://doi.org/10.1787/0030a4cd-en>.

¹⁵ Bruegel, "Food Security: The Role and Limits of International Rules on Export Restrictions," Bruegel | The Brussels-based economic think tank, accessed September 5, 2022, <https://www.bruegel.org/blog-post/food-security-role-and-limits-international-rules-export-restrictions>; World Bank, Why Is the World Facing a Food Crisis?, vol. Episode 26, The Development Podcast, 2022, <https://www.worldbank.org/en/news/podcast/2022/06/10/world-food-crisis-security-hunger-supply-chains-war-ukraine-development-podcast>; "The Coming Food Catastrophe."

¹⁶ Pushan Dutt and Daniel Traca, "Corruption and Bilateral Trade Flows: Extortion or Evasion?," *The Review of Economics and Statistics* 92, no. 4 (November 1, 2010): 843–60, https://doi.org/10.1162/REST_a_00034.

¹⁷ Horace Phiri and Abdi Khalil Edris, "Neopatrimonialism and Agricultural Protection: The Case of Maize in Malawi," *MaSSP Working Papers*, *MaSSP Working Papers* (International Food Policy Research Institute (IFPRI), 2013), <https://ideas.repec.org/p/ifpr/masspp/1.html>.

¹⁸ Suman Chakrabarti, Avinash Kishore, and Devesh Roy, "Arbitrage and Corruption in Food Subsidy Programs: Evidence from India's Public Distribution System," 2017, https://ageconsearch.umn.edu/record/235763/files/AAEA_PDS_leakage.pdf; Naomi Hossain and Patta Scott-Villiers, eds., *Food Riots, Food Rights and the Politics of Provisions*, 2017, <https://doi.org/10.4324/9781315175249>; Jordan Kyle, "Local Corruption and Popular Support for Fuel Subsidy Reform in Indonesia," *Comparative Political Studies* 51, no. 11 (September 1, 2018): 1472–1503, <https://doi.org/10.1177/0010414018758755>.

¹⁹ Dutt and Traca, "Corruption and Bilateral Trade Flows"; Antoine Bouët et al., "Family Farming, Regional Markets, and Cross-Border Trade Corridors (FARM-TRAC) in the Sahel" (International Food Policy Research Institute, June 2021).

consumers or small farmers.²⁰ In this way, corruption can undermine trade-related quality safeguards or emergency response.

- **Disruptions, bottlenecks and prices swings herald a new “resource curse.”**

Global food value chains carry more transparent pricing and less direct involvement of state-owned enterprises than trade in other commodities. These factors should lower relative corruption risks. Indeed, a recent study of trade-based money laundering suggests that it is only highly perishable foods which are subject to opportunistic mispricing for money laundering purposes, as the valuation of such items is more easy to obscure and manipulate.²¹ Similarly, our incidence analysis of enforcement action and other litigation against the top 16 commodity traders during the last two decades has found fewer foreign corruption enforcement actions for food commodity traders compared to traders in other commodities.²² However, the global food crisis outlined above has severely disrupted these regular patterns of transparency and traceability, introducing new disruptions and bottlenecks, unpredictable price fluctuation, and fierce international competition for both agricultural inputs and food resources. These developments bear the hallmarks of a “resource curse,” where the lure of huge windfall profits and gatekeeping opportunities invite rent-seeking practices while price disorder makes these behaviors difficult to detect.²³

- **Commodity trading 3.0 (asset-rich, finance-light) rewires corruption risk.**

As noted above, commodities trading has long been a low-margin business. In agriculture, a handful of dominant global trading houses were understood to rely on financial speculation to generate profits.²⁴ Our incidence analysis has to some extent corroborated this premise, with recent market manipulation infractions involving leading firms including Olam, Glencore and Vitol.²⁵ However, in recent years, financialization may have tapered off, as major commodity traders have begun to acquire physical assets both upstream and downstream of trading activities.²⁶ This approach, a re-industrialization of agricultural

²⁰ Giovanni Anania, “Agricultural Export Restrictions and the WTO” (International Centre for Trade and Sustainable Development, 2013), <https://www.files.ethz.ch/isn/173336/agricultural-export-restrictions-and-the-wto-what-options-do-policy-makers.pdf>.

²¹ Financial Action Task Force and Egmont Group, “Trade-Based Money Laundering: Trends and Developments” (Paris, France: Financial Action Task Force (FATF), December 2020), <https://www.fatf-gafi.org/media/fatf/content/Trade-Based-Money-Laundering-Trends-and-Developments.pdf>.

²² For a more granular breakdown by types of enforcement see Figure 7.

²³ Michael L. Ross, “The Politics of the Resource Curse: A Review,” SSRN Electronic Journal, 2013, <https://doi.org/10.2139/ssrn.2342668>.

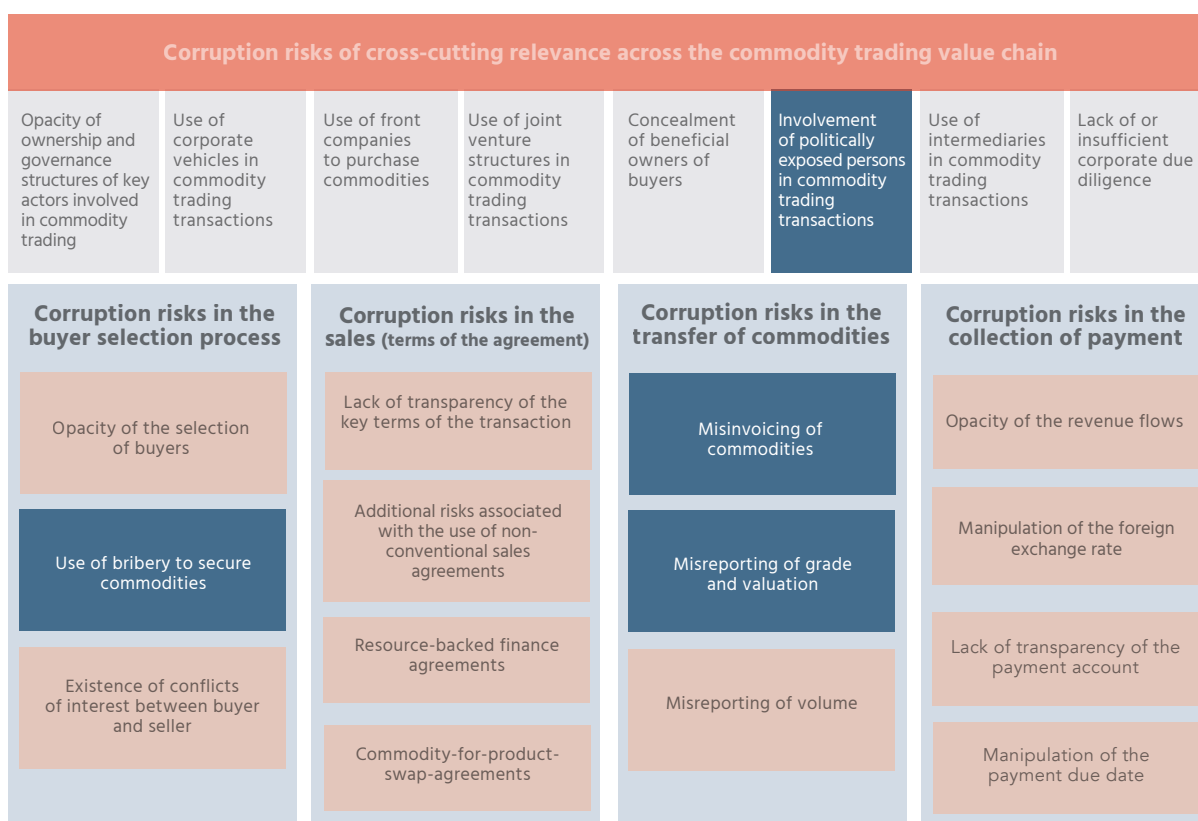
²⁴ Joseph Baines and Sandy Brian Hager, “Commodity Traders in a Storm: Financialization, Corporate Power and Ecological Crisis,” *Review of International Political Economy* 29, no. 4 (July 4, 2022): 1053–84, <https://doi.org/10.1080/09692290.2021.1872039>.

²⁵ Commodity Futures Trading Commission, “CFTC Imposes \$3 Million Penalty against Olam International, Ltd. and Olam Americas, Inc. for Violating Cocoa Position Limits and Unlawfully Executing Noncompetitive Trades | CFTC,” Commodity Futures Trading Commission, January 20, 2015, <https://www.cftc.gov/PressRoom/PressReleases/7104-15>; Department of Justice Office of Public Affairs, “Glencore Entered Guilty Pleas to Foreign Bribery and Market Manipulation Schemes,” United States Department of Justice, May 24, 2022, <https://www.justice.gov/opa/pr/glencore-entered-guilty-pleas-foreign-bribery-and-market-manipulation-schemes>; District Attorney - New York County, “News Release: November 20, 2007,” New York County District Attorney’s Office, November 20, 2007, <https://web.archive.org/web/20100616074150/http://manhattanda.org/whatsnew/press/2007-11-20.shtml>.

²⁶ Baines and Hager, “Commodity Traders in a Storm.”

trade, could allow them to derive profits by controlling segments of the value chain,²⁷ reducing the pressure to engage in financial engineering and related corruption. Direct asset ownership and operations in both producing and consuming countries increases these traders' exposure to conventional corruption risks.

FIGURE 3: Corruption typology for food insecurity



The integrity landscape – a distinct opportunity

“The thing about agriculture is that it’s food. And everybody cares very much about the food that they eat... So there’s a tremendous emphasis on traceability.”

- commodity trader Jonathan Kingsman ²⁸

As concerns about the origin and quality of the food we eat occupy a central public sentiment about globalization, food-related value chains have a long history of advancing quality standards, with associated commitments to transparency and traceability.²⁹ The imperative of decarbonising agricultural production and the global food value chain is further accelerating this drive towards responsible business conduct. As one industry

²⁷ Paul Chapman, “The New Merchants of Grain with Jonathan Kingsman,” HC Insider Podcast; 30 June 2021, n.d., <https://podcasts.apple.com/gb/podcast/the-new-merchants-of-grain-with-jonathan-kingsman/id1512721188?i=1000527345076>.

²⁸ Chapman.

²⁹ OECD, “Thematic Dialogue on Commodity Trading Transparency: Corruption Risks in the Commodity Trading Value Chain.”

expert summarizes: “Traceability is not a luxury, it is ‘a must have.’”³⁰ The evolving Environmental and Social Governance (ESG) frameworks do often nod to anti-corruption under their governance dimension, yet more could be done to strongly interlink the ESG and anti-corruption policy and research agendas.

For example, the dominant agricultural commodity trading firms are owned privately or by small groups of concentrated shareholders.³¹ While shareholder activism has been a primary avenue for pressing corporate accountability concerns in other sectors, it has limited potential in agricultural trading. Instead, effective pressure in this sector has come from two other key stakeholder groups: banks as essential financial underwriters of trading operations who are themselves scrutinized against ESG metrics and consumers who care about the quality and carbon footprint of their food.³² More research is needed on how responsible investment does or could drive anti-corruption efforts, as is research on how corporate integrity issues could be elevated in consumer purchase decisions.

AT A GLANCE - The evidence landscape on corruption and the global food trading system

There are a number of conceptually well-established corruption risk factors for agricultural commodity trade, yet there is only limited empirical and comparative evidence on the overall scale and scope of corruption in this area. The same applies to evidence on solutions and integrity measures. Rapid transformations of the sector also call for new modes of applied research to yield timely, actionable insights. Overall, the empirical evidence base is strongest when it comes to understanding corruption risks and integrity measures at the level of domestic consumption or production: domestic trade measures, price controls or food subsidy schemes may be loved or loathed, but they are the prevalent toolset to manage acute food security issues with high, well-documented vulnerabilities to corruption.

³⁰ J. Lambert, “A Conversation with J-F Lambert,” Blog Commodity Conversations, August 12, 2019,” *Commodity Conversations* (blog), August 12, 2019.

³¹ Baines & Hager 2021

³² Chapman, “The New Merchants of Grain with Jonathan Kingsman”; Lambert, “A Conversation with J-F Lambert.”

CLIMATE TRANSITION

The oil and gas sector emits around 5200 million tons of carbon into the atmosphere each year, either as carbon dioxide or its equivalent. Through the combustion of fossil fuels, the energy sector in total generates about 75% of global greenhouse gas emissions (GHG) (IEA 2022).³³ In response, the global community has agreed to a set of targets that aim to bring overall net emissions to zero.

Renewable energy commodities are the driving force on the road to global net zero. But the path is far from clear. Clean energy infrastructure is highly dependent on the supply of copper, nickel, steel, aluminum, polysilicon, and other raw materials, including rare-earth minerals. Demand for these critical minerals is outpacing the development of supply chains, market mechanisms and financing models necessary to meet global decarbonization commitments.³⁴ Meanwhile, the absolute supply of these minerals, or the global production capabilities for associated green technologies, may not be sufficient to meet net zero targets.

Consider, for example, the mineral needs of electric vehicles: there are only enough global reserves of nickel and lithium if these minerals are exclusively used to produce Li-ion batteries, when in fact they have other essential uses.³⁵ New replacement batteries will also be required every 8-10 years, from either a mined mineral source, or a recycled metal source. Given limitations on supply and technological capacities, this is likely to be impossible.³⁶

³³ International Energy Agency 2022. <https://www.iea.org/data-and-statistics/data-product/greenhouse-gas-emissions-from-energy>

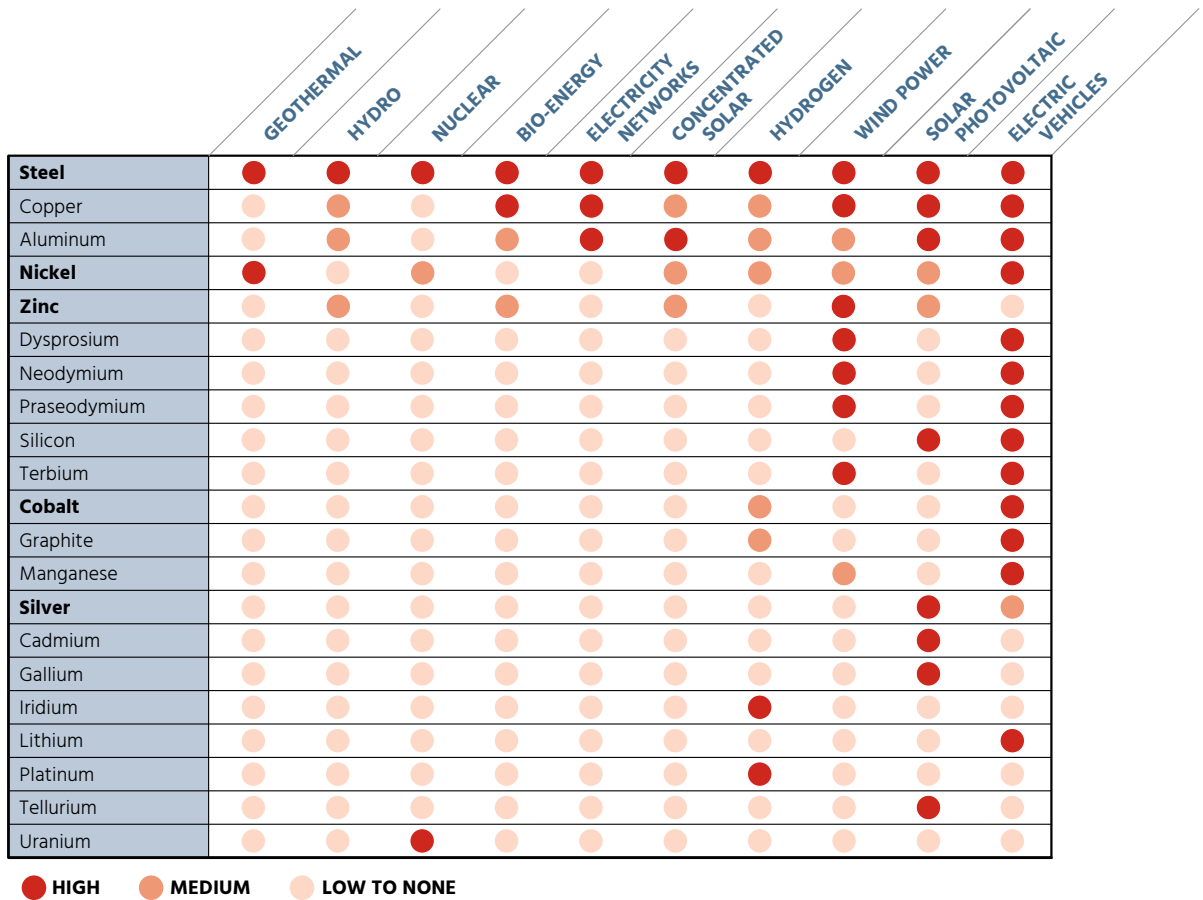
³⁴ Marcelo Azevedo et al., "The Raw-Materials Challenge: How the Metals and Mining Sector Will Be at the Core of Enabling the Energy Transition" (McKinsey & Company, January 10, 2022), <https://www.mckinsey.com/industries/metals-and-mining/our-insights/the-raw-materials-challenge-how-the-metals-and-mining-sector-will-be-at-the-core-of-enabling-the-energy-transition>. International Energy Agency 2022. <https://www.iea.org/data-and-statistics/data-product/greenhouse-gas-emissions-from-energy>

³⁵ A majority of nickel is used in stainless steel, but it is increasingly used in electric vehicle batteries because of its higher energy density. The most important use of lithium is in rechargeable batteries for items such as mobile phones, laptops, and digital cameras.

See also Richard Herrington, "Mining Our Green Future," *Nature Reviews Materials* 6, no. 6 (June 2021): 456–58, <https://doi.org/10.1038/s41578-021-00325-9>.

³⁶ Rodrigo Castillo and Caitlin Purdy, "China's Role in Supplying Critical Minerals for the Global Energy Transition. What Could the Future Hold?," *Leveraging Transparency to Reduce Corruption* (Washington, DC: Brookings, July 2022), https://www.brookings.edu/wp-content/uploads/2022/08/LTRC_ChinaSupplyChain.pdf.

FIGURE 4: Critical mineral demands for climate transition technologies



DATA SOURCE: *Critical raw materials for strategic technologies and sectors in the EU. A foresight study*, European Commission, Mar 9, 2020; *The role of critical minerals in clean energy transitions*, IEA, May 2021; *The raw-materials challenge: How the metals and mining sector will be at the core of enabling the energy transition*. Azevedo et al. McKinsey, 2021

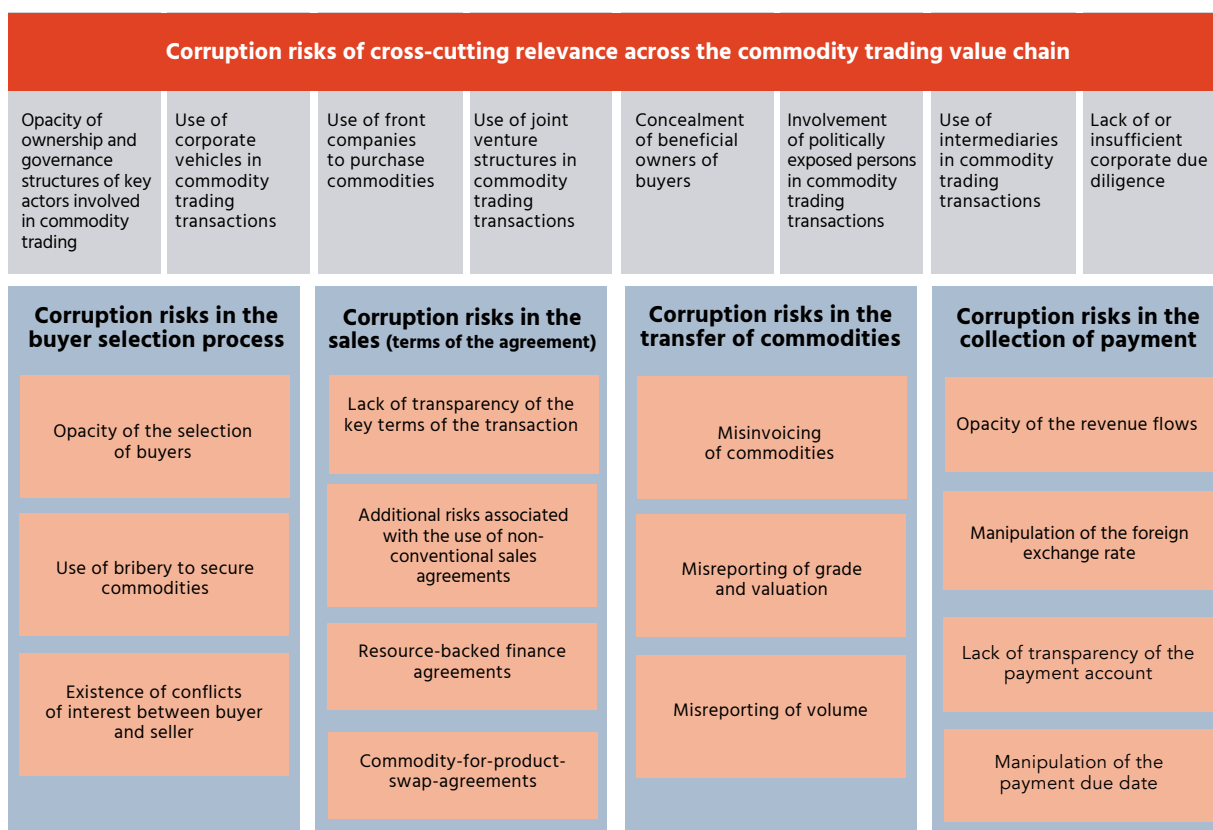
This could make critical mineral markets either sluggish or aggressively volatile, depending on the rate at which technology progresses, the discovery of new deposits of critical minerals, and the potential for windfall revenues in both physical commodities and derivatives markets. Commodity booms have historically led to surges in corruption and rent-seeking.³⁷ This section considers whether the extractive industry is positioned to handle such a boom in the clean energy minerals sub-sector.

Clean energy minerals - corruption risks in booming markets

The extractives industry generates huge profits through fossil fuels markets, and the scale for something similar in clean energy mineral markets is cause for concern. First trades made by 35 national oil companies with commodity traders or other buyers generated over \$2.1 trillion in 2018, which represented 22% of total government revenues. In sub-

³⁷ Alexandra Gillies, *Crude Intentions: How Oil Corruption Contaminates the World* (Oxford, New York: Oxford University Press, 2020).

Saharan Africa alone, oil and mining account for 28% of gross domestic product (GDP) and more than three-quarters of export earnings.³⁸ Overall, corruption in the energy commodities sector includes all of the types represented in Figure 1, reproduced below.



As seen in the last few decades, the outsized role of high-demand energy commodities in national economies fuels corruption and magnifies corruption risk, with extensive and destabilizing effects on developing country economies. Since 2000, there have been around 270 penalty records in the oil and gas industry related to the Foreign Corrupt Practices Act (FCPA), totaling more than \$14 billion in monetary sanctions.³⁹ In Nigeria alone, an estimated \$400 billion in oil revenues has been lost to corruption since 1960.⁴⁰ Similar trends are emerging in markets for new energy minerals: recently, court auditors in the Democratic Republic of Congo, which holds 75% of the world's current cobalt reserves, identified more than \$400 million in missing tax advances and loans from the state mining company Gecamines.⁴¹

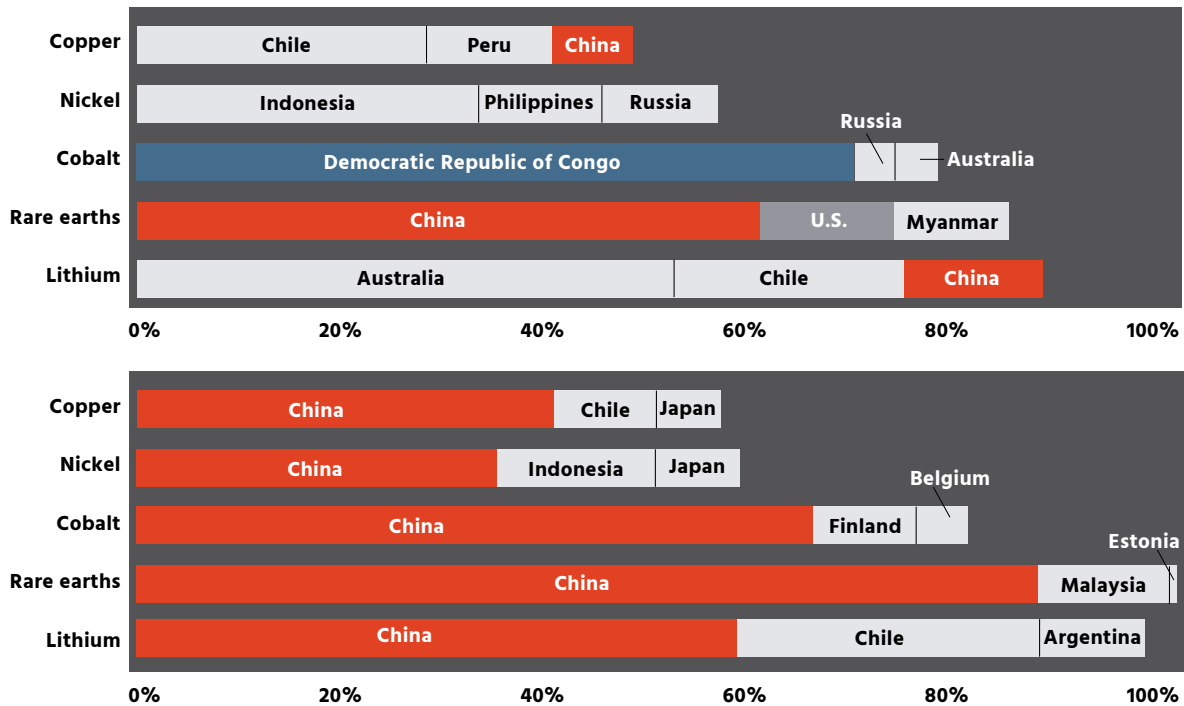
³⁸ Porter and Anderson, "Illicit Financial Flows in Oil and Gas Commodity Trade: Experience, Lessons and Proposals."

³⁹ Stanford Law School. 2022. Foreign Corrupt Practices Act Clearinghouse.

⁴⁰ Global Witness, "Probe into Murky ExxonMobil Deal Shows Why Strong U.S. Transparency Rules Are Needed for Oil Companies," Briefing (Global Witness, June 24, 2016), <https://en/press-releases/probe-murky-exxonmobil-deal-shows-why-strong-us-transparency-rules-are-needed-oil-companies/>.

⁴¹ Stanis Bujakera and Aaron Ross, "Congo Auditor Says \$400 Million Went Missing from State Mining Company," Reuters, June 4, 2022, sec. Africa, <https://www.reuters.com/world/africa/congo-auditor-says-400-million-went-missing-state-mining-company-2022-06-04/>.

FIGURE 5: China’s dominance of the clean energy minerals markets.



DATA SOURCES: International Energy Agency 2021; U.S. Geological Survey, 2022: Mineral commodity summaries.

One driver of corruption in both conventional energy and critical mineral commodities is the lack of due diligence requirements, or difficulties with adequate enforcement. Production of clean energy minerals is spread across a few specific countries, as shown in Figure 5. Multistakeholder initiatives like the Extractive Industries Transparency Initiative (EITI) have contributed meaningfully to disclosure measures in implementing countries, focused heavily in the mining or production of minerals.⁴² Midstream and downstream operations, meanwhile, are increasingly dominated by firms in China, over whom national authorities have been reluctant to establish due diligence requirements.⁴³ China also holds nearly all rare-earth mineral reserves, a key subset of clean energy minerals. As the European Union and the United States move towards stricter due diligence frameworks, there is the possibility of a bifurcation in supply chains into more expensive “cleaner” minerals and cheaper “dirtier” ones.⁴⁴ This may lead to price volatility, supply chain disruptions, and geopolitical conflict, all of which may be exploited, both legally and illicitly, by commodities traders.

⁴² EITI International Secretariat. Preparing for the Energy Transition: Key Questions for Countries Dependent on Oil, Gas and Mining. Extractive Industries Transparency Initiative (EITI), Oct. 2021, https://eiti.org/sites/default/files/attachments/en_eiti_policy_brief_preparing_for_the_energy_transition.pdf

⁴³ Jane Nakano, “The Chinese Dominance of the Global Critical Minerals Supply Chains,” The Geopolitics of Critical Minerals Supply Chains (Center for Strategic and International Studies (CSIS), 2021), <http://www.jstor.org/stable/resrep30033.4>; Searcey, Dionne, et al. “A Power Struggle Over Cobalt Rattles the Clean Energy Revolution.” The New York Times, 20 Nov. 2021. NYTimes.com, <https://www.nytimes.com/2021/11/20/world/china-congo-cobalt.html>.

⁴⁴ Castillo and Purdy, “China’s Role in Supplying Critical Minerals for the Global Energy Transition. What Could the Future Hold?”

Most current reserves of clean energy minerals are located in a handful of developing and middle-income countries, often characterized by weak governance of natural resources, or histories of fragility, conflict, and violence (FCV).⁴⁵ Indeed, the close links between politically exposed persons (PEPs) and commodity trading can often implicate commodity supply chains themselves in conflict finance.⁴⁶ There is a risk that clean energy minerals are used for trade-based money laundering, as is currently the case for illegally mined gold in South America⁴⁷ and Eastern Africa.⁴⁸ Even while legal, artisanal and small-scale miners face greater exposure to exploitation and corruption, and mining “hotspots” that emerge in cross-border areas are particularly at risk. Given the race for newer and more efficient clean energy technologies, there is an ongoing risk that weakly regulated mining is exploited for illicit profit, which may involve not only corruption, but also human trafficking and human rights abuses.

CASE STUDY: How corruption facilitates human rights abuse

Corruption can often serve as a facilitative offense to abuses and crime of all kinds, including human rights abuses. As private firms have become more entrenched in the production of minerals and energy commodities, as well as the overall climate transition, they have also become implicated in a range of abuses. The Business and Human Rights Centre has collected over 1000 allegations of corporate abuse in transition mineral production in the past 15 years, including displacement of communities, impacts on land, water, and housing, environmental pollution, denial of freedom of expression and association, child labour, and killings and attacks on human rights defenders, among others.⁴⁹

Carbon markets: a new source of risk?

International carbon markets are set to play a key role in reducing global greenhouse gas emissions. By placing a price on carbon emissions through market mechanisms, capital is encouraged to move into more sustainable projects, i.e., low-carbon technologies, thereby cutting emissions where it costs least to do so. Carbon markets essentially consist of two separate market mechanisms. The first is a compulsory mechanism of maximum emission allowances. Organizations can buy additional allowances to cover their emissions, or reduce emissions and sell their allowances to higher emitters. Such emissions trading

⁴⁵ Claire Church and Alex Crawford, “Green Conflict Minerals: The Fuels of Conflict in the Transition to a Low-Carbon Economy” (Winnipeg: International Institute for Sustainable Development, August 2018), <https://www.iisd.org/publications/report/green-conflict-minerals-fuels-conflict-transition-low-carbon-economy>.

⁴⁶ Louis Goddard and Sam Leon, “Fuelling Putin’s War Machine: How Obscure Rail Freight Data Revealed Oil Scandals – ACDC,” accessed September 7, 2022, <https://acdatacollective.org/blog/fuelling-putins-war-machine-how-obscure-rail-freight-data-revealed-oil-scandals/>.

⁴⁷ Pieth, Mark. Gold Laundering: The Dirty Secrets of the Gold Trade - And How to Clean Up. Salis Verlag, 2019.; Hunter, Marcena. Going for Gold: Russia, Sanctions and Illicit Gold Trade. Global Initiative Against Transnational Organized Crime, Apr. 2022, <https://globalinitiative.net/wp-content/uploads/2022/04/GITOC-Going-for-Gold-Russia-sanctions-and-illicit-gold-trade.pdf>.

⁴⁸ Dubai’s Role in Facilitating Corruption and Global Illicit Financial Flows. Carnegie Endowment for International Peace, 2020, <https://carnegieendowment.org/2020/07/07/dubai-s-role-in-facilitating-corruption-and-global-illicit-financial-flows-pub-82180>.

⁴⁹ Transition Minerals Tracker: <https://www.business-humanrights.org/en/from-us/transition-minerals-tracker/>

schemes (ETS) are sometimes combined with the second mechanism, a voluntary market for trading carbon offsets, which can be used to offset emissions not otherwise reduced.⁵⁰

In addition to the EU emissions trading system (EU ETS), national or subnational systems are operating or under development in Canada, China, Japan, New Zealand, South Korea, Switzerland, the United Kingdom, and the United States. The tightening of standards in the Paris Agreement is driving the growth of such markets, and prices within them: the value of traded global markets for carbon dioxide (CO₂) permits grew by 164% in 2021 to a record \$851 billion, 90% of which was generated in the EU alone.⁵¹ On the voluntary market side, former Bank of England governor Mark Carney has estimated that a unified carbon offset market could be worth \$100 billion by 2030.⁵² The International Emissions Trading Association (IETA) estimates that carbon markets could reduce the cost of implementing nationally determined contributions (NDCs) to the Paris Agreement by more than half—as much \$250 billion by 2030— or alternatively facilitate the removal of 50% more emissions at no additional cost.⁵³

This nascent global market for carbon offsets carries corruption risks, as experience in previous carbon markets has shown. The UN Clean Development Mechanism (CDM), for example, collapsed in 2012 under the weight of an over-certification of carbon credits, ongoing fraud within offset projects, and weak verifiability and monitoring. Indeed, many CDM-certified projects ultimately resulted in more GHG being released in the atmosphere. In 2011, the EU Emissions Trading Scheme (EU ETS) stopped accepting carbon credits earned by the destruction of chlorofluorocarbons (CFCs), even though they pose higher global warming risk than CO₂. Companies were making CFCs solely to destroy them for carbon credits, undermining the policy.

In the emerging market for carbon offsets, the risk of such policy-gaming comes from the lack of agreed-upon standards for what constitutes an offset, leading to a bifurcation in prices: low-end offsets in nature-based solutions like reforestation and afforestation trade at \$25 or less per ton, while high-end offsets, with long-term durable removal such as direct air capture and remineralization, are trading over hundreds of dollars per ton.⁵⁴ As one participant noted, “Either the Taskforce [on Scaling Voluntary Carbon Markets] recommends the creation of a global regulator, or it risks the same failure that has met previous attempts.”⁵⁵

⁵⁰ Article 6 of the Paris Agreement governs voluntary carbon markets.

⁵¹ Nina Chestney, “Global Carbon Markets Value Surged to Record \$851 Bln Last Year,” Reuters, January 31, 2022, sec. Energy, <https://www.reuters.com/business/energy/global-carbon-markets-value-surged-record-851-bln-last-year-refinitiv-2022-01-31/>; Nordeng, “Carbon Trading: Exponential Growth on Record High,” Refinitiv Perspectives (blog), February 18, 2022, <https://www.refinitiv.com/perspectives/market-insights/carbon-trading-exponential-growth-on-record-high/>.

⁵² Leslie Hook and Patrick Temple-West, “Carney Calls for ‘\$100bn a Year’ Global Carbon Offset Market,” *Financial Times*, December 3, 2020.

⁵³ International Emissions Trading Association, “The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges” (Washington, DC: University of Maryland and Carbon Pricing Leadership Coalition (CPLC), September 2019), https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.

⁵⁴ Kahn, Shayle. Will Today’s Booming Carbon Market Be Able to Avoid a Bust? 24 March 2022, <https://www.canary-media.com/podcasts/catalyst-with-shayle-kann/will-this-carbon-market-boom-be-different>.

⁵⁵ Jess Shankleman, “Carbon Offset Trading Is Taking Off Before Any Rules Are Set,” Bloomberg, July 9, 2021, <https://www.bloomberg.com/news/articles/2021-07-09/carbon-offset-trading-is-taking-off-before-any-rules-are-set>.

Without transparent standards and regulation, voluntary carbon markets are a prime target for corruption. Corruption vulnerabilities include tax and securities fraud, and theft, as well as manipulation of emissions measurements, double counting of carbon offsets, and falsification of credits. The latter poses the biggest threat to climate change mitigation, with 90% of offsets either failing to deliver or generating damaging side effects for local communities,⁵⁶ while less than 5% of offsets actually remove carbon dioxide from the atmosphere.⁵⁷ The nonprofit group CarbonPlan recently found crediting errors of over \$400 million in California’s forestry offsets program, with little evidence of impact.⁵⁸ While blockchain technology is increasingly touted as a tool to address these weaknesses, it is only as reliable as the information entered into the system, and, as the next section will show, carries its own corruption risks.

AT A GLANCE - The evidence landscape on corruption and the climate transition

Evidence trends in the climate transition point to two major corruption risks that are neither new nor unknown: the production of raw materials needed for new green technologies, which are subject to the same pressures as other raw extractive commodities; and the emerging voluntary markets for carbon offsets, which saw collapse a decade ago under the weight of fraud and weak regulatory standards. Historical trends in booming energy commodity markets create the possibility for corruption on a massive scale - billions of dollars lost, with proof of misdeeds only uncovered after the fact. Anticorruption efforts are hampered by complex and opaque ownership schemes that obscure money flows, and by sluggish global governance structures that are ill-equipped to prevent or stop acts of misappropriation. In terms of carbon markets, decarbonization efforts are much more robust after decades of institutionalization, but weaknesses remain in the market mechanisms surrounding carbon offsets. The lack of agreement as to which kinds of offsets warrant investment, as well as the lack of a global oversight entity (or harmonization of regional and national standards) continues to overshadow discussions of a global market. More concerning is the lack of evidence that existing offset schemes actually decarbonize the atmosphere, raising the question of whether billions of potential dollars in a voluntary carbon market will lead to more than financial profit, without a better understanding of the technologies of decarbonization rather than the mechanics of a global market.

⁵⁶ Jess Shankleman and Rathi Akshat, “Wall Street’s Favorite Climate Solution Is Mired in Disagreements,” Bloomberg, June 2, 2021, <https://www.bloomberg.com/news/features/2021-06-02/carbon-offsets-new-100-billion-market-faces-disputes-over-trading-rules>.

⁵⁷ Taskforce on Scaling Voluntary Carbon Markets, “Inventory Analysis for 2020,” 2020, https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf; Maggie Astor, “Do Airline Climate Offsets Really Work? Here’s the Good News, and the Bad,” The New York Times, May 18, 2022, sec. Climate, <https://www.nytimes.com/2022/05/18/climate/offset-carbon-footprint-air-travel.html>.

⁵⁸ Grayson Badgley et al., “Systematic Over-Crediting in California’s Forest Carbon Offsets Program,” *Global Change Biology* 28, no. 4 (2022): 1433–45, <https://doi.org/10.1111/gcb.15943>

BLOCKCHAIN: THE NEW DIGITAL FRONTIER OF CORRUPTION

Like all trade, global commodities trading is being transformed by digital technologies. This section considers the implications of blockchain technology for corruption in commodities trade. Blockchain is a type of distributed record-keeping, in which lists of transactions are divided into overlapping blocks. Altering one block alters the “chain” of blocks, making it possible to identify tampering, while the distribution of blocks protects the “chain” from being destroyed if a single node is compromised. This cryptographic form of record-keeping has proven particularly effective in the maintenance of digital, or crypto-, currencies, of which Bitcoin is the best known.

New technology, new risks

The implications of this emerging technology for international trade are mixed. Blockchain records are pseudonymous: users are tied to transactions through a numerical identity, not their real-world identity. As a result, cryptocurrency is a popular payment mechanism for trade in illicit goods, such as illegal drugs, or illicit services, such as money laundering and terrorism finance.⁵⁹ Additionally, cryptocurrency may be used to launder the proceeds of analogue forms of corruption,⁶⁰ and crypto-asset usage is higher in countries that score highly on corruption indices.⁶¹ Given its transnational nature, this system can facilitate cybercrime across international borders outside the regulatory reach of individual states.⁶²

Moreover, cryptocurrency falls between the cracks in financial regulation, as it may be both a currency and an asset. “In the US alone,” explain Fletcher et al., “these discrepancies have led to a bureaucratic turf war between different regulatory bodies, namely the Financial Crimes Enforcement Network, the Commodity Futures Trading Association, the Securities and Exchange Commission, and the Internal Revenue Service.”⁶³ This turf war has led to calls for alternative regulation through private industry bodies or through transnational agreements.⁶⁴

⁵⁹ Doron Goldbarsht and Louis de Koker, eds., *Financial Technology and the Law: Combating Financial Crime* (Springer, 2022).

⁶⁰ Kim-Kwang Raymond Choo, “Chapter 15 - Cryptocurrency and Virtual Currency: Corruption and Money Laundering/Terrorism Financing Risks?,” in *Handbook of Digital Currency*, ed. David Lee Kuo Chuen (San Diego: Academic Press, 2015), 283–307, <https://doi.org/10.1016/B978-0-12-802117-0.00015-1>.

⁶¹ Marwa Alnasaa et al., “Crypto, Corruption, and Capital Controls: Cross-Country Correlations,” SSRN Scholarly Paper (Rochester, NY, March 1, 2022), <https://papers.ssrn.com/abstract=4076356>.

⁶² Anatolii Prytula et al., “Cryptocurrency in Transnational Offenses: Criminal and Civil Legal Aspects,” *Amazonia Investiga* 10, no. 46 (November 25, 2021): 209–16, <https://doi.org/10.34069/AI/2021.46.10.21>.

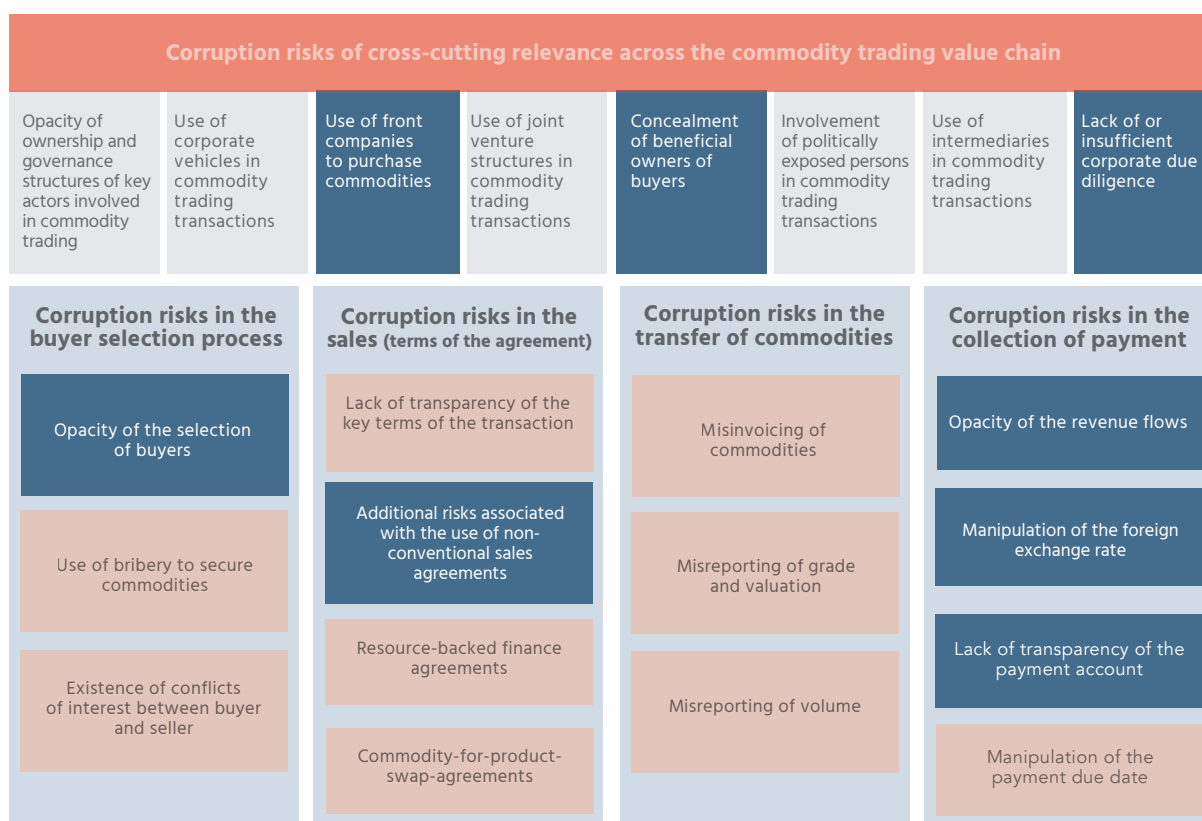
⁶³ Emily Fletcher, Charles James Larkin, and Shaen Corbet, “Cryptocurrency Regulation: Countering Money Laundering and Terrorist Financing,” SSRN Scholarly Paper (Rochester, NY, October 3, 2020), <https://doi.org/10.2139/ssrn.3704279>.

⁶⁴ Dianna L. Kyles, “Centralised Control Over Decentralised Structures: AML and CTF Regulation of Blockchains and Distributed Ledgers,” in *Financial Technology and the Law: Combating Financial Crime*, ed. Doron Goldbarsht and Louis de Koker, Law, Governance and Technology Series (Cham: Springer International Publishing, 2022), 121–50, https://doi.org/10.1007/978-3-030-88036-1_6; Fletcher, Larkin, and Corbet, “Cryptocurrency Regulation.”

At the same time, cryptocurrency may give rise to new forms of corruption. For example, the U.S. Drug Enforcement Administration has warned of an “emerging...vulnerability” to a new form of trade-based money laundering, in which “cryptocurrency is used to transfer funds across borders in ‘repayment’ for an actual or fictitious sale of goods.”⁶⁵ Cryptocurrency can also be a tool for states seeking to evade trade-related penalties for other misconduct. In 2018, for example, Venezuela launched a state-backed cryptocurrency in order to continue international oil exports in defiance of US economic sanctions that prevented transactions in bolivar.⁶⁶ While the digital currency later faced sanctions, its pseudonymous nature made these harder to impose.

In 2022, following international sanctions over its invasion of Ukraine, Russia also launched a digital currency, with the aim of trading directly with international partners – in particular buyers of Russian gas – without US dollars. “There is a risk,” argues Marianne Schneider-Petsinger of Chatham House, “that this could potentially be used to undermine sanctions.”⁶⁷ In addition, individuals and corporations in Russia may make use of private cryptocurrencies to conduct their own transactions. However, the total volume of such private crypto-coins is not yet large enough to allow large-scale evasion. State-backed cryptocurrency, whose volume is determined by state policy, carries a higher risk.

FIGURE 6: Corruption typology for cryptocurrency sector



⁶⁶ “Venezuela Launches Oil Cryptocurrency,” BBC News, February 20, 2018, sec. Business, <https://www.bbc.com/news/business-43133853>.

⁶⁷ “Russia, Ukraine, and Cryptocurrency as a Tool of War,” Chatham House – International Affairs Think Tank, March 25, 2022, <https://www.chathamhouse.org/2022/03/russia-ukraine-and-cryptocurrency-tool-war>.

Blockchain's anti-corruption potential?

Even as it brings new corruption risks in the realm of cryptocurrency, blockchain technology more broadly is increasingly touted as a boon for anti-corruption efforts. This optimistic view of the technology builds on recent developments in the governance of global supply chains. Since the 1990s, there has been an extraordinary proliferation of public, private, non-profit and hybrid standards for certifying various types of products and services as ethical from a labor or environmental standpoint. In order to move beyond “compliance in name only,” brands have sought metrics to monitor compliance with these standards.⁶⁸ Blockchain is currently in use by well-recognized industry standards including the Kimberly Process, the REDD+ initiative and Fairfood, representing key commodities sectors in mining, forestry and food.⁶⁹ These standards trace not only each component of every good produced as it moves around the globe, but also each supplying factory. Indeed, many of these programs rely on “smart contracts” in which compliance is a condition for suppliers to get paid.⁷⁰

Eliminating corruption is not the focus of these standards. Yet there is a growing expectation in research on anti-corruption that the same technologies can be used to certify compliance with anti-corruption standards. A key driver of corruption risk in the commodities sector is the large number of intermediaries involved, with documentation handled on paper, and therefore easily compromised.⁷¹ Creating a traceable list of intermediaries, whose purchase and sale prices are documented digitally, could eliminate forms of corruption such as customs bribery, misinvoicing or diversion of goods. These forms of corruption represent 42% of incidents involving commodities trading companies in the past 20 years.

In this context, “Blockchain provides a unique opportunity to sanitize the sector.”⁷² Applications of blockchain as an anti-corruption tool in commodities trading are, however, rare. Sarker et al (2021) have found that in the shipping industry, blockchain has effectively reduced both process and document-related corruption, both key forms of corruption in the commodities sector as well.⁷³ Nir Kshetri, in a study of the blockchain-enabled sustainability standards, has found that they are particularly effective in overcoming governance gaps in emerging markets, a key need in the commodities sector, with supply chains in fragile states.⁷⁴

⁶⁸ Jennifer Green, “Closing the Accountability Gap in Corporate Supply Chains for Violations of the Trafficking Victims Protection Act,” *Business and Human Rights Journal* 6, no. 3 (October 2021): 449–89, <https://doi.org/10.1017/bhj.2020.28>.

⁶⁹ Filipe Calvão and Matthew Archer, “Digital Extraction: Blockchain Traceability in Mineral Supply Chains,” *Political Geography* 87 (May 1, 2021): 102381, <https://doi.org/10.1016/j.polgeo.2021.102381>; Peter Howson, “Tackling Climate Change with Blockchain,” *Nature Climate Change* 9, no. 9 (September 2019): 644–45, <https://doi.org/10.1038/s41558-019-0567-9>; Peter Verhoeven, Florian Sinn, and Tino T. Herden, “Examples from Blockchain Implementations in Logistics and Supply Chain Management: Exploring the Mindful Use of a New Technology,” *Logistics* 2, no. 3 (September 2018): 20, <https://doi.org/10.3390/logistics2030020>.

⁷⁰ Michaela A. Balzarova, “Blockchain Technology – a New Era of Ecolabelling Schemes?,” *Corporate Governance: The International Journal of Business in Society* 21, no. 1 (January 1, 2020): 159–74, <https://doi.org/10.1108/CG-08-2020-0328>.

⁷¹ Helen Shan Jiang, “Fighting Corruption in Commodity Trading Through Blockchain Technology” (Conference paper, 2019 OECD Global Anti-Corruption & Integrity Forum, 2019), <https://www.oecd.org/corruption/integrity-forum/academic-papers/Helen-Shan-Jiang-commodity-trading.pdf>.

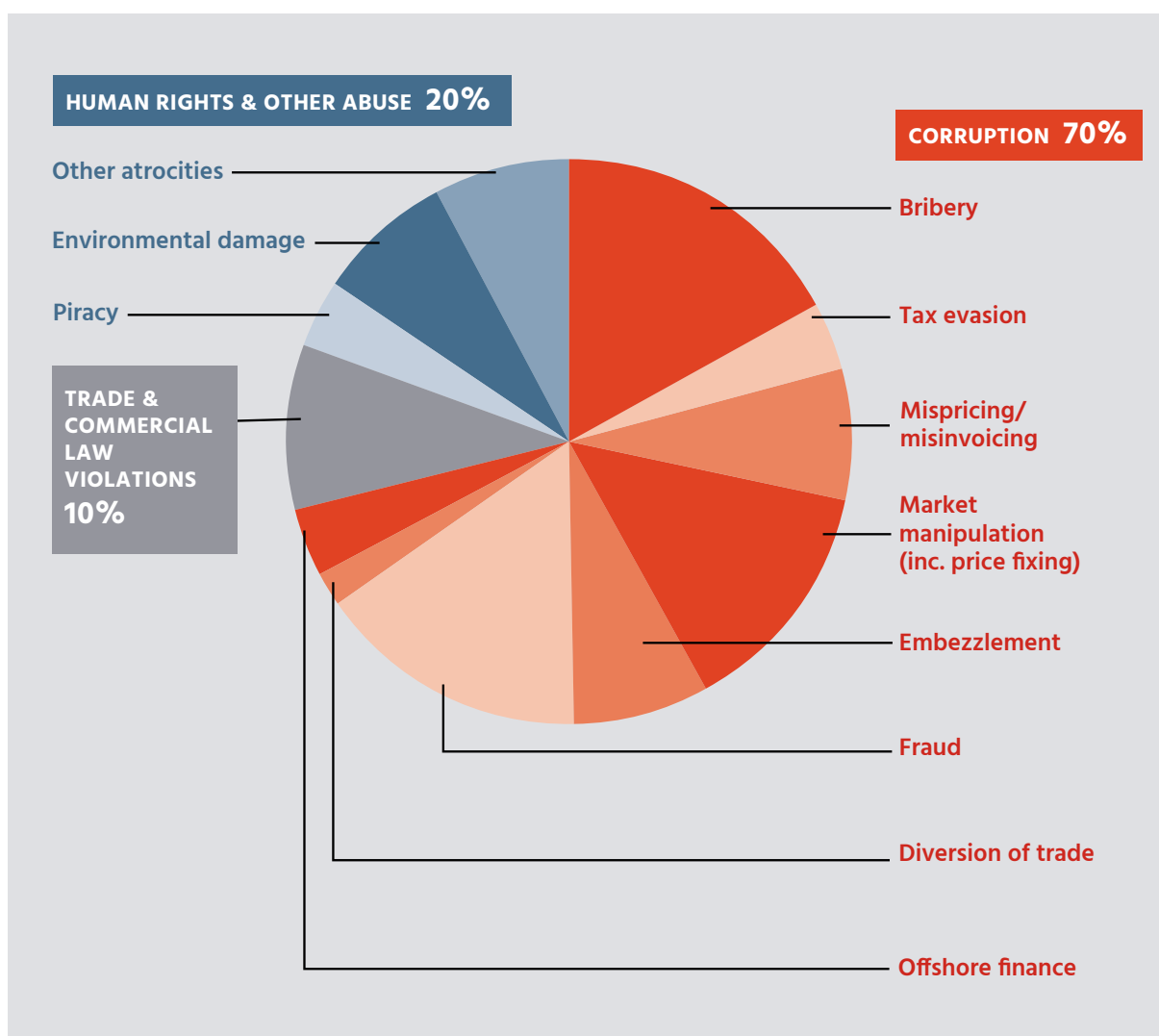
⁷² Jiang.

⁷³ Suprateek Sarker et al., “The Use Of Blockchain As A Resource For Combating Corruption In Global Shipping: An Interpretive Case Study,” *Journal of Management Information Systems* 38, no. 2 (April 3, 2021): 338–73, <https://doi.org/10.1080/07421222.2021.1912919>.

⁷⁴ Nir Kshetri, “Blockchain and Sustainable Supply Chain Management in Developing Countries,” *International Journal of Information Management* 60 (October 1, 2021): 102376, <https://doi.org/10.1016/j.ijinfomgt.2021.102376>.

Other studies have developed more hypothetical models.⁷⁵ Of particular note for the commodities trading sector is recent research by McDaniel and Norberg (2019) which highlighted the potential for blockchain in international trade, including facilitating trade finance documents (such as lending or insurance), reducing costs and increasing transparency at customs points, and providing real-time information on the provenance and movement of goods.⁷⁶ Such features might target financial fraud, customs bribery and diversion of goods. These forms of corruption represent 38% of incidents involving commodities trading companies in the past 20 years, as uncovered in the incidence analysis for this report and presented in Figure 7.

FIGURE 7: Enforcement and litigation versus the largest CTCs, 2000-2020



⁷⁵ Matthew Davis, Thomas Taro Lennerfors, and Daniel Tolstoy, "Can Blockchain-Technology Fight Corruption in MNEs' Operations in Emerging Markets?," *Review of International Business and Strategy* 32, no. 1 (January 1, 2021): 39–56, <https://doi.org/10.1108/RIBS-12-2020-0155>; Ahmet Kaplan, "Cryptocurrency and Corruption: Auditing with Blockchain," in *Auditing Ecosystem and Strategic Accounting in the Digital Era: Global Approaches and New Opportunities*, ed. Tamer Aksoy and Umit Hacioglu, Contributions to Finance and Accounting (Cham: Springer International Publishing, 2021), 325–38, https://doi.org/10.1007/978-3-030-72628-7_15.

⁷⁶ Christine A. McDaniel and Hanna C. Norberg, "Can Blockchain Technology Facilitate International Trade?," SSRN Scholarly Paper (Rochester, NY, April 24, 2019), <https://doi.org/10.2139/ssrn.3377708>.

CASE STUDY: International trade is complex

The pasta a consumer buys at the supermarket is made from wheat farmed in one country and transported to others for production before it makes its way to the table. Along the way, multiple companies are responsible for different, overlapping, stages: the ship transporting pasta boxes might be owned by one company, the pasta by another, and the ship crew might work for a third. Each of these companies needs their own paperwork to cross international borders, listing the goods, their origin and destination and their monetary value. It's easy for discrepancies to arise between these documents, allowing corrupt actors to conceal trade diversion or mispricing. In their study of the shipping industry, Sarker et al. (2021) found that some agricultural goods traveling between one African country and one European country passed through 40 actors along the way. Yet when a major shipping firm adopted blockchain instead of paper certificates, ensuring that all the actors used the same numbers, document-based corruption was reduced across the supply chain.

The research on blockchain and commodities surveyed here has therefore focused on its implementation in the private sector, and implications for private corruption. Other scholars have highlighted ways that blockchain might be used to target public corruption, and increase government accountability. In particular, this body of research calls for the use of blockchain to document the tendering and contracting process for public procurement, adopting the “smart contract” model already in use in private supply chains, as well as for protecting government records of land title or other property. These applications do not carry much relevance for commodity trading, as they are largely focused on domestic transactions. One exception, however, is a recent effort by Tian et al (2017) to model a blockchain-enabled standard for food supply, which would carry implications for corruption associated with food insecurity.⁷⁷

Practitioners should proceed with caution, especially as the pseudonymous form of blockchain would likely need modification to provide the kind of identification of traders required for anti-corruption application.⁷⁸ Moreover, there are significant concerns about how these technologies could be implemented in emerging markets, where many of the key corruption risks identified in this report arise. As Grace Nsomba, an expert in the southern African food supply chain at the University of Johannesburg explains: “All the stakeholders in the process - ministries of trade, industry, and so on - their systems all have to work (with the digital systems) and that has proven very difficult.” In the absence of such comprehensive connections, some participants in commodity markets may be left behind, with deleterious development consequences. As Nsomba notes, “If there is digitalization at that level, but what about integrating the farmers? Does digitalization mean that some will get excluded? We need to be realistic around our expectations of what digitalization can provide and the extent to which certain countries can implement digitization.”

⁷⁷ Feng Tian, “A Supply Chain Traceability System for Food Safety Based on HACCP, Blockchain & Internet of Things,” in 2017 International Conference on Service Systems and Service Management, 2017, 1–6, <https://doi.org/10.1109/ICSSSM.2017.7996119>.

⁷⁸ Hasna El Alaoui El Abdallaoui, Abdelaziz El Fazziki, and Mohamed Sadgal, “Crowdsourcing and Blockchain-Based E-Government Applications: Corruption Mapping,” in Smart Applications and Data Analysis, ed. Mohamed Hamlich et al., Communications in Computer and Information Science (Cham: Springer International Publishing, 2020), 86–99, https://doi.org/10.1007/978-3-030-45183-7_7.

In addition to such distributional concerns, the application of blockchain to traders in emerging markets and developing countries may subject them to new forms of surveillance by either government or trading partners “higher up” the supply chain. Given the corruption risks associated with government entities in key markets for commodities trade, such surveillance may also be a mitigating factor in the technology’s anti-corruption potential.

AT A GLANCE - The evidence landscape on corruption and blockchain

As a relatively new technology, blockchain’s impact on corruption is currently the subject of much hypothetical speculation from researchers and practitioners alike. Two key evidence trends pull in opposing directions. First, blockchain-supported cryptocurrency, which can evade the reach of established financial regulation, carries new corruption risks. These include the transport of illicit goods or money laundering proceeds, as well as efforts to evade trade sanctions for other misconduct. Second, blockchain record-keeping has been elevated as a possible solution to forms of trade-based corruption that arise in particular from the lack of accountability between different actors along complex global supply chains. While experiments are underway to implement such standards in the supply chains for manufactured goods and some agro-foods, with mixed results, they have yet to be deployed in other commodities sectors. Further research is therefore needed before practitioners can place confidence in this policy lever.

CORRUPTION IN COMMODITIES: WHAT WE KNOW AND WHAT WE NEED TO FIND OUT

This report has considered long-standing corruption risks and emerging developments in three key areas of the commodities trade: food and agriculture, energy and green minerals, and blockchain and digitalization. In addition to the evidence landscape within each of these domains, as highlighted in the preceding sections, this section summarizes four overarching trends in our findings that cut across the commodities trading industry. It also identifies avenues for future research and, where relevant, policy intervention arising from them.

The domestic and the international:

Corruption in commodities trading is closely integrated with domestic policy contexts in countries where commodities are sourced and processed. These include, for example, the political and economic pressures of domestic food (in)security, which may shape regulatory contexts in which corruption emerges. A recent study on agricultural trading routes in Western Africa, for example, finds high variability with regard to corruption exposure in terms of extortionary check-points across comparable trading routes with the ad-valorem corruption burden fluctuating between 1 and 20%.⁷⁹ Meanwhile, the bulk of commodity trading firms are headquartered in a small number of jurisdictions (NL, Singapore, Switzerland, UAE, UK), whose regulators show variable appetite for action but could in principle have great leverage to step up global standards and enforcement.⁸⁰

- **Implication for future research:** Instead of seeking to isolate corruption as a global constant, researchers should seize on the possibility for comparative analysis that this high variability between countries offers.
- **Implication for policy intervention:** Identifying these differences may illuminate factors that could be harnessed for integrity interventions.

⁷⁹ Antoine Bouet, Kathryn Pace, and Joseph Glauber, "Informal Cross-Border Trade in Africa: How Much? Why? And What Impact?" (Washington, DC: International Food Policy Research Institute, 2018).

⁸⁰ Andreas Goldthau and Llewelyn Hughes, "Saudi on the Rhine? Explaining the Emergence of Private Governance in the Global Oil Market," *Review of International Political Economy* 28, no. 5 (September 3, 2021): 1410–32, <https://doi.org/10.1080/09692290.2020.1748683>; Financial Times, "Gunvor Boss Criticises 'Loose Lending' in Singapore," June 14, 2020; Milin, Z. and Jones, P., "Why We Applaud the CFTC's Anti-Corruption Enforcement Efforts," *Global Witness* (blog), May 21, 2019, <https://en.blog/why-we-applaud-cftcs-anti-corruption-enforcement-efforts/>.

“Sacrifice zones” & corruption in the context of upheaval:

Commodities trading is undergoing a number of market upheavals, from the war in Ukraine disrupting supply chains, the climate transition elevating new minerals to critical status, and the fourth (digital) industrial revolution remaking the processes by which trade is conducted. These upheavals, like all forms of market turmoil, create new opportunities for corruption that exploits unpredictability and volatility. Moreover, the decarbonization imperative has raised the specter of “sacrifice zones”⁸¹: hotspots of transformations such as rare earth metal mining, wind farm permitting or green subsidies where normal governance standards are weakened to allow for expedited scale-ups.

- **Implication for future research:** Corruption research has long highlighted problems with emergency procurement and other time-critical settings⁸²: this extant knowledge can be built upon to map expected corruption pathways in new high-risk circumstances.
- **Implication for policy intervention:** Harvesting extant knowledge in this way could yield forward-looking insights on how to address this type of corruption.

Certified sustainability – and the “subprime”:

A countervailing trend is the rise of sustainability standards and an emphasis on traceability across a range of commodities trading chains. As this report has demonstrated, research on how economic and social governance certification – underpinned by blockchain – could be applied to anti-corruption is largely speculative. Applications might include adapting electronic voucher programs to curb corruption in interventions for food security,⁸³ or satellite and remote-sensing technologies to track illicit shipments or fraud in carbon offset claims.

At the same time, the traceability trend for value chains across all commodities is driving a market differentiation that also gives rise to a “sub-prime” segment: products, from diamonds and oil to food and carbon-offsets, that defy or manipulate responsibility regimes, and so trade at a lower price. Future research is needed about such subprime products, as regulatory arbitrage of this type has historically raised corruption risks.

Finally, during the period of our study, global governance actors, from the World Trade Organization to the International Organization of Standardization, have begun exploring mechanisms to integrate traceability into international governance regimes, in part in response to efforts by individual states to impose such standards in trade policy.⁸⁴ Such standards may be particularly important for integrating small traders and artisanal producers who may struggle to adopt their own resource-intensive integrity measures,

⁸¹ Dayna Scott and Adrian Smith, “Sacrifice Zones’ in the Green Energy Economy: Toward an Environmental Justice Framework,” *McGill Law Journal / Revue de Droit de McGill* 62, no. 3 (2017): 861–98, <https://doi.org/10.7202/1042776ar>.

⁸² Jessica Schultz and Tina Søreide, “Corruption in Emergency Procurement,” *Disasters* 32, no. 4 (December 1, 2008): 516–36, <https://doi.org/10.1111/j.1467-7717.2008.01053.x>.

⁸³ Abhijit Banerjee et al., “Food vs. Food Stamps: Evidence from an At-Scale Experiment in Indonesia,” Working Paper, Working Paper Series (National Bureau of Economic Research, April 2021), <https://doi.org/10.3386/w28641>; Tesfamichael Wossen et al., “Productivity and Welfare Effects of Nigeria’s e-Voucher-Based Input Subsidy Program,” *World Development* 97 (September 1, 2017): 251–65, <https://doi.org/10.1016/j.worlddev.2017.04.021>.

⁸⁴ Maha Rafi Atal, “Globalizing Regulation: A New Progressive Agenda for Trade and Investment,” *Global Perspectives*, 2022.

but could be assisted through the multilateral system to adopt global benchmarks. There is a small emerging literature on the new ISO 37001 anti-bribery standard that attests to this potential and highlights the need and promise of more research on how such schemes can help raise governance and integrity standards for smaller players in global trade settings.⁸⁵

- **Implication for future research:** Future research should empirically test the record of certified sustainability standards and trade-linked integrity standards (including the real impact on firms' behavior) to assess the viability of these approaches for anti-corruption application. Researchers should also adopt novel methods to generate new data about activities in the emerging "subprime" market, whether through ethnography, "mystery shopping" or large-scale leaks.⁸⁶
- **Implication for policy intervention:** Policymakers should consider how constructive whistleblowing can be better encouraged and built into regulatory systems.⁸⁷

New litigation and new data sources:

This report has drawn from a wide range of sources, including existing records of anti-corruption enforcement. In these records, investigations against oil and mineral traders outstrip investigations into agro-food trading. While this is consistent with predictions in the literature, it is unclear whether this reflects patterns of corruption taking place, or a regulatory gap in the types of corruption legislated against.

At the same time, trade-related corruption is implicated in other types of legal disputes, including commercial arbitration of payment disputes between intermediaries in commodity supply chains, tax enforcement disputes between traders and their home jurisdiction or employment disputes that may reference corruption-related misconduct. The incidence analysis conducted for this report, and summarized in Figure 7, draws on this broader range of mentions of the top commodity traders in legal records, surfacing incidences of potential corruption that may not have been prosecuted as such.

There are a number of new or expanding collective initiatives to support integrity in relation to global commodity trading, which similarly integrate corruption into a broader panoply of integrity concerns. The pioneering Extractives Industry Transparency Initiative whose evolution and impact receive some attention in the research community has been joined by a host of more recent initiatives such as the Maritime Anti-Corruption Network

⁸⁵ Jean-Pierre Méan and Holger Gehring, "Implementing ISO 37001 to Manage Your Bribery Risks," *Global Trade and Customs Journal* 13, no. 5 (May 1, 2018), <https://kluwerlawonline.com/journalarticle/Global+Trade+and+Customs+Journal/13.5/GTCJ2018022>; Edmundo R Lizarzaburu et al., "Gestión empresarial: una revisión a la norma ISO 37001 antisoborno" (Revista del CLAD Reforma y Democracia, 2019), <https://www.redalyc.org/journal/3575/357559582004/html/>; Natalia Jagodzińska, "ISO 37001 System as a Tool to Meet Anti-Corruption Requirements in the Small and Medium-Sized Enterprise Sector," *Zeszyty Naukowe. Organizacja i Zarządzanie / Politechnika Śląska* z. 154 (2021), <https://doi.org/10.29119/1641-3466.2021.154.4>.

⁸⁶ Daniel Lafayette Nielson and Jason Campbell Sharman, "Signatures for Sale : How Nominee Services for Shell Companies Are Abused to Conceal Beneficial Owners," April 21, 2022, <https://policycommons.net/artifacts/2388125/signatures-for-sale/3409236/>; Brooke Harrington, *Capital without Borders: Wealth Managers and the One Percent* (Harvard University Press, 2017), <https://doi.org/10.4159/9780674973619>.

⁸⁷ Dieter Zinnbauer, "Megaleaks and the Transparency Agenda a Decade after Wikileaks – Different and More Relevant than Received Wisdom May Suggest," SSRN Scholarly Paper (Rochester, NY, May 24, 2022), <https://doi.org/10.2139/ssrn.4118584>.

(MACN 2011), the Fisheries Transparency Initiative (2016), the Targeting Natural Resources Corruption (TNRC) project or the Illegal, Unreported and Unregulated Fishing Index (2019). The research and diagnostic exercises that these initiatives undertake can provide further data sources for broader anti-corruption research in these sectors.

This expanding research remit in turn reflects an evolution in enforcement practices. While most enforcement action against corruption in global commodity trading has so far been linked to specific anti-corruption laws and agencies, such as the Foreign Corrupt Practices Act (FCPA) in the US or the UK Bribery Act, agencies with other remits are beginning to take up corruption-related cases. This might include market manipulation and investor fraud charges from the US Commodities and Futures Trading Commission, which would not be otherwise recorded in corruption records focused exclusively on the FCPA. It may also include litigation in European courts, or international trade and investment tribunals, on the enforcement of the emerging body of sustainability standards. As this report has highlighted, corruption may be implicated in efforts to subvert these. Corruption researchers should pay close attention to these developments, which may surface new sources for future research.

- **Implication for future research:** Future research should make use of legal records beyond anti-corruption enforcement, including commercial and trade litigation and industry-focused integrity databases to build a more complete picture of corruption risks and anti-corruption opportunities. Patterns of corruption in the existing literature should be checked against this fuller picture to confirm their accuracy. Drawing on these broader sources, a largely untapped reserve for corruption researchers, would integrate corruption research into the wider field of corporate misconduct and accountability.

REFERENCES

Alnasaa, Marwa, Nikolay Gueorguiev, Jiro Honda, Eslem Imamoglu, Paolo Mauro, Keyra Primus, and Dmitriy Rozhkov. "Crypto, Corruption, and Capital Controls: Cross-Country Correlations." SSRN Scholarly Paper. Rochester, NY, March 1, 2022. <https://papers.ssrn.com/abstract=4076356>.

Anania, Giovanni. "Agricultural Export Restrictions and the WTO." International Centre for Trade and Sustainable Development, 2013. <https://www.files.ethz.ch/isn/173336/agricultural-export-restrictions-and-the-wto-what-options-do-policy-makers.pdf>.

Astor, Maggie. "Do Airline Climate Offsets Really Work? Here's the Good News, and the Bad." The New York Times, May 18, 2022, sec. Climate. <https://www.nytimes.com/2022/05/18/climate/offset-carbon-footprint-air-travel.html>.

Atal, Maha Rafi. "Globalizing Regulation: A New Progressive Agenda for Trade and Investment." *Global Perspectives*, 2022.

Azevedo, Marcelo, Magdalena Baczynska, Patricia Bingoto, Greg Callaway, Ken Hoffman, and Oliver Ramsbottom. "The Raw-Materials Challenge: How the Metals and Mining Sector Will Be at the Core of Enabling the Energy Transition." McKinsey & Company, January 10, 2022. <https://www.mckinsey.com/industries/metals-and-mining/our-insights/the-raw-materials-challenge-how-the-metals-and-mining-sector-will-be-at-the-core-of-enabling-the-energy-transition>.

Badgley, Grayson, Jeremy Freeman, Joseph J. Hamman, Barbara Haya, Anna T. Trugman, William R. L. Anderegg, and Danny Cullenward. "Systematic Over-Crediting in California's Forest Carbon Offsets Program." *Global Change Biology* 28, no. 4 (2022): 1433–45. <https://doi.org/10.1111/gcb.15943>.

Baines, Joseph, and Sandy Brian Hager. "Commodity Traders in a Storm: Financialization, Corporate Power and Ecological Crisis." *Review of International Political Economy* 29, no. 4 (July 4, 2022): 1053–84. <https://doi.org/10.1080/09692290.2021.1872039>.

Balzarova, Michaela A. "Blockchain Technology – a New Era of Ecolabelling Schemes?" *Corporate Governance: The International Journal of Business in Society* 21, no. 1 (January 1, 2020): 159–74. <https://doi.org/10.1108/CG-08-2020-0328>.

Banerjee, Abhijit, Rema Hanna, Benjamin A. Olken, Elan Satriawan, and Sudarno Sumarto. "Food vs. Food Stamps: Evidence from an At-Scale Experiment in Indonesia." Working Paper. Working Paper Series. National Bureau of Economic Research, April 2021. <https://doi.org/10.3386/w28641>.

Blas, Javier, and Jack Farchy. 2021. "Big Oil's Secret World of Trading. Bloomberg.

Bouët, Antoine, Brahim Cissé, Abdourahmane Sy, and Fousseini Traoré. "Family Farming, Regional Markets, and Cross-Border Trade Corridors (FARM-TRAC) in the Sahel." International Food Policy Research Institute, June 2021.

Bouet, Antoine, Kathryn Pace, and Joseph Glauber. "Informal Cross-Border Trade in Africa: How Much? Why? And What Impact?" Washington, DC: International Food Policy Research Institute, 2018.

Bruegel. "Food Security: The Role and Limits of International Rules on Export Restrictions." Bruegel | The Brussels-based economic think tank. Accessed September 5, 2022. <https://www.bruegel.org/blog-post/food-security-role-and-limits-international-rules-export-restrictions>.

Bujakera, Stanis, and Aaron Ross. "Congo Auditor Says \$400 Million Went Missing from State Mining Company." *Reuters*, June 4, 2022, sec. Africa. <https://www.reuters.com/world/africa/congo-auditor-says-400-million-went-missing-state-mining-company-2022-06-04/>.

Calvão, Filipe, and Matthew Archer. "Digital Extraction: Blockchain Traceability in Mineral Supply Chains." *Political Geography* 87 (May 1, 2021): 102381. <https://doi.org/10.1016/j.polgeo.2021.102381>.

Castillo, Rodrigo, and Caitlin Purdy. "China's Role in Supplying Critical Minerals for the Global Energy Transition. What Could the Future Hold?" Leveraging Transparency to Reduce Corruption. Washington, DC: Brookings, July 2022. https://www.brookings.edu/wp-content/uploads/2022/08/LTRC_ChinaSupplyChain.pdf.

Chakrabarti, Suman, Avinash Kishore, and Devesh Roy. "Arbitrage and Corruption in Food Subsidy Programs: Evidence from India's Public Distribution System," 2017. https://ageconsearch.umn.edu/record/235763/files/AAEA_PDS_leakage.pdf.

Chapman, Paul. "The New Merchants of Grain with Jonathan Kingsman." HC Insider Podcast; 30 June 2021, n.d. <https://podcasts.apple.com/gb/podcast/the-new-merchants-of-grain-with-jonathan-kingsman/id1512721188?i=1000527345076>.

Chestney, Nina. "Global Carbon Markets Value Surged to Record \$851 Bln Last Year." *Reuters*, January 31, 2022, sec. Energy. <https://www.reuters.com/business/energy/global-carbon-markets-value-surged-record-851-bln-last-year-refinitiv-2022-01-31/>.

Choo, Kim-Kwang Raymond. "Chapter 15 - Cryptocurrency and Virtual Currency: Corruption and Money Laundering/Terrorism Financing Risks?" In *Handbook of Digital Currency*, edited by David Lee Kuo Chuen, 283–307. San Diego: Academic Press, 2015. <https://doi.org/10.1016/B978-0-12-802117-0.00015-1>.

Church, Claire, and Alex Crawford. "Green Conflict Minerals: The Fuels of Conflict in the Transition to a Low-Carbon Economy." Winnipeg: International Institute for Sustainable Development, August 2018. <https://www.iisd.org/publications/report/green-conflict-minerals-fuels-conflict-transition-low-carbon-economy>.

Commodity Futures Trading Commission. "CFTC Imposes \$3 Million Penalty against Olam International, Ltd. and Olam Americas, Inc. for Violating Cocoa Position Limits and Unlawfully Executing Noncompetitive Trades | CFTC." Commodity Futures Trading Commission, January 20, 2015. <https://www.cftc.gov/PressRoom/PressReleases/7104-15>.

Davis, Matthew, Thomas Taro Lennerfors, and Daniel Tolstoy. "Can Blockchain-Technology Fight Corruption in MNEs' Operations in Emerging Markets?" *Review of International Business and Strategy* 32, no. 1 (January 1, 2021): 39–56. <https://doi.org/10.1108/RIBS-12-2020-0155>.

Department of Justice Office of Public Affairs. "Glencore Entered Guilty Pleas to Foreign Bribery and Market Manipulation Schemes." United States Department of Justice, May 24, 2022. <https://www.justice.gov/opa/pr/glencore-entered-guilty-pleas-foreign-bribery-and-market-manipulation-schemes>.

District Attorney - New York County. "News Release: November 20, 2007." New York County District Attorney's Office, November 20, 2007. <https://web.archive.org/web/20100616074150/http://manhattanda.org/whatsnew/press/2007-11-20.shtml>.

Dutt, Pushan, and Daniel Traca. "Corruption and Bilateral Trade Flows: Extortion or Evasion?" *The Review of Economics and Statistics* 92, no. 4 (November 1, 2010): 843–60. https://doi.org/10.1162/REST_a_00034.

EITI International Secretariat. *Preparing for the Energy Transition: Key Questions for Countries Dependent on Oil, Gas and Mining*. Extractive Industries Transparency Initiative (EITI), Oct. 2021, https://eiti.org/sites/default/files/attachments/en_eiti_policy_brief_preparing_for_the_energy_transition.pdf

El Alaoui El Abdallaoui, Hasna, Abdelaziz El Fazziki, and Mohamed Sadgal. "Crowdsourcing and Blockchain-Based E-Government Applications: Corruption Mapping." In *Smart Applications and Data Analysis*, edited by Mohamed Hamlich, Ladjel Bellatreche, Anirban Mondal, and Carlos Ordonez, 86–99. Communications in Computer and Information Science. Cham: Springer International Publishing, 2020. https://doi.org/10.1007/978-3-030-45183-7_7.

European Commission, *Critical raw materials for strategic technologies and sectors in the EU*. A foresight study. Mar 9, 2020

Financial Action Task Force, and Egmont Group. "Trade-Based Money Laundering: Trends and Developments." Paris, France: Financial Action Task Force (FATF), December 2020. <https://www.fatf-gafi.org/media/fatf/content/Trade-Based-Money-Laundering-Trends-and-Developments.pdf>.

Financial Times. "Gunvor Boss Criticises 'Loose Lending' in Singapore," June 14, 2020.

Fletcher, Emily, Charles James Larkin, and Shaen Corbet. "Cryptocurrency Regulation: Countering Money Laundering and Terrorist Financing." SSRN Scholarly Paper. Rochester, NY, October 3, 2020. <https://doi.org/10.2139/ssrn.3704279>.

Food and Agriculture Organization of the United Nations. "Trade of Agricultural Commodities 2000–2020." Food and Agriculture Organization of the United Nations, May 10, 2022. <http://www.fao.org/food-agriculture-statistics/data-release/data-release-detail/en/c/1507740/>.

Gillies, Alexandra. *Crude Intentions: How Oil Corruption Contaminates the World*. Oxford, New York: Oxford University Press, 2020.

Global Witness. "Probe into Murky ExxonMobil Deal Shows Why Strong U.S. Transparency Rules Are Needed for Oil Companies." Briefing. Global Witness, June 24, 2016. <https://en/press-releases/probe-murky-exxonmobil-deal-shows-why-strong-us-transparency-rules-are-needed-oil-companies/>.

Goddard, Louis, and Sam Leon. "Fuelling Putin's War Machine: How Obscure Rail Freight Data Revealed Oil Scandals – ACDC." Accessed September 7, 2022. <https://acdatacollective.org/blog/fuelling-putins-war-machine-how-obscure-rail-freight-data-revealed-oil-scandals/>.

Goldbarsht, Doron, and Louis de Koker, eds. *Financial Technology and the Law: Combating Financial Crime*. Springer, 2022.

Goldthau, Andreas, and Llewelyn Hughes. "Saudi on the Rhine? Explaining the Emergence of Private Governance in the Global Oil Market." *Review of International Political Economy* 28, no. 5 (September 3, 2021): 1410–32. <https://doi.org/10.1080/09692290.2020.1748683>.

Green, Jennifer. "Closing the Accountability Gap in Corporate Supply Chains for Violations of the Trafficking Victims Protection Act." *Business and Human Rights Journal* 6, no. 3 (October 2021): 449–89. <https://doi.org/10.1017/bhj.2020.28>.

Harrington, Brooke. *Capital without Borders: Wealth Managers and the One Percent*. Harvard University Press, 2017. <https://doi.org/10.4159/9780674973619>.

Herrington, Richard. "Mining Our Green Future." *Nature Reviews Materials* 6, no. 6 (June 2021): 456–58. <https://doi.org/10.1038/s41578-021-00325-9>.

Hoffman, Andy, Javier Blas, and Mark Burton. "Commodity Traders Face Bribery and Corruption Probes." *Bloomberg*, March 25, 2019. https://www.rigzone.com/news/wire/commodity_traders_face_bribery_and_corruption_probes-25-mar-2019-158454-article/.

Hook, Leslie, and Patrick Temple-West. "Carney Calls for '\$100bn a Year' Global Carbon Offset Market." *Financial Times*, December 3, 2020.

Hossain, Naomi, and Patta Scott-Villiers, eds. *Food Riots, Food Rights and the Politics of Provisions*, 2017. <https://doi.org/10.4324/9781315175249>.

- Howson, Peter. "Tackling Climate Change with Blockchain." *Nature Climate Change* 9, no. 9 (September 2019): 644–45. <https://doi.org/10.1038/s41558-019-0567-9>.
- Hunter, Marcena. *Going for Gold: Russia, Sanctions and Illicit Gold Trade*. Global Initiative Against Transnational Organized Crime, Apr. 2022, <https://globalinitiative.net/wp-content/uploads/2022/04/GITOC-Going-for-Gold-Russia-sanctions-and-illicit-gold-trade.pdf>.
- International Emissions Trading Association. "The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges." Washington, DC: University of Maryland and Carbon Pricing Leadership Coalition (CPLC), September 2019. https://www.ieta.org/resources/International_WG/Article6/CLPC_A6%20report_no%20crops.pdf.
- International Energy Agency, *The role of critical minerals in clean energy transitions*. May 2021
- Jagodzińska, Natalia. "ISO 37001 System as a Tool to Meet Anti-Corruption Requirements in the Small and Medium-Sized Enterprise Sector." *Zeszyty Naukowe. Organizacja i Zarządzanie / Politechnika Śląska* z. 154 (2021). <https://doi.org/10.29119/1641-3466.2021.154.4>.
- Jiang, Helen Shan. "Fighting Corruption in Commodity Trading Through Blockchain Technology." Conference paper. 2019 OECD Global Anti-Corruption & Integrity Forum, 2019. <https://www.oecd.org/corruption/integrity-forum/academic-papers/Helen-Shan-Jiang-commodity-trading.pdf>.
- Kahn, Shayle. *Will Today's Booming Carbon Market Be Able to Avoid a Bust?* 24 March 2022, <https://www.canarymedia.com/podcasts/catalyst-with-shayle-kahn/will-this-carbon-market-boom-be-different>.
- Kaplan, Ahmet. "Cryptocurrency and Corruption: Auditing with Blockchain." In *Auditing Ecosystem and Strategic Accounting in the Digital Era: Global Approaches and New Opportunities*, edited by Tamer Aksoy and Umit Hacioglu, 325–38. Contributions to Finance and Accounting. Cham: Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-72628-7_15.
- Kara, Siddharth. 2018. "Is Your Phone Tainted by the Misery of the 35,000 Children in Congo's Mines?" *The Guardian*.
- Kshetri, Nir. "Blockchain and Sustainable Supply Chain Management in Developing Countries." *International Journal of Information Management* 60 (October 1, 2021): 102376. <https://doi.org/10.1016/j.ijinfomgt.2021.102376>.
- Kyle, Jordan. "Local Corruption and Popular Support for Fuel Subsidy Reform in Indonesia." *Comparative Political Studies* 51, no. 11 (September 1, 2018): 1472–1503. <https://doi.org/10.1177/0010414018758755>.
- Kyles, Dianna L. "Centralised Control Over Decentralised Structures: AML and CTF Regulation of Blockchains and Distributed Ledgers." In *Financial Technology and the Law : Combating Financial Crime*, edited by Doron Goldbarsht and Louis de Koker, 121–50. Law, Governance and Technology Series. Cham: Springer International Publishing, 2022. https://doi.org/10.1007/978-3-030-88036-1_6.
- Lambert, J. "A Conversation with J-F Lambert., Blog Commodity Conversations, August 12, 2019." *Commodity Conversations* (blog), August 12, 2019.
- Lizarzaburu, Edmundo R, Kurt Burneo, Gabriela Barriga, and Luis Eduardo Noriega. "Gestión empresarial: una revisión a la norma ISO 37001 antisoborno." *Revista del CLAD Reforma y Democracia*, 2019. <https://www.redalyc.org/journal/3575/357559582004/html/>.
- Mbow, Cheikh, Cynthia Rosenweig et al. "Special Report on Climate Change and Land, Chapter 5 : Food Security." IPCC. Accessed September 4, 2022. <https://www.ipcc.ch/srccl/chapter/chapter-5/>.
- McDaniel, Christine A., and Hanna C. Norberg. "Can Blockchain Technology Facilitate International Trade?" SSRN Scholarly Paper. Rochester, NY, April 24, 2019. <https://doi.org/10.2139/ssrn.3377708>.

Méan, Jean-Pierre, and Holger Gehring. "Implementing ISO 37001 to Manage Your Bribery Risks." *Global Trade and Customs Journal* 13, no. 5 (May 1, 2018). <https://kluwerlawonline.com/journalarticle/Global+Trade+and+Customs+Journal/13.5/GTCJ2018022>.

Milin, Z., and Jones, P. "Why We Applaud the CFTC's Anti-Corruption Enforcement Efforts." *Global Witness* (blog), May 21, 2019. <https://en.blog/why-we-applaud-cftcs-anti-corruption-enforcement-efforts/>.

Nakano, Jane. "The Chinese Dominance of the Global Critical Minerals Supply Chains." *The Geopolitics of Critical Minerals Supply Chains*. Center for Strategic and International Studies (CSIS), 2021. <http://www.jstor.org/stable/resrep30033.4>.

Nesvetailova, Anastasia, Ronen Palan, Hannah Petersen, and Richard Phillips. "IFFs and Commodity Trading: Opportunities for Identifying Risks in Energy Traders' Financial Conduct Using Groups' Corporate Filings." CITYPERC Working Paper. London: University of London, 2021. https://researchcentres.city.ac.uk/___data/assets/pdf_file/0005/583565/IFFs-AND-COMMODITY-TRADING-final-oct-2020-.pdf.

Nielson, Daniel Lafayette, and Jason Campbell Sharman. "Signatures for Sale : How Nominee Services for Shell Companies Are Abused to Conceal Beneficial Owners," April 21, 2022. <https://policycommons.net/artifacts/2388125/signatures-for-sale/3409236/>.

Nordeng, Anders. "Carbon Trading: Exponential Growth on Record High." *Refinitiv Perspectives* (blog), February 18, 2022. <https://www.refinitiv.com/perspectives/market-insights/carbon-trading-exponential-growth-on-record-high/>.

OECD. "The Impacts and Policy Implications of Russia's Aggression against Ukraine on Agricultural Markets." OECD Policy Responses on the Impacts of the War in Ukraine. OECD Policy Responses on the Impacts of the War in Ukraine, August 5, 2022. <https://doi.org/10.1787/0030a4cd-en>.

———. "Thematic Dialogue on Commodity Trading Transparency: Corruption Risks in the Commodity Trading Value Chain." Fifteenth Plenary Meeting of the Policy Dialogue on Natural Resource-Based Development. Paris: Organisation for Economic Co-operation and Development, 2020. https://www.oecd.org/dev/DAY_5_Policy_Paper_Corruption_Risks.pdf.

Pegg, David et al. 2022. "Revealed: Credit Suisse Leak Unmasks Criminals, Fraudsters and Corrupt Politicians." *The Guardian*.

Pieth, Mark. *Gold Laundering: The Dirty Secrets of the Gold Trade - And How to Clean Up*. Salis Verlag, 2019.

Phiri, Horace, and Abdi Khalil Edris. "Neopatrimonialism and Agricultural Protection: The Case of Maize in Malawi." *MaSSP Working Papers*. MaSSP Working Papers. International Food Policy Research Institute (IFPRI), 2013. <https://ideas.repec.org/p/fpr/masspp/1.html>.

Plüss, Jessica Davis. 2021. "Commodity Giants Race to Clean up Mineral Supply Chains amid Green Energy Boom." SWI swissinfo.ch.

Porter, D., and C. Anderson. "Illicit Financial Flows in Oil and Gas Commodity Trade: Experience, Lessons and Proposals." Paris: OECD, 2021. <https://www.oecd.org/dac/accountable-effective-institutions/illicit-financial-flows-oil-gas-commodity-trade-experience.pdf>.

Prytula, Anatolii, Vasyl Lutsyk, Aryna Sviatoshniuk, Olena Tkalia, and Kateryna Kalachenkova. "Cryptocurrency in Transnational Offenses: Criminal and Civil Legal Aspects." *Amazonia Investiga* 10, no. 46 (November 25, 2021): 209–16. <https://doi.org/10.34069/AI/2021.46.10.21>.

Ross, Michael L. "The Politics of the Resource Curse: A Review." *SSRN Electronic Journal*, 2013. <https://doi.org/10.2139/ssrn.2342668>.

Chatham House – International Affairs Think Tank. "Russia, Ukraine, and Cryptocurrency as a Tool of War," March 25, 2022. <https://www.chathamhouse.org/2022/03/russia-ukraine-and-cryptocurrency-tool-war>.

Sarker, Suprateek, Stefan Henningsson, Thomas Jensen, and Jonas Hedman. "The Use Of Blockchain As A Resource For Combating Corruption In Global Shipping: An Interpretive Case Study." *Journal of Management Information Systems* 38, no. 2 (April 3, 2021): 338–73. <https://doi.org/10.1080/07421222.2021.1912919>.

Schultz, Jessica, and Tina Søreide. "Corruption in Emergency Procurement." *Disasters* 32, no. 4 (December 1, 2008): 516–36. <https://doi.org/10.1111/j.1467-7717.2008.01053.x>.

Scott, Dayna, and Adrian Smith. "'Sacrifice Zones' in the Green Energy Economy: Toward an Environmental Justice Framework." *McGill Law Journal / Revue de Droit de McGill* 62, no. 3 (2017): 861–98. <https://doi.org/10.7202/1042776ar>.

Schwartz, Franklin W., Sangsuk Lee, and Thomas H. Darrah. 2021. "A Review of the Scope of Artisanal and Small-Scale Mining Worldwide, Poverty, and the Associated Health Impacts." *GeoHealth* 5(1).

Shankleman, Jess. "Carbon Offset Trading Is Taking Off Before Any Rules Are Set." *Bloomberg*, July 9, 2021. <https://www.bloomberg.com/news/articles/2021-07-09/carbon-offset-trading-is-taking-off-before-any-rules-are-set>.

Shankleman, Jess, and Rathi Akshat. "Wall Street's Favorite Climate Solution Is Mired in Disagreements." *Bloomberg*, June 2, 2021. <https://www.bloomberg.com/news/features/2021-06-02/carbon-offsets-new-100-billion-market-faces-disputes-over-trading-rules>.

Stanford Law School. 2022. "Third-Party Intermediaries Disclosed in FCPA-Related Enforcement Actions." Foreign Corrupt Practices Act: Statistics & Analytics.

Taskforce on Scaling Voluntary Carbon Markets. "Inventory Analysis for 2020," 2020. https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf.

The Economist. "The Coming Food Catastrophe." Accessed September 5, 2022. <http://www.economist.com/leaders/2022/05/19/the-coming-food-catastrophe>.

Tian, Feng. "A Supply Chain Traceability System for Food Safety Based on HACCP, Blockchain & Internet of Things." In 2017 *International Conference on Service Systems and Service Management*, 1–6, 2017. <https://doi.org/10.1109/ICSSSM.2017.7996119>.

BBC News. "Venezuela Launches Oil Cryptocurrency," February 20, 2018, <https://www.bbc.com/news/business-43133853>.

Verhoeven, Peter, Florian Sinn, and Tino T. Herden. "Examples from Blockchain Implementations in Logistics and Supply Chain Management: Exploring the Mindful Use of a New Technology." *Logistics* 2, no. 3 (September 2018): 20. <https://doi.org/10.3390/logistics2030020>.

Vogl, Frank. *The Enablers: How the West Supports Kleptocrats and Corruption: Endangering Our Democracy*. Lanham, Maryland: Rowman & Littlefield, an imprint of The Rowman & Littlefield Publishing Group, Inc, 2022.

World Bank. *Why Is the World Facing a Food Crisis?* Vol. Episode 26. The Development Podcast, 2022. <https://www.worldbank.org/en/news/podcast/2022/06/10/world-food-crisis-security-hunger-supply-chains-war-ukraine-development-podcast>.

World Food Programme. "HungerMap: Global Insights and Key Trends," September 6, 2022. <https://static.hungermapdata.org/insight-reports/latest/global-summary.pdf>.

Wossen, Tesfamicheal, Tahirou Abdoulaye, Arega Alene, Shiferaw Feleke, Jacob Ricker-Gilbert, Victor Manyong, and Bola Amoke Awotide. "Productivity and Welfare Effects of Nigeria's e-Voucher-Based Input Subsidy Program." *World Development* 97 (September 1, 2017): 251–65. <https://doi.org/10.1016/j.worlddev.2017.04.021>.

Zinnbauer, Dieter. "Megaleaks and the Transparency Agenda a Decade after Wikileaks – Different and More Relevant than Received Wisdom May Suggest." SSRN Scholarly Paper. Rochester, NY, May 24, 2022. <https://doi.org/10.2139/ssrn.4118584>.

ANNEX: SOURCES FOR FURTHER DATA

Extractives Industry Transparency Initiative: <https://eiti.org/>

Fisheries Transparency Initiative: <https://www.fiti.global/>

Illegal, Unreported and Unregulated Fishing Index: <https://globalinitiative.net/analysis/iuu-fishing-index-2021/>

Lexis-Nexis PSL - Trade, Commercial and Enforcement Litigation, United Kingdom and Europe <https://www.lexisnexis.com/uk/lexispsl/pslhome>

Maritime Anti-Corruption Network: <https://macn.dk/>

Targeting Natural Resources Corruption: <https://biodiversitylinks.org/projects/current-global-projects/tnrc>

World Bank investment dispute database: <https://icsid.worldbank.org/cases/case-database>

World Trade Organization trade dispute database: https://www.wto.org/english/tratop_e/dispu_e/find_dispu_cases_e.htm

United Nations investment dispute database: https://uncitral.un.org/en/case_law

United States regulatory enforcement database: <https://violationtracker.goodjobsfirst.org/>

<https://ace.globalintegrity.org>
info@globalintegrity.org

Global Integrity
1100 13th Street, NW, Suite 800
(at the Open Gov Hub)
Washington, DC 20005 USA

Design by Raúl Rodríguez,
R studio T, NYC,
www.rstudiot.com

Infographics by Tom Koken,
R studio T