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Indicators of illicit activities in gold supply chains

Insights from Peru and Kenya

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Abstract: Illicit gold flows constitute a major development challenge for governments and a social responsibility challenge for the jewellery industry, which accounts for the majority of global gold demand. This paper highlights aspects of gold supply chains that lack transparency and may indicate junctures where illicit activities are taking place, resulting in a loss of tax and customs revenues. Using Peru and Kenya as case study countries, we draw from United Nations Comtrade data and qualitative data from field research to examine the magnitude of the gold trade, the forms in which gold is traded, and key trade partners for each country. We suggest that midstream portions of gold supply chains should be given more attention, certain types of gold exports and imports present greater traceability challenges than others, and some countries play a much more significant role in the global jewellery trade. We propose areas where further investigations may be warranted to ensure more transparent and responsible gold supply chains.

Key words: gold supply chains, Peru, Kenya, trade discrepancies, transparency, responsibility

JEL classification: E26, F10, N50, Q37

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1 Introduction

Gold is used in jewellery, dentistry, medicine, electronics, and aerospace, and has long been a form of monetary exchange and investment. Over 20 per cent of this gold is produced by the artisanal and small-scale mining (ASM) sector (IGF 2017), generally characterized by relatively small and labour-intensive operations and low-capital forms of production and processing (Malone and Martinez 2022). Recently, gold supply chains originating from artisanal and small-scale mines have come under increased scrutiny by governments, manufacturers, retailers, and consumers because of allegations of child labour, environmental contamination and degradation, money laundering, and other social problems associated with gold mining and gold supply chains. This has resulted in increased pressure on downstream buyers of gold with respect to ‘responsible’ supply chains and raises questions as to the extent to which gold supply chains are or can be transparent.

The decentralized nature of gold supply chains, the extent to which gold aggregates along the supply chain, and its malleability are just some of the factors that make it challenging to trace gold back to its origin. This can especially be the case for gold from artisanal or small-scale mines, as it often changes hands several times—mostly unofficially—prior to being exported out of its country of production (legally or illegally). In most cases, gold is produced and traded by actors who are considered informal and/or operate in the ‘extra-legal’ economy, generating household income outside the bounds of state institutions (De Soto 2000; Siegel and Veiga 2009). Throughout this process, it is likely that small quantities of gold from different locations are aggregated together at different sales points. This not only obfuscates the origins of this gold, including the context in which it was produced and the potential risks present, but also creates a greater number of entry points that can be intercepted by or infused with illicit activities, including other kinds of trafficking (i.e. drugs, weapons), money-laundering activities, and extortion (FATF and APG 2015).

Gold flows and their associated financial flows, which are often cash-based transactions and ‘untraceable’, constitute a major development challenge for artisanal and small-scale gold-producing countries and a major compliance and corporate social responsibility challenge for various industries, including the jewellery industry. The jewellery industry accounts for the majority (55 per cent in 2021) of global gold demand, while gold used for investment is the second-largest source of demand (25 per cent) (World Gold Council 2022). Most jewellery companies are not able to trace their gold to the source of origin (Human Rights Watch 2020), and jewellery is particularly vulnerable to various kinds of fraud as well as gold-based money laundering (GBML). Recently, concerns related to the use of gold for sanctions evasion or the financing of state regimes with poor human rights records have resurfaced with Russia’s invasion of Ukraine. The Global Gold Transparency Initiative, in its March 2022 ‘Open Letter to the Jewelry Industry’, posed the question, ‘Could Russia use the jewelry industry as a conduit to convert their gold reserves and mined gold to cash to fund their war effort?’ (GGTI 2022). Recent reports claim that Russia has smuggled hundreds of tonnes of illicit gold from Sudan over the last few years as part of an effort to mitigate anticipated Ukraine-related sanctions (Collins 2022). This coincides with a general increase in the presence of Russia in several African states such as the Central African Republic, with ties to the gold and mineral sectors (IMPACT 2022).

In this paper, we provide an initial analysis of the non-monetary gold trade to reveal areas that may be potential causes for concern among downstream users attempting to source from ‘transparent’ gold supply chains. To do this, we zero in on two countries, Peru and Kenya. Peru is the eighth-largest gold producer in the world and the largest gold producer in Latin America (USGS 2020). Although Kenya is less of a player in the global gold trade, there are a significant number of people who rely on informal artisanal and small-scale gold mining (ASGM) activities for their livelihoods,

and there are some indications that Kenya's role in illicit flows of artisanal gold produced in East Africa may be underestimated (IMPACT 2021). For our analysis, we first examine the quantity and types of gold products exported from and imported to Peru and Kenya, as reported to UN Comtrade by these countries and their trade partners. We specifically pay attention to discrepancies that appear in the reported values and highlight notable features, and we supplement these analyses with qualitative data from interviews. We conclude that midstream sections of gold supply chains should be given more legislative and regulatory attention, and that gold imports and exports declared as jewellery, waste and scrap, and ores and concentrates present the most traceability challenges. Finally, we speculate on areas where further investigations may be warranted to ensure more transparent and responsible gold supply chains.

2 Seeking transparency and responsibility in gold supply chains

There have been efforts at different scales to promote and assess transparency and responsibility in gold supply chains. Upstream actors in the ASGM sector have been targeted through laws and certifications administered by government and by non-governmental organizations (NGOs), while downstream actors have been encouraged or mandated to use 'responsible' gold in their supply chains and to carry out greater due diligence on where and how the gold used in their products is produced.

2.1 Regulating the upstream sector

Governments have focused primarily on formalizing the ASGM sector to address several perceived negative impacts of ASGM activities, including environmental, health and safety, illicit financing, and other issues. Globally, however, 70–80 per cent of the sector continues to work informally (IGF 2017). In Peru, there are more formalized ASGM operators than anywhere else in the world, with estimates of the number of people in Peru working directly in ASGM ranging from 100,000 to 500,000 (De Echave 2016). Yet the number of miners formalized in Peru still accounts for only 2 per cent of the total ASGM population (G. Martinez et al. 2021). There are also several large- and medium-scale gold mining operations in Peru. Some medium-scale operations have agreements with artisanal and small-scale miners where they allow them to mine on their concessions and purchase their gold (Rodriguez-Novoa and Holley 2023). In other cases, gold is processed locally using mercury and is sold to buyers or intermediaries who then sell to refineries for further processing (Smith 2019). These dynamics complicate gold supply chains, as several intermediaries are involved at various points along the in-country supply chain.

Most of Kenya's ASGM sector remains informal. Several factors have contributed to this, including (but not limited to) an outdated policy framework, limited formal governance, and little oversight (Tampushi et al. 2022). Compared with other East African countries, Kenya has not garnered the same attention with respect to its role as both a small-scale gold producer and a transit country for illicit gold flows from other countries—including South Sudan and the Democratic Republic of Congo (DRC) (IMPACT 2021). Kenya's domestic ASGM sector produces an estimated 6.9 tons annually (Ministry of Environment and Forestry 2022). This is a relatively smaller production capacity than that of the region's larger producers, such as the DRC (ACE 2020) or Tanzania (Vice President's Office 2020). Despite a relatively smaller size, the sector provides a significant contribution to livelihoods, supporting approximately 250,000 miners (Solidaridad 2022). Factoring in dependents, the sector is estimated to support approximately 800,000 individuals in the country (Ministry of Environment and Forestry 2022).

Like many states across the African continent, Kenya underwent a regulatory update of its mining code in 2016, which covers artisanal, small-, and large-scale mining. This update sought to provide further provisions for ASM activity, including the zoning of land for ASM, permitting and licensing, and governance reforms at the local and national levels. In the Great Lakes region of Africa, where concerns over the use of gold and the 3Ts (tin, tantalum, and tungsten) as a source of financing have garnered significant regional and international attention, a Regional Certification Mechanism (RCM) has been established by member states of the International Conference on the Great Lakes Region (ICGLR), with some members having domesticated this mechanism into national law (Mulungi 2016; Odyek 2020). Though partially operationalized in some countries, overall implementation of the RCM—especially as it relates to gold—has been slow, and Kenya has not taken major steps to implement it.

Other initiatives targeting upstream actors in gold supply chains include voluntary gold certification schemes administered by NGOs. These include the Fairtrade gold certification administered by Fairtrade International and the Fairmined gold certification administered by the Alliance for Responsible Mining (ARM). These programmes provide a premium for gold produced by small-scale miners who are working formally and who comply with a set of environmental and labour standards (Martinez et al. 2022). They have been shown to improve working conditions for miners and have led to better environmental practices despite their limited reach (Martinez et al. 2022; N.U. Martinez et al. 2021).

2.2 Initiatives targeting downstream users of gold

The downstream gold-buying market has also been targeted with a series of regulations and guidelines that mandate or encourage due diligence. Gold was one of the first minerals of focus in the creation of the OECD (Organization for Economic Co-operation and Development) *Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas*, which seeks to ‘help companies respect human rights and avoid contributing to conflict through their mineral sourcing practices’ (OECD 2016: 3). Gold is also one of four minerals targeted by section 1502 of the Dodd Frank Act and the European Union’s Conflict Minerals Regulation (2010), which put in place a set of requirements for US and European importers of the 3Ts and gold from conflict-affected regions (Macchi 2022). These were some of the first regulations aimed at curtailing the sourcing of gold from the DRC (Dodd Frank) or other countries with armed conflicts or in violation of international law (EU Conflict Mineral Regulation). Although they represent steps towards ensuring more responsible and transparent gold supply chains, the reach of these regulations is relatively limited given that some of the largest gold market buyers are not captured by them—such as companies based in the United Arab Emirates (UAE), India, Turkey, and China.

In the US, the Federal Trade Commission (FTC) regulates the jewellery industry by requiring companies to not misrepresent various aspects of gold used in their industry, including its origin (FTC 1996). The FTC also periodically publishes ‘Green Guides’, which provide guidance for industries on how to make and substantiate environmental claims and avoid ‘greenwashing’. Other organizations also set standards for the jewellery industry, including the Responsible Jewellery Council (RJC), the largest industry-led standard-setting organization.

3 The illicit flow of gold

Some legal and regulatory frameworks around the gold supply chain contain loopholes that can provide mechanisms for obscuring the origin of gold. The most prevalent of these involves what

customs personnel sometimes term a ‘tariff shift’.¹ The basic principle is that when a substantive change occurs with a good as it passes through a transit hub, changing its Harmonized System code, the transit hub becomes, for customs purposes, the country of origin. For example, gold doré (Harmonized System/HS Code 710812) from Country A might be exported to an intermediary in Country B, where it is smelted and used to manufacture gold jewellery (HS Code 711319), before being imported into Country C. The change in tariff code means that on the gold’s arrival in Country C, Country B can be listed as the gold’s country of origin, effectively obscuring the actual origin of the gold itself.

Gold is also laundered into the legitimate supply chain, including the jewellery supply chain, through fraudulent paperwork, some of which exploits regulatory frameworks designed to prevent gold laundering. A small-scale miner enrolled in a formalization programme gains a degree of regulatory credibility; that miner can then be used to add a veneer of legitimacy to illegally mined or smuggled gold. One recent case in Peru, for instance, involved an organized criminal group concealing the origin of millions of dollars’ worth of gold by falsifying documents through the Integral Registry of Mining Formalization (REINFO), which functions through the Regional Directorate of the Ministry of Energy and Mining (MINEM). The gold, which was warehoused at the Port of Callao for intended shipment to Dubai, China, and Switzerland, left a trail through official records, including those of Peruvian customs (Praeli 2020). A prominent Peruvian prosecutor has criticized the fact that a miner in the process of formalization—which continues to be extended legislatively—is not subject to penalties if found mining illegally (Garay 2021). In Colombia, illegally mined or smuggled gold has been extensively laundered into the legitimate domestic supply chain by being fraudulently reported as the production of artisanal and small-scale miners without their knowledge, or even when they do not engage at all in illicit activities (OECD 2022). Such document trails can expose key actors and convergence nodes in illicit supply chains and potentially reveal further contacts, front companies, and other inputs that in turn expose the illicit financial flows linked with the criminal supply chains.

Significantly, gold jewellery in the marketplace is not subject to being fire-assayed for purity, for the obvious reason that the jewellery would be ruined. This immunity to being assayed creates room for various kinds of fraud or money laundering using jewellery (OECD 2022). In Latin America, a series of criminal investigations dating back decades have found gold jewellery to be a favoured mechanism for money laundering and gold laundering (OAS 2022). In 2019, for instance, a Colombian criminal organization was found to be smuggling gold bars to Panama, where the gold was sold via counter-trade for bulk jewellery from Panamanian wholesale jewellers; the jewellery was then resold in Colombian retail stores beneficially owned by the criminal organization, effectively laundering large sums of narcotics proceeds (En Segundos 2019). In Peru, there is evidence that jewellery companies in large cities play a role as both gold buyers in and mercury suppliers to the illicit market (IUCN NL 2021). The pattern of illicit mercury dealers operating behind the veneer of a legal enterprise such as a jewellery or trading store is consistent with findings encountered elsewhere in Peru (Smith 2019), the DRC (Martin 2020), and South Africa (Martin 2019).

Beyond its own production, Kenya has served as a transit hub for gold produced in other countries in the region for several decades. South Africa Resource Watch (SARW 2014) has noted that Indian families that had established themselves in Nairobi began purchasing gold from Congolese traders as early as the 1950s, either by travelling to the DRC and bringing back undeclared gold or by purchasing it from Congolese traders who travelled to Nairobi. Kenyan traders continue to play

¹ USCBP (US Customs and Border Protection) agents, personal communication, 31 May 2022.

a significant role in the DRC's artisanal gold sector, such as in Bunia, Ituri province, where they are involved in the trade of goods and services beyond the purchase of gold, such as petrol.² There are indications that the amount of gold leaving Kenya unofficially—whether produced domestically or transiting through the country—is significantly higher than previously estimated (IMPACT 2021).

3.1 Indicators of illicit flows

Global trade discrepancies have long been examined as indicators of illicit activities within supply chains. In the extractive industries, 'mis-invoicing' may be more common because of the large volumes of exports involved and a lack of capacity among regulatory agencies in resource-rich countries of the Global South (UNCTAD 2016). Investigations into trade mis-invoicing can be traced back to Ferraris (1885), who examined the accuracy of gold trade statistics. Since then, several studies have compared bilateral trade data to reveal discrepancies between countries in trade invoicing (see Bhagwati 1974; Biswas and Marjit 2005; Buehn and Eichler 2011; Fisman and Wei 2004; Kellenberg and Levinson 2018). The basic principle underlying such investigations is that a commodity's reported value should be the same for the country that is exporting that commodity as the value reported by the country importing it.

Trade values can be deliberately under-invoiced to avoid import duties, or not reported at all upon entry into a country, resulting in a loss of revenue from trade taxes (UNCTAD 2016). Three primary motives have been identified for deliberate mis-invoicing: to maximize profits by avoiding tariffs or by taking advantage of export subsidies (Bhagwati 1974; Buehn and Eichler 2011; Kellenberg and Levinson 2018), to avoid exchange and customs controls (Biswas and Marjit 2005), and to circumvent bureaucratic processes (corruption/smuggling) (Fisman and Wei 2004). Although mis-invoicing may reflect illicit flows of commodities, legitimate discrepancies should appear in the trade data due to the costs of freight, insurance, and duties, which are paid by the importing country and are generally calculated at 10 per cent of the total reported value (UNCTAD 2016). Lag time in reporting and misclassification of commodities, either deliberately or not, can also be responsible for discrepancies in commodity values (UNCTAD 2016).

In some cases, there are 'perverse' discrepancies where the value of a country's imports of a commodity is less than the value of the corresponding exports of its trading partner (Bhagwati 1974). In other cases, there are 'excessive normal' discrepancies, which appear when the importing country reports much more value for the goods than is to be expected, taking into account freight costs, insurance, and duties (Bhagwati 1974). Compromising the transparency of gold supply chains still further, not all mis-invoiced trade results in a notable difference between export and import values (UNCTAD 2016).

4 Methods

To examine gold supply chains emanating from Peru and Kenya, we used data from the UN Commodity Trade Statistics database (Comtrade; UN Statistics Division, various dates) on commodity imports and exports over a 21-year period (2000–20). The database contains import and export values for over 7,000 commodities, as reported by authorities in approximately 200 countries. In the Comtrade database, globally traded commodities are assigned an HS code, which groups them according to the material of which they are composed. Customs authorities use these

² Interview conducted by IMPACT with an anonymous expert in the ASGM sector, Bunia, Ituri province, DRC, 2021.

codes to calculate duty and tax rates on traded goods. We identified HS codes corresponding to four main categories of gold: metal, waste and scrap, jewellery, and ores and concentrates (Table 1).

Table 1: Harmonized System codes used in this study

Gold form	HS codes	Description
Metal	HS 7108.11	Non-monetary gold (including gold plated with platinum) unwrought or in semi-manufactured forms, or in powder form
	HS 7108.12	
	HS 7108.13	
Waste and scrap	HS 7112	Waste and scrap of precious metal or of metal clad with precious metal; other waste and scrap containing precious metal or precious metal compounds, of a kind used principally for the recovery of precious metal
	HS 7112.91	Waste and scrap of gold, including metal clad with gold but excluding sweepings containing other precious metals
	HS 7112.30	Ash containing precious metal or precious metal compounds
	HS 7112.9, HS 7112.99	Other
Jewellery	HS 7113, HS 7113.1, HS 7113.11, HS 7113.19, HS 7113.20	Articles of jewellery and parts thereof, of precious metal, or of metal clad with precious metal
Ores and concentrates	HS 2616.90	Precious-metal ores and concentrates, excluding silver ores and concentrates

Source: authors' construction based on Comtrade database.

Both monthly and yearly trade data can be obtained using Comtrade, and for each trade transaction there should be two reports in the dataset—one from the exporter (source) country and one from the importer (destination) country. However, not all countries report all of their trade activities to the UN; many trade transactions are reported by only one party. To address this issue, we concentrated on transactions where both parties reported the trade values. Some of these transactions showed significant discrepancies between the amounts of trade reported by respective parties, which may be used to indicate a lack of trade transparency. We do not know the exact causes of discrepancies in reported trade data, and legitimate trade discrepancies can occur as mentioned. Therefore, the primary focus of our analysis was on temporal changes in trade volume and obvious discrepancies that could be used to indicate gold supply chain transparency.

Although our emphasis here is largely quantitative, we supplemented our analysis of the UN Comtrade data with data from field research in both Peru and Kenya. Members of our team have been conducting academic research in small-scale mining communities in Peru since 2016 and have been working in the African Great Lakes region on topics related to conflict minerals since 2005. Over the course of this period, we have carried out numerous interviews with government officials, regulators, miners, and community members and have practised participant observation at mine sites, in government offices, and in artisanal and small-scale mining communities, as well as during NGO- and government-sponsored workshops and training in artisanal and small-scale mining regions. Through these endeavours, we have been able to gain a better understanding of some of the nuances in gold supply chains in each country (see, for example, IMPACT 2021; Martin 2020; G. Martinez et al. 2021; Martinez et al. 2022, 2023; Smith 2019). During the past year, we have focused some of the interview questions we have asked of approximately 20 government and gold supply chain actors on topics more specifically related to regulating and participating in the gold trade in their jurisdictions.

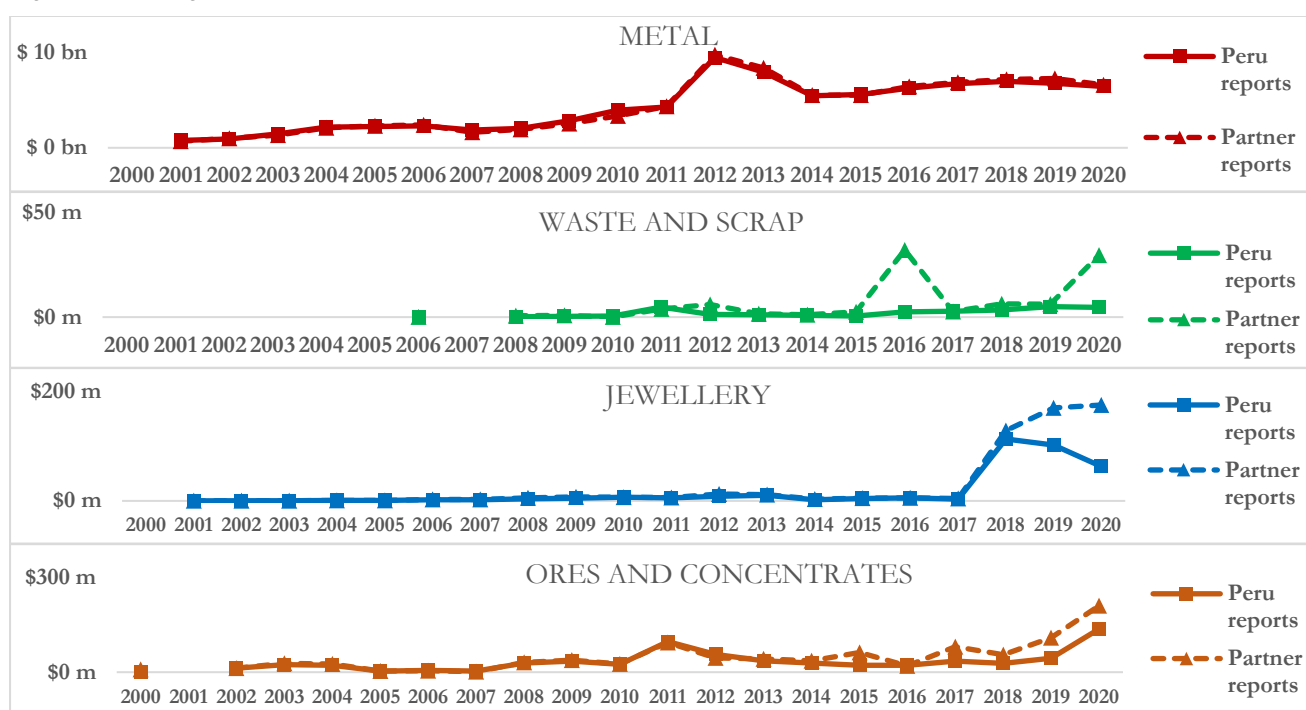
5 Results

We first analysed the amount and forms of gold exports and imports for Peru and Kenya, to understand the scale at which trade discrepancies occur and identify trends.

5.1 Peru's gold trade

For Peru, gold exported in the form of metal had the highest value and showed the least discrepancies in reported values from 2000 to 2020 (Figure 1). Gold waste and scrap had the lowest value over time, and no data for gold scrap appeared in the Comtrade database until 2006. Thereafter, trade values for gold waste and scrap showed few, if any, discrepancies, with two obvious exceptions, including an excessive normal discrepancy (where the importing country reported a value exceeding the 10 per cent margin for costs such as freight and duties) in 2016 and again in 2020. The value of gold jewellery traded was relatively consistent and did not exceed US\$13 million until 2018, when it increased tenfold to nearly \$130 million. Over the next two years, jewellery trade values diverged significantly. This resulted in excessive normal discrepancies of more than 66 per cent in 2019 and 178 per cent in 2020. The value of ores and concentrates remained below \$40 million until 2011, when it increased to nearly \$100 million. The values increased after 2016, reaching the highest point in 2020. There were significant discrepancies after 2015, with the greatest excessive normal discrepancies in 2015 and 2019.

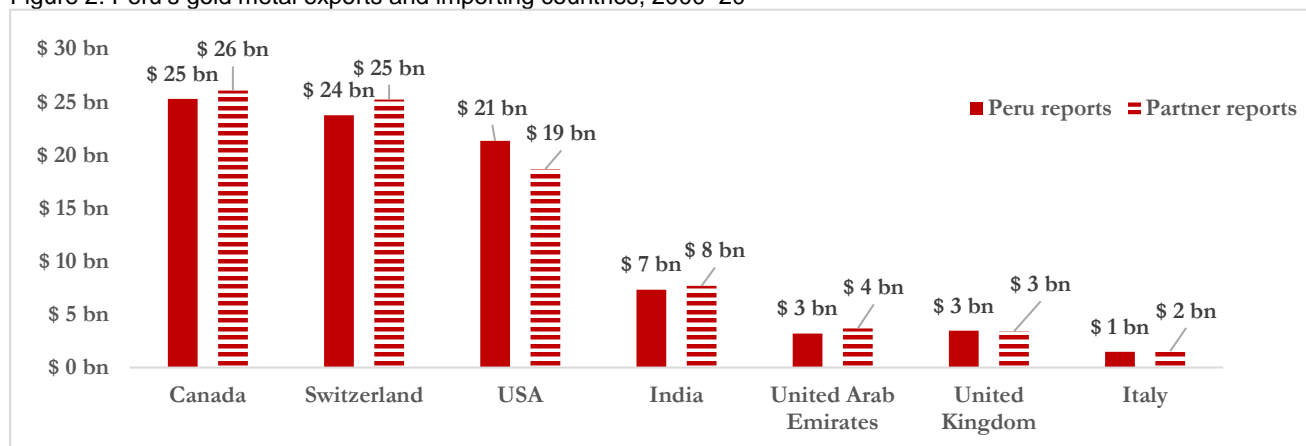
Figure 1: Peru's gold exports, 2000–20



Source: authors' illustration based on Comtrade data.

Gold metal was exported from Peru to seven countries, with Canada, Switzerland, and the US accounting for the majority (Figure 2). Most of the reported values showed few to no discrepancies after the 10 per cent margin was considered. However, the US and the UK showed perverse discrepancies, reporting a slightly lower value of gold metal imports from Peru than Peru reported as exports to these countries.

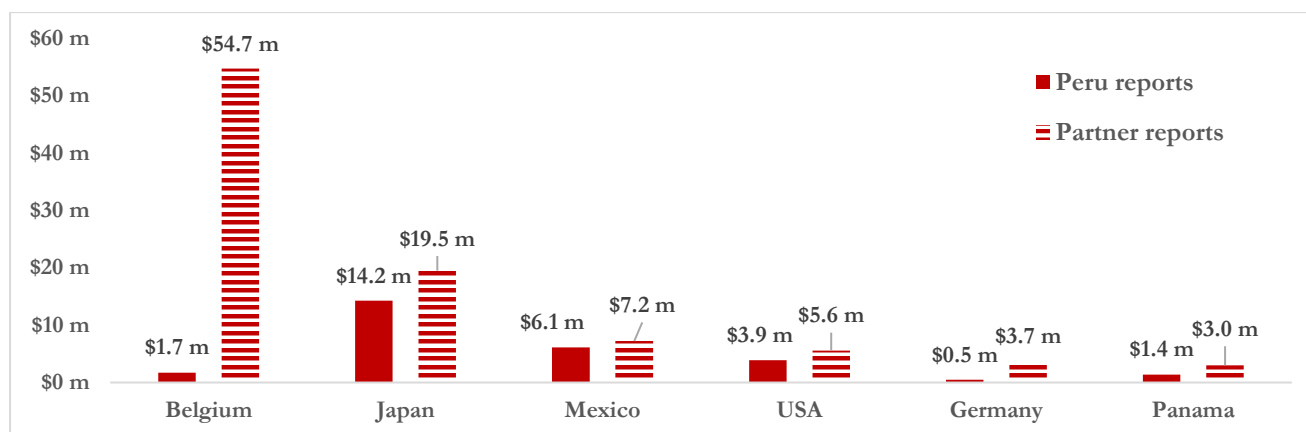
Figure 2: Peru's gold metal exports and importing countries, 2000–20



Source: authors' illustration based on Comtrade data.

Gold waste and scrap was exported from Peru to six countries (Figure 3). The trade between Peru and Belgium shows the greatest discrepancies, with Belgium reporting a value of 32 times more in imports than Peru reported as exports to Belgium.

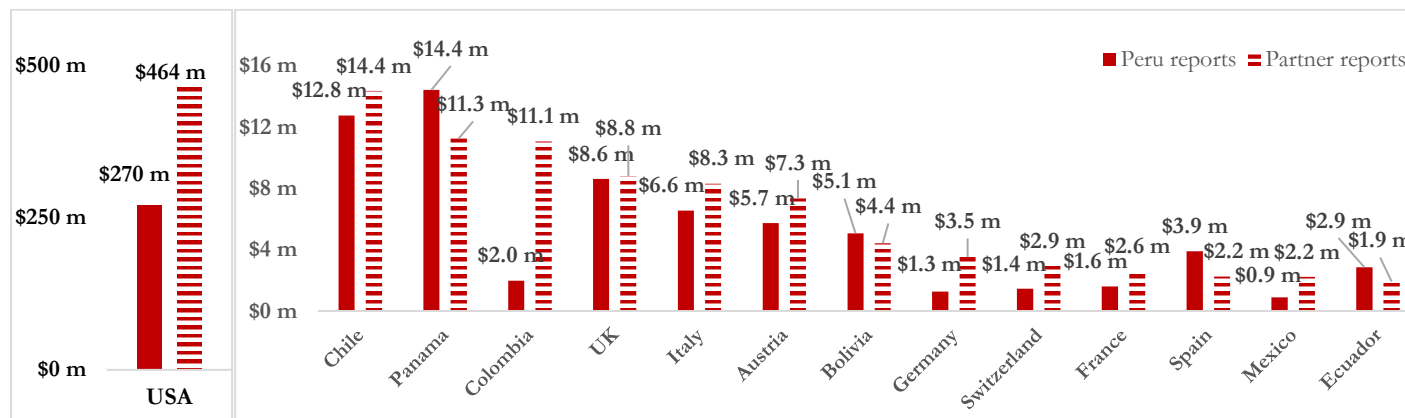
Figure 3: Peru's gold waste and scrap exports and importing countries, 2000–20



Source: authors' calculations based on Comtrade data.

Within the 21-year period, the majority of Peru's gold jewellery exports went to the US (Figure 4). Over this time, Peru reported just over half of the value of gold jewellery that the US reported receiving from Peru. A closer look at the data showed that in 2020, both Peru and the US reported trade volumes of between 5.6 and 5.8 tonnes, but Peru valued those exports at US\$59.1 million while the US valued them at \$171.25 million. In 2021, the two countries again reported roughly commensurate trade volumes of between 10 and 10.7 tonnes, but Peru reported the value of that tonnage as \$94.1 million and the US as \$306.8 million. Also of note was the excessive normal discrepancy in jewellery export reporting between Peru and Colombia, with Peru reporting jewellery exports worth \$2 million to Colombia and Colombia reporting jewellery imports from Peru worth more than \$11 million.

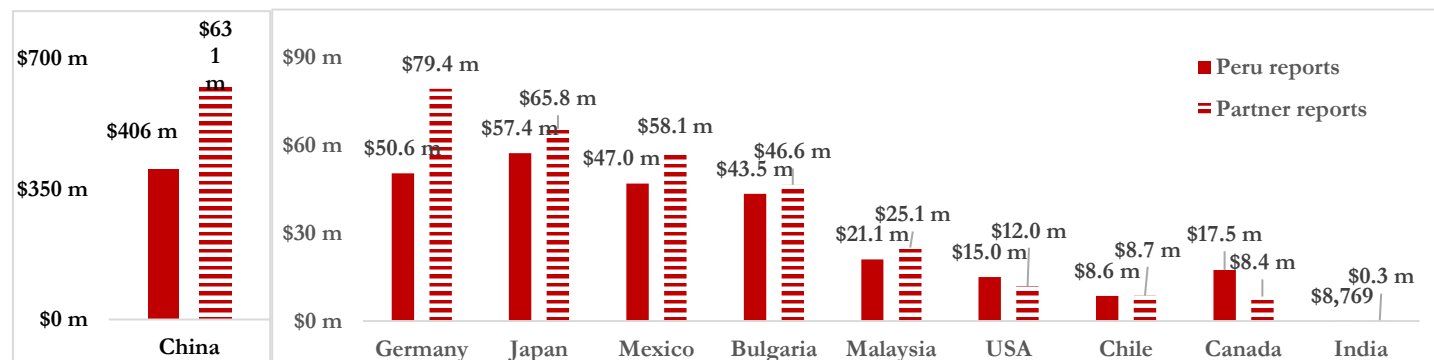
Figure 4: Peru's jewellery exports and importing countries, 2000–20



Source: authors' illustration based on Comtrade data.

Most of Peru's gold ores and concentrates were exported to China (Figure 5), with trade values showing excessive normal discrepancies. This pattern also appears in the trade data reported between Peru and Germany and Peru and Mexico, although to a much lesser extent. Japan is only slightly over the 10 per cent margin, and the US and Canada show perverse discrepancies. Peru reported less than US\$10,000 in gold ores and concentrates exported to India, while India reported imports worth US\$0.3 million from Peru.

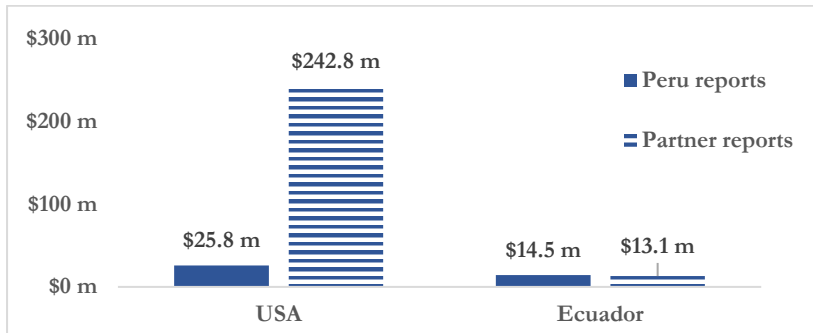
Figure 5: Peru's ores and concentrates exports and importing countries, 2000–20



Source: authors' illustration based on Comtrade data.

Peru also imported gold in the form of metal, jewellery, and concentrate. During the 21-year period of this study, the US reported exporting nearly US\$245 million in gold metal to Peru, but Peru reported receiving only about \$25 million in gold metal from the US, showing a quite large perverse trade discrepancy. Ecuador also exported gold metal to Peru, with commensurate trade values reported (Figure 6).

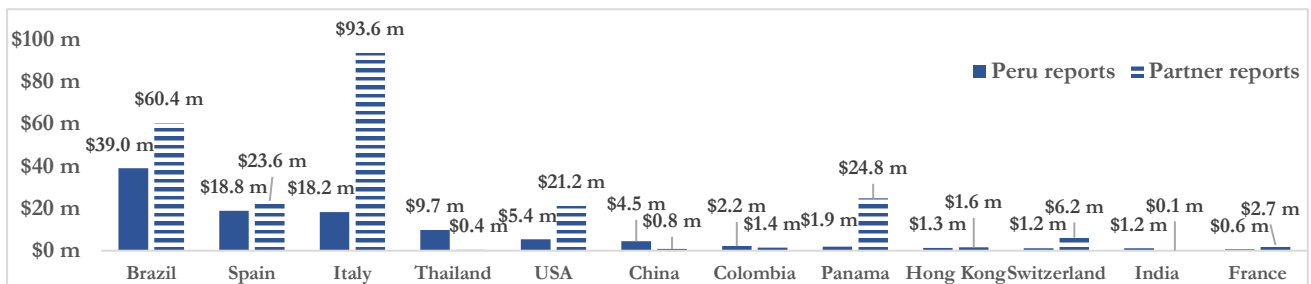
Figure 6: Peru's gold metal imports and exporting countries, 2000–20



Source: authors' illustration based on Comtrade data.

According to Peru's trade partners' data, Italy, Brazil, Panama, Spain, and the US exported significant amounts of gold jewellery to Peru; however, Peru's reporting on these imports was relatively minimal, showing perverse discrepancies (Figure 7).

Figure 7: Peru's jewellery imports and exporting countries, 2000–20

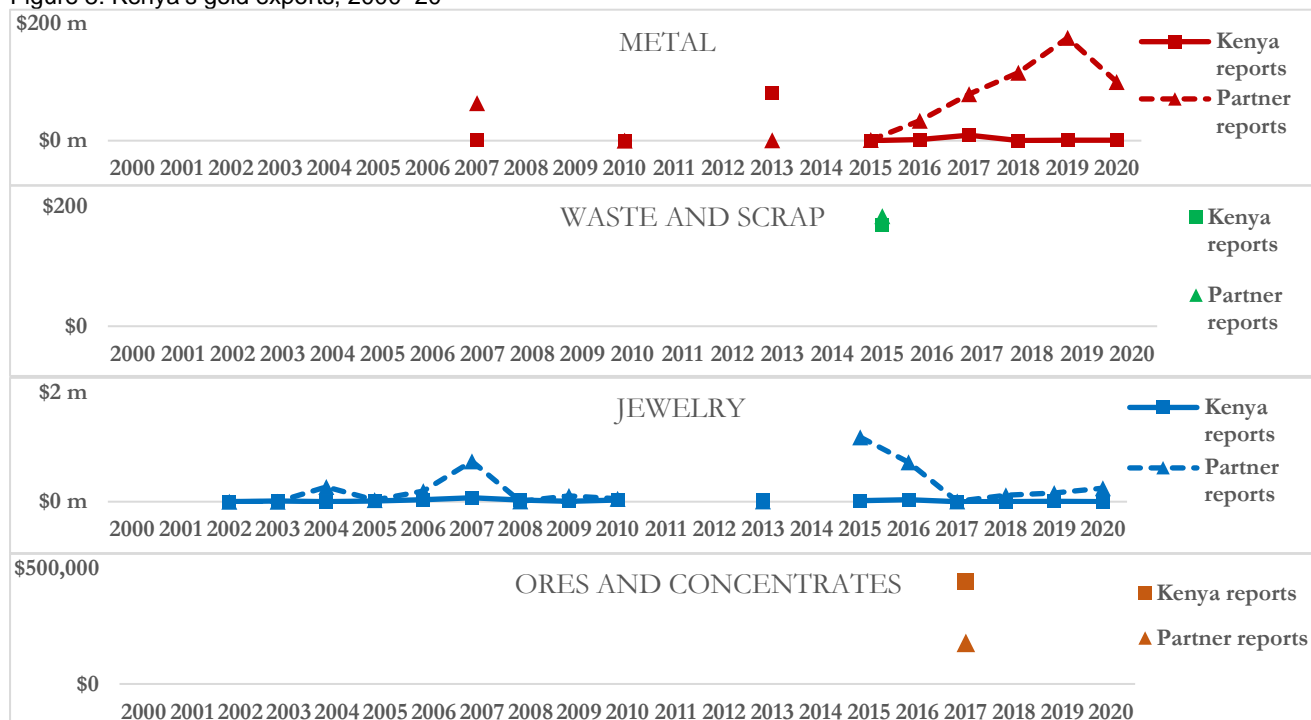


Source: authors' illustration based on Comtrade data.

5.2 Kenya's gold trade

Over the past 21-year period, Kenya's reporting of gold exports was quite inconsistent, with gold metal showing the greatest discrepancies in reporting, when these data were reported (Figure 8). There was a relative lack of reporting of gold metal by Kenya from 2000–15. Over time, Kenya reported only a minimal amount of gold scrap exports in 2015. The country's reported jewellery exports showed a different trend and were the most consistent, which differentiates it from other East African countries, including Rwanda, for which jewellery reporting was much more sporadic, and Uganda, which consistently reported both gold metal and jewellery. There was a gap between 2010 and 2015, except for 2013, when jewellery exports from Kenya were not reported by any countries. Of note is the fact that in 2007 and 2015, Kenya's trade partners reported a much higher value of jewellery imported from Kenya than Kenya reported exporting to these countries.

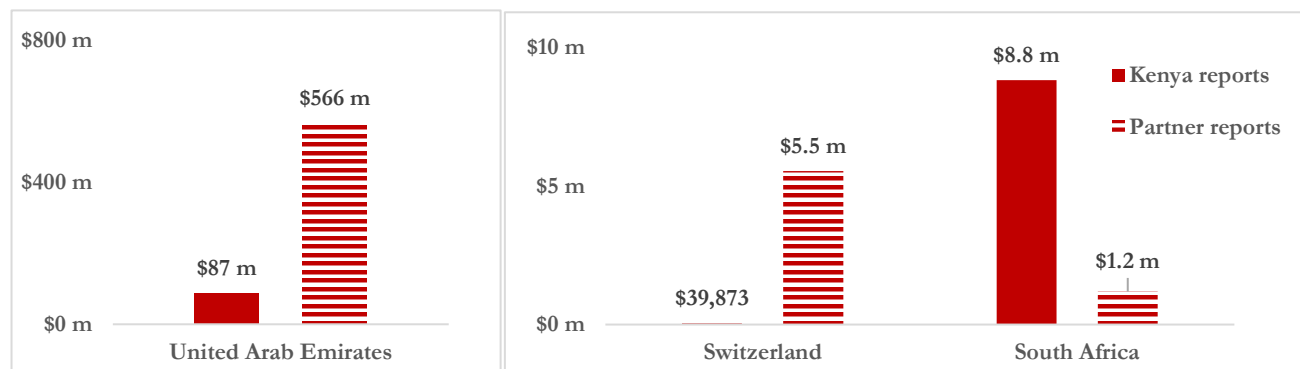
Figure 8: Kenya's gold exports, 2000–20



Source: authors' illustration based on Comtrade data.

Kenya reported gold metal exports to the UAE and South Africa, with the UAE receiving the majority of gold metal from Kenya and showing an excessive normal discrepancy and South Africa showing a perverse discrepancy (Figure 9). Kenya reported less than US\$40,000 of exports to Switzerland; however, Switzerland reported gold metal imports from Kenya valued at over \$5 million, showing an excessive normal discrepancy.

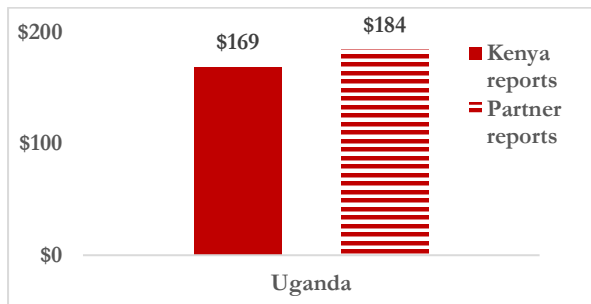
Figure 9: Kenya's gold metal exports and importing countries, 2000–20



Source: authors' illustration based on Comtrade data.

Kenya reported exporting gold scrap to Uganda in only one year (2015), with a normal discrepancy after considering the 10 per cent margin for taxes, duties, and transit costs (Figure 10).

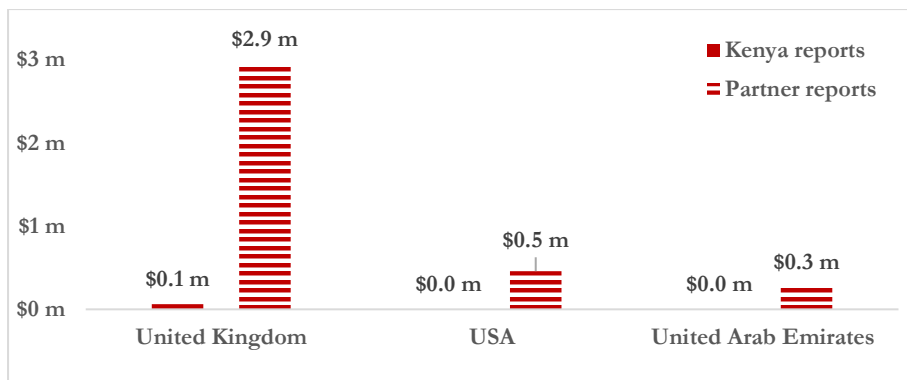
Figure 10: Kenya's gold waste and scrap exports and importing country in 2015



Source: authors' illustration based on Comtrade data.

Kenya declared exports of jewellery only to the UK, which, along with the US and UAE, reported receiving gold jewellery from Kenya (Figure 11). The UK showed an excessive normal discrepancy.

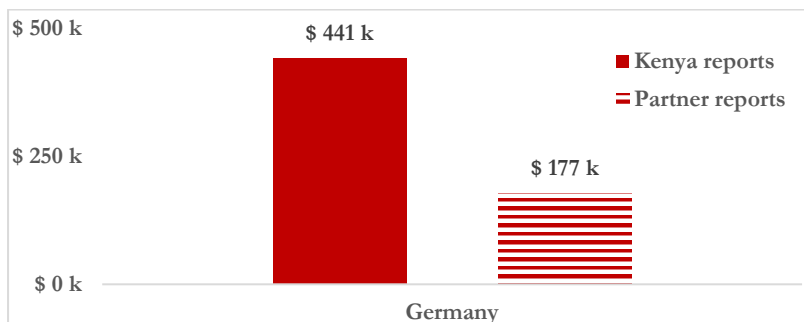
Figure 11: Kenya's jewellery exports and importing countries, 2000–20



Source: authors' illustration based on Comtrade data.

Kenya reported exporting gold concentrates only to Germany in 2017, showing a perverse discrepancy (Figure 12).

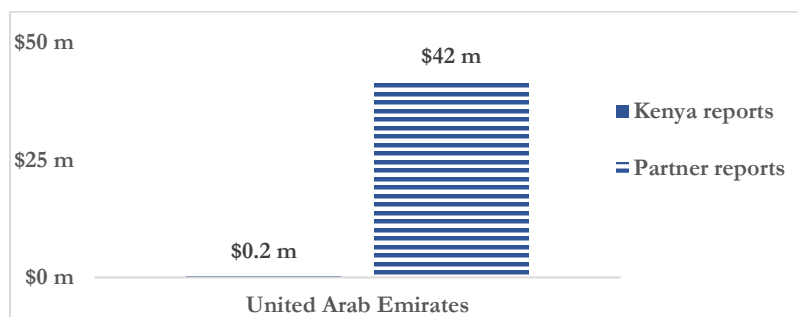
Figure 12: Kenya's ores and concentrates exports and importing country in 2017



Source: authors' illustration based on Comtrade data.

Kenya reported minimal gold metal imports, yet the UAE reported a significant amount of gold metal exports to Kenya, showing a perverse discrepancy (Figure 13).

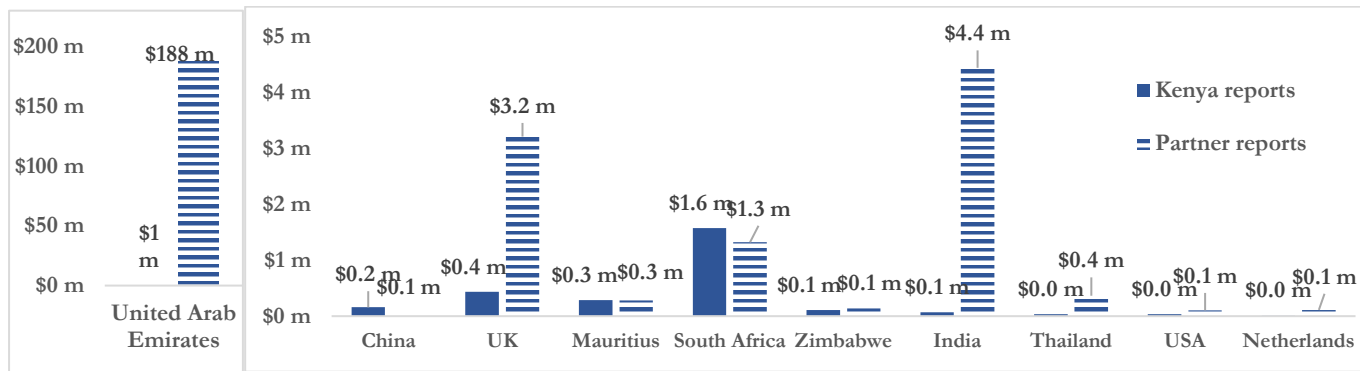
Figure 13: Kenya's gold metal imports and exporting country, 2000–20



Source: authors' illustration based on Comtrade data.

Kenya did appear to import a significant amount of jewellery, primarily from the UAE (Figure 14). While Kenya did not report the bulk of these imports, in 2021 the UAE reported exporting gold jewellery to Kenya with a value of nearly US\$45 million—double the amount that the UAE had reported exporting in previous years. The UAE was the only significant exporter of gold-based jewellery to Kenya, with the second-largest exporter being India and the third-largest the UK. All of these trade values showed a reverse discrepancy. Of note is the amount of gold jewellery that was imported from South Africa to Kenya; however, the discrepancy was normal given the 10 per cent margin. Kenya did not report any imports of gold ores and concentrates or of gold waste and scrap, and no country reported exporting these goods to Kenya.

Figure 14: Kenya's gold jewellery imports and exporting countries, 2000–20



Source: authors' illustration based on Comtrade data.

6 Discussion

Some noticeable results emerged from our Comtrade data analysis. In this section, we highlight these and add more depth by including qualitative data generated from our interviews, as well as supporting evidence from the literature. We first focus on Peru, where the scale of gold production and trade is significantly higher than Kenya. Our analysis of the Comtrade trade data on Peru's gold exports and imports points to some of the potential ways in which the origins or sourcing of gold can be obscured. It also provides new insights into the global flow of gold concentrates and highlights the role of the US as a gold trading partner with Peru. We then turn to Kenya, a smaller gold producer than Peru, but where discrepancies in gold metal and gold jewellery trade values put a spotlight on the largely informal nature of gold production in the country and the roles of the UAE and India in the gold trade.

6.1 Highlights from Peru

For Peru, over the 21-year period of this study, gold metal exports showed the least discrepancies. There are several large gold mines in Peru owned and operated by multinational companies that export gold as metal, and generally, artisanal and small-scale mined gold is exported as metal. These activities are reflected in the quantity of gold exported from Peru. Given that ASM gold accounts for 20 per cent of Peru's gold production, this apparent alignment between Peru's reporting and that of its trade partners is somewhat surprising due to the association of ASM with illicit activities. Diving deeper into Peru's gold production sheds some light on this. In 2021, Peru's average monthly reported gold production was nearly half (44 per cent) of the average monthly exports (Martinez et al. 2023). This indicates that a large amount of gold was not registered with the tax authorities in Peru; however, it was accounted for before it left the country.

Although the reporting of gold waste and scrap and jewellery by Peru and its export partners was relatively aligned over time, there are a couple of areas to highlight. Gold waste and scrap showed significant excessive normal discrepancies in 2016 and again in the last year of this study, 2020. Gold jewellery showed excessive normal discrepancies in 2019, with an increase in this discrepancy in 2020. Although we cannot determine a relationship between gold waste and scrap and jewellery from these data, any kind of gold, especially unsold jewellery, can be labelled and shipped as scrap (Drummond 2011). This shift in designation can be exploited for anything from tax fraud to laundering the true origin of mined gold (Drummond 2011). The connection between gold waste and scrap and jewellery is evident in the marketing of 'recycled' gold. Big jewellery companies have engaged in the positive marketing of 'green' gold and have stated that they are moving to recycled gold by 2025 (Pandora 2020). This kind of marketing can be misleading and provide a veneer of transparency and responsibility to illicit gold that easily makes its way into the licit supply chain.

The discrepancies in reported trade values of gold ores and concentrates in the recent years of this study mirror other countries' recent trade reporting for concentrates. For example, in 2020, South Africa reported exporting to Germany 257,771 kg of concentrate valued at US\$4.5 million, while Germany reported importing from South Africa 131,767 kg—but valued that concentrate at over 1.4 billion (Comtrade, 2021). Hence, the concentrate left South Africa valued at \$17.70/kg and arrived in Germany valued at nearly \$11,000/kg. The change in price might partly reflect the value of the concentrate after beneficiation in Germany; however, it constitutes an inaccurate record of the actual imports, prior to beneficiation. Similarly, in 2019, Finland reported exporting to the UK 94 kg of gold concentrate worth US\$1.25 million. The UK reported receiving from Finland 2,285 kg valued at \$8.9 million. This indicates that the gold left Finland priced at \$1,334/kg and arrived in the UK valued at over \$39,000/kg (Comtrade, 2021).

There are several reasons why gold concentrates would be an ideal commodity for exploitation by illicit networks. First, there are no price benchmarks for gold concentrates, and prices are agreed ad hoc between buyer and seller. Second, a cargo of gold concentrate cannot be fire-assayed or scanned with an XRF (X-ray fluorescence) gun for an assessment of purity and value. Usually, high-value concentrate is more likely to be entrusted to established commodities traders and traced more carefully than low-quality concentrate. Third, gold concentrate sometimes goes to copper smelters instead of gold refineries, and these smelters separate out the gold and sell it. This follows a supply chain distinct from what we habitually think of as the gold supply chain. Fourth, gold concentrate, unlike bullion, carries VAT in most jurisdictions, opening the door to various forms of VAT fraud, including carousel fraud. Finally, depending on processing technology, gold concentrates can be beneficiated from low grade to medium, or medium to high, which makes for a range of concentrate products that might be traded and shipped with varying prices. All of these issues add layers of opacity to the actual value of the gold being moved.

Most of Peru's gold jewellery exports went to the US, and the excessive normal discrepancies evident in the values reported by Peru and the US bear deeper examination. These discrepancies could indicate gold smuggling through the jewellery trade; they may also point to tax fraud or trade-based money laundering (TBML) in the form of large-scale mis-invoicing. According to a former Peruvian government employee whom we interviewed, jewellery exports receive little to no scrutiny from Peruvian customs. Also of note was the discrepancy in jewellery export reporting between Peru and Colombia, with Peru reporting jewellery exports worth US\$2 million to Colombia and Colombia reporting jewellery imports from Peru worth more than \$11 million. Jewellery, by its nature, could be a way to legitimize gold, whereby it is put into the market with a different label, such as scrap.

6.2 Highlights from Kenya

The Comtrade data on Kenya and its trade partners show some different features that can be further unpacked and highlight other aspects of the gold trade. Kenya's reporting, and that of its trade partners, on gold waste and scrap and gold ores and concentrates was essentially negligible, and the reporting on gold metal showed that gold metal was the highest-valued gold commodity with the most trade discrepancies. This may reflect Kenya's greater reliance on gold produced by a primarily informal ASM sector. Artisanally mined gold can be easily transported from one country to another without being detected, and there is evidence of an increasing amount of Kenyan gold being illegally brought to Uganda and Tanzania (Hunter et al. 2021). These routes are also those typically taken by mercury, given the interconnectedness of the chemical with gold processing. The Malaba border post along the Ugandan border is noted as a common mercury transit point (NEMA 2019). Price fluctuations for both gold and mercury are a primary factor in shifting trade flows from one direction to another.

A legal permit is required to export gold, but many gold exporters apparently circumvent this requirement, as was highlighted in a report by the auditor-general for the 2018/19 financial year (Mutai 2021). The report noted a number of 'irregular' exports conducted by companies that did not appear to have valid export permits, as required by Kenyan law (Mutai 2021). Gold being illegally exported outside of Kenya is often transported via air travel (IndiaTV 2014; Teyie 2021). Some larger traders use private jets (Martin 2020), while others use commercial airlines. In both cases, gold is actively obscured and not declared. A number of documented cases of attempted gold smuggling via commercial flights highlight the range of methods that smugglers have utilized in order to conceal gold, such as by using specially made gold items that can be worn and concealed under clothing (Shaikh 2018; NDTV 2022) or hiding gold within food and beverage items. In some cases, commercial airline employees have been involved in gold smuggling (Shaikh 2018).

Regardless of whether gold exits Kenya directly or via neighbouring countries, it is well documented that the majority of East Africa's gold makes its way to Dubai in the UAE (Marks et al. 2021). The data from Comtrade confirmed this for Kenya, as the majority of Kenya's gold metal was exported to the UAE. It also appears that Kenya imported gold metal from the UAE, although Kenya's reporting on this was minimal compared with the UAE's. Kenya also imported a significant amount of gold jewellery from the UAE. The UAE is the fifth-largest exporter of jewellery in the world, a trade worth US\$5.38 billion in 2020 (Observatory for Economic Complexity 2021). Jewellery imported into Kenya from the UAE appears at least in part to serve domestic jewellery stores. According to one trader interviewed in Mombasa, gold jewellery found in Kenya is imported from UAE or India or is jewellery that has been stolen or improperly registered.³

The trade data from Kenya highlight the important role that both the UAE and India play with respect to the global gold and jewellery market. Over the past ten years, the UAE and India have been among the top five gold metal importing countries in the world, with the exception of 2016 and 2020, when India was in sixth place. In addition to being large importers of gold, both countries also export significant quantities of gold jewellery. In 2021, the UAE was the third-largest exporter of gold jewellery, with an export value of US\$9.9 billion, while India was the fifth-largest exporter, with a value of \$8.4 billion (Comtrade 2021).

India's exports of gold jewellery are significant for several countries. In 2021, ten countries imported a value of nearly US\$100 million in jewellery from India, with the US and the UAE reporting the most at \$3.2 million and \$2.7 million respectively (Comtrade 2021). The UAE also exports a significant amount of gold jewellery; in 2021, its top destinations included China/Hong Kong, Kuwait, Saudi Arabia, Iraq, Switzerland, Turkey, and the US. The extent to which these countries have been labelled as key destinations for illicitly traded gold (Marks et al. 2021; IMPACT 2019), coupled with the volumes of jewellery being exported out of them to all corners of the world, presents a significant challenge for the global jewellery industry writ large. The extent to which gold from varying sources is aggregated together at various points along the supply chain, along with the general opacity of the chain, makes it nearly impossible for most jewellers to identify whether problematic gold is entering their products.

The Comprehensive Economic Partnership Agreement (CEPA) signed in 2022 between India and the UAE emphasizes the vulnerability of scrap gold to illicit exploitation (CEPA 2022). The CEPA does not define scrap gold but eliminates all import taxes on it from the UAE to India, without requiring any value added or processing. As one industry observer has noted, the result is an open door for virtually any form of gold to be exported from the UAE to India and called 'scrap' (Shah 2022). This possibility for this gold to become duty-free is troubling given that much of the ASGM production out of Africa is reportedly imported into the UAE as scrap (Shah 2022), although Kenya reported no scrap exports. And while the UAE has recently taken first steps to limit gold smuggling and GBML more rigorously within its borders, Indian regulations still incentivize smuggling and GBML (IGPC 2022; Martin 2019; Sahay and Nambiath 2020).

³ Interview conducted by IMPACT with former gold trader, Mombasa, Kenya, July 2021.

7 Conclusions

Taken together, the results presented here from Peru and Kenya represent starting points from which to examine illicit gold supply chains more closely. Moreover, they emphasize areas that should receive more attention when legislating and conducting due diligence on gold supply chains.

It is evident from our analysis that gold supply chains are shaped by the contexts through which they flow, operating at different scales and with distinctive characteristics. Any effort to improve transparency in gold supply chains must be designed to fit these different contexts.

Illicit flows of gold present several risks to governments—including significant loss of revenues from the taxation of gold production and trade. While it is ideal for governments to extract value from national gold deposits, the informal nature of the artisanal gold sector and the ease with which gold can be smuggled necessitates a fiscal approach that does not inadvertently incentivize actors to produce, sell, or buy gold informally. Further, in contexts like Kenya, where gold production is more nascent and small-scale, the investment required to be able to apply the fiscal regime and extract revenue from the sector may outweigh the benefits the state may secure. Governments may want to focus more on creating a conducive environment for formalizing the sector and mitigating other potential risks, such as the use of mercury or injuries/deaths due to poor health and safety practices, prior to focusing on revenue collection. Further, governments need to carefully consider the extent to which overly burdening the ASGM sector from a revenue-collection perspective may push actors to choose illicit channels in order to avoid these payments.

In general, the ASGM sector has been a primary focus of initiatives targeting transparency in gold supply chains. This may be an appropriate emphasis in Kenya given the discrepancies in gold metal trade data and the largely informal nature of gold mining and gold supply chains there. However, our research shows that in Peru, midstream sections of the supply chain may play a greater role in obscuring the origins and value of gold. While efforts should continue to encourage and support a more responsible and transparent ASGM sector, attention should also be given to sites where gold is traded, refined, and exported. On a global scale, trade partner countries which exhibit significant discrepancies in amounts and values of gold traded could be examined for potential legal loopholes in valuing and labelling gold.

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