



Misinvoicing in mineral trade: what do we really know?

Olle Östensson¹

Received: 10 October 2017 / Accepted: 20 December 2017 / Published online: 14 February 2018
© The Author(s) 2018. This article is an open access publication

Abstract

The present paper reviews studies of trade misinvoicing by three organizations. One of them is general in nature and does not address directly the issue of trade misinvoicing of minerals. One arrives at some conclusions which are difficult to check but which seem to indicate that misinvoicing is of major importance in African mineral trade. The third arrives at similar conclusions and contains detailed data that make it possible to check the accuracy of the claims. The review shows that the studies suffer from important weaknesses: elementary checks of data have not been carried out and any anomaly is considered proof of illicit capital flows without any further investigation. Thus, while we do not really know much with any certainty about the significance of misinvoicing in mineral trade, we do know that the published estimates are gross exaggerations. The organizations responsible for the estimates would be well advised to have future publications peer-reviewed by external reviewers.

Keywords Misinvoicing · Illicit capital flows · Commodity trade · Minerals trade

Introduction

Misinvoicing, where the value of goods is declared as lower or higher than the normal or market value, may be a very important problem in world trade: It is often argued that it is one of the major means whereby illicit capital flows aiming to avoid taxes and trade duties occur. It is important to note that the estimates of trade misinvoicing reported in studies do not represent actual losses to the economies concerned. The losses, in the form of forgone tariffs or taxes, are smaller than the gross value of the flows, although in some cases they could be large relative to the size of the economy concerned. In countries with strict capital controls, illicit flows can be associated with evading capital controls. As argued by Forstater (2016), “This can be motivated by concern about financial instability or predatory government or by a desire to access international

investment and consumption. This should not be conflated with theft of public money or loss of investment funds. However, it might be argued that it reduces the stake of elites in ensuring property rights and development at home.” Other effects, such as the impact of capital flows on the exchange rate, should of course also be taken into account and may be of considerable importance at certain points in time.

Estimates of illicit capital flows have traditionally used a residual method, where the net of capital flows into and out of a country is compared to the change in the value of total assets. Apart from statistical and other errors, a mismatch between the two may indicate that capital flows have not been declared. A number of studies have attempted to estimate the extent of the problem, often finding that it is of impressive size, justifying assertive measures to control and reduce it. In recent years, attempts have been made to estimate the magnitude of misinvoicing of trade as an additional vehicle for illicit capital flows. Some studies have found that such practices result in massive illicit capital flows.¹ Moreover, some studies have attempted to demonstrate that trade in natural resources is a particularly important element of the overall phenomenon. In

This paper is dedicated to Marian Radetzki in belated celebration of his 80th birthday. Marian has always been the first to question conventional wisdom and “accepted truths” and has been an example to us all in that respect. Thanks go to Mehmet Arda for several helpful and clarifying comments and suggestions.

✉ Olle Östensson
olleostensson@gmail.com

¹ University of Dundee, Dundee, Scotland

¹ For instance, Global Financial Integrity (2017, p. viii) estimates that trade invoicing accounted for illegal financial flows corresponding to on average 12.4% of developing country trade during the period 2005 to 2014. It should be noted that, strictly speaking, the loss to governments amounts only to the sum of taxes and duties that would otherwise have been paid, not the entire difference between export and import data representing the illicit capital flow.

the following, a few of the studies on trade misinvoicing, including two that present significant results for international trade in minerals, are reviewed in order to assess whether their results are sufficiently reliable to be used as a basis for public policy, at the national or intergovernmental level.

Background

It is argued that trade misinvoicing as an instrument of illicit capital flows mainly takes place as underinvoicing of exports, whereby less is received and declared for exports than would normally be the case, and overinvoicing of imports, whereby more than the normal prices are paid for imports. More complicated manoeuvres are of course possible, for instance, underinvoicing of imports with the difference between the price paid and the normal one being paid into overseas accounts. However, several of the attempts to study the problem have focused on the simpler variations.² Misinvoicing in the form of underinvoicing of exports or overinvoicing of imports may be used to reduce taxable income. Another motive may be to reduce the imposition of trade duties either at the exporting or importing end. Finally, trade misinvoicing can be seen as an avenue of capital flight. Capital flight is a phenomenon that can result in official outflow of capital in response to adverse change in political and economic environment. Therefore, for capital to choose trade misinvoicing to move money out, the capital controls in place would have to be sufficiently high. When loose capital controls exist for an economy, the flight of capital can take place through official channels. However, with sufficiently stringent controls, capital may choose to move through the route of misinvoiced trade (Tandon and Kavita Rao 2017, p. 10). Results by Patnaik et al. (2010) suggest that trade misinvoicing should be seen as one element of de facto openness on the capital account: “Economic agents who desire capital movements for traditional reasons such as financial portfolio diversification, bets on exchange rate movements, are likely to achieve these movements through trade misinvoicing. To the extent that misinvoicing is feasible, countries do not have a choice about embarking on high capital account openness once they have adopted high current account openness.”

Studies of trade misinvoicing commonly rely on a mirror analysis of trade data, where the value of exports of a particular good from country A to country B according to country A's export data is compared to the value of imports of the same good to country B from country A according to country B's import data. If the registered value of the exports is significantly lower than the value of imports, then underinvoicing of exports or overinvoicing of imports may have taken place.

² World Bank Group (2017) provides a good overview of transfer mispricing as well as other mispricing practices specifically for mining.

The estimates are normally based on either the IMF's Direction of Trade Statistics (or DOTs) or the United Nations Commodity Trade Statistics (Comtrade). Since both use reported national trade data, the differences between them are normally not significant.

It is important to note that estimates based on mirror analyses of this kind using these data are subject to a number of discrepancies that have little to do with trade misinvoicing. Important sources of discrepancies, some particularly relevant in the case of minerals trade, include the following:

- Unintentional errors in the classification of goods with the same good being classified differently when exported and imported, or in the volume or value of goods: Errors are relatively common in trade statistics. A study on copper trade based on Comtrade data found approximately 650 records that had to be edited in an aggregated database of 37,000 permutations of reporter and partner regions because they showed improbably large deviations from the time series' trend, not including discrepancies visible in a mirror analysis (Tercero and Soulier 2016). The number is less than 2%, which may appear small, but it has to be seen in conjunction with the 12.4% of total developing country trade that is subject to trade misinvoicing according to one estimate (Global Financial Integrity 2017, p. viii).
- Intentional discrepancies in goods classification, for instance, to reduce duties levied at either the export or import end: Such mistakes often constitute a form of tax evasion but do not necessarily represent illicit capital flows from developing countries since the trade will be reported, only under the wrong tariff line and, presumably, at the same price.³ However, the entire value would be counted as trade misinvoicing in a mirror trade analysis.
- Recorded export destinations being different from actual ones because goods are sent to bonded warehouses or other similar transit points, with the country where the warehouse is located recorded as destination: This type of error may be quite important, particularly for minerals, which are often held in bonded warehouses for extended periods. Even where the commodity eventually leaves the warehouse to be registered as imports in the same country, the delay could lead to exports and imports being reported as occurring in different years. For instance, metals sent to London Metal Exchange (LME) warehouses anywhere in the world may remain there for very long periods of time, making any determination of final destination and matching exports and imports to the same trading year very complicated. Another example is provided by the

³ This type of error may be quite common. The author recalls being told by a metal trader many years ago how to circumvent export controls for unwrought copper in a particular country: “you take a wirebar (the most commonly traded form of copper at the time, author's note), bash it with a sledgehammer a couple of times and then it's classified as scrap”.

frequent accumulation of metal stocks, particularly stocks of iron ore, in Chinese ports. In May 2017, such iron ore stocks reached 136 million tonnes, representing about 2 months of Chinese imports and a value of approximately \$8 billion (Business Insider Australia 2017). The existence of such stocks may lead to large discrepancies between years.

- Price changes while goods are in transit: For goods that have spent some time in transit, for instance in bonded warehouses, price changes may be important. However, depending on pricing practices, they can also be significant for commodities that travel straight from seller to buyer, for instance, if the seller has hedged the sale by buying futures or options that allow her to lock in a certain price and the physical deal is settled at the spot price at the time of delivery.
- Discrepancies between estimated and actual freight costs: Export values are reported free on board or fob, while import values are reported including cost, insurance, and freight, or cif. Since a mirror trade analysis cannot very well attempt to estimate representative freight costs for all goods, a standard markup, usually 10%, is applied to export values to place them on an equal footing with import values. While 10% may accurately represent the portion of import values that is accounted for by freight and insurance for all goods on average, there are good reasons to believe that the portion is higher for many minerals. For instance, over the past decade, freight has accounted for between 15 and 50% of the price of Chinese imports of iron ore from Brazil and for 5 to 30% of imports from Australia. Similar proportions apply to other low value minerals that are commonly shipped in dry bulk carriers.

Overall, the sum of errors may be small compared to overall misinvoicing and may offset each other. This is at least claimed by one of the more authoritative sources of estimates, Global Financial Integrity (see the “Global financial integrity” section in the following), which states

Some discrepancies in the trade misinvoicing (GER) and balance of payment leakages (HMN) figures reflect statistical errors in the reporting that underlies the official data. However, such measurement errors are probably on the decline as the capacity, experience, and training among developing world customs agencies and statistical compilers has increased. Any overstatement in illicit flows due to statistical errors is almost certainly offset by all the other factors that these official calculations simply cannot capture: bulk cash transfers, same invoice faking, misinvoicing in services and intangibles, and hawala transactions. It is unlikely that developing countries accidentally omitted over US\$1 trillion from their economies in 2013. (Global Financial Integrity 2015, p. 4.)

While the argument is slightly misleading since it appears to say that even systematic discrepancies are not important because other larger problems are not reported at all, it is conceivable that the sources of discrepancies are small compared to overall trade misinvoicing globally. Nevertheless, discrepancies for individual countries or products can be significant, particularly if they result from systematic differences, for instance, in goods classification, underestimated freight costs or a large portion of trade going through transit points or bonded warehouses, rather than recording errors. As has just been argued, some of the sources of discrepancies are likely to be more important for minerals than for trade on average. Conclusions for individual countries or commodities may thus be inaccurate.

As Forstater (2016) notes,

One further clue that ordinary merchanting and transit trade involving international hubs may be significant in generating trade misinvoicing estimates can be seen from the overall pattern of goods trade reported globally. While there are significant mismatches between exports and imports reported by pairs of countries, it is striking that globally, imports and exports track each other closely, falling within the 10% margin conventionally allowed for the cost of transport and insurance overall. Why would billions of dollars of over- and underinvoicing cancel each other out so neatly each year, so as to appear invisible? It is hard to imagine how this would happen if the data mismatches mainly reflected separate, hidden frauds carried out by disparate entities to move money across borders... However, this pattern of over and under invoicing netting out neatly is consistent with mismatches that would be expected from merchanting and transit trade along commodity supply chains.

It is important to underline the difference between misinvoicing and transfer mispricing.⁴ By definition, transfer mispricing occurs between related parties, which is not necessarily the case for trade misinvoicing.⁵ In the case of transfer mispricing, there

⁴ The term transfer mispricing is used here rather than transfer pricing, since the latter term describes a practice that is necessary in all cases of trade between related parties and that is usually both legal and compliant with established accounting practices.

⁵ Transfer mispricing may also amount to misinvoicing, as in a classical case involving Alusuisse, an aluminum company based in Switzerland, and the Icelandic government. Alusuisse's Icelandic smelter, ISAL, obtained its alumina from affiliated mines in Australia. In the early 1980s, however, the Icelandic government discovered that the internal transfer prices used were far in excess of what could be justified by the cost of alumina in Australia and the transportation costs from Australia to Iceland. Alusuisse agreed to pay back taxes to help resolve this matter. (Skúlason and Hayter 1998). The Australian tax authorities subsequently demanded additional tax payments from Alusuisse's Australian subsidiary, Austraswiss, on the grounds that alumina prices reported to them had been understated (Raw Materials Report 1986).

is in principle no difference between the export and import value and only one invoice, but the price used in the invoice is different from the arm's length price.

There are few examples of either transfer mispricing or trade misinvoicing having been clearly documented.⁶ Readhead (2016) cites some examples, particularly in individual case studies underlying her main study,⁷ and provides an overview of experiences in a number of African countries, finding that they face several major challenges in implementing transfer pricing rules, including lack of regulations, data on comparable transactions, and appropriate administrative structures, as well as difficulties accessing taxpayer information from other jurisdictions. There are, however, few clearly documented cases of trade misinvoicing or transfer mispricing for minerals, and the difficulties just described may explain why so few examples are known.

Against the background of scarce concrete evidence of trade misinvoicing in individual cases, it is perhaps not surprising that researchers and others with an interest in trying to establish the extent of trade misinvoicing have turned to more indirect methods. Estimates of illicit capital flows have provided a starting point for this work. Trade misinvoicing is believed by many to represent a large portion of such flows. One of the best known sources of estimates estimates that it represents 87% of illicit financial outflows from developing countries (Global Financial Integrity 2017, p. vii).

Studies of trade misinvoicing

Global Financial Integrity

Global Financial Integrity (GFI in the following) is a non-profit, Washington, DC-based research and advisory organization, which produces analyses of illicit financial flows, advises developing country governments on policy solutions, and promotes transparency measures in the international financial system. It publishes a report on illicit financial flows from developing countries at intervals of about 1 year.

GFI uses one of two procedures to calculate trade misinvoicing, depending on the availability of bilateral trade data (Global Financial Integrity 2015, p. 47–48). It uses IMF data.

⁶ One of the more often cited examples of alleged transfer pricing is the case of the Mopani mine in Zambia. The mine is owned by Glencore, a trading company, and in a leaked audit report commissioned by the Zambian government, it was claimed that copper exports had been systematically underpriced (Grant Thornton and Econ Pöyry 2010). A review of the claims in the audit report shows that they were at the very least strongly exaggerated and based partly on misunderstandings (Chamber of Mines of Zambia and ICMM 2014, Annex C). The Zambian Government took no action against Mopani on the basis of the audit report.

⁷ See <https://resourcegovernance.org/analysis-tools/publications/preventing-tax-base-erosion-africa-regional-study-transfer-pricing> for these case studies.

When bilateral trade data are available for countries, GFI calculates trade misinvoicing for a particular developing country by comparing that country's reported exports to and imports from advanced countries with the corresponding reports by the advanced countries of imports from and exports to the developing country. These discrepancies thus reflect trade misinvoicing for developing countries vis-à-vis the group of advanced countries only. Next, for each developing country in the sample, the trade discrepancies are marked up to reflect trade vis-à-vis the rest of the world by applying a ratio equal to that country's trade volume with the world relative to its trade volume with advanced countries only. Finally, the bilateral trade misinvoicing estimates are adjusted for entrepôt trade through Hong Kong, using re-export statistics from the Hong Kong Census and Statistics Department. Because disaggregated re-exports data are not available for other major trade entrepôts such as Singapore and Dubai, no similar adjustment is made for trade passing through these countries.

When bilateral trade data are not available, the trade discrepancies are calculated in the same way as described above except that world trade reports must be used in place of the (presumably more accurate) advanced country trade reports used in the previous calculation. Other than that, the data are adjusted in the same way as described above for the bilateral advanced countries calculation.

A potentially serious problem with GFI's calculations is that they assume, when using bilateral data, that developed country data are correct and implicitly that misinvoicing is practiced only in developing countries. However, a study comparing developed and developing countries found a higher frequency of export misinvoicing by developed countries than by developing ones (Tandon and Kavita Rao 2017, p. 4).

GFI arrives at high estimates of trade misinvoicing. According to its latest report, misinvoicing of developing country trade represented at least \$1756 billion in 2014, or 12.4% of their total trade (Global Financial Integrity 2017, p. viii).

GFI does not present any sectoral or commodity group estimates for misinvoicing and no conclusions concerning such groups can therefore be drawn directly from its estimates. However, it does represent individual country estimates and high estimates in the case of, for example, Nigeria, which have led many to conclude that trade in particular commodities, oil in the case of Nigeria, accounts for a high portion of misinvoicing. GFI has, however, changed its approach and estimates when information pointing to systematic errors for some commodities has become available. Thus, it states in its latest report:

Due to bilateral data availability, Zambia and South Africa... were calculated in our most recent report using the bilateral advanced economies method. However,

irreconcilable issues in the destination reporting of Zambia's copper exports and South Africa's gold exports distort bilateral estimates of misinvoicing to such a degree that bilateral estimations of misinvoicing for these countries are of little practical use. To mitigate this destination reporting issue, we have decided to treat these countries as world reporters and apply the world aggregate method. (Global Financial Integrity 2017, p. 45–46).

The issues concerning South Africa and Zambia will be addressed in more detail in the “UNCTAD” section in the following.

GFI considers its estimates to be conservative. It may very well be true that real illicit capital flows are as large as or larger than its estimates. However, we do not know. Moreover, some of GFI's assumptions rest on uncertain ground. First, while it may be true that recording errors in different directions can be expected to offset each other, systematic discrepancies cannot be expected to do so. Intentional misclassification of goods and discrepancies between exporting and importing countries concerning export destinations due to re-exports are likely to be two of the most important. The above quotation concerning South Africa and Zambia makes it clear that GFI's earlier estimates of trade misinvoicing for these countries were exaggerated. As long as GFI does not provide any insight into its detailed data, it is not possible to say how common or important such discrepancies are, unless one repeats the entire exercise in order to identify possible sources of systematic errors.

African Union/United Nations Economic Commission for Africa

The 4th Joint African Union Commission/United Nations Economic Commission for Africa (AUC/ECA) Conference of African Ministers of Finance, Planning, and Economic Development was held in 2011. This Conference mandated ECA to establish the High Level Panel on Illicit Financial Flows from Africa. In 2015, the Panel, which was chaired by former President of South Africa Thabo Mbeki, published its report.

The AU/ECA report, which only analyzes African trade, uses a slightly different method from the GFI. First, it uses Comtrade data instead of the IMF statistics, which allows it to access more detailed data (six-digit level in the Harmonized System). Second, it “nets off” the estimates—that is, its estimates are the difference between the trade mispricing illicit financial flows in the two directions for a given pair of countries for a given product, while GFI disregards inflows that is. Third, to calculate the cost of insurance and freight, an econometric model estimating transport costs is used to assess cif values and mirror flows at fob prices, while GFI uses a fixed cif/fob ratio of 1.1 for assessing the value of cif. Fourth, ad

valorem equivalents are used to represent the time to trade across borders (African Union and United Nations Economic Commission of Africa 2015, p. 95). These differences mean that in principle, the AU/ECA estimates should be somewhat more accurate than the GFI ones, although their incidence is likely to be almost negligible, except possibly for the use of a model to estimate transport costs, where it is difficult to assess the importance without having seen the model.

The AU/ECA estimates for trade mispricing for Africa are higher than the GFI ones although of the same order of magnitude, at \$242 billion for the 2000–2008 period, compared to \$162 billion for GFI. More interesting for the purposes of this paper, AU/ECA provides a breakdown by commodity groups at the two-digit level of the Harmonized System. During the period 2000–2010, the three most important categories were (African Union and United Nations Economic Commission of Africa 2015, Table AIII.4) as follows:

1. Oil (HS 27) \$83.4 billion
2. Precious metals (HS 71) \$57.2 billion
3. Ores (HS 26) \$15.2 billion

Copper (HS 74) with \$12.2 billion and iron and steel (HS 72) with \$10.9 billion were in sixth and seventh place, respectively. These five groups accounted together for \$179 billion, or 56% of the total estimated trade misinvoicing for African countries.

The report also provides some individual country data, although not in sufficient detail to allow an analysis of the possible reasons underlying the reported instances of misinvoicing. Thus, it mentions that in precious metals and minerals, iron and steel, and ores, the greatest shares in total illicit capital flows due to trade misinvoicing from Africa are from the Southern African Customs Union (SACU), with 97.6, 59.7, and 51.8%, respectively. Zambia accounts for 65% of misinvoicing in copper (African Union and United Nations Economic Commission of Africa 2015, p. 97). In all these cases, exports are found to be underinvoiced. It is somewhat surprising that only one or two countries account for most of the illicit capital flows due to trade in minerals and that revenues from such a large portion of exports in these countries could go missing. A more detailed investigation would seem to be called for but it is not provided in the report. The following section will demonstrate that most or all of the estimated misinvoicing is due to statistical errors.

UNCTAD

In July 2016, on the occasion of the fourteenth UNCTAD conference, the UNCTAD secretariat presented a study on trade misinvoicing for commodities (UNCTAD 2016a), with case studies for five countries: Chile (copper), Côte d'Ivoire

(cocoa), Nigeria (oil), South Africa (gold, iron ore, silver, and platinum), and Zambia (copper). The results are similar to the ones in the AU/ECA report. In particular, very large estimates of trade misinvoicing are reported for gold exports from South Africa and copper exports from Zambia. Trade misinvoicing is also reported for the other commodities and countries, although less important, except for the Nigerian case.

The report concludes that “the results show substantial export misinvoicing – both underinvoicing and overinvoicing – in all the five countries, with a clear preponderance of export underinvoicing, except for copper exports from Chile. It is therefore clear that export misinvoicing could be an important channel of capital flight from these countries.” (UNCTAD 2016a, p. 31). It continues to say that

a number of key results emerge at the product level. The first is the puzzling case of gold exports from South Africa, where the country’s official statistics report very little gold exports while substantial amounts appear in its leading trading partners’ records. This does not appear to be a simple matter of undervaluation of the quantities of gold exported, but rather a case of pure smuggling of gold out of the country. (UNCTAD 2016a, p. 31)

Concerning other countries, it notes that

In Chile, there is systematic and massive export overinvoicing of copper, while the results for Zambia show both underinvoicing and overinvoicing of copper exports. It would be worth investigating the sources of these differences, in particular, whether these disparities arise from differences in trade regulation regimes, tax regimes or capital control regimes between the two countries. (UNCTAD 2016a, p. 31)

The case of Zambia appears to be particularly puzzling to the authors:

Switzerland and China accounted for an accumulated \$31.8 billion of export overinvoicing and \$5.6 billion of export underinvoicing, respectively. Together, these trading partners account for 67.7 per cent of Zambia’s total copper exports...Copper exports to Switzerland present a peculiar case, as no such exports are recorded in Switzerland at all. Excluding Switzerland, Zambia recorded systematic export underinvoicing starting in 2005, with a cumulative \$12 billion in export underinvoicing over the 1995–2014 period. The peculiar feature of trade with Switzerland deserves to be explored further, especially at a more disaggregated, company level. It is possible that exports are recorded as destined to an importer in Switzerland when the

importer does not reside there, as would be the case with transit trade. Therefore, it would be important to investigate the effective destination of Zambian copper marked as exported to Switzerland that never arrives in that country. (UNCTAD 2016a, p. 16)

The report attracted considerable attention, particularly since it was presented at a high profile event during the Conference. The conclusions were rapidly queried. The main reason for this was that the report differed in one crucial aspect from other reports on trade misinvoicing: it presented the detailed data on which the conclusions were based. It was therefore possible for readers to see how calculations had been made and to identify any possible errors or misinterpretations of statistics.

In response to the many critical comments, UNCTAD subsequently produced a second revised report in December 2016 (UNCTAD 2016b). In this report, some of the estimates, particularly concerning South Africa, were changed and the comments were revised. According to UNCTAD, “The reactions to the report also revealed some areas of confusion in the interpretation of the results and inadequate understanding of the key concepts used in the analysis.” (UNCTAD 2016b, “Accompanying note for the revised version of the Report” p. 1). It goes on to discuss some of the criticisms and to defend the original report’s conclusions. In this context, it is stated:

Another possible source of abnormal discrepancies could be inconsistencies in recording of the origin and destination of products. While such inconsistencies may affect trade misinvoicing estimates at the product-partner level, their effect on estimates of total misinvoicing at the national level, which are incorporated in the estimation of capital flight, is likely to be negligible. (UNCTAD 2016b, “Accompanying note for the revised version of the Report” p. 3) and

The issue of transit trade may also be an explanation of the large discrepancies between exporting and importing countries’ commodity trade records. In the context of the much broader issue of transparency, however, this raises the question of why exports should be recorded as destined to a country when they are not shipped to that country. Clearly, if a commodity is just “transiting” in a country, it should not be recorded as an export to this country. The evidence presented in the UNCTAD report whereby export commodities end up not being tracked from the origin to their ultimate destination should be considered as a matter of concern. This practice undermines the global efforts to ensure a fair distribution of the gains from trade especially on behalf of producers in developing countries. UNCTAD 2016b, “Accompanying note for the revised version of the Report” p. 3)

In summary, UNCTAD claims (1) that discrepancies in recording of the origin and destination of products have a negligible effect on estimates of total misinvoicing and (2) that transit trade should be considered a matter of concern that undermines efforts to ensure a fair distribution of the gains from trade. The validity of the first point will be discussed in the following. As regards the second point, the claimed effects of transit trade would need to be backed up with solid evidence in order to be taken seriously. No evidence of the negative effects is presented, except for the numbers themselves, which, as will be seen, are erroneous. Since it is stated nowhere in the second version of the report that the reported misinvoicing was due to errors by the authors, UNCTAD apparently stands by the results. The results as concerns minerals⁸ are discussed in the following.

South Africa

The most controversial result was the alleged smuggling of gold from South Africa. It appeared incredible that South African gold production to a value of \$78.2 billion could have been smuggled out of the country between 2000 and 2014 without anybody noticing. A number of companies, industry associations, and academics questioned the results. Most importantly in the case of South Africa, an independent consulting firm was commissioned by the South African Chamber of Mines to review the report. It produced a draft report in November 2016 (Eunomix 2016) and a final report in June 2017 (Eunomix 2017). In summary, the two reports point out that (Eunomix 2017, p. 33):

- Until 2010, South Africa reported most of its gold exports as monetary gold, whereas UNCTAD included only non-monetary gold in its analysis since monetary gold is not included in Comtrade data (although it is easily identified in South African statistics). Many of the importing countries reported their gold imports from South Africa as non-monetary gold, which meant that import values for non-monetary appeared much larger than reported exports. This factor accounts for the major part of the discrepancy.
- After 2010, the vast majority of South African gold exports are recorded, but the destination countries are not reported due to historical practices of South African tax and customs authorities. Thus, in Comtrade, the 2011–2014 gold exports are all reflected as “unallocated” but were ignored in the original UNCTAD report.
- South African export statistics exclude non-domestic gold refined and exported from South Africa. However, the importing country reports under the same reporting

system will include all gold imported from South Africa, including substantial amounts of non-domestic gold refined in the refinery in South Africa (few gold producing countries have domestic refineries). Non-South African gold mined in other African countries but refined in South Africa is therefore most likely recorded as South African gold by importers.

Accordingly, South Africa’s gold exports are in fact much higher than the numbers the UNCTAD study found in Comtrade, thus significantly closing the gap UNCTAD explained by supposed underinvoicing and smuggling. According to Eunomix, the misinvoicing discrepancy in gold exports between partner country data and the average across three alternative domestic data sources shrinks from \$78.2 billion to \$9.8 billion after allowing for the “regular” 10% discrepancy margin rate (adjustment to eliminate the bias introduced by the difference between fob and cif values) in terms of UNCTAD’s methodology.

The UNCTAD report also found a very large discrepancy for silver and platinum for the years 2000 and 2002, with South African exports according to Comtrade being 97–98% lower than imports from South Africa by partner countries, and smaller discrepancies for other years. Anybody who has used Comtrade data knows that data errors are frequent (see Tercero and Soulier 2016). Normally an economist or statistician faced with such large differences in reported trade between years would be expected to check whether the very large discrepancies were found also in other alternative data sources before jumping to the conclusion that misinvoicing was the reason. Eunomix (2017) presents domestic statistics that do not exhibit the precipitous fall in exports in 2000 and 2002. In addition, Eunomix presents an explanation for the smaller discrepancies in other years, where figures are influenced by toll refining of platinum from Zimbabwe in South Africa (Eunomix 2017, p. 41–42). Yet, even in the second version of its report, after having seen the conclusions challenged and having had ample time to verify the results, UNCTAD maintains that “With respect to its nine major trading partners, South Africa saw a cumulative amount of export underinvoicing of \$19 billion over the 15-year period starting in 2000” (UNCTAD 2016b, p. 23).

Finally, with respect to iron ore, UNCTAD finds underinvoicing of exports from 2000 to 2010, particularly to Japan and the Netherlands, and overinvoicing from 2011 to 2014. In the second version of its report, UNCTAD states with reference to the underinvoicing of exports to Japan and the Netherlands “The large and abnormal discrepancies with these leading trading partners deserve detailed investigation” (UNCTAD 2016b, p. 24). There are however simple explanations for these discrepancies that are familiar to anybody with some knowledge of international iron ore trade. First, Rotterdam in the Netherlands is a major transit port for iron

⁸ The results for Nigeria concerning oil and for Côte d’Ivoire concerning cocoa are not discussed here in order to keep the focus on non-fuel minerals only.

ore to the European Union. Accordingly, South African exports to, for instance, Germany may very well be reported as exports to the Netherlands since they are offloaded there and put on barges to Germany. The large variations in both reported exports from South Africa to the Netherlands and the imports to the Netherlands from South Africa, together with the fact there is no pattern of one being consistently larger than the other, point to this being the result of reporting errors rather than misinvoicing. As seen from Fig. 1, declines in Dutch imports tend to coincide with increases in German imports and the sum of both countries' imports from South Africa varies by less than the individual country imports.

As regards Japan, the standard 10 % correction applied by UNCTAD for the difference between cif and fob values is too low since freight rates between South Africa and Japan have been a much higher portion of the cif price for almost all years studied.⁹ It is likely that this factor explains the entire "misinvoicing" in the case of Japan. Figure 2 shows the freight rate for iron ore from South Africa to China (which is virtually the same as the freight rate to Japan) as a portion of the price of lump ore from Kumba Resources, the largest South African iron ore producer, fob to Japan. Kumba Resources stopped making its prices public after 2007. It should be noted that the price of lump ore, for which the longest time series is available, was about 50% higher than the price of iron ore fines during the years concerned. Accordingly, freight rates were an even higher portion of prices for cheaper qualities of iron ore.

Finally, as Eunomix points out, South African iron ore exporters switched to reporting exports cif instead of fob as of 2011 (Eunomix 2017, p. 44), which probably explains most or all of the "overinvoicing" found by UNCTAD for the period 2011–2014. When both exports and imports are reported on a cif basis, any difference between the two values due to transport costs disappears. The introduction by UNCTAD of a "correction factor" of 10% then results in an apparent overinvoicing of exports.

Chile

In the case of Chile's copper exports, the UNCTAD report finds large amounts of misinvoicing, mainly with respect to the Netherlands and China. The report offers the following reasoning:

One of the possible reasons for the extremely large "perverse" (negative) and "excessive normal" (positive) discrepancies in partner by partner data may

⁹ Interestingly, variations in the freight rate were larger than variations in the iron ore price for the period studied. However, freight rates were correlated with iron ore prices (both being strongly correlated with the growth in Chinese industrial production and exports).

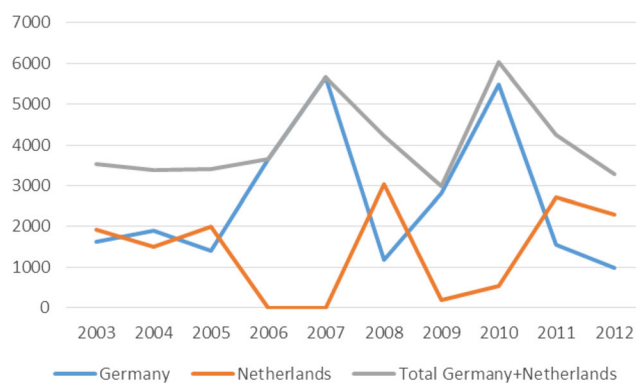


Fig. 1 Iron ore imports from South Africa to Germany and the Netherlands, 2003–2012, thousand tonnes. Source: UNCTAD 2013, Table 29, p. 40

be inconsistencies in the recording of the actual destination of exports...However, so long as Chile's copper exports are registered as imports in only one country, the aggregate values should not be affected. Thus large estimated discrepancies with respect to the rest of the world suggest export misinvoicing.

This argument completely overlooks the important role of transit trade for copper, with ports such as Rotterdam, Hong Kong, and Singapore acting as transit points for large quantities of copper. In such cases, total exports and imports do not necessarily match, since the exporter may report Singapore as the destination for a shipment that will be transferred to a Chinese port, while the Chinese importer, knowing that the copper came from Chile, will report it as such.¹⁰ This is particularly important given the role of the London Metal Exchange (LME) warehouses in international copper trade.

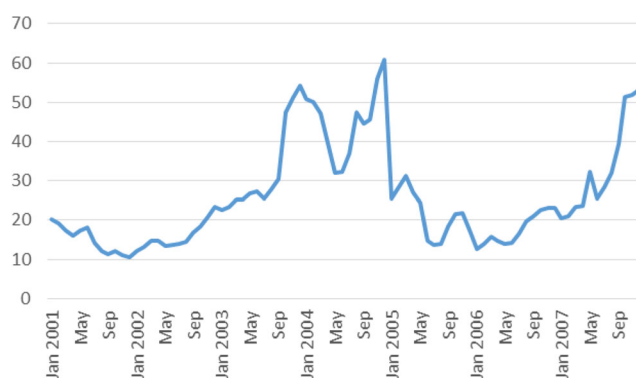


Fig. 2 Freight rate from South Africa to China for iron ore as a portion of the price of iron ore from South Africa (Kumba Resources, lump) for sales to Japan, percent. Sources, UNCTAD 2007, Tables 84 and 85, and UNCTAD 2013, Tables 92 and 93, calculations by author

¹⁰ As earlier mentioned, GFI corrects for the phenomenon as far as Hong Kong is concerned by using statistics for re-exports from Hong Kong. It is somewhat surprising, in view of the importance of Hong Kong as a transit port to China and the availability of data, that UNCTAD chose not to carry out the same correction.

There exists more than 600 LME approved warehouses in 40 locations around the world. It is very common for copper shipments to be put in an LME warehouse before being delivered to the final customer. In such a case, the shipment does not pass through customs and is not reported as imports until it has been released from the warehouse. In the case of China, the role of bonded warehouses should also be mentioned (there are no LME-approved warehouses in China). These bonded warehouses have from time to time contained massive quantities of copper, partly because copper in storage has been used as a convenient collateral for loans.¹¹ In conclusion, it is very difficult to draw any conclusions from the copper trade data concerning China. Proof of misinvoicing would have to rely on investigations of individual cases.

Zambia

UNCTAD finds substantial misinvoicing of copper exports from Zambia. Large exports are reported as going to Switzerland, while “no copper imports are recorded in Switzerland at all. Excluding Switzerland, Zambia recorded systematic export underinvoicing starting in 2005, with a cumulative \$12 billion in export underinvoicing with its major trading partners over the 1995–2014 period, and \$14.5 billion relative to the rest of the world (all the trading partners).” UNCTAD goes on to remark that “It is possible that exports are recorded as destined to an importer in Switzerland when the ultimate importer does not reside there, as would be the case with transit trade” (UNCTAD 2016b, p. 15). The actual explanation has nothing to do with transit trade but reflects the conditions under which Swiss trading companies operate. Trading companies based in Switzerland buy copper from Zambia and sell it, mainly to China. The most important company is Glencore, which has a subsidiary in Zambia, Mopani, which is a large copper producer and also toll smelts and refines copper from other mines. When the copper leaves the mine, the final destination may not be known and it may be reported as Switzerland for the sake of convenience. Glencore operates under the special Swiss legal and tax regime of merchanting trading companies:

Merchanting is defined as a transaction in which a company in Switzerland purchases goods from a supplier abroad and then sells those goods on to a buyer abroad. As a rule, the goods do not cross the border into Swiss territory and are, in consequence, not subject to Swiss customs duties...Merchanting transactions must be reported at the transaction price valuation...Merchanting traders not only buy and sell commodities, they are also involved in organising transport in connection with the

¹¹ For analyses of the importance of bonded warehouses in China, see Tang and Zhu (2016) and Geman and Scheiber (2017).

transaction, insurance against loss of or damage to the goods, storage at loading and off-loading terminals, and verification of the goods. Above all, merchanting traders must arrange for the financing of their capital-intensive commodity transactions. In keeping with a revision of the international standards on international trade in services, merchanting transactions will no longer be considered as trade in services, after the new standards go into effect (2014), but will be counted as trade in goods. Federal Department of Foreign Affairs 2013, Box 1, p. 8.

These circumstances are well known to anybody involved in commodity trading in Switzerland. That they are unknown to UNCTAD, which is based in Switzerland and moreover in a city, Geneva, that can be described as the world center of commodity trading, is surprising.¹²

Conclusions

The reply to the question posed in the title of this paper, that is, what do we really know about misinvoicing in mineral trade, must be that while we do not really know much with any certainty about the significance of misinvoicing in mineral trade, we do know that the published estimates are gross exaggerations.

The review of studies by three organizations has shown that the studies suffer from important weaknesses, apart from the tendency to picture gross capital flows resulting from trade misinvoicing as total losses to the economies concerned. Elementary checks of data have not been carried out and any discrepancy is considered proof of illicit capital flows without any further investigation. There are, however, differences between the studies. The GFI studies are general in nature and do not directly claim to offer proof of criminal behavior by specific companies in specific countries, while AU/UNECA and UNCTAD jump to conclusions on the basis of poorly understood data.

To recapitulate:

The two studies that permit some detailed analysis (AU/UNECA and UNCTAD) both base their overall numbers almost exclusively on major instances of alleged misinvoicing for South African gold exports and Zambian copper exports. In the first case, a simple comparison with national South African statistics would have been sufficient to identify the differences in commodity classification and dramatically reduce the size of the alleged misinvoicing. A slightly more detailed investigation of circumstances would have revealed

¹² According to the Geneva Trading and Shipping Association (GTSA), there are some 400 companies that are directly connected with commodity trading in Geneva, and some 8000 jobs that depend on the commodities industry (Federal Department of Foreign Affairs 2013, p. 10).

both further specifics of South African trade reporting and that the inclusion in import statistics of gold from other countries refined in South Africa may have influenced figures. In the second case, that of Zambian copper exports, it would have been sufficient for UNCTAD to check the facts with Swiss federal authorities or with any one of hundreds of commodity traders in Geneva. The AU/UNECA may be excused for their lack of understanding of trading practices, not having such direct access to experts.

Consequently, these two cases of alleged trade misinvoicing can safely be dismissed. This means that the estimates for trade misinvoicing of minerals have to be drastically revised downwards and that very little remains of the total.

The other cases follow a pattern of inability or reluctance to check basic facts, whether they concern transit trade of copper and iron ore, toll smelting of platinum or storage of copper in LME or bonded warehouses.

In conclusion, one would hope that both the Economic Commission for Africa and UNCTAD have their publications peer-reviewed by external reviewers in the future. One also hopes that they will be less quick to jump to conclusions, particularly when the conclusions in question raise doubts about the competence or honesty of governments or companies.

Since exaggerations and misleading conclusions in some studies do not preclude the possibility that misinvoicing may be an important problem in minerals trade, it is worth asking what can be done about it. Research and critical reviews of the empirical evidence by organizations such as the Natural Resource Governance Institute, which is active in the field, will help improve understanding of the importance of the problem. Work under-way on base erosion and profit shifting in OECD and elsewhere may be of some help as will strengthened capacity of national tax and customs authorities to identify anomalies in pricing. Much is already being done in this area by several international and bilateral agencies.

Open Access This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

References

- African Union and United Nations Economic Commission of Africa (2015) Illicit financial flows, report of the High Level Panel on illicit financial flows from Africa, Commissioned by the AU/ECA Conference of Ministers of Finance, Planning and Economic Development
- Business Insider Australia (2017) China's iron ore stocks are piling up rapidly, <http://www.businessinsider.com/chinas-iron-ore-stocks-are-piling-up-rapidly-2017-5?IR=T>, May 22, accessed on 9 Sept 2017
- Chamber of Mines of Zambia and ICMM (2014) Enhancing mining's contribution to the Zambian economy and society
- Eunomix (2016) A review of the UNCTAD report on trade misinvoicing, with a focus on South Africa's gold export, draft final, 7 November
- Eunomix (2017) A review of the UNCTAD report on trade misinvoicing, with a full counterfactual on South African exports, final report, 5 June
- Federal Department of Foreign Affairs (2013) Background report: commodities. Report of the interdepartmental platform on commodities to the Federal Council, 27 March, Berne
- Forstater M (2016) Illicit flows and trade misinvoicing: are we looking under the wrong lamppost? Bergen: Chr. Michelsen institute (CMI Insight no. 5)
- Geman H, Scheiber M (2017) Recent experiences of copper on the Shanghai futures exchange: some lessons for warehouse monitoring. *Resources Policy* 54:130–136. <https://doi.org/10.1016/j.resourpol.2017.09.010>
- Global Financial Integrity (2015) Illicit financial flows to and from developing countries: 2004–2013, April
- Global Financial Integrity (2017) Illicit financial flows to and from developing countries: 2005–2014, December
- Grant Thornton, Econ Pöyry (2010) Pilot audit report—Mopani Copper Mines PLC
- Patnaik I, Sen Gupta A, Shah A (2010) Determinants of trade misinvoicing. Working paper no. 2010-75, National Institute of Public Finance and Policy, New Delhi
- Raw Materials Report (1986) Document, Volume 4, Issue 2
- Readhead A (2016) "Preventing tax base erosion in Africa: a regional study of transfer pricing challenges in the mining sector", Natural Resource Governance Institute, July
- Skúlason JB, Hayter R (1998) Industrial location as a bargain: Iceland and the aluminium multinationals 1962–1994. *Geogr Ann* 80B(1):29–48. <https://doi.org/10.1111/1468-0467.00026>
- Tandon, S. and R. Kavita Rao, 2017, Trade misinvoicing: what can we measure? National Institute of Public Finance and Policy, New Delhi, NIPFP working paper series, working paper no. 200 accessed on 2 November 2017 at <http://www.nipfp.org.in/publications/working-papers/1792/> Page 2
- Tang K, Zhu H (2016) Commodities as collateral. *Rev Financ Stud* 29(8): 2110–2160. <https://doi.org/10.1093/rfs/hhw029>
- Tercero L, Soulier M (2016) An examination of copper contained in international trade flows, *Mineral Economics*, October
- UNCTAD (2007) Iron ore statistics, September
- UNCTAD (2013) Iron ore statistics, UNCTAD/SUC/2013/3, November
- UNCTAD (2016a) Trade misinvoicing in primary commodities in developing countries: the cases of Chile, Côte d'Ivoire, Nigeria, South Africa and Zambia, UNCTAD/SUC/2016/2, 1st version, accessed 16 Dec 2016
- UNCTAD (2016b) Trade misinvoicing in primary commodities in developing Countries: the cases of Chile, Côte d'Ivoire, Nigeria, South Africa and Zambia, UNCTAD/SUC/2016/2, 2nd version, accessed 30 July 2017
- World Bank Group (2017) Transfer pricing in mining with a focus on Africa: a reference guide for practitioners