Africa Development, Volume XLIV, No. 2, 2019, pp. 27-52

(ISSN: 0850 3907)

Illicit Financial Flows in Southern Africa: Exploring Implications for Socio-economic Development

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Abstract

This article views Illicit Financial Flows (IFFs) as any illegal and corrupt practice to acquire money without the due process that is in line with international financial and trade regulatory frameworks. Based on this working definition, the article explores IFFs in the mining sectors in four countries (the Republics of Botswana, Namibia, South Africa and Zimbabwe) with a specific focus on the socio-economic implications for communities in the mining or former mining areas. Measurement issues are also attempted. Indeed, IFFs have severe implications for the communities (as for countries). Although the results are mixed, regarding the quantification of IFFs in the mining sector, it is clear that IFFs have major negative effects on welfare and political stability. Estimates show high levels of IFFs through trade mis-invoicing for the mining sector in all the four countries.

Résumé

Cet article considère les flux financiers illicites (FFI) comme toute pratique illégale et corrompue visant à obtenir de l'argent sans procédure régulière et non conforme aux cadres de réglementation financière et commerciale internationaux. Sur la base de cette définition de travail, l'article explore les flux financiers illicites dans les secteurs miniers de quatre pays (Afrique du Sud, Botswana, Namibie et Zimbabwe), en mettant l'accent sur les implications socio-économiques pour les communautés des zones minières actuelles ou anciennes. Des problèmes de mesure sont également tentés. En effet, les FFI ont de graves conséquences pour les communautés (comme pour les pays). Les résultats sont mitigés quant à la quantification des FFI dans le secteur minier, mais il est clair que les FFI ont des

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effets négatifs majeurs sur le bien-être et la stabilité politique. Les estimations montrent des niveaux élevés de FFI pour le secteur minier dans les quatre pays résultant d'une erreur de facturation commerciale.

Introduction

Illicit Financial Flows (IFFs) out of sub-Saharan Africa have been shown to surpass foreign aid inflows into the continent, according to Kar and Cartwright-Smith (2010). Research confirms that the problem of IFFs in Africa requires attention. Kar and Cartwright-Smith (2010) also submit that if funds 'lost' through IFFs were to be reinvested into the African continent, the quest and scramble for Foreign Direct Investment (FDI) on the continent would not be needed. The IFFs and capital flight literature confirms that IFF levels are high. What is often not examined in the literature is the empirical evidence of how IFFs impact on the domestic economy. Can such dynamics be traced to industry and commodity levels? This article attempts that, over and above examining the socio-economic implications of IFFs. The research that informs this article studied four countries in Southern Africa (South Africa, Zimbabwe, Botswana and Namibia), focusing on the mining sector.

The relationship between IFFs and many other macro-economic phenomena has been examined in the literature, such as: capital flight/IFFs and institutions, IFFs and natural resource wealth, IFFs and corruption, IFFs and debt, and many more (see Fedderke et al. 2002; Boyce and Ndikumana 2001; Le and Zak 2006; Fadiran and Sarr forthcoming; Kar and Cartwright-Smith 2010). Most of these studies utilised IFFs and capital flight estimates that were available at the time, which mostly involved drawing from balance of payment errors. Some of these estimation techniques are no longer used. With the availability of new datasets on trade monitoring across the globe, coupled with the increased interest in the flow of illicit funds out of Africa, this article estimates IFFs with a focus on the diamond and platinum mining sub-sectors in the four countries that the study deals with.

The next section deals with the fieldwork undertaken, then followed by a section dealing with estimation techniques, then empirics and estimation. The article discusses implications before concluding. Indeed, IFFs have severe implications for the communities (as for countries). Although the results are mixed, regarding the quantification of IFFs in the mining sector, it is clear that IFFs have major negative effects on welfare and political stability. Estimates show high levels of IFFs through trade mis-invoicing in all the four countries, with regard to the mining sector.

Socio-economic development implications

Human development remains relatively low in many African countries, including countries in the Southern Africa sub-region (Gumede 2018). IFFs contribute to this because monies that should be used in advancing the well-being of the masses are 'lost' instead of being put into socio-economic development projects. Similarly, as demonstrated in Gumede (2018), poverty and inequality remain very high in Southern Africa. Indeed, the study of IFFs suffers from both methodological and conceptual complexities and confusions. For instance, there has been a high tendency among scholars to confuse capital flight with IFFs. Bokosi and Chikumbu (2015) argue that 'there is often an information asymmetry between African governments and investors in the mining sector, which results in tax avoidance through the under-reporting of the quantity and composition of minerals'.

As indicated above, this part of the article deals with data collected in selected communities in South Africa and Namibia. Fieldwork could not be successfully undertaken in Zimbabwe and Botswana because necessary permissions were not secured, and the research relied on other sources and observations. It is important to indicate that the study focused primarily on government departments, mining communities. It initially also intended to interview mining companies but that was not undertaken due to both logistical challenges the view that information from management/owners of mining companies are not trustworthy. For South Africa, the communities (in mining areas) where fieldwork was undertaken were in the Sekhukhune region in the Limpopo Province and Bapong community of the North West Province. The Namibian community studied was based in Lüderitz which falls under the Karas Region. In South Africa, the focus was on platinum while in Namibia the attention was on diamonds.

The extent of IFFs in the studied countries is large. Dikuelo (2016), for instance, argues that Botswana is among Southern African countries that are prone to IFFs with up to P200 billion estimated to have been moved illegally over 10 years up to 2013. The Global Financial Integrity (2015) also notes that between 2004 and 2013, a whooping sum of US$ 20 billion might have been transferred out of Botswana in form of IFFs. According to Global Financial Integrity (2015), Namibia lost R17 million in 2012 which had increased to around R30 million in 2015. For South Africa, the Davis Tax Committee and the South African Revenue Service estimated that South Africa lost R25 billion between 2000 and 2014. Regarding Zimbabwe, Global Financial Integrity (2015) estimates that Zimbabwe lost about US$ 12 billion over the past three decades. The mining sector constituted the main avenue for IFFs in Zimbabwe, with US$ 2.7 billion lost in the sector as against other sectors such

as wildlife, fisheries and timber where US$ 15 million, US$ 28 million and US$ 17.5 million were lost respectively (Bhebhe 2015). Ncube and Okeke-Uzodike (2015) provide a political analysis of the high incidences of IFFs in Zimbabwe. They traced the politicisation of the bureaucracy and the general public life to the incursion of endemic corruption in the country.

Overall, fieldwork confirmed that IFFs are negatively impacting on socio-economic development in the communities in mining and former mining areas. It is also interesting that there appears to be good capacities for dealing with IFFs, at least for South Africa and Namibia (the two countries that were studied in detail). The capacities referred to include

(i) the human capacity (trained personnel, correct skills match for analysing mining related IFFs) of government institutions to detect and resolve the problems of trade mis-invoicing, regulation of transfer pricing and tax evasion in mining specifically;

(ii) the ability of government institutions and personnel to formulate, implement, monitor and evaluate the requisite policies to address the problem of trade mis-invoicing, regulation of transfer pricing and tax evasion in the mining sector;

(iii) the credibility of the institutions collecting revenue from the mining companies to resolve the problem of trade mis-invoicing and regulate transfer pricing and tax evasion in the mining sector. To enhance socio-economic development in the communities, it is important that there is better coordination among all role-players (i.e. mining companies, community leaders, government representative, etc). Policy and legislation would also greatly help. For South Africa, for instance, there are social and labour plans but these are not implemented effectively for the benefit of communities. It would also be useful to have legislation that very specifically deals with IFFs.

Extent of IFF in the two sectors and in the four countries

With regard to platinum, in South Africa between 2000 and 2015, a total of US$ 323.3 is estimated for the computed IFFs in real value (nominal was approximately US$ 242 billion). In Zimbabwe, the computed IFF obtained a value of US$ 11 trillion in real terms (nominal obtained approximately US$ 12 trillion).[1] Most of the measures recorded a negative (under-invoicing) for South Africa while it seems Zimbabwe was the opposite, with a positive (over-invoicing) value.

In the diamond sector, looking at the period 2000 to 2015, when considering the quantity traded differences and a non-monetary signal of IFF, the measure obtained -594, 1,530, -252, and -93 for Botswana, Namibia, South Africa and Zimbabwe respectively. When considering the net weight and unadjusted trade value differences, which we also use

as proxy for IFF, the values were approximately 12,509 KGs and US$ 19 billion for Botswana; 108,801KGs and US 23 billion for Namibia; -10 million KGs, and US$ -39.6 billion for South Africa; and 84,820 KGs and US$ -208 million for Zimbabwe. The net weight differences and the trade value difference do not always correspond together in sign, as with the Zimbabwean diamond sector.

Given that computed IFF is derived from the net weight differences in trade flows, it always corresponds, whether the difference is positive or negative. In a similar manner to the platinum sector, a negative difference signals that the values declared by the exporting country are smaller than the value declared by the importing country. This implies that a possible under-invoicing has occurred, while a positive value implies the opposite. The computed IFF for each of the four countries' diamond sector reported US$ 364 million for Botswana, US$ 1 billion for Namibia, US$ -55 billion for South Africa and US$ 5.5 billion for Zimbabwe. The highlight is that the values for estimated IFF for all four countries in the diamond sector alone are quite alarming, especially when these numbers are considered in light of the size of each economy.

Estimation techniques

The nature of IFFs is such that they are often directly or indirectly linked to a country's natural resources. Therefore, the availability of a new dataset, such as the United Nations Commodity Trade (UN COMTRADE) 2015, the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) dataset, and the International Monetary Fund Direction of Trade Statistics (IMF DOTS), all make enquiry into lower levels of trade flows feasible. Given the level of IFFs from South Africa, examining the nature of IFFs within one of its richest sectors might shed some more light on the nature of IFFs in the country (UNECA 2015a; 2015b). This applies to both the diamond and platinum mining sectors. In a similar manner, diamond mining accounts for major revenue sources for Botswana, Namibia and Zimbabwe.

A few disclaimers need to be highlighted regarding the estimations undertaken. Given the very nature of IFFs, they are not meant to be observed; so any estimation thereof will have some inaccuracies. In the IFFs literature, there are three main categories:

(i) IFFs that emanate from corruption in the form of embezzlement and bribery by officials in government;

(ii) IFFs that emanate from laundering of money from different forms of illegal activities; and

(iii) IFFs that emanate from tax evasion and attempts by firms to move money between borders.

The third category accounts for most IFFs in Africa and the developing world, and are the sort of IFFs that countries worry about, since these represent funds that could be going towards growing the domestic economy (Hummels and Lugovskyy 2006; Mevel, Vakataki'Ofa and Karingi 2013).

In calculating estimates for IFFs, it is important to keep in mind that the very nature of IFFs seeks to avoid direct observation, and as such any estimates of IFFs will be just that: estimates. Nevertheless, estimation techniques often attempt to avoid as many errors as possible so that the final results are not overly over-estimated or under-estimated. Before diving into the methodology of the estimation technique opted for, previous existing methodologies are briefly discussed. There are several methods in the literature, and some are adaptations of some of the older methods. The balance of payment approach is one of the older methods in the IFF/capital flight literature. This method was introduced by Cuddington (1986). In this approach, IFF/capital flight is calculated as the total outflows of private short-term capital plus errors and omissions. There are obvious problematic assumptions intrinsic in the definition, in that it assumes no other form of IFF occurs in the economy be it in the form of long-term capital flows or trade mis-invoicing both of which can lead to an overall ambiguity in the calculations. This is also known as the *hot money method*. The direct measure approach developed by the Bank of England (in 1989) captures IFFs as cross-border bank deposits by private residents. This method, while simple, narrow and precise, neglects the significant portion of IFFs carried out by multinational corporations and so, more specifically in reference to the goals of this study would be inadequate.

The indirect measurement method focuses on the difference between increases in external debt plus FDI inflows and current account deficits. This difference is then added to the increase in official reserves. This approach was at the time adopted in some studies by the World Bank (2016a; 2016b), Guaranty (1986) and Pastor (1990). The main issue with this approach is that it may over estimate IFFs since its definition in some ways is not mutually exclusive from what actual capital flows capture in the form of reserves and FDI. The residual measurement approach calculates it by taking foreign assets which do not yield any investment income, the premise being that any differences between officially and unofficially declared capital holding abroad would signal IFFs. This method is however highly dependent on the accuracy of the balance of payment accounts, and as we know for a lot of sub-Saharan African countries, macro-economic accounting accuracy can be dicey. This method is often referred to as *the Dooley method* (Fedderke and Liu 2001; Mevel, Vakataki'Ofa and Karingi 2015). Other adaptations of the said methods include capital flight estimations by Boyce and Ndikumana (2001) and Ndikumana and Boyce (2008; 2012).

The trade mis-invoicing approach is one that has been around since concerns about IFFs have been raised in literature, however methods of capturing this as an estimate for IFF have improved overtime. One recent approach in this same vein is the DOTS. This measurement approach uses trade mis-invoicing in comparing bilateral trade statistics between countries on the same trade flow. In essence, the method would look at South Africa, for example, and compare the recorded exports of diamonds by South Africa to Zimbabwe, to the recorded imports of diamonds by Zimbabwe from South Africa. This forms the foundation for the DOTS approach as well as the approach used (an adaptation of the DOTS approach) in that it differs slightly in a few ways: how import records and export records of a trade flow are converted to a singular unit for consistency and comparison; how time lags and delays are computed; and the overall decomposition of the trade data to obtain the said trade mis-invoice (Mevel, Vakataki'Ofa and Karingi 2015).

In more specific terms, while the DOTS informs a significant portion of the estimation technique used for this article, the main differentiating points lie in the fact that DOTS is captured at the country level, in which case focusing on a particular sector or commodity (as in this study) would be impossible. The COMTRADE data set reports trade flows for commodities up to the 6-digit level. However, for this report, diamond and platinum are considered at the 4-digit level. Furthermore, in adapting the IMF DOTS methodology, one needs to be aware of the purpose for which the data was originally compiled, and that is to accurately compile balance of payment account and track trade statistics. As such, a few problems arise when employing the same methodology to track bilateral trade flows between countries. The main issue being with comparison of trade statistics captured by two different countries.

The records of trade statistics captured by the exporting country is often captured free on board (FOB). Trade values that are captured FOB imply that the cost of delivery of the goods are the importer's responsibility once they leave the exporter's port. On the other side of the trade flow, the importer captures the trade value as inclusive of cost, insurance and freight (CIF). This is encouraged by trade monitoring organisations, including the UN COMTRADE. The problem however arises when the same trade data is to be used to track possible trade mis-invoicing, which is often an avenue for IFF. There is therefore a need to find a comparative ratio to convert the FOB inclusive trade value to CIF inclusive trade value or vice versa. While this has been attempted by researchers in the past, it is often more difficult to construct such a ratio for sub-Saharan African countries. Not surprisingly, this has been done for many Western countries, however most of the existing database do not show this data for the four countries considered in this article.

Another often encountered obstacle, as is the case with South Africa, is when both the imports and exports are reported as FOB.

To circumvent this, the trade units rather than the trade values are used as proxies for trade mis-invoicing. The COMTRADE dataset reports five different measures for each product it captures. These are:

(i) Quantity unit code,
(ii) Quantity unit,
(iii) Alternative quantity unit,
(iv) Net weight in kilograms, and
(v) Trade value in US$.

When we compare these same measures between the reported data by the exporting country and importing country, there still exists a discrepancy. Often, the reported export quantity and weight are lower than the reported import quantity and weight. This was the case for Botswana, South Africa and Zimbabwe, with Namibia being the only exception among the four countries. Without adjusting the CIF trade values, the exports and (imported from).

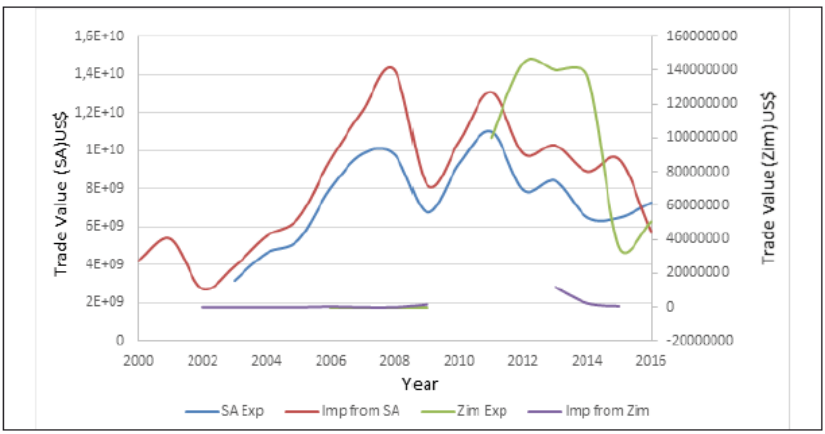
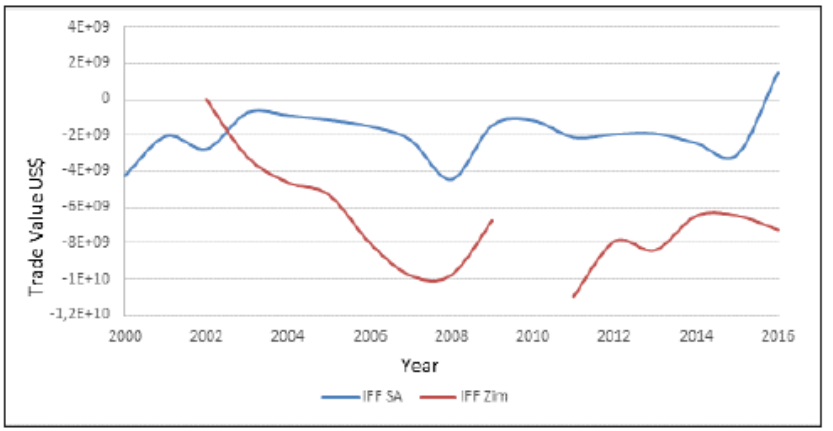


Figure 1: Platinum exports and imports from trading partners, 2000–16

Source: Various sources compiled by the research team, UN COMTRADE

Values for each of the four countries in the diamonds goods market, and for Zimbabwe and South Africa in the platinum goods market are presented in Figures 1 to 5.



Source: Various sources compiled by the research team, UN COMTRADE

The Figures show a significant gap between reported exports by exporting, and the bilateral reported imports from their respective trading partners, in the trade flows. Admittedly, the aggregation of the data into annual data may have contributed to this discrepancy. In the balance of payment and trade tracking literature, studies often consider this discrepancy as either representing transportation costs (i.e. the CIF and FOB interrelations) or representing errors in accounts. In fact, it is through the computation and matching of trade flows that organisations such as the IMF, CEPII and authors such as Hummels and Lugovskyy (2006) and Gaulier et al. (2008) have tried to calculate freight and transportation costs between countries. In addition to this, there are other complications that may have caused this inconsistency, which are not necessarily down to IFF alone. Such include differences in product classification, time lags between recording of exports dispatch and its delivery, exchange rate differentials, different product valuation (this is pertinent in the case of diamonds, where pricing is highly variable across time and space). Therefore, one needs to keep such complications in mind when deducing IFFs from such discrepancies (Hummels and Lugvoskyy 2006; Gaulier et al. 2008; Gaulier and Zignago 2010; Mevel, Vakataki'Ofa and Karingi 2015).

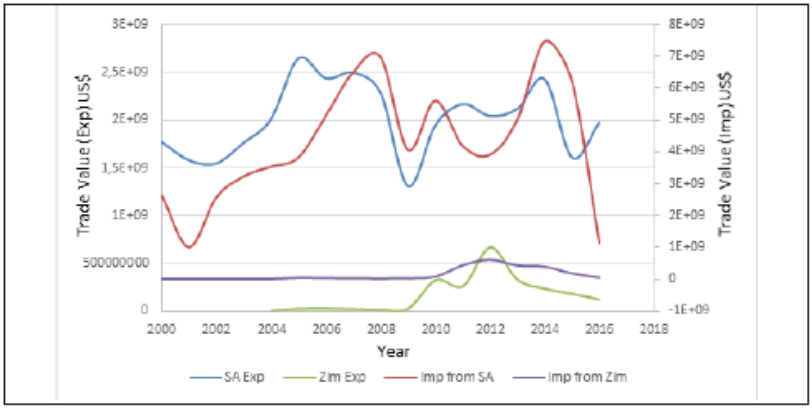


Figure 3: Diamond exports and imports from partners for South Africa and Zimbabwe, 2000–16

Source: Various sources compiled by the research team, UN COMTRADE

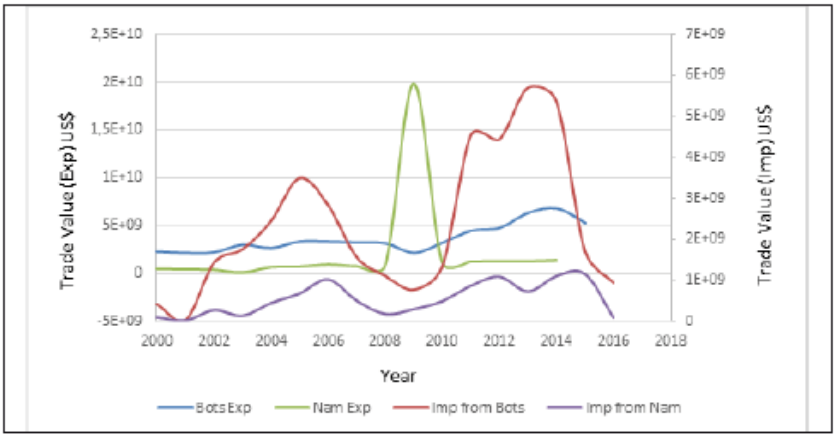


Figure 4: Diamond exports and imports from partners for Botswana and Namibia, 2000–16

Source: Various sources compiled by the research team, UN COMTRADE

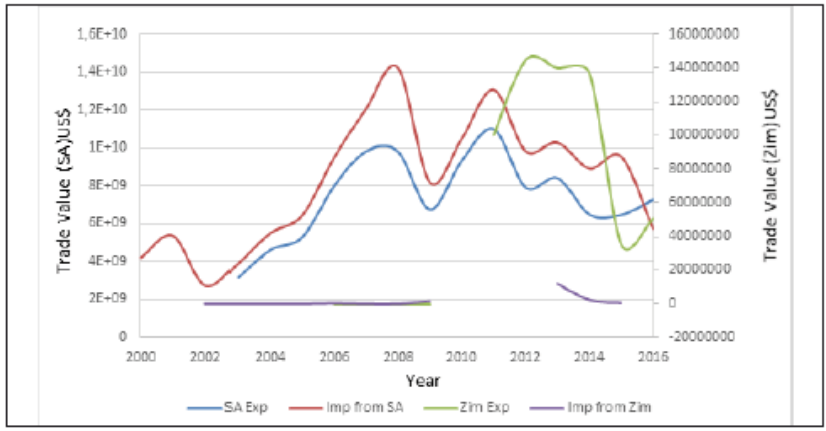


Figure 5: Unadjusted IFF within the diamond commodity market, 2000–16
Source: Various sources compiled by the research team, UN COMTRADE

Data and estimates

As indicated above, a host of data sources were used. Care was taken in ensuring that the measurement scales are consistent throughout for all measures used. The data sources include: UN COMTRADE (2015), World Bank, IMF DOTS, the CEPII BACI database, U.S. Geological Survey; Menzie et al. 2013; Minerals Program, publications from the chamber of mines, and departments of mineral resources of Botswana, Namibia, South Africa and Zimbabwe. The COMTRADE data provided the core variables to capture trade flows of diamond and platinum. In the COMTRADE data, there are about 5,000 products, for about 200 different countries, and products are tracked up to the 6-digit level, following the harmonised system nomenclature. It currently goes as far back as 1960 for some countries. However, for most sub-Saharan African countries, the time span is limited. The data also has monthly level data from 2012 and above for the four countries considered.

Deciding on a dependent variable to gauge the possible impact of IFFs from the two sectors considered, data availability was a major player. On the one hand, a measure that is capable of reflecting changes in the mining sector as much as possible was selected. On the other hand, this should be a measure that is readily available for the period for which IFF from these two sectors is being studied. For South Africa, it may be possible to obtain such data from various sources, such as the National Treasury, and household surveys. The problem however arises when trying to obtain similar data

from the three other countries (i.e. Botswana, Namibia and Zimbabwe). This prompted the exploration of employment in the mining sector. While employment is not a direct measure of welfare, relative to other possible measures, we opted for this measure as data related to it was available in all four countries. Employment (or unemployment) is the sound alternative measure in the absence of data for more direct welfare measures.

The other measure used is the political stability index from the World Bank. This measure captures the likelihood of political instability or politically motivated violence. The index is constructed using a composition of many different variables, including social unrest, internal conflict, protests and riots, intensity of violent activities of underground political organisations, etc. In South Africa, Namibia, Zimbabwe and to a lesser extent Botswana, a significant portion of protests and strikes occur within the mining sectors. Therefore, political stability is an ideal measure of one of the possible avenues of impact of IFFs.

To extract bilateral trade flows pertaining to diamond and platinum, a decision was taken to determine what category of the two products the study would capture. At the 6-digit level, both products are often mixed with other products in the form of coating and jewellery mixes. Therefore, two commodity codes were identified to capture diamond and platinum respectively: 7102 & 7110. In the COMTRADE data, the two commodity codes are defined as: 7102 – '*Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal, and articles thereof; imitation jewellery; coin // Diamonds, whether or not worked, but not mounted or set*'; and 7110 – '*Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal, and articles thereof; imitation jewellery; coin // Platinum, unwrought or in semi-manufactured forms, or in powder form*'. Therefore, only these two commodities were identified to capture trade flows in the diamond and platinum sectors of the four countries considered.

As far as timeframe is concerned, the data goes farther back than 2000. However, as is often the case when dealing with aggregated data in Southern Africa, there are also a few missing observations, limiting the period to 2000 and later. While the initial plan was to consider the period 2005–15, the small number of cross-sections and the short time span of 11-year annual data would be incapable of any trustworthy quantitative analysis. The lack of monthly data over the desired period also forced the use of annual data, albeit over a slightly longer period of 2000 to 2015. To compute a trade value that is independent of the individual countries' product valuation, and hence avoid the CIF/FOB measurement debacle, the average diamond

prices reported in the U.S. Geological Survey yearbooks for diamond was used, while the platinum prices provided by the World Bank Global Economic Monitor (GEM) Commodities database was used. To proxy for welfare, the employment by the mining sector in each country was used. Data on the individual commodity market employment was not available for all the countries. In addition, tax contribution by the mining sector was also considered, but such data were hard to come by. Only Namibia had the requisite data for this. The graph in Figure 6 plots the computed IFFs and contribution of diamond mining to Namibia's tax revenue.

To compute the IFFs, it is recommended that the ratio of CIF/FOB should be obtained, and then one of the two measures be converted to the other. Only after this can the differential between the reported bilateral trade flows be considered an estimate or signal IFFs. The data for calculating the CIF component of imports or the FOB component of exports is available for many countries on the BACI database. However, the data for Botswana, Namibia, South Africa and Zimbabwe are not provided here. This makes it almost impossible to construct the CIF/FOB ratio for these countries, due to the nature of data required for it. We therefore make use of the quantity and net weight measures provided by COMTRADE, and obtain the average selling price per carat of industrial diamond for the years 2000 to 2013. This was provided in the annual yearbook reports of the U.S. Geological Survey. The obtained average diamond price is then used to construct a computed IFF that is free of either CIF or FOB.

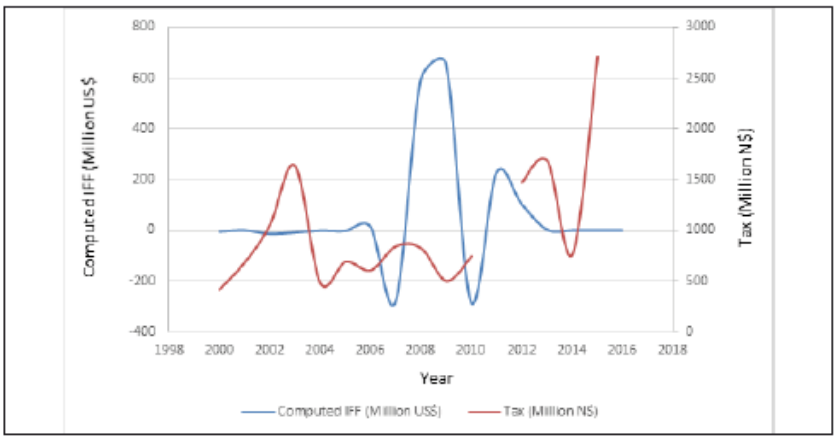


Figure 6: Diamond mining contribution to tax revenue, and IFF (Namibia)
Source: Various sources compiled by the research team, Chamber of Mines, Namibia

This is possible, since the immediate concern of this article is not with transportation costs of trade, but rather the mis-invoicing that occurs within trade, and possible facilitation of IFF from it. This will be used as one of the proxies for IFF in our empirical analysis.

Lastly, total diamond and platinum production in each country was obtained and used as a control variable in the analysis. This measure was also obtained from U.S. Geological Survey country annual reports, although the same data could also be found in the publications of institutions dealing with mining in each of the countries studied. This however has numerous missing data. The U.S. Geological Survey reports were opted for, for the sake of consistency. Although Botswana and Namibia are not typically known as platinum producing countries, in the data these two countries still feature as top platinum producing countries in the world. The mining of platinum is however a recent phenomenon in both countries; as such, data on the production, exports and imports from the two countries are sparse and cover a relatively short period. Another variable considered for gauging welfare includes political stability, while other variable to be controlled for or used as instruments include trade, mineral rents, natural resource rents, gross capital formation, GDP growth, diamond prices, platinum prices, total platinum production and total diamond production.

To identify an adequate empirical estimation technique, a few things need to be considered. While we are not dealing with national accounts data, the data being collected are still at country level, and as such, prone to the same noise that often hampers macro-economic data analysis. This brings up issues of endogeneity. In this case, endogeneity can arise. For example, in the case of South Africa where IFFs are often ranked as among the highest on the continent, that high financial flows can be jointly determined with high levels of trade as well as economic performance. Therefore, care is taken to ensure the estimation technique selected guards against the effect of this. The main differentiating factor is that the output of the two commodities are not explicitly endogenously determined by the economy. Nevertheless, caution dictates that traditional estimation techniques such as OLS may obtain inconsistent results. This can be because of the reverse causality that is most certain to arise in such an analysis. For example, good increased production in the diamond sector can lead to decreased IFFs due to increased capitalisation of the mining companies, while at the same time, decreased IFFs can result in improvement in output within the same market.

The above concerns inform the estimation technique adopted. However, it should also be informed by the panel data characteristics of the data used. The first step involves testing the data set for unit roots. Unit root tests of panel data are often not as accurate in comparison to unit root tests of time

series data. As such there are many unit root tests in the empirical literature. For this analysis, we employ the Augmented Dickey-Fuller approach, on which most other unit root tests are based, there we stick to this test only for the unit root analysis. The Augmented Dickey-Fuller Fisher (ADF Fisher) unit root test was developed by Maddala and Wu (1999).[2] It has a Chi-Square distribution and a null hypothesis of non-stationarity, which is the presence of a unit root. The result of the unit root test is presented in Table 1 in the Annexure. The results show that most of the variables are non-stationary, except for a few. There are two options that need consideration. First, differencing of the stationary variables, to remove the unit root, would result in loss of long-run information contained in the data. This may be of importance, depending on the dynamics this analysis is interested in. However, given the relatively short period covered by the data, exploring long-run dynamics of IFFs would be difficult. Therefore, in such an instance, it makes sense to first difference the variable integrated of Order 1.

With these concerns in mind, it is important to determine the best estimation technique for our purpose. A possible option would be to use an instrumental variables technique to account for all the endogenous variables. This would entail a two-stage least square approach. This method is based on the traditional OLS estimation approach; however, it helps to account for the possible presence of reverse causality by incorporating instruments which are orthogonal in nature. Given the potential for reverse causality, leading to endogeneity in our analysis, it is best to opt for an estimation technique that helps circumvent this. In implementing a 2SLS analysis, the first equation captures the relationship between some welfare measure and IFFs in the form:

$$W_t = a_0 + a_1 1FF_t + \beta Z_t \quad (1)$$

and

$$1FF_t = \gamma_0 + \gamma_1 X_t + \partial Z_t \quad (2)$$

Where is the measure of welfare being tested, which in our case could be one of two measures: employment in the mining sector and political stability. The political stability measure is captured in the World Bank Governance database. A larger negative index indicated weak levels of political stability, while larger positive numbers indicate strong levels of political stability. The anticipated direction of influence from IFF to political stability is a negative relationship. As such, the IFF coefficient should be negative. However, given the nature of IFF on the continent, the flow can be ambiguous, as IFF tends to pick up during growth spurts in the economy, while growth is expected to usher in better institutions, which should in turn reduce the ease of flow of illicit funds through the economy.

Empirical results

The first aspect of the analysis considers the diamond industry, examining the impact of the calculated IFF from the diamond commodity trade on political stability and employment in the mining sector. From the estimation explanations in the second section, there are four different potential measures of IFF obtained. The first two (commodity quantity and commodity net weight) are not in monetary terms, but rather in terms of commodity quantity. The second two are the reported trade values differentials in US$, and the computed value of the differential in reported trade net weight. Tables 2 and 3 present the results of regressing IFF in all four different forms on employment in the mining sector of all four countries. In Table 1, both fixed effects and random effects results are reported, as well as no effects at all. The reason for this is that while there may be individual country characteristics that are interesting, the small data may be hindering this from being a tangible realisation. However, random effects are more suited to this situation. As the results show, in columns 3, 8, 9, and 12, the impact of IFF is significant, albeit it does not take up the negative form anticipated.

The observed positive correlation of IFF in all four different measures with better mining sector employment outcomes is not as much a puzzle, as it is a limitation of the current data to tease out effectively the role of IFF. There is an increased possibility of more IFF in the presence of increase economic performance or mining sector improvement, and this may be the effect that our analysis is picking up. To support the argument that a positive coefficient may be as a result of the data limitations and possible missing variable bias, the graph in Figure 7 shows a clear counter-flow in the movement of employment and IFF. If Table 3 (in the Annexure) is considered, again a positive correlation is observed between IFF measures (using random effects) and political stability. This correlation is important, because often the most significant strikes and protests in countries like South Africa, Namibia and Zimbabwe are by workers in the mining sector. Therefore, it is possible to draw some observable correlation between the two phenomena.

A positive coefficient in this situation is not as bothersome as the correlation between employment and IFF being positive. This is because, there are many other concurrencies in the macro-economy that could have a much stronger influence on political stability than activities in the mining sector.

Moving on to the platinum commodity and trade market, Tables 4 and 5 (in the Annexure), show the results obtained. The regression in this case needs to be taken with caution, given the paucity of data for quantitative analysis. The reason being that only Zimbabwe and South Africa are active exporters of platinum, while Botswana and Namibia are yet to establish a fully-fledged platinum mining sector. Therefore, both countries were dropped in the panel analysis, leaving us with just Zimbabwe and South Africa. The results in Table 4 (in the Annexure) report the possible correlations between IFF from platinum mining activities in South Africa and Zimbabwe, and employment in these two sectors. No significant correlation was found. Ideally, a better proxy would be data that narrows the data down to employment in the platinum mining sector of each country's economy. However, such data was not available for Zimbabwe. In South Africa where the data is available, Figure 8 plots the employment in platinum mining and IFF from platinum mining. It shows that, while there has been a continuous increase in the employment numbers in platinum mining, the times where a sharp jump in IFFs from platinum mining is observed is also followed by a slight slowdown in the growth of employment (see 2004, 2012, 2014).

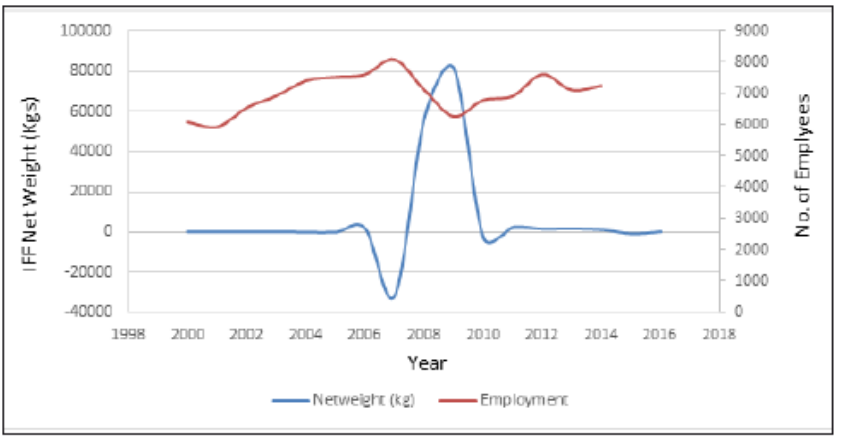


Figure 7: Diamond IFF (in net weight) and employment in Namibia

Sources: Compiled by the research team, UN COMTRADE, Namibia Chamber of Mines

Figure 8: Plot of IFF value in US$ from the platinum mining in South Africa, and number of employees

Source: Various sources compiled by the research team, UN COMTRADE

The results in Table 5 (in the Annexure) follow the same narrative as observed with IFF in the diamond mining area, although one of the regressions (in column 1) shows a significant and negative correlation between the quantity of IFF (in platinum kilograms) and political stability. A negative coefficient implies a weakening of political stability.

Implications

It is generally agreed that IFFs are a major problem in Africa, and the extractive sector is the most affected. One major implication of the study undertaken, which this article distils, is that something needs to be done in the mining areas and for communities in the (former) mining areas. There needs to be socio-economic development projects for such communities. Another important issue is that policies and legislation need strengthening to ensure that communities in the (former) mining areas benefit from mining operations or at least that such communities are not adversely affected. In addition, although the Namibian and South African governments have some relevant capacities, both governments do not have specialised policy and institutional approaches to quantifying and properly assessing the extent of IFFs in the mining sector. In strengthening the institutional architecture to combat IFFs in the mining sector, Southern African governments with mining operations need to jointly audit their abilities to address IFFs from

multinational companies with a high level of legal and accounting capacity. It will be hard, if not impossible, for individual SADC or African states to separately address IFFs. This is because the issue is a multifaceted complex problem involving multinational companies which might have better human capital capabilities than individual government institutions/departments. Most importantly, even if capacities, policies and laws were strengthened, it would still matter whether the officials in relevant institutions and those enforcing laws are ethical or not. It is in this context that Gumede (2017) has been arguing for thought liberation and critical consciousness (over and above thought leadership).

Critical consciousness implies that the citizenry, community members in this context, can hold mining companies or whoever takes them for a ride accountable. To be able to do this, community members have to be critically conscious in a sense that they fully appreciate the implications of IFFs. With regards to thought liberation, similarly, community members should be primarily concerned with the advancement of wellbeing rather than with other spoils that come with access to material wealth. The leadership at the community level should be above board because there are always attempts to corrupt them. The major concern of development initiatives in the communities should be about future generations. The traditional leadership, for instance, could not collude with mining companies and corrupt government officials for their own gain if they were mentally liberated. The focus would have been on schools, healthcare and other important amenities.

Conclusion

The article has discussed IFFs in the mining sector in Southern Africa and attempted to quantify them. As the literature says, the problem of IFFs is big. The extractive sector is the most affected. Focusing on diamonds and platinum in selected countries in Southern Africa, indeed IFFs have adverse effects not just on the countries but also on the socio-economic development of the communities in the (former) mining areas. Also, even though there are some capacities, institutions, policies and laws regarding the mining sector in the countries examined, there is no specific attention paid to IFFs in the mining sector. For some countries, there is general concern about IFFs broadly but no specific focus on the mining sector. Essentially, more needs to be done to strengthen capacities, institutions, policies and laws regarding IFFs in the mining sector, and also to ensure that communities in the (former) mining areas are not adversely affected.

With regard to estimations, the results are mixed. There are still challenges regarding methods and methodologies. The UN COMTRADE data, in

conjunction with many other trade monitoring organisations, and the push for a harmonised trade monitoring nomenclature will make tracking of trade, trade values and the invoicing of trade activities less tedious. This should hamper the use of trade mis-invoicing as a major route for moving illicit funds out of African countries. Despite these initiatives, using some of the available data for quantitative individual country analysis, especially for African countries, is still difficult. This is mainly due to very limited available relevant data.

Going forward, attempts should be made to accurately quantify transportation costs, insurance freight and FOB rates for African countries. This would make tracking trade mis-invoicing a better possibility, and estimations and analysis at industry level, and even commodity level, robust.

Notes

1. Values are based on the reported dollar price per ton for platinum from the World Bank Global Economic Monitor (GEM) commodities database. Each kg is equivalent to 32.1507 tons. Thus, each net weight reported is multiplied by the 32.1507, and further multiplied by the price reported by the World Bank GEM commodities database.
2. Undertaken through the Eviews 5 econometric package.

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Annexure

Table 1: Augmented Dickey Fuller unit root test

	ADF		ADF 1st diff		
Variable	Stat	P-value	Stat	P-value	Integration level
Diamond units	24.9286	0.0016	n/a	n/a	0
Diamond net weight	21.8323	0.0052	n/a	n/a	0
IFF value	37.199	0	n/a	n/a	0
Computed diamond IFF	22.399	0.0042	n/a	n/a	0
Total diamond production	4.2189	0.8369	26.536	0.0008	1
Diamond price	10.4913	0.2322	19.4958	0.0124	1
Total employment	6.61928	0.5782	24.0999	0.0022	1
Political stability	25.11	0.0015	n/a	n/a	0
Mineral rents	9.42783	0.3075	39.8309	0	1
Total natural resources	12.0595	0.1486	43.9025	0	1
Trade	12.1741	0.1436	33.6975	0	1
Capital	7.0916	0.5268	24.4689	0.0019	1
GDP growth	25.4997	0.0013	n/a	n/a	0
Platinum unit	26.7791	0.0008	n/a	n/a	0
Platinum net weight	39.7801	0	n/a	n/a	0
Platinum IFF value	16.2668	0.0387	n/a	n/a	0
Computed platinum IFF	47.3801	0	n/a	n/a	0
Platinum produced	1.77029	0.7779	13.3493	0.0097	1
Platinum price	6.94946	0.5421	36.9651	0	1

Table 2: Impact of diamond commodity market IFF on employment in the mining sector

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Diamond quantity	0.0005	0.0004	0.0004**									
	0.284	0.251	0.016									
Diamond net weight				0.0000	0.0000	0.0000***						
				0.844	0.895	0.000						
Diamond IFF value							0.0000	0.0000	0.0000**			
							0.407	0.296	0.022			
Diamond IFF value (computed)										0.0000	0.0000	0.0000*
										0.792	0.629	0.086
Diamond output	0.0583	-0.0028	0.0086	0.2843	0.0665	1.2533***	0.0530	0.1131	0.0371	0.2520	0.0981	0.3149**
	0.877	0.992	0.953	0.608	0.826	0.000	0.894	0.704	0.838	0.633	0.738	0.046
Diamond prices	-0.0037	-0.0006	-0.0014	0.0009	0.0011	-0.0006	-0.0087	-0.0035	-0.0070	0.0001	-0.0002	-0.0027
	0.655	0.935	0.710	0.954	0.864	0.659	0.497	0.734	0.197	0.995	0.980	0.444
Cross-section effects	None	Fixed	Random	None	Fixed	Random	None	Fixed	Random	None	Fixed	Random
Obs	37	37	37	37	37	37	37	37	37	37	37	37

*, **, and *** represent 10%, 5% and 1% levels of significance respectively. P-values are reported in italics below the coefficient. Most values are in original form, without applying natural log, because a significant percentage of these were negative observations. Therefore, some of the coefficients are relatively small.

Table 3: Impact of diamond commodity market IFF on the level of political instability

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Diamond quantity	0.001	0.0000	0.0002									
	0.722	0.846	0.353									
Diamond net weight				0.0000	0.0000	0.0000						
				0.939	0.119	0.008						
Diamond IFF value							0.0000	0.0000	0.0000			
							0.555	0.710	0.002			
Diamond IFF value (computed)										0.0000	0.0000	0.0000
										0.374	0.758	0.000
Diamond output	-1.340	-0.126	-0.714	-1.329	-0.139	-1.410	-0.963	-0.125	-1.049	-1.470	-0.127	-1.430
	0.070	0.005	0.000	0.066	0.002	0.000	0.068	0.005	0.000	0.081	0.005	0.000
Diamond prices	0.021	0.789	0.003	0.017	0.002	-0.003	0.035	-0.001	0.026	-0.019	-0.004	-0.064
	0.720	0.789	0.630	0.793	0.818	0.612	0.422	0.867	0.000	0.810	0.632	0.000
Cross-section sffects	None	Fixed	Random	None	Fixed	Random	None	Fixed	Random	None	Fixed	Random
Obs	33	33	33	33	33	33	33	33	33	33	33	33

*, **, and *** represent 10%, 5% and 1% levels of significance respectively. P-values are reported in italics below the coefficient. Most values are in original form, without applying natural log, because a significant percentage of these were negative observations. Therefore, some of the coefficients are relatively small.

Table 4: Impact of IFFs from platinum commodity market on employment in the mining sector

Variable	Model 1	Model 2	Model 3	Model 4
Platinum quantity	0.0008	-0.0002		
	0.8949	0.8917		
Platinum weight				
Platinum IFF value			0.0000	0.0000
			0.9108	0.7591
Platinum IFF value (computed)				
Platinum output	0.4452	0.2873	0.1288	0.0405
	0.7139	0.4636	0.6836	0.9393
Platinum prices	0.0007	0.0005	0.0004	0.0002
	0.5467	0.1129	0.1111	0.5991
Cross-section effects	None	Fixed	None	Fixed
Obs	17	17	17	17

*, **, and *** represent 10%, 5% and 1% levels of significance respectively. P-values are reported in italics below the coefficient. Most values are in original form, without applying natural log, because a significant percentage of these were negative observations. Therefore, some of the coefficients are relatively small.

Table 5: Impact of IFFs from platinum commodity market on political stability

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Platinum quantity	-0.0187***	0.0002						
	0.0000	0.9756						
Platinum weight			0.0000	0.0000*				
			0.3064	0.0769				
Platinum IFF value					0.0000***	0.0000		
					0.0006	0.1308		
Platinum IFF value (computed)							0.0000	0.0000*
							0.5616	0.0853
Platinum output	-0.3933	-0.4578	-1.8443*	-0.2196	-0.0531	-0.0992	-3.4628*	-0.2272
	0.4435	0.2294	0.0741	0.4334	0.9363	0.7554	0.0797	0.4239
Platinum prices	-0.0004	-0.0006	-0.0023	-0.0003	0.0010	0.0002	-0.0028	-0.0003
	0.5890	0.2793	0.1390	0.4030	0.3210	0.6453	0.2774	0.4159
Cross-section effects	None	Fixed	None	Fixed	None	Fixed	None	Fixed
Obs	20	20	20	20	20	20	20	20

*, **, and *** represent 10%, 5% and 1% levels of significance respectively. P-values are reported in italics below the coefficient. Most values are in original form, without applying natural log, because a significant percentage of these were negative observations. Therefore, some of the coefficients are relatively small.