GLOBAL FINANCIAL INTEGRITY

Kenya: Potential Revenue Losses Associated with Trade Misinvoicing

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We are pleased to present here our analysis, **Kenya: Potential Revenue Losses Associated with Trade Misinvoicing**.

Trade misinvoicing is a reality impacting Kenya and every other country of the world. Imports coming into a country can be over-invoiced in order to shift money abroad. Or imports can be under-invoiced in order to evade or avoid customs duties or VAT taxes. Similarly, exports going out of a country can be under-invoiced in order to shift money abroad. And exports are occasionally over-invoiced, for example in order to reclaim VAT taxes.

Global Financial Integrity finds that trade misinvoicing is the most frequently utilized mechanism facilitating measurable illicit financial flows. Misstating import and export values has become normalized in much of commercial trade, and the same facilitating shadow financial system is used to move money of criminal and corrupt origin. We are dealing with a systemic problem that merits serious concerted attention.

Parties to trade who engage in misinvoicing do so because it is profitable to them. That is, they will incur some costs (including the expected cost of getting caught) but do so because the expected benefits to them of misinvoicing are larger than their expected costs. While those parties benefit from misinvoicing, there are additional social costs to nations affected by such activity. Trade misinvoicing redirects economic resources away from their most productive use (i.e., it is a type of "rent-seeking" activity) and that can result in social inefficiencies in the allocation and distribution of resources.

While any country may be affected by misinvoicing, the problem is particularly acute for developing countries where productive capacities may already be limited. The social costs of misinvoicing can undermine sustainable growth in living standards in developing countries as well as exacerbate already pronounced inequities in the distribution of income and wealth. Moreover, by depressing government revenues and exacerbating inequality, those social costs can also impede progress in the developing world on important social goals, such as poverty reduction.

In this analysis we seek to provide an approximate measure of revenues lost to the Kenyan government due to trade misinvoicing. We illustrate this in the first section of the report for 2013 (the last year for which comprehensive data for Kenya are available). For that year, we can reasonably identify potential revenue losses in excess of US$907 million, or about 8 percent of total Kenyan

government revenues. That is a conservative figure, as it does not encompass many aspects of trade misinvoicing and other illicit financial flows that do not show up in official statistics. Moreover, the detailed data available for estimating trade misinvoicing in Kenya comprise a fraction of all of that country's trade flows.

Furthermore, we take one aspect of this problem—import under-invoicing—and subject it to detailed analysis utilizing detailed bilateral trade data. We find that Kenyan imports of cereal from Pakistan, mineral fuels from India and, more generally, imports from China to be particularly prone to potential revenue loss to the government of Kenya due to under-invoicing.

All researchers on this issue of trade misinvoicing are constantly seeking better data and better analytical methodologies. Even as we work toward these goals, what is most important is to appreciate the order of magnitude of the problem and the potential for development revenues if the problem is curtailed.

Recognizing the shortcomings in data, Global Financial Integrity has developed **GFTrade**, a database of current world market prices of 80,000 categories of goods in the Harmonized System, as traded by 30 of the largest global economies. This enables emerging market and developing country customs and revenue authorities to assess instantly the risk that trade misinvoicing may be a reality in transactions as they are coming in or going out. **GFTrade** is in use in Africa now.

Global Financial Integrity thanks the Ford Foundation for its support of these efforts.

Raymond Baker
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Executive Summary

This report analyzes Kenya's bilateral trade statistics for 2013 (the most recent year for which sufficient data are available) which are published by the United Nations (Comtrade). The detailed breakdown of bilateral Kenyan trade flows in Comtrade allowed for the computation of trade value gaps that are the basis for trade misinvoicing estimates. Import gaps represent the difference between the value of goods Kenya reports having imported from its partner countries and the corresponding export reports by Kenya's trade partners. Export gaps represent the difference in value between what Kenya reports as having exported and what its partners report as imported.

Analysis of trade misinvoicing in Kenya in 2013 shows that the potential loss of revenue to the government is $907 million for the year. To put this figure in context, this amount represents eight percent of total annual government revenue as reported to the International Monetary Fund. Put still another way, the estimated value gap of all imports and exports represents approximately 23 percent of the country's total trade.

The portion of revenue lost due to import misinvoicing is $767 million. This amount can be further divided into its component parts: uncollected VAT tax ($324 million), customs duties ($229 million), and corporate income tax ($214 million). Lost revenue due to misinvoiced exports was $140 million for the year which is related to lower than expected corporate income and royalties.

Examination of the underlying commodity groups which comprise Kenya's global trade show that a large amount of lost revenue ($92 million) was related to import under-invoicing of just five product types. Those products and the related estimated revenue losses include: mineral fuels ($15 million), electrical machinery ($17 million), vehicles ($18 million), cereals ($21 million), and worn clothing ($21 million). Lost revenue due to mispriced exports ($140 million) may be related to the coffee, tea and spice trade given this category of goods makes up over 90 percent of all exports.

Trade misinvoicing occurs in four ways: under-invoicing of imports or exports, and over-invoicing of imports or exports. In the case of import under-invoicing fewer VAT taxes and customs duties are collected due to the lower valuation of goods. When import over-invoicing occurs (i.e. when companies pay more than would normally be expected for a product), corporate revenues are lower and therefore less income tax is paid. In export under-invoicing the exporting company collects less revenue than would be anticipated and therefore reports lower income. Thus, it pays less income tax. Corporate royalties are also lower.

Total misinvoicing gaps related to imports can be broken down by under-invoicing ($2 billion) and over-invoicing ($761 million). It should be noted that these figures represent the estimated value of the gap between what was reported by Kenya and its trading partners. The loss in government

revenue is a subset of these amounts and is based on VAT tax rates (16 percent), customs duties (11.3 percent), corporate income taxes (28.1 percent), and royalties (.1 percent) which are then applied to the value gap. Export misinvoicing gaps were $496 million for export under-invoicing and $341 million for export over-invoicing. Lost corporate income taxes and royalties are then applied to export under-invoicing amounts to calculate lost government revenue.

The practice of trade misinvoicing has become normalized in many categories of international trade. It is a major contributor to poverty, inequality, and insecurity in emerging market and developing economies. The social cost attendant to trade misinvoicing undermines sustainable growth in living standards and exacerbates inequities and social divisions, issues which are critical in Kenya today.

I. An Illustration of Potential Revenue Losses Due to Misinvoicing

Import over-invoicing is done for the purpose of shifting money abroad. Instead of paying US$100 per unit for an import, you can arrange for the invoice to read US$120 per unit and upon payment put the extra US$20 into a foreign bank account.

Import under-invoicing can be done for the purpose of evading or avoiding the payment of customs duties and VAT taxes. Instead of paying US$100 per unit, you can arrange for the invoice to read US$50 a unit and save on the duties and VAT that would have been payable at the higher price. Upon paying the invoice at US$50, you still owe the remaining US$50 and therefore must have a separate means of shifting money abroad to complete the transaction. In other words, import under-invoicing is always done with an additional mechanism for shifting money out of the country to meet the balance due.

Exports can be handled in the same way. Under-invoicing shifts money into foreign holdings. This practice has plagued resource exports from Africa for centuries. The High Level Panel on Illicit Financial Flows from Africa found that illicit financial flows are most evident in Africa's resource exporting countries. New data sources are available to shed light on this reality.

What would be the explanation for over-invoicing an export, indicating that a higher than world market price is payable to the exporter on the transaction? Customs duty and VAT tax drawback is one reason. In some countries and industries, exports are encouraged by offering rebates on the duty and VAT components within the costs of imported materials used in local production. This provides an incentive for over-invoicing of exports, enabling the over-invoiced amount of the transaction to generate an excessive refund to the exporter at the government's expense. In analyzing the trade misinvoicing phenomenon and the potential for revenue losses to the Government of Kenya, Global Financial Integrity (GFI) has utilized data provided by UN Comtrade. In these data sets we look for gaps in export and import statistics, suggestive of misinvoicing.

In addition, tariff data is sourced from the World Integrated Trade Solution (WITS). Income tax data has been derived from the report Paying Taxes 2013, an annual analysis by the accounting firm PwC and the World Bank Group. Royalty rates are sourced from Kenya's Miscellaneous Fees and Levies Act, while the uniform VAT rate is published by the Kenya Revenue Authority.

The following table summarizes our findings, in annual figures for 2013.

Table 1. Illustration: Trade Misinvoicing and Potential Revenue Losses in Kenya
(2013 data, in millions of U.S. dollars or in percent of actual collections)

	USD, Millions	% Collections
Import Value Analyzed	**11,990**	–
Import Under-Invoicing	2,025	–
VAT %, lost revenue	324	12% *
Customs duty %, lost revenue	229	29%
Import Over-Invoicing	761	–
Company income tax %, lost revenue	214	4% **
Export Value Analyzed	**3,885**	–
Export Under-Invoicing	496	–
Company income tax %, lost revenue	139	3% **
Royalties, lost revenue	0.7	–
Export Over-Invoicing	341	–
Potential Revenue Losses	907	8% ^

* All VAT (import & other)
** Import & excise duties
^ All Revenue

Sources: Trade data: UN Comtrade.
Tariff data: WITS.
VAT rate: Kenya Revenue Authority, 16% rate (no exemptions considered), http://www.kra.go.ke/customs/faqcustoms2.html.
Company income tax rate: PWC/World Bank 'Paying Taxes' 2013, profit tax rate, p. 155.
Export Royalties: The Repulic of Kenya, Miscellaneous fees and Levies Act, No. 29 of 2016, www.kenyalaw.org.
Actual Collections: 2014 IMF Article IV, 2013/14 estimated collections, p. 33. Kenyan Shillings converted to USD using annual average rate, IMF International Financial Statistics (86.12 Shillings/Dollar).

The level of imports analyzed equaled US$12 billion in 2013. Analyzed exports amounted to US$3.9 billion.

Import under-invoicing and over-invoicing are estimated at US$2.0 billion and US$761 million respectively.

Export under-invoicing and over-invoicing are somewhat smaller by comparison, at US$496 million and US$341 million respectively.

To these figures, we apply the following:

- VAT taxes at 16.0 percent for the sample analyzed.[1] No exemptions to this rate are considered in this simple illustration.
- Customs duties, applied at varying rates by 6-digit HS code, at an average of 11.3 percent.
- Company income taxes at of 28.1 percent, drawn from the PWC/World Bank Group report.[2]
- Royalties applied at reported rates at the commodity level, at an average of 0.1 percent.[3]

[1] Kenya Revenue Authority, "Customs Services Department: Frequently Asked Questions," Kenya Revenue Authority (KRA), n.d., http://www.kra.go.ke/customs/faqcustoms2.html.
[2] PricewaterhouseCoopers, "Paying Taxes 2013: The Global Picture" (London: PricewaterhouseCoopers, n.d.), 155.
[3] The Republic of Kenya, "Miscellaneous Fees and Levies Act" (2016), http://kenyalaw.org/lex/rest//db/kenyalex/Kenya/Legislation/English/Acts%20and%20Regulations/M/Miscellaneous%20Fees%20and%20Levies%20Act%20-%20No.%2029%20of%202016/docs/MiscellaneousFeesandLeviesActNo29of2016.pdf.

Applying these figures to the levels of indicated over- and under-invoicing produces an estimate of US$907 million lost to government revenues in 2013, or about 8 percent of total reported Kenyan government revenue ((which includes taxes and other receipts) as reported to the International Monetary Fund (IMF)[4]).

GFI regards this illustrative estimate of potential revenue loss as conservative for a number of reasons. First, a variety of illicit transactions simply cannot be estimated from the underlying data. Such transactions would include:

- **Same invoice faking.** The gaps that show up in export and import values in available trade data do not include transactions where the intentional misinvoicing has been agreed between the exporter and the importer and therefore no gap appears between the export and import documents. This methodology is widely used by both multinational corporations and long-term trading partners and is difficult to detect. GFTrade, GFI's global trade pricing database, enables same invoice faking to be detected.

- **Services and intangibles.** Available trade pricing data covers only merchandise goods. Not included are management fees, interest payments, licenses, etc., which have become commonly used avenues for overcharges, shifting money out of emerging market and developing countries.

- **Cash transactions.** Sometimes used in commerce and often used in criminal transactions, cash transactions do not show up in our data.

- **Hawala and flying money transactions.** Our analyses cannot detect transactions that utilize mechanisms which avoid the immediate movement of payment. These techniques are increasingly leveraged as commerce becomes more internationalized.

Additionally, only a fraction of the trade data reported by Kenya is amenable to the type of analysis presented here (as will be discussed further below). Finally, even that fraction of data that can be analyzed reflects varying degrees of quality. To enhance the robustness of its estimates of trade misinvoicing, GFI adjusted the data it used to address reliability concerns. Those quality control adjustments worked to lower the estimated degree of misinvoicing.

[4] "Kenya: 2014 Article IV Consultation," IMF Country Report (Washington, D.C.: International Monetary Fund, October 2014), 33, https://www.imf.org/external/pubs/ft/scr/2014/cr14302.pdf.

II. GFI's Approach to Estimating Trade Misinvoicing in Kenya with a Detailed Look at Potential Revenue Losses from Under-Invoiced Imports

The central objective of the analysis is to identify commodity-trade partner combinations which appear to be more likely than others to present risk of revenue loss due to trade misinvoicing. Toward this end, GFI presents a summary of the methods it used to estimate trade misinvoicing for imports and exports along with a more detailed presentation of potential revenue impacts of import under-invoicing for Kenya. The availability of Kenyan tariff data comparable in detail to the partner country and commodity detail available for Kenyan trade enable the more detailed estimates of revenue loss.

The first two subsections to follow reflect on all the misinvoicing estimates. In subsection A, the bilateral trade data used to estimate misinvoicing are summarized and are compared with other leading aggregate trade series for Kenya. That comparison is intended to shed light on the kinds of information the bilateral trade analysis can provide. Next, in subsection B, GFI provides an overview of the numerous statistical treatments of the basic data that were necessary to enable robust measurements of trade gaps. Finally, in subsection C, details of the potential revenue losses (in import duties) stemming from under-invoiced imports in Kenya are presented.

A. Overview of Kenyan Trade Data

For its analysis of misinvoicing in Kenya, GFI has chosen to use detailed bilateral trade statistics published by the United Nations (Comtrade) as its primary source. Those data are the most comprehensive public source of trade information currently available for Kenya.[5] The detailed breakdown of bilateral Kenyan trade flows in Comtrade, allowed for the computation of trade gaps that are the basis for the misinvoicing estimates. Import gaps represent the difference between the value of goods Kenya reports having imported from its partner countries and the corresponding export reports by Kenya's trade partners. Similarly, export gaps represent the difference in dollar value between what Kenya reports as having exported to its partners and what its partners report as imported from Kenya.

The value of imports Kenya reports to the UN since 1997 are summarized in Table 2. The first column of the table show aggregate Kenyan merchandise imports as published by the Central Bank of Kenya (CBK) in its reporting of balance of payments. The CBK data were converted by GFI

[5] GFI researched the possible availability of more detailed country data from Kenyan government sources and concluded that the UN Comtrade data were the most comprehensive trade data appropriate and available online for Kenya. GFI did use aggregate trade and other data available from the IMF and the Central Bank of Kenya (including detailed trade data for Kenyan trade with selected advanced countries) for reference purposes.

Table 2. Kenyan Imports (millions of U.S. dollars)

	Central Bank of Kenya	UN-COMTRADE HS-As reported				
		Total Reported by Kenya	Matched Values	Matched Quantities	Orphaned	Lost
By Year						
1997	—	$3,199	$1,986	$1,202	$1,212	$480
1998	—	$3,231	$2,053	$1,336	$1,178	$459
1999	$2,778	$2,756	$1,584	$1,159	$1,171	$410
2000	$3,252	$2,891	$1,580	$1,375	$1,311	$496
2001	$3,557	$3,992	$2,252	$2,022	$1,740	$398
2002	$3,273	$3,068	$1,750	$1,499	$1,319	$390
2003	$3,715	$3,377	$1,880	$1,702	$1,497	$587
2004	$4,553	$4,566	$2,512	$2,266	$2,053	$502
2005	$6,149	$5,864	$4,129	$4,033	$1,735	$660
2006	$7,311	$7,258	$3,905	$3,807	$3,353	$708
2007	$8,990	$8,908	$6,058	$5,791	$2,850	$1,204
2008	$11,074	$11,179	$8,336	$7,097	$2,843	$1,152
2009	$10,207	$10,214	$6,609	$6,214	$3,605	$1,023
2010	$12,095	$12,097	$8,282	$7,649	$3,814	$1,326
2011	$14,805	—	—	—	—	—
2012	$16,278	—	—	—	—	—
2013	$16,358	$16,256	$12,883	$12,091	$3,372	$1,433
2014	$18,407	—	—	—	—	—
2015	—	—	—	—	—	—
2016	—	—	—	—	—	—
Percent of total UN reported		*100%*	*67%*	*60%*	*33%*	*11%*
By Commodity (ranking)		Percent of column total (1997-2010, 2013)				
(1) Mineral fuels		22%	13%	12%	40%	9%
(2) Machinery		10%	11%	10%	6%	2%
(3) Vehicles		8%	11%	12%	2%	1%
(4) Electrical machinery		8%	9%	8%	4%	2%
(5) Aircraft		5%	4%	4%	6%	0%
(6) Iron and steel		4%	5%	5%	3%	3%
(7) Plastics		4%	5%	6%	2%	3%
(8) Cereals		4%	5%	5%	3%	1%
(9) Edible oils, waxes		4%	2%	2%	7%	2%
(10) Pharmaceuticals		3%	4%	4%	1%	2%
TOTAL		*71%*	*68%*	*68%*	*75%*	*25%*
By Partner Country (ranking)		Percent of column total (1997-2010, 2013)				
(1) United Arab Emirates		12%	6%	5%	25%	8%
(2) India		10%	13%	14%	3%	3%
(3) China		7%	10%	11%	2%	1%
(4) South Africa		6%	8%	9%	3%	1%
(5) Japan		6%	8%	8%	2%	0%
(6) United Kingdom		6%	7%	7%	3%	2%
(7) USA		6%	7%	7%	4%	4%
(8) Saudi Arabia		4%	2%	2%	10%	1%
(9) Germany		4%	4%	4%	2%	1%
(10) Indonesia		3%	2%	2%	5%	0%
TOTAL		*64%*	*67%*	*68%*	*58%*	*21%*

Sources: GFI calculations using data from the Central Bank of Kenya and the United Nations. The data from the Central Bank of Kenya are reported online in millions of Kenyan shillings and were converted to US dollars essentially using the exchange rates used by the UN in constructing the Comtrade data.

to U.S. dollars using the same exchange rates used by the UN in converting Kenyan shillings in its construction of the Comtrade data (available only in US dollars).

The upper panel of the table compares the data sources by year, beginning in 1997. The CBK aggregates generally match the values reported by Kenya to the UN: over the 1999-2010 and 2013 (the years for which both CBK and Comtrade data are available), the import aggregate reported to Comtrade is, on average, just under the aggregate published by the CBK by about 1 percent. However, significant differences appear in particular years (especially 2000 and 2001).

It's impossible to reconcile those differences using available data alone. But such discrepancies are not unique to Kenya; indeed, such discrepancies between Comtrade country-commodity trade flows and country-reported balance of payments (BoP) aggregates are quite the rule. Compared with such comparisons made for other countries, the differences in the Kenyan case appear modest. In any event, the differences most likely reflect the increased burden faced by many countries in maintaining sufficiently detailed internal records for fully accurate bilateral reporting (for Comtrade).

Additional characteristics of the Comtrade data are illustrated in the table. Total imports reported by Kenya to the UN Comtrade database (i.e., the third column of the table), is defined to be the sum of "matched values" (the fourth column) and "orphaned" values (the sixth column). The matched values correspond to those records in the Comtrade database for which both Kenya and its partner country on a particular trade report values. By contrast, "orphaned" imports correspond to those records in the database for which Kenya reports a value for imports of a commodity from a particular country while that country reports no exports of that good to Kenya in that period. Such records cannot be considered in the quantitative calculation of misinvoicing as there is no mirror pair of trades for that record.[6] A final category of imports is designated (in the rightmost column) as "lost." Those values correspond to exports reported by Kenya's trade partners as shipped to Kenya in a particular year but are not recorded as imports by Kenya in that year. As with the case of orphaned imports, lost imports cannot be directly useful in the calculations of import gaps because they too do not correspond to a proper mirror pair.

While over two-thirds of Kenyan reported imports correspond to matched values (i.e., legitimate mirror pairs), GFI uses a subset of those mirror pairs; those observations for which both Kenya and its partner countries each report non-zero trade volumes (and in the same physical units) in addition to non-zero trade values. That magnitude is reported in the column labelled "matched quantities." Over the years for which Kenyan data are available in Comtrade, observations with matched

[6] Some researchers have used the categorical information in such orphaned imports to help identify the likelihood that factors correlated with informal trade are resulting in a particular commodity-partner country pair showing up as an orphaned input; see, for example, Carrere-Grigourio[2015].

Table 3. Kenyan Exports (millions of U.S. dollars)

	Central Bank of Kenya	UN-COMTRADE HS-As reported				
		Total Reported by Kenya	Matched Values	Matched Quantities	Orphaned	Lost
By Year						
1997	—	$1,837	$1,357	$1,231	$480	$1,212
1998	—	$1,828	$1,369	$1,216	$459	$1,178
1999	$1,754	$1,616	$1,205	$1,059	$410	$1,171
2000	$1,764	$1,544	$1,048	$993	$496	$1,311
2001	$1,942	$1,506	$1,108	$1,046	$398	$1,740
2002	$2,181	$1,280	$890	$699	$390	$1,319
2003	$2,411	$2,322	$1,735	$1,624	$587	$1,497
2004	$2,684	$2,437	$1,936	$1,618	$502	$2,053
2005	$3,227	$3,258	$2,599	$2,579	$660	$1,735
2006	$3,437	$3,353	$2,645	$2,601	$708	$3,353
2007	$4,080	$4,026	$2,822	$2,747	$1,204	$2,850
2008	$4,972	$4,956	$3,804	$3,759	$1,152	$2,843
2009	$4,463	$4,426	$3,403	$3,353	$1,023	$3,605
2010	$5,149	$5,105	$3,779	$3,682	$1,326	$3,814
2011	$5,752	—	—	—	—	—
2012	$6,124	—	—	—	—	—
2013	$5,883	$5,422	$3,989	$3,887	$1,433	$3,372
2014	$6,041	—	—	—	—	—
2015	—	—	—	—	—	—
2016	—	—	—	—	—	—
Percent of total UN reported		*100%*	*75%*	*71%*	*25%*	*74%*
By Commodity (ranking)		Percent of column total (1997-2010, 2013)				
(1) Coffee, tea, spices		90%	94%	93%	66%	10%
(2) Live trees and plants		2%	2%	3%	3%	2%
(3) Mineral fuels		1%	1%	1%	3%	1%
(4) Edible vegetables		1%	1%	1%	2%	0%
(5) Salt, stone, cement		0%	0%	0%	0%	1%
(6) Plants, prepared		0%	0%	0%	1%	1%
(7) Iron and steel		0%	0%	0%	1%	0%
(8) Tobacco		0%	0%	0%	1%	2%
(9) Plastics		0%	0%	0%	1%	0%
(10) Edible oils, waxes		0%	0%	0%	1%	2%
TOTAL		*96%*	*99%*	*99%*	*78%*	*19%*
By Partner Country (ranking)		Percent of column total (1997-2010, 2013)				
(1) Uganda		14%	18%	17%	2%	0%
(2) United Kingdom		11%	14%	15%	2%	3%
(3) United Rep. of Tanzania		9%	10%	10%	4%	0%
(4) Netherlands		7%	9%	8%	3%	1%
(5) Pakistan		5%	5%	5%	6%	1%
(6) USA		5%	5%	6%	4%	4%
(7) Egypt		4%	5%	6%	0%	1%
(8) Fmr Sudan		3%	2%	2%	6%	0%
(9) Germany		3%	3%	3%	1%	2%
(10) United Arab Emirates		3%	1%	1%	8%	25%
TOTAL		*64%*	*73%*	*73%*	*37%*	*37%*

Sources: GFI calculations using data from the Central Bank of Kenya and the United Nations. The data from the Central Bank of Kenya are reported online in millions of Kenyan shillings and were converted to US dollars essentially using the exchange rates used by the UN in constructing the Comtrade data.

quantities comprise nearly two-thirds (60 percent) of the total value of all imports reported by Kenya to the UN.[7]

The bottom panels of Table 2 present the commodity and partner country dimensions of Kenyan imports in the Comtrade database. The top ten commodities Kenya imports and the top ten countries which export to Kenya comprise over two-thirds of the value of total imports reported by Kenya. It appears, however, that in focusing on the leading commodities that Kenya imports as well as the leading countries from which it imports, we have a higher-than-average proportion of useful mirror trade gaps available for use in the analysis. Observations with matched quantities represent 60 percent of total imports reported by Kenya, and they represent 68 percent of both the top ten commodities reported and imports reported from trade with that country's top ten partners.

Table 3 presents an analogous summary of the Comtrade data for exports. As was the case with total reported imports, total exports reported by Kenya (again, the sum of "matched values" and "orphaned" exports) generally match the aggregate goods exports reported in the CBK's BoP accounts. Exports of coffee, tea and spices (mostly black tea) represent over a quarter of total Kenyan exports with over 90 percent of the export value reported in Comtrade corresponding to matched quantities.

While Kenya's trade reports to Comtrade match those reported by the CBK to a greater degree than is the case with other countries, discrepancies remain and cannot be explained using the available data alone (if at all). Accordingly, the information value of the detailed Comtrade data is best conveyed by treating the Comtrade database as an internally consistent unit, emphasizing relative propensities for misinvoicing (e.g., estimated misinvoicing as a share of total trade as given by Comtrade) as opposed to dollar levels that are not fully reconcilable with other, more complete but less detailed estimates of Kenyan trade. Accordingly, we report both propensities and dollar flows of potential revenue losses due to misinvoicing below.

B. Statistical Treatments of the Basic Comtrade Data

Gaps can arise in bilateral trade data for a variety of reasons, many of them reflecting legitimate factors. GFI has attempted to address as many such factors as possible, given the limitations of available data. These adjustments are summarized in turn.

Swiss gold trade. Asymmetries in the types of trade that countries report can give rise to trade gaps that are unduly large, not because of trade misinvoicing but because, one country may be reporting trade in goods that its partner country suppresses. Such was the case with Switzerland's failure to report its exports and imports of gold on a bilateral basis since the early 1980s. As a result, it would

[7] For Kenya, the proportion of imports reported with matched quantities to total imports is somewhat higher than the average for all imports reported by all countries in the Comtrade database over the 1997-2016 period.

be the case that some countries (such as India) would report imports of gold from Switzerland even as Switzerland reported no gold exports to those other countries (in effect, Swiss gold would be an orphaned import for those countries). Because Switzerland resumed reporting its gold trade on a bilateral basis, beginning in 2012, the Comtrade data no longer reflect the distortions. For prior years, however, they remain. To mitigate the remaining distortions, GFI adjusted the bilateral trade data in Comtrade using gold trade data published by Switzerland in recent years.

Hong Kong re-exports. Over time, trading hubs have become increasingly important in international trade, displacing the older direct point-to-point arrangements between trade partners. While this trend has tended to increase the volume and efficiency of trade worldwide, transshipments through trading hubs complicates the measurement of misinvoicing using the mirror trade methodology.

In general, there are insufficient data to correctly disentangle the ultimate partners to trade from the interim flows through hubs. However, in the case of Hong Kong (a major trade hub with nearly all of the country's exports consisting of re-exports, much of that from mainland China), data are available. GFI purchased re-export data from the Hong Kong Census Office and implemented these adjustments at the 6-digit level of commodity detail for the period from 2000 through 2015.

Transport margins. Most countries report imports on a "cost, insurance and freight" (CIF) basis while export values are reported according to the "free on board" (FOB) valuation. To enable direct comparisons of import and export values, import values must first be converted to an FOB basis.

GFI implemented those adjustments in three steps.

1. A statistical model linking CIF/FOB margins for any two countries trading any particular good was developed and estimated trades selected the entire Comtrade database over the 1997-2016 period.
2. The statistical model was then applied to all Kenyan import transactions, adjusting them to an FOB basis.
3. The results were scaled to ensure that the estimated CIF/FOB margins for Kenya were consistent with a "consensus" global average for transport costs.

Each of these steps is explained in turn.

There has been an enormous amount of research into the nature of transport costs in trade in recent decades and the statistical work performed by GFI, in particular, builds upon the research reported in recent years by Centre d'Etudes Prospectives et d'Informations Internationales (CEPII)

and the Organisation for Economic Co-operation and Development (OECD).[8] GFI's model extends the determinants of transport margins developed by CEPII (namely, the role of such factors as distance between trade partners, contiguity, landlockedness, and "world" prices for individual commodities) and includes factors such as the presence of trade agreements between partners (which should lower the costs of trade) and categorical factors as to whether either or both trade partners are developing countries (proxies for the quality of a country's infrastructure). This is a less extensive list of factors than that used by the OECD, but using more elaborate infrastructure indexes and per capita income in the country pairs (as included in the OECD's work) would reduce the number of countries for which transport costs could be estimated. GFI's work follows the OECD's decision to restrict the Comtrade data included to only "reliable" observations, a step not included in the CEPII work.[9] GFI's estimated equation qualitatively supported the findings of both the CEPII and OECD research.[10]

GFI's statistical work on transport margins used import gaps reflecting all countries and commodities in the Comtrade database over the 1997-2016 period, not just those for Kenya. In order to adjust as much of the imports relevant to Kenyan trade as possible, in the second step, GFI simply applied the global estimates to bilateral trade for Kenya.

It turned out that the statistical model produced what GFI judged to be very high transport margins, with the estimated CIF/FOB markup rate averaging 14.1 percent for all countries and commodities and years in the sample. That rate is much higher than the 10 percent average flat rate the IMF (and GFI) have used in previous research. Many researchers have suggested that the traditional flat rate may be too high, especially given the tendency for transport margins to have declined over time.

In order to line up GFI's results with that of other representative research, it was decided to scale down GFI's estimates of transport margins to match the global average in the OECD research of 6.2 percent. In effect, all of the transport margins estimated in the GFI model were reduced by a flat factor of 6.2/14.1. The relative differences between the country-commodity-time specific margins of OECD and GFI are preserved by this final step. In particular, the margins used to adjust imports relevant to Kenyan trade averaged about 9 percent after the scaling, well above the assumed 6.2 percent global rate.

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[8] The key papers are Gaulier-Zignano[2010] and Fortanier-Miao[2017]. Guillaume Gaulier and Soledad Zignago, "BACI: International Trade Database at the Product-Level. The 1994-2007 Version," CEPII Working Paper Number 2010-23 (Paris, France: CEPII, October 2010), http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=1; Guannan Miao and Fabienne Fortanier, "Estimating CIF-FOB Margins on International Merchandise Trade Flows," Working Paper, Statistics Directorate, Committee on Statistics and Statistical Policy (Paris: OECD, March 2016).

[9] Specifically, GFI followed the OECD in including in the statistical model only those mirror trades for which: (a) the associated trade volumes differ by less than 5 percent, and (b) the ratio of the import price per unit (CIF) to the corresponding export price was not less than 1 and not greater than 2. The OECD argues persuasively that CEPII's inclusion of all matched transactions (including those for which import prices were below the associate export prices) biased downward CEPII's estimated CIF/FOB margins.

[10] GFI's research on transport margins is work still in progress. A more detailed presentation of GFI's estimated model of transport margins used here is available upon request.

Shrinkage adjustments to enhance robustness and reliability. Once the trade gaps were calculate using all the aforementioned treatments, the range of the trade gaps remained implausibly high (in absolute value). To ensure that such implausible trade gaps (more likely the result of error than trade misinvoicing) did not have an undue influence on the overall results, GFI weighted the dollar gaps, assigning low weights to gaps that were of dubious reliability. Many types of reliability ratings have been used in the analysis of bilateral trade. The particular weights chosen by GFI based reliability on the discrepancy between reported trade volumes for a given observation: if the proportionate difference between the reported volumes of imports and exports was large, the difference between the values of reported imports and exports was assigned a low weight.[11] In this regard, the trade misinvoicing estimates reported here might further be viewed as conservative.

C. Potential Revenue Losses from Import Under-invoicing

As indicated in Table 1 earlier, import under-invoicing in Kenya totaled US$2.0 billion in 2013, nearly 17 percent of total imports analyzed for that year and the largest of the misinvoicing estimates for that year. By adding up the product of detailed tariff rates and import under-invoicing by commodity, GFI estimated the potential loss of import duties due to import under-invoicing to be US$229 million in 2013, or 29 percent of total customs duties and excise tax revenues.[12] In this section, we break down that total with an eye toward identifying commodities and countries that appear to be riskiest in terms of their susceptibility to revenue loss.[13]

Revenue losses due to under-invoiced Kenyan imports are depicted by HS 2-digit commodity groups in Figure 1. The left hand bar chart shows potential revenue losses as a percent of total Kenyan imports for each commodity in 2013. The right hand bars show the potential revenue losses in terms of millions of U.S. dollars for that year.

In relative terms, the largest potential revenue losses (prepared meat & fish, umbrellas & walking sticks, prepared feathers, animal products and leather articles) each amounts to more than 20 percent of imported value, but their dollar values are relatively small. By contrast, some of the categories showing large potential dollar revenue losses (e.g., vehicles and electrical machinery) indicate smaller relative losses.

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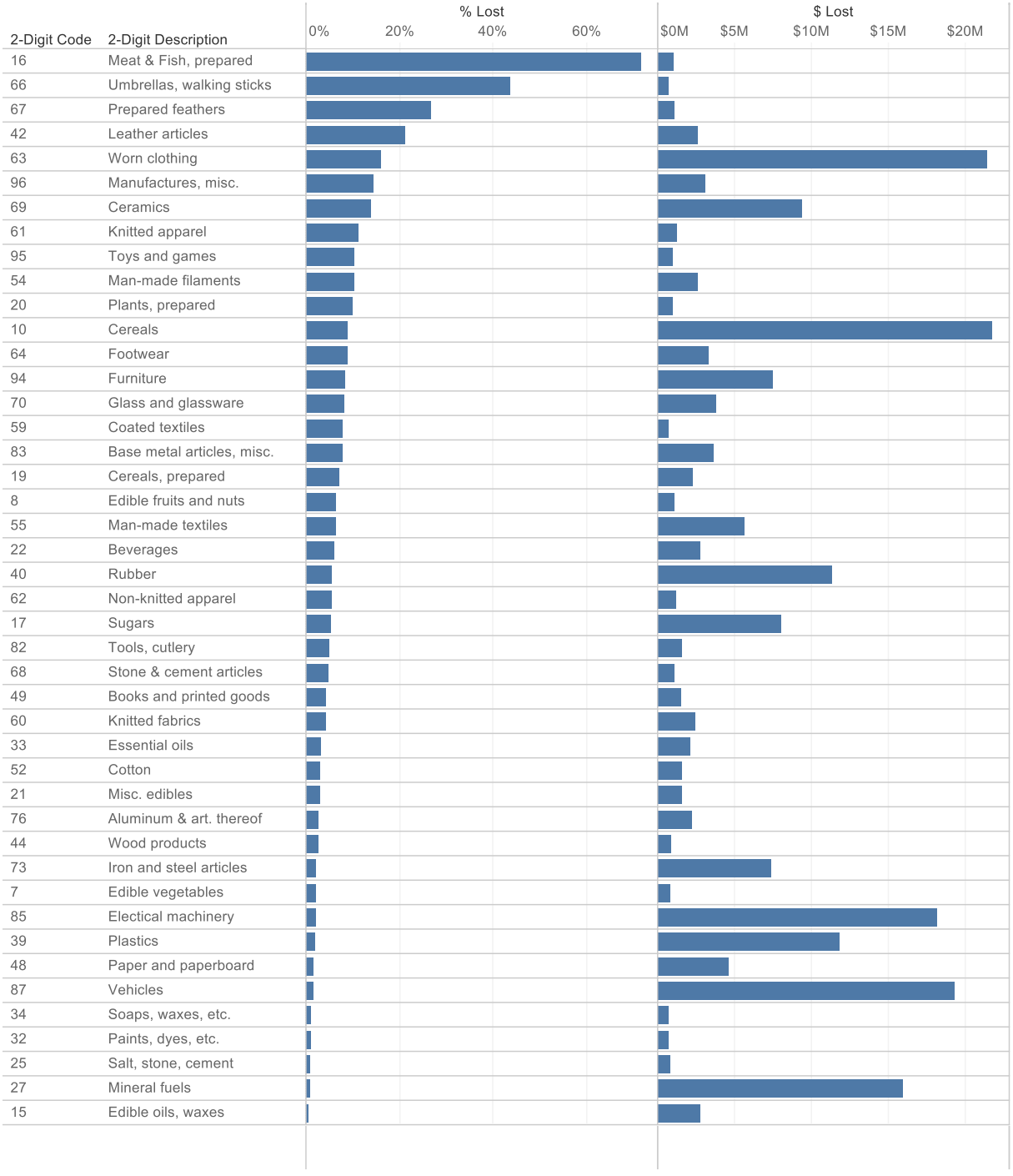
[11] Specifically, the weight GFI applied to the mirror pair of observations equaled one minus the ratio of the absolute value of the differences between the reported volumes of trade divided by the larger volume reported in the mirror pair. If the volumes were identical, the resulting weight for the value gap would be one (no shrinkage). The shrinkage was larger (i.e., the weight was smaller) the larger the relative distance between the mirror reports of trade volume. This weighting scheme was used, for example, in ECLAC[2016]. A similar approach to weighting proportional trade gaps was used in CEPII[2010]. Economic Commission for Latin America and the Caribbean (ECLAC), "Economic Survey of Latin America and the Caribbean" (Santiago: UN ECLAC, 2016), http://www.cepal.org/en/node/37887; Gaulier and Zignago, "BACI: International Trade Database at the Product-Level. The 1994-2007 Version."

[12] Those estimates include potential revenue losses on customs duties only; they do not include domestic VAT losses on imports.

[13] We choose to present estimates for 2013 because it is the latest available year for which we have Comtrade data on Kenyan trade.

Figure 1. Kenya: Potential Tariff Revenue Losses Due to Import Underinvoicing, by Commodity Group in 2013 (Estimated potential revenue losses as a percent of value of total imports of each commodity group and in millions of U.S. dollars)



2-Digit Code	2-Digit Description
16	Meat & Fish, prepared
66	Umbrellas, walking sticks
67	Prepared feathers
42	Leather articles
63	Worn clothing
96	Manufactures, misc.
69	Ceramics
61	Knitted apparel
95	Toys and games
54	Man-made filaments
20	Plants, prepared
10	Cereals
64	Footwear
94	Furniture
70	Glass and glassware
59	Coated textiles
83	Base metal articles, misc.
19	Cereals, prepared
8	Edible fruits and nuts
55	Man-made textiles
22	Beverages
40	Rubber
62	Non-knitted apparel
17	Sugars
82	Tools, cutlery
68	Stone & cement articles
49	Books and printed goods
60	Knitted fabrics
33	Essential oils
52	Cotton
21	Misc. edibles
76	Aluminum & art. thereof
44	Wood products
73	Iron and steel articles
7	Edible vegetables
85	Electical machinery
39	Plastics
48	Paper and paperboard
87	Vehicles
34	Soaps, waxes, etc.
32	Paints, dyes, etc.
25	Salt, stone, cement
27	Mineral fuels
15	Edible oils, waxes

Sources: GFI staff calculations using data from the United Nations Comtrade data base.
Note: Only potential losses greater than US$500,00 displayed.

A similar situation arises when we consider revenue risks stemming from under-invoiced imports by Kenya's trade partners (see Figure 2). The partner countries clearly indicating the largest relative potential revenue losses are Pakistan, Estonia, Guatemala and Botswana, but only the first of those countries indicates a sizeable dollar value of potential revenue losses. By contrast, partner countries associated with larger potential dollar values of revenue loss (such as China, India and the United Arab Emirates) each indicate more modest revenue losses relative to import value reported.

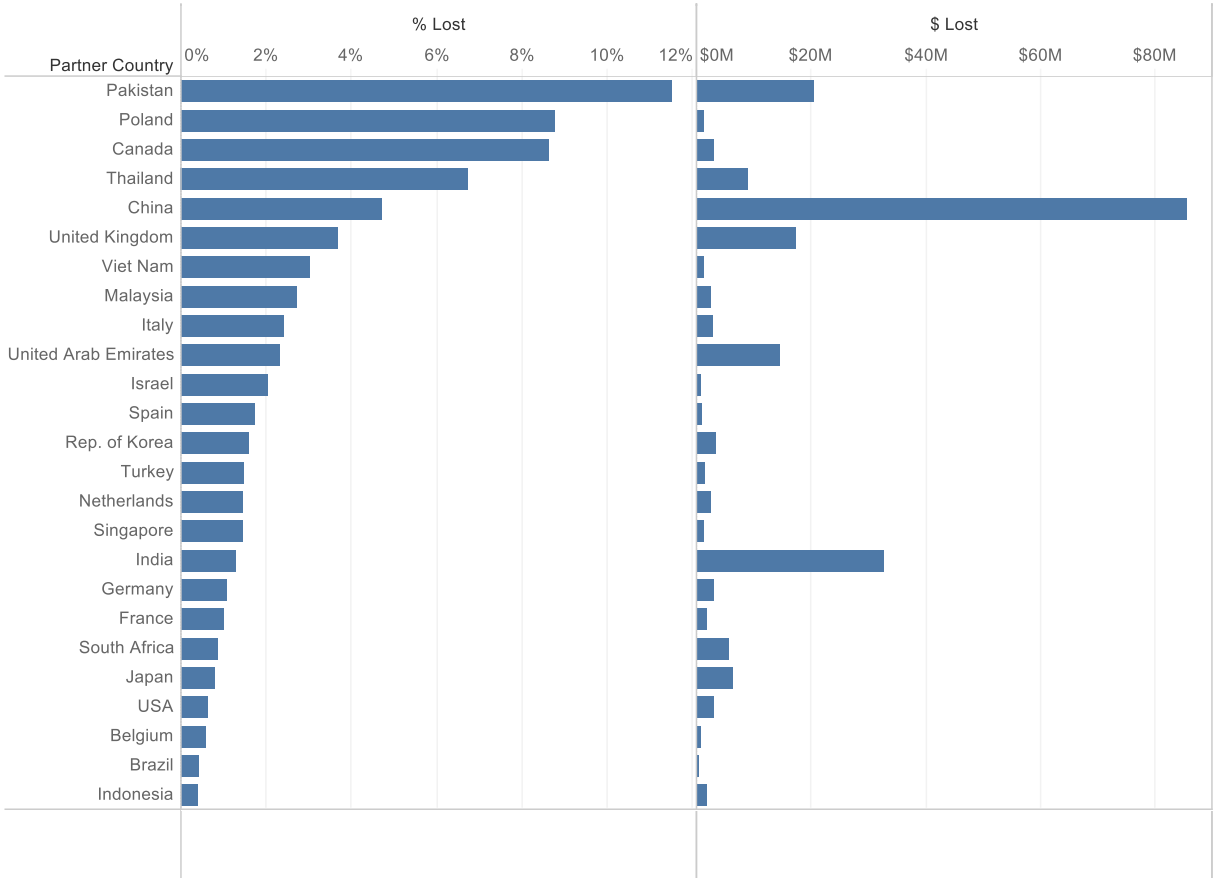
A more revealing approach to identifying such revenue loss risks may be to compare potential revenue losses by commodity-country pairs in a way that allows comparisons in terms of dollar magnitude and relative terms at the same time. This is depicted in Figure 3.

Each row in Figure 3 corresponds to a different HS 2-digit commodity and each column corresponds to a country exporting to Kenya. The boxes depicted for each commodity-country combination convey both the dollar magnitude of the potential revenue losses (the size of the box) and the magnitude of the potential losses relative to total imports of the given commodity (row) from a given country (column). The number of boxes in each row indicates the degree to which revenue losses from under-invoicing of that particular commodity are distributed across many countries (risks associated with particular countries). Similarly, the number of boxes in each column indicate country-specific revenue risks to Kenya.

The revenue risks can be concentrated in a particular commodity-country pair; the leading examples depicted in Figure 3 are potential revenue losses associated with Kenyan imports of cereals from Pakistan or mineral fuels from India. On the other hand, a number of Kenya's partner countries are associated potential revenue losses on imports from worn clothing. Similarly, imports from China appear to carry persistent potential revenue losses over relatively many goods.[14]

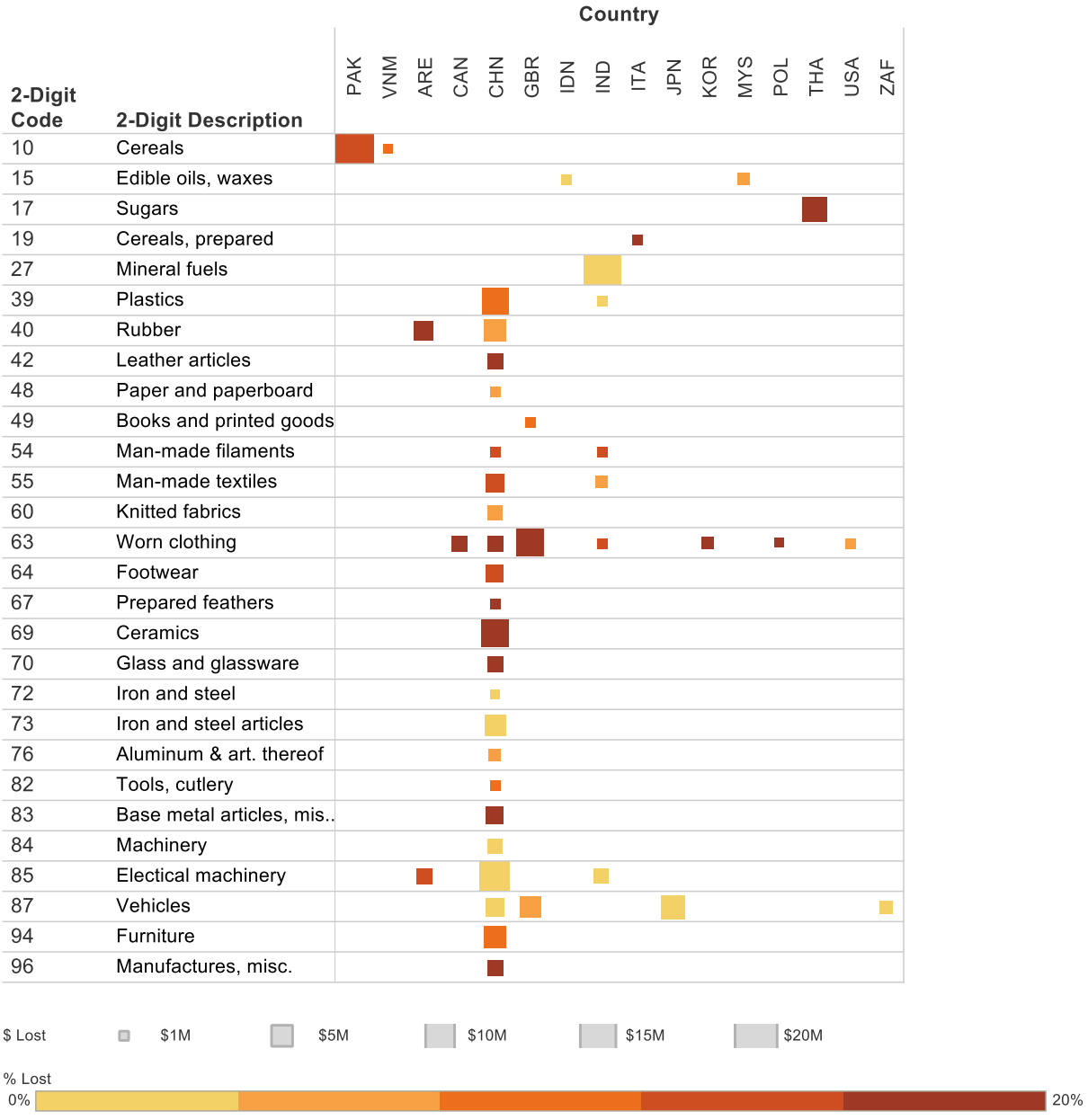
[14] This analysis for 2013 is intended to be illustrative as well. The estimates of potential revenue losses could be evaluated over more refined commodity groups such as HS-4 digit and HS-6 digit groups. GFI will provide such more highly refined estimated groupings upon request.

Figure 2. Kenya: Potential Tariff Revenue Losses Due to Import Underinvoicing, by Partner Country in 2014 (Estimated potential revenue losses as a percent of value of total imports from each partner country and in millions of U.S. dollar)



Sources: GFI staff calculations using data from the United Nations Comtrade data base.
Note: only potential losses greater than US$500,000 displayed.

Figure 3. Kenya: Potential Tariff Revenue Losses by Commodity Group and Partner Country in 2013 (The size of each box indicates dollar value and estimated potential losses with darker coloring indicating larger potential losses relative to total Kenyan imports of each commodity group for each partner country)



Sources: GFI staff calculations using data from the United Nations Comtrade data base.
Note: Only potential losses greater than US$1 million displayed.

Conclusions

There are three ways that Kenya can curtail revenues losses due to trade misinvoicing. First is through legislative and regulatory measures that posit substantial disincentives for importers and exporters. Second is detecting misinvoicing as transactions are occurring and taking corrective steps in real time. Third is clawing back lost revenues after misinvoicing is found through subsequent audits and reviews. Of these, by far the greater potential for gain is attendant to the first and second options. Clawing back lost revenues after the fact is a difficult exercise.

GFI's conservatively estimated US$908 million in potential lost revenues in 2013 alone represents resources that could have made an immense difference in housing, education, and health services and could have gone far in easing poverty and inequality and accompanying social strains. We have identified some of the commodity groups and trading relationships that need much greater scrutiny. Opportunities exist for a whole-of-government approach to resolving much broader misinvoicing problems.

Pursuit of legitimate and transparent trade by the Government of Kenya and concerned civil society organizations can pay rich dividends to the nation in decades to come.

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About

Global Financial Integrity

Founded in 2006, Global Financial Integrity (GFI) is a non-profit research and advisory organization, based in Washington, DC. GFI produces quantitative analyses of trade-related illicit financial flows, advises governments of developing countries on effective policy solutions and promotes transparency measures in the international financial system as a means to global development and security.

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