GLOBAL FINANCIAL INTEGRITY

Illicit Financial Flows to and from 148 Developing Countries: 2006-2015

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Global Financial Integrity

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Global Financial Integrity wishes to thank the Government of Finland for supporting this project.

We are pleased to present here our analysis of country-level *Illicit Financial Flows to and from 148 Developing Countries: 2006-2015.* This is the eighth report in a series that we have provided since 2008.

Regular readers of our annual estimation of illicit flows will notice several changes from our previous reports in this edition of our analysis—the first of which appears on the cover. In the report title this year we note the number of countries (148) for which we have conducted assessments. This is no mere window dressing but, rather, is the result of a conversation with a widely-respected policy maker in the global development field. "Your global number [of illicit flows] isn't helpful" in making policy, we were told, because it doesn't provide country-level estimates which can be put into context of national economic indicators. The realization came swiftly: we need to convey to our most important audience that—whatever global number might be associated with our previous analyses—our estimates are, indeed, comprised of individual country-level evaluations which can be put into a local framework of GDP, inequality, trade, debt and other gauges of economic health. We hope this re-framing of our analysis will contribute to determining the scale of the impact illicit flows have on developing economies.

Another change this year includes our use of UN Comtrade data to estimate the magnitude of trade-related illicit flows. Widely seen as a more detailed reflection of an individual country's global trade activity than the IMF's Direction of Trade Statistics (which we had used exclusively in the past and which is included again this year) Comtrade provides the ability to determine trade gaps between developed and developing countries based on some 5,000 HS-6 digit commodity classes. The volume and specificity of the Comtrade data required additional steps to analyze the information but in the end it offers improved country-level estimates. It should be noted however that, due to a lack of trade reporting to the Comtrade dataset, illicit flow estimates are not provided for 44 countries. This indicates a need for increased capacity building and technical assistance to improve trade data collection, analysis and reporting in many nations. We do include IFF estimates for all countries using the DOTS dataset.

Regardless of the dataset used the common thread between this year's study and those published previously is that illicit flows, as we've noted in the report, continue to be an "obstacle to achieving sustainable and equitable growth in the developing world." While there are many ways to make this point we show that, as a percentage of a country's total trade value, illicit inflows and outflows averaged 18 percent in 2015 (using the more conservative Comtrade figures). Moreover, only a few

nations had an IFF/total trade ratio of under 10 percent while in some countries the ratio was almost three times that figure. So, while growing trade volumes can be a sign of improved economic health for developing countries, trade-related IFFs should be considered in that equation given that they can significantly undermine the potential benefit from increased trade activity.

We hope this analysis of illicit flows is of benefit to policy planners, academics, journalists and advocates and we seek their reactions to the estimates provided here. As always, we look forward to continued engagement with governments, multilateral institutions, and other experts in attacking the problem of illicit flows everywhere.

Tom Cardamone
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Global Financial Integrity

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Charts and Tables in the Report

Executive Summary

This is the latest in a series of reports, issued on a roughly annual basis by Global Financial Integrity (GFI), which provides country-level estimates of the illicit flows of money into and out of 148 developing and emerging market nations as a result of their trade in goods with advanced economies, as classified by the International Monetary Fund.[1] Such flows—hereafter referred to as illicit financial flows (IFFs)—are estimated over the years from 2006 to 2015, the most recent ten year period for which comprehensive data are available. In addition to updating the estimated IFFs GFI has presented in the past, this report widens the scope of its research and uses a more detailed database published by the United Nations (UN) along with updated measures from the International Monetary Fund (IMF) data it has used previously. This report presents estimates of IFFs based on both data sets. GFI defines IFFs as "money that is illegally earned, used or moved and which crosses an international border." Currently, the World Bank, IMF, UN, and the OECD use a similar definition.

This study underscores the point that **trade-related IFFs appear to be both significant and persistent features of developing country trade** with advanced economies. As such, trade misinvoicing remains an obstacle to achieving sustainable and equitable growth in the developing world. **Highlights of our research for the year 2015 using the Direction of Trade Statistics dataset from the IMF show that:**

- **the top quintile (30) of countries, ranked by dollar value of illicit *outflows*, includes resource rich countries such as South Africa ($10.2 billion) and Nigeria ($8.3)** but also European countries including **Turkey ($8.4 billion), Hungary ($6.5 billion) and Poland ($3.1 billion)** as well as Latin American nations **Mexico ($42.9 billion), Brazil ($12.2 billion), Colombia ($7.4 billion) and Chile ($4.1 billion).** Asian states in the top 30 countries of this category include **Malaysia ($33.7 billion), India ($9.8 billion), Bangladesh ($5.9 billion) and the Philippines ($5.1 billion)**
- **the top quintile (30) of countries, ranked by illicit *outflows* as a percentage of total trade with advanced economies,** produces an entirely different group of countries including **Mozambique (48.1%), Malawi (44.1%), Zambia (43%), Honduras (39.7%), Namibia (38.7%) and Myanmar (30.8%)**
- **the list of top 30 countries ranked by dollar value of illicit *inflows*** (Note: illicit inflows are a type of resource curse in that a) their origin is unknown, b) inflows are invisible to governments, c) they are not taxed, and d) they often times fuel illegal activities such as drug trafficking) include a regionally diverse group including **Vietnam ($22.5 billion), Thailand ($20.9 billion), and Indonesia ($15.4 billion)** as well as Latin American nations **Panama ($18.3 billion) and Argentina ($4.8 billion).** Additional countries include **Kazakhstan ($16.5 billion), Belarus ($6.1 billion) and Morocco ($3.9 billion).**

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1   International Monetary Fund (2011). Classifications of Countries Based on Their Level of Development: How it is Done and How it Could be Done, IMF Working Paper, February. Retrieved at: https://www.imf.org/external/pubs/ft/wp/2011/wp1131.pdf.

For DOTS-based estimates of illicit flows—in dollars and as a percentage of total trade with advanced economies—for countries which do not appear above see: Appendix Table III-1. DOTS-based Estimates of Potential Trade Misinvoicing by Country, 2015.

Highlights of our research for 2015 using the Comtrade dataset from the United Nations show that:

- the top quintile (30) of countries, ranked by dollar value of illicit *outflows*, includes European nations Hungary ($7.6 billion), Romania ($5.1 billion) and Bulgaria ($1.8 billion), as well as Latin American countries Mexico ($31.5 billion), Brazil ($12 billion), Argentina ($2.7 billion) and Peru ($2.1 billion). Asian nations included in the top 30 countries of this category include Malaysia ($22.9 billion), Thailand ($16 billion), Indonesia ($9.6 billion) and Vietnam ($9.1 billion). African nations among the top 30 include South Africa ($5.9 billion), Algeria ($4.1 billion), and Tunisia ($1.8 billion)
- the top quintile (30) of countries, ranked by illicit *outflows* as a percentage of total trade with advanced economies, produces a different set of countries including Uganda (14.7%), Rwanda (13.7%), and Namibia (13.6%), as well as Costa Rica (12.5%), Colombia (12.1%) and Guatemala (11.9%)
- the list of top 30 countries ranked by dollar value of illicit *inflows* include a regionally diverse group including Poland ($32.3 billion), Romania ($6.8 billion), Indonesia ($10.1 billion) Bangladesh ($2.8 billion), Chile ($3.2 billion), Colombia ($2.9 billion), Morocco ($2.7 billion), and Tunisia $2.3 billion)

For Comtrade-based estimates of illicit flows—in dollars and as a percentage of total trade with advanced economies—for countries which do not appear above see: Appendix Table III-2. Comtrade-based Estimates of Potential Trade Misinvoicing by Country, 2015.

Further, the study finds that over the period between 2006 and 2015, IFFs accounted for over 20 percent of developing country trade, on average, with a nearly even split between outflows and inflows (see Table X-1 and Figure X-1).

Table X-1. Estimated Potential Trade-Related Illicit Financial Flows, All Developing Economies, 2006-2015 (Percent of total developing country trade with advanced economies unless noted)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average, 2006-2015	2015 (Billions of US dollars)	
												IFFs	Total Trade
A. Total (outflows plus inflows)													
DOTS-based estimates	28.2	27.2	26.9	28.3	27.5	26.0	26.2	27.1	26.6	28.5	27.1	1,935	6,792
Comtrade-based estimates	21.1	21.0	21.5	21.8	21.3	20.1	20.2	20.8	19.7	21.6	20.8	1,128	5,213
B. Outflows													
DOTS-based estimates	14.1	13.5	13.2	14.5	13.3	11.6	11.5	11.2	10.9	11.9	12.4	807	6,792
Comtrade-based estimates	10.8	10.9	11.4	12.3	11.5	10.4	10.4	10.1	10.0	11.5	10.8	598	5,213
C. Inflows													
DOTS-based estimates	14.1	13.7	13.7	13.8	14.2	14.4	14.7	15.9	15.7	16.6	14.8	1,128	6,792
Comtrade-based estimates	10.3	10.1	10.1	9.5	9.9	9.8	9.8	10.6	9.7	10.2	10.0	530	5,213
Addendum item: Unrecorded BOP flows													
Outflows	1.2	1.2	1.5	2.8	2.5	1.4	1.8	1.7	1.7	3.1	1.9	342	11,155
Inflows	0.7	0.4	0.6	0.3	0.4	0.2	0.3	0.2	0.3	0.5	0.4	61	11,155

Source: GFI staff estimates using data from the International Monetary Fund's Direction of Trade Statistics (DOTS) and Balance of Payments (BOP) databases as well as the United Nations Comtrade database.

Note: Estimated potential trade-related illicit financial flows are defined as the sum of estimated potential trade misinvoicing and unrecorded BOP flows. Estimates of total trade with advanced economies were calculated as an average of the magnitude reported by each developing country and the magnitude reported by the country's advanced economy trade partners. Total trade is defined for any country as the sum of its merchandise imports (on an FOB basis) and exports. The trade totals recorded in the DOTS and Comtrade data need not match precisely as they are reported independently and can reflect differences in country and commodity trade coverage. For this reason, comparisons of dollar-denominated estimates from different databases as well as within each of the databases is not meaningful and are recorded here for illustrative purposes. Estimates of unrecorded BOP leakages are drawn from the IMF's BOP database and reflect an estimate of each country's total trade with advanced economies that differs yet again from the DOTS and Comtrade estimates. Those were incorporated directly using the reported propensities which, for the purpose of evaluating the dollar magnitudes of IFFs, are applied to the DOTS and Comtrade trade totals, respectively. Therefore, the dollar values reported for unrecorded BOP outflows and inflows do not directly enter the dollar values of IFFs reported for the DOTS and Comtrade estimates.

Figure X-1. Alternative Estimates of Potential Trade-Related Illicit Financial Flows, 2006-2015 (Percent of total developing country trade with advanced economies)

Source: GFI staff estimates using data from the International Monetary Fund.

Note: Total trade equals developing country imports from and exports to advanced countries, amounting to different magnitudes in the UN and DOTS databases.

As was the case in its past reports, GFI's updated estimates of trade-related illicit financial flows stem from two sources: (1) misinvoicing in merchandise trade, and (2) leakages in the balance of payments, labelled by the International Monetary Fund (IMF) as "net errors and omissions" in its Balance of Payments accounts. Of those two sources, our estimates indicate that **potential trade misinvoicing is the primary means for illicitly shifting funds between developing and advanced countries.** Over the ten-year time period of this study, **potential trade misinvoicing has amounted to between 19 and 24 percent of developing country trade, on average.** (see Table X-2 and Figure X-2).
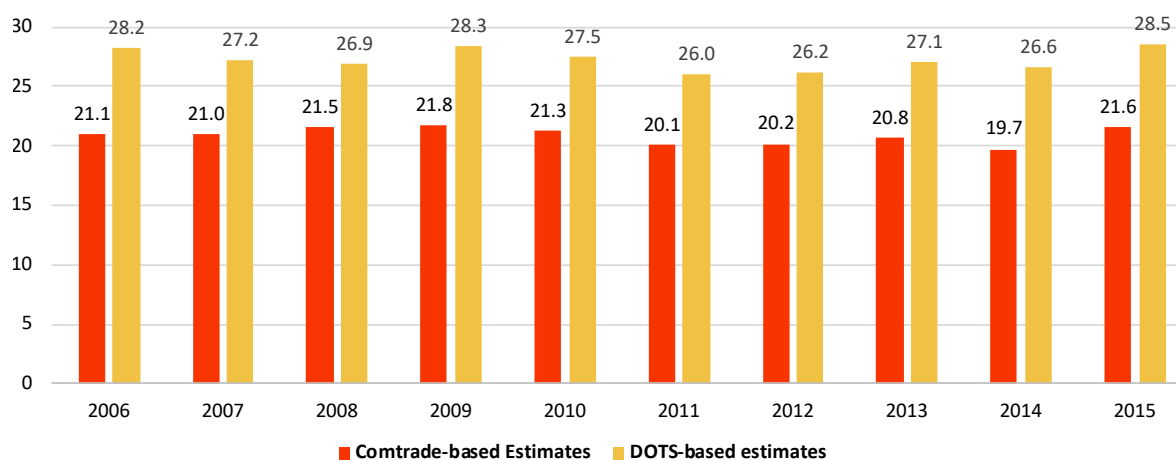
Table X-2. **Estimated Potential Trade Misinvoicing, All Developing Economies, 2006-2015**
(Percent of total developing country trade with advanced economies unless noted)

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | Average, 2006-2015 | 2015 (Billions of US dollars) | | |
												Potential Trade Misinvoicing	Total Trade	Average annual percent change since 2006
A. Total (outflows plus inflows)														
DOTS-based estimates	26.3	25.6	24.8	25.2	24.6	24.4	24.1	25.2	24.6	24.9	24.9	1,690	6,792	3.8
Comtrade-based estimates	19.1	19.4	19.4	18.7	18.5	18.5	18.1	18.8	17.8	18.0	18.6	940	5,213	3.4
B. Outflows														
DOTS-based estimates	12.9	12.3	11.6	11.7	10.8	10.2	9.7	9.5	9.2	8.8	10.5	599	6,792	0.1
Import over-invoicing	3.2	3.3	3.3	3.4	3.2	3.4	3.3	3.7	3.7	3.6	3.4	241	6,792	5.7
Export under-invoicing	9.7	9.0	8.4	8.3	7.6	6.8	6.4	5.8	5.5	5.3	7.1	358	6,792	-2.4
Comtrade-based estimates	9.5	9.7	9.8	9.5	9.0	9.0	8.6	8.4	8.3	8.4	9.0	438	5,213	2.6
Import over-invoicing	3.2	3.4	3.8	3.6	3.2	3.3	3.3	3.3	3.3	3.3	3.4	175	5,213	4.5
Export under-invoicing	6.3	6.3	6.0	5.9	5.9	5.7	5.3	5.1	5.0	5.1	5.6	264	5,213	1.6
C. Inflows														
DOTS-based estimates	13.4	13.3	13.2	13.5	13.8	14.2	14.4	15.7	15.4	16.1	14.4	1,091	6,792	6.5
Import over-invoicing	9.3	9.0	8.1	9.1	9.4	9.2	8.7	9.1	9.2	10.8	9.2	732	6,792	6.1
Export under-invoicing	4.1	4.3	5.1	4.4	4.5	5.0	5.8	6.6	6.2	5.3	5.3	359	6,792	7.5
Comtrade-based estimates	9.6	9.7	9.6	9.2	9.5	9.5	9.5	10.4	9.5	9.6	9.6	502	5,213	4.1
Import over-invoicing	4.6	4.8	4.6	4.5	4.5	4.3	4.3	4.4	3.9	4.1	4.4	214	5,213	2.9
Export under-invoicing	5.0	4.9	5.0	4.7	5.0	5.3	5.2	6.0	5.5	5.5	5.3	287	5,213	5.2

Source: GFI staff estimates using data from the International Monetary Fund's Direction of Trade Statistics (DOTS) and the United Nations Comtrade database.
Note: Estimates of total trade with advanced economies were calculated as an average of the magnitude reported by each developing country and the magnitude reported by the country's advanced economy trade partners. Total trade is defined for any country as the sum of its merchandise imports (on an FOB basis) and exports. The trade totals recorded in the DOTS and Comtrade data need not match precisely as they are reported independently and can reflect differences in country and commodity trade coverage. For this reason, comparisons of dollar-denominated estimates from different databases as well as within each of the databases is not meaningful and are recorded here for illustrative purposes.

Figure X-2. Alternative Estimates of Potential Trade Misinvoicing, 2006-2015
(Percent of total developing country trade with advanced economies)
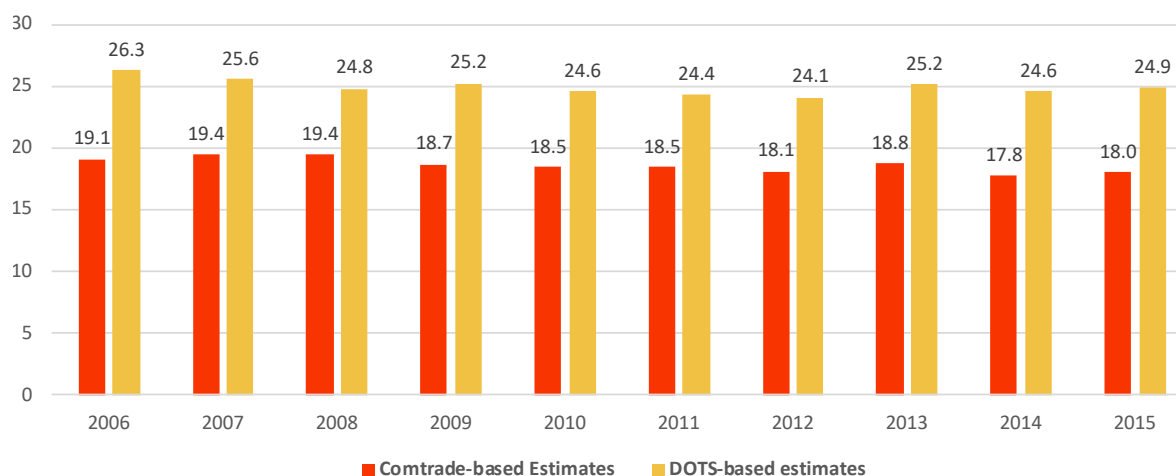
Source: GFI staff estimates using data from the United Nations and the International Monetary Fund.
Note: Total trade equals developing country imports from and exports to advanced countries, amounting to different magnitudes in the UN and DOTS databases.

Trade misinvoicing is accomplished by misstating the value or volume of an export or import on a customs invoice. Trade misinvoicing is a form of trade-based money laundering made possible by the fact that trading partners write their own trade documents, or arrange to have the documents prepared in a third country (typically a tax haven)—a method known as re-invoicing. Fraudulent manipulation of the price, quantity, or quality of a good or service on an invoice allows criminals, corrupt government officials, and commercial tax evaders to shift vast amounts of money across international borders quickly, easily, and nearly always undetected.

This study only covers misinvoicing of goods trade. We do not include estimates of misinvoicing involving services trade due to the lack of bilateral trade data on services which has been a growing component of world trade. This is an important reason why GFI believes estimates of illicit flows from developing countries by economists are likely to be under- rather than over-stated.

By their nature, IFFs are typically intended to be hidden. Given this, even those types of illicit flows that can be measured must be measured indirectly and are, therefore, an imprecise estimate of this activity. However, there are many forms of illicit flows that cannot be picked up using available economic data and methods. For example, cash transactions, same-invoice faking, misinvoicing in services and intangibles, and hawala transactions are simply not registered directly in available economic data. Therefore, we characterize the estimates presented here as likely to be very conservative. Nonetheless, they fill a critical gap in the literature and to the extent the conservative estimates are large, amply demonstrate the scale of the trade-related IFFs problem.

Bilateral trade data allow analysts to examine mirror reports to draw inferences, albeit uncertain ones, as to the potential global scale of trade misinvoicing. While highly detailed country data sources can provide important insights, such data are not available on a comprehensive basis for all countries.

The most significant methodological change introduced in the updated estimates reflects GFI's use of two macroeconomic databases on bilateral trade to yield two estimates of potential trade misinvoicing. As it has in the past, GFI has constructed one set of potential trade misinvoicing estimates using the IMF's Direction of Trade Statistics (DOTS) which report bilateral trade on a country-to-country basis. The DOTS data used here reflect substantial methodological improvements introduced by the IMF over previous vintages of DOTS, and GFI has simplified the procedures it has used in the past to process its DOTS-based estimates. The revisions to the DOTS data and GFI's procedures for using those data account for the differences between its current and past estimates of potential trade misinvoicing; nevertheless, the estimation results are not fundamentally different from GFI's DOTS-based estimates in the past.

The second database used in its current estimates (for the first time) is the Comtrade database maintained by the United Nations (UN). Beyond the country-to-county reports of bilateral trade in DOTS, Comtrade additionally records both the value and volume of bilateral trade at the commodity level—the harmonized 6-digit commodity detail (amounting to about five thousand distinct commodities) represents the most detailed level of comparable commodity trade reporting available on a comprehensive basis. The richer detail available in the Comtrade data enabled GFI to employ (standard) statistical treatments and more precise accounting for its estimates than is possible with the DOTS database.

Even taking into account all those changes in both the databases and the methods appropriate for each, along with the uncertainty that attends all such estimates, the clear message in the numbers is that potential misinvoicing on trade with advanced economies has been both a significant and persistent issue for developing country trade.

In 2015, IFFs became part of development orthodoxy in the UN's Sustainable Development Goals and at the Financing for Development Conference in Addis Ababa. World leaders still have much to do to curb the opacity in the global financial system which facilitates these outflows. GFI recommends a number of steps that governments and other international regulators can take to develop greater financial transparency and curtail illicit outflows, including:

Beneficial Ownership
- Governments should establish public registries of verified beneficial ownership information on all legal entities, and all banks should know the true beneficial owner(s) of any account in their financial institution.

Anti-Money Laundering

- Government authorities should adopt and fully implement all of the Financial Action Task Force's (FATF) anti-money laundering recommendations; laws already in place should be strongly enforced.

Country-by-Country Reporting

- Policymakers should require multinational companies to publicly disclose their revenues, profits, losses, sales, taxes paid, subsidiaries, and staff levels on a country-by-country basis.

Tax Information Exchange

- All countries should actively participate in the worldwide movement towards automatic exchange of tax information as endorsed by the OECD and the G20.

Trade Misinvoicing

- Deliberate trade misinvoicing for the purpose of evading or avoiding VAT taxes, customs duties, income taxes, excise taxes, or any other form of government revenues should be made illegal.
- Customs agencies should treat trade transactions involving a tax haven with the highest level of scrutiny.
- Governments should significantly boost their customs enforcement by equipping and training officers to better detect intentional misinvoicing of trade transactions, particularly through access to real-time world market pricing information at a detailed commodity level.
- GFI has developed a product to assist governments in the detection of potential misinvoicing in real time: GFTrade is a proprietary risk assessment application enabling customs officials to determine if goods are priced outside typical ranges for comparable products.[2]

Sustainable Development

- Governments should sign on to the Addis Tax Initiative to further support efforts to curb IFFs as a key component of the development agenda.

The massive flows of illicit capital shown in this study represent diversions of resources from their most efficient social uses in developing economies and are likely to adversely impact domestic resource mobilization and hamper sustainable economic growth. For example, some portion of the illicit flows highlighted here may correspond to tax revenues lost by developing country governments which would then be unavailable for use by those governments toward reducing

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[2] Additional information on GFTrade is available on GFI's website; see https://www.gfintegrity.org/solutionsforinspiredeconomies/.

inequality, eliminating poverty and, more generally, raising the quality of life for people living in those countries. Whatever the source of the illicit flows, it is necessary to consider their role in any discussion of the development equation. It is important to examine not only the volume of resources legally flowing into and out of developing countries but also the illicit flows associated with leakages of capital from the balance of payments and from trade misinvoicing. Governments and international organizations must strengthen policy and increase cooperation to combat this scourge.
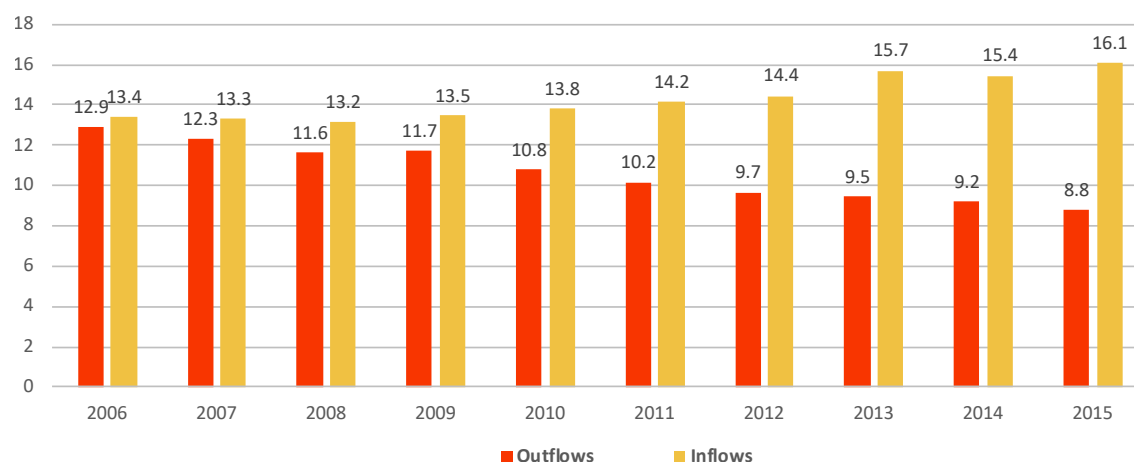
I. DOTS-based Estimates of Potential Misinvoicing, 2006-2015

A. The Estimates

Based on substantially revised DOTS data, GFI estimates potential trade invoicing to have averaged nearly 25 percent of total developing country trade over the 2006-2015 period, with the propensity for misinvoicing inflows exceeding that for outflows widening over the period (see Figure I-1). While the persistence and significance of total potential trade misinvoicing (i.e., outflows plus inflows) is also indicated in the estimates for broad geographical regions, the distribution of potential misinvoicing between outflows and inflows varies markedly across regions (see Table I-1). In particular, it's worth noting that Sub-Saharan Africa, estimated to have the highest propensity for trade misinvoicing on its trade with advanced economies (just under a third of its total trade with advanced economies), is also the only region with estimated misinvoicing outflows to have exceeded inflows on average over the period.

Figure I-1. DOTS-based Estimates of Potential Trade Misinvoicing, 2006-2015
(Percent of total developing country trade with advanced economies)

Source: GFI staff estimates using data from the International Monetary Fund's Direction of Trade Statistics (DOTS).
Note: Total trade equals developing country imports from and exports to advanced countries.

As a region, Sub-Saharan African countries had the highest propensity for trade misinvoicing during the 10-year period of the study at 32.6 percent of total trade with advanced economies on average (33.9 percent in 2015). For 2015 this equates to an estimated $84 billion in illicit flows due to misinvoicing. Illicit outflows for the period averaged 17.4 percent of total trade with advanced economies and were 17.3 percent in 2015. The dollar value of illicit outflows in 2015 was $43 billion. Illicit inflows for the period averaged 15.2 percent of total trade with advanced economies and were 16.6 percent in 2015. The dollar value of illicit inflows in 2015 was $41 billion. Additionally, during the period Developing Europe had the second largest trade-related illicit flows at 28 percent of total

Table I-1. DOTS-based Estimates of Potential Trade Misinvoicing, Developing Economies by Region, 2006-2015 (Percent of total developing country trade with advanced economies unless noted)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average, 2006-2015	2015 (Billions of US dollars) Potential Trade Misinvoicing	Total Trade	Average annual percent change since 2006
All developing economies														
TOTAL	26.3	25.6	24.8	25.2	24.6	24.4	24.1	25.2	24.6	24.9	24.9	1,690	6,792	3.8
Outflows	12.9	12.3	11.6	11.7	10.8	10.2	9.7	9.5	9.2	8.8	10.5	599	6,792	0.1
Import over-invoicing	3.2	3.3	3.3	3.4	3.2	3.4	3.3	3.7	3.7	3.6	3.4	241	6,792	5.7
Export under-invoicing	9.7	9.0	8.4	8.3	7.6	6.8	6.4	5.8	5.5	5.3	7.1	358	6,792	-2.4
Inflows	13.4	13.3	13.2	13.5	13.8	14.2	14.4	15.7	15.4	16.1	14.4	1,091	6,792	6.5
Import under-invoicing	9.3	9.0	8.1	9.1	9.4	9.2	8.7	9.1	9.2	10.8	9.2	732	6,792	6.1
Export over-invoicing	4.1	4.3	5.1	4.4	4.5	5.0	5.8	6.6	6.2	5.3	5.3	359	6,792	7.5
Sub-Saharan Africa														
TOTAL	29.2	33.0	32.6	33.7	32.1	31.8	32.0	32.3	35.0	33.9	32.6	84	248	2.6
Outflows	16.1	19.5	18.3	18.4	16.2	15.0	18.1	17.2	18.1	17.3	17.4	43	248	1.8
Import over-invoicing	3.9	6.7	4.8	6.3	5.8	5.6	6.4	7.0	6.5	6.6	6.0	16	248	6.9
Export under-invoicing	12.1	12.9	13.4	12.1	10.4	9.4	11.7	10.2	11.6	10.7	11.4	27	248	-0.5
Inflows	13.1	13.5	14.3	15.3	15.9	16.8	13.9	15.1	16.9	16.6	15.2	41	248	3.6
Import under-invoicing	6.7	6.6	7.1	6.9	7.2	8.1	7.7	8.7	10.1	10.2	8.0	25	248	5.7
Export over-invoicing	6.5	6.9	7.2	8.3	8.7	8.7	6.3	6.4	6.8	6.4	7.2	16	248	0.9
Asia														
TOTAL	27.9	27.3	24.9	25.7	25.0	24.0	24.2	26.0	25.2	26.3	25.5	919	3,491	5.6
Outflows	15.5	14.3	13.4	12.9	11.9	10.8	9.7	9.6	9.6	9.3	11.3	325	3,491	0.4
Import over-invoicing	3.7	3.4	3.8	3.2	3.3	4.3	3.4	4.1	4.3	3.6	3.8	125	3,491	5.8
Export under-invoicing	11.8	10.9	9.7	9.7	8.6	6.5	6.2	5.6	5.3	5.7	7.5	199	3,491	-1.9
Inflows	12.5	13.0	11.5	12.7	13.1	13.2	14.6	16.3	15.6	17.0	14.2	595	3,491	10.0
Import under-invoicing	11.0	11.0	9.7	10.5	10.8	10.0	10.1	10.4	10.6	12.5	10.6	437	3,491	7.8
Export over-invoicing	1.5	2.0	1.8	2.2	2.3	3.2	4.5	6.0	5.1	4.5	3.6	158	3,491	20.4
Developing Europe														
TOTAL	28.8	27.8	30.1	28.9	28.4	30.3	28.3	27.3	26.4	23.3	28.0	270	1,156	0.6
Outflows	9.3	9.4	9.4	11.8	10.8	11.2	9.5	9.0	8.2	7.1	9.5	83	1,156	0.0
Import over-invoicing	2.2	2.6	2.4	3.0	2.2	1.9	2.6	2.5	2.4	2.5	2.4	29	1,156	4.5
Export under-invoicing	7.1	6.8	7.0	8.7	8.6	9.3	6.9	6.5	5.8	4.6	7.1	53	1,156	-1.9
Inflows	19.5	18.4	20.7	17.1	17.6	19.1	18.9	18.4	18.2	16.2	18.5	187	1,156	0.9
Import under-invoicing	8.9	8.2	7.4	7.2	7.3	9.4	7.3	7.2	6.9	7.1	7.7	82	1,156	0.5
Export over-invoicing	10.6	10.2	13.4	10.0	10.3	9.6	11.6	11.2	11.3	9.1	10.8	105	1,156	1.3
Middle East & North Africa														
TOTAL	25.8	22.7	20.1	19.2	18.8	18.1	18.4	19.7	19.2	22.3	20.1	167	748	0.0
Outflows	13.1	11.6	10.0	8.5	7.3	7.1	8.3	7.7	7.3	7.3	8.6	55	748	-4.7
Import over-invoicing	2.0	2.4	2.5	3.5	3.0	2.2	2.9	3.2	3.0	3.9	2.9	29	748	9.2
Export under-invoicing	11.0	9.2	7.4	5.0	4.3	4.9	5.4	4.5	4.3	3.4	5.8	25	748	-10.8
Inflows	12.7	11.1	10.1	10.7	11.5	10.9	10.1	11.9	11.9	15.0	11.5	112	748	3.5
Import under-invoicing	10.6	8.8	7.2	8.1	8.1	6.7	5.2	6.2	6.8	10.1	7.5	75	748	1.1
Export over-invoicing	2.1	2.2	2.9	2.6	3.4	4.3	4.9	5.7	5.1	4.9	4.0	36	748	11.3
Western Hemisphere														
TOTAL	19.1	18.9	19.8	22.6	22.1	21.7	22.1	23.1	22.6	21.8	21.5	250	1,149	5.2
Outflows	9.3	9.2	9.5	9.2	8.9	8.4	8.8	8.9	8.4	8.2	8.8	95	1,149	2.3
Import over-invoicing	3.5	3.8	3.3	3.6	3.2	2.8	3.1	3.4	3.1	3.5	3.3	41	1,149	3.8
Export under-invoicing	5.8	5.4	6.1	5.7	5.8	5.6	5.8	5.5	5.2	4.7	5.5	54	1,149	1.2
Inflows	9.8	9.7	10.3	13.4	13.1	13.3	13.2	14.2	14.3	13.6	12.7	156	1,149	7.4
Import under-invoicing	5.6	5.7	6.1	9.0	9.1	9.0	9.7	10.0	9.6	9.8	8.5	112	1,149	10.3
Export over-invoicing	4.2	4.0	4.2	4.4	4.1	4.4	3.5	4.3	4.7	3.8	4.2	43	1,149	2.4

Source: GFI staff estimates using data from the International Monetary Fund's Direction of Trade Statistics (DOTS).

Note: Estimates of total trade were calculated as an average of the magnitude reported by each developing country and the magnitude reported by the country's advanced economy trade partners. Total trade is defined for any country as the sum of its merchandise imports (on an FOB basis) and exports. The trade totals recorded in the DOTS and Comtrade data need not match precisely as they are reported independently and can reflect differences in country and commodity trade coverage. For this reason, comparisons of dollar-denominated estimates from different databases as well as within each of the databases is not meaningful and are recorded here for illustrative purposes. The developing countries by region are given in Appendix Table I-1 Geographical Regions.

trade with advanced economies. Asian nations' average propensity for trade misinvoicing from 2006-2015 was 25.5 percent. In other regions the propensity to misinvoice was slightly lower than the global average but still exceeded 20 percent of the total value of all trade transactions.

B. Construction of the DOTS-Based Estimates

In early 2018, the IMF released revised estimates of its DOTS database.[3] From those revised DOTS data, GFI selected bilateral trade reports for 148 developing countries trading with 36 advanced economies (see Appendix Table I-1. Geographical Regions) over the 2006-2015 period. Each mirror trade pair (in a given year) represented a trade value reported by a developing country (import/export) with the associated value (export/import) reported by its advanced country partner. Potential estimated trade misinvoicing was then represented by the import and export gaps (where a typical developing country is denoted by D and its advanced economy trade partner by A):

Import gap: **(D's reported imports from A) – (A's reported exports to D);** and,
Export gap: **(D's reported exports to A) – (A's reported imports from D).**

When the gap for each mirror pair was negative, that value discrepancy was designated as potential under-invoicing. Conversely, when the gap for a mirror pair was positive, the value discrepancy was designated as potential over-invoicing. Those dollar gaps were then divided by total trade with advanced economies (exports plus imports)—measured as an average of D's reported trade with A and A's reported trade with D—to obtain an estimated propensity.[4]

In all analyses of bilateral trade data for the purposes of estimating potential trade misinvoicing, some effort must be made to put import and export reports on a comparable basis. That is because international protocols concerning the ownership of trade goods define the exporter as owner until the point at which the goods are on board the vessel of transit to the importer's destination. As a result, exporters tend to report the value of their goods on a "free on board" (FOB) basis, while importers report the value on those same goods on a "cost, insurance and freight" (CIF) basis which exceeds the FOB value.

The trade reports underlying the DOTS database are generally reported directly to the IMF by individual countries. While most of the imports reported to the IMF are on the conventional CIF basis some are reported on an FOB basis. In calculating trade gaps with DOTS, GFI made no adjustments to the imports reported by the DOTS FOB reporters and, in the case of the CIF reporters, GFI followed the IMF in assuming that the reported CIF import values represented a flat 6 percent markup on the (unobserved) FOB, enabling a calculation of the implied FOB values for the calculation of the trade gaps.[5]

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3   The revisions to the DOTS data as well as improved methodologies are fully described in Marini, Dippelsman & Stanger (2018).
4   The aggregate propensities reported in the tables across countries, regions and time reflect a similar calculation using appropriately aggregate US$ magnitudes.
5   That is, for those import values available only on a CIF basis, GFI divided the reported value by 1.06 to create an FOB valuation. Prior to the revision, the IMF had assumed a 10 percent markup for DOTS non-reporters. The change to 6 percent is discussed in Marini, Dippelsman & Stanger (2018), p. 11.

C. Comparison With GFI's 2017 Estimates

In the past, GFI had exclusively constructed its estimates of potential trade misinvoicing using DOTS data. Its current estimates utilize DOTS data that reflect significant methodological revisions by the IMF but GFI has also simplified the procedures it has applied to the DOTS data as well. While those differences between the estimates reported here and those reported in GFI's last report GFI(2017) cannot be completely reconciled, a basic comparison suggests that such differences may not be very large.

On average, over the 2005-2014 period, the estimates of potential misinvoicing implied by GFI's 2017 data and methods amounted to just over 22 percent of total developing country trade, just a few percentage points below the nearly 25 percent estimate using updated DOTS data and revised methods (see Table I-2).[6]

Table I-2. Comparison of Alternative DOTS-based Estimates of Potential Trade Misinvoicing, All Developing Countries, Average over 2005-2014
(Percent of total developing country trade with advanced economies unless noted)

	2018 Report		2017 GFI Report Data & Methods
	Baseline Estimate Using New Data & Methods	New Data & Methods But Assuming CIF/FOB Margin of 10%	
TOTAL	**24.9**	**24.1**	**22.2**
Outflows	10.7	8.6	5.8
Inflows	14.2	15.5	16.4

Source: GFI staff estimates using data from the International Monetary Fund's Direction of Trade Statistics (DOTS).
Note: Trade misinvoicing flows from GFI's 2017 report were drawn from the low estimates reported in https://www.gfintegrity.org/wp-content/uploads/2017/04/IFF_2017-04_WebTables.xlsx.

While there are too many differences between the data and procedures used in the current and 2017 reports (many, beyond GFI's control) to allow for a complete reconciliation of the estimates, examining some of the key changes in the procedures GFI employed for its current report may be helpful. The two most significant changes in GFI's methods used with the DOTS data relate to: (1) GFI's treatment of the CIF/FOB margin, and (2) GFI's treatment of sporadic reporters in the DOTS data. Both changes in methods were intended to present the information content of the DOTS database in as simple a fashion as possible.

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[6] The propensity estimates for 2017 reported in the table are calculated by dividing the dollar-denominated lower range estimates of misinvoicing derived in 2017 by the estimated total trade numbers used in the current report. As such, the propensities differ only due to the noted revisions in data and methods. However, the 2017 estimates reported here are substantially higher than those *reported* in GFI (2017). That difference reflects an error in GFI's 2017 tabulation of the propensities: while the estimated numerators (dollar misinvoicing flows) were calculated correctly, the denominators, developing country total trade, were not. The mistake in the 2017 report was not discovered by GFI until preparation of the current report was well underway—GFI regrets its error in its 2017 report.

With regard to the conversion of reported imports from a CIF to FOB basis in its current estimates (a 6 percent margin is now used for CIF reporters in DOTS, as described above), the procedures used in previous GFI reports amounted to assuming a 10 percent markup from FOB to CIF valuations for all imports reported in DOTS (that assumption reflected the IMF's previously reported assumptions). The effects of that change are reported in the middle column of Table I-2, labelled "New Data & Methods But assuming CIF/FOB Margin of 10 percent." The lower (effective) margin of 6 percent assumed in the current estimate yields a slightly higher estimate of total potential misinvoicing than the previously-used flat 10 percent assumption (24.9 percent versus 24.1 percent of total developing country trade). However, the change in the CIF/FOB margin produces even sharper differences on the direction of the estimated misinvoicing flows (i.e., outflows versus inflows): the gap between the estimated propensities for outflows and inflows is narrower using the lower 6 percent margin than with the higher 10 percent margin GFI used in the past. This is not a surprising result, as the direct effect of lowering the assumed transport margin on any particular mirror trade discrepancy is predictable: lowering the CIF/FOB margin raises the FOB valuation of imports which, in turn, would move some import under-invoicing into over-invoicing status and some export under-invoicing into over-invoicing status, other things equal.

The second key procedural change involves GFI's treatment of sporadic reporting in the DOTS data. Formerly, GFI calculated trade discrepancies differently for developing countries deemed to have reported too infrequently over a given time interval: frequent/full reporting countries were designated "bilateral" reporters while the more sporadic reporters were designated as "world" reporters with the classification of developing countries between one class or another depending on the time period under review. For example, in its 2017 report, GFI designated bilateral reporters as developing countries that reported trade with at least 30 advanced economies for each of the 2005-2014 period. Estimates of potential trade misinvoicing for countries designated as bilateral reporters would be constructed in the same way as described above. For the countries designated as world reporters, potential trade misinvoicing would be calculated using its trade aggregated over all countries (i.e., world trade).[7]

In constructing its current estimates, GFI did not use the bilateral/world designation in calculating potential trade misinvoicing. The main reason is that the primary focus of the current report is in comparing the DOTS-based estimates with those Comtrade-based estimates. Both databases reflect sporadic reporting which is addressed, to some extent, by the IMF in its construction of DOTS but

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[7] See GFI (2017), pp. 43-44 for a more detailed account of the treatment of "world" reporters in previous reports.

to no extent by the UN in assembling Comtrade. From its examinations of the coverage of the two databases over the 2006-2015 period, GFI decided that no ad hoc rule could be developed to treat the databases comparably without also drastically reducing the information content of both. Accordingly, GFI decided to not treat either the DOTS or Comtrade data in this way for sporadic reporting.

One final note concerns special designations made by GFI for South Africa and Zambia in its 2017 report owing to asymmetries in reporting exports of gold (South Africa) and copper (Zambia) that would, if reflected in the DOTS data, tend to unduly bias their estimated trade gaps up or down.[8] While it's not clear whether the revised IMF data reflect such distortions, the inclusion of South African and Zambian trade gaps in the current report do not necessarily inflate the (absolute value) of the estimated trade propensities. In fact, excluding South African and Zambian trade gaps completely would increase the estimated misinvoicing propensities for Sub-Saharan Africa, not reduce them.[9]

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[8] Both South Africa and Zambia were designated to be world reporters; see GFI (2017), pp. 45-46.
[9] Specifically, excluding South Africa and Zambia from the calculation *increases* the estimated propensity for trade misinvoicing to 35.3 percent of total trade with advanced economies relative to the 32.6 percent reported in Table I-1 (which includes South Africa and Zambia). In other words, taken together, South Africa and Zambia have a lower-than-average misinvoicing propensity for misinvoicing than the other countries of the Sub-Saharan region.

II. Comtrade-Based Estimates of Potential Misinvoicing, 2006-2015

A. The Estimates

Using Comtrade data, GFI estimates potential trade misinvoicing to have averaged nearly 19 percent of total developing country trade over the 2006-2015 period, with the propensity for misinvoicing inflows exceeding that for outflows widening over the period (see Figure II-1). While the persistence and significance of total potential trade misinvoicing (i.e., outflows plus inflows) is also indicated in the estimates for broad geographical regions, the overall level of misinvoicing and the distribution of potential misinvoicing between outflows and inflows varies to a much smaller extent in the Comtrade-based estimates than is the case with the DOTS-based estimates (see Table II-1).

Figure II-1. Comtrade-based Estimates of Potential Trade Misinvoicing, 2006-2015
(Percent of total developing country trade with advanced economies)
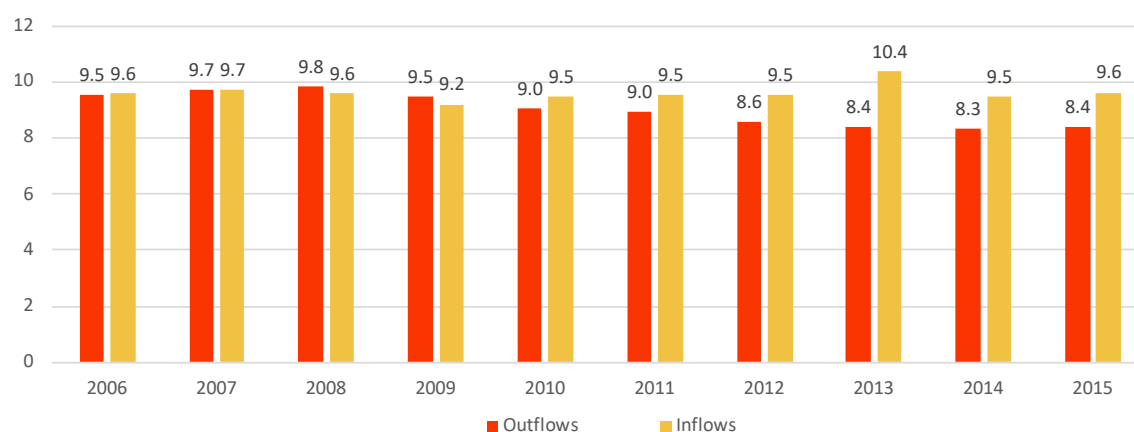
Source: GFI staff estimates using data from the United Nations Comtrade database (Comtrade).
Note: Total trade equals developing country imports from and exports to advanced countries.

As a region, Middle East and North African countries had the highest propensity for trade misinvoicing during the 10-year period of the study at 20.4 percent of total trade with advanced economies on average (20 percent in 2015). For 2015 this equates to an estimated $77 billion in total illicit flows due to misinvoicing. Illicit outflows for the period averaged 9.3 percent of total trade with advanced economies and were 9.1 percent in 2015. The dollar value of illicit outflows in 2015 was $35 billion. Illicit inflows for the period averaged 11.2 percent of total trade with advanced economies and were 10.9 percent in 2015. The dollar value of illicit inflows in 2015 was $42 billion. Additionally, during the period Developing Europe had the second largest trade-related illicit flows at 19.8 percent of total trade with advanced economies. Asian nations' average propensity for trade misinvoicing from 2006-2015 was 19 percent. In other regions the propensity to misinvoice was slightly lower than the global average but still exceeded 15 percent of the total value of all trade transactions.

Table II-1. Comtrade-based Estimates of Potential Trade Misinvoicing, Developing Economies by Region, 2006-2015 (Percent of total developing country trade with advanced economies unless noted)

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average, 2006-2015	2015 (Billions of US dollars) Potential Trade Misinvoicing	Total Trade	Average annual percent change since 2006
All developing economies														
TOTAL	19.1	19.4	19.4	18.7	18.5	18.5	18.1	18.8	17.8	18.0	18.6	940	5,213	3.4
Outflows	9.5	9.7	9.8	9.5	9.0	9.0	8.6	8.4	8.3	8.4	9.0	438	5,213	2.6
Import over-invoicing	3.2	3.4	3.8	3.6	3.2	3.3	3.3	3.3	3.3	3.3	3.4	175	5,213	4.5
Export under-invoicing	6.3	6.3	6.0	5.9	5.9	5.7	5.3	5.1	5.0	5.1	5.6	264	5,213	1.6
Inflows	9.6	9.7	9.6	9.2	9.5	9.5	9.5	10.4	9.5	9.6	9.6	502	5,213	4.1
Import under-invoicing	4.6	4.8	4.6	4.5	4.5	4.3	4.3	4.4	3.9	4.1	4.4	214	5,213	2.9
Export over-invoicing	5.0	4.9	5.0	4.7	5.0	5.3	5.2	6.0	5.5	5.5	5.3	287	5,213	5.2
Sub-Saharan Africa														
TOTAL	16.5	20.5	22.2	17.6	15.2	16.4	16.6	16.4	19.5	20.2	17.8	22	111	-1.3
Outflows	8.0	10.3	11.2	8.9	7.3	6.9	7.7	7.9	9.4	9.8	8.5	11	111	-1.3
Import over-invoicing	3.7	4.3	4.3	3.8	3.3	3.6	3.7	3.3	3.6	4.2	3.7	5	111	-2.0
Export under-invoicing	4.3	6.0	6.9	5.0	4.0	3.3	4.0	4.6	5.9	5.6	4.8	6	111	-0.8
Inflows	8.5	10.2	10.9	8.7	7.9	9.5	8.9	8.5	10.0	10.4	9.3	12	111	-1.2
Import under-invoicing	4.7	5.7	6.9	5.0	4.3	4.0	4.2	5.2	4.8	6.6	5.0	7	111	0.1
Export over-invoicing	3.7	4.5	4.0	3.7	3.6	5.4	4.7	3.3	5.2	3.8	4.3	4	111	-3.2
Asia														
TOTAL	20.2	20.0	19.6	18.8	19.0	18.6	18.6	19.9	17.7	18.5	19.0	537	2,899	4.7
Outflows	11.2	10.8	10.6	9.9	9.9	9.5	9.0	8.8	8.3	8.8	9.5	256	2,899	2.9
Import over-invoicing	2.7	2.6	3.2	2.8	2.6	2.7	2.6	2.6	2.7	2.9	2.7	84	2,899	6.7
Export under-invoicing	8.5	8.2	7.4	7.1	7.3	6.8	6.4	6.3	5.7	5.9	6.8	171	2,899	1.5
Inflows	9.0	9.2	9.0	9.0	9.1	9.2	9.6	11.0	9.4	9.7	9.5	281	2,899	6.6
Import under-invoicing	3.8	4.1	3.7	4.0	4.0	3.8	3.6	3.9	3.1	3.1	3.7	91	2,899	3.6
Export over-invoicing	5.2	5.1	5.2	4.9	5.1	5.3	5.9	7.2	6.3	6.6	5.8	191	2,899	8.5
Developing Europe														
TOTAL	20.4	20.6	20.7	19.7	19.9	19.5	19.8	19.5	19.6	18.8	19.8	171	912	1.6
Outflows	8.4	8.3	8.7	9.0	8.3	8.3	8.3	8.1	8.5	7.7	8.3	70	912	1.6
Import over-invoicing	3.5	3.7	3.8	3.9	3.4	3.2	3.3	3.4	3.4	3.2	3.5	30	912	1.8
Export under-invoicing	4.9	4.6	4.9	5.2	4.9	5.1	5.0	4.7	5.1	4.5	4.9	41	912	1.5
Inflows	12.1	12.2	12.0	10.7	11.6	11.2	11.5	11.4	11.1	11.1	11.5	101	912	1.5
Import under-invoicing	6.4	6.3	5.7	5.3	5.4	5.3	5.4	5.2	5.1	5.4	5.5	49	912	0.6
Export over-invoicing	5.7	6.0	6.3	5.4	6.2	5.9	6.2	6.2	6.0	5.6	6.0	51	912	2.4
Middle East & North Africa														
TOTAL	18.0	19.5	20.4	21.4	20.0	25.8	18.5	20.0	20.9	20.0	20.4	77	385	5.8
Outflows	8.2	8.9	9.2	10.8	8.6	11.2	8.9	8.9	9.3	9.1	9.3	35	385	5.9
Import over-invoicing	3.8	4.0	4.3	5.4	4.1	5.0	6.1	5.2	5.9	6.3	5.1	24	385	10.6
Export under-invoicing	4.4	4.9	5.0	5.4	4.5	6.2	2.8	3.7	3.4	2.8	4.2	11	385	-0.5
Inflows	9.8	10.6	11.1	10.6	11.4	14.6	9.7	11.1	11.6	10.9	11.2	42	385	5.8
Import under-invoicing	6.3	7.5	7.0	6.6	6.4	6.9	7.0	6.3	6.9	7.6	6.8	29	385	6.8
Export over-invoicing	3.5	3.1	4.1	4.0	5.0	7.7	2.7	4.9	4.7	3.3	4.3	13	385	3.9
Western Hemisphere														
TOTAL	16.2	16.1	16.6	16.3	15.7	15.2	15.4	14.9	14.0	14.6	15.4	132	906	1.1
Outflows	7.5	8.7	9.5	8.5	7.9	7.9	7.9	7.4	7.4	7.3	8.0	66	906	2.0
Import over-invoicing	4.0	4.7	4.8	4.7	4.1	4.3	4.1	4.1	3.8	3.5	4.2	32	906	0.8
Export under-invoicing	3.5	4.0	4.7	3.8	3.9	3.6	3.8	3.3	3.7	3.8	3.8	35	906	3.2
Inflows	8.7	7.5	7.1	7.9	7.7	7.3	7.5	7.5	6.6	7.3	7.5	66	906	0.3
Import under-invoicing	4.1	3.6	3.4	4.3	3.9	3.7	4.1	4.1	3.5	4.2	3.9	38	906	2.5
Export over-invoicing	4.6	3.9	3.7	3.6	3.8	3.6	3.4	3.3	3.1	3.1	3.6	28	906	-2.1

Source: GFI staff estimates using data from the United Nations Comtrade database.

Note: Estimates of total trade were calculated as an average of the magnitude reported by each developing country and the magnitude reported by the country's advanced economy trade partners. Total trade is defined for any country as the sum of its merchandise imports (on an FOB basis) and exports with advanced economies. The trade totals recorded in the DOTS and Comtrade data need not match precisely as they are reported independently and can reflect differences in country and commodity trade coverage. For this reason, comparisons of dollar-denominated estimates from different databases as well as within each of the databases is not meaningful and are recorded here for illustrative purposes. The developing countries by region are given in Appendix Table I-1 Geographical Regions.

B. Construction of the Comtrade-Based Estimates

The Comtrade database is considerably more detailed than DOTS, offering researchers more comprehensive information on bilateral trade and flexibility in designing the statistical framework with which robust inferences can be made. In deriving estimates of potential trade misinvoicing, GFI drew on conventions from current research practice using Comtrade. Other approaches are possible, but for the purposes of comparison with the DOTS-based estimates, a simple and representative approach was taken.[10]

The calculation of trade gaps using Comtrade data is broadly the same as with the DOTS data (described in the previous section) except that the Comtrade gaps are calculated for each of up to about 5,000 HS-6 digit commodity classes available. Each annualized mirror trade recorded in Comtrade includes data on both the value (in dollars) and volume (in physical units) of the reported trade. Both the values and volumes are used in estimating potential trade misinvoicing which proceeds in three distinct steps:

1. **Preliminary data treatments.** The Comtrade data were adjusted to mitigate potential distortions in the estimates stemming from: (a) non-reporting of Swiss trade flows of precious metals in Comtrade for years prior to 2012; and (b) entrepôt trade through Hong Kong. Possible distortion to the trade gaps was mitigated (though not entirely resolved) by adjusting the Comtrade data using for Chinese re-exports via Hong Kong.[11]

2. **FOB equivalents.** For those countries that report import values to the United Nations on a CIF basis only, FOB equivalents are calculated using margins predicted by an equation estimated by GFI which takes into account a variety of factors that might be expected to affect transport and insurance margins.[12]

3. **Raw trade gaps.** The import and export gaps are then calculated in value terms ($US, FOB basis) for each commodity traded between developing and advanced economies in the same way as described above for the DOTS data.

4. **Weighted trade gaps.** Discrepancies in the volumes reported for each mirrored trade are then used to weight the raw trade gaps: a higher weight is applied to a given discrepancy in value the smaller is the associated volume discrepancy.

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10 The steps taken in treating the data for the bilateral trade data here are the same as reported for the partner-country method (PCM) as applied to South African imports as reported in Salomon (2018b).

11 The data used to adjust the pre-2012 Swiss reports to Comtrade were retrieved from an online database maintained by the Swiss government "Trade in Gold, Silver and Coins" (retrieved in March 2015 from https://www.ezv.admin.ch/ezv/en/home/suche. html#%22Trade%20in%20gold%2C%20silver%20and%20coins%22).The data necessary for the re-export adjustment to China's trade flow reports to Comtrade were purchased from the Census and Statistics Department of the Government of Hong Kong Special Administrative Region at the HS 6-digit level of commodity detail. In addition to those adjustments, some basic country re-assignments outlined in Fortanier & Sarrazin (2016) were applied to raw Comtrade data prior to making the historical Swiss and Hong Kong re-export adjustments. Taken as a whole, those adjustments should reduce trade gaps arising from inconsistencies in reporting and transhipments. The effects of those adjustments on the trade gaps is comparable to the results reported in Fortanier & Sarrazin (2016).

12 The estimated conversion margins are discussed in Section III and the underlying estimated equation in Appendix II below.

The use of estimated CIF-to-FOB conversion margins and the volume-based weighting of the trade gaps, made possible by the Comtrade database, are a significant departure from previous practice by GFI which relied solely on DOTS. This is intended to better inform the reader about the estimates provided. We summarize some of the effects of those new assumptions and present some guidelines for interpreting the results in the next section.

III. Key Assumptions and a Guide to Interpreting the Estimates

The estimates of potential trade misinvoicing reported here are necessarily imprecise largely because trade misinvoicing is not observable and statistical estimates must rely on discrepancies in bilateral trade reports that generally will reflect both legitimate and illicit factors. Those imprecisions, inherent in any single bilateral trade database, are magnified when separate estimates are made from two, largely independent, databases. Finally, assumptions made in the course of analysis may be entirely natural and appropriate for one database and not for the other database.

A. Basic Differences Between the DOTS and Comtrade Databases

While, taken together, DOTS and Comtrade are the two most comprehensive accounts of bilateral trade information available on a comparable basis over time, they are also produced largely independent of one another. DOTS trade flows are reported by countries directly to the IMF and the IMF staff makes use of additional data and statistical techniques to adjust for sporadic non-reporting or late reporting. By contrast, the Comtrade database reflects a compilation of country trade reports with no adjustments by the UN for late or nonexistent reporting. Due to the adjustments made to trade data by the IMF staff all 148 countries are represented in the DOTS data set. However, there are no data for 44 of the 148 countries (29.7 percent) listed in Comtrade data set. An additional point to note is that coverage of trade flows in DOTS can vary over time and by country; in Comtrade, coverage of trade flows can additionally vary by commodity.

Trade totals available for analysis in the DOTS and Comtrade data using a sample of 189 countries and territories over the period from 2000 to 2015 are presented in Table III-1.[13] The differences between the two databases for total reported imports are relatively small, with Comtrade totals averaging about 3 percent below (or 1 percent of GDP) those reported in the DOTS data. For total reported exports, however, the differences are substantially larger: the Comtrade export totals are, on average, 17 percent below the DOTS totals, with larger discrepancies for developing country reporters than for advanced country reporters (for developing countries, the differences export discrepancy amounts to 6 percentage points of GDP versus 3 percent for advanced countries).

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13 This section is based on Salomon (2018a). The sample used there contains the sample used in this report as a proper subset.

Table III-1. Country-Reported Trade Flow Totals Using DOTS and Comtrade Databases, Annual Averages for 2000-2015 (Based on a sampling of 189 countries, 154 developing economies and 36 advanced economies)

	Imports (CIF Basis)					
	Value (US$,mn)			Percent of GDP		
	All	Developing	Advanced	All	Developing	Advanced
DOTS	$12,310,044	$3,908,387	$8,401,657	24%	23%	24%
Comtrade	$11,897,743	$3,808,970	$8,088,774	23%	22%	23%
Difference (DOTS minus Comtrade)	$412,301	$99,417	$312,883	1%	1%	1%
Percent	3%	3%	4%	–	–	–
Comtrade: Detail				Percent of Total Comtrade Imports		
Matched	$9,347,045	$2,826,718	$6,520,327	79%	74%	81%
"Orphaned"	$1,287,483	$605,464	$682,019	11%	16%	8%
Other	$1,263,216	$376,788	$886,428	11%	10%	11%
"Lost"	$752,184	$382,559	$369,625	6%	10%	5%

	Exports (FOB Basis)					
	Value (US$,mn)			Percent of GDP		
	All	Developing	Advanced	All	Developing	Advanced
DOTS	$13,478,343	$4,897,423	$8,580,920	26%	29%	24%
Comtrade	$11,222,728	$3,851,504	$7,371,224	21%	23%	21%
Difference (DOTS minus Comtrade)	$2,255,615	$1,045,919	$1,209,696	4%	6%	3%
Percent	17%	21%	14%	–	–	–
Comtrade: Detail				Percent of Total Comtrade Imports		
Matched	$9,230,931	$3,170,095	$6,060,836	82%	82%	82%
"Orphaned"	$752,184	$382,559	$369,625	7%	10%	5%
Other	$1,239,613	$298,850	$940,764	11%	8%	13%
"Lost"	$1,287,483	$605,464	$682,019	11%	16%	9%

Source: Adapted from Salomon (2018a), Table 1, p. 38. The calculations underlying those estimates were based on bilateral trade data published by the International Monetary Fund (Direction of Trade Statistics) and the United Nations Conference on Trade and Development (UN-Comtrade). Data on gross domestic product (in current U.S. dollars, at market prices) are published by the World Bank (World Development Indicators).

Notes: Matched flows correspond to those Comtrade records for which the following three criteria hold: (1) non-zero values for the trade are reported by both the reporting country and its partner; (2) non-zero volumes for the trade are reported by both the reporting country and its partner; and, (3) volumes are reported in the same physical units for both the reporting country and its partner. "Orphaned" flows correspond to those Comtrade records in which a country-reported import (export) has no matching partner-reported export (import) for a particular commodity in the same year. "Other" corresponds to those Comtrade records which are matched in the sense of matching criterion (1) above but fail on criteria (2) and (3). That is, those records that indicate non-zero mirror values but at least one country in the mirror pair does not report volumes or, if it does report volumes, reports in different physical units from its partner in that trade. Finally, "lost" flows are those Comtrade records in which the country reports no imports (exports) but the partner country reports exports (imports); those lost flows are not included in the country-reported totals in the table. The list of countries included in the sample is available from GFI upon request. IMF designations were used to classify economies as developing or advanced.

Additionally, a significant fraction of the Comtrade data cannot directly be used for calculating trade gaps: on average, only 79 percent of country-reported imports (by value) and 82 percent of country-reported exports can be fully matched into useful partner-country mirror reports over the 2000-2015 period.

For these (and other) reasons, GFI chooses to highlight both propensities and dollar-value estimates of potential trade misinvoicing. In particular, we report estimated potential trade invoicing for a particular developing country trading with advanced countries as a share of its total trade with advanced countries.

B. Key Assumptions Underlying the DOTS and Comtrade Estimates

As with our previous reports on illicit flows all trade misinvoicing from a given trade gap is assigned to the developing country. This is based on the assumption that illicit funds in developing countries seek sanctuaries where funds can be converted to hard currencies and be hidden, laundered and moved with relative ease.

There are two other assumptions underpinning our report:

Trade Margins—In previous reports we assumed 10 percent trade margins for DOTS. Now, following the new IMF methodology we use whatever trade margins are available in DOTS (i.e., for countries reporting FOB imports as well as CIF—a small portion of the sample) and six percent margins for those who report only on a CIF basis. On average, this amounts to a six percent trade margin for DOTS (totals and by regions).

By contrast, for Comtrade, we use a statistical regression to estimate trade margins—the upper panel of Table III-2 shows the average margins for all developing country imports and by major region (the regression specification and results are presented in Appendix II). We should note that because the country/commodity coverage differs by year and by region, the table is simply documenting what the effects of our Comtrade assumptions are, not intended to be a statement about the reality of trade margins in different regions. It should also be noted that for all developing countries the average margin over the ten-year period is 6.2 percent, very close to the IMF's assumption and also close to the estimates of Miao and Fortanier (2016). The inclusion of trade margins that vary by trade partner, by commodity traded and by year is a distinct improvement in the GFI method in that it allows a more realistic treatment of trade margins, consistent with the approaches of other researchers.

Table III-2. Key Assumptions Underlying Comtrade-based Estimates of Potential Trade Misinvoicing by Region, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Average, 2006-2015 Average	Average, 2006-2015 Dispersion
Trade Margins for Developing Country Imports (Percentage by which imports on a CIF basis exceed imports on an FOB basis)												
All developing economies	*6.6*	*6.2*	*6.1*	*6.4*	*6.3*	*6.0*	*6.2*	*6.3*	*5.9*	*6.3*	*6.2*	*0.2*
Regions:												
Sub-Saharan Africa	4.5	5.0	4.7	5.9	5.7	5.9	5.6	5.6	5.2	4.6	5.3	0.9
Asia	7.9	7.6	7.6	7.8	7.5	7.2	7.4	8.0	7.0	7.2	7.5	0.5
Developing Europe	6.2	5.9	5.8	6.0	5.8	5.5	5.7	5.4	5.1	5.3	5.7	0.4
Middle East & North Africa	8.7	8.5	8.2	8.1	8.1	7.9	8.0	7.7	7.6	7.9	8.0	0.4
Western Hemisphere	3.6	2.4	2.4	2.4	2.7	2.8	2.7	2.7	2.6	4.1	2.8	0.3
Weights Applied to Developing Country Import Gaps (Percent)												
All developing economies	*31.8*	*32.5*	*32.9*	*32.1*	*32.2*	*32.6*	*33.6*	*33.1*	*32.8*	*32.3*	*32.6*	*0.7*
Regions:												
Sub-Saharan Africa	27.2	25.6	29.9	22.2	20.5	20.9	21.5	21.6	33.7	29.5	24.4	7.4
Asia	39.3	38.1	38.6	37.4	40.3	39.9	39.9	40.0	39.6	41.3	39.6	1.2
Developing Europe	33.4	33.5	31.1	32.2	33.5	33.9	32.8	34.3	33.9	33.8	33.2	0.9
Middle East & North Africa	31.7	23.9	26.8	24.9	27.1	29.3	16.9	21.4	25.9	20.6	24.6	5.0
Western Hemisphere	40.5	37.7	38.2	34.9	38.6	36.4	36.8	36.3	38.2	37.7	37.5	1.7

Source: GFI staff estimates using data from the United Nations Comtrade database and statistical procedures described in the text.

Note: GFI used a statistical regression procedure (estimated over all Comtrade import gaps from 2000 through 2015) to estimate imports on an FOB basis for all countries not reporting on that basis to the UN. The weights used to scale down Comtrade trade gaps in value terms reflected disparities in reporting for each category of trade in volume terms. The dispersion estimate reported in the table is the interquartile range for the ten annual estimates in each row.

Weights—The use of weighted measures (rather than the raw trade gaps) in the Comtrade estimates is intended to improve the reliability of the trade misinvoicing estimates. The weighting scheme is described in formal terms as follows: let Q^D and Q^A denote, respectively, the reported volume of trade (of a particular good in a particular year) between a developing country reporter (D) and its advanced-country trade partner (A). The weight applied to the trade gap in value terms was specified as

$$\{1 - |Q^D - Q^A|/max(Q^D,Q^A) \} .$$

Note that a different weight will apply to every matched record in Comtrade; for a given developing country, the weights will vary over time, by commodity traded and by trading partner.

This weighting scheme, frequently used in the literature, effectively shrinks the arithmetic value of the dollar-denominated trade gap by a factor that increases as the associated volume gap rises. That is, the dollar value of a dollar-denominated trade gap is assigned a higher value the closer are the associated matched volume reports; conversely, a larger volume discrepancy means we're placing a lower weight on the dollar-denominated trade gap. Generally, this might be interpreted as a reliability weight for matched Comtrade values; in effect, this also serves to privilege trade gaps that appear more likely to be due to mispricing. Other interpretations of this weighting scheme are possible (for example, see Economic Commission for Latin America and the Caribbean (2016), p. 124). Additionally, other specifications for such weighting are possible; see, for example, ten Cate (2007) and Gaulier & Zignano (2010).

IV. Policy Recommendations

A. Overview

Illicit financial flows from developing countries are facilitated by a lack of transparency in the global financial system that encourages the use of tax havens, secrecy jurisdictions, anonymous trusts and shell companies to hide and launder the funds. There are countless techniques to illegally move funds out of a country and/or to launder dirty money—including the misinvoicing of trade, which can be used to shift proceeds of criminal and corrupt activity across national borders.

Though policy environments vary from country to country, there are best practices that all countries should adopt and promote at international and regional forums and institutions, including the G20 countries, the United Nations, the World Bank, the IMF, the OECD, and the African Union. This section highlights these best practices and suggests further steps domestic and international regulators could take to curtail illicit financial flows.

B. Anti-Money Laundering

Information on the ultimate, true, human owner(s) of all corporations and other legal entities, referred to as "beneficial owners," should be disclosed upon formation, updated regularly, and made freely available to the public in central registries. Countries and international institutions should require gatekeepers to the financial system—lawyers, accountants, corporate service providers, and financial institutions—to identify the beneficial owners of their accounts and clients. In particular, beneficial owners for all banking and securities accounts should be identified in order to address the problems posed by anonymous companies and other legal entities.

In 2015, the European Union adopted legislation requiring each EU Member State to create registers of beneficial ownership information by May 2017 that are freely accessible by law enforcement authorities and financial institutions, and available to third parties that can demonstrate a legitimate interest in the information. Nothing prevents EU Member states from creating entirely open registries, however, and a few countries both within and outside the EU have already committed to doing so, including the UK, Denmark, Norway, the Ukraine, Ghana, Kenya, Nigeria, and Colombia. However, progress by G20 countries towards meeting even the less ambitious High Level Principles on Beneficial Ownership Transparency (adopted by the G20 in November 2014) has been poor.[14] GFI urges countries to commit to the creation of public registries of corporate beneficial ownership information and to engage with countries already in the process of implementing public registers to learn from their challenges and successes.

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[14] "Just for Show? Reviewing G20 Promises on Beneficial Ownership" (Transparency International, November 12, 2015), https://www.transparency.org/whatwedo/publication/just_for_show_g20_promises.

C. Beneficial Ownership of Legal Entities

At a minimum, all countries should comply with the Financial Action Task Force (FATF) Recommendations to combat money laundering and terrorist financing. The most recent update to those recommendations was released in 2012, introducing new priority areas on corruption and tax crimes.[15]

Despite good intentions and good policy, actually stopping money laundering often comes down to enforcement. Regulators and law enforcement officials must strongly enforce all anti-money laundering laws and regulations already on the books. This includes prosecuting criminal charges against and imposing appropriate penalties upon employees of financial intuitions who are culpable for allowing money laundering to occur as well as other professional facilitators such as lawyers, accountants, and corporate service providers.

D. Automatic Exchange of Financial Information

All countries should actively participate in the global movement toward the automatic exchange of financial information. Ninety-six countries have committed to implementing the OECD/G20 standard for this exchange by the end of 2018, which represents some progress from this time last year, when 89 countries had committed. Nonetheless, the OECD and G20 must ensure that developing countries, and especially the least developed countries, are included in the process. The system that has been established provides a necessary framework, but allows countries to "choose" one another for actual information exchange; a process that is currently excluding most developing countries. In addition, the system should allow for a phase-in period for developing countries during which they can receive information from other countries without needing to reciprocate right away. During this period, they can receive technical assistance to help adapt their information collection and processing systems to be able to provide the necessary information to their exchange partners.

E. Country-by-Country Reporting

All countries should require multinational corporations to publicly disclose their revenues, profits, losses, sales, taxes paid, subsidiaries, and staff levels on a country-by-country basis as a means of detecting and deterring abusive tax avoidance practices. As part of the Base Erosion and Profit Shifting (BEPS) initiative, the G20 countries and the OECD countries agreed in November 2015 to take the necessary measures to require their large, multinational companies to provide such reporting on a country-by-country basis. Unfortunately, the agreement only requires that the information be provided by the parent of the multinational company to its home tax authority. Other countries' tax authorities will be able to access the information only through official treaty requests,

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15 Financial Action Task Force, "The FATF Recommendations: International Standards on Combating Money Laundering and the Financing of Terrorism & Proliferation" (Paris, France: FATF, February 2012), http://www.fatf-gafi.org/topics/fatfrecommendations/documents/fatf-recommendations.html.

and therefore only where such treaties are in place. GFI strongly recommends that countries require their companies to provide public country-by-country reporting so that the information can be analyzed by legislators responsible for fixing the profit-shifting problems that such reporting will help identify. Since legislators alone will not have enough qualified people to adequately analyze the information necessary to make informed policy changes, publicly available country-by-country reporting will also allow experts from academia, civil society and the media to lend their analytical skills to the problem.

F. Curtailing Trade Misinvoicing

While not all types of illicit flows can be estimated, in the case of this study trade misinvoicing accounts for a substantial majority of illicit flows during the time period averaging upwards of 87 percent of measured IFFs. This represents 12.4 percent of developing country trade over the 2006-2015 period. Curbing trade misinvoicing must necessarily be a major focus for policymakers around the world.

Governments should adopt laws making trade misinvoicing illegal. GFI suggests language, adapted within each country, approximately as follows:

> Whoever, in relation to the importation or exportation of goods or in relation to the trade in services or intangible property, deliberately misstates, manipulates, falsifies, or omits a price, quantity, volume, grade, or other material aspect of an invoice for the purpose of (i) evading or avoiding VAT taxes, customs duties, income taxes, or any other form of tax or revenue collected by the Government; (ii) obtaining a tax benefit, export subsidy, or other benefit provided by the Government; or (iii) evading or avoiding [capital or foreign exchange controls]; shall be subject to a civil or criminal fine of up to [specific amount] [or imprisoned for up to [X} year(s), or both].

Governments should significantly boost customs enforcement by providing appropriate training and equipment to better detect the intentional misinvoicing of trade transactions. One particularly important tool for stopping trade misinvoicing as it happens is access to the most recently available, commodity-level world market pricing information. This would allow customs officials to tell whether a particular good may be significantly mis-priced relative to prevailing world trade pricing for that good. This variance could then trigger an audit or another form of further review for the transaction. GFI's cloud-based database GFTrade™ is a proprietary risk assessment tool designed to allow customs to do just that.

Given the greater potential for abuse, trade transactions with secrecy jurisdictions should be treated with the highest level of scrutiny by customs, tax, and law enforcement officials. Brazil is an excellent example on this point, subjecting transactions with secrecy jurisdictions and tax havens to a higher tax rate.[16]

G. Addis Tax Initiative

The Addis Tax Initiative (ATI) attempts to focus the political will of several countries to address the illicit flows menace.[17] Launched by over 30 countries and international organizations, the ATI is the outcome of a side event at the 2015 Financing for Development Conference and directly links illicit financial flows to domestic resource mobilization, and in turn, to sustainable development.[18] Those governments and organizations have acknowledged that curbing illicit flows is crucial to achieving the SDGs. Germany, the United States, the United Kingdom, and the Netherlands are among the developed nations taking part in the non-binding effort to seek ways to reduce IFFs. Ethiopia, Indonesia, the Philippines, and Tanzania, and other developing countries have said they will strive to curb their losses of revenue (due to IFFs). GFI strongly encourages other countries to sign on to the Addis Tax Initiative and has entered into discussions with many of these governments to determine how the aspiration of the Addis Action Agenda, the SDGs, and the ATI can move to implementation.

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16 Walter Stuber, "Brazil: Tax Haven Jurisdictions - Haven or Hell?," Mondaq, January 8, 2013, http://www.mondaq.com/brazil/x/215184/Income+Tax/Tax+Haven+Jurisdictions+Haven+Or+Hell.

17 "Financing for Development Conference: The Addis Tax Initiative - Declaration" (Addis Ababa, Ethiopia: International Tax Compact, July 15, 2015), http://www.taxcompact.net/documents/Addis-Tax-Initiative_Declaration.pdf.

18 "Better Tax Systems Crucial for Development," [Press Release] (Addis Ababa, Ethiopia: International Tax Compact, July 15, 2015), http://www.taxcompact.net/documents/Addis-Tax-Initiative_Press-Release.pdf.

BOX 1. The World Customs Organization's Recommendations to Address Trade Misinvoicing

In November 2018 the World Customs Organization published a study titled *Illicit Financial Flows via Trade Misinvoicing*. The study was in response to a request from the G20 Leaders' Communiqué in September 2016 for the WCO to examine trade misinvoicing and its role in illicit financial flows. The report notes that the work "has been prepared in collaboration between experts and scholars from the WCO, OECD, GFI, academia and Customs administrations, under the responsibility of the Secretariat of the WCO. However, the report should not be regarded as the officially endorsed views of those organizations or of their member countries."

In that context, the report examines two methods of estimating trade misinvoicing including:

"Partner Country Method (known as mirror data analysis), which measures discrepancies in bilateral trade records between trade partners, and Price Filter Method (known as unit price analysis), which measures the mis-invoiced value of trade transactions for which the unit price is considered abnormal."

The study notes that estimates of trade misinvoicing are not comparable between the two methods and that within each method different results may be found depending on the various assumptions made. Further, the report suggests that "rather than disputing the accuracy of individual assessment mechanisms, attention should rather focus on the actions to combat IFFs/TM, the existence of which is indisputable..." The WCOs recommendations to battle trade misinvoicing include:

"An indispensable prerequisite to tackling IFFs/TM is ensuring that Customs have sufficient mandate and resources to examine whether 'financial transactions' between traders correspond to the 'value of traded goods'. Customs used to concentrate its attention only on under-invoicing of imports in line with its traditional mandate of detecting possible revenue leakage. However, in response to the risk of IFFs/TM, Customs should have sufficient mandate and resources to tackle:

- over-invoiced imports intended to disguise capital flight as a form of trade payment,
- under-invoiced exports intended to conceal trade profit abroad such as tax havens, and
- over-invoiced exports/under-invoiced imports intended to bring illicit proceeds into the... legal financial system.

Provide capacity building including financial and human resources for Customs to combat IFFs/TM. In managing human resources, Customs should enhance integrity, as it is a pre-requisite for the effective and efficient functioning of a Customs administration, and it is essential in combating IFFs.

Enhancing partnership of Customs with i) trade business, ii) other government agencies such as tax authorities, Financial Intelligence Units (FIU) and police, and iii) Customs administrations of trade partners is also essential so that Customs can secure timely information and data to detect IFFs concealed in trade.

New technology such as Blockchain could potentially provide a solution to prevent and detect any fraudulent manipulation of trade transactions and related financial transactions by sharing and analyzing relevant information in a trusted and secure manner.

The WCO believes that it would be helpful for the WCO to get a mandate from the G20 to continue its work in the fight against IFFs/TM in cooperation with members, business, relevant authorities and international organizations. The WCO will report the progress to the G20 periodically."

V. Conclusions

The estimates presented in this report, estimated using two different databases, underscore the severity of the problem illicit financial outflows present to the developing world. Estimated potential illicit flows in and out of the developing world amounted to magnitudes within 20 to 30 percent of total developing country trade, on average, over the ten years between 2006 and 2015.

The numerical estimates are intended to illustrate the magnitude of the problem. The IMF and UN databases underlying the alternative estimates are the best data available for such comprehensive global assessment of trade-related IFFs. Significant and persistent IFFs in and out of developing countries imply sizeable social costs falling on the governments and citizens of those countries. GFI believes that identification of such costs by orders of magnitude, if not exactitude, highlights the need for policymakers to curtail those flows and reduce social costs.

GFI recommends a number of policy measures to curtail illicit flows. Broadly, they are related to increasing transparency in the global financial system, and thereby curbing illicit flows. Measures related to tax haven secrecy, anonymous companies, and money laundering techniques are of particular importance.

Specifically, GFI's major policy recommendations to world leaders include:

1. **Beneficial Ownership.** Governments should establish public registries of beneficial ownership information on all legal entities, and all gatekeepers to the financial system should know the true beneficial owner(s) of any account or client relationship they open.

2. **Anti-Money Laundering.** Government authorities should adopt and fully implement all of the Financial Action Task Force's (FATF) anti-money laundering recommendations; laws already in place should be strongly enforced.

3. **Country-by-Country Reporting.** Policymakers should require multinational companies to publicly disclose their revenues, profits, losses, sales, taxes paid, subsidiaries, and staff levels on a country-by-country basis.

4. **Tax Information Exchange.** All countries should actively participate in the worldwide movement towards the automatic exchange of tax information as endorsed by the OECD and the G20.

5. **Trade Misinvoicing.** Deliberate trade misinvoicing should be made illegal. Customs agencies should treat trade transactions involving a tax haven with the highest level of scrutiny. Moreover, governments should significantly boost their customs enforcement by equipping and training officers to better detect intentional misinvoicing of trade transactions, particularly through access to the most recently available world market pricing information at a detailed commodity level.

6. **Addis Tax Initiative.** Governments should sign on to the Addis Tax Initiative to further support efforts to curb illicit financial flows as a key component of the development agenda.

Illicit financial flows must be curtailed if domestic resource mobilization initiatives are to stand any chance of succeeding. National and international policymakers must consider the outsized effect of illicit financial flows on development, and implement appropriate policies. GFI has a strong track record of working with governments, and stands ready to assist in this effort.

Appendix I: Geographical Regions

	Developing Economies (148)				Advanced Economies (36)
Sub-Saharan Africa (45)	**Asia (25)**	**Developing Europe (23)**	**Middle East & North Africa (22)**	**Western Hemisphere (33)**	**Advanced Economies (36)**
Angola	Bangladesh	Albania	Afghanistan, Islamic Republic of	Antigua and Barbuda	Australia
Benin	Bhutan	Armenia, Republic of	Algeria	Argentina	Austria
Botswana	Brunei Darussalam	Azerbaijan, Republic of	Bahrain, Kingdom of	Aruba	Belgium
Burkina Faso	Cambodia	Belarus	Djibouti	Bahamas, The	Canada
Burundi	China, P.R.: Mainland	Bosnia and Herzegovina	Egypt	Barbados	Cyprus
Côte d'Ivoire	Fiji	Bulgaria	Iran, Islamic Republic of	Belize	Czech Republic
Cabo Verde	India	Croatia	Iraq	Bolivia	Denmark
Cameroon	Indonesia	Georgia	Jordan	Brazil	Estonia
Central African Republic	Kiribati	Hungary	Kuwait	Chile	Finland
Chad	Lao People's Democratic Republic	Kazakhstan	Lebanon	Colombia	France
Comoros	Malaysia	Kyrgyz Republic	Libya	Costa Rica	Germany
Congo, Democratic Republic of	Maldives	Macedonia, FYR	Mauritania	Dominica	Greece
Congo, Republic of	Mongolia	Moldova	Morocco	Dominican Republic	Hong Kong
Equatorial Guinea	Myanmar	Montenegro	Oman	Ecuador	Iceland
Eritrea	Nepal	Poland	Pakistan	El Salvador	Ireland
Eswatini, Kingdom of	Papua New Guinea	Romania	Qatar	Grenada	Israel
Ethiopia	Philippines	Russian Federation	Saudi Arabia	Guatemala	Italy
Gabon	Samoa	Serbia, Republic of	Sudan	Guyana	Japan
Gambia, The	Solomon Islands	Tajikistan	Syrian Arab Republic	Haiti	Korea, Republic of
Ghana	Sri Lanka	Turkey	Tunisia	Honduras	Latvia
Guinea	Thailand	Turkmenistan	United Arab Emirates	Jamaica	Lithuania
Guinea-Bissau	Timor-Leste, Democratic Republic of	Ukraine	Yemen, Republic of	Mexico	Luxembourg
Kenya	Tonga	Uzbekistan		Nicaragua	Malta
Lesotho	Vanuatu			Panama	Netherlands
Liberia	Vietnam			Paraguay	New Zealand
Madagascar				Peru	Norway
Malawi				St. Kitts and Nevis	Portugal
Mali				St. Lucia	San Marino
Mauritius				St. Vincent and the Grenadines	Singapore
Mozambique				Suriname	Slovak Republic
Namibia				Trinidad and Tobago	Slovenia
Niger				Uruguay	Spain
Nigeria				Venezuela, Republica Bolivariana de	Sweden
Rwanda					Switzerland
Sao Tome and Principe					United Kingdom
Senegal					United States
Seychelles					
Sierra Leone					
Somalia					
South Africa					
Tanzania					
Togo					
Uganda					
Zambia					
Zimbabwe					

Note: The designation of an economy as either "advanced" or "developing" is determined by the International Monetary Fund. Advanced economies are used as a benchmark against which potential trade misinvoicing is estimated. Not every developing country reported bilateral trade with advanced economies in every year published in the DOTS and Comtrade databases.

Appendix II: Estimating Transport Margins

The transport margins used to convert Comtrade import reports from a CIF to an FOB basis were estimated from a statistical regression that allowed margins to vary over time, across reporting countries and their trading partners and by the HS 6-digit commodity classification for the good traded. The regression equation was developed in line with recent empirical research and is intended to be a representative, but not necessarily definitive, treatment of transport margins.

Factors deemed useful explanatory variables for (unobserved) transport margins included the following, given for each mirror report:

- the physical distance between the two partners to trade;
- various geophysical characteristics of the trade partners such as whether the countries share a border, whether the countries are landlocked, and whether the countries are on the same continent;
- broad economic differences between the partners to trade as proxied by the status of each partner to trade as either developed or developing by the IMF's criteria;
- the strength of regional trade agreements (RTAs) if any between the two trade partners; and,
- the "median world price" of the HS 6-digit commodity traded each year as well as time and other fixed effects.

Other things equal, we would expect transport margins to rise as the physical distance between trade partners increases; to increase for landlocked countries (in which case, the CIF basis would include possibly costly internal transit); to increase for trade between developing countries (which, for example, may entail the use of port infrastructure of lesser overall quality than might be the case for trade between developed countries); and, to decrease with stronger regional trade agreements between the partners to trade. With respect to the median global price of the commodity traded in a particular year, the expected effects on transport margins is indeterminate: higher valued commodities would generally entail higher insurance costs but they might be easier to transport between countries. Finally, with technological advances in transportation, we might expect transport margins to be trending down over time.

The primary objective of the equation selection and estimation was to establish a reliable association between transport margins and those characteristics of trade. Using a censored sample of the complete UNCT database from 2000-2015 (i.e., all available country data), GFI estimated a regression equation relating the proportional raw import gap (i.e. the ratio of reported imports on a CIF basis to partner-reported exports on an FOB basis) as a dependent variable with the various right-hand-side variables listed above, suitably transformed (i.e., the independent variable as well as the non-categorical exogenous factor were both the distance and median world price entered in log form and the square of the log of distance was added as a regressor). The estimated coefficients (see Table II-1) all matched

in terms of expected signs—the coefficient on the median global price term was estimated to be negative (as was the case in Miao and Fortanier (2016) but not Gaulier and Zignano (2010), studies of a similar nature but with different degrees of censoring the sample and covering different time periods). The average CIF/FOB margin estimated over the all countries in the 2000-2015 Comtrade sample was just over 7 percent; that's slightly higher than Miao and Fortanier (2016), considerably higher than Gaulier and Zignano (2010) but also significantly lower than the 10 percent assumed by the IMF (and others) until recently.[19]

Appendix Table II-1. Regression Estimates of Transport Margin Equation, 2000-2015
(Dependent variable is the natural logarithm of the proportional import gap)

	Coefficient Estimate	Standard Error	t-value	p-value
ln_distw	-3.08E-02	1.21E-03	-25.576	< 2.00E-16
ln_distw_squared	2.81E-03	7.90E-05	35.566	< 2.00E-16
log(uvmdn)	-3.51E-03	3.68E-05	-95.216	< 2.00E-16
d_contig	-2.97E-02	2.61E-04	-113.697	< 2.00E-16
d_conti	-1.65E-03	2.96E-04	-5.583	2.37E-08
d_rta	-3.84E-03	6.62E-05	-57.963	< 2.00E-16
d_landlocked_i	3.61E-03	2.65E-04	13.64	< 2.00E-16
d_landlocked_j	-3.30E-03	2.88E-04	-11.456	< 2.00E-16
d_dev_i	1.14E-02	2.05E-04	55.684	< 2.00E-16
d_dev_j	2.17E-02	2.02E-04	107.275	< 2.00E-16
Residual standard error: 0.1374 on 2,186,061 degrees of freedom				
(62,494 observations deleted due to missingness)				
Multiple R-squared: 0.04942, Adjusted R-squared: 0.0494				
F-statistic: 4371 on 26 and 2186061 DF, p-value: < 2.2e-16				

Note: The regression was estimated (in R) using a censored sample of all import gaps available (i.e., all countries with matched trade reports) in the (annualized) Comtrade database for the period 2000-2015. The censoring excluded all records for which (1) the mirror trade volumes differed by more than 2.5 percent, and (2) the ratio of the (implied) unit values of imports to exports was greater than 1.8 or less than 0.8. The regression also included time fixed effects, an intercept term and an indicator of whether the mirror trade values in each record were on the same HS classification; estimated coefficients on those terms were significant but are not reported here (GFI will make those available upon request). The p-value reported in the rightmost column for each coefficient is the probability that the coefficient takes on the value estimated when, in fact, the true value is zero. All the p-values are extremely low, suggesting a high likelihood that the estimated coefficient differs significantly from zero. The variable mnemonics and data sources are listed in the table below, where the indexes {t,i,j,k} denote the year, importing country, exporting country partner, and HS-6 digit commodity, respectively.

Mnemonic	Variation	Description (Source)
ln_distw	{i,j}	log of the weighted distance between i & j (CEPII)
ln_distw_squared	{i,j}	ln_distw x ln_distw
log(uvmdn)	{t,k}	log of the median "world" price of good k at time t
d_contig	{i,j}	dummy = 1 if i and j share a border (CEPII)
d_conti	{i,j}	dummy = 1 if i and j are on the same continent (CEPII)
d_rta	{t,i,j}	categorical variable for type of regional trade agreement between i and j in year t (Bergstrand & Baier (2015), extended to 2015 by GFI)
d_landlocked_i	{i}	dummy = 1 if i is landlocked (CEPII)
d_landlocked_j	{j}	dummy = 1 if j is landlocked (CEPII)
d_dev_i	{i}	dummy = 1 if i is a developing economy (IMF)
d_dev_j	{j}	dummy = 1 if j is a developing economy (IMF)

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[19] Data purchased from the Centre d'Études Prospectives et d'Informations Internationales (CEPII), publicly available from Economic Integration Agreement Dataset and the International Monetary Fund were used as variables on the right hand side of the regression.

Appendix III: Country Estimates

Appendix Table III-1. DOTS-based Estimates of Potential Trade Misinvoicing by Country, 2015
(Percent of total developing country trade with advanced economies unless noted)

| Country | Potential Import Misinvoicing | | Potential Export Misinvoicing | | Inflows (b)+(c) | Outflows (a)+(d) | Total trade with advanced countries (millions of US $) | Inflows [(b)+(c)] (millions of US $) | Outflows [(a)+(d)] (millions of US $) |
	Over-Invoicing (a)	Under-Invoicing (b)	Over-Invoicing (c)	Under-Invoicing (d)					
All developing countries	*3.6*	*10.8*	*5.3*	*5.3*	*16.1*	*8.8*	*6,792,072*	*1,090,632*	*599,224*
Afghanistan, Islamic Republic of	35.5	62.8	0.1	4.6	62.9	40.1	845	532	339
Albania	5.8	9.7	7.1	4.7	16.8	10.4	3,937	661	411
Algeria	4.9	5.9	7.2	7.7	13.2	12.6	55,276	7,284	6,971
Angola	3.5	6.4	7.1	10.6	13.5	14.2	20,691	2,790	2,930
Antigua and Barbuda	0.8	114.5	4.8	2.1	119.3	2.9	723	863	21
Argentina	3.1	11.4	1.1	4.0	12.5	7.1	38,366	4,805	2,738
Armenia, Republic of	18.9	5.4	5.9	3.6	11.3	22.5	1,351	153	304
Aruba	2.8	45.8	0.3	7.5	46.1	10.3	1,231	567	126
Azerbaijan, Republic of	5.9	9.8	7.4	33.0	17.2	38.9	14,408	2,483	5,611
Bahamas, The	0.2	63.8	0.6	5.4	64.4	5.6	4,646	2,994	260
Bahrain, Kingdom of	6.3	5.7	22.6	6.5	28.3	12.8	9,122	2,586	1,166
Bangladesh	1.1	5.6	1.4	16.4	7.0	17.5	33,731	2,363	5,918
Barbados	7.1	2.5	10.0	0.6	12.5	7.7	1,067	133	82
Belarus	12.1	11.5	43.1	2.7	54.6	14.8	11,090	6,057	1,645
Belize	8.6	11.8	2.5	8.6	14.4	17.2	647	93	111
Benin	7.9	68.0	4.4	3.4	72.4	11.3	1,495	1,082	169
Bhutan	33.7	0.2	1.7	16.0	1.9	49.7	184	3	91
Bolivia	16.6	1.5	12.3	1.8	13.7	18.4	5,074	697	935
Bosnia and Herzegovina	12.9	9.2	5.9	7.2	15.0	20.0	6,956	1,047	1,392
Botswana	4.7	1.6	21.2	11.0	22.8	15.7	3,890	885	610
Brazil	2.8	6.5	3.3	4.9	9.7	7.6	160,789	15,648	12,233
Brunei Darussalam	5.5	27.3	4.8	1.9	32.1	7.3	6,477	2,080	474
Bulgaria	0.8	5.9	4.6	1.9	10.5	2.7	29,663	3,121	815
Burkina Faso	23.5	2.8	20.3	2.7	23.1	26.2	2,370	547	620
Burundi	28.2	19.1	15.6	20.5	34.6	48.7	190	66	92
Côte d'Ivoire	5.1	2.7	7.3	2.8	10.0	7.9	9,998	1,003	786
Cabo Verde	3.8	3.4	7.4	0.2	10.8	4.0	954	103	38
Cambodia	1.2	11.3	0.5	24.3	11.8	25.5	11,519	1,354	2,932
Cameroon	6.7	10.8	8.3	9.9	19.1	16.6	4,287	818	712
Central African Republic	17.2	5.9	12.4	2.1	18.3	19.3	485	89	94
Chad	0.0	0.0	0.0	0.0	0.0	0.0	2,006	0	0
Chile	2.8	10.8	0.2	4.4	11.0	7.2	56,976	6,250	4,098
China, P.R.: Mainland	4.1	14.0	5.6	5.4	19.7	9.5	2,327,220	457,785	222,070
Colombia	3.7	6.4	0.8	11.8	7.2	15.5	47,455	3,412	7,377
Comoros	0.9	35.6	0.0	17.6	35.6	18.5	56	20	10
Congo, Democratic Republic of	0.0	0.0	0.0	0.0	0.0	0.0	2,771	0	0
Congo, Republic of	20.1	3.8	15.5	12.8	19.4	32.9	5,779	1,119	1,898

(Percent of total developing country trade with advanced economies unless noted)

Country	Potential Import Misinvoicing		Potential Export Misinvoicing		Inflows (b)+(c)	Outflows (a)+(d)	Total trade with advanced countries (millions of US $)	Inflows [(b)+(c)] (millions of US $)	Outflows [(a)+(d)] (millions of US $)
	Over-Invoicing (a)	Under-Invoicing (b)	Over-Invoicing (c)	Under-Invoicing (d)					
Costa Rica	3.8	2.5	0.1	11.3	2.7	15.1	15,275	409	2,299
Croatia	2.2	4.9	7.1	1.5	12.1	3.7	21,351	2,583	800
Djibouti	27.1	69.6	0.4	4.8	70.0	31.9	518	363	165
Dominica	0.4	97.4	0.0	1.0	97.4	1.4	261	254	4
Dominican Republic	4.6	0.7	0.9	2.9	1.6	7.5	16,040	258	1,208
Ecuador	2.8	3.2	2.3	4.2	5.5	7.0	20,587	1,133	1,442
Egypt	9.5	15.0	2.0	7.7	17.0	17.2	39,623	6,717	6,833
El Salvador	11.8	1.0	2.5	2.4	3.4	14.2	7,547	260	1,071
Equatorial Guinea	0.0	0.0	0.0	0.0	0.0	0.0	5,195	0	0
Eritrea	25.1	11.0	1.2	15.2	12.2	40.3	135	16	54
Eswatini, Kingdom of	20.3	16.7	29.6	28.4	46.2	48.7	211	98	103
Ethiopia	15.5	27.0	8.1	2.5	35.1	18.1	5,505	1,930	994
Fiji	17.8	18.6	0.8	4.4	19.4	22.2	1,894	367	421
Gabon	5.2	2.7	20.4	13.0	23.1	18.2	4,985	1,151	908
Gambia, The	10.6	53.6	0.0	9.5	53.7	20.1	183	98	37
Georgia	19.4	9.1	1.7	7.8	10.7	27.2	3,086	331	841
Ghana	8.4	8.0	1.3	17.9	9.3	26.3	9,019	837	2,372
Grenada	27.4	1.2	2.8	1.9	4.0	29.3	174	7	51
Guatemala	4.8	0.4	0.6	5.1	1.1	9.9	13,700	144	1,362
Guinea	5.5	20.2	1.1	13.7	21.3	19.2	1,775	378	341
Guinea-Bissau	14.3	18.4	2.2	0.5	20.7	14.8	129	27	19
Guyana	41.1	0.5	4.8	11.9	5.4	53.0	1,760	95	933
Haiti	0.4	39.6	0.0	0.0	39.6	0.4	2,070	820	9
Honduras	2.2	24.1	0.3	37.5	24.4	39.7	9,335	2,276	3,708
Hungary	1.5	5.2	6.3	3.2	11.5	4.7	138,163	15,855	6,521
India	2.1	7.8	3.7	1.7	11.6	3.8	256,360	29,648	9,797
Indonesia	2.2	9.9	0.3	5.1	10.2	7.2	150,859	15,410	10,927
Iran, Islamic Republic of	14.8	13.6	0.0	0.0	13.6	14.8	19,597	2,668	2,899
Iraq	0.0	0.0	0.0	0.0	0.0	0.0	32,762	0	0
Jamaica	4.5	0.7	5.9	1.1	6.6	5.6	3,422	227	193
Jordan	2.0	12.1	0.0	6.1	12.1	8.1	9,788	1,184	795
Kazakhstan	8.3	4.5	48.6	16.5	53.1	24.9	30,978	16,456	7,702
Kenya	10.7	19.7	3.1	7.4	22.8	18.0	6,811	1,553	1,229
Kiribati	7.8	48.3	0.3	18.3	48.7	26.1	83	41	22
Kuwait	3.1	3.1	0.0	0.0	3.1	3.1	39,617	1,220	1,227
Kyrgyz Republic	17.8	9.2	16.5	4.0	25.6	21.8	1,021	262	222
Lao People's Democratic Republic	0.0	0.0	0.0	0.0	0.0	0.0	1,178	0	0
Lebanon	5.1	8.0	1.5	2.2	9.5	7.2	10,306	980	746
Lesotho	17.6	0.9	0.5	38.9	1.4	56.6	567	8	320
Liberia	0.0	0.0	0.0	0.0	0.0	0.0	6,190	0	0

Country	Potential Import Misinvoicing		Potential Export Misinvoicing		Inflows (b)+(c)	Outflows (a)+(d)	Total trade with advanced countries (millions of US $)	Inflows [(b)+(c)] (millions of US $)	Outflows [(a)+(d)] (millions of US $)
	Over-Invoicing (a)	Under-Invoicing (b)	Over-Invoicing (c)	Under-Invoicing (d)					
Libya	1.2	24.7	2.8	19.6	27.6	20.7	11,273	3,107	2,337
Macedonia, FYR	4.8	12.0	4.1	5.8	16.0	10.6	6,607	1,058	701
Madagascar	8.4	12.6	6.1	7.5	18.6	15.9	2,338	436	371
Malawi	34.0	2.6	9.4	10.1	12.0	44.1	798	96	352
Malaysia	2.8	9.2	0.5	13.1	9.7	15.9	212,077	20,649	33,744
Maldives	23.4	4.3	0.3	9.2	4.6	32.6	700	32	228
Mali	6.6	23.1	2.2	6.2	25.3	12.7	1,533	388	195
Mauritania	20.6	10.1	3.5	10.3	13.6	30.9	1,908	260	589
Mauritius	7.1	9.8	5.8	6.7	15.6	13.7	2,884	451	396
Mexico	3.5	8.4	5.0	3.3	13.5	6.8	632,533	85,141	42,922
Moldova	9.5	10.1	5.3	7.5	15.5	17.0	2,025	313	345
Mongolia	6.7	4.7	24.1	19.7	28.8	26.4	1,610	463	425
Montenegro	10.6	19.6	1.2	4.9	20.8	15.5	842	175	131
Morocco	5.2	7.7	2.9	4.5	10.6	9.7	36,489	3,866	3,552
Mozambique	23.5	14.5	25.2	24.6	39.7	48.1	3,892	1,545	1,870
Myanmar	17.7	11.6	10.5	13.1	22.1	30.8	7,921	1,748	2,439
Namibia	17.6	6.7	34.0	21.1	40.7	38.7	2,241	913	867
Nepal	23.0	34.7	0.2	6.2	34.9	29.3	926	323	271
Nicaragua	4.3	8.2	0.3	12.6	8.6	16.9	5,060	434	853
Niger	48.0	7.3	13.8	15.6	21.1	63.6	1,363	288	867
Nigeria	5.1	10.7	3.6	14.9	14.3	20.0	41,227	5,902	8,251
Oman	2.6	27.3	4.1	6.7	31.3	9.3	16,411	5,140	1,532
Pakistan	0.6	9.4	3.6	2.9	13.0	3.5	22,522	2,921	778
Panama	0.0	118.2	0.3	8.3	118.4	8.4	15,422	18,264	1,290
Papua New Guinea	2.1	0.0	12.2	34.3	12.2	36.4	8,234	1,005	2,999
Paraguay	10.0	21.9	11.3	1.3	33.2	11.3	3,999	1,329	451
Peru	3.1	5.1	2.0	2.6	7.1	5.6	34,008	2,410	1,921
Philippines	0.5	14.1	5.5	5.7	19.6	6.3	81,249	15,953	5,101
Poland	0.5	8.5	5.5	0.5	14.0	1.0	303,391	42,376	3,091
Qatar	2.1	8.4	3.9	4.8	12.3	7.0	62,366	7,670	4,337
Romania	0.5	3.8	5.8	2.1	9.6	2.6	83,469	8,016	2,143
Russian Federation	3.0	6.8	16.8	8.3	23.6	11.3	274,777	64,830	31,013
Rwanda	28.8	5.1	20.8	9.4	25.9	38.2	513	133	196
Sao Tome and Principe	20.5	3.4	0.7	2.1	4.1	22.6	94	4	21
Samoa	28.4	12.9	3.2	1.0	16.1	29.4	258	41	76
Saudi Arabia	5.1	4.7	12.0	3.2	16.7	8.3	193,841	32,404	16,119
Senegal	5.2	26.8	1.0	4.5	27.8	9.7	3,561	990	346
Serbia, Republic of	5.3	7.6	4.7	5.1	12.4	10.4	16,045	1,987	1,668
Seychelles	5.7	25.7	3.8	9.0	29.4	14.7	769	226	113
Sierra Leone	52.5	20.3	0.4	27.3	20.7	79.8	641	132	512

Appendix Table III-1. DOTS-based Estimates of Potential Trade Misinvoicing by Country, 2015 (cont.)
(Percent of total developing country trade with advanced economies unless noted)

| Country | Potential Import Misinvoicing | | Potential Export Misinvoicing | | Inflows (b)+(c) | Outflows (a)+(d) | Total trade with advanced countries (millions of US $) | Inflows [(b)+(c)] (millions of US $) | Outflows [(a)+(d)] (millions of US $) |
	Over-Invoicing (a)	Under-Invoicing (b)	Over-Invoicing (c)	Under-Invoicing (d)					
Solomon Islands	3.9	0.0	4.2	12.9	4.2	16.8	315	13	53
Somalia	0.0	0.0	0.0	0.0	0.0	0.0	185	0	0
South Africa	2.5	5.8	1.2	10.7	6.9	13.2	77,339	5,365	10,207
Sri Lanka	3.5	12.4	2.9	2.2	15.3	5.7	13,080	2,002	750
St. Kitts and Nevis	0.4	31.6	0.1	13.7	31.7	14.2	304	96	43
St. Lucia	1.7	49.3	15.9	0.2	65.2	1.9	527	343	10
St. Vincent and the Grenadines	25.4	33.6	0.2	1.1	33.8	26.6	193	65	51
Sudan	20.2	14.6	0.2	23.8	14.8	44.0	1,979	293	871
Suriname	0.9	6.0	3.5	14.5	9.6	15.4	1,818	174	280
Syrian Arab Republic	24.9	29.8	1.1	0.5	31.0	25.4	809	251	206
Tajikistan	23.8	9.1	1.6	12.0	10.7	35.8	511	55	183
Tanzania	22.1	11.7	3.4	7.3	15.1	29.4	3,540	535	1,042
Thailand	4.4	8.5	2.3	3.2	10.8	7.6	192,715	20,888	14,725
Timor-Leste, Democratic Republic of	3.6	12.4	1.7	76.7	14.1	80.2	375	53	301
Togo	2.6	146.7	0.9	4.2	147.6	6.7	3,310	4,886	222
Tonga	28.6	0.6	7.2	1.3	7.8	30.0	111	9	33
Trinidad and Tobago	9.4	3.2	7.7	3.4	10.9	12.8	10,620	1,162	1,359
Tunisia	2.5	7.9	3.5	3.1	11.4	5.6	22,863	2,612	1,280
Turkey	1.9	8.6	1.1	3.0	9.7	4.8	173,950	16,927	8,422
Turkmenistan	0.0	0.0	0.0	0.0	0.0	0.0	1,813	0	0
Uganda	22.1	5.1	3.0	7.1	8.0	29.2	1,622	130	473
Ukraine	10.5	4.6	3.1	7.3	7.7	17.8	24,783	1,917	4,408
United Arab Emirates	0.8	18.5	0.0	0.0	18.5	0.8	158,427	29,344	1,308
Uruguay	1.1	26.6	1.7	20.7	28.3	21.7	5,815	1,645	1,263
Uzbekistan	38.8	1.2	6.5	34.4	7.7	73.2	5,659	437	4,144
Vanuatu	7.1	29.9	6.4	23.1	36.3	30.2	262	95	79
Venezuela, Republica Bolivariana de	4.0	6.7	3.8	8.2	10.5	12.2	31,814	3,352	3,868
Vietnam	1.4	10.6	1.7	4.5	12.4	5.9	181,583	22,456	10,640
Yemen, Republic of	12.3	24.6	0.9	26.4	25.5	38.7	1,860	475	720
Zambia	21.9	1.0	109.7	21.1	110.8	43.0	3,590	3,976	1,542
Zimbabwe	25.4	15.0	0.0	69.9	15.0	95.3	703	106	670

Source: GFI staff calculations using data from the International Monetary Fund's Direction of Trade Statistics (DOTS).

Note: Estimates of total trade with advanced economies were calculated as an average of the magnitude reported by each developing country and the magnitude reported by the country's advanced economy trade partners. Total trade is defined for any country as the sum of its merchandise imports (on an FOB basis) and exports with advanced economies.

Appendix Table III-2. Comtrade-based Estimates of Potential Trade Misinvoicing by Country, 2015
(Percent of total developing country trade with advanced economies unless noted)

Country	Potential Import Misinvoicing				Potential Export Misinvoicing				Inflows (b)+(c)	Outflows (a)+(d)	Total trade with advanced countries (millions of US $)	Inflows [(b)+(c)] (millions of US $)	Outflows [(a)+(d)] (millions of US $)
	Over-Invoicing (a)		Under-Invoicing (b)		Over-Invoicing (c)		Under-Invoicing (d)						
	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)					
All developing countries	*3.3*	*34.7*	*4.1*	*32.0*	*5.5*	*34.7*	*5.1*	*32.0*	*9.6*	*8.4*	*5,212,585*	*501,686*	*438,320*
Afghanistan, Islamic Republic of	5.7	5.9	2.8	39.4	3.6	21.2	5.8	54.0	6.4	11.5	40	3	5
Albania	4.7	36.2	8.5	42.9	4.5	44.8	2.1	30.6	13.0	6.9	3,066	398	210
Algeria	4.7	33.8	4.2	33.8	3.0	34.4	3.8	64.4	7.2	8.6	48,366	3,461	4,138
Angola	2.9	20.3	3.9	25.9	3.8	27.9	5.0	52.9	7.7	7.8	15,669	1,210	1,228
Antigua and Barbuda	4.3	20.7	4.1	3.2	0.0	3.7	0.0	43.3	4.1	4.3	388	16	17
Argentina	4.5	41.6	7.0	37.8	2.6	44.3	3.8	55.0	9.5	8.3	32,807	3,128	2,724
Armenia, Republic of	9.0	28.2	4.9	24.1	2.0	38.6	2.6	27.4	6.9	11.7	784	54	91
Aruba	11.9	19.5	4.9	14.6	0.1	15.8	0.2	74.8	5.0	12.1	525	26	63
Azerbaijan, Republic of	2.6	30.3	2.8	14.9	1.6	10.8	0.7	2.1	4.4	3.3	10,026	440	330
Bahamas, The	10.1	28.1	16.5	38.8	0.5	11.9	1.8	30.6	17.0	12.0	2,635	449	316
Bahrain, Kingdom of	8.0	38.1	6.2	36.8	3.5	28.6	3.2	18.8	9.7	11.3	5,758	560	648
Bangladesh	3.0	20.0	1.9	29.3	5.6	31.6	4.2	21.5	7.5	7.2	36,998	2,778	2,666
Barbados	9.6	27.3	10.8	35.1	0.4	12.4	1.2	60.5	11.1	10.8	648	72	70
Belarus	6.4	31.3	4.9	27.0	3.2	16.3	2.5	21.6	8.1	8.9	7,085	573	633
Belize	5.1	16.4	8.1	34.0	3.7	31.3	2.5	48.7	11.8	7.6	384	45	29
Benin	3.5	16.4	12.4	12.3	0.1	31.4	1.0	27.4	12.5	4.5	1,154	144	52
Bhutan	.	.	.	.	.	.	.	.	.	.	.	.	.
Bolivia	6.4	26.7	2.8	21.0	11.3	66.6	3.9	64.1	14.1	10.3	3,890	547	400
Bosnia and Herzegovina	5.4	28.9	4.4	31.2	3.7	25.7	2.8	27.6	8.1	8.2	5,710	464	468
Botswana	5.1	27.1	4.9	38.7	21.8	62.5	0.0	38.4	26.7	5.1	495	132	26
Brazil	3.9	38.4	6.0	38.6	3.3	30.3	5.2	43.6	9.2	9.1	132,751	12,273	12,044
Brunei Darussalam	1.8	20.7	2.8	14.2	5.0	83.7	1.4	65.3	7.8	3.1	5,467	426	170
Bulgaria	3.4	33.4	6.2	40.8	4.0	30.6	3.9	29.4	10.1	7.3	24,378	2,473	1,772
Burkina Faso	5.1	12.0	5.1	28.1	0.5	7.4	3.4	4.6	5.7	8.5	1,308	74	111
Burundi	6.3	15.9	11.1	31.7	0.2	1.0	3.5	28.0	11.4	9.8	111	13	11
Côte d'Ivoire	3.3	25.5	3.5	30.8	5.8	50.9	5.1	52.1	9.3	8.4	8,765	813	739
Cabo Verde	7.8	40.1	10.3	42.4	1.1	17.5	1.1	33.2	11.5	9.0	425	49	38
Cambodia	2.6	19.7	2.0	17.2	6.1	17.4	5.0	7.1	8.1	7.6	8,937	723	679
Cameroon	6.0	38.7	5.9	32.2	7.6	52.7	6.7	47.3	13.5	12.7	3,562	481	452
Central African Republic	10.4	19.5	8.7	23.4	1.5	25.7	1.1	17.7	10.2	11.5	73	8	8
Chad	.	.	.	.	.	.	.	.	.	.	.	.	.
Chile	3.0	38.1	4.3	38.7	2.3	42.9	4.1	44.9	6.5	7.1	48,632	3,176	3,455
China, P.R.: Mainland	2.7	38.4	2.4	29.1	7.6	45.8	5.8	45.2	10.1	8.6	2,018,422	203,317	173,118
Colombia	4.0	39.1	4.6	34.4	2.3	36.4	8.1	53.9	6.9	12.1	41,787	2,880	5,062
Comoros	.	.	.	.	.	.	.	.	.	.	.	.	.
Congo, Democratic Republic of	.	.	.	.	.	.	.	.	.	.	.	.	.
Congo, Republic of	.	.	.	.	.	.	.	.	.	.	.	.	.

Appendix Table III-2. Comtrade-based Estimates of Potential Trade Misinvoicing by Country, 2015 (cont.)

(Percent of total developing country trade with advanced economies unless noted)

Country	Potential Import Misinvoicing				Potential Export Misinvoicing				Inflows (b)+(c)	Outflows (a)+(d)	Total trade with advanced countries (millions of US $)	Inflows [(b)+(c)] (millions of US $)	Outflows [(a)+(d)] (millions of US $)
	Over-Invoicing (a)		Under-Invoicing (b)		Over-Invoicing (c)		Under-Invoicing (d)						
	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)					
Costa Rica	6.2	34.9	5.3	39.2	1.4	25.6	6.2	40.9	6.7	12.5	10,666	717	1,332
Croatia	5.2	39.7	5.0	44.9	4.4	33.1	1.7	26.1	9.4	6.8	18,112	1,711	1,238
Djibouti	.	.	.	.	.	.	.	.	.	.	.	.	.
Dominica	.	.	.	.	.	.	.	.	.	.	.	.	.
Dominican Republic	6.9	22.0	4.1	15.3	2.1	24.8	3.6	26.6	6.2	10.5	11,881	740	1,252
Ecuador	2.9	21.0	4.1	24.4	2.0	34.5	3.8	45.3	6.1	6.6	18,572	1,138	1,230
Egypt	9.7	31.3	5.0	21.0	2.6	24.5	2.1	21.0	7.6	11.7	24,468	1,848	2,869
El Salvador	10.4	41.9	2.5	31.9	3.1	34.8	1.8	29.7	5.6	12.2	6,262	348	764
Equatorial Guinea	.	.	.	.	.	.	.	.	.	.	.	.	.
Eritrea	.	.	.	.	.	.	.	.	.	.	.	.	.
Eswatini, Kingdom of	.	.	.	.	.	.	.	.	.	.	.	.	.
Ethiopia	8.6	17.6	5.1	26.0	14.9	61.9	0.6	16.5	20.1	9.2	3,198	642	295
Fiji	10.4	27.1	5.1	13.1	1.3	12.0	5.0	30.8	6.4	15.4	1,485	95	229
Gabon	.	.	.	.	.	.	.	.	.	.	.	.	.
Gambia, The	.	.	.	.	.	.	.	.	.	.	.	.	.
Georgia	24.5	62.6	7.5	32.7	0.9	35.2	1.2	14.9	8.4	25.6	2,426	204	622
Ghana	.	.	.	.	.	.	.	.	.	.	.	.	.
Grenada	.	.	.	.	.	.	.	.	.	.	.	.	.
Guatemala	7.0	41.3	3.1	33.4	2.5	26.5	4.9	36.1	5.6	11.9	11,440	639	1,366
Guinea	6.6	38.2	7.3	34.1	0.1	5.0	7.7	46.1	7.4	14.3	1,295	95	185
Guinea-Bissau	.	.	.	.	.	.	.	.	.	.	.	.	.
Guyana	4.6	21.6	4.1	22.4	2.0	20.2	13.1	66.2	6.1	17.7	959	58	169
Haiti	.	.	.	.	.	.	.	.	.	.	.	.	.
Honduras	.	.	.	.	.	.	.	.	.	.	.	.	.
Hungary	3.4	32.4	5.4	40.1	6.3	40.3	3.4	32.9	11.7	6.8	111,620	13,038	7,556
India	3.2	31.1	4.8	33.2	4.4	32.7	4.5	33.5	9.2	7.8	190,939	17,578	14,819
Indonesia	2.9	33.5	4.2	33.1	4.2	36.7	5.1	30.8	8.4	7.9	120,676	10,081	9,580
Iran, Islamic Republic of	.	.	.	.	.	.	.	.	.	.	.	.	.
Iraq	.	.	.	.	.	.	.	.	.	.	.	.	.
Jamaica	7.8	35.2	5.4	27.3	1.6	12.2	1.5	33.8	7.0	9.3	2,631	185	246
Jordan	8.1	29.2	9.0	28.7	0.6	4.3	0.7	4.8	9.6	8.8	6,896	664	605
Kazakhstan	3.2	27.7	1.9	24.8	9.3	16.7	4.0	20.7	11.2	7.2	26,150	2,935	1,889
Kenya	.	.	.	.	.	.	.	.	.	.	.	.	.
Kiribati	.	.	.	.	.	.	.	.	.	.	.	.	.
Kuwait	12.6	40.8	9.9	37.6	0.1	20.9	0.4	13.3	10.0	13.0	11,586	1,158	1,509
Kyrgyz Republic	4.1	22.4	3.4	22.9	13.3	76.5	2.4	78.2	16.7	6.5	842	141	54
Lao People's Democratic Republic	1.7	21.8	6.1	16.1	3.7	26.3	7.6	22.2	9.8	9.3	433	42	40
Lebanon	.	.	.	.	.	.	.	.	.	.	.	.	.

Country	Potential Import Misinvoicing				Potential Export Misinvoicing				Inflows (b)+(c)	Outflows (a)+(d)	Total trade with advanced countries (millions of US $)	Inflows [(b)+(c)] (millions of US $)	Outflows [(a)+(d)] (millions of US $)
	Over-Invoicing (a)		Under-Invoicing (b)		Over-Invoicing (c)		Under-Invoicing (d)						
	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)					
Lesotho	.	.	.	.	.	.	.	.	.	.	.	.	.
Liberia	.	.	.	.	.	.	.	.	.	.	.	.	.
Libya	.	.	.	.	.	.	.	.	.	.	.	.	.
Macedonia, FYR	2.8	25.4	7.0	37.7	2.7	56.4	2.2	29.4	9.7	5.0	5,582	539	279
Madagascar	2.4	29.2	3.3	22.4	6.2	42.7	5.5	38.0	9.5	7.8	1,847	176	145
Malawi	3.3	13.3	4.7	37.9	3.5	26.6	12.5	44.1	8.2	15.9	646	53	103
Malaysia	2.7	24.5	6.3	34.5	3.1	24.3	10.6	47.1	9.4	13.3	171,919	16,122	22,889
Maldives	8.9	24.5	9.9	32.3	0.7	50.9	10.1	76.8	10.6	19.1	455	48	87
Mali	.	.	.	.	.	.	.	.	.	.	.	.	.
Mauritania	.	.	.	.	.	.	.	.	.	.	.	.	.
Mauritius	3.2	27.2	5.0	32.3	3.4	31.1	3.9	39.7	8.4	7.2	2,310	194	166
Mexico	2.9	40.9	3.5	38.9	3.3	41.7	3.1	39.5	6.8	6.0	522,597	35,533	31,504
Moldova	5.2	24.5	5.4	20.5	2.9	36.3	2.8	32.3	8.3	8.0	1,657	137	133
Mongolia	8.5	24.9	9.5	29.6	2.1	22.8	1.7	31.7	11.6	10.2	877	102	89
Montenegro	.	.	.	.	.	.	.	.	.	.	.	.	.
Morocco	6.0	35.3	5.0	26.2	3.5	23.4	4.9	33.6	8.5	10.9	31,498	2,688	3,421
Mozambique	7.3	25.7	9.5	28.9	1.7	32.8	4.6	16.7	11.2	11.9	1,692	189	201
Myanmar	6.1	20.6	3.7	7.1	2.9	20.8	3.7	13.1	6.6	9.8	3,852	254	379
Namibia	2.7	26.1	2.9	17.9	5.2	20.2	10.9	58.4	8.1	13.6	886	72	121
Nepal	8.2	29.7	9.0	24.6	2.1	28.1	2.1	23.8	11.2	10.2	604	67	62
Nicaragua	3.5	32.5	1.9	16.0	3.4	28.9	7.8	29.0	5.3	11.3	4,270	228	482
Niger	3.7	5.6	12.4	32.7	0.0	0.0	0.0	4.0	12.4	3.7	570	71	21
Nigeria	.	.	.	.	.	.	.	.	.	.	.	.	.
Oman	3.5	20.7	10.7	34.5	1.0	8.1	2.2	29.9	11.7	5.7	6,322	742	362
Pakistan	2.6	20.8	5.8	27.4	5.2	23.2	5.9	26.3	11.0	8.4	18,766	2,058	1,579
Panama	5.1	36.5	5.2	6.9	0.2	1.7	0.4	41.2	5.4	5.5	6,802	369	377
Papua New Guinea	.	.	.	.	.	.	.	.	.	.	.	.	.
Paraguay	7.8	43.5	4.4	16.5	5.1	31.2	1.7	30.2	9.5	9.6	3,127	297	299
Peru	3.6	44.5	3.2	29.9	3.4	50.3	3.4	49.3	6.6	7.0	30,647	2,024	2,143
Philippines	6.2	33.8	9.6	34.9	4.8	22.1	4.4	30.4	14.3	10.5	43,541	6,243	4,588
Poland	2.6	37.7	7.2	37.4	6.0	40.4	3.5	40.2	13.2	6.0	245,477	32,318	14,839
Qatar	2.1	16.7	2.0	23.0	11.5	50.5	5.8	34.0	13.5	7.9	47,717	6,447	3,769
Romania	3.6	36.1	5.2	44.4	4.7	37.4	3.8	34.4	9.8	7.4	69,221	6,812	5,131
Russian Federation	2.9	36.5	4.0	32.0	7.6	26.8	6.8	39.5	11.6	9.6	211,323	24,590	20,384
Rwanda	7.7	19.6	3.5	17.1	0.8	6.7	6.0	43.9	4.3	13.7	247	11	34
Sao Tome and Principe	14.3	46.0	6.7	35.1	0.6	14.3	0.9	39.4	7.3	15.3	73	5	11
Samoa	11.4	20.9	5.4	17.6	0.3	52.8	1.1	24.4	5.7	12.6	166	9	21
Saudi Arabia	8.7	28.1	10.7	35.6	0.8	31.7	1.0	26.5	11.5	9.7	69,670	8,018	6,739
Senegal	4.3	20.8	13.4	31.9	0.9	31.1	2.4	34.1	14.3	6.6	2,784	399	185

Appendix Table III-2. Comtrade-based Estimates of Potential Trade Misinvoicing by Country, 2015 (cont.)
(Percent of total developing country trade with advanced economies unless noted)

Country	Potential Import Misinvoicing				Potential Export Misinvoicing				Inflows (b)+(c)	Outflows (a)+(d)	Total trade with advanced countries (millions of US $)	Inflows [(b)+(c)] (millions of US $)	Outflows [(a)+(d)] (millions of US $)
	Over-Invoicing (a)		Under-Invoicing (b)		Over-Invoicing (c)		Under-Invoicing (d)						
	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)	Weighted gap	Weight (%)					
Serbia, Republic of	.	.	.	.	.	.	.	.	.	.	.	.	.
Seychelles	3.7	23.6	4.5	13.1	3.3	67.5	0.6	58.3	7.8	4.3	427	33	18
Sierra Leone	22.1	30.3	5.5	13.2	10.6	49.3	1.6	44.8	16.0	23.8	227	36	54
Solomon Islands	9.9	18.8	5.3	15.3	4.4	49.6	2.4	31.5	9.6	12.3	154	15	19
Somalia	.	.	.	.	.	.	.	.	.	.	.	.	.
South Africa	4.0	31.9	7.6	28.0	3.2	31.2	6.7	40.9	10.7	10.7	55,042	5,896	5,913
Sri Lanka	3.7	35.3	3.6	31.8	4.2	30.6	5.3	36.8	7.8	9.0	11,287	882	1,011
St. Kitts and Nevis	.	.	.	.	.	.	.	.	.	.	.	.	.
St. Lucia	.	.	.	.	.	.	.	.	.	.	.	.	.
St. Vincent and the Grenadines	13.4	26.3	6.9	25.2	0.2	69.6	0.1	46.6	7.1	13.5	84	6	11
Sudan	.	.	.	.	.	.	.	.	.	.	.	.	.
Suriname	.	.	.	.	.	.	.	.	.	.	.	.	.
Syrian Arab Republic	.	.	.	.	.	.	.	.	.	.	.	.	.
Tajikistan	.	.	.	.	.	.	.	.	.	.	.	.	.
Tanzania	7.9	34.2	10.7	35.1	3.4	39.0	4.3	44.7	14.2	12.2	2,240	317	272
Thailand	4.5	35.8	4.1	28.9	4.0	31.4	5.4	40.0	8.1	9.9	160,836	12,969	15,951
Timor-Leste, Democratic Republic of	.	.	.	.	.	.	.	.	.	.	.	.	.
Togo	0.8	22.4	5.7	3.5	0.2	24.8	3.1	72.2	5.8	3.9	2,733	160	106
Tonga	.	.	.	.	.	.	.	.	.	.	.	.	.
Trinidad and Tobago	3.7	32.8	2.5	25.1	2.7	50.9	7.3	51.7	5.2	11.0	7,652	397	841
Tunisia	5.2	32.3	6.5	31.5	4.8	29.0	4.1	24.6	11.3	9.2	19,978	2,264	1,841
Turkey	3.6	38.5	5.3	35.5	3.2	41.6	4.8	43.2	8.5	8.4	148,272	12,649	12,387
Turkmenistan	.	.	.	.	.	.	.	.	.	.	.	.	.
Uganda	9.8	27.7	4.7	28.8	3.2	44.0	4.9	45.4	7.9	14.7	1,161	92	171
Ukraine	4.6	33.5	4.9	31.5	2.1	27.9	7.1	55.8	7.0	11.7	20,499	1,435	2,390
United Arab Emirates	7.0	36.4	11.5	33.8	1.3	20.6	1.1	4.3	12.8	8.1	93,437	11,999	7,584
Uruguay	4.0	32.1	11.2	25.9	3.1	37.6	2.3	22.3	14.3	6.2	4,115	589	256
Uzbekistan	.	.	.	.	.	.	.	.	.	.	.	.	.
Vanuatu	.	.	.	.	.	.	.	.	.	.	.	.	.
Venezuela, Republica Bolivariana de	.	.	.	.	.	.	.	.	.	.	.	.	.
Vietnam	2.1	26.3	3.0	24.1	4.9	41.6	5.5	32.5	7.9	7.5	121,507	9,656	9,146
Yemen, Republic of	7.4	16.3	11.4	23.6	0.1	26.6	0.5	12.3	11.5	7.9	588	68	46
Zambia	7.3	19.1	3.3	21.9	5.0	5.3	0.7	31.8	8.3	8.0	1,286	106	103
Zimbabwe	9.1	14.9	10.9	35.5	0.1	44.6	1.2	7.7	10.9	10.2	336	37	34

"." denotes missing data.

Source: GFI staff calculations using data from the United Nations' Comtrade database.

Note: Estimates of total trade with advanced economies were calculated as an average of the magnitude reported by each developing country and the magnitude reported by the country's advanced economy trade partners. Total trade is defined for any country as the sum of its merchandise imports (on an FOB basis) and exports with advanced economies.

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About

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

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