

Lost in trade: towards a red-flag system to target trade misinvoicing and tax evasion in Tanzania

Antonio Andreoni¹ and Luca Tasciotti²

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^{1,2} SOAS University of London, Department of Economics

Correspondence to: Antonio Andreoni (aa155@soas.ac.uk)

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Acronyms and abbreviations

COMESA	Common Market for Eastern and Southern Africa
CTI	Confederation of Tanzania Industries
CU	Customs Union
DRC	Democratic Republic of Congo
EAC	East African Community
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
HS	Harmonized System
PPP	Purchasing power parity
SADC	Southern African Development Community
SI	Sensitive Item
TPA	Tanzania Ports Authority
TRA	Tanzania Revenue Authority
Tshs	Tanzanian shilling
UEA	United Arab Emirates

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Executive summary

Trade misinvoicing and the resulting tax evasion are profoundly intertwined with the political economy of corruption and the development trajectory of Tanzania. Since the 1990s – the so called ‘*Ruksa*’ (opening up) period – and then with the establishment of the East African Community (EAC) Customs Union since 2005, the management of trade, tariff schedules and smuggling have opened up several opportunities for rents capture, rent-seeking and illicit financial flows. Trade misinvoicing can take different forms, the main ones relating to the *underreporting* of commodity flows to avoid the payment of tariffs set for imported goods, and *overreporting* as a way of moving capitals out of the country. Existing evidence suggests that the size of underreporting – i.e. the difference between what the importing and exporting countries declare – is positively correlated with the tariff rate set in the importing country. This paper contributes to the existing literature by providing new longitudinal evidence on the scale of corruption in trade misinvoicing (both underreporting and overreporting) and new econometric analyses of the critical channels and factors driving trade underreporting in Tanzania under different tariff regimes. We found that between 2013 and 2017, the cumulative value of trade underreporting amounted to over US\$10 billion.

By using disaggregated trade data for more than two decades – from 1995 to 2017 – we first show how underreporting is a heterogeneous phenomenon, that is, different clusters of commodities (from two to six digits according to the Harmonized System (HS) for international classification) are targeted differently by smugglers. For clusters of commodities we provide quantitative evidence of the scale of underreporting and the resulting tax evasion.

Second, with a specific focus on the pre- and post-EAC Customs Union, we assess and find strong evidence that since 2005 the EAC arrangement has been associated with increasing trade misinvoicing in Tanzania. The regional customs union tariff regimes have opened up further opportunities for rent-seeking.

Third, we test and find significant econometric evidence that trade underreporting is more prevalent with increases in import tariffs. We exploit three years of variations in the EAC Customs Union Tariff Schedules to show that the quantum of underreporting reacts to changes in the import tariff for each product and that this relationship becomes stronger in specific circumstances. These relate to the different types of trading-country partners, the size of imported commodities for each country-commodity transaction and the type of commodities – i.e. if it is a Sensitive Item (SI) for which special tariffs apply. We find that trading with China, Hong Kong, India, Indonesia, Kenya, South Africa and the United Arab Emirates constitutes almost all Tanzanian smuggling, and also that large shipments of around 5,000 goods constitute 80% of total smuggling a year and are the transactions that are particularly prone to trade misinvoicing.

Goods such as sugar listed under the SI scheme within the EAC Customs Protocol are among the most problematic commodities as they are extremely elastic to import tariff variations. Finally, we test if underreporting is affected by product mislabelling – that is, assigning the

wrong label to goods in order to exploit different tariff regimes between finished or unfinished goods – and the extent to which total trade misinvoicing increases under political elections. We do not find econometrically significant evidence of these two mechanisms, although the sign of the coefficients behaves as expected, that is, they show a positive relationship. Despite this, specific commodities like sugar show a cyclicity in underreporting associated with the elections, while others like edible oil might be affected by mislabelling.

Building on this new evidence for Tanzania, this paper sets out a ‘red-flag framework’ for policy-makers and development practitioners to capture differences in trade misinvoicing and, thus, for differentiating and targeting anti-corruption initiatives at the customs level. The framework can be used as a scoreboard to estimate the likelihood of trade misinvoicing – specifically in the form of underreporting – for specific categories of products, tariff schedules, sensitive items, size of imported commodities and trading partner. We highlight how ‘designing for differences’ and targeting is critical for effective anti-corruption strategies. Companion research (Andreoni et al., forthcoming a and b) has shown what types of bottom-up anti-corruption strategies will be necessary for two specific commodities – i.e. sugar and rice – to make the enforcement of the red-flag framework possible.

1. Introduction

Tariffs, duties, levies and other trade-related taxes constitute standard tools set by governments to manage the economic integration of their country with the outside world (Betz, 2018). In general, a rise in the tariff applied to imported goods simultaneously translates into increased barriers to international commodities (Javorcik and Narciso, 2008; Gawande et al., 2015). An attractive feature of tariffs is the possibility of ‘policy targeting’ – that is, applying different taxes to different commodities, to target distinct goods, to exclude some others from any tariff or to apply higher rates to other goods (mostly finished commodities).

Product-specific tariff rates are commonly used by governments to accommodate the competing demands arising from industrial policy objectives, thus, allocating rents to different interest groups in the economy (e.g. traders, producers, etc.) in the form of import licences, tariff protections or other special trade arrangements. This also occurs due to the need to respond to the quantity and quality of domestic demand, including price affordability of sensitive products and food security, as well as the need to meet macroeconomic conditions related to trade and payment balance, but also inflation.

Trade-related taxation is the main source of tax revenue across developing countries. Taxation patterns around the world reveal large cross-country differences. Among developed countries, taxation relies heavily on income tax; developing countries, in contrast, rely more heavily on trade taxes, as well as taxes on consumption (Prichard, 2016). In developing countries, trade-related taxes such as tariffs are at the centre of the political economy of taxation and business–government relationships. The setting up and enforcement of trade tariffs offer several opportunities for rents allocation and rent-seeking processes.

In 2015 Global Financial Integrity (GFI) estimated that outflows from developing countries due to trade misinvoicing alone accounted for US\$800 billion and that a few commodities were responsible for this massive outflow of resources, especially in Africa. In the most recent estimations of illicit financial flows from GFI, trade misinvoicing was calculated as responsible for two-thirds of the total of illicit flows, which for developing countries alone amounted to something between US\$600 billion and US\$900 billion (GFI, 2017).

Tariff evasion is a world-wide phenomenon (Drenski et al., 2019), and is particularly severe in those countries in which governments have difficulties in enforcing tariff rates, customs procedures and rules. In these cases, it is very likely for importing firms to engage in trade misinvoicing, which can be done in several ways. Mis(under) reporting happens when the home firm declares to be importing a lower amount of foreign goods than the amount declared by the exporting partner. Under- and overreporting occurs when the quantity of goods imported is underreported to avoid the tariff on that particular good but the quantity of a similar good facing a lower tariff is overreported (Betz, 2009; Cantens et al., 2013; Nitsch, 2017; Khan et al., 2019). As an example, a study showed how the multinational corporation Johnson & Johnson when exporting shower gel subject to a 20% tariff to Russia

declared it to be a soap substitute which was subject to a 15% tariff (Javorcik and Narciso, 2013). Along the same line, imports of chicken to Russian firms were misclassified and declared as turkey, which had a 10% lower tariff (Afontsev, 2012). In Tanzania in the recent past, there have been allegations of smuggling of sugar and mislabelling of other commodities like edible oil (refined or semi-refined) (Therkildsen and Bourgoin, 2012; Andreoni, 2017).

The evasion of tariffs poses multiple challenges to state-building and government policies, the main being a reduction in public revenues (Fjeldstad and Moore, 2008; Prichard, 2016; Khan et al., 2019). Other challenges manifest in the distortion of developmental policy objectives and the creation of rent-capture opportunities which might trigger unproductive rent-seeking behaviour. At the political level, trade misinvoicing frustrates a government's attempts to favour and/or protect domestic firms from foreign competition – their industrial policy (Andreoni and Chang, 2019). Domestic firms suffer negative spill-over effects too, as underreporting implies unfair competition from foreign companies. Targeted protection is of little use where it is not enforced, and selective liberalisation allows importers to take advantage of loopholes in the tariff schedule, eroding protection on other products.

Building on existing evidence, this paper presents new evidence on the magnitude of trade misinvoicing and tax evasion in Tanzania, as well as providing new econometric analyses that suggest an opportunity to differentiate and target anti-corruption strategies. There are five reasons why Tanzania is an extremely interesting case in the context of trade misinvoicing and tax evasion.

First, the extent of Tanzania's trade is relatively large compared to other countries in the same region. This reflects the fact that Tanzanian ports (in particular its main port located in Dar es Salaam) are used by neighbouring land-locked countries – i.e. Burundi, Rwanda and Uganda (and in some cases even the Democratic Republic of Congo (DRC), Zambia and Malawi) – as an entry point for their imports as well. Thus, several products destined to land-locked countries in the Southern-Eastern African region are imported into Tanzania and then re-exported. The other major port, in fact the largest in the region, is Mombasa in Kenya. This means that the problem of trade misinvoicing in Tanzania is made even more complicated by the rents opportunities offered by re-exporting and through trade agreements and trade in transit arrangements in the region.

Second, the existence of a Customs Union (CU) market – dating back to 2004 – ratified among Kenya, Tanzania and Uganda results in tariffs complexities as commodities traded among the CU countries face different – and lower – levels of taxation compared to goods arriving from third countries (Bünder, 2008). The East African Community (EAC) CU expanded over the years to include Rwanda and more recently South Sudan. Moreover, given the existence of special arrangements across the regions under the CU Protocol, several rents opportunities are available to traders.

Third, some of the countries in the EAC are also part of other trade agreements. Notably, Tanzania is part of the Southern African Development Community (SADC) Free Trade Area established in 2000 and operative since 2008 (the other major economy that is part of the

SADC is South Africa). Kenya, the first economy in the EAC, has also been part of the Common Market for Eastern and Southern Africa (COMESA) Free Trade Area since 2000, which includes 16 countries (Tanzania is not one of them). Again, the overlapping systems of rule on tariffs create high levels of complexity in tax administration – for example, in the assessment of rules of origin or the application of appropriate tariffs.

Fourth, Tanzania also represents an interesting case study in the context of underreporting of trade because over the years there have been several studies pointing to corruption practices within the country's internal tax administration (Ehrhart and Mwaipopo, 2003; Fjeldstad and Rakner, 2003). More recently, Transparency International highlighted the fact that a third of actors who had been in contact with the customs department had been given the impression that they needed to pay a bribe (Transparency International-Kenya, 2013).

Fifth, the developmental impact of trade misinvoicing and related tax evasion is of enormous scale in Tanzania. Historical evidence shows that due to an exceedingly complex tax structure and to the weakness of the tax administration in the enforcement of tariff schedules, the value of revenue loss from customs due to smuggling and underreporting amounted to 2.5 times the reported customs revenues in 1993–1994. Moreover, the level of tax exemptions in Tanzania are relatively high. In 2000, the Tanzania Revenue Authority (TRA) reported that tax exemptions were in the range of 2.3% of the tax–gross domestic product (GDP) ratio, which is equal to approximately 24% of total revenue collected. Between 2005 and 2008, tax exemptions averaged about 4% of GDP. In comparison, in Kenya and Uganda, exemptions amounted to 1% and 0.4% of GDP, respectively (CRC Sogema, 2013). More recently, it has been shown that tax exemptions remain central in connection to elections and hamper changes to effectively increase tax collection in Tanzania (Levin and Widell, 2014; Therkildsen and Bak, 2019).

Based on the results of our econometric analyses, and building on a set of new hypotheses on the drivers, processes and heterogeneity of trade misinvoicing in Tanzania, we point towards the development and potential of a red-flag system that could be deployed to target anti-corruption interventions in the country. We also calculate the magnitude of the tariff evasion when it comes to commodities being imported in Tanzania, discuss whether tariff evasion has been increasing in the country in the last 20 years and offer explanations to the phenomenon of underreporting.

The paper uses international trade data from the UNComtrade platform which collects data in a standardised format – the Harmonized System (HS) – to classify commodities into over 5,000 distinct categories using six-digit codes. The HS covers about 98% of global trade flows and is widely used by members of the World Trade Organization (WTO).

The paper is structured as follows. Section 2 discusses existing studies on underreporting and illustrates regularities and differences among countries. Section 3 offers readers an insight on the data used and presents descriptive statistics of the underreporting phenomenon in Tanzania. Section 4 sets out the econometric model used, while Section 5 discusses our main results. We provide concluding remarks in Section 6, where we also introduce a stylised red-flag framework for managing trade misinvoicing in Tanzania.

2. Literature review: theories, mechanisms and evidence

The nexus between taxes and tax burden has been long recognised; the direction of the correlation between a tax rate on the one side and the amount of income declared by tax payers on the other is still being discussed and empirically measured (Andreoni et al., 1998; Desai et al., 2007). In Allingham and Sandmo's (1972) seminal contribution, the authors claim that evasion is likely to increase with the marginal tax rate if the consumer is risk-neutral; they observe that allowing consumers to be risk-averse makes the nexus between tax rate and reported income more ambiguous.¹

As many developing and transition countries heavily rely on import tariffs as a source of revenue, tax evasion for what concerns imported goods has recently replaced the reported income at the centre of the tax evasion debate. Bhagwati (1964) looked at the discrepancies between Turkey's import data and the export data reported by its trade partners, suggesting that the underreporting may be explained by the undervaluation on top of misclassification of imports at the border, for the precise reason of reducing the tariff burden. Bhagwati opened up a black box that has interested several scholars since. Shortly after, Balassa (1971) pointed out that evasion of import duties through smuggling constituted a major issue in Mexico, Argentina and the Philippines. And a study by Pritchett and Sethi (1994) on Jamaica, Kenya and Pakistan provided further evidence, even though the relationship between tariff revenues and tariff rate was found to be weak.

Building on these seminal contributions, several attempts have been made to capture the scale of trade misinvoicing through country-level bilateral trade data – so-called 'mirror trade statistics' – alongside (and sometimes in combination with) 'residual measures' of capital flight based on Balance of Payments (BoP). These residual measures are calculated as the difference between recorded inflows and recorded uses of foreign exchange (Ndikumana and Boyce, 2010). Country-level mirror trade statistics are built around anomalies in bilateral trade, that is, the existence of gaps between the declared values of total exports from one country and imports from another. In some cases (e.g. Ndikumana and Boyce, 2010; Spanjers and Salomon, 2017), this mirroring of bilateral import and export activities is adjusted so that when a gap exists between a developed and a developing country, we assume there is an illicit financial flow and that the developing country would misinvoice at the same rate with other developing countries (so called 'bilateral advanced economy calculation'). For those developing countries for which bilateral data are not

¹ More recent studies have challenged the maximisation framework used by the Allingham–Sandmo model. This has led to an extension of the model which now incorporates the choice between labour and leisure representing respectively the hours spent on a regular job and the hours spent on informal market activities (Sandmo, 2004).

available, world trade benchmarks are constructed building on country-level data (for a methodological review see Khan et al., 2019).

In the tariff tax department, other contributions have assessed the extent to which trade misinvoicing – thus, trade evasion – is explained by tariff rates. Overall, studies have found econometric evidence of a positive correlation across several countries. For example, Fisman and Wei (2004) found that import tariff evasion rises with the tariff rate. By looking at the value of trade reported by Hong Kong (the importing country) and by China (the exporter) the authors show how elastic the underreporting behaviour can be, as 1% increase in the rate of the tariff translates into an increase in underreporting of 3%. They conclude that tax evasion happens via underreporting practices as well as by mislabelling higher-taxed goods into lower tariff categories.

There are a few classical studies focusing on tax evasion in customs duties across African countries. Tsikata (1999) finds large discrepancies for Tanzania between revenues as implied by the published tariff and estimated import volumes versus the actual receipts. A study by Mpango (1996) focused on measuring the magnitude of deliberate under-invoicing of imports in Tanzania. The magnitude of deliberate aggregate under-invoicing of imports was found to be approximately 20%, induced by high scheduled tariff rates, vigorous exchange rate adjustment, low salaries and minimal incentives offered to the customs staff and opportunities for evasion. The issue of tax evasion as a factor that contributes to poor tax performance is also discussed in Mwinyimvua (1996), who cites avenues for the evasion of import duties and sales and excise taxes that include under-invoicing, smuggling, the use of tax exemptions, complex tax schedules, excessive documentation and corruption.

Over the last two decades, several new studies across developing countries have emerged that have generated new evidence on trade misinvoicing and other tax departments (see also Fjeldstad and Moore, 2008 for a review). For example, Dunem and Arndt (2009) used an approach similar to the one used by Fisman and Wei (2004). Building on a case study on Mozambique, they conclude that tax evasion behaves in an elastic way, displaying an elasticity of 1.4%. Bouët and Roy (2009), in a comparative study of Kenya, Nigeria and Mauritius, find a significant effect from tariff rates on evasion. The point elasticity for Kenya was measured to be approximately 1.4. (Cantens et al., 2013) provide an in-depth qualitative analysis of trade misinvoicing for Cameroon. The same World Bank team expanded the analysis to Tunisia (Ayadi et al., 2013) and Madagascar (Chalendar et al. 2016). Other studies have focused on corporate tax evasion (Crivelli et al., 2015) and the impact of tax havens and other illicit financial flows on tax losses across African countries (Fjeldstad et al., 2017).

In Tanzania, since the establishment of the TRA² in 1995 and the Tanzania Ports Authority (TPA)³ in 2004, several reforms have attempted to simplify the tax regime, both in terms of

² The TRA was established by Act of Parliament No. 11 of 1995, and it started its operations on 1 July 1996.

rate structure and number of tariff bands, while retaining significant numbers of tax exemptions. Early studies by the Confederation of Tanzania Industries (CTI) showed that the value of lost revenues from customs tax due to misclassification and underreporting of imported goods exceeded 250 billion Tanzania shillings (Tshs.) for the period between March 1993 and March 1994 (Nehemiah et al., 1999). In 2000, the TRA reported that tax exemptions were in the range of 2.3% of the tax-GDP ratio, which is equal to approximately 24% of total revenue collected (CRC Sogema, 2013). Fjeldstad and Semboja (2001) found evidence that in the case of the local development levy in Tanzania, tax compliance was positively related to factors such as ability to pay, the perceived probability of being prosecuted, and the number of tax evaders known personally by the respondent. Oppressive tax enforcement, harassment of taxpayers, and discontent with public service delivery were found to increase tax resistance.

With a focus on the customs tariff tax department, Levin and Widell (2014) measured the effect of tax rates on tax evasion in trade between Kenya and Tanzania. They find evidence of underreporting practices in Tanzania, with this phenomenon increasing in prevalence over time. Their study builds on Tsikata (1999), who finds large underreporting in Tanzania, mainly due to (legal) exemptions, corruption/smuggling across official entry points (ports and roads) and smuggling across unofficial entry points (unguarded borders). Similar explanations are also discussed by Mpango (1996), who focused mainly on the low salaries and minimal incentives for customs officials as drivers of tax evasion. More recently, Andreoni et al. (forthcoming a) have looked at the ways in which smuggling is connected to the 'political economy of scarcity' in Tanzania, and identify several channels and processes involved in smuggling of sugar in Tanzania and the broader EAC.

While this paper's objective is not to explicitly assess the effectiveness of the TRA and TPA and the impact of customs reform in Tanzania, there is ample evidence suggesting that countries like Tanzania have higher chances of experiencing severe trade misinvoicing practices, especially underreporting.⁴ Indeed, given Tanzania's development stage – both from an industrial and institutional perspective – trade misinvoicing, smuggling and corruption-related activities are widespread practices as they represent key channels for rents allocation at the intersection between state and businesses (public–private corruption), as well as in the ongoing relationship between different businesses at national and international levels (private–private corruption).⁵

³ The TPA was established by the Ports Act No. 17 of 2004. The Act separated waterway operations between the Tanzanian mainland and Zanzibar. The Act incorporated the company into a Parastatal wholly owned by the Government of Tanzania and managed by a board of between five and eight members and a chairman who is appointed by the President. The organisation comes under the Ministry of Works, Transport and Communication and the Ministry has the power to assign board members.

⁴ Interestingly, Bouët and Roy (2012) highlight the fact that the estimated elasticity of evasion – how fast underreporting increases in a country when there is an increase in the tax – matched the ranking of Kenya, Nigeria and Mauritius in terms of institutional quality as measured by Transparency International's Corruption Perception Index.

⁵ See Andreoni (2017) for an historical analysis of the evolution of Tanzania's political settlements.

Trade misinvoicing includes several and sometimes counterintuitive practices whereby customs information is deliberately misreported or manipulated to achieve different objectives such as transfer pricing, bypassing import duties or export bans, smuggling, dumping, and so on. The misreporting or manipulation of the information can depend on the 'nature' of the good, the 'value' of the traded good, and the 'quantity' of the traded goods, as well as different permutations of these three dimensions (e.g. underreporting of both the value and the quantity of goods).

Trade misinvoicing can lead to both situations of over-invoicing and under-invoicing, depending on the objectives of the participants involved in the illicit financial flows (see Table 1). Over-invoicing is a way to take advantage of export subsidies or reducing the declared import of certain goods by over-invoicing others or transferring capital out of a country by importing goods of lower value than declared (or even of no value in some cases). Under-invoicing, on the other hand, allows traders to bypass export bans or quantity restrictions and to reduce the payment of customs duties on imports (Forstater, 2016; Nitsch, 2017).

Table 1: Typologies of misinvoicing

Sign of misreporting	Reason	Explanation
Value import Tanzania < Value export foreign country	Miscalculation Mislabelling Misinvoicing (underreporting commodities with higher tariff)	Corruption by customs authority Traders collusion Rents capture (avoiding import tariff) Tax evasion
Value import Tanzania > Value export foreign country	Misinvoicing (overreporting commodities with lower tariff)	Capital flight Tax evasion Rents capture (export incentive) Other illicit financial flows (including bribes, criminal transfers)
Value import Tanzania is missing while value export foreign country is NOT missing	Pure smuggling Miscalculation/reporting	
Value import Tanzania is NOT missing while value export foreign country is missing	Misinvoicing	

Source: Authors' elaboration.

Finally, trade misinvoicing can happen at different stages of the trading chain – e.g. country of origin or country of destination – and result from individual as well as collusive practices between traders (importers and exporters) or corrupt practices involving traders and one or more customs authorities. In cases of re-exporting and trade transit, the players involved in trade misinvoicing can be located in several countries.

Traditional approaches to fight trade misinvoicing have often focused their attention on the customs authority level. The idea is that underreporting is a particularly severe phenomenon in those countries in which customs officials are given discretion to operate and where audits or secondary inspections are less likely to happen. Underreporting can be driven by two factors: the inability of customs agents to inspect all imports, and the potential for corruption in the interaction between importers and customs agents.

We focus on the first to start with. To detect misreporting, customs agents need to identify the correct tariff category of imports, which requires inspections and knowledge of the customs code of the imported good. As an example, there is difference in terms of customs tax to be paid between ‘shoes with outer soles and uppers of rubber and plastics’ and ‘sports footwear’ or ‘footwear’. The very same difficulty arises when customs agents need to detect whether a tie is made of silk or of polyester, similar products facing different tariff. These difficulties are more pronounced in countries with weaker recruitment and less professionalised training. The probability that misreporting is detected is therefore considered a function of bureaucratic capacity: the ability of governments to enforce policies through professional bureaucracies (Weber, 1922).

Evidence of governments trying to limit underreporting comes from the United States, where a subcommittee hearing of the US Congress in 2009 discussed the problem of tariff evasion in the country, which was particularly severe in textile imports at that time (Betz, 2018). On the other hand, in South Africa, a report prepared for the Department of Trade and Industry highlighted how firms were frustrated with the ineptitude of the government to deal with all the inefficiencies at the borders, which had consequences for local industries and local jobs (FRIDGE Research, 2010). Where states lack the capacity to detect misreporting, because customs agents lack the ability to enforce differentiated tariff rates, importing firms can evade tariffs.

While all these institutional and government capability factors matter in understanding trade misinvoicing, there are more fundamental factors determined by the structure and political economy of developing countries which lead to corruption practices in customs authorities. Countries at early stages of industrialisation are ‘structurally vulnerable’ to trade misinvoicing and all the related corruption processes discussed above. This is due to the fact that the underdevelopment of the manufacturing sector, both in terms of scale and price competitiveness, creates strong incentives for trade misreporting and smuggling. Traders can make significant margins – i.e. rents capture – out of imported commodities if they can bypass import tariff barriers erected to protect nascent and infant industries. Traders – or better importers – have a strong incentive in allocating part of the rents gained with trade misinvoicing to corrupt the authorities involved in designing trade schedules (‘corruption by design’ – in the process of setting up high-tariff protection) and in implementing and enforcing import duties.

We realise why trade misinvoicing is so widespread in countries like Tanzania if we combine the ‘capability arguments’ above – according to which customs officers are not well trained and are not equipped with the necessary tools to perform their complex tasks – with the fact that officers in customs authorities are not always well paid and can be under significant pressure to allow rent capture to happen. These structural factors are also intertwined with another context-specific political economy process. In some cases, large margins arising from trade misinvoicing are also recycled into policy money through patron–client networks. In countries like Tanzania, the revenue and port authorities are contested by political parties and ruling coalitions as they are all interested in capturing the multi-billion rents that these authorities manage for the government. This is why these authorities become contested

political domains and are difficult to reform with simple capability enforcement training and vertical anti-corruption enforcement.

This being said, there might be areas in which a coalition of interests emerge where there is willingness to address and eradicate smuggling of specific commodities. This can happen when a coalition of domestic producers manage to push for government enforcement of tariff schedules (see Andreoni et al., forthcoming a, for a study of the sugar trade in Tanzania). In these specific cases – that is, when powerful groups manage to align their interests towards controlling smuggling – the enforcement of the tariffs and customs rules might be facilitated by the use of red-flag systems which allow to target-checking operations and other anti-corruption processes. Thus, targeted evidence for specific commodities and related assessment of tax evasion become useful to implement change.

3. Data and empirical models

3.1. The Harmonized System for trade data and challenges through misreporting

Customs in each country follow a specific classification put in place to track traded commodities for purposes related to tariff and taxes imposition. Most countries still report their trade statistics to the World Customs Organization (WCO) which, in turn, organises the received trade data into a comparable trade classification system. The system is commonly known as the Harmonized Commodity Description and Coding System, known as the Harmonized System (HS). The HS was adopted in 1983 and statistics became available a few years after, in 1988. The HS is revised every five to seven years; in its latest revision in 2012, the system could display disaggregated data for nearly 5,000 group commodities, which cover almost 16,000 single commodities. Each group of commodities is numbered by a six-digit code; by 2013, the HS had been adopted by over 200 countries and covered more than 98% of international merchandise. The HS is used as an evidence base for various purposes, including for the definition of internal taxes, trade policies, monitoring of controlled goods, statistics on transport, price monitoring, quota controls, compilation of national accounts, and economic research and analysis.

This paper uses trade data, organised according to the HS, available from the COMTRADE website.⁶ The time period under consideration ranges from 1995 to 2017; in those 22 years, Tanzania has imported slightly more than 308,000 goods. Import for Tanzania has increased over time, in terms of both value and the variety of goods imported. The total value of imported goods in 2017 was five times higher than that in 1995, whereas the number of different commodities being imported – using the six-digit definition – rose from slightly more than 5,800 in 1995 to 18,000 in 2017.

Data on trade present methodological difficulties which mean that comparisons between traded goods can be challenging (for a discussion of specific methodological issues see Cantens et al., 2013; Khan et al., 2019). Thanks to the HS put in place by the WCO, differences in the way of reporting imports/exports between statistical agencies of importing and exporting countries have been reduced to a minimum. However, there are factors which can create a gap in the way trade is recorded by different countries. First, the existence of different shipping costs may represent a bias for the analysis. Second, the incorrect identification of a destination country may represent a problem too. When this issue arises, the exporting country declares as a destination the one of the last shipment instead of the final importing country; if the importing country classifies correctly its imports by country of origin, this results in a discrepancy between records. This happens when, for

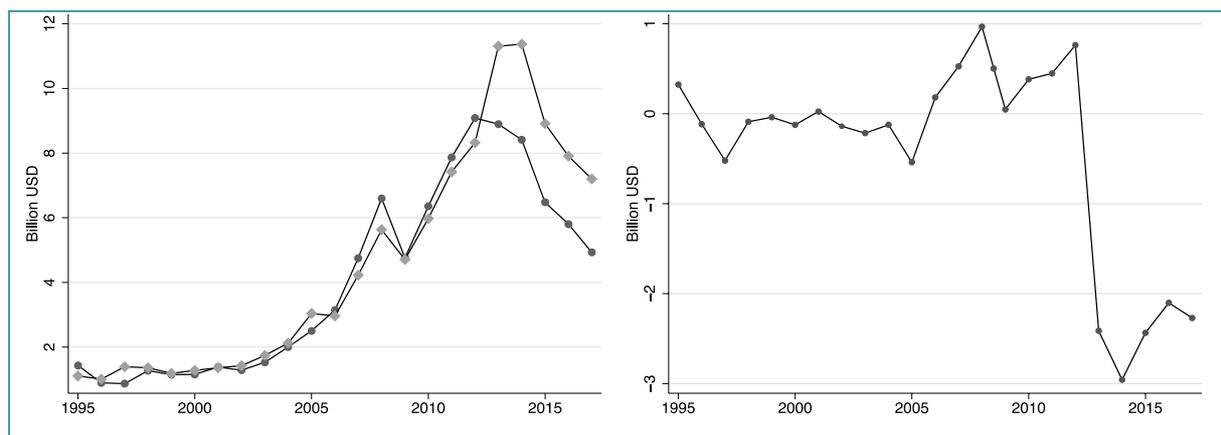
⁶ <https://comtrade.un.org/data> lastly accessed the 18/10/2019.

example, South Africa exports to the DRC via Tanzania; this transaction may be recorded as an export to Tanzania by the South African statistics, and as a re-export by Tanzania, leading to potential smuggling in the Tanzanian records. Third, the timing of the import/export may represent an issue, as it is reasonable to expect a difference between the departure of the shipment and its arrival; in extreme cases, the export may be recorded in the previous calendar year while the import may appear in the accounts for the next year. Exchange rates may also play a role in assessing the value of traded goods, and can explain differences in values (Betz, 2018).

At the crux of all the possible biases mentioned above, lies a consistent difference between what an importing country declares to import and what the exporting countries record; this difference manifests in both the value and in the quantity of goods imported. The size of this difference – indicated as trade misinvoicing (or smuggling) in what follows – is represented for Tanzania in Figure 1.

The chart on the left illustrates the trend in imports (exports) as reported by Tanzania (exporting countries); the difference (in US\$ billion purchasing power parity (PPP) for 2010) is illustrated on the right. Negative values relate to situations of underreporting, that is, cases in which Tanzania has declared lower values of imports compared to what the exporting countries have declared. The opposite case is when the values are positive, which is when Tanzania has declared more – i.e. has overreported import values compared to exporters. The trend in trade misinvoicing seems to remain constant and slightly on the negative side until 2005, with two peaks in underreporting in 1997 and 2005. Between 2006 and 2008 and between 2009 and 2012, we find a large degree of overreporting, peaking at US\$1 billion in 2008. Trade misinvoicing then turns back to negative values in 2013 with a dramatic dip in 2014 that indicates underreporting of about US\$3 billion. Between 2013 and 2017, the cumulative sum for underreporting is above US\$10 billion.

Figure 1: Value of imports recorded by Tanzania (black line) and by exporting countries (grey) (L), versus value of total trade misinvoicing (US\$ billion PPP for 2010) (R)



Source: Authors' elaboration using Comtrade data.

Figure 1 presents an aggregate picture of the scale of trade misinvoicing in Tanzania and, specifically, provides evidence of a significant and increasing level of underreporting. This phenomenon is extremely heterogenous, however, as we discover by disaggregating the

trade mirror data and looking for concentrations of underreporting across different clusters of commodities. Table 2 provides evidence of the degree of tax evasion related to underreporting for different groups of commodities (see Appendix Table A1 for the magnitude of under-/overreporting).

Table 2: Revenue losses for Tanzania due to smuggling in trade (US\$ million, PPP 2010)

Category/Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Vegetable products	19.6	4.2	-3.7	50.4	61.3	-52.2	-15.7	-17.2	-2.7	0.0	-61.8
Fats & oils	12.7	1.3	-12.0	-20.1	-22.8	-16.4	-33.3	-2.5	-13.2	-25.2	-42.2
Prepared foodstuffs, beverages, spirits and tobacco	-23.9	-16.2	-2.1	-38.4	-34.1	-25.0	1.0	-44.2	-46.7	-26.6	7.7
Mineral products	4.7	5.0	3.4	4.3	6.3	2.3	3.6	5.3	-0.8	1.6	-1.2
Products of chemical and allied industry	-11.0	-12.8	-13.6	-14.3	-12.0	-14.8	-23.1	-19.5	-17.6	-13.6	-11.9
Plastics and rubber	-54.1	-1.6	-1.0	-1.5	-18.3	-34.5	-26.7	-37.6	-39.2	-32.5	-24.3
Skin, leather and articles thereof	-3.2	-3.2	-2.3	-4.4	-5.7	-6.5	-7.9	-15.5	-23.0	-13.3	-12.5
Wood & articles of wood materials	-1.2	-0.6	-0.2	-0.2	-1.2	-1.3	-1.7	-2.3	-1.8	-1.6	-1.5
Pulp of food, paper and paperboard	-4.0	-1.9	-3.0	-2.3	-1.0	-9.9	-9.9	-11.3	-17.7	-20.2	-12.4
Textiles and textile articles	-51.6	-85.0	-67.5	-91.4	-104.0	-86.1	-128.0	-197.0	-209.0	-187.0	-165.0
Footwear, headgear, umbrellas	-8.6	-10.4	-10.0	-18.3	-22.3	-27.4	-30.1	-51.8	-62.7	-46.6	-44.1
Articles of stone, cement, glass	-6.6	-5.5	-3.7	-5.4	-6.2	-5.0	-15.1	-26.7	-30.3	-20.3	-23.6
Pearls, precious stones	-1.6	-1.1	-0.7	-0.9	-0.2	-0.4	-1.1	-2.0	-1.2	-1.0	-1.6
Base metals and articles of base metal	-11.4	1.5	-7.9	-16.5	-1.9	-21.3	15.2	-31.5	-61.4	-42.9	-45.4
Machinery and mechanical appliances, electrical equipment	-3.9	0.2	-10.0	-11.9	-2.3	-32.3	-29.8	-52.1	-37.7	-45.2	-41.6
Vehicles, aircraft, vessels	-6.9	40.3	46.8	56.0	55.0	38.0	9.0	37.3	-3.5	16.0	-0.5
Optical, photographic instruments	-0.6	-0.6	-0.3	-0.8	-0.6	-0.9	-1.8	-0.4	-1.1	-2.0	-0.9
Arms and ammunition	0.0	0.0	-0.1	-0.1	-0.2	-0.3	-0.1	0.0	n/a	0.0	-0.2
Miscellaneous manufacturing articles	-4.5	-6.0	-1.9	-6.7	-4.0	-11.9	-20.9	-39.3	n/a	-33.9	-31.6
Works of art & antiques	-0.1	-0.1	0.0	-0.1	0.0	0.0	n/a	0.0	n/a	0.0	0.0
Total	-156	-92	-89	-122	-114	-305	-316	-508	-569	-494	-514

Notes: Classification of the commodities is taken from Levine and Widell (2014).

Sources: Authors' elaboration from Comtrade data and EAC Common External Tariff, 2007, 2012 and 2017.

Negative values in Table 2 indicate a tax loss for the Tanzanian government – as a consequence of the underreporting of imports. The overall trend indicates that the size of the foregone tax has steadily increased over time to US\$514 million (PPP 2010), as the latest figure shows. All categories but that of 'Prepared foodstuff, beverages, spirits and tobacco' display a negative value.

The contributions of the different commodity categories in terms of foregone tax are not the same nor are they stable over time. There are a few regularities though; the contribution of 'Textile and textile article' in terms of foregone tax is considerable and has increased over time – from a loss of US\$52 million in 2007 to US\$165 million in 2017. In 2017, the commodities within the textile categories that contributed the most to foregone tax were 'Plain weave cotton', 'Woven fabric > 85% textured polyester', 'Mens, boys jackets & blazers, material nes' and 'Women, girls ensembles, of material nes'. Other categories of commodities that consistently contributed to tax losses in 2017 include 'vegetable products', 'base metals and articles of base metals' and 'footwear', which account for a total loss of approximately US\$140 million.

3.2. Our hypotheses

Against this background, we test particular hypotheses around factors and processes driving trade misinvoicing, with a focus on underreporting (and thus tax evasion) across different groups of products.

First, we test if Tanzania joining the EAC CU in 2005 has had a positive or negative impact on trade misinvoicing in the form of underreporting. Through participation in the EAC Customs Protocol, all EAC members agreed on a common tariff schedule (first published in 2007, and subsequently updated every five years, in 2012 and 2017). While on paper the Customs Protocol establishes a common customs territory, countries have retained until today large margins for divergence. This variance is officially recognised in the Custom Protocol where a list of 'Sensitive Items' (SI) with differentiated tariff schedules is granted. On top of this, EAC countries can regularly ask for exemptions to respond to specific challenges such as a food scarcity alarm, or the need to grant access to key inputs for domestic producers (e.g. the import licensing scheme for industrial sugar). These exceptions are reported in the EAC Gazette, however there is evidence that countries have diverged from the official process and have gained extra exceptions (for a discussion, see Andreoni et al., forthcoming a). By testing if trade misinvoicing has increased or decreased with the introduction of the EAC Customs Protocol, we check for medium- and long-term changes in opportunities for rents and rent-seeking.

Second, we look at whether the degree of smuggling – i.e. the value of underreporting – reacts to changes in the import tariff for each product as listed in the tariff schedule under the EAC Customs Protocol. We exploit variations in tariff schedules from 2007 for every five years, moving across three major tariff bands – 0%, 10% and 25%. We expect that an increase in a tariff for a given product will correspond to an increase in the rent that the government is allocating for that specific product. This means that the higher the tariffs, the higher the rents and thus the smuggling.

We extend the analysis under this second hypothesis to explore three further factors. We look at how the relationship between import tariff and quantum of smuggling – the value of underreporting – changes under three specific circumstances according to: (i) the type of trading partner (country) (Table 3); (ii) the size of imported commodities (Table 3); and (iii) if (or not) the commodity is listed among the CU SI. We also interpolate some of these variables to test for the existence of further channels and cumulative effects.

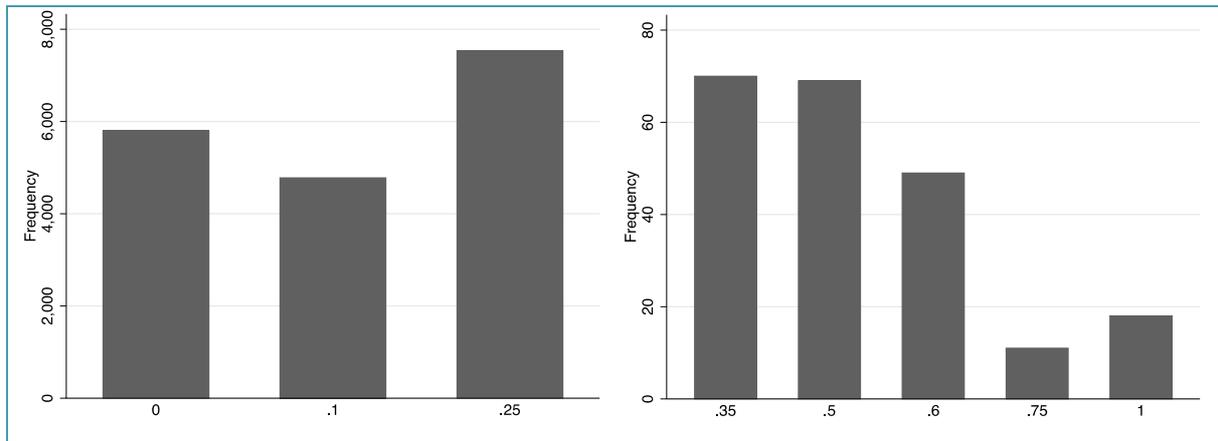
Table 3: Major exporting countries to Tanzania, and share and value of their exports

Country	Share of Tanzanian imports coming from the country (%)	Value of the import for the 2007–2017 period (US\$ m., PPP 2010)
India	15.82	13,282
China	14.35	14,641
South Africa	9.97	9,229
United Arab Emirates	6.63	6,140
Kenya	3.05	2,825
Hong-Kong	2.75	2,544
Indonesia	2.14	1,978

Source: Authors' elaboration from Comtrade data.

Under Article 12 of the EAC CU Protocol, member countries established a three-band common import tariff, agreeing that all products imported into the Community will receive an import tariff of 0%, 10% or 25%. Import tariff rates higher than 25% are applied to selected items – such as sugar, maize, cement, rice, cotton fabrics, milk and dairy products – in an attempt to protect domestic production from foreign commodities (Aloo, 2017).

SI commodities face a different import tariff tax, mostly higher than for the non-SI commodities. The percentage of the import tariff for commodities is highlighted in Figure 2 for the last year available (2017). The figure on the right refers to SI commodities – for which taxation is higher – while the figure on the left relates to all other commodities, for which the import tariff does not exceed 25%. Import duties for SI commodities can range from 35% to 100%. The majority of them are under the 35%, 50% and 60% tariff bans. Around 30 commodities attract an import tariff protection between 75% and 100%. Among these SI listed products, we test the relationship between import tariff and quantum of smuggling for one specific product – sugar.

Figure 2: Import tariff on imported commodities (L) and on Special Items (SI) commodities (R), 2017

Source: Authors' elaboration from EAC, Common External Tariff, 2017.

The existing literature suggests that other factors and processes might matter too for the prevalence of misreporting of trade data in Tanzania. For example, political elections may play a role in determining the occurrence and scale of smuggling – especially for specific SI-listed commodities, for which even with limited quantities the unit-rent margins are extremely high.

Finally, we test a third hypothesis in terms of whether import smuggling is due to invoice mislabelling, by which a higher-taxed product is imported as a lower-taxed commodity type. This hypothesis is also found in the literature, including in discussions on smuggling in Tanzania for commodities such as refined and semi-refined edible oil (Andreoni et al., forthcoming a) on sugar b) on rice 2020).

While this paper greatly benefits from the modelling approach in Levin and Widell (2014), the analysis presented here is substantially different as it covers a longer period – 10 years instead of a 1-year snapshot – and looks at additional pathways of smuggling.

3.3. Econometric analysis

Let's indicate with M_v the value of a Tanzanian import and with X_v the value of foreign countries' exports to Tanzania. The measure of smuggling is then equal to the ratio between the export value and the import value (X_v/M_v). In cases in which there is no smuggling, the two quantities will be the same and their ratio equal to zero; smuggling manifests when the ratio is higher than one. In the econometric analysis that follows, the logarithm of these two quantities is used (Table 4).

Table 4: Summary statistics

Variable	Mean	Standard deviation	N
2007–2011			
Log(Xq)	9.72	2.60	79,843
Log(Mq)	9.36	2.73	79,843
Log(Xq/Mq)	0.36	2.31	79,843
Abs. value of Value import – Value export	394,290	790,694	79,843
Import tariff	0.19	0.08	79,843
Import tariff for SI goods	0.47	0.13	935
Average import tariff	0.34	0.18	79,843
2012–2016			
Log(Xq)	9.58	2.84	94,017
Log(Mq)	9.31	2.85	94,017
Log(Xq/Mq)	0.26	2.42	94,017
Abs. value of Value import – Value export	417,990	856,367	94,017
Import tariff	0.20	0.09	65,147
Import tariff for SI goods	0.47	0.14	1,137
Average import tariff	0.34	0.14	94,017
2017			
Log(Xq)	9.38	2.85	18,381
Log(Mq)	9.08	2.84	18,381
Log(Xq/Mq)	0.30	2.27	18,381
Abs. value of Value import – Value export	273,114	268,286	18,381
Import tariff	0.20	0.09	12,525
Import tariff for SI goods	0.49	0.14	217
Average import tariff	0.34	0.18	18,381

Note: The division of the overall period of analysis 2007–2017 into three sub-periods reflects the fact that revisions of the common external tariff were made in 2007, 2012 and 2017. The variable ‘Abs. value of |Value import – Value export|’ is indicated US\$, 2010 PPP.

Source: Authors’ elaboration from Comtrade data.

Model (1) looks at whether the practice of misreporting – either in the form of under- or overreporting – has increased since Tanzania became a member of the EAC in 2005. This is measured in terms of the effect that being part of a tariff agreement has had on the magnitude of misreporting, in terms of the absolute value of the difference between the value of the import (export) recorded by Tanzania (exporting country). The dependent variable, as specified in Model 1, only assumes positive values by construction.

$$(1) \text{ Abs. value |Value import – Value export|}_i = b_0 + b_1 (\text{EAC membership})_i + e_i$$

where the dummy variable ‘EAC membership’ takes the value 1 if Tanzania is part of the EAC (after 2005) or 0 otherwise; b_0 is a constant, e_i is a composite error term that is assumed to be independent and identically distributed and normal, with a mean of zero and a constant variance. The sub-index i denotes the six-digit commodity code.

Model (2) incorporates the effect that the import tariff has on smuggling and is used to test all the other channels previously described.

$$(2) \text{Log} (X_v/M_v)_i = b_0 + b_1 (\text{import tariff})_i + e_i$$

where the variable *import tariff* denotes the commodity-specific import tax. If smuggling is driven by the tax rate, then the coefficient β_1 will be higher than zero. As Levin and Widell (2014) suggest, the implicit assumption here is that import taxes are exogenous in equation (2); it is very likely that high values of smuggling for a single commodity or for a category of commodities will induce the government to reduce the import tax. This has previously happened in Tanzania where several nuisance taxes were recently abolished (Levin, 2005).

It is possible that the smuggling phenomenon takes the form of mislabelled imports, which occurs when a country declares to import a commodity that has a lower import tariff instead of declaring the real commodity that is being imported which has a higher import tariff (Fisman and Wei, 2004). Equation (3) measures the scale of mislabelling by introducing the 'average import tariff, which is defined as the 'average level of the import tax of *all other products* in a goods four-digit class, weighted by the export value' (Levin and Widell, 2014).

$$(3) \text{Log} (X_v/M_v)_i = b_0 + b_1 (\text{import tariff})_i + b_2 (\text{average import tariff})_i + e_i$$

If the variable 'average import tariff' takes a negative and significant value, then smuggling happens via the mislabeling channel, i.e. 'the lower the tax rate on product *i*' versus similar varieties, the greater the incentive for mislabelling the import of product *i*' (ibid.).

Models (1), (2) and (3) are tested using other control variables, commonly used in gravity model studies as determinants of trade. Five regressions are estimated for each of the models. Regression 2 uses the additional variable import tariff squared, regression 3 the distance and common language variables, regression 4 the common religion and contiguity variables, and regression 5 the population and GDP of the importing and exporting countries, the number of hours of difference in the time in the importing and exporting country, membership of the General Agreement on Tariffs and Trade (GATT) and a continent dummy.

The regression analysis uses trade data from 2007 to 2017; data on import tariffs is available from 2007, two years after Tanzania joined the EAC.

4. Results

In this section we present the results of our econometric analysis for the set of hypotheses presented in section 3. All the models for which regressions output are shown have five specifications – from regression 1 to 5 – which use different control variables (specified under each regression table). For brevity, this study only reports the coefficient and the standard error associated with the variable ‘Import tariff’.

Table 5 presents the econometric results for model (1).

Table 5: Ordinary Least Squares (OLS) results for the absolute size of misreporting pre- and post-EAC (model 1)

	Regression 1	Regression 2	Regression 3	Regression 4
EAC Custom Union	192,827***	192,827***	198,702***	183,277***
	21,766	21,766	24,000	42,431
Constant	15,899***	15,899***	16,163***	-13,074***
	1,786	1,786	3,692	1,221
N	305,701	305,701	26,513	265,135
R2	0.01	0.01	0.01	0.01

Notes: the dependent variable is the absolute size of misreporting and only assumes positive values by construction. Control variables used for the different models are a dummy year indicating years before the EAC (equal to 1 if year is before 2005 and equal to 0 if year is after or equal to 2005). (Regression 1), distance and common language; (Regression 2), common religion and contiguity; (Regression 3), population and GDP of the importing and exporting countries, number of hours of difference in the time of the importing and exporting country, GATT member and a continent dummy (Regression 4 in Table 5).

Source: Authors' elaboration from Comtrade data.

The results confirm that the introduction of the EAC Customs Protocol contributed dramatically to trade misinvoicing, and the results are significant. The coefficient of approximately US\$200,000 (2010 PPP) tells us the amount of trade misinvoicing for each country-commodity transaction. This means that the Customs Protocol has created further opportunity for smuggling, although these opportunities were also present before.

These results can be related to the fact that traders have the opportunity to exploit not only rents at the national level, but also the differential rents allocated by different countries in the EAC as part of the exceptions they can accord to their tariffs. If the rules of origin were enforceable, then this rent would be difficult to be captured. But this is not the case. As a result, something imported in Kenya (e.g. rice) with a lower tariff protection could enter Tanzania where the same commodity is protected by a higher tariff without any real check. The trader can indeed import the commodity through the Kenya channel and then exploit the porous borders and send the commodity to Tanzania. Tanzania's borders are particularly porous both in the mainland (and lake regions) with several countries, and between the mainland and Zanzibar. Traditionally, the latter has been a significant channel for smuggling, given the unique regime of exemptions the small island has been guaranteed (Andreoni et al., forthcoming a) on sugar b) on rice, 2020).

The results in Table 5 are corroborated by the descriptive statistics reported in Table 6; the absolute value of total trade misreporting has increased with time, and was particularly rapid after the introduction of the EAC Custom Protocol in 2005. At a less aggregated level, the values of the misreporting for each of the country-commodity transactions have increased as well – the values in the fourth column are listed as mean misreporting. The average misreporting for the period before year 2006 amounts to US\$155,000 and to US\$340,000 from 2006 to 2017, with a difference of approximately US\$195,000, as the coefficients associated with the control variable ‘EAC Custom Union’ in Table 5 indicate.

Table 6: OLS results for the scale of smuggling (model 1)

Year	Total misreporting (absolute value, in US\$ bn, PPP 2010)	Total under-/overreporting (US\$ bn, PPP 2010)	Mean misreporting for country-commodity transaction (absolute value, US\$, PPP 2010)	Number of country- commodity transactions
1995	1.49	0.24	190,007	5,138
1996	0.863	-0.12	156,989	5,497
1997	1.12	-0.52	181,950	6,133
1998	1.4	-0.09	198,065	7,046
1999	1.22	-0.04	173,502	7,053
2000	1.11	-0.12	119,334	9,270
2001	1.38	0.02	133,938	10,313
2002	1.25	-0.14	116,332	10,788
2003	1.51	-0.22	129,457	11,667
2004	1.94	-0.12	156,749	12,345
2005	2.6	-0.54	178,078	14,591
Introduction of the EAC Customs Protocol				
2006	2.77	0.18	203,664	13,612
2007	4.76	0.53	322,050	14,766
2008	5.72	0.97	349,033	16,396
2009	3.66	0.05	225,728	16,199
2010	4.88	0.38	298,952	16,311
2011	6.32	0.45	391,036	16,171
2012	9.3	0.76	508,737	18,285
2013	8.65	-2.41	427,427	20,243
2014	8.5	-2.96	457,007	18,602
2015	7.13	-2.44	393,159	18,147
2016	5.71	-2.10	304,567	18,740
2017	5.02	-2.27	273,114	18,381

Note: The variable ‘Total misreporting’ is the sum of the absolute value of all the misreported country-commodity transactions. The trend of the ‘Total under-/overreporting’ is the same as highlighted in the right-hand chart in Figure. The variable ‘Mean misreporting’ is the absolute value of all the misreported country-commodity transactions, whose number is expressed in the last column.

Source: Authors’ elaboration from Comtrade data.

Table 7 to Table 13 present the regression results for models (2) and (3), and include all the commodities that Tanzania has imported in the period between 2007 and 2017.

In relation to the impact of the import tariff on trade misinvoicing, Table 7 shows that the coefficient of b_1 is positive and significant and it ranges between 0.80 and 1.27. This means that if the import tariff increases by one percentage point, smuggling would increase as well by between 0.8% and 1.2%. The sign and the size of the coefficients are in line with what Levin and Widell (2014) previously found. In their study, the b_1 coefficient was measured to be equal to 2.6 but the number of observations only amounted to 767.

The positive and significant coefficients seem to be robust to the different model specifications; while the inclusion of other control variables reduces the size of the coefficients, the significance does not change. The robustness of each model is checked by performing regressions on sub-samples of the data which exclude the 5% and 1% highest and/or lowest values of the smuggling; the coefficients for b_1 do not change substantially and remain significant.⁷

Table 7: OLS results for the scale of smuggling (model 2)

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Import tariff	1.27***	.92***	.85***	.84***	.80***
	0.04	0.08	0.09	0.09	0.09
Constant	.09***	.11***	.12***	.10***	0.00
	0.01	0.01	0.01	0.01	0.02
N	188,674	188,674	149,663	149,663	149,569
R2	0.01	0.04	0.05	0.05	0.06

Notes: control variables used for the different models are import tariff (Regression 1); import tariff squared (Regression 2); distance and common language (Regression 3); common religion and contiguity (Regression 4); population and GDP of the importing and exporting countries, number of hours of difference in the time of the importing and exporting country, GATT member and a continent dummy (Regression 5).

Source: Authors' elaboration from Comtrade data.

Table 8 shows the coefficients associated with the import tariff variable when the sample is restricted to the import of goods coming from one of the following countries: China, Hong Kong, India, Indonesia, Kenya, South Africa and the United Arab Emirates (UAE). Exports from these countries account for between 50% and 80% of the total merchandise imported by Tanzania. A natural next step is to measure whether the size of the smuggling coming from these big exporters is more elastic to changes in the import duties. The coefficient b_1 – this time ranging between 1.36 and 1.58 – means that a 1% increase in the import tariff increases more than proportionally the size of trade misinvoicing. This result suggests that a sizeable share of the smuggling comes from these seven countries and that the gap between what Tanzania records as imports and what the foreign country records as exports has the potential to increase in size if the import tariff increases. Again, the b_1 coefficients are robust to the different model specifications – regressions 1 to 5 – and to the exclusions of outliers (the top 1% and 5% for highest and lowest smuggling).

⁷ Robustness results available from the authors upon request.

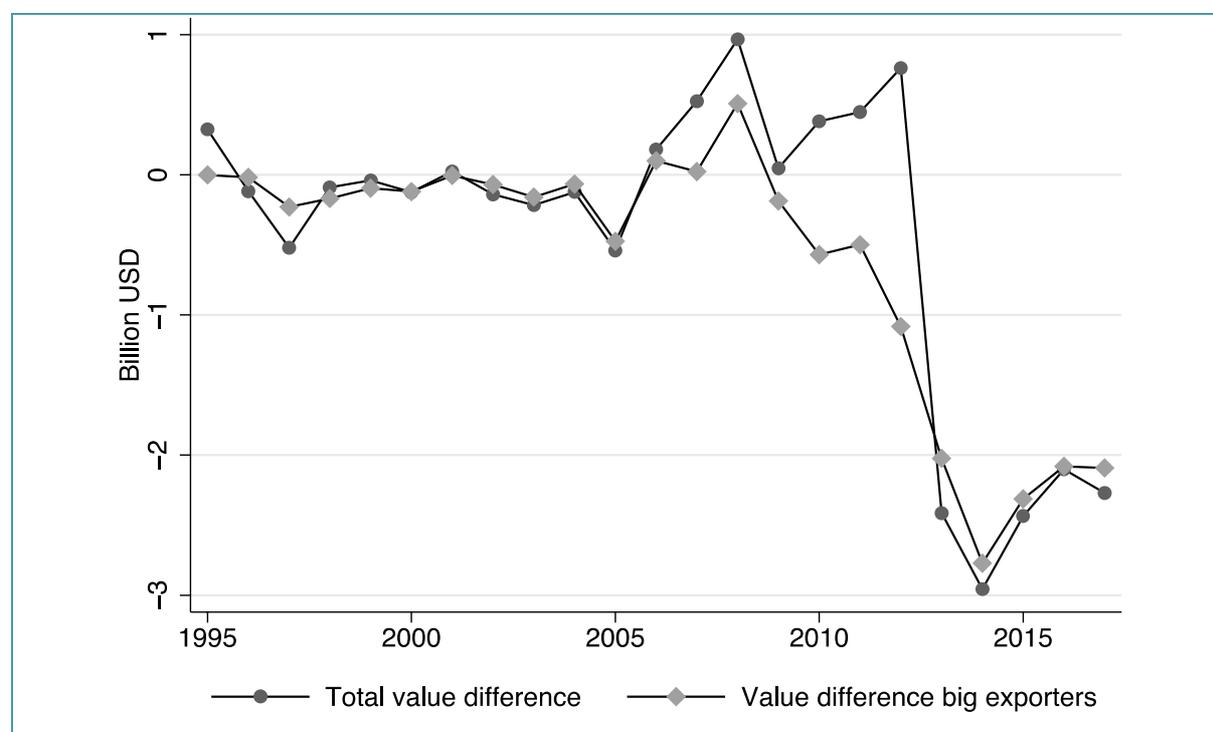
Table 8: OLS results for the size of smuggling with big traders (model 2)

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Import tariff	1.50***	1.58***	1.39***	1.36***	1.44***
	0.06	0.12	0.13	0.13	0.13
Constant	.11***	.10***	.17***	.09***	-.11***
	0.02	0.02	0.02	0.02	0.05
N	85,392	85,392	69,181	69,181	69,181
R2	0.01	0.01	0.01	0.02	0.02

Notes: Only trade from China, Hong Kong, India, Indonesia, Kenya, South Africa and UAE has been considered here. The control variables used in Regression 1 to 5 are the same as those used in Table 1.

Source: Authors' elaboration from Comtrade data.

Understanding the channels through which smuggling occurs is vital when defining policies to eradicate it. Figure 3 shows the considerable contribution that trade with these big importers makes to total smuggling values in Tanzania. The difference in recording imports and exports is positive (i.e. overreporting) between 2006 and 2008, while it is negative (i.e. underreporting) and has increased in prevalence overall in the remaining years. Very high levels of over- and underreporting are recorded from 2010 until 2017, when the total value of smuggling went from US\$1 billion (PPP 2010) to almost US\$3 billion. In the last five years of the analysis, smuggling from trading with these particular big traders constitutes almost the totality of underreporting during this period.

Figure 3: Trends in smuggling with big exporters (model 2)

Notes: The big exporters considered here are China, Hong Kong, India, Indonesia, Kenya, South Africa and UAE.

Source: Authors' elaboration from Comtrade data.

The focus of the analysis now turns to how smuggling rates change when only those goods which constitute 80% of the smuggled commodities are considered in the model. The import of these goods – about 5,000 a year on average and one quarter of the goods imported per year – should raise a flag to the Tanzanian customs as these constitute a large part of the smuggling phenomenon in the country. The coefficients associated with b_1 show that the smuggling is elastic to increases in the import tariff; a 1% increase in the tax would potentially increase smuggling by 1.28%– 1.55%.

Table 9: OLS results for the scale of smuggling of commodities that constitute 80% of total smuggling (model 2)

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Import tariff	1.55***	1.38***	1.34***	1.34***	1.28***
	0.07	0.13	0.16	0.16	0.16
Constant	1.82***	1.82***	1.59***	1.82***	1.02
	0.01	0.01	0.03	0.25	0.59
N	47,434	47,434	31,234	31,234	31,234
R2	0.01	0.01	0.02	0.02	0.03

Notes: The control variables used in Regression 1 to 5 are the same as those used in Table 1. Commodities have been ordered according to the size of the smuggling and only those that contribute to 80% of the smuggling have been included in the analysis.

Source: Authors' elaboration from Comtrade data.

The EAC CU Protocol introduced the removal of import tariffs for goods traded among EAC partners, the removal of non-tariff barriers for trade happening among EAC partners and the introduction of a list of sensitive goods (SI) that were provided with additional protection. Table 10 looks at how an increase in the import tariff for those goods in the SI category would increase smuggling; the underreporting of SI goods is very elastic to changes in the tariff, as a 1% increase would translate to an average increase in smuggling of 11%.

Table 10: OLS results for the scale of smuggling for SI goods

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Import tariff	10.12**	10.25***	12.45***	13.04***	11.37***
	4.37	2.45	3.12	3.11	3.18
Constant	0.33	-2.08	-2.84	-6.21	-10.41
	0.24	0.71	0.97	2.50	5.36
N	2,284	2,284	1,838	1,838	1,837
R2	0.01	0.02	0.03	0.03	0.06

Notes: Only trade using SI) goods has been considered here. The control variables used in Regression 1 to 5 are the same as those used in Table 1.

Source: Authors' elaboration from Comtrade data.

Table 11 takes into consideration only those SI goods that represent the highest 30% group of imported goods, while Table 12 takes into consideration only sugar-related commodities in the SI.

Table 11: OLS results for the scale of smuggling for SI goods that represent the highest 30% of imports (model 2)

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Import tariff	24.97***	23.99**	23.24***	21.64***	18.48***
	6.97	4.05	4.96	4.99	5.40
Constant	1.51***	-4.46	-3.94	-8.36	-1.57
	0.38	1.17	1.55	3.96	9.96
N	390	390	266	266	266
R2	0.03	0.10	0.09	0.11	0.15

Notes: The control variables used in Regression 1 to 5 are the same as those used in Table.

Source: Authors' elaboration from Comtrade data.

Table 12: OLS results for the scale of smuggling for sugar-related commodities (model 2)

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Import tariff	4.25	8.45**	7.05*	6.05	8.47*
	4.23	2.61	3.09	3.02	3.33
Constant	2.43***	0.76	1.15	2.39	6.85
	1.13	1.25	1.61	1.72	4.48
N	594	594	475	475	475
R2	0.01	0.02	0.02	0.03	0.04

Notes: Only trade involving sugar-related commodities has been considered here. The control variables used in Regression 1 to 5 are the same as those used in Table 1 with the inclusion of the world price for sugar.

Source: Authors' elaboration from Comtrade data.

Smuggling related to the import of the top SI products and sugar in particular is found to be particularly elastic to the size of the import tariff; Table 12 shows how increases in the import tariff will result in an increase in the smuggling of sugar by a value of between 4% and 8.5%. The same analysis for rice-related commodities is unviable as rice tariffs do not change over the period of analysis.

The OLS estimations for model (3) are presented in Table 13; in line with Levine and Widell (2014), smuggling in Tanzania does not seem to happen via the mislabelling channel. The coefficient associated with the 'average import tariff' variable – which is supposed to be negative and significant if the mislabelling channel is to be validated – is not consistent across the different models and is not significant either.

Table 13: OLS results for the scale of smuggling due to mislabelling of goods (model 3)

	Regression 1	Regression 2	Regression 3	Regression 4	Regression 5
Import tariff	0.84***	0.84***	0.90***	0.87***	0.87***
	0.14	0.14	0.16	0.15	0.15
Average import tariff	0.04	0.04	-0.03	-0.02	-0.04
	0.06	0.06	0.07	0.07	0.07
Constant	0.14***	0.14***	0.04*	0.77***	2.84***
	0.00	0.01	0.02	0.08	0.21
N	188674	188674	149663	149663	149569
R2	0.01	0.031	0.02	0.02	0.04

Notes: control variables used in Regression 1 to 5 are the same as those used in Table 1.

Source: Authors' elaboration from Comtrade data.

The influence that elections may have on the scale and sign of smuggling in Tanzania has been tested too; however the results are not robust. The magnitude of the smuggling does not depend in a significant way on whether or not an election has taken place in a particular year. The election pathway has been tested for all the commodities imported by Tanzania and for sugar- and rice-related commodities in particular without any robust relationship arising.

5. Discussion: towards a red-flag framework for smuggling

The structural link between trade misinvoicing, tax evasion and corruption is complex, as it involves multiple factors, processes and incentives at the interface of the trade activities chain and the political settlement in a country. Based on the new evidence on trade misinvoicing for Tanzania presented in this paper, we suggest that a ‘red-flag framework’ for policy-makers and development practitioners could capture differences in trade misinvoicing and, thus, enable targeting of anti-corruption initiatives at the customs level.

By better understanding the pathways through which trade misinvoicing happens in Tanzania, it could be possible to limit the occurrence of smuggling, a phenomenon which has increased over time, particularly since the country entered the EAC. The red-flag framework could be used as a scoreboard to estimate the likelihood of trade misinvoicing – specifically in the form of underreporting – for particular categories of products, tariff schedules, sensitive items, quantities of imported commodities and trading partner.

‘Designing for differences’ and targeting are critical for effective anti-corruption strategies. Companion research (Andreoni et al., forthcoming a) has shown for two specific commodities – sugar and rice – what types of bottom-up anti-corruption strategies will be necessary for enforcement of the red-flag framework to be possible.

Table 14 is a first sketch of the framework and highlights the different factors/channels studied in this paper, the expected impact and the areas that need to be targeted in anti-smuggling efforts. It identifies the greatest point of vulnerability in the current custom system in Tanzania as being that of the Sensitive Items (SI) regime. Since 2017, countries in the EAC have engaged in discussions about the opportunity to move towards a new EAC tariff schedule which excludes SI and introduces an extra ban to reduce incentives for mislabelling, especially between final and semi-refined products. However, there is no evidence that mislabelling is a significant smuggling channel. While this practice definitely occurs, it is not a significant explanatory factor for the quantum of underreporting found in Tanzania. This engagement from countries is in stark contrast to the resistance demonstrated with regards to the removal of SI lists, which provides additional evidence of the high rents associated with SI products.

However, even if EAC countries were able to come to an agreement around the elimination of the SI regime, our evidence suggests that there are other channels through which underreporting is working in Tanzania and the broader EAC region, especially when commodities come from specific countries and reach Tanzania in large bulk. Moreover, the possibility of governments bypassing customs agreements (without any enforceable threat of checks and sanctions from other countries) and establishing ad-hoc tariff barriers makes the system vulnerable to trade misinvoicing, tax evasion and corruption. Independently from SI, the higher the import tariff, the higher the rent and the incentive for trade misinvoicing.

Table 14: Red-flag framework: channels, impacts and areas for targeting as part of anti-smuggling efforts in Tanzania

Channel	Impact on smuggling	Target areas for monitoring and anti-corruption efforts
EAC membership	Being part of the EAC has a positive and significant effect on the absolute scale of misreporting, which increases by US\$190,000 (2010 PPP) for each country-commodity transaction	Membership of Customs Protocols such as that of the EAC creates further opportunities for smuggling, as traders can exploit rents at the national level as well as rents allocated by other countries in the union
SI commodities	An increase in the import tariff rate of 1% increases the rate of smuggling by 10–13% for SI goods	Smuggling is positively associated with SI commodities; smuggling of these commodities is very elastic to any increase in the import tariff
SI commodities and big imports	An increase in the import tariff rate of 1% increases the rate of smuggling by 18–25%	Smuggling is positively associated with SI commodities and the effect on smuggling increases as the value of commodities increases
Sugar-related goods (SI special case)	An increase in the import tariff rate of 1% increases the rate of smuggling by 4.2–8.5% for these products	There is a positive causal relationship between the smuggling of sugar-related commodities and the import tariff. The relationship is not always significant but positive and relatively large
Import tariff	An increase in the import tariff rate of 1% increases the rate of smuggling by 0.8–1.2%	Increases in the import tariff will increase the likelihood that importing companies will under-report trade
Big exporters	An increase in the import tariff rate of 1% increases the rate of smuggling by 1.4–1.6% for certain big exporters	Imports from China, Hong Kong, India, Indonesia, Kenya, South Africa and UEA are likely to attract a higher rate of smuggling
Big imports	An increase in the import tariff rate of 1% increases the rate of smuggling by 1.3–1.5% for larger quantities of traded goods	Big imports are associated with higher levels of smuggling. Evidence suggests that the higher the value of the import, the higher the likelihood of smuggling
Mislabelling	No sizeable and significant impact found	The likelihood of mislabelling occurring (is negligible and non-significant. This is not an area for targeting anti-corruption efforts
Elections	No sizeable and significant impact found. Analysis of the trend suggests a positive nexus between the election in 2005, 2010 and 2015 and the magnitude of smuggling during those years, but econometric analysis does not suggest any causal relationship	The occurrence of political elections does not have a significant and positive impact on smuggling. This is not an area for targeting anti-corruption efforts

Source: Authors' elaboration.

As discussed above, a red-flag framework and tool can enable the implementation and enforcement of effective anti-smuggling strategies at the customs level, provided that powerful groups in specific sectors of the economy manage to align their interests towards controlling smuggling. The framework can also help in the construction of these coalitions. For example, through such a system, powerful interest groups can easily access information and monitor trade misinvoicing trends, thus they can estimate the amount of commodities that have entered the country without attracting the correct import tariff and the associated tax evasion. In Tanzania, the CTI has lobbied the government in several national business council meetings, pointing to irregularities, unfair competition and smuggling. In some cases,

some scattered evidence has been used to signal to the government that the revenue loss is so large that there is a potential alignment of interests between some industrialists and the government.

Another area in which the framework and econometric models can be helpful relates to the EAC-level negotiations for which each country in the region has produced position papers. Having a tool that suggests the import tariff elasticity of trade misinvoicing enables countries to estimate the trade-offs over protection in specific areas. Tariffs can be a very useful industrial policy tool, but their value depends on the real beneficiaries of rents and whether they put these rents to productive use or not. In some cases, tariffs that are destined to protect certain groups might be captured along the production and trade chains by other groups who do not deserve protection. On the other hand, the removal of tariffs does not necessarily translate into cheaper domestic prices, as there are few traders capable of importing commodities in bulk, and it is these same few that control warehouses, logistics and commercial distribution, and that can apply high mark ups on imported goods.

To conclude, there is no single solution to trade misinvoicing and tax evasion. The impact of targeted strategies will depend on both technical capabilities in implementation and the support of powerful groups who have a stake in fighting such illicit financial flows. For anti-corruption efforts to succeed, these groups should converge around very specific commodities, which is why red-flag systems such as the one proposed here need to be designed at four to six digits in the Harmonized System – that is, at a high level of disaggregation to distinguish imports of different types of products, for example refined/industrial versus domestic sugar. At this level, the interests of powerful groups come to the fore and strategies can be better targeted and designed for differences.

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Appendix

Table A1: Differences in the value of imports as recorded by Tanzania and by exporters (US\$ million, PPP 2010)

Category/Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Vegetable products	45.3	26.8	30.6	149.0	186.0	-56.3	24.6	34.4	-4.8	17.5	-100.0
Fats & oils	72.1	14.0	-47.4	-82.6	-63.9	-45.0	-127.0	-16.3	-85.8	-69.3	-168.0
Prepared foodstuffs, beverages, spirits and tobacco	-43.9	-43.6	-36.4	-83.9	-74.4	-68.0	54.1	-94.6	-110.0	-120.0	84.6
Mineral products	1150.0	1320.0	220.0	737.0	912.0	1950.0	642.0	780.0	120.0	215.0	-175.0
Products of chemical and allied industry	-77.4	-99.5	-66.2	-77.8	-54.3	-166.0	-222.0	-169.0	-94.3	-136.0	-50.6
Plastics and rubber	-174.0	-10.7	-5.5	2.8	-64.8	-130.0	-119.0	-137.0	-131.0	-105.0	-114.0
Skin, leather and articles thereof	-12.6	-12.6	-9.3	-17.8	-22.9	-26.3	-31.5	-62.2	-92.2	-53.1	-49.8
Wood & articles of wood materials	-6.9	-3.1	-1.7	-2.7	-5.1	-4.2	-11.9	-25.5	-12.7	-3.8	-8.9
Pulp of food, paper and paperboard	-13.1	-45.4	-39.0	-18.9	-50.5	-72.2	-41.6	-43.8	-102.0	-97.8	-76.7
Textiles and textile articles	-171.0	-263.0	-216.0	-282.0	-318.0	-324.0	-419.0	-649.0	-708.0	-631.0	-563.0
Footwear, headgear, umbrellas	-34.9	-42.8	-40.5	-75.2	-90.3	-112.0	-122.0	-210.0	-255.0	-194.0	-178.0
Articles of stone, cement, glass	-21.2	-16.4	-5.8	-15.6	-19.2	-19.8	-64.9	-107.0	-123.0	-83.6	-97.3
Pearls, precious stones	-6.3	-4.3	-2.9	-3.6	-0.7	-1.6	-4.4	-8.0	-4.7	-4.2	-6.6
Base metals and articles of base metals	34.1	84.7	-68.8	-20.5	-11.6	-39.1	6.2	-133.0	-310.0	-207.0	-222.0
Machinery and mechanical appliances, electrical equipment	-126.0	1.4	-85.0	-26.2	-125.0	-151.0	-395.0	-489.0	-442.0	-527.0	-225.0
Vehicles, aircraft, vessels	-54.8	151.0	-190.0	235.0	268.0	88.4	47.2	142.0	-85.3	62.2	-26.9
Optical, photographic instruments	-2.3	-6.6	-3.6	-15.4	-0.4	-4.4	-51.1	-2.1	5.8	-13.2	-10.9
Arms and ammunition	-0.1	-0.1	-0.6	-0.6	-0.9	-1.1	-0.3	-0.2	n/a	0.0	-0.9
Miscellaneous manufacturing articles	-18.7	-24.4	-8.1	-27.2	-16.5	-50.3	-92.0	-160.0	0.0	-137.0	-128.0
Works of art & antiques	-14.1	-62.9	-62.7	-44.0	0.0	-5.7	n/a	-52.0	n/a	-14.2	15.5

Notes: The classification of the commodities is taken from Levine and Widell (2014). Negative (positive) values indicate that Tanzania has recorded a value for the import that is lower (higher) than that recorded by the exporter.

Sources: Authors' elaboration from Comtrade data.

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SOAS University of London, Thornhaugh Street, Russell Square, London WC1H 0XG

T +44 (0)20 7898 4447 • E ace@soas.ac.uk • W www.ace.soas.ac.uk