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Abstract

The aim of this work is twofold: to measure the level of mis-invoicing in Benin's trade with its main trading partners and to determine its causes. First, based on mirror statistics, we estimate the gross trade discrepancies at about \$3.065 billion on average over the period 2000-2017. This represents more than 350% increase in 18 years. Fraud is dominated by under-invoicing of both imports and exports. The countries most prone to fraud are mainly Asian countries (China, India, and Malaysia), while the most misreported products are mainly those with low proportions of trade (fabrics, textiles and second-hand goods, palm oil, vehicles and motorcycles, cashew nuts, wood and wooden goods). Second, the econometric results obtained from the Panel Corrected Standards Errors (PCSE) methods showed that the determinants of mis-invoicing are customs tariffs, the Benin/Nigeria tariff differential, the share of trade in a product, and indicator variables such as the introduction of the PVI, the perishability of a product, the region of origin, and the tariff and non-tariff measures enacted in recent years. Considering our results, Benin needs to review its trade policy and work toward more effective management of its international trade flows. At the same time, international organizations such as the WTO and the WCO must cooperate and coordinate the management of international trade to control fraud.

Keywords: mis-invoicing, tariffs, mirror statistics, international trade, PCSE

JEL codes : F14, F12, H26, E26, C23

1. Introduction

Misrepresentation or mis-invoicing¹ is a common and frequent feature of international business transactions. Thus, trade transaction declarations are not free from misconduct. For example, the quantity and value of a shipment can be manipulated either to reduce the payment of customs duties (under-invoicing) or to take better advantage of export subsidies (over-invoicing). Misclassification of products or misrepresentation of the destination of a shipment can be used to circumvent trade restrictions.

Generally, the accuracy of international trade statistics is probably compromised to an unknown degree by mis-invoicing. However, mis-invoicing in commercial transactions is far from a new phenomenon.² An interesting literature has emerged studying the determinants of commercial mis-invoicing by analyzing bilateral trading partner statistics (for recent examples, Nitsch; 2016, 2017; Cantens; 2015; Fisman and Wei, 2007; Berger and Nitsch, 2008; Farzanegan, 2008). Despite the continued interest in identifying and correcting reporting errors, mis-invoicing in international trade transactions still appears to be attracting increasing attention for at least three reasons. First, international trade generally accounts for an increasing share of a country's GDP, especially for developing countries. As trade becomes relatively larger and more dynamic, the accuracy of trade measurement is also of growing interest for tax revenue consolidation. Second, unlike other forms of misconduct, it appears in principle that mis-invoicing in international trade transactions is easier to detect because of the existence of mirror statistics. Any discrepancies between the corresponding data entries can directly indicate errors or mis-invoicing. Third, it has been argued that mis-invoicing in trade is an important means of transferring unrecorded capital out of a country. There is considerable political interest in the flow of funds between countries, particularly if these flows are illicit. Indeed, several studies have focused on trade between developing and developed countries and have used a priori assumptions to attribute commercial mis-invoicing generally to developing countries (Patnaik et al. 2010; Ndikumana and Boyce, 2008; Kar and Cartwright-Smith, 2010; Kar and Leblanc, 2013; and Kar and Spanjers, 2014).

Furthermore, trade mis-invoicing is considered an important channel for income tax avoidance and duty evasion, particularly in Africa. For example, more than 54% of illicit financial flows in Africa originate from trade mis-invoicing, estimated at \$407 billion over a 10-year period from 2001 to 2010 (AUC / ECA, 2015). In addition, in a series of reports and studies, Kar and its Global Financial Integrity (GFI) co-authors assert that trade mis-invoicing is the primary method used in illicit financial flows, including capital flight (e.g., Kar and Cartwright-Smith 2008; Kar and Freitas 2012 and Kar 2014).

Therefore, to assess the loss of tax and customs revenue in a country of interest, it is essential to properly estimate the extent of commercial mis-invoicing. The analysis of mis-invoicing is complex because of the hidden nature of these types of transactions. Nevertheless, it can be apprehended by two main methods: the investigation field and mirror statistics (Bhagwati, 1964, 1967; Golub, 2012; Benjamin et al., 2015). The most widely used method for estimating commercial mis-invoicing is the method of comparing trade data from partner countries (hereafter referred to as the mirror statistics method), originally introduced in Bhagwati's pioneering study. Thus, in order to quantify the volume of commercial mis-invoicing using this method, it is imperative to assume that the trade statistics of partner countries, particularly advanced economies, are sufficiently accurate to substitute for market values (hereafter referred to as the "accuracy assumption"; or "the no-invoice assumption")³ (see, Kar and Cartwright-Smith, 2010). Indeed, this accuracy assumption can only be based on data produced by advanced economies. Insofar as weak surveillance capacity at customs posts coupled with constrained

¹ Throughout the document, we refer to the level of commercial discrepancies that can exist for both explicit reasons of error, Caf-fob discrepancy, and implicit reasons of fraud as mis-invoicing

² Bhagwati (1964) provides a preliminary analysis.

³ See Ajayi 1997; Baker et al, 2014; Boyce 1990; Boyce and Ndikumana 2001; Chang and Cumby 1991; Gulati 1987; Kar 2014; Kar and Cartwright-Smith 2010; Kar et al. 2008; Ndikumana and Boyce 1998, 2008, 2012; The United Nations: Economic Commission for Africa (AUC / ECA, 2015)

trade liberalization in developing countries such as Benin remains one of the factors facilitating illegal trade transactions despite regional integration efforts in recent years.

The case of Benin is particularly relevant to this issue. Benin is a founding member of the WAEMU, a customs union, along with three of its direct neighbors, Togo, Niger, and Burkina Faso, and four other countries. All eight countries are also members of Economic Community of West African States (ECOWAS)⁴, a larger regional grouping that also includes Nigeria. Although UEMOA has abolished the UEMOA CET since 2015 in favor of the ECOWAS CET, ECOWAS is hardly advanced in terms of trade liberalization. For example, Nigeria has a protectionist trade policy with high tariff peaks, non-tariff barriers and import bans; its currency is non-convertible and chronically overvalued (IMF, 2017) not to mention the outright closure of land borders. However, the pan-African regional integration process has been moving forward in recent years, especially with the entry into force in May 2019 of the African Continental Free Trade Area (AfCFTA). The AfCFTA is expected to boost combined consumer and business spending and increase intra-African trade by at least 53.2%. Indeed, intra-regional trade is very low, for example, Benin's trade with Nigeria was only about 6% of Benin's exports and 2% of Benin's imports in 2015-2017 (Golub and Mbaye, 2019). These official statistics are highly misleading, however, as they do not reflect the vast informal trade along the border. The economic relationship between the two countries, despite being members of ECOWAS, is already asymmetric, with Nigeria exerting much more influence on Benin than vice versa. Given Nigeria's highly protectionist trade policy⁵, Benin has adopted a strategy centered on being a "warehouse state," i.e., serving as a trade hub, importing goods and re-exporting them legally but mostly illegally to Nigeria, thus opening the door to mis-invoicing. However, Benin's dependence on Nigeria is not explicitly reflected in official trade statistics, which may limit the use of official or international statistics (e.g., COMTRADE) to analyze trade divergence, especially with respect to the application of the WTO rules of origin and thus invites qualification of the results found.

The nature of Benin's international trade has two components: an official component, registered by government agencies, and a component that is not registered or that escapes registration, known as informal trade. The latter component is generally carried out with neighboring countries with which Benin shares long borders that are poorly controlled, thus introducing distortions in the success of trade policies. This component of Beninese trade much debated in the literature (see, Igué and Soulé, 1992; Golub, 2012, Mbaye and Golub, 2009; Benjamin et al., 2015; Bensassi et al., 2016; Mitaritonna et al., 2017) is not debated here, even though the topic remains very current and of great interest. The component of interest in this article is the official aspect often very neglected in the literature. It is generally practiced with overseas countries where the keeping of rigorous statistics assumes accuracy of statistics.

However, analysis of Benin's international trade statistics from mirror data shows large discrepancies in Benin's trade flows with its partners. A comparison of trade data between Benin and 20 of its main partners⁶ shows that mis-invoicing amounted to \$2.824 billion in 2017, compared to \$614.45 million in 2000, an increase of more than 359.6% in 18 years. Although they have fallen in recent years by nearly 60% between 2010 and 2017, their volume remains worrying because they represent nearly 68.5% of foreign trade and 30% of Benin's GDP in 2017. The upward trend in foreign trade (often driven by imports) noted in recent years is likely to hide a large flow of illegal transactions - official trade serves as a camouflage for illegal trade (Pitt, 1981 ; Martin and Parnagarya, 1984 ; Farzanegan, 2008) - hence

⁴ ECOWAS aims to promote economic integration but also plays a role in political cooperation and stability. Its stated objective is to create a regional common market.

⁵ Nigeria's trade policy has long been highly protectionist, with most-favored-nation (MFN) rights reaching 35%, an import ban on more than 25 groups of articles, and many other forms of trade. 'non-tariff and price barriers. In 2011, these tariffs applied to imports from Benin in 2011, the implementation of tariff reduction and harmonization at the ECOWAS level has not yet started. Imports from Nigeria to Benin were, in 2011, compared to the WAEMU external tariff.

⁶ France, China, India, United States, Thailand, Egypt, Niger, Nigeria, Belgium, Vietnam, United Arab Emirates, Denmark, Turkey, Bangladesh, Malaysia, Holland and Togo

the importance of analyzing recorded trade flows in the light of mirror statistics. Thus, these few statistics lead us to ask the question: what are the causes of mis-invoicing in Benin's foreign trade? To answer this question, the purpose of this research is to assess the level of divergence in Benin's trade with its main trading partners. Then to determine the causes of mis-invoicing in Benin's foreign trade. The remainder of the paper is organized as follows: Section 2 deals with the objectives and hypotheses while Section reviews empirical literature. Section 4 focuses on the methodology and analysis of some statistics. Section 5 provides a comprehensive analysis of the results obtained; and Section 6 presents the conclusions and policy implications.

1. Objectives

The overall objective of this study is to analyze the effect of mis-invoicing on the Beninese economy. More specifically, the objectives areas follow:

- Measure mis-invoicing using the "mirror data" approach
- Determine the factors responsible for mis-invoicing in Benin's foreign trade

2. Literature review

2.1. Theoretical review

2.2. Mis-invoicing and its effect on the economy

Analysis of the welfare effects of mis-invoicing on trade challenges the conventional view that illegal trade, by circumventing tariff distortions, is welfare enhancing. In their seminal paper, Bhagwati and Hansen (1973) assume that both legal and illegal trade is conducted at the same world market price. Bhagwati and Hansen conclude that illegal trade is not improving welfare. Introducing a third non-traded good into this framework, Sheick (1974) showed that the coexistence of illegal and legal trade can be welfare improving. Pitt (1981) argues that the coexistence of legal and illegal trade is an empirical fact. In an institutional setting, he demonstrates that firms use legal trade to disguise illegal trade and that the welfare consequences are ambiguous. Analyzing the determinants of trade mis-invoicing, Pitt (1981) argues that illegal trade responds to price disparity, defined as the difference between the actual domestic price and the world market price, including all taxes. If, for example, the world market price of an exportable product is lower than its domestic price, most of the actual export value is traded illegally because a legal export would produce a loss. Thus, the greater the price disparity, the greater the incentive to under-invoice. Many studies also contribute to this strand of literature by highlighting the well-established link between illegal trade and welfare (see, e.g., Caliendo and Parro, 2015; Felbermayr and Jung, 2015).

2.2.1. Mis-invoicing assessment methods

To address the issue of accuracy in trade statistics, two approaches have been frequently applied in the literature (Nitsch, 2012). First, the analysis can focus on episodes in which the free on board (FOB) values of exports exceed the corresponding carriage, insurance and freight (CIF) values of imports. To the extent that the latter include additional price components (transportation costs) and thus must, by definition, be higher than the former, such "perverse" statistics may indicate that mispricing has occurred. This argument was first presented in an empirical analysis of import underpricing by Bhagwati (1964) and is still referred to as mirror statistics.

Second, several papers apply a fixed c.i.f./f.o.b. conversion factor. For the conventions of international organizations, a 10% difference between c.i.f. and f.o.b. values is assumed. For example, when using partners' data to complete their trade database, the International Monetary Fund generally applies a c.i.f./f.o.b. factor of 1.1. Any discrepancy in the mirror statistics that exceed this correction could then be attributed to mispricing; see, for example, Bhagwati, Krueger, and Wibulswasdi (1974). However, this approach provides, at best, only a very rough empirical indication of the potential presence of mispricing, as the assumption of a fixed conversion factor that does not vary over time or across trading partners is clearly sensitive (Nitsch, 2012).

However, studies use other alternative methods to estimate mis-invoicing, finding that aggregate trade data may not show significant variation and yield erroneous results. Thus, to reduce these errors, after estimation by mirror data estimation, Farzanegan (2008) uses the MIMIC model to refine his results for the Iranian economy. Similarly, Nitsch (2012) analyzes approaches to measuring illicit flows obtained from mirror data. Thus, he identifies the model of Kar and Cartwright-Smith (2008) based on the method of "Gross excluded reversals (GER)". This method assumes that under- or over-invoicing of exports/imports represents capital flight.⁷ Although these authors sought to innovate, the basic assumptions seem to be too strong and led to underestimation of fraud. Also, this method is based on the fixed conversion ratio, which has been criticized by the authors themselves.

2.2.2. Foreign trade statistics tested against mirror data

The goal of trade mis-invoicing analysis is to quantify the extent of unfair behavior by traders, which could help assess the appropriateness of policies and the implications of such illegal practices.

There are several possible reasons for trade gaps. Simola (2012), building on the classification of Makhoul and Otterstrom (1998), finds that the causes of discrepancies in trade statistics can be divided into three groups. First, discrepancies may arise from "unavoidable" factors, the most important of which is the common practice of reporting imports on a CIF basis and exports on a FOB. There should also be some natural variation depending on the type of goods and geographic distances between trading partners. Second, discrepancies are generated by structural differences such as the timing of trade registers, thresholds for trade records, and exchange rate variations. Finally, discrepancies in mirror statistics can be caused by classification errors. Misclassification may be due to human error or the inexperience of customs officials, as modern classification has become much more difficult when re-exports are involved.

These possible alternative explanations for the perverse discrepancies show how difficult it is, in practice, to use the statistical technique of country-to-country comparisons to draw conclusions about the falsification of commercial invoices and the direction of these flows. However, when these discrepancies persist and are very large and concern certain categories of products, one can conclude that illegal transactions based on mis-invoicing are taking place. Indeed, mirror statistics have been used several times to examine customs fraud and other smuggling schemes in trade, and these factors have not been sufficient to explain some of the differences in international trade statistics (Fisman and Wei, 2007; Berger and Nitsch, 2008). It is clear, then, that even if human error or the cost of transport between trading partners is mentioned, these reasons alone do not explain the growth of divergence in international trade; for the differences in comparison are very large. Studies suggest from this perspective that rising tariffs and overall corruption in a country correlate with larger discrepancies in bilateral trade statistics and thus are factors in mis-invoicing in trade (Javorcik and Narciso, 2007, 2017; Berger and Nitsch, 2008).

Bhagwati (1967) pointed out that one method used by economists in 1967 was to assess fraud through interviews with people working in the field, but with considerable and obvious limitations. Mirror analysis for fraud matching has been used in many research contexts: for general assessments of "informal trade" (Carrère and Grigoriou, 2014), to determine how monetary, tax, or customs policies encourage fraud (Bhagwati, 1964; McDonald, 1985; Fisman and Wei, 2004; De Boyrie et al., 2005; Mishra et al., 2008; Kubo, 2012; Forstater, 2016; Goldberg and Pavcnik, 2016), to model different types of fraud and their statistical detection (Bhagwati, 1981), to assess capital flight through international trade (Boyce and Ndikumana, 2001; De Boyrie et al., 2005). Mirror analysis has thus been used to challenge the validity of data in some countries where they deviate too much from statistical data from other countries considered reliable (Yeats, 1990). Gaulier and Zignago (2010) suggested a method and created a database for harmonizing international trade data by reconciling country data. Then, when data for a country is not available or is considered false or unreliable, it is calculated from the import and export data of countries that are its economic partners (Yeats, 1995; Choo, 2008; Barbieri et al., 2009).

⁷ See Nitsch, 2012 for more details.

Thus, the wide availability of international trade data has been a major advance in trade fraud investigations.

2.3. Empirical Review: The Determinants of Mis-invoicing

The literature on mis-invoicing is extensive and began with the pioneering work of Bhagwati (1964). The most common method for identifying commercial mis-invoicing is to compare the reported value of a commercial transaction in one country with the corresponding entry in the partner country's mirror statistics. The difference between the defective and the correct declaration of a transaction is then interpreted as mis-invoicing. Analyzing trade data for Turkey and its major trading partners, Bhagwati (1964) reveals a strong indication of under-invoicing on imports of transport equipment and machinery, both product categories being characterized by high tariffs. Naya and Morgan (1969) study trade statistics for seven Southeast Asian countries. Their main conclusion is that inter-Asian trade differentials are significantly larger than in developed countries. McDonald (1985) analyses the divergence ratio between developing and industrialized countries and finds that export under-invoicing is positively correlated with export taxes. Yeats (1990) finds that trade data for African countries indicate large-scale mis-invoicing activities depending on the product category. This finding for African countries is in line with the results obtained by Berg (1985), who concludes that inconsistencies in African foreign trade statistics are largely explained by mis-invoicing. This finding has been confirmed (Hamanaka, 2011, Rotunno and Vezina, 2012; Levin and Widell, 2014; Sequeira, 2016).

Similarly, Fisman and Wei (2004) examine the existing discrepancy in Chinese imports from Hong Kong and conclude that underreporting of import values and mislabeling of the most taxed products are generally prevalent. Fisman and Wei (2007) analyze the illicit trade in cultural goods and find a strong correlation between mis-invoicing in these goods and the extent of corruption in the exporting country. This finding was confirmed by Berger and Nitsch (2008) using a wide range of product categories. Beja (2008) estimates China's unreported trade between 2000 and 2005 to be \$1.4 trillion.

In addition, Farzanegan (2008) applies a multi-indicator multiple cause approach (MIMIC) to study the determinants and magnitude of illegal trade in Iran. He finds that commercial mis-invoicing in Iran accounts for between 6% and 25% of total trade between 1970 and 2002. Also, given the nature of imports and export data, the trade deficit (customs fraud) hypothesis implies that traders would tend to understate the value of imports and report the true value of exports to the country of origin (Epaphra, 2015). Thus, under-invoicing of imports is therefore probably the most prevalent form of trade misreporting, mainly because of its immediate benefits. Since customs duties are usually determined based on the declared value of the item, which can be difficult to verify in practice, underpricing directly reduces the payment of taxes. Yang (2008) provides an example illustrating the tax evasion behavior of importers. When Philippine customs tightened control by hiring private firms to conduct pre-shipment inspection of imports from a subset of countries, imports from processing countries switched to an alternative method: transportation through export processing zones. On the one hand, if imported goods are not declared under the appropriate tariff heading (e.g., to escape trade taxes by classifying highly taxed goods as tax-free), imports in the product category erroneously declared in the customs declaration are effectively overdeclared (Forstater, 2016, Goldberg and Pavcnik, 2016).

Chalendard et al. (2016) document this fraudulent behavior for Madagascar. Noting that the import of fertilizers, books, and some grains is exempt from customs duties and VAT in Madagascar, they find that the import value of these products significantly exceeds the corresponding export value. Overall, their estimates suggest that customs fraud reduced non-oil customs revenues (customs duties and import value-added tax) in Madagascar by at least 30% in 2014. Misclassification of customs duties (and, consequently, over-invoicing of imports) accounted for just under half of these losses. Our work is also related to the study by Sequeira (2016), which draws attention to the impact of evasion on the estimation of trade elasticities. She obtains the estimate of trade elasticity equal to 0.1 in the context of a 30% decrease in the average nominal tariff rate applied by Mozambique on its imports from South Africa. Mozambique did not adjust the extensive or intensive margins of imports in response to changes in nominal rates due to widespread corruption and tariff evasion, which affected about 80% of all shipments. Similarly, Javorcik and Pakel (2018) show theoretically and empirically that if tax evasion

is not considered, trade elasticity is estimated with a large downward bias, leading to a miscalculation of gains from trade. Similar results are found by Ndikumana, (2016).

Another explanatory element of mis-invoicing is the Black-Market Premium (BMP) premium. Indeed, all countries with non-convertible currencies are at a disadvantage compared to those whose currencies have exchange value outside their territorial space. Barnett (2003) finds interesting results from a model where smuggling and parallel markets emerge because of government restrictions that prevent agents from holding foreign currency as well. The author attributes movements in parallel rates to non-fundamental uncertainty and finds some interesting results. First, Barnett's model generates equilibria with positive and negative parallel premiums, and correlations between illegal trade and the premium. Second, it suggests in a novel way that currency speculation is the source of smuggling, and that this affects real economic activities in all sectors of the economy. The BMP (Black Market Premium) is then an important determinant of the volume of illegal trade. Biswas and Marjit (2007) also contribute to this strand of the literature, using the well-established concept of trading partner statistics. They find a positive (negative) correlation between BMP and the under-invoiced export (import) of illegal traders who sell (buy) from the exchange rate of unreported black-market transactions.

On the other hand, given that currency inconvertibility is combined with quantitative restrictions on imports, and implicit or explicit taxation of export crops, Azam and Daubrée (1991) use a simplified macroeconomic model to analyze the determination of the parallel market exchange rate in economies where distortions are imposed on both trade in goods and currency. They obtain results that essentially confirm that the parallel exchange rate is a powerful transmission belt through which contraband flows through the impact of various variables on the economy, such as the quantity of money, the world and producer price of the cash crop, the price of imported consumer goods, and quantitative import restrictions (Nitsch, 2012; Ogun, 2015; Shaar and Baharumshah, 2016; Hong and Pak, 2017).

3. Methodology

3.1. Mirror statistics method

The "mirror data", using bilateral trade flows to compare imports at CIF value and exports at FOB value of a country with its partner countries. Normally, if there is no mis-invoicing, this comparison would not reveal any disparity, but if there is, there is a presumption of mis-invoicing. Presumption, because mis-invoicing cannot be directly inferred because there are other causes for the discrepancies in the data, such as insurance and transportation costs contained in the import charges. According to the IMF (1993), insurance and transport costs cannot exceed 10% of the CIF value, which must be considered when calculating the FOB value. However, several authors have shown that these costs are higher for sub-Saharan African (SSA) countries. They are estimated at nearly 20% of the CIF value. However, as noted by Nitsch (2012), this approach is very unreliable because the assumption of a fixed conversion factor that does not vary over time or between trading partners is clearly delicate (Nitsch, 2012). For this reason, in our work, we decompose the variation observed in the CIF - FOB ratios of the matched partner into two parts: one corresponding to shipping costs, i.e., 20%, and the other being unexplained, i.e., all the errors and frauds on invoices. Thus, any discrepancy in the Benin mirror statistics that exceeds the 20% ratio could then be attributed to mis-invoicing. We estimate the total level of mis-invoicing in Benin's exports and imports with its main partners through the following equations:

$$F_{imports} = M_b - X_p \quad (1)$$

$$F_{exports} = X_b - M_p \quad (2)$$

where

$F_{imports}$ and $F_{exports}$ are the observed trade gaps in imports and exports, respectively.

X_b are Benin's recorded exports (at FOB prices) to its partners;

M_p are imports from Benin reported by its main partners;

M_b are Benin's recorded imports from its partners;

X_p are exports carried over to Benin by its main partners.

Divergences are determined in aggregate over the period 2000-2017. However, for a more disaggregated level of data at the level of partner countries and products concerned, we retain the 2013-2017 sub-period for two reasons : (i) unavailability of data at the disaggregated level over a long period ; (ii) the last five years considered are relevant because they are marked by a strong reduction in divergences and a certain number of tariff and non-tariff measures applied that could more plausibly explain the change. The econometric analysis is done over the period 2013-2017.

3.2. Econometric approach

3.2.1. Theoretical model

Economic literature identifies several causes of mis-invoicing. We base our analysis on the general model defined by Jackson (2003) inspired by the work of Sheick (1974). After analyzing the different possible causes of fraud, the author identified several causes of trade data discrepancies for empirical validation. Equation (4) is given with respect to domestic import records for P_{ij}^m the ratio of discrepancies as a percentage of estimated exports.

$$P_{ij}^m = \hat{\alpha}_1 + \hat{\alpha}_2 ER_i + \hat{\alpha}_3 BMP_i + \hat{\alpha}_4 MTAR_{ij} + \hat{\alpha}_5 MSUB_{ij} + \hat{\alpha}_6 RISK_{ij} + e_{ij} \quad (4)$$

The accuracy of the domestic export data is also determined by the export levies $XLEV_{ij}$ and subsidies $XSUB_{ij}$.

$$P_{ij}^x = \hat{\beta}_1 + \hat{\beta}_2 ER_i + \hat{\beta}_3 BMP_i + \hat{\beta}_4 XLEV_{ij} + \hat{\beta}_5 XSUB_{ij} + \hat{\beta}_6 RISK_{ij} + e_{ij} \quad (5)$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the coefficients to estimate.

ER: the real exchange rate; BMP: the premium of the black exchange market; MTAR: import tariff; XLEV: Export taxes; SUB are trade subsidies; RISK: the level of risk in the trade and e_{ij} are the terms of errors.

3.2.2. Model specifications

Equations (4) and (5) constitute the general model to be applied. However, data constraints prohibit the inclusion of a measure of risk, the exchange rate, and the parallel exchange market premium in the regression equation. The main reason is that although these data exist, they are not specific to each type of product, for example, or for each partner, Benin being the only country considered, which makes their inclusion redundant. They are therefore constant in all observations. These variables can be used for macro panel years. We only do a simple analysis in the appendix (correlation degree of the variables) by integrating these variables into the time series because of the relatively short duration of the series. Also, we use as a measure of deviations the value of the ratio of deviations to recorded import trade (ProFFI). We estimate the following model:

$$ProFFI_{it} = \hat{\alpha}_1 + \hat{\alpha}_2 DD_{it} + \hat{\alpha}_3 GapDD_{it} + \hat{\alpha}_4 RDI_{it} + \hat{\alpha}_5 PDCl_{it} + \hat{\alpha}_6 IVP_{it} + \hat{\alpha}_7 PP_{it} + \hat{\alpha}_8 RDP_{it} + \hat{\alpha}_9 MNT_{it} + \vartheta_{it} \quad (6)$$

where i = products imported and t = 2013 to 2017 and ϑ an error term.

DD_{it} is the rate of customs duty applied in Benin. Since January 1, 2015, Benin has applied the ECOWAS Common External Tariff (CET). The latter has five rates (instead of four for the old CET WAEMU): zero, 5%, 10%, 20% and the new band of 35%. According to authors like Bhagwati (1964); Yeats (1990); Farzanegan (2008); Levin and Widell, (2014); Sequeira, (2016); the price remains the primary cause of mis-invoicing. We expect a positive sign from this variable on mis-invoicing.

$GapDD_{it}$ measures the differential in customs tariffs between Nigeria and Benin. It is equal to the ratio of Nigerian customs duty to Beninese customs duty. Nigeria is supposed to align its tariffs with the

ECOWAS CET⁸, but it does not do so by implementing protectionist trade policy. We are also expecting a positive sign.

RDI_{it}, tax revenue is the variable that considers customs measures related to the level of duties and / or subsidies on imports. As previous studies have shown (Bhagwati 1964, Rozanski and Yeats 1994, Yeats 1978, 1990, 1995), we expect a positive sign for this variable on fraud.

PDC_{it}, As the statistical analyses in the previous sections have shown, the important part of a product in the trade can influence the level of fraud. If it is important, the customs authorities have an interest in raising the level of control to reduce fraud and recover rights.

Next, we insert four dummy variables to account for the characteristics that are difficult to quantify due to fraud. Thus, the PVI variable indicates the effect of this program on frauds since its implementation. It takes the value 1 if the PVI is implemented that year and 0 otherwise. According to our statistical analysis, we expect a negative sign.

PP: the perishability of a product. Bensassi et al. (2016) and Mitaritonna et al. (2017) showed that when a product is perishable it is more prone to smuggling, with time being an important factor. The variable takes value 1 if the product is perishable (in this case food products) and 0 otherwise.

RDP: The region of origin of a product can also determine whether it is easy to smuggle or not. The Asian countries being the most important partners in the fraud, it takes the value 1 if the product comes from Asia and 0 otherwise.

MNT: Tariff and non-tariff measures adopted through decrees or ministerial orders in recent years are numerous and highly restrictive and are therefore likely to increase fraud. It takes 1 if the product has a measurement and 0 otherwise. We expect positive signs from these latest variables on import frauds.

The previous analysis is valid for export flows for which we estimate the following equation:

$$ProFFE_{it} = \hat{\beta}_1 + \hat{\beta}_2 PDCE_{it} + \hat{\beta}_3 ProbF + \hat{\beta}_4 PP_{it} + \hat{\beta}_5 MNT_{it} + \delta_{it} \quad (7)$$

where I define export products and t=2013 to 2017; δ an error term.

However, the export products considered are all to Asia, the region of origin/destination variable was removed. Also, since the Import Verification Program (IVP) is not applied to export flows, this variable is also removed. Since taxes are almost non-existent on exports, we do not include this variable in the specification.

3.2.3. Estimation method

The econometric procedure adopted is a variant of Generalized Least Square (GLS), designed to combat the problems of autocorrelated and heteroscedastic errors frequently encountered in panel data analysis, especially for small sample sizes. Indeed, to remedy these problems, Beck and Katz (1995) proposed a modification of the full GLS-Parks estimator, called panel-corrected standard errors (PCSE). PCSE calculates panel-corrected standard error estimates for linear cross-sectional time series models where the parameters are estimated by OLS regression or Prais-Winsten regression. When computing standard errors and variance-covariance estimates, PCSE assumes that the disturbances are, by default, heteroskedastic and simultaneously correlated over several panels. The PCSE estimator has proven to be very popular (Mondigbaye et al, 2017). Finally, we proceed to the validation of our models through different tests namely: the global significance test of the coefficients, individual significance test of the coefficients and stability test of the coefficients.

⁸ Benin also applies other community duties and taxes, namely: the statistical charge (RS) of 1% (5% on goods imported under suspensive regimes); the ECOWAS (PC) community levy of 0.5% on behalf of the Community Commission; and the community solidarity levy (PCS) of 1% on behalf of the WAEMU Commission. However, Benin does not apply the provisional taxes (community but optional national application) provided during the period of adjustment to the ECOWAS CET.

Table 1 : Summary of Model Variables

Variables	Definitions	Expected signs	Sources
Imports mis-invoicing⁹ (ProFFI) Export mis-invoicing (ProFFE)	The ratio in the absolute value of mis-invoicing on exports or imports on trade recorded from mirror statistics		<i>COMTRADE</i>
Beninese Tariff (DDB)	The price level conforms to the ECOWAS CET applied to each product	(+)	<i>International Trade Center (ITC)</i>
Tariff gap (GapDD)	Calculated from the Nigerian DD and Beninese DD ratio, both aligned with CET ECOWAS.	(+)	<i>International Trade Center (ITC)</i>
Probability to under invoicing (ProbF)	Take value 1 if the product is undervalued and 0 otherwise		<i>COMTRADE</i>
Customs Revenue (RDI/RDE)	Customs revenue of the State RDI: measured as Customs revenue as a share of import value of the product RDE: measured as Customs revenue as a share of export value of the product	(+) on both types of trade. Any increase in revenue is related either to duties and taxes applied to or to the volume of goods, but these have positive effects on the volume of fraud.	<i>Directorate General of Customs and Indirect Rights (DGDDI) -Benin</i>
Share in Trade (PDC)	PDCI: product import value as a share of total imports PDCE: product export value as a share of total exports	(-)	<i>World Development Indicator s (WDI)</i>
Perishable product (PP)	Takes the value 1 if perishable product and 0 otherwise	(+)	<i>Nature of the product</i>
Region of origin of products (RDP)	Takes 1 if the product comes from Asia and 0 otherwise	(+)	<i>COMTRADE</i>
Non-tariff measures (NTMs)	Take 1 if the product has undergone measurement (s) during the year	(+)	<i>National Policy</i>
Source: Authors (2019)			

⁹ Jackson (2003) makes the important assumption that trade statistics reported by industrialized countries are reported with a sufficient degree of precision. To do this to construct the ratio of fraud to imports from an African country, for example, he relates it to the exports recorded by these industrialized countries. This way of doing things, if justified, can camouflage the scale of fraud. To do this, we report trade fraud recorded by Benin. Our analyzes were not conclusive when we introduced this variable as a dependent variable, so we included it as independent variables in the binary models.

3.2.4. Samples and data sources

The empirical analysis concerns Benin with a sample of seventeen¹⁰ main trade partner countries using annual aggregate trade data for the sub-period 2013-2017. We identify 13 key products of Benin's trade with its partners (9 import products and 4 export products)¹¹. We use two-dimensional data where the individuals are the identified products and the five years considered. Full details on the construction of the explanatory variables, as well as summary statistics, are provided in the Appendix. Data are from the Commodities Trade Statistics database (COMTRADE), the International Trade Centre (ITC), and the World Bank database, 2018 (World Development Indicators) and the Indirect Customs and Duties Directorate.

We supplement our analysis with interviews with 10 actors in Benin's foreign trade through the following structures: Direction Générale des Douanes et Droits Indirects/Direction de Renseignement et d'Enquêtes Douanières (DGDDI/DRED), the company Benin Control (BC), the Institut National de Statistiques et de l'Analyse Economique (INSAE), the Port Autonome de Cotonou (PAC), the Direction du Commerce Extérieur (DCE), and merchants. These interviews were held from October 18 to November 15, 2019 and lasted an average of one hour. The questions that were asked during these interviews are recorded in a table in the appendix.

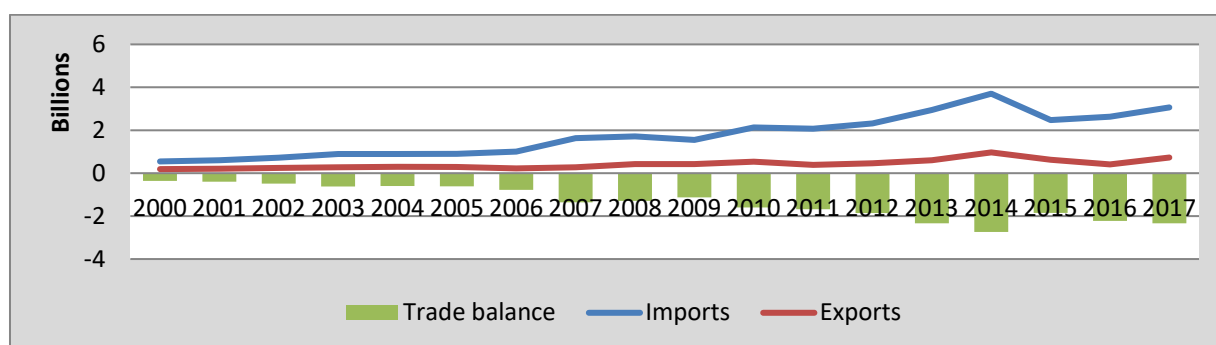
4. Results and analysis

This section serves as a presentation of our results. It is divided into two main parts. First, we make a statistical analysis of the evolution of Benin's foreign trade while evaluating fraud and its extent. Second, we conduct an econometric analysis to clearly identify the causes of mis-invoicing in Benin's foreign trade.

4.1. Registered trade and mis-invoicing

4.1.1. Analysis of the evolution of Benin's international trade

Benin's foreign trade is characterized by a structural deficit and low export diversification. Benin's imports consist mainly of final consumer goods. Exports are mainly cotton and its derivatives and cashew nuts. Over the period 2000-2017 (Figure 1), there has been a steady and growing trend in both export and import flows. However, there was a drastic decline in 2015 of 33% and 35% respectively in import and export flows. This decline continued in 2016 with the economic slowdown in the Nigerian market (GDP contraction of -1.75% in 2016) and the devaluation of the Naira in June 2016. Despite these feats, the trade deficit did not decline significantly but increased moderately by 5% from \$2.2 billion to \$2.3 billion given the high level of imports in the same year.



Source: Authors (2019) from Comtrade, 2019

Figure 1: Evolution of Benin's foreign trade (\$ billion)

¹⁰ These countries represent 76.5% of Benin's total trade in 2017.

¹¹ These are the products identified in the descriptive analysis above.

4.1.2. Partners and main products traded

Table 2 shows the share of the main countries in foreign trade over the period 2013-2017. To identify loyal trade partners, we first calculate the average share of these countries over the period 2013-2017. We find China in the lead with more than 10% of Benin's exports of products such as cotton, scrap metal and wood mainly. India and Nigeria follow with more than 8.8% and 7.7% respectively, mainly cotton, wood and cashew nuts for India and re-export products: rice, meat and offal (to Nigeria). In terms of import flows, India leads the way with 11.0% of flows, driven by products such as rice, cotton fabrics and medicines. It is followed by Thailand (10.8%) and France, which comes in third place with nearly 9.5% of flows carried by products such as medicines, offal and wheat flour. For this flow, China comes only in 4th position with a proportion of 8.8% carried by motorcycles, thrift stores and cotton fabrics. In a second step, we consider the share for the year 2017. This ranking has undergone some changes with the entry of new countries at the top of the ranking (Viet Nam) and the loss of other countries of their place (China, France). The seventeen countries considered in these calculations are the main trading partners because they represent 76.9% of the total trade flow of 2017 or 75.5% and 78.3% respectively of the import and export flows. Our analyses are therefore based on Benin's trade volume with its main partners.

Table 2: 2013-2017 market share and different products in trade

Partners	Share 2017 (% of total flow)	Average share 2013- 2017(% of total flow)	Main products
			Exports
Vietnam	13.9	6.7	Cotton, Scrap and Raw Wood
Bangladesh	12.6	7.2	Cotton fiber
Malaysia	11.4	7.6	Cotton and Wood
India	10.5	8.8	Cashew nuts, Cotton and Wood
Nigeria	9.8	7.7	Oils (palm, cotton, vegetables), cakes (solid residues, by-products of oil manufacture), and fats
China	7.8	10.0	Cotton, scrap and wood
Niger	3.9	6.1	Cement
Egypt	3.0	2.8	Cotton
Denmark	3.1	2.2	Shea almonds
Turkey	2.3	1.9	Cotton
Total	78.3	60.9	
			Imports
India	19.0	11.0	Rice, Cotton Fabric, Pharmaceutical Products
Thailand	14.4	10.8	Rice
China	7.8	8.8	Motorcycles, Pharmaceuticals and Cotton Fabric and Thrift Store
Holland	7.2	4.8	Refined hydrocarbon products
Togo	7.0	7.9	Electric power, Hydrocarbons and cements
France	6.9	9.5	Medicines, Meat and Offal and Wheat Flour
Malaysia	3.9	2.5	Palm oil and its fractions
Belgium	3.5	4.1	Refined hydrocarbon products
USA	2.9	4.2	Vehicles and Motorcycles, Refined Hydrocarbon products, meat and offal
EAU	2.8	2.0	Rice
Total	75.5	65.8	

Source: Authors (2019) from Comtrade, 2019

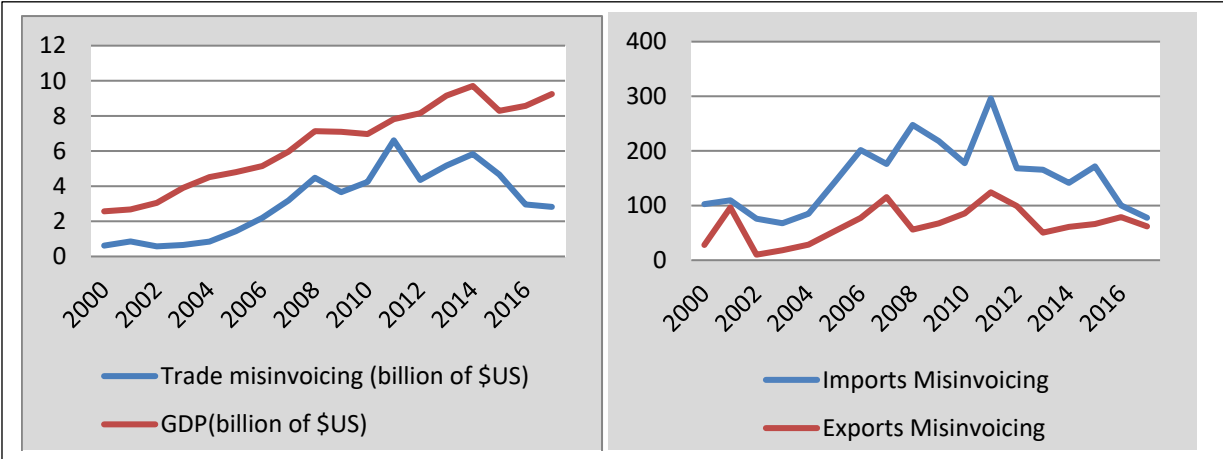
4.1.3. Mis-invoicing: Magnitude of Gaps in Bilateral Data

Discrepancies at the level of aggregate trade

Empirical investigations of the extent of inconsistencies between partner countries based on trade statistics have allowed several authors, including Jackson (2003), to draw several conclusions. In general, the level of accuracy is low, especially high levels of aggregation. Moreover, there seems to be no justification for assuming that the discrepancies simply reflect FOB-CIF differentials. Indeed, for Benin and its main partners, we find large discrepancies between the trade flows recorded on each side. These gaps average \$3.065 billion over the period 2000-2017. Farzanegan (2008) finds a similar value (\$3 billion) for mis-invoicing in Iranian trade over the period 1970-2002. In Benin, discrepancies show substantial variation, rising sharply by 976% between 2000 and 2011. They peaked in 2011 at approximately \$6.6 billion, representing about 85% of GDP. This estimate is lower than that of the World Bank (2015), which estimated the gap at nearly \$8.5 billion or 116% of GDP for the year 2011. A 57% decline was then noted between 2011 and 2017, bringing the growth rate to 360% over the study period. In terms of trade, the share of mis-invoicing in total trade, especially that of imports, is considerable and borderline alarming, as it far exceeds the amounts of legally recorded trade (figure 2). Mis-invoicing imports were estimated at more than 100% of total trade in 2000 and increased steadily until 2011, when they reached a peak of nearly 300%. Similarly, fraud on export invoices shows a similar trend, but with more moderate proportions. From 2000 to 2011, the incidence of fraud increases from 27% to over 124% in 2011, which is the year with the largest differences.

The theory on mis-invoicing is that larger volumes of goods traded lead to larger illegal practices. However, in 2011, Benin's foreign trade was no greater than in previous years; on the contrary, it contracted due to the wait-and-see behavior of operators during election periods. Indeed, from 2010 to 2011, trade fell by 3% and 27.2% respectively for import and export flows. This spike in mis-invoicing in 2011 must therefore be explained elsewhere. For example, this year the organization of elections in Benin is attracting a lot of attention to the detriment of other spheres of life in the country. Traders and customs agents may take advantage of these moments to falsify trade data, especially if it is assumed that the customs code was not amended in 2011.

However, discrepancy rates have been reduced considerably, especially in recent years. After 2011, we see this rate decreasing from 300% to 168% in 2012 and continuing to decrease until it reaches 62% in 2017 for import flows. Similarly, for export flows, we see a decline in the rate of mis-invoicing from 124% in 2011 to 50% in 2013 and finally to 61% in 2017. Although these proportions are still high, we note the efforts of the authorities to clean up foreign trade flows.



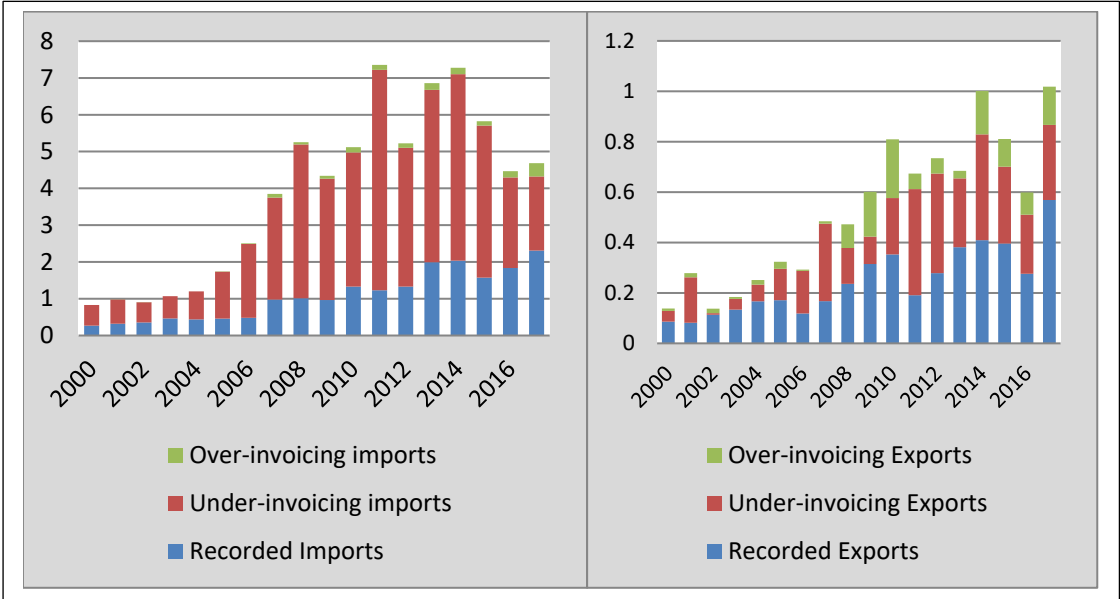
Source: authors (2019) based on Comtrade 2019 data
Figure 1 : Share of mis-invoicing in Benin's total trade (%)

Are we talking about under-invoicing or over-invoicing?

When discussing the role of illegal practices in creating discrepancies in official trade, it is useful to distinguish between those that lead to the over-reporting of exports (imports) relative to imports

(exports), from those that under-report exports (imports). In general, mis-invoicing in Benin's trade is characterized by under-invoicing of both imports and exports, but it is higher on the import side and exceeds the recorded values (Figure 4). Over-invoicing exists, but it is lower on the import side. The evolution of mis-invoicing in Benin between 2000 and 2017 has increased more than proportionally to recorded trade (Figure 4). Import under-declarations are estimated to have increased from \$561.7 million to \$2.01 billion, an increase of more than 258 percent in 18 years. The over-declarations of imports detected are significant only from 2005 and are such that they rise from \$9.2 million to \$360.8 million, a drastic increase of nearly 4000% in 12 years, while the recorded trade in imports has only increased by 760% from \$268.7 million to \$2.3 billion between 2000 and 2017. Regarding export flows, we note that under-declarations have increased by nearly 600% for values ranging from \$ 42.6 million to \$ 298.1 million respectively from 2000 to 2017. Over-declarations have seen a more pronounced increase of nearly 1411.8% for values ranging from \$10.03 million to \$151.7 million, while the recorded flow shows an increase of 562% for values rising from \$85.8 million to \$568.6 million.

Over the period 2000-2017, the average fraud for all flows is \$3.065 billion with a 360% increase. These statistics do not differ much from the statistics calculated by Kar and Spanjers (2014) for some developing countries. For example, they find frauds of \$2.297 billion and \$1.823 billion for Côte d'Ivoire and Togo over the period 2003-2012. Over the same period, the average frauds are more important for Asian countries such as: China, Malaysia, and India are \$105.726 billion, \$43.495 billion and \$32.057 billion, respectively. There are many reasons for these differences in the case of Benin. They may include the CIF-FOB differential, geographical distances, the type of goods, the timing of the trade register, exchange rate variations, classification errors, the level of modernity of the port and port practices, classification problems when re-export is involved, etc. Nevertheless, the size of the differences obtained leads us to believe that beyond these reasons, the motivations may be to circumvent the standards.



Source: Authors (2019) from Comtrade, 2019
Figure 3: Types of discrepancies and recorded trade (\$ billion)

These analyses call for three main observations: (i) the highest volumes of mis-invoicing are carried out in imports, but it is precisely this type of flow that brings foreign trade to over 80% in 2017. This supports the analysis of Pitt (1981) who states that falsification of statistics is more widespread in larger volumes of trade. (ii) Import mis-invoicing is characterized by under-invoicing, which indicates that the primary objective of these transactions is to avoid customs duties (Bhagwati, 1964; Morgenstern, 1963; Jackson, 2003). (iii) Export mis-invoicing's are characterized by both under- and over-invoicing and are less voluminous than the former. Here the objective of benefiting from export subsidies (by over-

invoicing) would not be the only one; it is therefore important to investigate the phenomenon. Indeed, if certain export products are subject to export taxes (as is the case with cashew nuts) and demand conditions are such that the producer bears part of the tax incidence, the exporter has a motive to circumvent these trade restrictions by underreporting the quantities exported. In addition, the existence of the parallel FCFA/Naira exchange market encourages operators to underestimate their exports and sell on the informal market while benefiting from the premium intended to finance the informal market (Bhagwati, 1981).

4.1.4. Partner countries involved mis-invoicing in Benin's trade

From Table 3, we identify Benin's partner countries with which the discrepancies are greater over the last five years (2013-2017). Of Benin's ten (10) main trade partner countries, eleven have recorded mis-invoicing levels exceeding 100% of recorded trade flows for at least one year. Only France has statistics consistent with Benin for discrepancies not exceeding 20% of trade over the five years under review. Thus, for import flows, Benin's leading partner in trade fraud is China with an average of nearly 916% from 2013-2017, where rates reached records of over 1121% and 1021% in 2014 and 2015, respectively. Although the rates are still very high, we notice a downward trend of 200% and 300% compared to 2015 in 2016 and 2017 respectively. In second place comes Malaysia with almost 500% on average proportions of mis-invoicing with a peak of 932% in 2014 and then remarkable decreases of 442%, 600% and almost 800% of mis-invoicing. Next comes the US with an average of 334% mis-invoicing proportion and a peak of 682% in 2015 followed by substantial declines in subsequent years. India comes in fourth with an average of 160% of mis-invoicing proportions with a peak in 2014 of over 500%. As with the previous countries, there are decreases in the following years, however, these decreases are stronger, bringing the gaps to less than 20% from 2015 to 2017. Next come countries like the United Arab Emirates, Belgium and Thailand with average proportions of 146%, 92% and 76% respectively. The latter countries have also seen their mis-invoicing's drop in the last two years. This downward trend in illegal practices and errors in Benin's foreign trade bodes well and demonstrates the efforts of political authorities through trade policies and measures to reduce unrecorded trade flows (e.g., PVI, PVI-NG, capacity building of the customs administration).

Regarding export flows, the leading partner in mis-invoicing is India, with an average proportion of mis-invoicing in the recorded flow of nearly 270% between 2013 and 2017. We note a peak in 2014 of 350% followed by slight decreases in subsequent years. In second place, we have Vietnam with an average proportion of over 180%. We also note a peak in 2016 of 406% followed by a sharp decline of nearly 300% in 2017. In third place comes China with an average proportion of mis-invoicing of almost 110%, with a peak in 2014 of almost 180%. In fourth place comes Malaysia with an average fraud proportion of 93.5%, however, there is some stability in these proportions over the period under consideration. Finally, we find Denmark with an average proportion established around 82.3% with a peak in 2014. In lesser proportions, we find in descending order Nigeria (77.1%), Turkey (44.3%), Niger (24.7%), Egypt (19.6%) and finally Bangladesh (16.3%). Recall that apart from Turkey, these main partners in fraud are also the main partners in trade recorded.

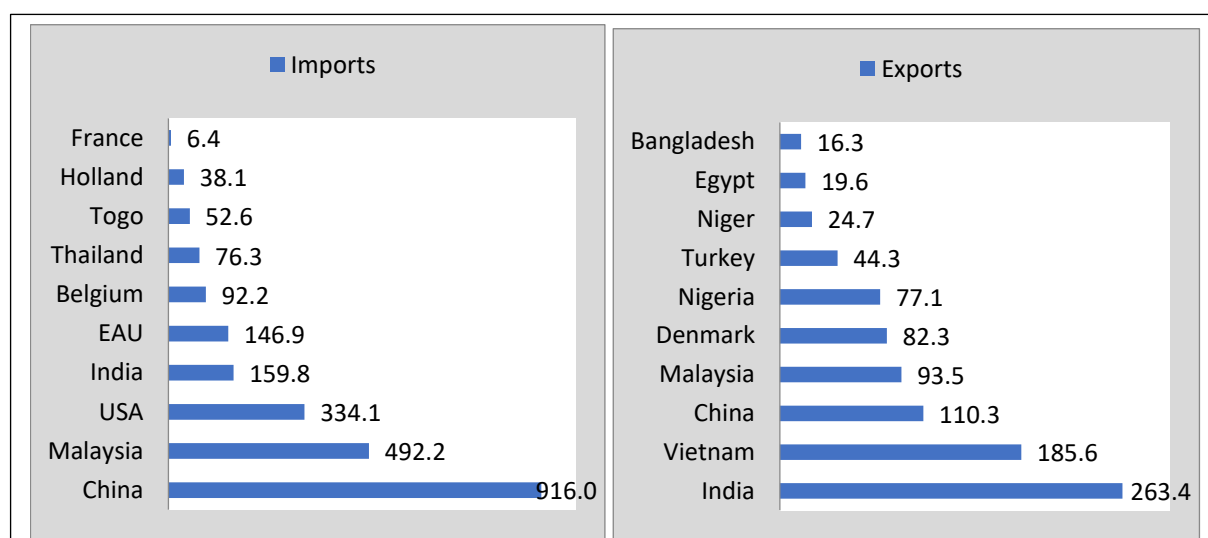
The evolution of the volume of imports in recent years is partly encouraged by re-exports. Indeed, re-exports of legally imported goods (or quasi-smuggling) is a particularly important component of trade in Africa that consists of "re-exports" where goods are officially imported into a low-tax or low-cost country with the aim of transshipping them either legally or illegally to neighboring countries with higher taxes, import quotas from trade facilitation services, or stricter regulatory standards (Golub, 2015). Thus, the combination of Nigeria's protectionist trade policy with the size of its markets has led to the creation of a re-export trade in Benin, whereby imports from outside the region (e.g., Asian and EU countries) pass through Benin before being mostly smuggled into Nigeria. Based on the ECENE survey (INSAE, 2011), illegal re-exports from Benin to Nigeria amount to more than 267 billion FCFA in 2009 alone, while for the same year, legal re-exports are estimated at only 34 billion FCFA, or about 8% of illegal re-exports (Bessan, 2019). Thus, mis-invoicing is encouraged by re-export trade and could be reduced if re-export incentive policies were removed.

The evolution of these statistics calls for two main comments : (i) Benin's main legal trade partners are also the main fraud partners, so the greater the volume traded, the greater the fraud, sometimes more than proportionally (nearly 300% fraud for a recorded trade of 76%); the volume of trade or the type of products may be the basis for such practices. (ii) Imports for re-export may be a source of mis-invoicing in Benin's trade through these high volumes to supply markets in neighboring countries.

Table 3: Major partners in mis-invoicing in Benin from 2013-2017 (%)

Mis-invoicing in proportion of the flow recorded by partner countries											
Years		2013		2014		2015		2016		2017	
	Mis-invoicing	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over
Imports	China	914.55		1121.15		1021.46		820.99		701.81	
	Malaysia	580.61		932.08		480.28		330.12		139.28	
	USA	274.07		231.48		682.02		300.45		182.51	
	India	163.69		538.16		67.95		12.48			16.84
	EAU	199.61		134.09		245.36		8.59			
	Belgium	124.05		146.44		132.03			37.97		20.24
	Thailand	94.52		153.69		13.02		60.25		60.11	
	Togo		60.25		65.57		52.74		34.08		50.17
	Netherlands	17.11		16.08		74.72			22.5		60.09
	France	3.97		15.17		1.65		10.58		0.54	
Exports	India	177.82		350.34		326.99		239.78		221.99	
	Vietnam	196.33		93.49		127.94		406.56		103.58	
	China	70.94		179.43		136.87		103.02		61.20	
	Malaysia		83.25		96.13		97.94		99.94		90.46
	Denmark		23.92		88.08		99.97		99.80		99.90
	Nigeria	47.38		97.15		89.57		74.93		76.25	
	Turkey	1467.02			96.18		41.01		5.41		34.75
	Niger		26.44		1.96	2.62		27.8		64.83	
	Egypt	1.09		77.79		8.38		7.03		3.91	
	Bangladesh	12.94		27.7		10.77		23.89			

Source: Authors (2019) based on Comtrade 2019 data



Source: Authors (2019) based on Comtrade 2019 data

Figure 4: Average share of mis-invoicing by partner (2013-2017 in %)

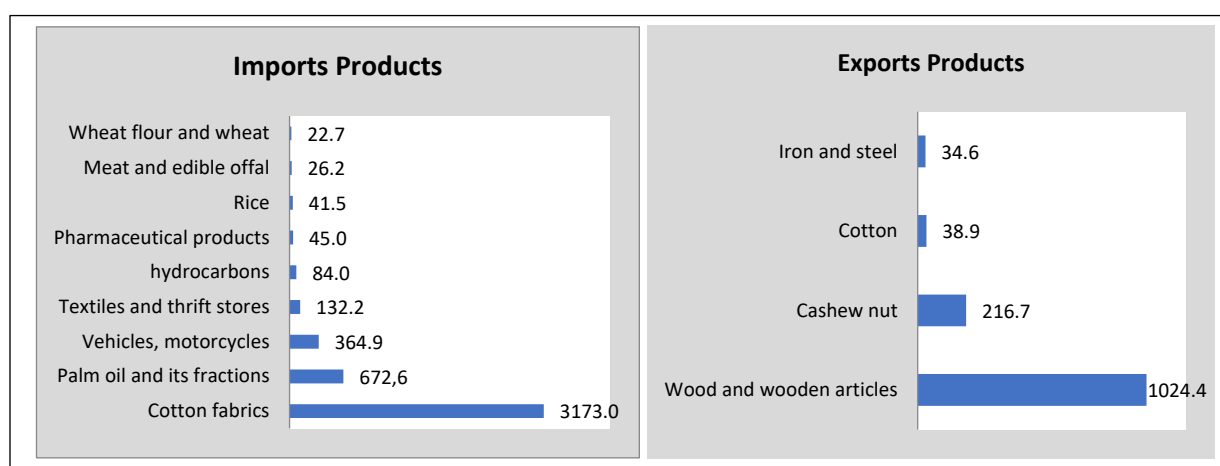
4.1.5. Mis-invoicing by main products in Benin's trade

When we push the analysis to the product level, it becomes plausible. Indeed, from Table 4, we seek to detect mis-invoicing based on the main products traded. We have selected thirteen products, nine of which are imports and four of which are exports. In general, while it is true that the largest volumes of fraud are committed with the main trading partners, when it comes to products, it is not the main products that are more subject to illegal practices. Fraud is highest with products that have a smaller share of trade but are subject to restrictive trade measures that encourage fraud.

Table 4: Main products subject to mis-invoicing (%)

		Mis-invoicing in proportion of the flow recorded by product									
Years		2013		2014		2015		2016		2017	
Mis-invoicing		Under	Over	Under	Over	Under	Over	Under	Over	Under	Over
Imports	Cotton fabrics	3356.3		3103.1		3336.0		3044.1		3025.6	
	Palm oil and its fractions	823.1		1491.4		468.2		461.2		119.2	
	Vehicles, motorcycles	494.5		586.9		515.5		109.1		118.4	
	Textiles and thrift stores	126.1		115.1		91.1		122.8		211.1	
	hydrocarbons		86.5		87.0		62.8		90.0		93.6
	Pharmaceutical products	77.7		67.6		62.5		15.5		1.9	
	Rice	100.2			19.2	16.0		4.8			67.0
	Meat and edible offal	11.8		33.1			3.79		55.8	46.3	
	Wheat flour and wheat		28.6		21.6		4.68		35.2		23.4
Exports	Wood and wooden articles	694.5		1800.8		827.4		1306.0		493.5	
	Cashew nut	116.5		162.1		231.4		370.9		202.4	
	Cotton	4.9		63.1		20.06		59.6		46.6	
	Iron and steel		13.0		38.7		35.3		53.6		32.2

Source: authors (2019) based on Comtrade 2019 data



Source: Authors (2019) based on Comtrade 2019 data

Figure 5: Average share of mis-invoicing by major products (%2013-2017).

In terms of import flows, the products most affected by fraud in order of importance are: cotton fabrics and similar (3173%), palm oil and its fractions (672.6%), vehicles, motorcycles and accessories (364.9%), and textiles and second-hand goods (133.2%), whereas for example for the year 2017, their share in recorded trade was only 0.84%, 6.6%, 5%, and 0.64% respectively. On the other hand, products

whose weight is important in the import trade, such as rice (35%) and hydrocarbons (17.3%), are less prone to illegal practices, with an average of 41.5% and 84% of mis-invoicing. However, there are products whose shares of trade are relatively low (3.3%, 1.7% and 3.0% respectively) and which are also less prone to illegal practices. These are meat and edible offal, flour and wheat, and pharmaceutical products, which have fraud proportions of 26%, 22.7%, and 45%, respectively. These products are essentially imported from France, the country least prone to fraud in transactions with Benin, according to the analysis above. For these products, the statistics have not surprisingly accurate for several years (see Table 4). This leads to the conclusion that if fraud on product invoices is directed at products with low proportions in trade, the seriousness or otherwise of the product's partner can lead to limiting or increasing this fraud. Another finding is that the products subject to mis-invoicing are mainly re-export products. Table 5 below shows the share of re-exports in Benin's imports for some key re-export products.

Table 5: Quantity and share of re-exports to Nigeria for key products

	Rice		Palm Oil		Used Cars	
	Quantity (ton)	% share of import	Quantity (ton)	% share of import	Quantity (number)	% share of import
2011	112.3	41.59	122.6	7.2	358 181	71.91
2012	294.4	53.29	94.9	17.8	334 488	82.59
2013	854.2	62.82	146.8	28.4	343 890	84.49
2014	848.0	61.62	102.1	38.6	353 146	79.19
2015	751.2	33.88	147.6	14.2	285 587	78.75
2016	403.0	37.67	97.9	32.9	79 093	61.21

Source: Report of the Mission to Assess the Competitiveness of Products in the Nigerian Market, 2017

Indeed, informal re-export and transit trade to Nigeria accounts for 20 percent of Benin's GDP, according to World Bank's data in 2019. Re-export trade is concentrated in a few products subject to high tariffs or import bans in Nigeria, such as rice, palm oil, textiles, and used cars. Table 5 above shows the evolution of re-exports to Nigeria of these products. On average, from 2011 to 2016, the evolution of re-exports of these products follows that of imports. On average, nearly 50% of rice, 27% of vegetable oil and 80% of used cars are imported from overseas and then re-exported to Nigeria.

In terms of export flows, the products of fraud are wood and wood products (1,024%) and cashew nuts (216.7%). Similarly, as above, cotton, Benin's leading export product (accounting for nearly 50% of exports in 2017), records an average share of mis-invoicing of only about 39%. While wood and wood products, representing 0.25% of export trade, record staggering proportions of fraud averaging over 1000%. However, this rule does not apply to cashew nuts, which, although representing more than 13% of Benin's export trade in 2017, has an average fraud rate of nearly 185%. This result is consistent with our earlier conclusion about the seriousness or otherwise of the trading partner. Indeed, most of the walnut production is exported to India, which is one of Benin's trading partners where their fraud is prevalent (2nd, see Figure 5). Similarly for iron and steel, although low in trade (0.51%), the share of fraud is not high (35%), however, this share increased by nearly 22% between 2013 and 2017, which helps to validate our conclusion on the seriousness of the partner because this product is mainly exported to Viet Nam and China respectively 1st and 3rd country to fraud exports.

Furthermore, while in general there has been a downward trend in mis-invoicing recorded by partner countries in recent years, this finding is mixed when the analysis is brought back to the product level. Indeed, a downward trend is observed only for products such as vehicles and motorcycles (74.5%), pharmaceuticals (100%), palm oil and its fractions (84.5%), and wood and wood products (29.4%). For these last two products, a sharp increase in 2016 (a year of very significant tax measures and trade restrictions) should be noted before the decline in 2017. We note a stability of proportions to fraud for products such as cotton fabrics (3000%), hydrocarbons (80%) and Cotton (40%). On the other hand,

increases are recorded for products such as textiles and second-hand goods (62.4%), meat and edible offal (158.2%), rice (519%), iron and steel (22%) and cashew nuts (81.5%).

4.2. Some reasons for the discrepancies in Benin's bilateral foreign trade

Benin's economy is unique, and the upward trend in trade gaps, in addition to traditional causes, is also based on causes that are specific to Benin.

4.2.1. The ambiguous role of tariff and non-tariff measures

These increases in fraud have been justified by the tightening of trade measures in recent years. Indeed, in October 2016, 15 import products were declared prohibited by Beninese customs through service note 396/DGDDI/DLRI on "Temporary ban on the release for consumption of certain products by land". These are food products such as: wheat flour, pasta, vegetable oils, frozen meat and offal, milk, sardines, tomato concentrates, alcoholic beverages, food yeast, second-hand clothes and hosiery, shoes and Chinese bags, furniture and leather, tires, rice and fabrics. In addition, for meat and edible offal, an interministerial order of April 24, 2017, was signed by the government to ban the import of meat and meat products from Brazil declared unfit for human consumption. This prohibition measure also concerns the import of frozen meat, from all origins through the land borders.

Regarding export products such as mahogany nuts and wood, there has been an increase in taxation and regulation of export procedures. To name a few, the Beninese government introduced during one of its councils of ministers in April 2017, an additional levy of 50 FCFA per kilo of raw nut exported. This tax is in addition to the export tax of 10 FCFA per kilo called "contribution to agricultural research" provided for by the finance law management 2017. In addition, the export of cashew nuts is prohibited by land. Similarly, for the timber sector, the sector not being organized, the Council of Ministers on Wednesday, April 13, 2016, had decided to suspend the export of timber and the approvals of exploitation of forest products to clean up the sector. To revive the sector, a differential tax grid by volume is applied according to the level of processing. In addition to forestry import and export duties, a volume-based customs tax has been introduced. In addition, conservation measures have been taken to protect forests that are under serious threat of destruction. These measures have therefore encouraged actors to increase fraud on these products by circumventing the established measures. Figure 6 ranks the products that are subject to mis-invoicing in Benin.

Moreover, all the discrepancies assessed over the period 2013-2017, are under-invoicing (except for wheat flour, hydrocarbons and iron and steel), which confirms the conclusion of some works that avoidance of payment of customs duties and taxes are one of the primary motivations for fraud (Farzanegan, 2008; Golub and Mbaye, 2009; Golub, 2012; Benjamin et al., 2012; Berger and Nitsch, 2015).

4.2.2. The role of flexibility measures: the practice of adjusted value and the re-export incentive

In Benin, two types of customs clearance are applied. Customs duties are applied either to the transaction value of the goods or to the adjusted value. The adjusted value is the result of a relaxation measure for customs clearance operations for consumer goods, mainly food products and textiles (see Table 6). Given the heavy tax burdens (cumulative tariffs go to more than 34% to 60% of the market value of wheat flour and fabrics respectively), this measure consists of lowering the transactional value before the application of customs duties to encourage imports of non-locally produced goods, while implementing the state's social policy. For example, in June 2018, a ton of wheat flour had a transactional value of 270,000FCFA while the adjusted value was 150,000FCFA or 55% of the transactional value¹². Although it constitutes a loss of tax revenue for the state, this measure has a social connotation because it facilitates the purchase of these goods by disadvantaged segments. In addition, this practice constitutes a bias in Beninese customs statistics. A reservation is therefore necessary on the quality and availability of statistics on Beninese trade, a finding already noted by a World Bank study in 2015 on

¹² Information obtained from interviews with stakeholders in Benin's foreign trade. These are customs officials, Benin control, INSAE, PAC and the Ministry of Trade.

competitiveness and trade in Benin. Indeed, it is the adjusted value that appears in Benin's customs data transmitted to Comtrade¹³.

In addition, the implementation of these adjusted values justifies in part the upward trend in the differences in bilateral trade and thus constitutes an important cause of mis-invoicing in Benin's trade. Indeed, when comparing the mirror statistics of imports, the gap is very large (\$6.1 billion in 2011 and average \$2.72 billion). Where do these imports go? It is unlikely that they will be absorbed by Benin's domestic market, as they represented 80% of the country's GDP in 2011 and an average of nearly 45% of GDP. It is more likely that many, if not all, of these "unaccounted for" imports are in fact fraudulent. Imports that are undervalued because they are imported under the normal regime, declared for local consumption, are then fraudulently re-exported to Nigeria. The gross value of transit trade with Nigeria is estimated at more than two-thirds of Benin's GDP, and its contribution in terms of value added is estimated at about 20 percent of GDP (Golub 2012). Moreover, the products affected by this clearance process are precisely those products that are prohibited or subject to severe trade restrictions in Nigeria. The table below compares the products subject to value capture with those that are prohibited or have high tariffs in Nigeria.

Table 6: Products subject to relaxation in Benin vs. Prohibited products in Nigeria

Products subject to adjusted value		Prohibited Products in Nigeria / Re-export Products	
Tomato	Rice,	Frozen poultry	Plastic sanitary ware and household articles of plastics
Sweetened condensed milk	Frozen meat (sausage, poultry abtas, gesier),	Meat (pork, beef)	Retreaded and used pneumatic tires
Unsweetened condensed milk	Frozen fish,	Bird eggs	Toilet paper and corrugated cardboard
Chewing gum	Pasta,	Refined vegetable oils and fats	Carpets and other textile floor coverings
Candies	Wheat flour,	Sugar cane or beet and Cocoa butter, powder and cakes	bags and suitcases
biscuits	Granulated sugar,	Spaghetti and Noodles	Hollow glass bottles
candles	Wax fabrics,	Juice	Used Compressors, Used Air Conditioners and Refrigerators and Freezers Used.
cubes	Hitarget fabrics,	Waters (mineral and carbonated)	Used vehicles
matches	Synthetic fabric	Cement	Furniture
Refined palm oil		Various Drugs	Ballpoint pens and coins
Vegetable oil		Pharmaceutical waste	
		Soaps and detergents	
		Mosquito Coils	

Source: Extract from Service Note N°1020-DGDDI-DBP of April 10, 2017, and Bessan (2019).

4.2.3. Role of the Import Verification Program (IVP) in reducing discrepancies

Another important factor in reducing trade discrepancies is the implementation of the Import Verification Program. Indeed, memo No. 551/DRAL/R3 on the implementation of the interministerial order No. 161/Mef/Mpdepp-Cag/Mdcentmip of March 31, 2011, has been taken by customs. The said memo is related to the implementation of Decree No. 2011-106 of March 26, 2011 establishing a program of verification of importers (PVI) in Benin with the corollary of an obligation to inspectors at the customs post of the Autonomous Port of Cotonou to "take into account the verification certificate issued by the company Benin Control-SA for the clearance of goods whose FOB value is greater than or equal to 500,000 CFA francs. This implies the use of the value issued by the certificate of verification of the Benin-Control-Sa company for the clearance of any goods whose FOB value is higher than 500,000 FCFA. The goods exempted from submission to the IVP are listed in Table 7 below.

¹³ The transaction values are not recorded by the Beninese customs; it is Benin control which keeps these statistics today since the implementation of the PVI.

As noted above, the IVP is a mechanism for verifying the value of goods entering Benin through both documentary checks, based on importers submitted documents, and physical controls using scanners and tracking systems. Its purpose is to improve customs revenues by combating customs fraud, facilitating the removal of goods from the customs cordon and strengthening the capacity of the customs administration. The IVP was suspended 17 months after its implementation and then renewed five years later through the IVP-New Generation in 2017, its effects remain palpable on mis-invoicing. The PVI and the IVP-NG have changed the habits of port agents. The verification of statistics from the advent of this program shows a significant reduction in fraud, at the general level. As for the analysis at the product level, the discrepancies remain high and persistent for certain products, namely products subject to adjusted value such as fabrics, palm oil, second-hand goods, etc.

Table 7: List of products not subject to the IVP

<i>Products exempted from PVI</i>	
Stones and precious metals; art objects; Explosives and pyroCETHnic articles, Ammunition and weapons other than hunting and / or sport, similar materials and equipment imported by the army for its own account; Live animals; Used metals and used tires; Plants, seeds and floricultural products; Cinematographic films impressed and developed; Current newspapers and periodicals; Drugs and pharmaceuticals;	Personal effects and household objects including used vehicles; Postal parcels; Donations made to natural and legal people of public law; Imports by the Administrations for their own account; Supplies to United Nations diplomatic and consular missions and agencies imported directly by them for their own purposes; commercial samples; Goods totally exempt from tax and value added tax.

Source : Author’s computation based on data from http://benincontrol.net/wpcontent/uploads/2017/01/marchandises_soumises_contrle_liste_exemptions.pdf

4.3. Determinants of the volume of mis-invoicing in the statistics

4.3.1. Validation of findings

In this section, we identify the significant determinants of discrepancies in trade statistics reporting Benin's imports/exports from its main trading partners using mirror statistics. Recall that we cannot test the accuracy of the data with this method; instead, we assess consistency. This is particularly relevant in the following empirical analysis based on specification (3). We estimate for each trade flow an equation with the PCSE estimator with contemporaneous autocorrelation to show the relevance of the chosen estimator and the existence of autocorrelation between the panel. Then the autocorrelation chosen is specific to each product because this allows us to obtain better results. In addition, Beck and Katz (1995) argue in favor of estimating panel-specific AR parameters, as opposed to one AR parameter for all panels. The estimation results are reported in Table 8.

4.3.2. Estimation results and economic analysis

For import flows (PCSE 1), the variables selected explain 70% of the divergence in trade, and the model is statistically significant at 1%. All the variables considered have the expected signs and are significant except for the Nigeria/Benin tariff differential and the probability of under-invoicing. Tariffs have a positive effect on divergence, meaning that a 1 percentage point increase in tariffs increases divergence due to fraud by 0.59 percentage points. This result corroborates previous work that finds that DD is the primary reason for smuggling goods to avoid DD payments. In Benin, the implementation of the ECOWAS CET in 2015 consisted in raising the level of DDs compared to countries in the subregion. Similarly, the positive effect of the DD differential between Benin and Nigeria corroborates our results. Since Benin's trade policy is essentially modeled on Nigeria's, any 1 percentage point increase in Nigerian DD relative to Benin's leads to a 0.13 percentage point increase in divergence due to fraud. Considering the construction of this explanatory variable, from the theoretical WIP, we conclude that the hypotheses are corroborated by this result, despite its insignificance. Thus, if this gap exists between

the two neighboring countries, fraud will increase. This assertion is based on a non-linear relationship between duty rates and revenues of the Laffer curve type.

However, the product share of trade (POC) variable is negative and significant at the 1% risk level. The increase in the share of total trade could correspond to greater accuracy in the data and thus a reduction in import fraud. Indeed, a higher share suggests that the government is more dependent on this source of revenue. In this sense, the marginal value to the government of a unit of import of that product with a higher volume is greater than the marginal value to the government of a unit of import of a product with a lower volume. Therefore, whatever level of resources is available to customs authorities, it is optimal to allocate them in a way that maximizes the accuracy of import record for high volume imports. The results found invalidate previous work that defines a relationship between the dynamism of import trade evolution and discrepancies where legally registered trade is a springboard for higher volumes of fraud. While it is true that it is easier to conceal the value of goods when the volume is large, this can also be accompanied by increased control, especially in a country like Benin that is heavily dependent on fiscal resources to finance its national policy.

The variables product perishability (PP) and import verification program (IVP) are both negative and significant. Perishable products, generally food products, are difficult to camouflage and are therefore less prone to fraud. Similarly, the implementation of the import verification program is a good instrument for reducing fraud. The RDP and MNT variables are incentive factors for fraud. Indeed, Asian countries are in all sectors and trade with the world in very large volumes (e.g. China is the world record in terms of exports and imports in 2018), so there are higher risks to fraud. This is consistent with the fact that most of the products subject to adjusted value come from Asian countries. Also, the tariff and non-tariff measures implemented by the government in recent years have resulted in an increase in the already high level of fraud.

The regression equation for exports (PCSE 2) gives an R-square equal to 0.52 and a Wald-statistic p-value significant at 1% error. The negative sign of the constant does not support the analysis of Jackson (2003) who justifies this parameter as the CIF-FOB difference if the model is well specified. Thus, the negative sign indicates that the relatively large differences in export products could be more than just differences in transportation costs or exchange rates; it could be a problem of fraud. This justifies the significance of this variable. The customs export revenue (DR) variable was omitted because it is strongly correlated with the CDP variable. In addition, Benin's export promotion policy involves very little tax on its exports (0.85% road tax).

The PDC and PP variables have negative expected signs and are significant at the 1% level respectively. The latter result is contrary to that found by Mitaritona et al. (2017) in the context of informal cross-border trade. Like import flows, when export flows become significant, fraud decreases with some differences for the same reasons discussed above. Indeed, exports in Benin are not very diversified, and it goes without saying that strict controls are applied to the small number of transactions that take place. We also note that the more perishable the product is, the less prone it is to fraud.

This unpredictable result shows the effort of the public authorities to support producers. Indeed, the Investment Code and the industrial free zone (IFZ) regime provide for various reductions, exemptions or other tax incentives (including import duties) also on raw materials and packaging imported for the manufacture of exported products. Exports of products processed or manufactured in the free zones and free points by companies approved for the ZFI regime are subject only to payment of the road tax. However, since the entry into force of the ECOWAS CET, companies approved under the ZFI regime no longer enjoy tariff preferences within countries of the region such as Nigeria, since community origin is not conferred on their products. However, since 2016, following an amendment to the Investment Code, companies approved under the ZFI provisions can waive this regime to opt for the benefits offered by the Investment Code. Within the Benin Chamber of Commerce and Industry (CCIB), the AGOA Resource Center, in place since 2010, assists Beninese exporters to benefit from the advantages (trade preferences) offered under AGOA. In 2014, the government established the Investment and Export Promotion Agency (Apiex) under the Presidency of the Republic to support exports and investments in Benin. It is the result of the merger of the Beninese Trade Promotion Agency (ABePEC), the One-Stop

Shop for the Formalization of Enterprises (GUFÉ) and the Presidential Investment Council (CPI). Apex's export promotion activities include the dissemination of trade information on external markets. The other variables are not significant.

Results of micro panel estimates of the volume of mis-invoicing are reported in Table 8. We then estimated for the whole trade (PCSE 3) to test the robustness of the results. Concerning the individual significance, this model confirms the previous results obtained with a few nuances. Indeed, the divergence in the value of a product is positively and significantly influenced by customs duties and differential, customs revenue, the region of origin/destination of the product, and tariff and non-tariff measures. While it is negatively and significantly influenced by parameters such as the product's share of trade, the product's perishability, and the implementation of the import verification program (PCSE 3). Thus, the volume of trade divergence increases with an increase in DD or customs revenue, or when a product is subject to tariff measures or if the product originates/destines in an Asian country. This result describes the reality of the data, which shows a tendency to over-invoice rather than under-invoice export products, especially when it comes to products such as cotton, iron, and steel. Cashew nuts and wood are more affected by tariff and non-tariff measures, so the trend is more toward under-invoicing.

Table 8: Micro panel estimate results of mis-invoicing volume

Dependents Variables	Imports mis-invoicing (LProFFI)	Exports mis-invoicing (LProFFE)	Trade mis-invoicing (LProFF)
Independents Variables	PCSE (1)	PCSE (2)	PCSE (3)
LDDDB	0.5978209**		
LGapDD	0.1304491		
LPDC	-0.4053877***	-0.6022024***	-1.013781***
LRD			0.5513506***
ProBF	-0.1849049	0.4541019	-0.926***
RDP	1.799532***		1.739603***
MNT	0.3385664	0.6398891	0.580073**
PP	-1.706032***	-1.388092***	-0.4373348***
PVI	-0.3607894		-0.4373348***
Constante	1.600881**	-0.2495074	-8.327739***
Observations	40	20	65
R2	0.7080	0.5263	0.4714
Wald chi2	144.99	39.06	338.70
Prob	(0.000)	(0.000)	(0.000)
Estimated Covariances	36	10	91
Estimated	8	4	7
Autocorrelations			
Rhos	-0.7738107	-0.1580122	0.8075481
	-0.1079255	0.0964239	0.6537239
	0.8329336	0.6349003	0.8171638
	.	0.0085179	0.6595134

	0.2711091		0.6675706
Estimated Coefficients	9	5	8

NB:*,**,*** sont respectivement le niveau de significativité à 10%, 5% et 1%

Source: Author's computation

Conclusion

After assessing the discrepancies in Benin's trade statistics, we then attempted to explain the causes in two data sets (imports/exports). Based on the work of Jackson (2003) inspired by Sheikh (1974), we specified a model of mis-invoicing based on policy distortions and the impact of rent-seeking and illicit

behavior on data accuracy. The contribution to existing literature can be at three levels. First, following Jackson (2003), we include in the model additional explanatory variables beyond simple import tariffs. By stipulating net shares of each product in trade as nontrivial influence variables. Second, we find that the trade policy differential is a source of increased divergence due to fraud. Third, we include in our specifications indicator variables that support the possibility that some products are easier to smuggle than others through their perishability or non-perishability, or that imports from some countries are easier to conceal than those from others.

While there may be several reasons for these discrepancies, the fact remains that their upward trend and high volume over the past few decades undermines the accuracy of economic analysis and calls into question the country's trade policy regime (adjusted values). The level of recording of Beninese statistics must therefore be improved. Perfect records are not necessary. It is sufficient that any errors in the country's statistics are subject to random errors. To reduce these discrepancies, Benin needs to manage its international trade flows more effectively by strengthening customs control at the land and air border. Also, through capacity building of customs officers in the harmonized product classification system at disaggregated levels. At the same time, its trading partners, especially those in Asia, must contribute to more effective governance of international trade. The international community must cooperate and coordinate the management of its trade if the volume of fraud is to be controlled. To this end, there is a clear need to harmonize national and international trade laws to ensure regulatory consistency, make detection effective, facilitate the apprehension of violators, and control trade billing errors. Finally, WTO rules are not incompatible with this policy suggestion and, therefore, more political will is needed in Benin.

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Annexes

Divergences totales dans le commerce du Bénin (\$ US)			
	Imports	Exports	Fraudes totales
2000	561776755	52669060	614445815
2001	659620946	196708440	856329386
2002	550151601	24331022	574482623
2003	603338936	49742465	653081401
2004	759034694	84475213	843509907
2005	1282125210	152841236	1434966446
2006	2023605880	173547764	2197153644
2007	2871246569	316816476	3188063045
2008	4241730693	236178761	4477909454
2009	3378720107	286364980	3665085087
2010	3790090996	456288447	4246379443
2011	6128615550	482873642	6611489192
2012	3894424173	455680180	4350104353
2013	4870707048	303531544	5174238592
2014	5239000482	591630359	5830630841
2015	4251197076	414246529	4665443605
2016	2632641349	322623753	2955265102
2017	2374672248	449790037	2824462285
Moyenne	2784038906	280574439	3064613346
Somme	50112700313	5050339908	55163040221
Taux(%)	322,7074593	753,992908	359,6763809

Questions d'entretiens		
N°	Questions	Reponses
01	Nom et prénom, fonction et adresse	
02	Ces statistiques vous semble réelles ? Existe-t-ils des écarts dans le commerce extérieur du Bénin	
03	Sinon pourquoi?	
04	Si oui quelles pourraient être les causes	
05	Quelles sont les mesures que le gouvernement pourrait mettre en place pour réduire ces écarts	

IMPORTS DISCREPANCIES BY PARTNER												
	India	China	France	Malaisie	Thailande	Belgique	EAU	USA	Hollande	Togo	Total sous facturation	Total sur facture
2000	-32206455	-340773999	-69955290	-1106319	-43046073	-32706601	-4052532	-8302639	-17555236	-12071611	-561776755	
2001	-42554035	-472464335	-68310288	-1299025	-19311304	-20280561	-3994298	-6235900	-24941197	230003	-659390943	230003
2002	-47931137	-374286484	-40726134	-701622	-9415604	-34821789	-4363259	-14129628	-20960827	2815117	-547336484	2815117
2003	-46384932	-407965687	-20460984	-9355563	-42250715	-28363311	-6476563	-5106993	-26484231	-10489957	-603338936	
2004	-31511948	-517698961	-43648065	-3024286	-87613887	-14735104	-9795099	-27591875	-15808285	-7607184	-759034694	
2005	-76858988	-873889005	-48737899	-20975845	-114921388	-25949379	-29917191	-62513680	-19159803	9202032	-1272923178	9202032
2006	-112288689	-1366724957	-63128713	-81674755	-145785950	-48841271	-41840399	-101101770	-45050448	17168928	-2006436952	17168928
2007	-189041090	-1813248472	-72702524	-168607742	-162931013	-92836206	-26044884	-211513392	-33176284	101144962	-2770101607	101144962
2008	-227176260	-2086711824	-131991255	-347695471	-311523314	-80919537	-46530951	-811335286	-138381270	59465525	-4182265168	59465525
2009	-180335344	-1744504903	-116837605	-248283091	-313494397	-147408292	-30768576	-360000283	-157137201	79950415	-3298769692	79950415
2010	-243966215	-2055790438	-213642712	-357980639	-73064797	-48986702	-16970164	-416234781	-220143810	143310738	-3646780258	143310738
2011	-577101041	-2682260198	-801364402	-274283135	-40566249	-297433162	-42780152	-571661910	-704087605	137077696	-5991537854	137077696
2012	-336412849	-2221846692	-25841729	-279685493	-103848002	-139946377	-47442300	-531941836	-86901914	120556981	-3773867192	120556981
2013	-543403369	-2697522842	-13649778	-438813545	-301512259	-144823014	-84287704	-443534934	-21361981	181797622	-4688909426	181797622
2014	-446638239	-3200513264	-46137094	-448672442	-58562406	-207315031	-87350162	-545358747	-25877775	172575322	-5066425160	172575322
2015	-164912063	-2722539168	4791102	-280724506	-115325320	-159676482	-81726329	-550715709	-59348349	111438048	-4134967926	116229150
2016	-48900466	-1817998261	28047676	-219465242	-196271033	46560883	-5556652	-176413054	28209168	65218914	-2464604708	168036641
2017	97959286	-1686239495	1131242	-165939279	ND	21689574	ND	-161597656	132208298	107907418	-2013776430	360895818

EXPORTS DISCREPANCIES BY PARTNER												
	Bangladesh	Inde	Chine	Malaisie	Nigeria	Niger	Danemark	Egypte	Vietnam	Turquie	Sous factures	Sur factures
2000	-7741429	5580200	-693551	632051	-33239697	-932371	749309	-28273	759949	2312230	-42635321	10033739
2001	-3440259	12289733	381114	719145	-167038023	-2375700	837947	10011	1831226	-7785282	-180639264	16069176
2002	5264868	5795006	-657912	420478	5184252	-4711096	53954	ND	949495	-1293961	-6662969	17668053
2003	-3216502	-25824964	-6073426	757125	135843	-7192963	3049003	ND	3449366	43273	-42307855	7434610
2004	-3413334	-46546054	-18202891	-1748075	13589726	-6515937	-6124110	ND	4892066	-19056	-65993421	18481792

2005	1056223	-65993421	-35201789	7048621	16572234	-22304962	2779	-223954	3738228	-699025	-124423151	28418085
2006	-2068816	-57396112	-35448422	-59305	-46829333	-26408062	4251873	-197915	411628	-476298	-168884263	4663501
2007	-8990201	-38947006	-47388786	-1132423	-198143285	-10614819	9319587	-104599	588665	-1587105	-306908224	9908252
2008	-6845949	-79754563	-40093318	-1738843	84638681	-5121630	9006005	-21514	-8759172	-199086	-142534075	93644686
2009	-6654069	-81965166	-15078843	1274454	169738113	2920468	3806546	-147630	-4674375	105316	-108520083	177844897
2010	812497	-115049480	-72150192	2215624	226026357	-3194141	4056707	-3075812	-29009836	-697801	-223177262	233111185
2011	-675142	-242611514	-115849969	8851360	45761069	442880	6599811	-498802	-61136591	-446504	-421218522	61655120
2012	-1491191	-207333888	-146267926	9542814	41165635	3675668	5754024	908609	-38006274	-1534151	-394633430	61046750
2013	-2276997	-107114661	-85493060	19452423	-33266836	8349982	2620072	-150317	-43218249	-1588947	-273109067	30422477
2014	11767640	-211038296	-171212072	35115371	47391414	1131725	16660050	22440346	-37301007	37572438	-419551375	172078984
2015	5014496	-196970123	-44983756	53855823	35124770	-1575045	13524628	-1380203	-59792350	2025335	-304701477	109545052
2016	5829837	-144439294	-28109034	53961316	20299399	-6866325	8371104	-949630	-53634637	163177	-233998920	88624833
2017	ND	-133724702	-34774263	75178431	54355716	-18304365	22157155	-858252	-104657668	-5779485	-298098735	151691302

IMPORTS DISCREPANCIES BY PRODUCT

	Tissus de coton	Huile de palme et ses fractions	Véhicules, motocycles et les accessoires	Textiles et Friperies	Hydrocarbures	Produits pharmaceutiques	Riz	Viandes et abats de viandes	Farine de blé et froment	total des sous-factures	Total des surfactures
2013	-977349483	9873936	-35012029	-406904887	239329310	-697291906	-60661733	-528569098	-12739341	-2718528477	249203246
2014	-922334218	6743152	-30866291	-405546958	260396351	-983724644	-63003078	177655865	-32442956	-2437918145	444795368
2015	-653337411	823256	-22630791	-226090676	121460592	-807774389	-45398644	-68055628	4081946	-1823287539	126365794
2016	-397892757	4337972	-16914065	-210266424	260807691	-174615783	-12105027	-35268103	28805593	-847062159	293951256
2017	-473900120	1945459	-18896820	-140054155	405763822	-163387774	1696912	677627741	-22197352	-818436221	1087033934

EXPORTS DISCREPANCIES BY PRODUCT

	Bois et articles en bois	Noix de cajou	Coton	Fer et acier	Total Sous-factures	Total Sur-factures
2013	-8314690	-68432583	-118395862	-3160350	-198301472	
2014	-85440327	-106157969	-197805020	10773805	-389403316	10773805

2015	-31744993	-160355408	-88262392	9177841	-280362793	9177841
2016	-53745750	-124782801	-53013166	10239593	-231541717	10239593
2017	-105903915	-152031157	-34959167	4331728	-292894239	4331728

```
. correlate LProFFI LPDCI LDDB LGapDD ProbFimport RDP MNT PP PVI
(obs=40)
```

	LProFFI	LPDCI	LDDB	LGapDD	ProbFi~t	RDP	MNT	PP	PVI
LProFFI	1.0000								
LPDCI	-0.3118	1.0000							
LDDB	0.5303	-0.3141	1.0000						
LGapDD	0.1498	-0.1604	0.0324	1.0000					
ProbFimport	0.4632	-0.2502	0.7095	-0.0500	1.0000				
RDP	0.6173	-0.0173	0.4856	-0.0591	0.6198	1.0000			
MNT	-0.0115	-0.2519	0.2260	0.0500	-0.0476	0.0563	1.0000		
PP	-0.5232	0.1100	-0.0994	-0.1044	-0.1091	-0.2582	0.2182	1.0000	
PVI	-0.0317	-0.0565	0.0762	-0.1484	-0.1336	-0.0000	0.8018	0.0000	1.0000

```
. correlate LProFF LRD LPDC ProbF RDPD MNT PP PVI
(obs=65)
```

	LProFF	LRD	LPDC	ProbF	RDPD	MNT	PP	PVI
LProFF	1.0000							
LRD	-0.2195	1.0000						
LPDC	-0.3812	0.4355	1.0000					
ProbF	0.3847	-0.1134	-0.1422	1.0000				
RDPD	0.4451	-0.3382	0.1090	0.3617	1.0000			
MNT	0.1486	-0.1475	-0.2682	0.0150	0.0714	1.0000		
PP	-0.3041	0.3026	0.0547	0.0594	-0.3858	0.1874	1.0000	
PVI	-0.0420	0.2438	-0.1563	-0.1011	-0.1834	0.6041	0.1167	1.0000

```
. correlate LProFFE ProbFexport LPDCE MNT PP
(obs=20)
```

	LProFFE	ProbFe~t	LPDCE	MNT	PP
LProFFE	1.0000				
ProbFexport	0.3659	1.0000			
LPDCE	-0.5852	0.0693	1.0000		
MNT	0.4327	0.2887	-0.2820	1.0000	
PP	0.2115	0.3333	0.2544	0.2887	1.0000.



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