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Statistical methodology to estimate BEPS-related financial flows or tax-related illicit financial flows channelled via *phantom trade*

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Abstract

This research paper presents a statistical methodology to assess BEPS risks and estimate BEPS-related financial flows, generated by cross-border aggressive tax avoidance, or commercial and tax-related illicit financial flows, generated by international tax evasion practices, resulting from tax-minimizing routes which artificially divert cross-border trade income flows into offshore intermediary entities, located in low-tax jurisdictions.

Key words: BEPS, BEPS risks, BEPS-related financial flows, artificial financial flows, commercial and tax-related illicit financial flows, cross-border aggressive tax avoidance, international tax evasion, export transactions, cross-border trade

Contents

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Introduction[1]

The boundary between legal and illegal tax practices may be unclear. Considering a continuum of tax aggressiveness, activities may range from activities which are clearly within the spirit of the law (i.e. legal tax planning), activities that aggressively push the boundaries of what is acceptable under the law (i.e. aggressive tax avoidance), to behaviours which are clearly illegal (i.e. tax evasion).

This complexity is also reflected in the international debate concerning illicit financial flows. According to the OECD[2], tax-related illicit financial flows are essentially generated by international tax evasion or trade mispricing. The UNCTAD-UNODC Conceptual Framework for the Statistical Measurement of Illicit Financial Flows[3] notes that aggressive tax avoidance, although usually legal, can drain resources and be considered illicit. For this reason, aggressive tax avoidance has also been included as an illicit financial flow for the purposes of SDG indicator 16.4.1.

The OECD/G20 Base Erosion and Profit Shifting (BEPS)[4] package has addressed issues related to aggressive tax avoidance or tax planning strategies that exploit gaps and mismatches in tax rules to artificially shift profits to low or no-tax locations where there is little or no economic activity or to erode tax bases through deductible payments such as interest or royalties. The OECD Report on Measuring and Monitoring BEPS[5] indicates that most tax planning channels overlap with BEPS behaviours and represent tax-induced artificial financial flows that are not related to the location of real economic activity. According to the OECD, although some schemes used are illegal, most are not.

This statistical research seeks to contribute to this debate by estimating price anomalies likely resulting from tax-minimizing routes which artificially divert cross-border trade income flows into offshore intermediary entities, located in low-tax jurisdictions. Considering that the boundaries between legal and illegal tax practices may be unclear and that it is statistically infeasible to separate illegal (i.e. tax evasion) from legal practices (i.e. aggressive tax avoidance), for the purposes of this statistical research, the estimates include both BEPS-related financial flows, generated by aggressive tax avoidance practices, and tax-related illicit financial flows, generated by tax evasion or tax fraud. Possibly, the estimates overwhelmingly capture aggressive tax avoidance, but the estimated scale might include tax evasion and tax fraud.

[1] The views expressed are those of the authors and do not necessarily reflect the views or policies of the Secretariat of the Federal Revenue of Brazil.

[2] OECD (2014). Illicit Financial Flows from Developing Countries: Measuring OECD Responses. Available at: https://www.oecd.org/corruption/Illicit_Financial_Flows_from_Developing_Countries.pdf

[3] UNCTAD-UNODC (2020). Conceptual Framework for the Statistical Measurement of Illicit Financial Flows. Available at: https://www.unodc.org/unodc/en/data-and-analysis/iff.html

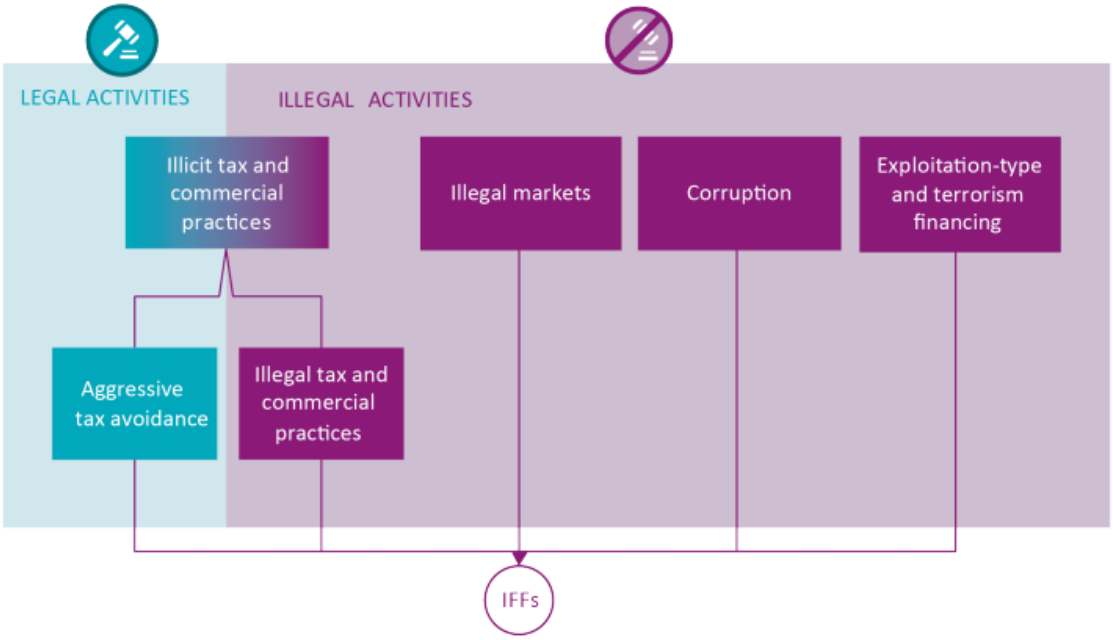
[4] According to the OECD, Base Erosion and Profit Shifting (BEPS) refers to tax planning strategies that exploit gaps and mismatches in tax rules to artificially shift profits to low or no-tax locations where there is little or no economic activity, resulting in little or no overall corporate tax being paid. Available at: https://www.oecd.org/tax/beps/about/ and http://www.oecd.org/ctp/preventing-the-artificial-avoidance-of-permanent-establishment-status-action-7-2015-final-report-9789264241220-en.htm#:~:text=Base%20Erosion%20and%20Profit%20Shifting%20(BEPS)%20refers%20to%20tax%20planning,overall%20corporate%20tax%20being%20paid.

[5] OECD. Measuring and Monitoring BEPS, Action 11 – 2015 Final Report. Available at: https://www.oecd.org/tax/beps/measuring-and-monitoring-beps-action-11-2015-final-report-9789264241343-en.htm

1. Conceptual approach

The UNCTAD-UNODC Conceptual Framework adopted a broader definition[6] of tax-related illicit financial flows, which includes both illegally generated flows from international tax evasion and flows that are not strictly illegal such as cross-border aggressive tax avoidance, which erodes the tax base of a country where that income was generated.

Figure 1. Categories of activities that may generate IFFs.



Source: UNCTAD and UNODC.

However, as pointed out in the Conceptual Framework[7], it is statistically unfeasible to separate illegal (i.e. tax evasion) from legal practices (i.e. aggressive tax avoidance).

Moreover, the literature[8] also indicates that the estimates of global profit shifting and associated tax revenue losses do not distinguish between tax avoidance, tax evasion and tax fraud.

The Brazilian experience also suggests that it is necessary to carry out a specific tax audit proceeding to identify, case by case, and according to the evidence collected and the national legal framework in force, if the suspicious transactions with offshore corporate structures enable (1) tax evasion, (2) aggressive tax planning or avoidance or (3) lawful tax avoidance.

[6] According to Cobham & Janský (2017), there is no single, agreed definition of illicit financial flows. The European Parliament has sought to bring the tax avoidance aspect into the definition of IFFs within the European Community. Available at: https://www.europarl.europa.eu/doceo/document/A-8-2015-0184_EN.pdf?redirect

[7] UNCTAD-UNODC (2020). Conceptual Framework for the Statistical Measurement of Illicit Financial Flows. Available at: https://www.unodc.org/unodc/en/data-and-analysis/iff.html

[8] International corporate tax avoidance in developing countries. European Parliament, TAX3 Committee: Hearing on Evaluation of Tax Gap. Available at: http://www.europarl.europa.eu/cmsdata/161049/2019%2001%2024%20-%20Petr%20Jansky%20written%20questions%20-%20Ev_TAX%20GAP.pdf

Referring to the World Customs Organization (WCO) Study Report on Illicit Financial Flows via Trade Mis-invoicing[9], the OECD states that "transfer pricing can also be used as part of an aggressive tax planning policy by a multinational enterprise group: the transfer pricing policy may be applied in such a way as to comply with the strict letter of the law, but that aggressively pushes the boundaries of what is acceptable under those laws. Some multinational enterprises may also engage in illegal tax evasion through fraudulent transfer mis-pricing."

Additionally, according to the OECD, BEPS refers to tax planning strategies that exploit gaps and mismatches in tax rules to artificially shift profits to low or no-tax locations where there is little or no economic activity, resulting in little or no overall corporate tax being paid. The OECD Report on Measuring and Monitoring BEPS[10] points out that most tax planning channels overlap with BEPS behaviours and represent tax-induced artificial financial flows that are not related to the location of real economic activity. Although some schemes used are illegal, most are not.

Considering that the boundaries between legal and illegal tax practices may be unclear, for the purposes of this statistical research, the estimates include both BEPS-related financial flows, generated by transfer pricing abuse practices (i.e. aggressive tax avoidance), and tax-related illicit financial flows, generated by trade mis-invoicing (i.e. tax evasion or tax fraud). Possibly, the estimates overwhelmingly capture aggressive tax avoidance, but the estimated scale might include tax evasion and tax fraud. Thereupon, for the purposes of this research paper, tax-related illicit financial flows are also referred to as artificial financial flows or BEPS-related financial flows.

2. Phantom trade rationale

Analogously to the *phantom investment* phenomena identified by a recent International Monetary Fund (IMF)[11,12] research, studies and audits carried out by the Secretariat of the Federal Revenue of Brazil (RFB)[13] demonstrate that Brazilian export transactions follow a pattern of very high reliance on triangular operations through offshore intermediary entities, likely, special purpose entities[14] or pass-through entities, located in tax havens or privileged tax regime jurisdictions. These tax-induced structures, frequently enabled by empty corporate shells with no real commercial activity, artificially divert the financial flows of trade transactions to low-tax jurisdictions. These artificial financial flows routed through transactions with *phantom corporations* also generate a serious distortion to what is believed to be the real structure of the Brazilian international trade network since the reported export transactions would be biased due to aggressive tax avoidance or international tax evasion strategies.

[9] WCO (2018). Study Report on Illicit Financial Flows via Trade Mis-invoicing. Available at: http://www.wcoomd.org/en/media/newsroom/2018/july/the-wco-presented-its-study-report-on-illicit-financial-flows.aspx

[10] OECD. Measuring and Monitoring BEPS, Action 11 – 2015 Final Report. Available at: https://www.oecd.org/tax/beps/measuring-and-monitoring-beps-action-11-2015-final-report-9789264241343-en.htm

[11] According to the IMF Working Paper "What is real and what is not in the Global FDI Network?", phantom corporations in low-tax economies give multinational firms a number of opportunities to avoid taxes in the high-tax economies where the real investments and the ultimate investors are located. Phantom investment that pass through empty corporate shells with no real business activities are designed to minimise companies' tax liabilities rather than financing productive activity, according to the research.

[12] IMF (2019). Jannick Damgaard, Thomas Elkjaer, Niels Johannesen. What is real and what is not in the Global FDI Network? Available at: https://www.imf.org/en/Publications/WP/Issues/2019/12/11/what-is-real-and-what-is-not-in-the-global-fdi-network

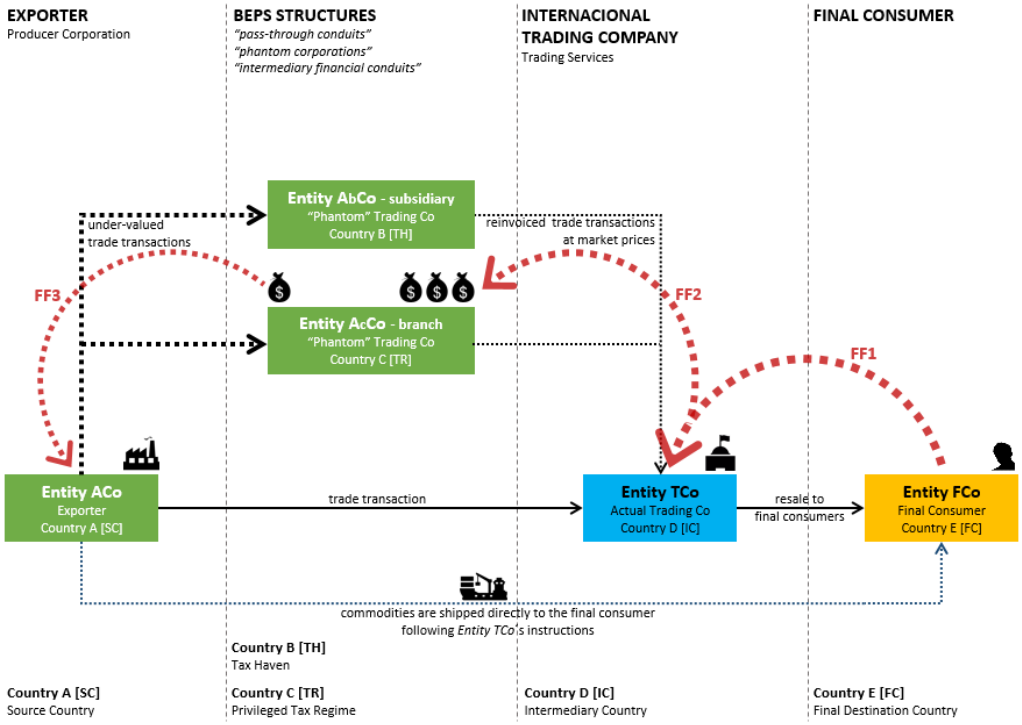
[13] RFB (2019). Fighting illicit financial flows: Brazilian Custom´s approach. Fabiano Coelho, Lucas Rodrigues Amaral, Luciana Barcarolo. Available at: https://mag.wcoomd.org/magazine/wco-news-89/fighting-illicit-financial-flows-brazilian-customs-approach/

[14] IMF (2018). Final Report of the Task Force on Special Purpose Entities. "An SPE resident in an economy, is a formally registered and/or incorporated legal entity recognized as an institutional unit, with no or little employment up to maximum of five employees, no or little physical presence, and no or little physical production in he host economy."
Available at: https://www.imf.org/external/pubs/ft/bop/2018/pdf/18-03.pdf

Considering the conceptual approach proposed, studies have been carried out to estimate the exposure to BEPS opportunities in export transactions of agricultural and mineral commodities. The main features of the *phantom trade* typology can be summarized as follows:

- **Hypotheses**: empty corporate shells or artificial offshore corporate entities (phantom corporations), with no real business activities, are used as a channel to transfer profits to lower-tax jurisdictions and reduce tax liabilities in Brazil.
- **Economic activity**: export transactions of agricultural and mineral commodities.
- **Manipulation**: underpricing of export transactions.
- **Channel or enabler**: offshore artificial corporate entities (*phantom corporations*) located in tax havens or privileged tax regimes.
- **Tax-related illicit financial flows generating activities**: international tax evasion or tax fraud.
- **BEPS-related financial flows generating activities**: cross-border aggressive tax planning strategies, which erodes the tax base of a country where that income was generated.
- **Case study and infographic representation**: this is a case study used to illustrate the exposure to BEPS opportunities in export transactions enabled by triangular operations with offshore intermediary entities, located in tax havens or privileged tax regime jurisdictions. As stated in the conceptual approach, it would be necessary to carry out a specific tax audit proceeding to identify, case by case, and according to the evidence collected and the national legal framework in force, if the suspicious transactions with the offshore corporate structure enable (1) tax evasion, (2) aggressive tax planning or (3) lawful tax avoidance.

Figure 2. Case Study Infographic.



Note: The payments or financial flows (FF) enabled by the BEPS structures could be disentangled, for didactic purposes, as follows:

FF1 (Country E [FC] to Country D [IC]): payments from final consumers (e.g.: *Entity FCo*) to actual international trading companies (e.g.: *Entity TCo*) at market prices. Low-tax or non-transparent jurisdictions not involved.

FF2 (Country D [IC] to Country B [TH] or Country C [TR]): payments from actual international trading companies (e.g.: *Entity TCo*) to *phantom* trading companies (*Entities AbCo and AcCo*) at market prices. Low-tax or non-transparent jurisdictions involved.

FF3 (Country B [TH] or Country C [TR] to Country A [SC]): payments from *phantom* trading companies (*Entities AbCo and AcCo*) to the *Entity ACo* (Exporter) at under-valued prices. Low-tax or non-transparent jurisdictions involved.
The FF2 is artificially created through the insertion of *phantom* trading companies (*Entities AbCo* and *AcCo*), empty corporate shells with no real economic activity located in low-tax and non-transparent jurisdictions, leading to profit shifting and tax revenue loss where the real economic activity is undertaken and the income is generated (Country A [SC]).

[SC]: Source Country, wherein the income is generated.

[TH]: Tax Haven, wherein the *phantom* trading company (intermediary financial conduit) is located.

[TR]: Privileged Tax Regime, wherein the *phantom* trading company (intermediary financial conduit) is located.

[IC]: Intermediary Country, wherein the actual international trading companies are located.

[FC]: Final Destination Country, wherein the final consumers are located.

3. Statistical methodology

According to Alex Cobham and Petr Janský[15], almost all approaches to tax-related illicit financial flows estimation are based on exploiting anomalies in data that may arise from the process of hiding. The main existing methodologies are based in four groups of estimates: (i) capital account-based; (ii) trade-based; (iii) offshore wealth; (iv) corporate tax avoidance. Thereupon, for the purposes of quantifying the impact of *phantom trade*

[15] Cobham, Alex & Yanký, Petr (2017). Measurement of Illicit Financial Flows. UNODC-UNCTAD Expert Consultation on the SDG Indicator on Illicit Financial Flows. Available at: https://www.unodc.org/documents/data-and-analysis/statistics/IFF/Background_paper_B_Measurement_of_Illicit_Financial_Flows_UNCTAD_web.pdf

on tax base erosion, a possible trade-based method, known as Price Filter Method[16], has been used to estimate the exposure to BEPS opportunities and measure the associated BEPS-related financial flows.

3.1 The Price Filter Method

As stated by Philip K. Hong and Simon J. Pak in the WCO Study Report on Illicit Financial Flows via Trade Mis-invoicing[17], "the Price Filter Method (PFM) estimates price filters for each Harmonized Commodity Description and Coding System (HS code) as a proxy for arm's length prices and uses the price filters to detect suspicious transactions with abnormal prices, which is an indication of possible trade mispricing. Trade mispricing occurs when the unit price of a transaction declared is different from the arm's length price of the transaction. The arm's length price in a transaction varies depending on the particular transaction circumstance, such as contractual terms, economic circumstances, and business strategies pursued by buyer and seller, to name a few."

Moreover, according to the WCO Study Report, to detect abnormally priced transactions, the price filters for each HS code include benchmark upper and lower bound prices allowing for variations in arm's length price during a specified time period. The price filters may be constructed from observable market prices or may be statistically estimated using transaction-level trade data.

The lower and upper bound prices may be set at the first quartile price and the last quartile price, such as the lower and upper quartile prices. Or they can be set at the average price +/- α (%) for each HS Code based on the judgment of commodity specialists. The price filter range may be set narrower or wider around the market price as appropriate. Additionally, the interquartile price range also may be used as a price filter to detect abnormal prices.

PRICE FILTER = [MARKET PRICE or STATISTICALLY ESTIMATED PRICE] +/- α (%) (1)

In this approach, all abnormally priced transactions detected by the price filter method are assumed suspicious mispriced[18] transactions and, likely, enables illicit capital flight or profit shifting out of countries either through import overinvoicing or export underinvoicing. The underinvoiced amount in export transactions, which is the focus of this statistical research, may be estimated as the lower bound price minus invoice price times quantity.

UNDERINVOICED AMOUNT = [LOWER BOUND PRICE - INVOICE PRICE] x [QUANTITY] (2)

3.1.1 The Price Filter Method for the Soya Bean Trade Market

In order to exemplify the statistical methodology based on the PFM approach, analyses were carried out to identify abnormal underinvoiced prices or BEPS opportunities in the soya bean trade market.

In the context of the Brazilian trade market, the soya bean price is composed by the commodity future market quoted price (e.g. Chicago Board of Trade (CBOT)[19] quoted

[16] Hong, Keejae P. & Pak, Simon Joong-woong (2017). Estimating Trade Misinvoicing from Bilateral Trade Statistics: The Devil is in the Details. Available at: https://www.tandfonline.com/doi/full/10.1080/08853908.2016.1202160

[17] WCO (2018). Study Report on Illicit Financial Flows via Trade Mis-invoicing. Available at: http://www.wcoomd.org/en/media/newsroom/2018/july/the-wco-presented-its-study-report-on-illicit-financial-flows.aspx

[18] All undervalued exports and all overvalued imports are assumed facilitating illicit capital flight or profit shifting. The research attributes the trade mispricing to international tax evasion or cross-border aggressive tax avoidance strategies.

[19] Chicago Board of Trade (CBOT). Soybean Futures Contract Specs. Available at: https://www.cmegroup.com/trading/agricultural/grain-and-oilseed/soybean.html

price) plus the *premium basis*[20] paid to the exporters. As a result, in order to pursuit a proxy for the arm´s length price, the price filter for the soya bean trade market should be constructed not only from observable market prices but also taking into account the premium basis negotiated.

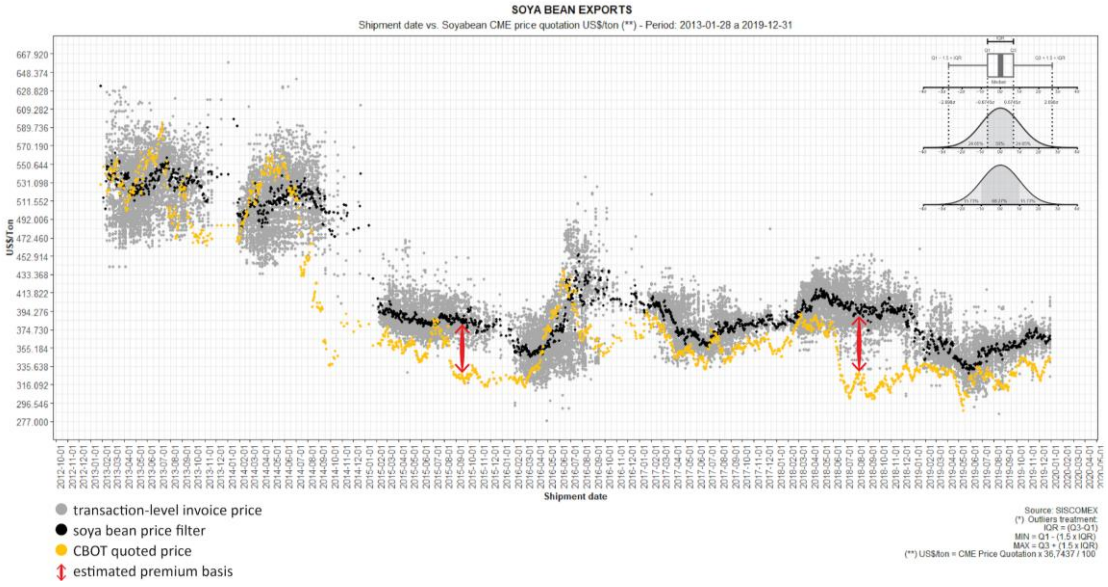
SOYA BEAN PRICE FILTER = [QUOTED PRICE + PREMIUM BASIS] +/- α (%) (3)

However, since the historical series of the *premium basis* are not available in opened data source, a proxy for the arm´s length price, hereinafter referred as the price filter for the soya bean trade market, was statistically estimated using a three-day weighted moving average price built on transaction-level trade data collected by the Customs Bureau[21]. The upper and lower bound prices were set at the three-day weighted moving average price +/- 1σ (standard deviation).

SOYA BEAN PRICE FILTER = [THREE-DAY WEIGHTED MOVING AVERAGE PRICE] +/- 1σ (4)

Figure 3 plots all transaction-level invoice prices (grey) and illustrates the price filter for the soya bean trade market statistically estimated using a three-day weighted moving average price including a benchmark upper and lower bound prices set at +/- 1σ (black). The Chicago Board of Trade (CBOT) quoted prices (yellow) were plotted as well.

Figure 3. Transaction-level invoice prices and the price filter for the soya bean trade market (2012-2020).



Source: SISCOMEX Customs Database, Secretariat of the Federal Revenue of Brazil and Chicago Board of Trade (CBOT).

The difference between the three-day weighted moving average price and the CBOT quoted prices suggests that, likely, a premium basis has been paid to the exporters. This

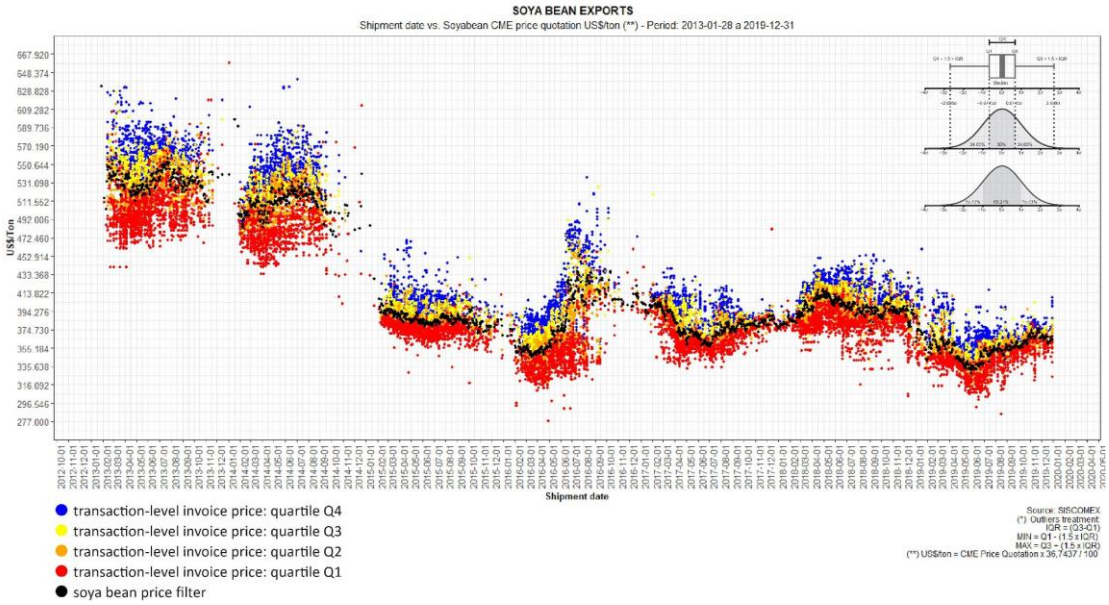
[20] Canziani & Guimarães (2006). Available at: https://www.esalq.usp.br/visaoagricola/sites/default/files/va05-agronegocio01.pdf
According to technical literature, in Brazil, the price of soya beans is determined based on Chicago Board of Trade (CBOT) quoted prices, plus the export premium negotiated for a given month of shipment, which represents a price premium or discount in relation to quotations on the Chicago Board of Trade (CBOT). The "premium basis" is negotiated between Brazilian exporters and global importers, and there is practically no export that does not involve it.

[21] SISCOMEX Customs Database, which is the Brazilian Integrated Foreign Trade System and is short for "Sistema Integrado de Comércio Exterior". It is used to register foreign merchandise transactions (imports and exports), allowing the Brazilian Government to monitor foreign trade. The Secretariat of the Federal Revenue of Brazil is responsible for administering tax and customs duties.

finding also indicates that the invoice prices should be, in general, equal or nearby to the estimated price filter for the soya bean trade market (proxy for the arm´s length price).

Before estimating the weighted moving average price, an outlier treatment was applied using the interquartile range (IQR)[22]. All export transactions which are more than 1.5 times the interquartile range above the quartile 3 (Q3 + 1.5 x IQR) or below the quartile 1 (Q1 – 1.5 x IQR) were excluded from the daily data series. In the following chart, the transaction-level invoice prices are segregated by quartiles Q1, Q2, Q3 and Q4.

Figure 4. Transaction-level invoice prices, segregated by quartiles Q1, Q2, Q3 and Q4 (2012-2020).



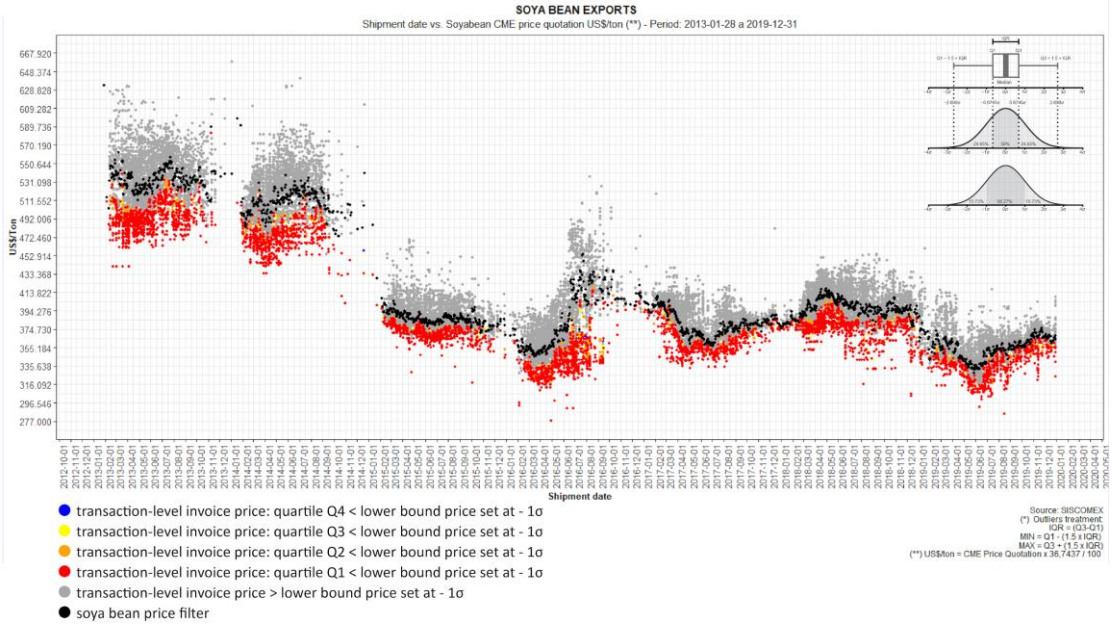
Source: SISCOMEX Customs Database, Secretariat of the Federal Revenue of Brazil.

In view of the aforementioned findings, the assumption is that transaction-level invoice prices below the estimated price filter for the soya bean trade market (three-day weighted moving average price minus 1σ) are evidence of potential exposure to BEPS opportunities and, therefore, the estimated underinvoiced amount might be used as a basis to estimate BEPS-related financial flows which are artificially diverted to low-tax jurisdictions through intermediary offshore structures.

Figure 5 highlights transaction-level invoice prices below the lower bound set at the weighted three-day moving average price - 1σ (standard deviation), which indicates suspicious abnormally underpriced invoices.

22 Interquartile range. Available at: https://en.wikipedia.org/wiki/Interquartile_range

Figure 5. Suspicious abnormally underpriced invoices, segregated by quartiles Q1, Q2, Q3 and Q4 (2012-2020).



Source: SISCOMEX Customs Database, Secretariat of the Federal Revenue of Brazil.

According to the interquartile range analysis and the assumptions of this statistical research, the transaction-level invoice prices classified in the quartile Q1[23] would be the most exposed to BEPS opportunities and, therefore, should be the focus of an additional methodological approach to estimate the risk exposure to BEPS-related financial flows, which takes into account factors such as economic substance and variables that might capture elements of secrecy such as the absence of international cooperation and information exchange, aiming to shed some light in the comprehension of the role played by special purpose entities or empty corporate shells (*phantom corporations*) located in favoured taxation jurisdictions, used as intermediary entities or financial conduits hubs, within the global trade network of commodities.

3.1.2 The Price Filter Method taking into account economic substance

The BEPS Action 5 Report[24], Countering Harmful Tax Practices More Effectively, Taking Into Account Transparency and Substance, "specifically requires substantial activity for any preferential regime. Seen in the wider context of the work on BEPS, this requirement contributes to the second pillar of the BEPS Project, which is to align taxation with substance by ensuring that taxable profits can no longer be artificially shifted away from the countries where value is created." Moreover, the OECD Report on Measuring and Monitoring BEPS[25], states that "if domestic incentives are designed to encourage artificial schemes without economic substance, then those schemes would be considered BEPS behaviours".

[23] Analysis showed (see also Figure 5) that some exceptional cases of prices in Q2 were observed below the estimated price filter for the soya bean trade market.

[24] OECD (2015). Action 5: 2015 Final Report. Countering Harmful Tax Practices More Effectively, Taking into Account Transparency and Substance. Available at: https://www.oecd-ilibrary.org/docserver/9789264241190-en.pdf?expires=1601320605&id=id&accname=guest&checksum=1D07D14425A89172DD91EB49372455B4

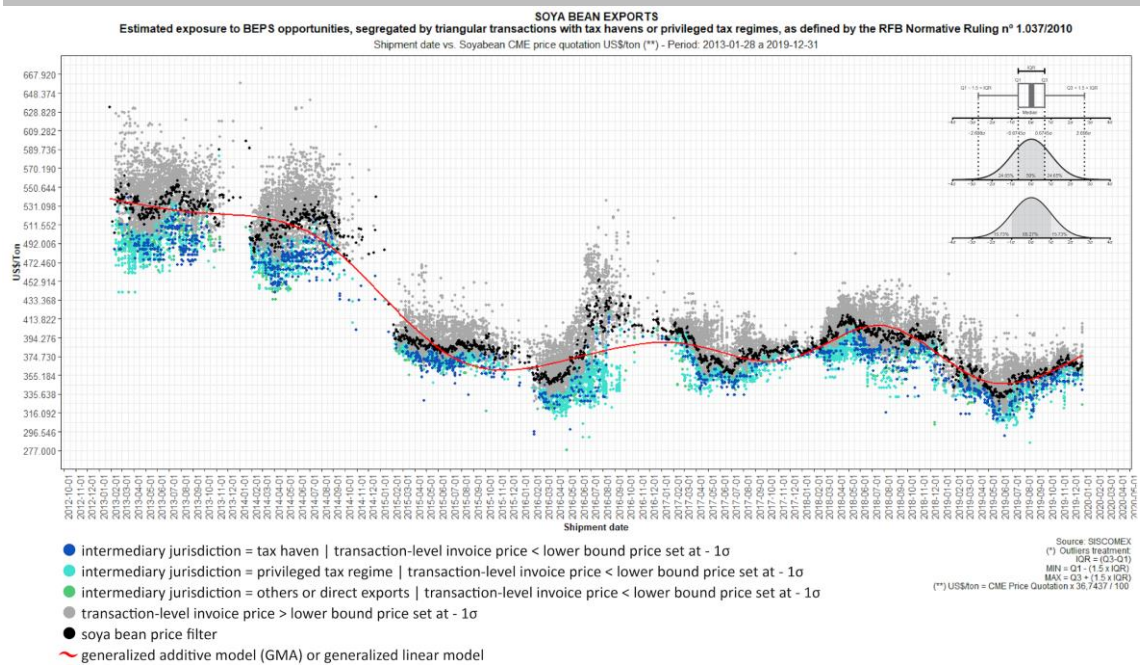
[25] OECD. Measuring and Monitoring BEPS, Action 11 – 2015 Final Report. Available at: https://www.oecd.org/tax/beps/measuring-and-monitoring-beps-action-11-2015-final-report-9789264241343-en.htm

According to the IMF Final Report of the Task Force on Special Purpose Entities[26] (SPEs), the scope of SPEs – entities with no or little employees, no or little physical presence, and no or little physical production in the host economy – are no longer restricted to financial vehicles. Tax-related strategies have emerged involving trading and reinvoicing services. Moreover, *near-SPEs* or hybrid companies displaying both SPE-like (financial intermediation) and non-SPE-like activities have emerged with the need to employ more staff legally as a result of the OECD's BEPS — an initiative to address tax avoidance strategies that exploit tax gaps and mismatches to artificially shift profits to low- or no-tax locations with no or little economic activity.

Given that Brazilian export transactions follow a pattern of very high reliance on triangular operations through offshore intermediary entities located in low-tax jurisdictions, likely, special purpose entities or empty corporate shells (*phantom corporations*) used as financial conduit hubs in the routing of commercial financial flows, it is crucial to assess the economic substance of these offshore hubs in order to understand the potential BEPS behaviour risks and related artificial financial flows.

As an initial proxy to assess the economic substance or artificiality of these potential BEPS structures, and, thus, estimate the BEPS risk exposure associated with the *phantom trade* phenomena, the transaction-level invoice prices considered at a high risk exposure to BEPS opportunities (suspicious abnormally underpriced invoices mainly observed in the quartile Q1) have been segregated by type of jurisdiction of acquisition[27] (intermediary jurisdictions or financial conduit hubs to which the commercial-related financial flows are diverted to), classified as (1) tax haven, (2) privileged tax regime or (3) other jurisdictions, as defined by the RFB Normative Ruling nº 1.037/2010.

Figure 6. Transaction-level invoice prices, segregated by type of jurisdiction of acquisition and estimated risk exposure to BEPS opportunities (2012-2020).



Source: SISCOMEX Customs Database, Secretariat of the Federal Revenue of Brazil.

[26] IMF (2018). Final Report of the Task Force on Special Purpose Entities.
Available at: https://www.imf.org/external/pubs/ft/bop/2018/pdf/18-03.pdf

[27] In triangular transactions, the country or jurisdiction of acquisition/sale is different from the country or jurisdiction of destination/origin. In general, the intermediary entities or financial conduit hubs are located in low-tax or non-transparent jurisdictions.

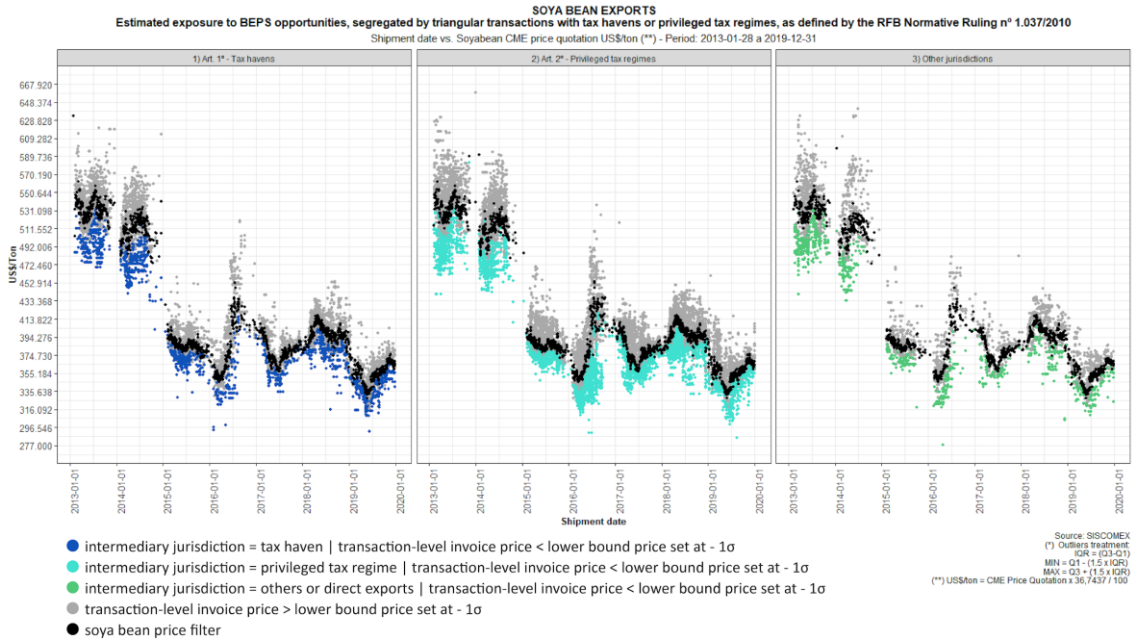
It is important to clarify that the RFB Normative Ruling nº 1.037/2010 lists favoured taxation countries or tax havens, defined as jurisdictions that do not impose tax on income or, when impose, it is a low-tax jurisdiction, in which the applicable income tax rate is equivalent to any percentage varying between zero and 20 per cent (maximum), as well as whose national legislation does not allow access to the information regarding the capital stock structure or ownership of the legal entities organized under the laws of any such jurisdiction.

Additionally, the RFB Normative Ruling nº 1.037/2010 also identifies the entities which are subject to the concept of privileged fiscal regime, which means any jurisdiction that meet one or more of the following requirements:

a. it does not tax income or where the maximum applicable tax income rate is below 20 per cent;
b. it grants fiscal advantages to a non-resident individual or legal entity:
    i. without requiring that substantial economic activity be made in the jurisdiction or dependency; or
    ii. conditioned to the non-exercise of substantial economic activity in the jurisdiction or dependency.
c. it does not tax the earnings obtained outside its territory or imposes a maximum applicable rate below 20 per cent to such earnings;
d. it does not permit access to information regarding the capital stock structure, ownership of assets or rights or to the economic transaction entered into between the parties.

Figure 7 illustrates the estimated risk exposure to BEPS opportunities represented by suspicious abnormally underpriced invoices, segregated by type of jurisdiction of acquisition (intermediary jurisdictions or financial conduit hubs) and separately classified as tax haven (blue), privileged tax regime (turquoise) or other jurisdictions (green), as defined by the RFB Normative Ruling nº 1.037/2010.

Figure 7. Transaction-level invoice prices, segregated by type of jurisdiction of acquisition (plotted separately) and estimated risk exposure to BEPS opportunities (2012-2020).



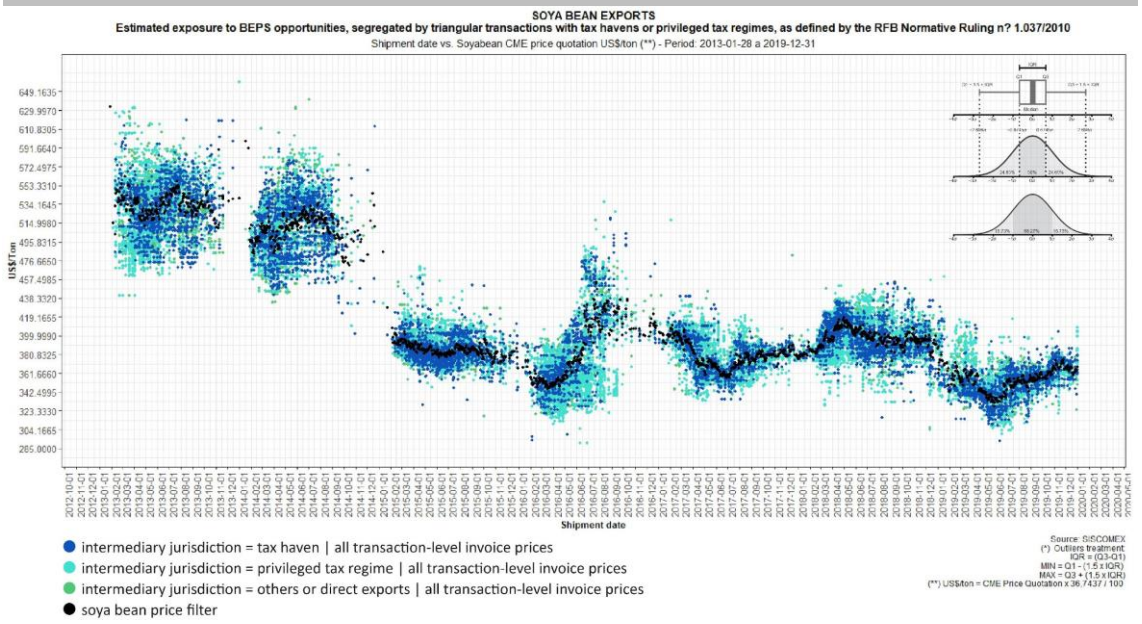
Source: SISCOMEX Customs Database, Secretariat of the Federal Revenue of Brazil.

This preliminary approach to assess the lack of economic substance indicates that favoured taxation jurisdictions and the lack of transparency likely played key roles as drivers of the BEPS-related financial flows phenomena, which results in profit misalignment as part of the value created in the commodity sector in Brazil is artificially transferred to entities with no economic substance, located in low-tax jurisdictions or non-transparent jurisdictions.

In view of this finding and considering that around 99 per cent of the export transactions rely on export transactions intermediated by entities located in favoured taxation jurisdictions, the price filter for the soya bean trade market, statistically estimated using transaction-level trade data collected by the Customs Bureau, likely, is biased down[28] by cross-border aggressive tax planning strategies.

Figure 8 plots all transaction-level invoice prices, segregated by type of jurisdiction of acquisition (intermediary jurisdictions or financial conduit hubs). This illustrates the very high reliance on tax-minimizing routes, possibly enabled by intermediary empty corporate shells with no real commercial activity, located in low-tax jurisdictions.

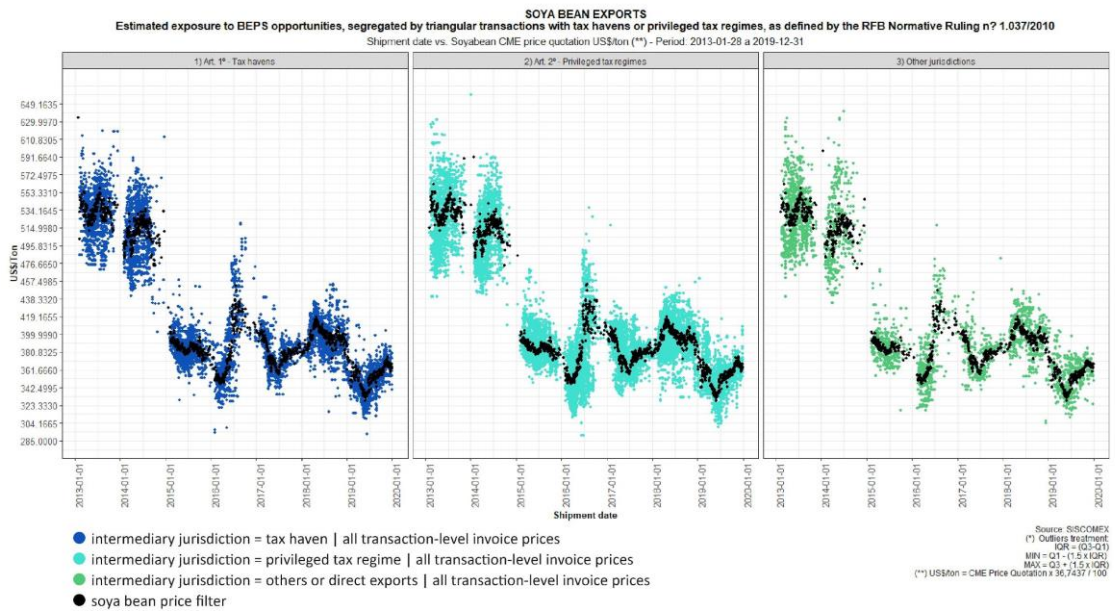
Figure 8. Transaction-level invoice prices, segregated by type of jurisdiction of acquisition (2012-2020).



Source: SISCOMEX Customs Database, Secretariat of the Federal Revenue of Brazil.

[28] According to the WCO Study Report on IFF/TM, a limitation of the price filter method is the fact that the statistical price filters are generated endogenously using trade statistics which also might include abnormally priced transactions. Available at: http://www.wcoomd.org/en/media/newsroom/2018/july/the-wco-presented-its-study-report-on-illicit-financial-flows.aspx

Figure 9. Transaction-level invoice prices, segregated by type of jurisdiction of acquisition (plotted separately) (2012-2020).



Source: SISCOMEX Customs Database, Secretariat of the Federal Revenue of Brazil.

Aiming to support a more accurate measurement of the underlying real economic activity and value created in Brazil as well as the BEPS-related financial flows, generated by cross-border aggressive tax planning strategies, or tax-related illicit financial flows, generated by tax evasion practices, the price filter should be constructed taking into account the real historical premium basis series.[29]

Nonetheless, despite the lack of information[30] concerning the real historical premium basis series, the biased down estimated price filter for the soya bean trade market indicates that even through a conservative estimation it is possible to observe high levels of risk exposure to BEPS-related financial flows.

In addition, the Country-by-Country (CbC) Reports contain useful information on the level of revenues, profits, and economic activities, which can be used as initial indicators that MNE groups have entities in low-tax jurisdictions with disproportionate earnings in relation to their level of economic activity. This may pose a particular BEPS risk if these earnings are largely derived from related party revenues, which could indicate that profit has been diverted from other parts of the group.

Hence, aiming to investigate tax-minimizing routes which divert cross-border trade income flows into empty corporate shells (*phantom corporations*), shifting away profits from the jurisdiction where the underlying economic activity is occurring, and identify international trade transactions that lack economic substance and generate artificial financial flows, it is recommended further refinements in the economic substance analysis following the Country-by-Country Reporting Handbook on Effective Tax Risk Assessment[31] (OECD), which suggests , for example, that flags may be raised where a group has operations in a jurisdiction with some or all of the following characteristics:

[29] Platts Assessments Methodology Guide. Available at: https://www.spglobal.com/platts/plattscontent/_assets/_files/en/our-methodology/methodology-specifications/platts-assessments-methodology-guide.pdf

[30] Lack of information availability through opened data source.

[31] OECD (2017). Country-by-Country Reporting Handbook on Effective Tax Risk Assessment. Available at: http://www.oecd.org/tax/beps/country-by-country-reporting-handbook-on-effective-tax-risk-assessment.pdf

Table 1. Country-by-Country Reporting Handbook on Effective Tax Risk Assessment

OECD Country-by-Country Reporting Handbook on Effective Tax Risk Assessment	
Characteristics	**Tax risk indicators**
High proportion of related party revenues	related party revenues / total revenues = high
Low substantial activities in proportion to revenues or profit before tax	total revenues or profit before tax / total employees = high total revenues or profit before tax / tangible assets = high
High return on equity	profit before tax / (stated capital + retained earnings) = high (profit before tax – income tax accrued) / (stated capital + retained earnings) = high
Low cost base	profit before tax / total revenues = high
Profitability exceeds that of the group as a whole	(profit before tax / total revenues) > (sum of profit before tax / sum of total revenues)
Low effective tax rate	income taxes accrued / profit before tax = low

3.2 Estimated BEPS-related financial flows

For the purposes of this statistical research, the alternative Price Filter Method[32] has been adjusted to assess the exposure to BEPS opportunities in *phantom trade* and estimate the correspondent BEPS-related financial flows, generated by cross-border aggressive tax planning strategies, or tax-related illicit financial flows, generated by tax evasion practices, in export transactions.

The price filter was statistically estimated using a three-day weighted moving average price built on transaction-level trade data for a specific commodity HS Code. The upper and lower bound prices were set at the three-day weighted moving average price +/- 1σ (standard deviation). The undervalued export transactions or abnormally underpriced transactions in relation to the lower bound price, likely, facilitate profit shifting out of countries.

The underinvoiced amount in export transactions corresponds to the estimated BEPS-related financial flows or potential profit shifting, likely, enabled by intermediary SPEs or near-SPEs entities located in favoured taxation jurisdictions. The potential BEPS-related financial flows were estimated as follows:

$$(a)\ Weighted\ Average\ Price(t) = \sum_{i=1}^{n}[Invoice\ Price\ (t:i)\ x\ Quantity(t:i)]\ /\ \sum_{i=1}^{n}[Quantity(t:i)]$$

$$(b)\ Weighted\ Moving\ Average\ Price(t) = \sum_{t'=t-3}^{t}[Weighted\ Average\ Price(t')\ x\ TIN(t')\ x\ E(t')\ ]\ /\ \sum_{t'=t-3}^{t}[TIN(t')\ x\ E(t')]$$

$$(c)\ Price\ Filter\ Range(t)' = [Weighted\ Moving\ Average\ Price(t') \pm 1\sigma\ ]$$

$$(d)\ Total\ Estimated\ BEPS\text{-}related\ FF = \sum_{t=1}^{n}[Lower\ Bound\ Price(t)' - Invoice\ Price\ (t:i)]\ x\ Quantity(t:i)$$

Weighted Average Price (t): daily average price weighted by transaction-level invoice prices and quantity in tons.

Weighted Moving Average Price (t): three-day moving average price weighted by quantity of tax payers (exporters) and by quantity of exports transactions.

Price Filter Range (t): upper and lower bound prices set at the three-day weighted moving average price +/- 1σ (standard deviation).

[32] Hong, Keejae P. & Pak, Simon Joong-woong (2017). Estimating Trade Misinvoicing from Bilateral Trade Statistics: The Devil is in the Details. Available at: https://www.tandfonline.com/doi/full/10.1080/08853908.2016.1202160

Lower Bound Price (t): three-day weighted moving average price - 1σ (standard deviation).

Total Estimated BEPS-related FF: the sum of the differences between the lower bound prices and transaction-level invoice prices below the lower bound (potential underinvoiced exports) in the period from date "t=1" to "t=n", wherein "1" represents the first and "n" the last day.

TIN (t'): quantity of tax payers (exporters) in a date "t'".

E(t'): quantity of export transactions in a date "t'".

Invoice Price (i): transaction-level invoice price in a date "t".

Quantity(i): weight in tons by transaction-level invoice price in a date "t".

The following table sums up the estimated BEPS-related financial flows[33], segregated by triangular transactions with tax havens or privileged tax regimes, as defined by the RFB Normative Ruling nº 1.037/2010:

Table 2. Estimated BEPS-related financial flows

Estimated BEPS-related financial flows
Period: 2017 to 2019

country of acquisition	triangular transactions	Incoterms	total exports US$	quantity TON	estimated BEPS-related FFs US$
Art.1º - Tax Haven	Yes	FOB	18.128.478.967	47.964.971	162.298.531
Art.2º - Privileged Tax Regime	Yes	FOB	29.913.890.618	79.024.100	300.401.808
Other jurisdictions	Yes	FOB	5.552.651.496	14.590.957	38.643.608
Other jurisdictions	No	FOB	150.150.582	407.331	2.507.883
Total			**53.745.171.664**	**141.987.359**	**503.851.830**

4. Conclusions and way forward

This statistical research indicates that favoured taxation jurisdictions and the lack of transparency likely play key roles as drivers of the 'phantom trade' phenomena, which results in profit misalignment as part of the value created in the commodity sector in Brazil is artificially transferred to entities with no economic substance, located in low-tax jurisdictions or non-transparent jurisdictions.

The biased down estimated price filter for the soya bean trade market indicates that even through a conservative estimation it is possible to observe financial flows with high levels of risk exposure to BEPS.

Despite the evidence already raised, many questions still remain unaddressed and further research and analysis are necessary to comprehend the role played by offshore special purpose entities (SPEs) and shed additional light into the grey zone between lawful tax avoidance, unlawful tax avoidance and tax evasion[34].

[33] The abnormally priced transactions detected by the price filter method are assumed suspicious mispriced transactions and, likely, enables illicit capital flight or profit shifting out of countries through export underinvoicing (outward financial flows). The research attributes the trade mispricing to international tax evasion or cross-border aggressive tax avoidance strategies.

[34] Picciotto, S. (1992). International Business Taxation, Weidenfeld & Nicolson. Available at: http://taxjustice.blogspot.be/2013/06/international-business-taxation.html

In this regard, the key to address this challenge lies in identifying adequate and reliable information that might help decouple cross-border financial flows related to real economic activity from those of SPEs, which are related to the *phantom phenomena* or BEPS risks. Measures aimed at implementing international standards of financial and fiscal transparency such as the OECD CbC Report and Common Reporting Standard (CRS) constitute a relevant set of data to tackle this issue. The IMF[35] proposal to separately identify cross-border transactions and positions for SPEs may offer a valuable contribution to identify transactions lacking economic substance.

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