1. Flows of offshore wealth and international tax evasion by individuals

Flows of offshore wealth are difficult to match with the concept of IFFs. First, the stock of offshore wealth tells us little about how it was generated: it can result from legally earned incomes or from illegal activities. Simply being offshore does not mean it is illegal, or illicit. It can be perfectly compliant with tax and other regulations. Second, offshore wealth is a stock and while IFFs are flows. If we assign a share of offshore wealth to IFFs, it opens up challenges related to the origin, transfer, or use of these flows. Central banks have developed some tools for this, as outlined in Case study 1 and Error! Reference source not found..

The application of so-called gravity models to tax and commercial IFFs is worth exploring (see Box 1) in the future. While the methods suggested for pilot testing do not include gravity models, some elements of IFFs may be analysed using them (see Error! Reference source not found.). Rather, the methods suggested for pilot testing attempt to transform offshore wealth to flows (F1).

Box 1. Gravity model

**Concept**
Gravity models have traditionally been used in the context of international trade to estimate bilateral trade flows between country $i$ and country $j$, though they can be used to model any flow between two countries. The basic premise is that these flows are a function of each country’s economic size and the distance between them, analogous to mass and distance in Newton’s law of universal gravitation, hence their name.

\[
F_{ijt} = G \times \frac{M_{it}M_{jt}}{D_{ij}}
\]

Formula (1) illustrates a gravity model in its simplest form, where the trade flows from country $i$ to country $j$ at time $t$, $F_{ijt}$, are represented by $G$, a constant, $M_{it}$ and $M_{jt}$, the economic sizes of countries $i$ and $j$, respectively, and $D_{ij}$, the distance between countries $i$ and $j$.

For econometric modelling, this formula is transformed using a natural logarithm to obtain what is considered a “very simple and thus appealing” (Cassetta et al., 2014, p. 7) econometric formula:

\[
\log F_{ijt} = g + \beta_1 \log M_{it} + \beta_2 \log M_{jt} - \beta_3 \log D_{ij} + \epsilon_{ijt}
\]

This formula can be extended to better suit the context of estimating IFFs by including parameters such as corruption levels, banking secrecy, shared language and so on. With modifications in specifications of the model, the method of estimating IFFs from gravity models would estimate normal trade flows between two countries and compare this estimated value with observed values. Deviations from the predicted levels can then potentially be attributed to IFFs.

**Strengths**
While gravity models perform well in the context of bilateral trade, their use to measure IFFs and money laundering is less well validated. Still, the approach has advantages, primarily around its data requirements. In order to estimate a gravity model for IFFs, only commonly available economic and geographic data in addition to other domain-specific data, such as corruption levels, are required. More research needs to be carried out to validate their usefulness in the IFFs context, but the approach can be an appealing one as a starting point for countries lacking other types of data.

**Limitations**
The outputs of gravity models are entirely estimated, with no attempt to directly measure IFFs or incorporate any hard data on them. This potentially limits their usefulness in generating indicator data. Furthermore, in several applications, the approach attempts to model flows at a macro level, making disaggregation into particular sectors difficult, also limiting their usefulness in informing policy.

**Applications**
Given the limitations of gravity models, they can be used for comparison or validation of the results of other methods to measure IFFs. With microdata, these models may provide detailed insight, such as the study of Italian cross-border bank transfers (Case study 1) or application of a gravity model on foreign securities owned by the Cayman Islands (Error! Reference source not found.).
Concept and assumptions
The undeclared offshore assets indicator (outlined in Cobham and Janský, 2020) is a top-down method which addresses offshore tax evasion by individuals. It does so by measuring the excess of the value of citizens’ assets declared by (partner) countries, over the value declared by citizens for tax purposes. The indicator does not distinguish between various categories of IFFs and will also include assets from illegal activities. Hence, double counting is a serious limitation of the method. Moreover, it only focuses on the side of IFFs that leave, or are outside the studied country, hence linking to outward IFFs only.

The indicator is reported by each territory, i.e., country. This means that for a particular country A, first, the sum of assets of country A’s citizens reported as being held in all other countries is calculated. This is then compared to the sum of assets declared by the citizens of country A as being held in all those countries. The difference is the amount of undeclared assets. Financial institutions are required to confirm the citizenship of account holders. At the same time, the indicator requires that Tax authorities aggregate their data on citizens’ self-declaration of assets held abroad for comparison.

The application of the method involves some difficulties. For instance, the concept of citizenship is used, although it does not always imply tax liability. Tax authorities and national regulations may differ in how they treat dual citizenship or how they define tax residency, i.e., residency for tax purposes. The so-called citizenship-by-investment programmes can obscure the measurement of tax evasion by individuals. Using data on cross-border bank deposits, Langenmayr and Zyska (2020) find that deposits in tax havens increase after a country starts offering a citizenship-by-investment program, providing indirect evidence that these programmes are used by tax evaders.

Overcoming limitations
While the methodology proposed is conceptually simple, it has limitations, and the general availability of data and cross-country comparability of results will pose significant challenges. Data exchange among national authorities and data transferred from financial institutions to Tax authorities are required to overcome issues with data availability and improve quality of estimates. Recent developments in the area, including the OECD Common Reporting Standard (CRS) provide substantial support in such measurement of IFFs. It should be noted that data exchange between authorities, within or across national borders, need to strictly abide by relevant competent authority agreements and respect of statistical confidentiality.

Building on estimated stock of undeclared wealth, the stock measure needs to be transformed into a flow measure. This can be achieved in theory by taking the difference of two subsequent stock measures. In addition, changes in the values of assets need to be considered first before assigning them to IFFs. The growth of wealth through measures of capital gains is accounted for, but the method does not provide means to consider the consumption of wealth.

Source data
Source data are available from the BIS, where data are published by location. Although these are considered the most consistent data currently available for this purpose by Cobham and Janský (2020), this source has limitations, however, in terms of countries covered. Moreover, certain asset
classes (e.g., art, real estate, or cryptocurrencies) are not considered. An alternative international source is the OECD CRS covering signatory economies, with similar coverage issues as BIS. Financial institutions report to national Tax authorities, and the latter would provide an important and relevant data source, yet practice has shown data access limitations. Data are reported on annual level, end-of-year stock.

**Calculation**

Calculation of the indicator is straightforward and stems from its definition as the excess of the value of country $i$'s citizens’ assets declared being held in countries $j$ over the value declared by citizens of country $i$:

$$\phi_i = \sum_j \beta_{j,i} - \alpha_i$$  \hspace{1cm} \text{Equation (41)}

where:

- $\phi_i$ ... undeclared assets of citizens of country $i$
- $\beta_{j,i}$ ... the sum of assets of citizens of country $i$ reported as being held in country $j$
- $\alpha_i$ ... the sum of assets declared by citizens of country $i$ as being held in other countries $j=1, \ldots, n$, where $j \neq i$

There are, however, two methodologically important issues we need to address in relation to measuring the IFFs:

1. As already mentioned, this indicator only addresses the assets held abroad, as a result of outflows (relating to **outward IFFs only**).
2. The indicator measures the assets, therefore a **stock**, and does not refer to flows.

We address the **second issue** first. To obtain the value of flows (outflows of IFFs) based on this indicator for a given year, $t$, we will need to calculate the indicator in equation (41) also for a preceding period, $t-1$. With the assumption that the difference in two successive stocks can be assigned to the flows, such difference could be a measure of related IFFs. With this, however, transformation of the assets, such as consumption, is not accounted for, leading to a potential overestimation of IFFs. At the same time, also capital gains in an offshore jurisdiction, if not accounted for, would be conflated with IFFs. The latter can, however, be addressed by including a factor of market valuation of the offshore wealth, $v_t$, thus, the flows of assets held abroad by citizens of country $i$ in period $t$ are calculated as:

$$\text{flow}_{i,t} = \phi_{i,t} - \phi_{i,t-1} (1 + v_t)$$  \hspace{1cm} \text{Equation (42)}

To determine the yearly rate of increase of assets captured in $v_t$, the MSCI world price index is used (MSCI 2020).

If these flows from equation (42) are positive, citizens of country $i$ are, by assumption, shifting assets abroad without declaring that to domestic authorities, even though they may be fully compliant with destination’s jurisdiction. Here the challenge is that increases could refer to capital gains on offshore assets, and decreases could point to consumption of offshore assets. Further, some offshore wealth may fall under limited reporting responsibility whereby a citizen is not required to report the wealth.
held abroad. Country pilots could consider ways of adjusting for some of these limitations. In the lack of corrections for the previous challenges, we can only assume the positive result of equation (42) corresponds to outflows of IFFs by citizens (for country $i$ in time $t$):

$$Outward IFFs_{t_i} = \max(0, \text{flow}_{t_i})$$

Equation (43)

If the flows, however, are negative, this only indicates that the undeclared assets are “less undeclared” – be it because reporting or detection has improved, or the assets have been transformed into consumption or other form of capital. We cannot treat the negative flows (defined by equation (42)) as inflows of IFFs into country $i$.

Addressing the first of the issues outlined above, to be able to determine the inward IFFs, the mirror image of all countries in $j$ with respect to country $i$ would need to be studied and aggregated. Also here, methodological and practical (data availability) limitations arise.

Without a clear concept supporting measurement of inward and outward IFFs the use of this indicator is limited to outward IFFs only. In absence of better alternatives, the indicator is still suggested for pilot testing, with further developments of the methodology and data availability required. The following case study is not an application of this presented method; rather it showcases the analyses of cross-border bank transfers with gravity model.

Case study 1. Italian cross-border bank transfers

Studying the Italian cross-border bank transfers between 2007 and 2010, Cassetta et al. (2014) use the gravity model to identify flows appearing to be abnormally above the predicted values by the model itself. Only cross border wire transfers made by private customers of Italian banks are considered in the study. National financial intelligence unit (FIU) classified destination countries as risky or not risky.

Destinations of cross-border financial flows

Using the original dataset by the FIU and adding a set of socio-economic and demographic variables for province of origin and country of destination (e.g., GDP per capita, average firm-level taxation, FDI per capita, dummy variable of shared border as a proxy for distance between areas, employment rate, personal taxable income, etc.), authors reveal the positive correlation between financial flows and foreign GDP and population, FDI and proximity to Italian provinces; and a negative correlation with firm-level tax rate.
The study is important not only for the application of gravity model to observe cross-border risky financial flows, but also to complement empirical analysis by contextual interpretation, shedding important light on the (illicit) financial flows in terms of, if not measuring IFFs directly, their risk assessment.