Network Properties of Tax Havens

A research proposal

Andrés Castro-Araújo
QMSS
Columbia University
New York, NY
ac4247@columbia.edu

ABSTRACT

A surprising inconsistency in publicly available Foreign Direct Investment data leads to a series of hypothesis about the network structure of tax havens. This, in turn, leads to the realization that traditional research on tax havens –and more broadly, the network of global corporate control– has focused too much on the properties of individual nodes and too little on the *properties of individual edges*. I propose to exploit the perceived deficiencies of FDI data to shine a light on anomalous transactions between countries, rather than just trying to classify individual countries as tax havens or not.

KEYWORDS

global investment networks; tax havens; measures of centrality

1 Introduction

Despite their importance, there's no broadly accepted definition of what makes a country a tax haven. This problem is a highly debated topic and the question is probably ill-defined. But that hasn't stopped many intergovernmental organizations (e.g. IMF, OECD) and independent advocacy groups (e.g. Tax Justice Network) from assembling lists of tax havens designed to produce "name and shame" pressures for policy change and international cooperation. These tactics follow a sense of urgency, given the fact that it's been estimated that roughly 10% of world GDP is hidden away in tax shelters [1].

In brief, attempts at identifying tax havens have followed one of two approaches:

1. A **quantitative approach** that defines tax havens as low-tax jurisdiction that "provides financial services to nonresidents on a scale that is incommensurate with the size and the financing of its domestic economy" [2]. Thus, tax havens are identified by taking some ratio of foreign investment to GDP by country, and then sorting the results from highest to lowest. As a result, tax havens are predominantly identified to be small islands like Bermuda, the Cayman Islands, Cyprus, and so on.

   To see how this is the case, consider the case of the British Virgin Islands. In 2017, it had 417 thousand active companies, but only around 23 thousand inhabitants [3].

2. A **qualitative approach** that focuses on taxation frameworks, treaty ratification, and other assessments of financial secrecy. The resulting lists are assembled by organizations such as the OECD and the IMF, and are subject to immense disagreements, especially by countries that find themselves inside them.

   More recently, the Tax Justice Network unveiled a *financial secrecy ranking* that ranks countries like USA, Germany, and Switzerland in the list of top 10 offenders. They further argue that if the British network of islands (i.e. overseas territories and crown dependencies) were taken as one, it would outweigh every other country by far [4]. The list is assembled by averaging over 20 secrecy indicators and then multiplying by a "global scale weight" which indicates each country's overall importance in the global market for financial secrecy.

Therefore, both approaches disagree on what to look for when identifying tax havens and, thus, how to best tackle corporate tax evasion. However, they are similar in one respect: both of them utterly disregard what some call the "network structure of global corporate control" [5]. In other words, they try to identify the biggest culprits of tax evasion without actually *following the money* as it moves around the intricate networks of global ownership; they don't account for the position each jurisdiction occupies in the grand scheme of things, nor how they relate to other countries.

In the following sections I describe how Foreign Direct Investment (FDI) data looks like; the way in which it's amenable to social network analysis; how it relates to tax havens; and conclude by claiming that tax haven research should consider focusing less on ranking individual countries in terms of how secretive (or how anomalous) they are; and focus instead on identifying relations between specific countries that seem to harbor suspicious behavior.

2.1 The inner workings of FDI data

Foreign direct investments are investments that take the form of *controlling ownership* of corporations in one country by corporations based in another country. Some of these corporations are best understood themselves as complex networks that span many different jurisdictions. For example, "the Britain-based banking and financial services company HSBC is composed of at least 828 legal corporate entities in 71 countries" [6]. These ownership relationships get recorded in FDI statistics at the country level. Each country reports two types of information [7]:

1. **Outward FDI:** these are direct investments abroad made by investors in reporting country. In other words, they represent transactions made by domestic investors that increase their investment in corporations based in a foreign country. If the transactions actually decrease their investment, then they are recorded as a negative transaction.
2. **Inward FDI:** these are direct investments inside the reporting country that come from foreign investors. These can also be positive or negative numbers.

In theory, these reports should be *symmetric*: one country's outward FDI should mirror its counterpart's inward FDI. Thus, we could very easily represent these flows as a directed network.

$$\{C_S \rightarrow C_T \mid G_S\} = \{C_S \rightarrow C_T \mid G_T\}$$

In words: the FDI flow from source to target country (when the information is recorded as an outward FDI by the source country) *should* equal the FDI from source to target (when the information is recorded an inward FDI by the target country). Note that these edges don't represent a flow of money, but rather an investment decision taken by C_S in C_T; and so the edge might have a negative weight.

However, this inequality usually does ***not*** hold. I first discovered this after assembling two networks G_S (outward FDI) and G_T (inward FDI) from data made publicly available on 204 countries by UNCTAD[1]. In these datasets, only 38% of the FDI flows are symmetric.

The following table shows the 5 biggest mismatches in FDI flows during the 2001-2012 period:

source	target	year	flowT	flowS	abs_diff
Luxembourg	Belgium	2008	63825.39	-48028.71	111854.10
Luxembourg	United Kingdom	2012	1262.15	101826.56	100564.41
United States	Netherlands	2007	19835.13	109097.00	89261.87
United States	Luxembourg	2009	108697.31	23074.00	85623.31
Belgium	Luxembourg	2008	-44492.62	41120.59	85613.21

Table 1: Five largest bilateral asymmetries (2001-2012).

[1] The United Nations Conference on Trade and Development (UNCTAD) is an intergovernmental body that deals with "trade, investment, and development issues".

There are two things to note here. First, some of the edges have different signs altogether. For example, in 2008 Luxembourg's outward FDI with respect to Belgium was a *negative* 48 billion dollars; but Belgium's inward FDI with respect to Luxembourg was a *positive* 63 billion dollars. The next section explains this puzzle of bilateral asymmetries.

Second, seen in network form, the traditional quantitative approach for identifying tax havens (i.e. the ratio of foreign investment to GDP) is consists on a very simple centrality measure: *we calculate the weighted in-degree of each country and then divide by GDP*. If we apply this measure to the G_S network, we get that Bermuda, Luxembourg, and Cyprus top the list. If we apply it to G_T, the results are similar except that the Marshall Islands replace Cyprus in the third position.

2.2 Bilateral asymmetries

There are many reasons why the FDI accounting is out of balance [7] [8]. At a global level, the asymmetries stem from the fact that not all countries participate in the data collection process; not all countries provide outward FDI data[2]; and the existence of bilateral asymmetries like those shown in Table 1.

At the country level, there are three main reasons:

1. Different valuation methods and estimation techniques.
2. Random error.
3. Differential treatment between fellow corporations in different countries. The following diagram provides an explanation:

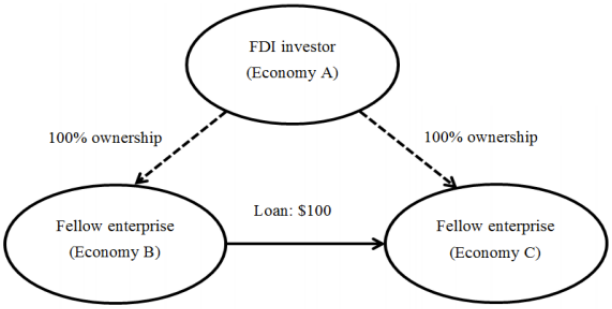

Figure 1: Differential recording of FDI loans among fellow enterprises (taken from Damgaard & Elkjaer 2017: 7).

Suppose that A fully owns two companies, B and C. If B lends $100 to C, this transaction will be recorded by country B as *negative inward FDI;* after all, corporation B is owned by non-resident A. This same transaction will be recorded by C as a *positive inward FDI* of $100. Thus, B's outward FDI doesn't match C's inward FDI. Furthermore, this transaction hides the fact that ultimately A is the one investing $100 in C.

These inconsistencies can be interpreted in one of two ways:

1. As a **nuisance.** According to this interpretation, FDI data offers a misleading picture of global economic integration. According to Damgaard and Elkjaer's research, around 40% of all FDI are completely decoupled from "real" economic activity: it consists on money passing around through empty corporate shells in which well-known tax havens play a dominant role. As such, these authors focus on *removing* these features in order bring out a more accurate depiction of the long-term investment relationships between countries [7]. In other words, their objective is to remove tax havens from their so-called "misleading" position in the global FDI network.
2. As a **feature**. After all, tax havens play a central role in the FDI network, even if the money flowing through them is disconnected from "real" economic activity. According to this view, these asymmetries stem from the involvement of unnecessary intermediaries in global transactions. Thus, if our purpose is to identify tax havens, we should spend more effort trying to understand how these inconsistencies in FDI reporting arise.

Focusing on bilateral asymmetries brings us full-circle to the two traditional approaches for identifying tax havens mentioned at the outset of this paper. The first approach takes a very simple weighted in-degree measure of centrality and tends to single out countries with very small population. The second approach doesn't take a network approach at all, but tends to single out larger well-developed countries like United States and the United Kingdom. The following table shows the 5 largest mismatches (weighted by the target country's GDP):

source	target	year	weighted_mismatch
United Kingdom	Luxembourg	2002	0.298
Germany	Malta	2006	0.214
Luxembourg	Cyprus	2009	0.208
United States	Luxembourg	2009	0.167
Belgium	Luxembourg	2008	0.153

Table 2: Five largest weighted asymmetries (2001-2012).

By focusing on these anomalous edges, we get a similar list to that provided by the *financial secrecy index,* except that instead of focusing on the characteristics of particular country-nodes, it focuses on the inconsistencies in particular FDI-edges. This focus, I will argue later, is better suited for the purposes of tax-policy organizations: to identify potential financial malfeasance among countries (an objective that can't avoid signaling out larger countries like USA and UK). Looking back at Table 2, for example, the point is not claiming that Germany as a whole is suspect of financial malfeasance, but that Germany's investments transactions with the island of Malta warrant a further look.

More importantly, if the first approach can be reframed as calculating a simple measure of node centrality, then the second approach could potentially be reframed as a calculating some measure of edge centrality.

The following section goes over a recent attempt to reframe the problem of tax havens in terms of networks, before concluding with a reflection about what criteria should be satisfied by a "good" measure of edge centrality that captures financial behavior most associated with our understanding of tax havens.

3 Network approaches

Measures of network centrality resemble more an art than a science. This is because, as Stephen Borgatti forcefully argues, these measures carry with them implicit assumptions about *what* is it exactly that flows inside a network, and *how* [9]. For example, the famous measure of betweenness centrality assumes that whatever it is that flows through network only does so through shortest paths. Other measures avoid thinking about loops, which are actually quite important in the FDI network. For example, Damgaard and Elkjaer estimate that around 5% of global FDI actually consists of *round-tripping,* which are circular paths in which the investment eventually returns to the original country [7]. Such investments would be more accurately portrayed as domestic investments disguised as FDI. But this disguised investment can be very important: circular flows of FDI are particularly suspicious from the tax policy point of view.

Right now, the state of the art network approach to tax havens is due to García-Bernardo et al [6]. These authors construct centrality measures for two different types of countries:

1. **Sink centrality** identifies those off-shore financial centers in which a disproportionate amount of value "disappears from the economic system". These are places like British Islands, Bermuda, and Cayman Islands. This measure of centrality is very similar to the weighted in-degree measure discussed earlier.
2. **Conduit centrality** identifies those jurisdictions that act as intermediate destinations for money that's in its way to "sink" tax havens.

Using both measures, they show "that the majority of investment from and to sink-OFCs occurs through only five jurisdictions (conduit-OFCs): the Netherlands, the United Kingdom, Switzerland, Ireland and Singapore" (García-Bernardo et al 2017: 9). In sum, they attempt to characterize tax havens not only as those countries where capital is ultimately stored, but also as those that act as important intermediary nodes or "conduits". Unlike previous approaches, García-Bernardo et al make a better use of the network properties of these investments.

[2] There are 14 countries that don't report outward FDI in the UNCDAT datasets: Guernsey, Hong Kong, Solomon Islands, Malta, Liechtenstein, Faroe Islands, Gibraltar, Isle of Man, Jersey, Monaco, Guam, Andorra, Uzbekistan, and Guyana.

However, note that this approach has one main assumption: investments that incur in financial malfeasance supposedly have a final destination. But this assumption is not consistent with the existence of circular investments (or "round tripping"); nor is it consistent with the fact that tax-havens might have a bigger role as unnecessary intermediaries instead of simply providing a final destiny for tax-exempt investments.

As Borgatti points out, financial investments might be better characterized as traversing the global FDI network "via walks rather than trails" (Borgatti 2005: 57). From the tax-policy point of view, what makes these walks suspicious is the accumulation of accounting inconsistencies (i.e. bilateral asymmetries) due to the use of intermediaries and "round tripping".

Therefore, I propose a method for identifying tax-haven behavior that begins by identifying imbalanced FDI-edges, which presumably arise from the excessive use of intermediaries to perform investments. A preliminary result for this kind of measure is shown in Table 2. After constructing this new network of imbalanced edges, we could then go one step further and identify tax havens as those nodes that participate the most in these imbalanced FDI flows. This will shine a light on countries not traditionally associated as tax havens (e.g. USA and UK). It can also be argued that this second step is unnecessary because tax-policy advocates should not care whether, for example, the USA should be classified as tax haven or not; but whether particular transactions between the USA and, e.g. Luxembourg, exhibit "tax-havenish" behaviors or not.

4 Conclusion

Traditional research on tax havens has focused excessively on the particular attributes of country-nodes, with the aim of classifying them into tax havens or not. This aim is intertwined with the ongoing advocacy strategy of unsuccessfully naming and shaming countries until they enact change.

In this paper, I propose a new approach that turns the so-called "deficiencies" of FDI data into an important feature of the global ownership network. The main idea is to identify FDI-edges that exhibit great bilateral asymmetries and signal them as the most likely sources of financial malfeasance. This approach has the benefit of being data-driven and also of identifying other countries besides stereotypical small islands in the Caribbean. We can then take this one step further and see how these inconsistencies cluster together.

However, more thought is needed in order to separate imbalances due to different valuation methods at the country level from those that are due to the complex involvement of intermediaries and "round tripping".

REFERENCES

[1] Zucman, Gabriel (2015). *The Hidden Wealth of Nations,* The University of Chicago Press.

[2] Zoromé, Ahmed. 2007. Concept of Offshore Financial Centers: In Search of an Operational Definition. Working Paper 07/87. Washington DC: IMF.

[3] *Tax Justice Network report on the British Virgin Islands*. 2018. Available at:

http://www.financialsecrecyindex.com/PDF/BritishVirginIslands.pdf

[4] *Financial Secrecy Index (2018):* https://www.financialsecrecyindex.com/

[5] Vitali, S., Glattfelder, J. B., & Battiston, S. (2011). The network of global corporate control. *PloS one*, *6*(10), e25995.

[6] Garcia-Bernardo, J., Fichtner, J., Takes, F. W., & Heemskerk, E. M. (2017). Uncovering offshore financial centers: Conduits and sinks in the global corporate ownership network. Scientific Reports, 7(1), 6246.

[7] Damgaard, J., & Elkjaer, T. (2017). *The Global FDI Network: Searching for Ultimate Investors.* International Monetary Fund.

[8] Angulo, E., & Hierro, A. (2017). *Asymmetries in the Coordinated Direct Investment Survey: What Lies Behind?* International Monetary Fund.

[9] Borgatti, S. P. (2005). Centrality and network flow. *Social Networks*, 27(1), 55-71.