Booking positions in small offshore financial centers:

Focus on US global banks

Carmela D'Avino

Rennes School of Business, Rennes, France

and

Mimoza Shabani

University of East London, London, United Kingdom (corresponding author)

Abstract

Small offshore centers are home to the leading booking centers of global banks and facilitate their transactions across offices worldwide. This paper investigates the factors driving booking positions in offices located in small offshore centers, with a focus on US global banks. We find that global banks tend to increase their booking positions when liquidity conditions at the global and parent levels deteriorate and when banks' risk-taking increases through leverage. Our results suggest that lower tax levels and higher secrecy explain booking centers' localization in small offshore countries.

Keywords: small offshore centers; prudential regulation; global banks; booking positions.

JEL Classification: F34; F33; K23.

1. Introduction

Offshore financial centers (OFCs) play a crucial role in the international financial system. The financial institutions operating within these centers have diverse business models, ranging from specialized financial product providers to those that focus primarily on facilitating and centralizing global liquidity flows. Financial intermediaries based in small OFCs, which are often identified as tax havens, typically operate through shell or brass plate offices. These offices do not usually engage in any significant local banking activity but instead aim to pool and channel vast amounts of liquidity within the global banks' own banking groups via internal capital markets (Errico and Musalem, 1999; Barth et al., 2009). While the existing literature has primarily focused on examining the role of small OFCs in illicit banking activities, such as tax evasion and money laundering (see Rose and Spiegel, 2007, for instance), there has been limited attention given to the internal liquidity channeling functions of banking offices situated in these centers.

Focusing on internal liquidity flows (interoffice) reported by foreign branches of US global banks, this paper aims to fill this gap in the literature by investigating the drivers that explain the liquidity flows toward bank offices located in small OFCs. We overcome the data availability challenges often encountered in small OFC-related research using sampling techniques to estimate the bilateral interoffice flows/booking positions between booking offices and other worldwide locations.

The proposed empirical analysis is structured in two parts and is based on balance sheet item data from foreign branches of US global banks aggregated by the host country. We first estimate the flows through internal capital markets of branches located in any country vis-à-vis the booking offices' jurisdictions with the aim to understand which *source* locations are behind the booking positions of small OFCs. To this extent, we use the minimum density sampling approach, developed by Anand et al. (2015) already used in the literature to estimate financial networks whenever data on bilateral exposure are not available. Second, we regress a number of panel specifications to understand what drives these flows toward booking offices located in small OFCs. We account for a wide set of factors capturing both source country and booking office location variables as well as the US liquidity and leverage of banks. In particular, we are interested in ascertaining how booking positions react to changes in different liquidity proxies. Is more liquidity channeled through booking offices when the banking system is liquidity-rich? Or does a shortage of liquidity in the banking system lead to an increase in the pooling and redistribution of liquidity through a small OFCs?

The topicality of our research question mainly stems from empirical relevance. Branches of US banks have large exposures in small OFCs, such as the Cayman Islands, the Bahamas, and the Channel Islands, with their balance sheets exceeding US $550 bn as of December 2017. For these locations, interoffice assets and liabilities (i.e., amounts owed to or from related offices) comprise a significant portion of the unconsolidated local assets. While the branch's legal status allows for unconstrained and tax-efficient coordination and distribution of the liquidity available within their own network, it also implies unlimited liability; that is, any losses occurring in these offices directly affect the parent bank's capital[1]. While the existing literature has highlighted the role of interoffice transactions of banks' internal capital markets in transmitting monetary and liquidity shocks (De Haas and Van Lelyveld, 2014; Cetorelli and Goldberg, 2012a), the focus is limited to non-tax haven locations. In these locations, banks provide banking services with different degree of product diversification (lending, deposit, securities, …). The business model of banks located in small OFCs, is, however very different with interoffice flows carrying an important weight in local balance sheets. Internal liquidity passing through these offices is highly susceptible to external shocks and is limitedly exposed to local ones. In turn, gaining insight into the factors that contribute to the liquidity flowing through small offshore financial centers (OFCs) can provide crucial knowledge about the broader drivers of global liquidity (Bruno and Shin, 2015a).

Our paper builds a bridge between two strands of the literature regarding small OFCs and global banking. We contribute to the small OFC literature by focusing on the drivers of booking positions of global banks. The global banking literature recognizes that internationally active banks use internal capital markets to reallocate liquidity across their offices worldwide in response to global and local shocks (De Haas and Van Lelyveld, 2014; Navaretti et al., 2010; Cetorelli and Goldberg, 2012a, 2012b). Small OFC locations are typically disregarded in the empirical applications found in these papers, as these mainly focus on the effect on loan provisions.

Our results suggest that US global banks centralize their liquidity collected through offices worldwide through booking centers when US and global liquidity dries up. We also find that the leverage of US banks is a significant push factor for interoffice flows to booking centers in small OFCs, which implies a positive relationship between global banks' risk-taking and booking positions in small OFCs. Small OFC characteristics, such as taxation levels and

[1] Evidence of global banks implantation in small OFC by legal status is found in Fietcher et al. (2011).

depositor information disclosure enforcement laws, also play a significant role in explaining the size and direction of these jurisdictions' booking positions.

For lawmakers, the normative implications of our results are far-reaching. Improving small OFC disclosure laws, tax compliance practices, and money laundering and terrorist financing activity monitoring has been the focus of worldwide regulators, particularly since the 2007-09 global financial crisis[2]. However, it is also crucial to understand the nature and direction of these flows through global banks' booking offices, as these are tightly linked to onshore financial stability. Global banks' unconstrained liquidity flows in and out offices located in small OFCs remain largely unregulated; a failure to account for the extent and determinants of global banks' booking positions may lead to an underestimation of the actual central role small OFCs play within global financial markets. In addition, sudden changes to these flows may contain early warning information on liquidity conditions in global financial markets due to the potential central role of global banks and small OFCs in global finance[3] (Dixon, 2001). The domestic regulator is typically in charge of regulating foreign branches of banks headquartered on their soil. A better understanding of the dynamics behind booking positions in small OFCs can help formulate appropriate policy frameworks, as changes in booking positions may provide a better understanding of the degree of the transmission of shocks in onshore economies.

The paper is organized as follows. Section 2 provides an overview of the existing literature, discussing our testable predictions. Section 3 provides an overview of the data and the details concerning the classification of the booking centers. Section 4 presents the estimation of bilateral interoffice positions, and Section 5 presents the estimated model. Section 6 discusses the estimated coefficients of several model specifications as well as some robustness checks. Section 7 concludes.

[2] The Financial Action Task Force and the G20 2010 initiatives are some examples. Seminal contributions discussing the regulation of offshore financial centers include the work by Rixen (2013) and Gnutzmann et al. (2010).

[3] Part of these flows involve the booking of Eurodollar deposits and loans originated through the internal banking network. As pointed out by William et al (2005), the economic consequences of the collapse of an offshore affiliate could be more severe and far-reaching for domestic economic stability, given that the size of their balance sheet tends to be much higher than that of the onshore parent bank.

2. Literature Review and hypotheses

Our paper relates to two mains strands of the literature: one that focuses on small OFCs or tax havens and another than examines internal capital markets of global banks.

The first testable hypothesis we put forward focuses on the factors that explain whether macroeconomic conditions in countries other than small OFCs explain the interoffice flows observed between the latter and small OFCs. De Haas and Lelyveld (2010), for instance, show that foreign offices of global banking groups recur to their internal capital markets to shed from liquidity shocks arising from shock in host countries. Similar results are put forward by Frey and Kerl (2015) and Santioni et al. (2020) for German and Italian global banking groups respectively during the Global Financial Crisis. In relation to the liquidity provision and pooling of small OFCs, we also expect higher booking positions versus these latter be observed during times of economic downturns. We thus test for the following hypothesis:

HP1: Deteriorating economic conditions in a host country stimulate booking positions in OFCs.

Our second testable hypothesis focuses on how characteristics of small OFCs affect the interoffice flows from other locations. The existing literature on small OFCs largely focuses on the factors determining their tax haven status; the consensus is that tax evasion and money laundering are underlying features of these jurisdictions (Masciandaro 2005; Coats and Rafferty, 2006; Dharmapala and Hines, 2009; Schwarz, 2011)[4]. Schwarz (2011) considers several determinants for a country becoming a small OFC. Using a comprehensive data set on money laundering regulation measures, the study finds that small OFC jurisdictions featuring lax money laundering oversight and rules tend to be identified as tax havens. The author also finds a negative relation between the economic prosperity of small OFCs and their likelihood of being both a tax haven and a money launderer. Rose and Spiegel (2007) find that countries that exhibit tax haven and money laundering status seem to attract cross-border flows. Other factors, such as political stability, regulation, common language, and population, offer no strong or consistent associations with small OFCs identification. Masciandaro (2008), on the other hand, puts forward a theoretical and empirical analysis to study the determinants of a country supplying offshore services and finds that developing countries that share a common legal tradition, political stability, and a low crime rate are more likely to become tax havens. A country's decision to provide offshore banking activities is largely driven by the desire to foster domestic economic growth. However, the economic benefits of becoming an OFC for host

[4] An interesting study on money laundering for countries other than small OFCs, see Ardizzi et al. (2018).

countries will depend on the nature of the established offshore companies (Hampton, 1994). That is, the benefits of offshore companies operating in host countries will depend on whether they are just *brass plates*, from which only the government would incur earnings from their activities, or have a physical presence benefiting the country, e.g., in the form of employability in the sector (Doyne and Johnson, 1999). Nonetheless, Butkiewicz and Gordon (2012) estimate the size of the offshore banking sector for 15 Caribbean OFCs, finding that they are associated with higher economic activity and thus positively contribute to host economies. These results are in line with Hines (2005), who finds that offshore countries attract more foreign investment due to tax benefits than other countries, which leads to higher economic growth for countries identified as OFCs. Errico and Musalem (1999) discuss the role OFCs played in the Asian and Latin American financial crises during the 1990s. Given the regulation and tax benefits the OFCs offer, banks were able to access the international capital market through them and greatly increased their credit expansion. Short-term borrowing through OFCs gave rise to an increased level of unhedged lending in the domestic market and increasing financial vulnerability in domestic economies.

Overall, while not specifically targeting flows in and out of small offshore financial centers (OFCs) via the banking system, the literature suggests that small OFCs are more prone to attracting cross-border flows, particularly when they have lenient regulations or taxation and favorable and institutional factors. Adapting these predictions to interoffice flows, we advance our first testable hypothesis:

HP2: Higher interoffice flows are associated with lower taxes and better institutional factor of small OFCs.

Our third and last testable hypothesis investigates the extent to which liquidity conditions in the home country affect booking positions through small OFCs. Empirical literature on the drivers of flows in internal capital markets has indeed highlighted the role of monetary and liquidity shocks occurring in the country where the global bank is headquartered. Cetorelli and Goldberg (2012b) show that US global banks respond to restrictive monetary policy in the US by increasing their borrowings through internal capital markets. Buch et al (2016) also advance evidence in support of the transmission of liquidity shocks arising from non-conventional monetary policy instruments used by the Fed during the GFC. Given the liquidity pooling function of small OFCs, we expect that tighter monetary conditions met by the headquarter will be associated with more substantial liquidity repatriation through small OFCs. We thus formulate the following hypothesis:

HP3: Tighter liquidity conditions in the domestic markets positively affect flows to small OFCs.

3. Background and data

3.1 Data

Our study's empirical investigation is centered on geographically segmented balance sheet data of the foreign branches of US banks available from the Federal Financial Institution Examination Council (FFIEC, FFIEC 030 report). The initial annual panel spans 2003 to 2017 and contains information on US global banks' assets and liabilities by country of location, totaling 57 jurisdictions[5]. On the asset side, the report provides information on claims of foreign branches vis-à-vis unaffiliated banks, related offices (both branches and subsidiaries), and the private sector, as well as securities holdings for investments and trading. On the liability side, we have information on deposits by banks and other sectors as well as debt vis-à-vis related offices and other debt.

The measurement of US global banks' booking positions is based on the report's data on interoffice assets and liabilities, that is, positions of branches located in a host country vis-à-vis related offices, which materialize through internal capital markets (McCauley et al., 2019). The IMF (1999) defines booking positions by global banks as the practice of *"recording the balance sheet positions arising from trades undertaken in one location to a 'book' located in a part of the organization with a different residency status"* (IMF, 1999, p. 1).

A preliminary look at the data reveals that interoffice assets and liabilities are significant items on the balance sheets of foreign branches of US banks, constituting 56% and 51% of their total assets, respectively. In some small OFC locations, such as the Cayman Islands and the Bahamas, interoffice transactions constitute over 90% of the branches' total assets.

3.2 Booking center countries' classification

Our empirical focus is on brass plate, or shell office, booking centers as used by US banks located in small OFCs. Offices in these locations are used almost exclusively for bookkeeping or administrative purposes by the parent bank, featuring a lack of local retail activities or off-balance sheet specialization, which would require a local workforce. Clearly, booking positions are not a prerogative of small OFCs, as branches located in international and regional financial centers (e.g., London, Hong Kong, and Singapore) book international transactions to various degrees. However, offices located in these latter locations have business

[5] We also include relevant variables for the US (see data Appendix, Table A1). Figures refer to end-of-year amounts. We are unable to extend the panel backward as internal capital markets positions, which are crucial for our analysis, have been collected starting from 2003 onwards.

models that are complex and feature diversified product offerings as well as large off-balance sheet exposures in a variety of derivative markets. It follows that in these locations it would not be appropriate to identify interoffice transactions with booking positions, as there may be many underlying local factors driving changes in internal capital market flows. On the other hand, booking offices located in small OFCs feature very simple balance sheet structures featuring almost exclusively large interoffice positions not affected by local macro fundamentals.

A branch located in a jurisdiction that is generally listed as a small OFC may not necessarily be a pure brass plate booking center. To assess which of the small OFCs in our panel can be classified as booking centers, we analyze several balance sheet variables available in our data set. We first identify which locations in our sample are classified as small OFCs according to several available sources reported in Table A2 of the Appendix (Financial Sector Assessment Program by the IMF, 2000; European Commission, 2017; BIS, 2017; Zorome; 2007; Lane and Milesi-Ferretti, 2011). We then investigate the extent to which foreign branches of US global banks in these locations meet the following booking center characteristics: (1) high shares of interoffice assets and liabilities, (2) negligible levels of local loans, and (3) negligible off-balance-sheet positions. Following these criteria, we identify the following small OFC jurisdictions used as booking centers (*BCs*) by US global banks: the Bahamas, Bahrain, the British Virgin Islands, the Cayman Islands, the Channel Islands, Macau, the Northern Mariana Islands, Panama, Puerto Rico, and the US Virgin Islands. We added the unincorporated US territories of the Northern Mariana Islands and Puerto Rico to the list; these meet our criteria but do not appear in other classifications due to the consolidation of their data with US data by the relevant statistical agencies.

4. Estimation of bilateral liquidity flows vis-à-vis booking center locations

Our empirical investigation's first step consists of estimating bilateral interoffice flows through internal capital markets across locations where foreign branches of global US banks are located. This allows us to quantify the booking positions between branches located in non-booking center jurisdictions or *source* locations and the BC.

The estimation of bilateral interoffice exposure is based on *aggregate* values of interoffice assets and liabilities, that is, internal capital market positions of branches in a given location compared to all other confounded locations. To this extent, the balance sheet variables of interest are “Gross due from head office, US branches, and other foreign branches” and “Gross due from consolidated subsidiaries” on the asset side and “Gross due to head office, US branches, and other foreign branches” and “gross due to consolidated subsidiaries” on the

liability side. Since we are interested in total inflows and outflows from related offices in every location, we define interoffice assets (IOA) as the sum of the former two variables and interoffice liabilities (IOL) as the sum of the latter two. For each time t, t=1,…, T, and host country n, n=1,…, N, we estimate T NxN matrices that will yield bilateral flows of liquidity exchanged through internal capital markets between branches in locations i and j for all j≠i.

Starting from available data on aggregate positions, the literature proposes a few methodologies that allow for estimating nonnegative matrices in which each element represents bilateral exposure. In finance, in particular, there has been a recent interest in these approaches boosted by the growing literature on financial networks. Anand et al. (2017) provide a comprehensive discussion on the different methods, thereby highlighting that the assumptions made on the network features should provide a guide on the best methodology to use. The maximum entropy approach (Upper and Worm, 2004), for instance, is a widespread iterative method used to estimate nonnegative exposure matrices yielding a complete network, i.e., all cross-sections are linked to each other by spreading the exposures across *nodes* (or units, or cross-sections) as much as possible. While the assumption of a complete network may be reasonable in some cases, it is unrealistic for our data. IOA or IOL values are low in some locations, and some degree of geographical concentration is expected for these variables. Using this method may lead to underestimating the actual extent of bilateral exposures (Mistrulli, 2011; Markose et al., 2012).

Anand et al. (2015) propose a methodology for network reconstruction yielding a sparse matrix from aggregate positions: the minimum density (*MD*) method. Links and nodes characterize the resulting estimated matrix or network. Nodes represent the cross-sectional units. A link between nodes denoted by the estimated elements of the estimated matrix quantifies the extent of the bilateral dependence between two cross-sections. This sampling approach, which consists of minimizing the number of links needed for distributing the variable's aggregate observed value, is particularly suited for our data, as it accounts for the spatial dispersion in interoffice transactions. It yields an estimated matrix with zero and nonnegative entries, an incomplete network in which not all *nodes*, which are host countries in our case, are connected.

Following Anand et al. (2015), we apply the MD approach to our research question and data as follows. The US global bank network of internal liquidity reallocation comprises N host countries in which foreign branches are located. The elements of the NxN nonnegative matrix X contain information on the gross interoffice positions. In particular, the element x_{ij} is how often branches located in country i lend to related branches located in country j. For each foreign

location *i*, the sum of the row elements of *X* represents the total IOA. On the other hand, the sum of X's column elements represents the total IOL, that is, aggregated over all other foreign locations. Both totals are observable and can be summarized as follows:

$$\text{Interoffice Assets: } IOA_i = \sum_{j=1}^{N} x_{ij}$$

$$\text{Interoffice Liabilities: } IOL_i = \sum_{j=1}^{N} x_{ji}$$

The MD method allows us to estimate the elements of *X* (unobservable) when only IOA_i and IOL_i are observable for every *i* (see Anand et al., 2015 for a detailed description of the procedure).

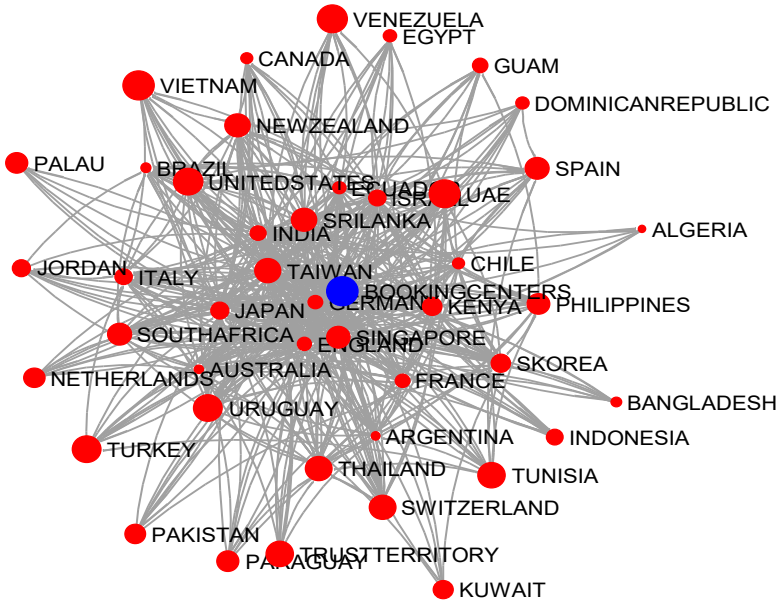
Figure 1 depicts the graphical representation of the estimated matrices in 2006 and 2016; the nodes' size reflects the relative amount of interoffice flows between branches located in any two locations. The black connectors identify the nonzero bilateral linkages between branches in any two locations. For ease of reading, the node corresponding to the BC group is in blue. The jurisdictions toward the center of the graph have the highest number of links and are thus the most central locations within the network. On the other hand, the locations situated at the edge of the graph are those with the fewest links with the other locations.

In Panel a), the estimated interoffice network shows the central role of booking centers in 2006. The BC group had considerable flows and nearly the highest number of links with the rest of the locations. This evidence points out that booking positions through branches in small OFC booking centers are booked across the geographical spectrum of global banks' locations. Ten years ahead, in 2016, a somewhat different picture emerges, as depicted in Panel b. The network features an important drop in the number of links, suggesting the lesser importance of interoffice transactions overall. The role of the BC group also has a less central role in the network. In particular, we find that booking positions through branches located in the BC group are booked by branches located in fewer locations and that the gross amounts of the flows are small when compared to pre-crisis levels. This is a general trend observed post-crisis in our estimated network, particularly following the European Sovereign Crisis in 2011, and aligning with the post-crisis deglobalization trend well documented in the literature (see McCauley et al., 2019 and references therein). There seems to be a consistent geographical pattern over time regarding the locations that tend to book more positions through the BC group. Offices located in international and regional centers are estimated to book the largest positions through branches located in the BC group. US-based offices are not particularly involved in booking positions through the BC group directly. Offices located in Australia, Canada, and some South

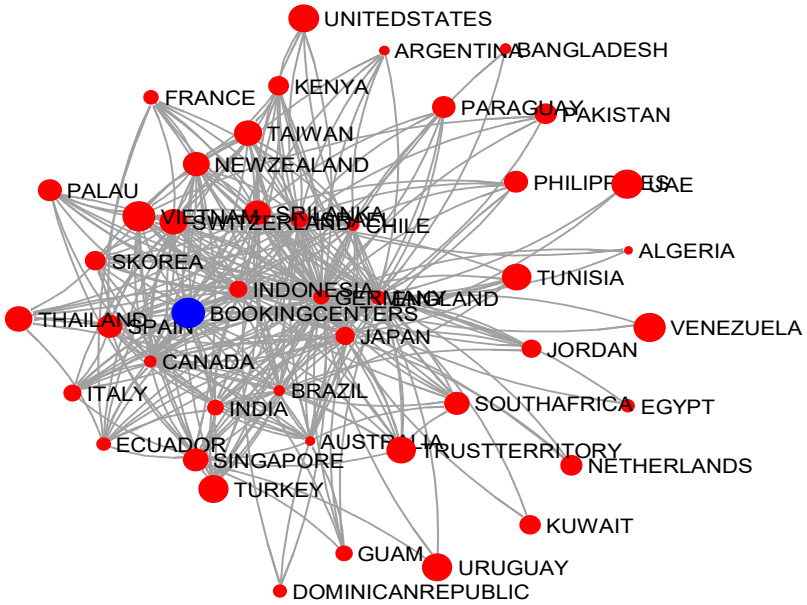
American countries, such as Brazil and Argentina, are estimated to book relatively larger positions with branches located in BC locations.

Figure 1: Estimated interoffice networks of US global banks using the MD methodology

Panel 1.a. 2006 data



Panel 1.b. 2016 data



Source: Authors' computations based on the FFIEC 030 report.
Notes: Figure 1 reports the estimated bilateral matrices using the MD methodology in 2006 (panel a) and 2016 (panel b). Each node represents the location where foreign branches of global US banks are located. The size of the nodes reflects the relative amount of interoffice flows between branches located in any two locations. The node in blue refers to interoffice positions in booking centers aggregated over the following countries: the Bahamas,

Bahrain, the British Virgin Islands, the Cayman Islands, the Channel Islands, Macau, the Northern Mariana Islands, Panama, Puerto Rico, and the US Virgin Islands The links represent the estimated bilateral linkages between branches in any two host countries.

5. Regression analysis

5.1 The model

The general specification of the estimated panel regressions has the following form:

$$\Delta ioa_{iOFC,t} = \beta_0 + \sum_{j=1}^{J} \beta_{1,j} Local\ BS_{i,t,j} + \sum_{k=1}^{K} \beta_{2,k} Local\ Macro_{i,t,k} + \sum_{q=1}^{Q} \beta_{3,q} BC\ factors_{t,q} + \sum_{w=1}^{W} \beta_{4,w} BC\ factors_{iOFC,t,w} + \sum_{z=1}^{Z} \beta_{5,z} US\ factors_{t,j} + \varepsilon_{iOFC,t} \quad (1)$$

The variable $\Delta ioa_{iOFC,t}$ captures liquidity flows of branches located in *i* toward the BC group and is measured as the log difference of interoffice assets of foreign branches located in country *i* due from offices located in booking centers located in small OFCs. This characterization of the dependent variable is in line with the relevant literature in which cross-border banking flows are proxied with gross bilateral claims (among many: Rose and Spiegel, 2007; Bruno and Shin, 2015)[6]. We construct $\Delta ioa_{iOFC,t}$ from the matrix X, estimated through the MD method described above; we obtain it by summing the row elements in x_i corresponding to the BC group. In addition, $Local\ BS_{i,t,j}$ and $Local\ Macro_{i,t,k}$ refer to the host country level's balance sheet variables of foreign branches of US banks and local macroeconomic indicators, respectively. For BC-related factors, we consider two types of variables. The vector $BC\ factors_{t,q}$ contains variables at the BC group level; these variables can be time-variant but do not depict cross-sectional variations. The factors contained in $BC\ factors_{iOFC,t,w}$, instead depict cross-sectional variations as they capture the extent to which any non-BC host country *i* fares in relation to the BC group. Last, $US\ factors_{t,j}$ refers to US-related variables, and $\varepsilon_{iOFC,t}$ is the idiosyncratic error.

The final annual panel used in the empirical analysis contains data on 47 non-BC jurisdictions spanning 2003-2017[7]. All specifications include year dummies, and depending on the estimation method, some include either fixed effects to capture time-invariant unobservable effects affecting our dependent variable or country dummies.

[6] In our case, this characterization is particularly suitable as gross inflows and outflows vis-à-vis BC are roughly equal.

[7] The US is included in the sample countries to account for liquidity flows compared to offices located in the country where the parent is headquartered.

5.2 Explanatory variables

Two research strands inform the variables entering the right-hand side of model (1). First, we refer to the literature on cross-border banking flows, as liquidity flows through internal capital markets are components of the gross flows widely studied in the international finance literature. Second, we refer to the literature on the factors underlying the OFC or a jurisdiction's tax haven status with the presumption that changes in those variables that significantly characterize small OFCs affect liquidity flows toward them. For instance, if advantageous tax rates and secrecy are a widely acknowledged feature of an OFC and thus the BC subgroup (see Schwarz, 2011 and Picard and Pieretti, 2011), then changes in taxes or disclosure laws might have an impact on the attractiveness of small OFCs, resulting in shifts in liquidity flows toward them.

As a branch-related, local balance sheet variable, we include in $Local\ BS_{i,t,j}$ the ratio of total deposits to total assets as a proxy for branch liquidity at the local level (*liquid*). In this definition of liquidity, we include local interbank deposits to account for the liquidity conditions in local money markets. We expect liquidity-rich branches to be associated with larger internal liquidity outflows, as discussed in De Haas and Lelyveld (2014) and Avdjiev et al. (2020). We also include the log of the total assets of the branches to account for the size of the local activities of foreign branches of US banks (*size*) to capture the eventual positive relationship between the expansion in the size of banks and capital flows across borders (Schularick and Taylor, 2012). We also capture the exposure to off-balance sheet activities of foreign branches by location (*offbalance*) by considering the notional amounts of interest rate swaps of foreign branches of US banks by country of location.

The local macro indicators considered in $Local\ Macro_{i,t,k}$, include interest rates (*interest*), real GDP growth rate (*gdp*), inflation rate (*inf*), unemployment rate (*unem*), and a crisis dummy (*crisis*) equal to one if the host country is experiencing a crisis in a given year. As De Haas and Lelyveld (2010, 2014) argued, local conditions may affect transactions in internal capital markets, albeit this effect can go in either direction. On the one hand, foreign banks located in countries experiencing a crisis may boost liquidity outflow to finance loan demand elsewhere. On the other hand, liquidity inflows through internal capital markets versus branches located in crisis-hit jurisdictions may receive support from the rest of the banking group to support their local activities. We additionally include the nominal exchange rate of the local currency concerning USD (*er*). Bruno and Shin (2015) and McGuire and von Peter (2009) point to the crucial role of the US dollar's value in affecting global banking liquidity flows. In

particular, we expect a negative relationship between the nominal exchange rate and liquidity outflows toward branches located in a small OFC.

Following Rose and Spiegel (2007) and Masciandro (2008), we include several institutional indicators for OFCs. In addition, as discussed in Brei (2013), we account for taxation levels in these jurisdictions as well as proxies for secrecy and credit information disclosure. This accounts for the eventual effect of these variables on liquidity flows toward the BC groups' branches through internal capital markets. The variables contained in $BC\ factors_{t,q}$ mainly include indicators that capture institutional factors characterizing the BC group, such as their taxation level (*taxes ofc*) and institutional factors. The former is proxied by tax and contribution rates as a percentage of profits. Its coefficient is expected to enter our regressions with a negative sign, as lower taxes in OFCs are expected to stimulate liquidity inflows toward them (see Schwarz, 2011). In the latter group, we consider the following time-variant institutional features of the BC: political stability (*political*), government effectiveness (*gov_eff*), regulatory quality (*reg_q*), and the rule of law (*rule_l*)[8] (available from the World Governance Indicators database). As for robustness, we also include a broad institutional measure capturing the strength of legal rights (*legal*) for each host country, available from the World Bank. This variable, included in $Local\ Macro_{i,t,k}$, measures the degree to which collateral and bankruptcy laws facilitate lending by protecting the rights of borrowers and lenders. The eventual extent to which the quality of legal institutions and institutional governance factors affect small OFCs is still debated in the literature. While Eden and Kudrle (2005) relate tax havens with subpar legal and institutional factors and Rose and Spiegel (2007) find no significant causation between small OFC status and this set of variables, Schwarz (2011) finds that small OFCs are associated with higher legal standards and improved institutional factors.

The variables considered in $BC\ factors_{iOFC,t,w}$ are bilateral relative measures concerning the BC group. In particular, we include the variable *secrecy*, thereby capturing the gap of secrecy and the scale of offshore activities between host country *i* and the BC based on data from the Financial Secrecy Index. We expect a negative coefficient of the secrecy variable as the lower or more negative value indicates that the scale of offshore activities in country *i* is relatively less important than in the BC group, which may increase the onshore demand for offshore services (Masciandaro, 2008). Relatedly, in some specifications, we also consider an

[8] For a detailed description of these variables please see the Worldwide Governance Indicators published by the World Bank.

indicator for credit depth of information (*cdepth*) included in $Local\ Macro_{i,t,k}$ that captures the rules and practices surrounding the reporting, scope, and availability of credit information. We expect that host countries with higher indexes of credit depth information (and thus stricter disclosure laws) should observe lower liquidity flows through US global banks' internal capital markets toward the BC group (Schjelderup, 2016). In some robustness specifications, we also include the dummy variable *regulation* capturing the relative degree of strictness of financial markets in host country *i*. The variable takes the value of 1 if regulation is more severe in *i* than in OFCs and 0 otherwise and should capture the eventual extent of cross-border regulatory arbitrage (Houston et al., 2012).

Last, $US\ factors_{t,j}$ includes several variables that are mainly US-centered. Following Gourinchas and Obstfeld (2012), we include the leverage level of chartered US banks (*leverage_us*), expected to be a push factor to internal liquidity inflows through offices located in BCs[9]. In some specifications, following Forbes and Warnock (2012) among many, we also include the VIX index of the implied volatility of S&P 500 equity index options (*vix*) as a proxy for global risk conditions and its potential explanatory power for cross-border banking flows due to its close (inverse) relation to banking leverage[10].

We include the US high-powered money (*m0us*) variable to account for US monetary policy stances and the US banking system's liquidity. There is a reasonable amount of evidence in the international finance literature that associates expansionary monetary policy with increased cross-border banking flows, as in Bremus and Fratzscher (2015), Rey (2013), and Bruno and Shin (2015b). However, these existing studies do not focus on internal banking flows to small OFCs or booking centers, which may represent different behaviors. Indeed, liquidity flows toward booking centers are not aimed at financing local activities in these small OFCs; rather, they are routed to offices located in other offices to finance loans elsewhere or make up for local restrictive high-powered money dry ups (De Haas and Levyled, 2015). A positive coefficient for *m0us* would support the former case, which would indicate that the offices located in the BC may pool excess liquidity available within the banking system. In contrast, a negative coefficient would support the latter effect, which would indicate that global banks may pool liquidity within their global branches' network by booking centers when US liquidity dries up rather than when the system is liquidity rich. This possibility may be particularly relevant to our sample, as it would be consistent with the evidence in support of the considerable decrease

[9] See also Borio and Disyatat (2011) and Bruno and Shin (2015).
[10] See also Avdjiev et al (2020) for a discussion.

in interoffice assets and liabilities of foreign branches located in the BC group observed in tandem with exceptional post-crisis quantitative easing measures. In contrast, during the restrictive phase of the US monetary policy stance pre-crisis, booking positions through small OFCs were at an all-time high. Last, in some specifications, we also consider a quantitative measure of the global money supply by including global broad money as a percentage of world GDP (*broadmoney*) as well as dummies that capture the timing of the crisis in the US (*crisis_us*) and the post-crisis period (*postcrisis_us*).

Table A3 in the Appendix details all the variables used in this paper alongside the sources and eventual transformations. Tables A4 and A5 report the descriptive statistics and the correlation analysis, respectively.

6. Results

6.1 Baseline and extended regressions

Table 1 reports the baseline panel regressions. The first baseline model includes local and macro factors exclusively as reported in specifications (1) and (2) for pooled and fixed-effects estimations, respectively. The second baseline model is reported in specification (3), adding to the control's *secrecy* and *taxes ofc* in the pooled estimation. In specification (4), the time-invariant variable *secrecy* is absorbed by the inclusion of host country fixed effects, and thus, its coefficient is not estimated.

Local balance sheet variables reveal, as expected, that those host countries in which the activities of branches of US banks are larger have higher liquidity inflows to the BC group. Similarly, those branches of US banks in which liquidity is more abundant depict higher liquidity flows to BC, albeit the effect is significant at the 10% level across specifications.

Most local macroeconomic controls do not significantly affect our dependent variable, with the exception of exchange rates vis-à-vis the USD and the local *crisis* dummy. The estimated coefficient of *Δer* is negative, as expected, and marginally significant in the three specifications. The *crisis* coefficient is strongly significant across all specifications and models presented in this paper. This finding is in line with Hypothesis 1, in that deteriorating economic conditions in a host country stimulate booking positions in OFCs. Therefore, suggesting that a local economic downturn stimulates branches to increase their booking positions or liquidity outflows to related offices located in the BC group. This evidence is consistent with the findings advanced by De Haas and Lelyveld (2010). They argue that foreign offices located in countries experiencing an economic downturn can lend through internal capital markets to offices located elsewhere. As expected, the variable *secrecy* enters with a negative coefficient in specification

(3), suggesting that branches located in host countries with lower availability of offshore services are associated with higher liquidity flows to the BC group. We also provide strong supporting empirical evidence on tax evasion and OFC literature (see for example Masciandaro, 2009 and Rose and Spiegel, 2007 amongst many). Indeed, the results suggest that as taxes in the BC rise, booking positions toward them decrease, as evidenced by the negative and strongly significant coefficient for *taxes ofc*. These findings also provide empirical support to Hypothesis 2, that is, *higher interoffice flows are associated with lower taxes and better institutional factor of small OFCs.*

Table 1: Regression results of baseline models

Panel regression - Dependent variable: Δ(ln(IOA))				
	Baseline I		*Baseline II*	
	(1)	(2)	(3)	(4)
Δsize	0.972**	0.972**	0.988**	0.988**
	(0.447)	(0.431)	(0.449)	(0.432)
Δliquid	2.850*	2.850*	2.845*	2.845*
	(1.576)	(1.518)	(1.578)	(1.520)
Δoffbalance	0.063	0.063	0.063	0.063
	(0.045)	(0.043)	(0.045)	(0.043)
interest	-0.039	-0.039	-0.040	-0.040
	(0.031)	(0.030)	(0.030)	(0.029)
ΔGDP	-0.005	-0.005	-0.000	-0.000
	(0.039)	(0.038)	(0.041)	(0.040)
inflation	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
unem	-0.034	-0.034	-0.031	-0.031
	(0.045)	(0.044)	(0.044)	(0.042)
Δer	-3.107*	-3.107*	-2.998	-2.998*
	(1.835)	(1.768)	(1.843)	(1.775)
crisis	1.307***	1.307***	1.302***	1.302***
	(0.446)	(0.429)	(0.447)	(0.431)
secrecy	-	-	-0.124***	-
			(0.042)	
taxes ofc	-	-	-3.603***	-3.603***
			(0.425)	(0.409)
Time dummies	Y	Y	Y	Y
Country dummies	Y	N	Y	N
Fixed effects	Y	Y	Y	Y
Observations	658	658	658	658
R2	0.237	0.223	0.241	0.226

Notes: A constant is included in every regression (unreported). The statistical significance of results is indicated by * = 10% level, ** = 5% level, and *** = 1% level using robust standard errors clustered at the host country-level. The dependent variable is the log change of interoffice assets recorded by foreign branches of US banks in a given host country vis-à-vis booking centres. These bilateral positions have been estimated using the MD approach.

In Table 2, we analyze the liquidity and leverage roles of US bank branches in booking positions. Specifications (1) and (2) report the estimates for the pooled and fixed effects estimator when the US monetary base's growth enters Baseline II. Our results indicate that a fall in US M0, or a restrictive US monetary policy stance, stimulates interoffice liquidity flows to BCs. This evidence supports our prediction that interoffice flows to booking offices behave differently from previously found cross-border banking flows. That is, liquidity flows toward booking centers compensate for local restrictive high-powered money dry-ups in the domestic country, where the headquarters is located. Global banks thus centralize their liquidity collected through offices worldwide through booking centers when US liquidity dries up. Including a broader measure of liquidity, notably global M3 (*broadmoney*), in specifications (3) and (4) yields comparable conclusions. A dry-up of liquidity in the global banking system is also associated with higher interoffice liquidity flows to BCs, which can be explained by global banks' efforts to pool and repatriate liquidity through the intermediation of booking centers. These findings are in line with our Hypothesis 3, that is, *tighter liquidity conditions in the domestic markets positively affect flows to small OFCs*.

In specifications (5) and (6) we include the leverage of US banks and the VIX index, respectively. We include these two controls in the Baseline I model to minimize multicollinearity among our explanatory variables[11]. Consistent with the literature, we find that leverage is a push factor to liquidity flows and thus booking positions. In specification (5), the positive and strongly significant coefficient of *leverage_us* reveals that the more leverage US banks take overall (i.e., at the worldwide consolidated level), the more interoffice flows to BCs. This evidence is confirmed in specification (6), in which we use the VIX index as a proxy for banking leverage (inverse relation between the two variables), as the coefficient's estimate is negative and strongly significant. Taken together, these results suggest that the restrictive US and global monetary stances and higher risk-taking by banks through leverage are significant push factors for interoffice flows to booking centers in small OFCs.

[11] A variance inflation factor (VIF) test is carried out systematically with each regression. This test indicates that the inclusion of the leverage proxies causes multicollinearity problems most notably with the OFC-related variables *secrecy* and *taxes ofc*.

Table 2: Estimation of baseline model including liquidity and leverage

Panel regression - Dependent variable: Δ(ln(IOA))						
	(1)	(2)	(3)	(4)	(5)	(6)
Δsize	0.970**	0.970**	0.970**	0.970**	0.988**	0.988**
	(0.452)	(0.435)	(0.452)	(0.435)	(0.449)	(0.449)
Δliquid	2.921*	2.921*	2.921*	2.921*	2.845*	2.845*
	(1.564)	(1.506)	(1.564)	(1.506)	(1.578)	(1.578)
Δoffbalance	0.064	0.064	0.064	0.064	0.063	0.063
	(0.044)	(0.043)	(0.044)	(0.043)	(0.044)	(0.044)
interest	-0.039	-0.039	-0.039	-0.040	-0.040	-0.040
	(0.031)	(0.030)	(0.031)	(0.030)	(0.030)	(0.030)
ΔGDP	-0.005	-0.005	-0.005	-0.005	-0.000	-0.000
	(0.039)	(0.040)	(0.039)	(0.040)	(0.031)	(0.041)
inflation	0.001	0.001	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
unem	-0.034	-0.034	-0.034	-0.034	-0.032	-0.031
	(0.045)	(0.044)	(0.045)	(0.044)	(0.044)	(0.044)
Δer	-3.107*	-3.021*	-3.021*	-3.021*	-2.998	-2.998
	(1.835)	(1.774)	(1.842)	(1.774)	(1.843)	(1.843)
crisis	1.303***	1.303***	1.303***	1.303***	1.302***	1.302***
	(0.447)	(0.430)	(0.447)	(0.430)	(0.447)	(0.447)
secrecy	-0.126***		-0.126***			
	(0.041)		(0.041)			
taxes ofc	-6.995***	-6.995***	-6.995***	-6.995***		
	(0.785)	(0.756)	(0.785)	(0.756)		
Δm0us	-7.416***	-7.416***				
	(1.496)	(1.441)				
Δbroadmoney			-5.402***	-5.402***		
			(1.090)	(1.049)		
leverage_us					0.291***	
					(0.034)	
vix						-0.901***
						(0.106)
Time dummies	Y	Y	Y	Y	Y	Y
Country dummies	Y	N	Y	N	Y	Y
Fixed effects	N	Y	N	Y	N	N
Observations	658	658	658	568	658	658
R2	0.242	0.227	0.242	0.227	0.242	0.241

Notes: A constant is included in every regression (unreported). The statistical significance of results is indicated by * = 10% level, ** = 5% level, and *** = 1% level using robust standard errors clustered at the host country-level. The dependent variable is the log change of interoffice assets recorded by foreign branches of US banks in a given host country vis-à-vis booking centres. These bilateral positions have been estimated using the MD approach. In specifications (1) and (2) we capture liquidity with the change in US monetary base, while in specifications (3) and (4) we add a variable capturing the change in global broad money as percentage of GDP. In specifications (5) and (6) we consider the leverage of US banks and the S&P 500 index of implied volatility (VIX), respectively.

Table A4 (Appendix) reports the Baseline II estimates, including the set of institutional quality indicators, which enter the model one at the time in each specification due to the relatively high correlation among the measures. Our findings are consistent with the literature (see Rose and Spiegel 20017 and Masciandro 2008 amongst others) supporting that improved legal and institutional quality factors in small OFCs increase capital flow toward them. Indeed, all the different institutional variables enter Baseline Model II with a positive and strongly significant coefficient. In particular, the magnitude of the coefficients reveals that more political

stability in BCs in small OFCs, which include low levels of politically motivated violence and terrorism, predicts the highest inflows through internal capital markets to branches located in BCs. Important levels of internal inflows to the BC group are estimated following improvements in government effectiveness in this latter group of jurisdictions. This variable particularly captures the credibility of the governments' commitment to policy implementation and the perceptions of the quality of public services in the BC group. Overall these findings complement our predictions advanced in Hypothesis 2.

6.2 Robustness

Several robustness checks are carried out to corroborate our results. First, we explicitly account for the endogeneity that may arise in our estimation by using an instrumental variable (IV) estimator. In our model, endogeneity may arise from the inclusion of balance sheet variables that are jointly determined. In particular, we suspect reciprocal feedback between our dependent variable and branch sizes by country of location[12]. The instruments included, both in levels and first differences, are commercial bank branches (per 100,000 adults), *cbn*, automated teller machines (ATMs) (per 100,000 adults), *atm,* and fixed broadband subscriptions (per 100 people), *broad*. These variables proxy for local banking depth and access and are expected to directly affect the balance sheet size while not directly affecting internal liquidity flows to branches located in the BC locations.

Table 3 below reports the IV estimates of the various specifications shown in the previous sections. Overall, instrumenting local size yields has an impact on local balance sheet variables, while all the other results previously discussed are confirmed. Most notably, the estimate of *Δsize* becomes not significant across specifications, while the size of off-balance-sheet activities, *Δoffbalance*, becomes positive and significant at the 5% confidence level. This evidence is not surprising, as it suggests that branches of US banks that are more engaged in off-balance-sheet activities, mostly based in international and regional financial centers, also depict higher booking positions. Overall, the Hausmann test and the Sargan test for over-identifying restrictions, reported at the bottom of the table, support our specifications and chosen instruments' suitability.

[12] As a preliminary investigation, we regress *dlioa* on *dsize* obtaining a strongly significant and positive coefficient.

Table 3: Results of instrumental variable (IV) estimator

Panel regression - Dependent variable: Δ(ln(IOA))

	Baseline I	*Baseline II*	*Liquidity US*	*Liquidity global*	*Leverage US*	*VIX*
	(1)	(2)	(3)	(4)	(5)	(6)
Δsize	0.736	0.586	0.585	0.585	0.586	0.586
	(1.819)	(1.818)	(1.810)	(1.810)	(1.818)	(1.818)
Δliquid	2.958*	2.858	2.956*	2.956*	2.858	2.858
	(1.767)	(1.790)	(1.741)	(1.741)	(1.790)	(1.790)
Δoffbalance	0.094**	0.096**	0.096**	0.096**	0.096**	0.096**
	(0.047)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
interest	-0.016	-0.015	-0.015	-0.015	-0.015	-0.015
	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)	(0.040)
ΔGDP	-0.012	-0.007	-0.008	-0.008	-0.008	-0.007
	(0.040)	(0.042)	(0.041)	(0.041)	(0.041)	(0.042)
inflation	0.001	0.000	0.000	0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
unem	-0.049	-0.049	-0.051	-0.051	-0.051	-0.050
	(0.072)	(0.072)	(0.073)	(0.073)	(0.073)	(0.072)
Δer	-3.039*	-2.966*	-2.989*	-2.989*	-2.966*	-2.966*
	(1.765)	(1.771)	(1.773)	(1.773)	(1.771)	(1.771)
crisis	1.504***	1.504***	1.506***	1.506***	1.504***	1.504***
	(0.482)	(0.482)	(0.481)	(0.481)	(0.482)	(0.482)
secrecy		-0.178*	-0.179*	-0.179*		
		(0.097)	(0.097)	(0.097)		
taxes ofc		-3.526***	-7.203***	-7.203***		
		(0.498)	(0.980)	(0.980)		
rule_l						
Δm0us			-8.033***			
			(2.508)			
Δbroadmoney				-5.852***		
				(1.827)		
leverage_us					0.285***	
					(0.040)	
vix						-0.881***
						(0.125)
Time dummies	Y	Y	Y	Y	Y	Y
Country dummies	Y	Y	Y	Y	Y	Y
Instruments for *Δsize*	cbn broad atm D(cbn) D(broad) D(atm)	cbn broad atm D(cbn) D(broad) D(atm)	cbn broad atm D(cbn) D(broad) D(atm)	cbn broad atm D(cbn) D(broad) D(atm)	cbn broad atm D(cbn) D(broad) D(atm)	cbn broad atm D(cbn) D(broad) D(atm)
Hausman's test (p-value)	0.005 (0.943)	0.025 (0.875)	0.022 (0.882)	0.022 (0.882)	0.025 (0.875)	0.025 (0.875)
Sargan's test (p-value)	0.864 (0.973)	0.947 (0.967)	0.889 (0.971)	0.890 (0.971)	0.947 (0.967)	0.947 (0.967)
Observations	658	658	658	658	658	658
R2	0.243	0.247	0.247	0.247	0.246	0.246

Notes: A constant is included in every regression (unreported). The statistical significance of results is indicated by * = 10% level, ** = 5% level, and *** = 1% level using robust standard errors clustered at the host country-level. The dependent variable is the log change of interoffice assets recorded by foreign branches of US banks in a given host country vis-à-vis booking centres. These bilateral positions have been estimated using the MD approach. Specifications (1) and (2) report the baseline results. In specifications (3) and (4) we capture liquidity with the change in US monetary base and the change in global broad money as percentage of GDP, respectively. In specifications (5) and (6) we consider the leverage of US banks and the S&P 500 index of implied volatility (VIX), respectively. All specifications have been estimated using an IV approach in which we are instrumenting for the change in the log of total assets of foreign branches of US banks in countries other than booking centres with the level and first differences of the following variables: commercial bank branches (per 100,000 adults), automated teller machines (ATMs) (per 100,000 adults), and fixed broadband subscriptions (per 100 people).

Table 4: Other robustness specifications- OLS and IV approach

Panel regression - Dependent variable: Δ(ln(IOA))						
	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled	*IV*	*Pooled*	*IV*	*Pooled*	*IV*
Δsize	0.970**	0.585	0.988**	0.586	0.988**	0.586
	(0.452)	(1.810)	(0.449)	(1.818)	(0.449)	(1.818)
Δliquid	2.921*	2.956*	2.845*	2.858	2.845*	2.858
	(1.564)	(1.741)	(1.578)	(1.790)	(1.578)	(1.790)
Δoffbalance	0.064	0.096**	0.063	0.096**	0.063	0.096**
	(0.044)	(0.048)	(0.044)	(0.048)	(0.044)	(0.048)
interest	-0.039	-0.015	-0.040	-0.015	-0.040	-0.015
	(0.031)	(0.040)	(0.031)	(0.040)	(0.031)	(0.040)
ΔGDP	-0.005	-0.008	-0.000	-0.007	-0.000	-0.007
	(0.039)	(0.041)	(0.041)	(0.042)	(0.041)	(0.042)
inflation	0.001	0.000	0.001	0.000	0.001	0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
unem	-0.034	-0.051	-0.031	-0.049	-0.031	-0.049
	(0.045)	(0.073)	(0.044)	(0.072)	(0.044)	(0.072)
Δer	-3.021*	-2.989*	-2.998	-2.966*	-2.998	-2.966*
	(1.842)	(1.773)	(1.843)	(1.771)	(1.843)	(1.771)
crisis	1.303***	1.506***	1.302***	1.504***	1.302***	1.504***
	(0.447)	(0.481)	(0.447)	(0.482)	(0.447)	(0.482)
legal					0.086***	0.123*
					(0.029)	(0.067)
cdepth			-1.120***	-1.605*		
			(0.374)	(0.870)		
secrecy	-0.126***	-0.179*				
	(0.097)	(0.097)				
regulation	0.459**	0.459				
	(0.220)	(0.373)				
taxes ofc	-6.995***	-7.203***	-3.603***	-3.526***	-3.603***	-3.526***
	(0.785)	(0.980)	(0.425)	(0.498)	(0.425)	(0.498)
Δm0us	-7.416***	-8.033***				
	(1.496)	(2.509)				
crisis_us	9.068***	9.518***				
	(1.009)	(3.358)				
postcrisis_us	-15.640***	-15.801***				
	(2.086)	(2.624)				
Time dummies	Y	Y	Y	Y	Y	Y
Country dummies	Y	Y	Y	Y	Y	Y
Instruments for *Δsize*		cbn broad atm D(cbn) D(broad) D(atm)		cbn broad atm D(cbn) D(broad) D(atm)		cbn broad atm D(cbn) D(broad) D(atm)
Hausman's test (p-value)		0.022 (0.882)		0.025 (0.875)		0.025 (0.875)
Sargan's test (p-value)		0.890 (0.971)		0.947 (0.967)		0.947 (0.967)
Observations	658	658	658	658	658	658
R2	0.242	0.247	0.241	0.246	0.241	0.246

Notes: A constant is included in every regression (unreported). The statistical significance of results is indicated by * = 10% level, ** = 5% level, and *** = 1% level using robust standard errors clustered at the host country-level. The dependent variable is the log change of interoffice assets recorded by foreign branches of US banks in a given host country vis-à-vis booking centres. These bilateral positions have been estimated using the MD approach. Specifications (1) and (2) report the results of the baseline model controlling for regulation, secrecy, taxes, change in broad money and temporal dummies capturing the US crisis and post-crisis period using OLS and IV approach, respectively. In specifications (3) and (4) we consider an indicator for credit depth of information whereas in specifications (5) and (6) we include another proxy for the strength of legal rights for each host country.

In Table 4, we report several robustness specifications estimated both by pooled panel and IV estimators. In specifications (1) and (2), we add several controls to specification (1) in

Table 3. Most notably, we include the variable *regulation* and temporal dummies capturing the US crisis and post-crisis period. The former time-varying variable captures the relative strictness of country *i* and the BC group's financial market regulations. While our previous results uphold, we find some evidence supporting a positive relationship between booking positions in the BC group and stricter local regulation. However, this effect ceases to be significant once we correct for endogeneity in specification (2). In both specifications, we find that booking positions through the BC group were significantly higher during the US crisis but lower than otherwise post-2009. These estimates are in line with the previous findings, according to which periods of excess US liquidity are associated with lower booking positions.

Specifications (3) and (4) consider an alternative proxy for *secrecy,* that is, the credit depth information index, collected at the non-BC host country level. The estimated coefficient is negative and significant, as expected, and in line with previous estimates of *secrecy*. Host countries with stricter disclosure laws are associated with lower liquidity flows and thus booking positions through US global banks' internal capital markets toward the BC group. Specifications (5) and (6) include the legal strength index as an alternative measure for the quality of institutional factors. The significant estimated coefficient is positive, as expected, confirming the evidence that stronger institutional factors stimulate booking positions toward BCs.

7. Concluding remarks

Global banks have significant booking positions through their shell offices located in small offshore centers. These pure administrative transactions materialize through changes in interoffice assets and liabilities through internal capital markets. This paper aimed to shed light on what drives these booking positions by focusing on US global banks. We investigate what factors significantly explain booking positions vis-à-vis shell offices located in small OFCs by US global banks. We have identified those small offshore jurisdictions in which US banks' branches carry out booking positions almost exclusively and estimate bilateral flows with offices located in other countries through internal capital markets. This has allowed us to evaluate the drivers of these flows based on various local, offshore, US, and global variables.

We find that local macroeconomic factors related to branches located in a non-BC host country have rather limited effects on booking positions compared to small OFCs. Only the occurrence of a local crisis and the shortage of the supply of offshore services are found to lead branches to increase their booking positions. Among the BC-level group variables found to significantly affect our dependent variable, we find that booking positions vis-à-vis shell offices

are negatively related to tax levels in BCs but positively associated with improved legal and institutional quality factors in small OFCs. Turning to liquidity conditions, our results suggest that booking positions increase during US and global liquidity shortages and the event of higher leverage of US banks.

From a policy perspective, our results are far-reaching and point to the importance of booking centers within the global banking network, particularly during systemic liquidity dry ups. Booking centers' characteristics, such as secrecy and taxes, also play a role in explaining interoffice positions used for booking purposes. Regulatory policymakers, often associating small offshore centers with tax evasion, money laundering, and other illicit activities, tend to disregard the potential benefits for global banks arising from booking centers. Therefore, understanding the drivers of booking positions in small offshore is crucial for regulators and policymakers in both booking centers' jurisdictions and in other countries. In the former case in particular, our findings can be valuable for regulators by providing guidance on effectively monitoring the key drivers we put forward. This can help them benefit from the special role of their jurisdiction while minimizing the transmission of shocks.

In particular, the policy prescriptions arising from our results are several. First, the support for the first empirical hypothesis, preconizing a negative association between booking positions towards offshore financial centers and economic conditions, highlights the importance of monitoring and regulating offshore activities during times of economic stress to prevent potential risks and the circumvention of domestic regulations. Second, the finding that higher interoffice flows are associated with lower taxes and better institutional factors in small OFCs, implies that tax and regulatory policies play a crucial role in attracting financial flows to these jurisdictions. Policymakers should consider the implications of tax rates and institutional quality on the stability and integrity of financial systems. Lastly, the finding that tighter liquidity conditions in domestic markets positively affect flows to small OFCs, suggests that during periods of domestic liquidity constraints, funds may seek refuge in small OFCs that offer alternative investment opportunities and potentially higher returns. Regulators should closely monitor these flows and assess the impact on domestic markets, as sudden outflows may pose risks to financial stability. Implementing measures to enhance liquidity management within domestic markets may help mitigate the likelihood of excessive outflows during such conditions.

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APPENDIX A: Tables

Table A1. Country list

Host Countries/ Locations					
ALGERIA	CAYMAN ISLANDS	GUAM	KUWAIT	PUERTO RICO	TURKEY
ARGENTINA	CHANNEL ISLANDS	HONG KONG	MACAU	SINGAPORE	UNITED ARAB EMI
AUSTRALIA	CHILE	INDIA	NETHERLANDS	SOUTH AFRICA	UNITED STATES
BAHAMAS	CHINA	INDONESIA	NEW ZEALAND	SPAIN	URUGUAY
BAHRAIN	DOMINICAN REPUBLIC	ISRAEL	NORTHERN MARIANA ISLANDS	SRI LANKA	VENEZUELA
BANGLADESH	ECUADOR	ITALY	PAKISTAN	SWITZERLAND	VIETNAM
BELGIUM	EGYPT	JAPAN	PALAU	TAIWAN	VIRGIN ISLANDS C
BRAZIL	ENGLAND	JORDAN	PANAMA	THAILAND	
BRITISH VIRGIN ISLANDS	FRANCE	KENYA	PARAGUAY	TRUST TERRITORY	
CANADA	GERMANY	KOREA, SOUTH	PHILIPPINES	TUNISIA	

Table A2. Small OFC classification

In-sample locations	FSAP, IMF (2000)	European Commission	BIS (2017), Lane and Milesi-Ferretti (2011)	Zorome (2007)
Bahamas	√	√	√	√
Bahrain		√	√	√
British Virgin Islands	√	√	√	
Cayman Islands	√	√	√	√
Channel Islands	√	√	√	√
Macao	√		√	
Palau	√			
Panama	√	√	√	√
Virgin Islands (US)		√		

Northern Mariana Islands and Puerto Rico are included in the US data in the above classifications.

Table A3. Variables Description

Variable	Description	Source	Transformation
Variables used in the MD estimation			
interoffice assets	Sum of: Gross due from head office, U.S. branches, and other foreign branches of this bank" (FORBC482) and "Gross due from consolidated subsidiaries of this bank" (FORBC483)	FFIEC 030	
interoffice liabilities	Sum of: Gross due to head office, U.S. branches, and other foreign branches of this bank" (FORBC485) and "Gross due to consolidated subsidiaries of this bank" (FORBC486)	FFIEC 030	
Dependent variables			
ioa	Interoffice claims of branches located in host country i vis-à-vis the OFC10	X matrix in MD estimation	Natural logarithm
Local variables			
Branches' Balance Sheet			
liquid	Deposits to assets	FFIEC 030	None
size	Total Assets	FFIEC 030	Natural logarithm
offbalance	Interest rate swaps notional amounts	FFIEC 031, BIS	Natural logarithm of one plus the variable
Macroeconomic indicators			
interest	Interest rate on loans, % per annum	IMF IFS, World Bank, Fed	None
gdp	Real GDP annual growth rate	IMF IFS, World Bank, Fed	None
inf	Inflation, annual rate	IMF IFS, World Bank, Fed	None
unem	Unemployment rate	IMF IFS, World Bank, Fed	None
crisis	dummy=1 for crisis	World Bank	None
er	Nominal eff. exchange rate against USD	IMF IFS, World Bank, Fed	Natural logarithm
cdepth	Credit depth information index 0=low, 8=high	World Bank	None
legal	Strenght of legal rights information index 0=weak, 12=strong	World Bank	None
Offshore variables			
BC			
taxes ofc	Tax and contribution rate (as % of profits)	World Bank	Average OFC10
political	Ranges from -2.5 (weak) to 2.5 (strong) political stability.	World Bank	Average OFC10
gov_eff	Ranges from -2.5 (weak) to 2.5 (strong) government efficiency.	World Bank	Average OFC10
rule_l	Ranges from -2.5 (weak) to 2.5 (strong) rule of law.	World Bank	Average OFC10
reg_q	Ranges from -2.5 (weak) to 2.5 (strong) regulatory quality.	World Bank	Average OFC10
i vis-à-vis BC			
secrecy	Continuous variable constricted as the gap between the index in the host country and the weighted average in the small OFC	Tax Justice Network	
regulation	Dummy=1 if financial markets' regulation is comparable to small OFC, dummy=0 if regulation is strictier.	Bank Regulation and Supervision Survey, the World Bank	
US variables			
leverage _us	Bank assets to capital in levels of US commercial banks	Federal Reserves	None
vix	CBOE Volatility index: VIX	Federal Reserves	None
m0us	Monetary base, US	Federal Reserves	Natural logarithm
broadmoney	Broad money, World, as % of GDP	World Bank	None
crisis_us	Dummy=1 for the 2007-2009 period.		None
postcrisis_us	Dummy=1 for the 2010-2017 period.		None

Table A4: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
dlioa	658	-0,464	3,626	-13,163	11,981
dsize	658	0,026	0,355	-2,938	2,694
dliquid	658	-0,005	0,095	-0,711	0,458
doffbs	658	-0,101	2,887	-15,228	15,151
dgdp	658	-0,042	3,205	-9,976	26,042
interest	705	9,264	8,127	0,500	67,083
inf	705	5,927	20,928	-2,674	456,905
unem	705	7,912	5,045	0,655	28,850
der	658	0,013	0,082	-0,325	0,573
crisis	705	0,078	0,268	0,000	1,000
taxes ofc	705	39,387	1,540	36,175	41,300
regulation	705	0,851	0,356	0,000	1,000
secrecy	705	-8,087	10,236	-26,575	9,105
leverage_us	705	9,036	0,916	7,850	10,870
vix	705	18,271	7,017	10,910	40,000
broadmoney	705	107,732	9,626	95,644	123,786
legal	705	4,670	3,180	0,000	12,000
cdepth	705	6,034	2,397	0,000	8,000
gov_eff	705	0,795	0,063	0,600	0,893
reg_q	705	0,779	0,082	0,647	0,938
rule_l	705	0,690	0,102	0,565	0,923
political	705	0,574	0,102	0,442	0,751

Table A5: Correlations

	dlioa	dsize	dliquid	doffbs	dgdp	interest	inf	unem	der	crisis	taxes ofc	regulati on	secrecy	leverage _us	vix	broadm oney	legal	cdepth	gov_eff	reg_q	rule_l	political
dlioa	1,000																					
dsize	0,022	1,000																				
dliquid	0,089	-0,184	1,000																			
doffbs	0,047	0,071	-0,028	1,000																		
dgdp	-0,017	0,005	-0,054	-0,037	1,000																	
interest	-0,033	-0,008	-0,007	-0,014	-0,004	1,000																
inf	-0,012	0,053	-0,015	0,010	-0,010	0,210	1,000															
unem	-0,012	-0,047	0,015	-0,056	0,058	0,196	0,018	1,000														
der	-0,012	-0,090	-0,009	0,013	-0,096	0,142	0,197	0,092	1,000													
crisis	0,031	-0,029	0,052	-0,017	0,013	-0,132	-0,033	0,159	0,007	1,000												
taxes ofc	-0,183	0,105	-0,057	0,010	0,041	0,045	-0,043	0,023	-0,140	0,079	1,000											
regulation	-0,013	0,014	0,003	-0,018	-0,008	-0,080	0,004	0,116	-0,001	0,107	0,000	1,000										
secrecy	-0,008	0,021	-0,012	0,033	-0,017	-0,012	0,070	-0,210	0,007	-0,298	0,000	-0,014	1,000									
leverage_us	-0,078	0,072	-0,108	0,047	-0,124	0,089	0,015	0,024	-0,237	-0,078	0,160	0,000	0,000	1,000								
vix	-0,216	0,025	-0,048	0,082	-0,234	0,048	0,001	-0,033	-0,066	0,146	0,436	0,000	0,000	0,359	1,000							
broadmoney	0,065	-0,103	0,099	-0,001	-0,043	-0,088	0,052	-0,076	0,344	0,003	-0,433	0,000	0,000	-0,683	-0,163	1,000						
legal	0,031	0,035	0,008	0,004	0,017	-0,355	-0,135	-0,138	-0,139	-0,025	0,000	0,111	-0,079	0,000	0,000	0,000	1,000					
cdepth	0,007	-0,025	0,007	-0,013	0,005	0,116	0,032	-0,077	0,023	0,092	0,000	-0,024	-0,494	0,000	0,000	0,000	-0,096	1,000				
gov_eff	-0,094	0,023	-0,002	0,002	-0,029	0,044	-0,100	0,065	-0,100	0,083	0,484	0,000	0,000	0,238	0,223	-0,648	0,000	0,000	1,000			
reg_q	-0,043	0,089	-0,074	-0,005	0,052	0,086	-0,050	0,095	-0,248	-0,019	0,460	0,000	0,000	0,629	0,105	-0,863	0,000	0,000	0,657	1,000		
rule_l	0,007	0,060	-0,064	-0,017	0,128	0,072	-0,034	0,098	-0,214	-0,038	0,314	0,000	0,000	0,507	-0,030	-0,721	0,000	0,000	0,476	0,939	1,000	
political	-0,035	0,032	-0,006	-0,032	0,123	-0,014	0,037	0,015	0,072	-0,163	0,017	0,000	0,000	0,106	-0,407	0,204	0,000	0,000	-0,249	0,141	0,253	1,000

Table A4: Institutional factors

Panel regression - Dependent variable: Δ(ln(IOA))				
	(1)	(2)	(3)	(4)
Δsize	0.988**	0.988**	0.988**	0.988**
	(0.449)	(0.449)	(0.449)	(0.449)
Δliquid	2.845*	2.845*	2.845*	2.845*
	(1.578)	(1.578)	(1.578)	(1.578)
Δoffbalance	0.063	0.063	0.063	0.063
	(0.045)	(0.045)	(0.045)	(0.045)
interest	-0.040	-0.040	-0.040	-0.040
	(0.030)	(0.030)	(0.030)	(0.030)
ΔGDP	-0.000	-0.000	-0.000	-0.000
	(0.041)	(0.041)	(0.041)	(0.041)
inflation	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
unemployment	-0.031	-0.031	-0.031	-0.031
	(0.044)	(0.044)	(0.044)	(0.044)
Δer	-2.998	-2.998	-2.998	-2.998
	(1.843)	(1.843)	(1.843)	(1.843)
crisis	1.302***	1.302***	1.302***	1.302***
	(0.447)	(0.447)	(0.447)	(0.447)
secrecy	-0.124***	-0.124***	-0.124***	-0.124***
	(0.042)	(0.042)	(0.042)	(0.042)
taxes ofc	-6.126***	-3.790***	-4.895***	-4.863***
	(0.787)	(0.450)	(0.607)	(0.602)
political	129.108***			
	(19.819)	-	-	-
rule_l		23.664***		
	-	(3.630)	-	-
reg_q			36.824***	
	-	-	(5.653)	-
gov_eff				51.186***
	-	-	-	(7.857)
Time dummies	Y	Y	Y	Y
Country dummies	Y	Y	Y	Y
Observations	658	658	658	658
R2	0.241	0.241	0.241	0.246

Notes: A constant is included in every regression (unreported). The statistical significance of results is indicated by * = 10% level, ** = 5% level and *** = 1% level using robust standard errors clustered at the host country-level.