Redrawing the Map of Global Capital Flows: The Role of Cross-Border Financing and Tax Havens

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Abstract

Cross-border capital flows are often opaque. Global firms commonly finance themselves through foreign subsidiaries, including shell companies in tax havens, making it difficult to observe the true economic linkages between investors and borrowers around the world. We associate the universe of traded equity and debt securities with their issuer's ultimate parent and apply our algorithm to revise bilateral investment positions from commonly used datasets. We find that private capital flows from developed countries like the U.S. and Eurozone to firms in large emerging economies – including Brazil, China, India, and Russia – are substantially larger than previously thought.

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Since the collapse of the Bretton Woods system, global capital flows have not only grown in volume but also in complexity. Global firms increasingly access capital markets through foreign affiliates, including those located in opaque jurisdictions such as tax havens. Further, many international statistics are reported on a "residency" basis, where security issuances are associated with the location of these affiliates, rather than on a "nationality" basis, which would instead associate them with the location of their ultimate parent company. As a result, understanding the underlying financial linkages across countries has become both more important and more difficult.

We combine a positions-level dataset of global portfolio holdings with information on the structure of corporate ownership chains to unveil the true underlying lending relationships between borrowers and lenders at micro and macro levels. We start with the dataset of global mutual fund and exchange traded fund (ETF) holdings provided by Morningstar and assembled in Matteo Maggiori, Brent Neiman and Jesse Schreger (2019*a*, henceforth MNS). For each position in the data, we link the security's immediate issuer to its ultimate parent. The resulting data can then be used to create a mapping that transforms cross-border positions from a residency to nationality basis and that sheds light on how global firms finance themselves.

Consider the large positions that U.S. mutual funds have in bonds issued by Petrobras International Finance Company (PIFCO), a company incorporated in the Cayman Islands. On a residency basis, these positions are treated as U.S. fixed income investments in the Cayman Islands. However, we associate PIFCO, a subsidiary, with its parent company, Petrobras, the Brazilian oil company. We therefore can restate these same positions on a nationality basis as U.S. fixed income investments in Brazil. We aggregate across all investments in these data to create what we refer to as "reallocation matrices", mappings that can potentially be applied to other residency-based datasets to transform them into nationality-based datasets. Their entries give the share of investment that is associated under residency with one country, given by the row, that is reallocated under nationality to another country, given by the column.

For example, in the MNS data, the U.S. holds $25 billion of corporate bonds where the immediate issuer is located in the Cayman Islands. Of that $25 billion in bonds, we match $3.2 billion (or 13 percent) with parent companies in Brazil and $5.2 billion (or 21 percent) with parent companies in China. The Cayman Islands row of the reallocation matrix for U.S. corporate bonds, therefore, has values of 13 percent and 21 percent in the columns labeled Brazil and China. About $8.8 billion of the residency-based position in the Cayman Islands is associated under nationality with U.S. issuers. The corresponding matrix entry, therefore, has a value of about 35 percent, implying that a large share of U.S. foreign bond investment to the Caymans should for many purposes instead be considered domestic investment. The value on the diagonal of the Cayman Islands' row gives the share of investment there under residency that should remain there under nationality and has a value of only 7 percent. Our calculations suggest that very little of the value of U.S. investment in corporate bonds from Cayman Islands issuers should remain associated with that country.

The MNS data cover portfolios domiciled throughout the world, and we create asset-class specific reallocation matrices for the ten developed economies that have the highest quality holdings data: the U.S., the European Monetary Union (EMU), Great Britain, Canada, Switzerland, Australia,

New Zealand, Sweden, Denmark, and Norway. For funds domiciled in these countries, we cover their worldwide holdings of securities, including both foreign and domestic. Looking across all the reallocation matrices, three common patterns emerge.

First, in the case of bonds, positions are almost always reallocated away from Bermuda, the Cayman Islands, and other tax havens. Under nationality, these positions are often associated with developing countries like Brazil, China, India, and Russia, which may reflect the fact that developing countries find it easier to issue offshore than onshore, where the legal system and institutional quality may be of concern to foreign investors. Reallocating positions from tax havens to developed countries is also common, though, perhaps because tax havens allow them to access international investors with less onerous rules governing the withholding of taxes on interest payments. These patterns may also reflect tax-driven profit-shifting, whereby one unit of a company raises money at a low interest rate in a low-tax regime and loans it at a higher interest rate to an affiliated unit in a high-tax regime.

Second, in the case of equities, we find that many developed-country investments in tax havens are actually associated under nationality with China. Many of these positions are in securities issued through Variable Interest Entities (VIE), a structure designed to avoid China's capital controls and the legality of which may rest on tenuous ground. Relatedly, we see a large share of equities reallocated by our algorithm away from Ireland and to developed countries, an adjustment reflecting the popularity of "tax inversions" there.

Third, in the case of asset-backed securities, for several investor countries, we find large reallocations toward the domicile of the investor, often because the underlying assets are found there. For example, our reallocation matrix records that 73.4 percent of U.S. investment in Cayman Islands' asset-backed securities should instead be thought of as U.S. domestic investment, largely because those securities are backed by U.S. mortgages.

We apply these reallocation matrices to two widely-used, publicly available, and residency-based datasets – the U.S. Treasury's International Capital (TIC) data and the IMF's Coordinated Portfolio Investment Survey (CPIS) data – to transform them into nationality-based bilateral positions covering the universe of security positions held by the investor countries in our data. TIC covers all foreign investments in securities made by U.S. residents and is used by the Bureau of Economic Analysis to calculate the U.S. Balance of Payments and International Investment Position. The CPIS dataset covers the foreign bilateral investments of a large number of other countries.

The key assumption we rely on in this procedure is that our reallocation matrices, which are constructed entirely from investments made by mutual funds and ETFs included in the MNS data, are representative of the overall set of securities investments, including those not made by funds and not in the MNS data. For example, we assume that the fact that in the MNS data 13 percent of U.S. investment in Cayman Islands corporate bonds is associated with Brazilian issuers implies that a similar percentage of holdings of Cayman Islands corporate bonds by U.S. hedge funds, life insurers, pensions, or households is also associated with Brazilian issuers.[1]

[1]We note that the MNS data itself captures significant shares of the cross-border positions measured in TIC and CPIS. For example, the MNS data includes $12 trillion in U.S. bond and stock positions in 2017 , including cross-

We find that investors have exposures that differ vastly from what would be detected using the residency-based statistics. European bond holdings in Brazil, for example, jump from $49 billion under residency to $133 billion under nationality. U.S. investment in Russian corporate bonds, essentially zero in the raw TIC data, increases to $12 billion under nationality. Positions in Bermuda, the Cayman Islands, Ireland, Luxembourg, and the Netherlands plunge. The equity stake of U.S. investors in Chinese companies increases by more than $500 billion relative to the residency-based statistics. Given current economic tensions between the countries and the fact that many of these positions are in VIEs, the sheer scale of the adjustment is of interest from the perspective of country-level risk exposures. In addition to these baseline results, we provide several robustness checks. For example, we report holding estimates when we only reallocate positions from tax havens, or when we do not allow reallocations from domestic to foreign positions.

Why can academic researchers not adjust TIC and CPIS data directly from a residency to a nationality basis, without using such reallocation matrices? The underlying security-level data for such datasets is rarely accessible to outside researchers. This is the case, for example, for TIC. Further, many datasets in international macroeconomics are not even collected at the security (or even issuer) level, but are instead based on aggregate reporting by financial institutions. This is the case, for example, for many countries in CPIS, which is based on surveys run by the IMF. We provide a useful workaround to these issues by using the global security holdings dataset developed by MNS.

In accounting for these key facts, our procedure redraws the map of global capital flows and, in addition to changes across particular bilateral pairs, these estimates alter elements of our broader understanding about capital flows. For example, the restated positions greatly increase the value of emerging market corporate bond holdings of developed countries, but imply far more muted changes to sovereign bond holdings. As a result, the fraction of total bond flows from developed countries to emerging economies that is accounted for by corporate bonds increases dramatically when switching from residence to nationality-based statistics. Further, our nationality-based positions imply that the largest firms play a disproportionately important role in capital flows since the largest firms are more likely to issue offshore.

In continuing and future work, we hope this improved understanding of global capital flows will shed light on such core topics in international macroeconomics as the Lucas paradox, the role and impact of tax havens on firm dynamics, gravity regressions in international finance, and the desirability and effectiveness of capital controls. The restated country risk exposures are of direct relevance for international economic policymakers. Finally, we note that our mapping and methodology is of independent interest for a number of other applications.[2] In domestic macroeconomics

border positions worth more than 40 percent of the value of all cross-border positions in TIC. The EMU holdings in the MNS data total nearly $10 trillion in 2017, with cross-border bond and stock positions worth more than one-third of the total amount reported in CPIS.

[2]We associate the immediate issuers of each of 26 million securities to their ultimate parents. This covers nearly the entire universe of securities traded globally, more than what is included in the Morningstar data and therefore suitable for a broad array of applications. Our procedure uses relationships observed in commercially available datasets from seven different providers including Bureau van Dijk, CUSIP Global Services, Dealogic, Factset, Morningstar, Refinitiv SDC, and S&P Capital IQ. In addition to corporate securities, our procedure also applies to structured finance vehicles

and finance, it is of interest to have a consolidated view of firms' capital structures. In international finance and trade, it is of interest to compare flows of goods and assets among related parties, often using firm-level data. In public finance, tax havens have long been recognized as crucial to understand wealth inequality and dynamics, but their fact-based analysis is in its infancy. Researchers can use our approach as much (e.g. our entire procedure on the universe of securities) or as little (a single security or firm) as they wish, as best fits their needs.

Related Literature. Our work is part of an ongoing effort to better understand how capital is allocated across borders. It has long been recognized that international financial statistics suffer from major flaws, a prominent one being the residency view that assigns all economic activity to the immediate actor. Philip R Lane and Gian Maria Milesi-Ferretti (2018) highlight the growing importance of tax havens in intermediating global capital flows, which renders the residency approach increasingly inadequate. The Bank for International Settlements (BIS) has spearheaded an initiative to study the issuance of international debt securities and bank loans both on a residency and on a nationality basis. Stefan Avdjiev, Mary Everett, Philip R Lane and Hyun Song Shin (2018) and Carol Bertaut, Beau Bressler and Stephanie Curcuru (2019) are ongoing efforts to understand how statistics have to be adapted to provide a more accurate picture of economic activity in the presence of global firms and tax havens. Similarly, a growing literature including Hines and Rice, 1994, Gravelle, 2009, Zucman, 2013, and Thomas R Tørsløv, Ludvig S Wier and Gabriel Zucman, 2018 focuses on the economic role of tax havens.

1 Data Sources and Aggregation Algorithm

The units of observation in our analysis are security-issuing entities, such as governments and firms, and the securities that they issue. We uniquely identify issuers using Committee on Uniform Security Identification Procedures (CUSIP) codes, which are issued and managed by CUSIP Global Services (CGS). CGS assigns a 9-digit CUSIP identifier to the vast majority of securities issued globally.[3] We take the universe of existing securities to be the $26,027,455$ securities present in the CUSIP master file.[4] These include various types of securities: equity, sovereign bonds, corporate bonds, structured finance products, commercial paper, exchange traded funds, and so forth. The first 6 digits of a CUSIP 9-digit code identify the issuing entity; we refer to this issuer number as

and issuance done by sovereigns, state- and local-level entities, and sovranational institutions, which commonly issue under multiple issuer codes (6-digit CUSIPs). The result is a mapping of each security around the world, as identified by a CUSIP 9-digit code, to the CUSIP 6-digit code of the ultimate parent of its issuer. We have posted our code and an associated guide at the website: globalcapitalallocation.com.

[3]For securities by issuers resident outside of the U.S. and Canada, the security codes assigned by CGS are formally known as CGS International Numbering System (CINS) codes, and follow the same structure as the CUSIP codes issued in the U.S. and Canada. For simplicity, we refer to both the North American CUSIP codes and the CINS codes as CUSIP codes.

[4]We consolidate the CGS ISIN_db issues master file, the CUSIP/CINS_db issues master file, the CGS mortgage backed securities issues master file, and the CGS 144A issues data files. The resulting consolidated file contains entries for $26,027,455$ individual CUSIPs as of October 2018. There are securities that do not have a CUSIP, but might have an alternative identifier such as an ISIN or a FIGI. In ongoing work we are adapting the procedure to also capture these residual cases.

the CUSIP6 code, and to the full security identifier as the CUSIP9 code. As we explain below, the CUSIP6 code is not a unique identifier of a firm (or other security-issuing legal entity) since firms often have multiple CUSIP6 codes.[5]

We combine information from seven commercially available data sources in order to create our final dataset linking issuers to their ultimate worldwide parents. The seven sources are the following: (i) the CGS Associated Issuer (AI) Master File , (ii) the Refinitiv SDC Platinum New Issues Database (SDC), (iii) the S&P Capital IQ Platform (CIQ), (iv) the Dealogic Debt Capital Markets (DCM) Feed, (v) the Bureau van Dijk's Orbis Database, (vi) the Factset Data Management Solutions Database, and (vii) the Morningstar holdings sample of open-end mutual funds and ETFs.[6]

The SDC, Capital IQ, and Dealogic databases focus on worldwide securities issuance, but they also record details of the corporate ownership chains of the firms involved in the transactions that they cover. Our procedure makes use of these latter data. The Orbis and Factset databases provide data on corporate ownership chains as well as data mapping securities to the firms that issued them. These five datasets cover overlapping but differentiated sets of issuers.

The consolidated CGS issuer and issue master files provide primary details on every CUSIP-bearing security globally: this includes key security contractual terms as well as information regarding each security's immediate issuer, which importantly includes residency, defined as the place of incorporation of each immediate issuer. Hence, throughout this paper we use the country codes associated with each issuer in the CGS issuer master file when reporting statistics on a *residency* basis. Six-digit issuer CUSIP codes do not correspond one-to-one with firms or other legal entities such as sovereigns, since frequent issuers are assigned multiple CUSIP6 codes to allow enough combinations in the last two additional digits to produce CUSIP 9-digit codes for all the securities that they issue.[7] In order to aggregate the CUSIP6 codes to unique entities, we use the CGS AI master file, which records all CUSIP6 codes assigned to a single entity.

The Morningstar holdings data for open-end mutual funds and ETFs primarily focuses on the market value of holdings of various securities by each fund. The data are self-reported to Morningstar by the funds and include for each security an identifier, most often the CUSIP (but ISINs are also used), as well as the name and country of the issuer. The latter two entries are not standardized by Morningstar (see MNS for a full description). Consider the case of two U.S. mutual funds buying the same security, a bond issued in the Cayman Islands by a subsidiary of Petrobras, the Brazilian oil firm. One fund might report the country for this security to be the Cayman Islands, because it is indeed issued by an entity located there. The other fund, however, might report Brazil, because the ultimate exposure is to the parent company located there. We

[5] By contrast CUSIP9 codes are unique identifiers for individual securities, with the exception of commercial paper for which the CUSIP9 codes are sometimes reused. Bonds issues in multiple markets and exchanges often have market-specific CUSIPs. Equities that are listed on multiple exchanges share the same CUSIP.

[6] From CGS we also use the following ancillary files: the consolidated CGS issuer master files, and the CGS Legal Entity Identifier (LEI) Plus master file.

[7] The last digit in a CUSIP 9-digit code is a check digit that combines all the previous digits to ensure easy verifiability that a CUSIP is valid.

found that in practice this human input is quite valuable, since each fund reveals what its managers think is the true underlying exposure. In particular, fund managers often have a strong incentive to accurately report the ultimate geographic exposure of their positions, since this information is typically prominently reported in funds' investor reports, and geographic exposures may also be constrained by the funds' mandates. We designed an algorithm, described in the next subsection, to extract the best prediction of ultimate parent location out of the universe of holdings, by all funds, in Morningstar.

All datasets are ultimately matched to one another using CUSIP codes as the primary identifier. In certain instances, datasets identify issuing entities and securities via ISIN, LEI, or internal codes, without reporting a CUSIP. In these cases, we translate these identifiers to CUSIP codes using the CUSIP-to-ISIN mapping data contained in the consolidated CGS issue master files and in the CGS LEI Plus master file.

1.1 Aggregation Algorithm

We briefly sketch here the aggregation algorithm and refer the interested reader to Appendix Section A for full details.[8] We start by constructing tables that map subsidiary issuer (CUSIP6) codes to the corresponding code of their ultimate parents, separately for each of our ownership data sources. We aggregate a subsidiary to a parent entity if the parent owns more than 50 percent of the equity of the subsidiary, as reported by any of our data sources.[9]

For the Morningstar holdings data we develop an algorithm to extract from the universe of security holdings by all funds the best prediction of the ultimate parent country of operation for each CUSIP6 code. We proceed in two steps. First, for each fund we extract the modal country assignment for each CUSIP6 code that ever appears in its holdings. Second, across funds we extract the modal country assignment for each CUSIP6 code obtained from the first step. In each step we penalize entries that assign a tax haven as the country of operation.[10] If the modal assignment is a tax haven but a less frequent assignment is not, we resort to the latter. The logic behind this choice, as well as other choices related to the treatment of tax haven countries that we make throughout our procedure, is that little or no economic activity takes place in tax havens compared to the size of security issuance. If a security has been issued by an entity resident in a tax haven, we presume that the true country of operation of the entity is different – in this case, we presume it is most likely to be another country reported by funds in the Morningstar data.

[8] Our code is publicly available at globalcapitalallocation.com.

[9] Our data sources vary in the extent to which they provide granular ownership information. While some sources (for example, Orbis) provide the exact percentage ownership figures for many corporate ownership chains, other sources only indicate whether certain ownership stakes exceed the 50 percent threshold. Regardless, we apply the common 50 percent ownership criterion to all subsidiary-to-parent links that we establish.

[10] We classify countries as tax havens by taking the union of lists provided by several sources, full details are in Appendix Section A. Table A.1 provides the complete list of such countries. The largest country included in our list of tax havens is Hong Kong. Since security issuance in Hong Kong is particularly likely to also originate from firms that are truly headquartered and operating there, we treat Hong Kong (and Luxembourg for similar reasons) differently in all our algorithms. We compile a list of the largest firms headquartered and operating in Hong Kong based on the Factset database. Whenever a reallocation involves these firms or their subsidiaries we do not treat Hong Kong as a tax haven.

Next, we resolve any multi-layer ownership chain occurring both within each data source and across data sources, and harmonize the country codes for each entity reported by the various data source, prioritizing the country codes that are reported by a majority of sources and those that agree with the information in Morningstar in case of disagreements. Throughout, we adopt the following rule: we avoid reassigning ownership away from countries that are not tax havens toward those countries that are tax havens, in order to avoid assigning ownership to shell holding companies. For example, suppose company A, headquartered in Italy, owns 51 percent of an issuing subsidiary B in Bermuda, and is in turn owned by a company C incorporated in the Cayman Islands. We would then say that B's nationality is Italy, not the Cayman Islands or Bermuda.

Finally, we construct an estimate for each issuer's ultimate parent via the following procedure: we first look for agreements among our ownership data sources, and we prioritize non-tax-haven-domiciled parents in case of disagreement among our sources. If none of the ownership data sources resolve to a corporate parent outside of tax havens but either the CGS associated issuer file or the merged CGS issue master files do, we use the CGS information, in that order of preference.[11]

The output of our algorithm is a database that maps each CUSIP6 into the CUSIP6 of the ultimate parent entity. For each of the two, the starting subsidiary code and the ultimate parent code, we also include information on: entity legal name, country of operations, and NAICS industry and sector codes.[12] The country of operation for each CUSIP6 code corresponds to our estimate based on the information obtained from our seven primary sources, as fully described in Appendix Section A.

2 Estimating Nationality-Based Cross-Border Positions

We use the resulting dataset to understand the impact of multiple layers of corporate ownership and opaque structures in tax havens on existing statistics on global capital flows. We take as an example two of the most widely-used datasets in international macroeconomics research: the TIC dataset produced by the U.S. Treasury Department and the CPIS dataset provided by the IMF. We proceed in two steps: (i) we apply our aggregation procedure to the MNS security-level dataset to construct reallocation matrices, at the country bilateral and asset class level, that allow us to go from residency- to nationality-based reporting, (ii) we then apply these reallocation matrices to TIC and CPIS to provide estimates of these datasets on a nationality basis. The first step in the procedure above is not only necessary for the second step, but is also of independent interest. It

[11] We wish to emphasize two areas of caution that users of our methodology should keep in mind. First, the quality of our issuer-parent links crucially depends on the quality of the underlying data reported by the sources described in Section 1. We do not expect the data sources to be entirely error-free and compile a list of corrections to be applied to the raw data. The list is included at the end of the aggregation code. We correct only verifiable mistakes in the data sources as we become aware of them and provide supporting evidence for each correction. Second, our methodology is limited in that it discards any chronological information associated with the parent-subsidiary corporate links, effectively only retaining the latest information available from each data source. This is because data sources vary widely in the quality of their historical linkage information, and we also expect selection biases in terms of which linkages and which firms would be included in the historical data. We are in the process of extending our procedure to keep track of historical information in corporate ownership chains.

[12] Names are obtained from the CGS master files; sector codes are obtained from Factset, Dealogic, and SDC.

provides a unique, security-level view of how capital *actually* flows across countries and of security issuances and purchases in tax havens.

2.1 Comparing Morningstar Holdings Data Under Residency and Nationality

The MNS data contain position-level information on mutual funds and ETFs domiciled throughout the world. They report all their equity, fixed income, cash, and alternative asset-class investments: each of these positions includes a 9-digit CUSIP code, which we use to match the holdings data to the issuer-parent links. The majority of funds report at a monthly frequency. The MNS dataset provides good coverage of worldwide mutual fund and ETF assets under management (AUM). For example, in December 2017 it includes 61,000 funds reporting over 11 million individual positions amounting to $32 trillion in AUM. We encourage the interested reader to refer to Matteo Maggiori, Brent Neiman and Jesse Schreger (2019*a*) for further details on the Morningstar data.[13]

For most of our analysis, we follow MNS and restrict this sample to funds domiciled in the following countries or regions, for which the data provides the best coverage of the relevant mutual fund and ETF universe: the U.S., the EMU, Great Britain, Canada, Switzerland, Australia, Sweden, Denmark, Norway, and New Zealand.[14]

Firm Level Reallocations by Country. Tables 2-5 report the largest reallocations by market value toward and away from the U.S., EMU, Great Britain, and Canada, respectively.[15] We focus on individual issuers but break down separately equities and corporate bonds. For example, Panel A of Table 2 shows that the largest reallocations toward the U.S. in corporate bonds come from consolidating issuance abroad, via local subsidiaries, of large U.S. corporations such as General Electric and Ford. It also shows the importance of international tax arbitrage: the largest reallocation occurs for Actavis, a U.S.-based pharmaceutical group headquartered in Ireland. Indeed, U.S. companies often perform a "tax inversion" by registering headquarters in Ireland to shield their foreign revenues from U.S. taxes. Panel B shows that reallocations away from the U.S. come from issuance in the U.S. by local entities that are themselves owned by foreign companies such as Anheuser Busch, T-Mobile, and Toyota. The table also provides us with a first glimpse of the importance of tax havens: the third largest reallocation of equities toward the U.S. comes from consolidating the equity capital of Schlumberger Ltd., the world's largest oilfield services company, which has executive headquarters in Texas and is listed on the New York Stock Exchange but is registered in Curaçao.

[13] See Matteo Maggiori, Brent Neiman and Jesse Schreger (2019*b*) and Andrew Lilley, Matteo Maggiori, Brent Neiman and Jesse Schreger (2019) for applications using these these and related data.

[14] We only consider the EMU as a block since, as detailed in MNS, mutual funds are concentrated in Luxembourg and Ireland, but collect investments from the rest of the countries in the European Union. If we look at individual countries separately, it is for the sole purpose of understanding the data and we encourage the reader not to take economic conclusions from these individual-country analyses.

[15] In keeping with the CUSIP-centric focus of our algorithm, the tables are consolidated at the CUSIP6 level of the subsidiary companies. The market values, therefore, are a lower bound on the total parent-level reallocation since multiple subsidiaries in each country might be reallocated to the same foreign parent company.

Table 3 provides analogous figures for the EMU. Panel B shows a large reallocation away from the EMU and toward Brazil caused by the consolidation of a Netherlands-based subsidiary of Petroleo Brasileiro S.A. (Petrobras), a Brazilian oil multinational. Interestingly, the subsidiary, Petrobras Global Finance B.V., is a debt-issuing vehicle with no industrial activity and is fully owned by the Brazilian parent entity. Panel B also shows a reallocation of corporate debt away from the EMU and into Russia due to Gazprom bond issuance via its Luxembourg subsidiary Gaz Capital S.A. Panel C focuses on equity positions reallocated toward the EMU. The first two rows of the panel highlight two different types of reallocation for the same company that our procedure allows for. The top reallocation for Royal Dutch Shell Plc does not change the CUSIP6 of the issuer (G7690A) but switches the assigned country from the UK to the EMU. This occurs because while the company is incorporated in the UK, and therefore its residency is UK, it is headquartered and administered in the Netherlands.[16] The second reallocation changes both the CUSIP6 (from 780259 to G7690A) and the country. This occurs because the company uses multiple issuer codes for its equity listings, which our procedure aggregates to a single corporate entity.

The cases described above highlight some of the most common patterns in the data. Reallocations happen in a continuum between two extremes: issuance by a subsidiary incorporated in a country in which the firm as a whole has no presence or economic connection, and issuance by a subsidiary that while located in a different country has on its own right a large local operation. The former case is highlighted above by Schlumberger's incorporation in Curaçao or Petrobras's issuance via its financial subsidiary in the Netherlands. One would imagine that economists would in most cases want to consolidate these issuances and assign them to the parent companies in their main country of operation. The latter case is highlighted above by T-Mobile and Toyota. T-Mobile U.S. Inc. is the brand name used in the U.S. by a subsidiary of Deutsche Telekom AG, the German telecommunication multinational. T-Mobile U.S. Inc. is a large mobile operator in the U.S. with substantial local revenues and assets. Similarly, Toyota Motor North America is a U.S.-based fully-owned subsidiary of Toyota Motor Corporation, the Japanese multinational automotive manufacturer. Toyota Motor North America is not only a large auto business in the U.S. but it also accounts for a substantial fraction of the parent company's worldwide sales.

We emphasize that economists, interested in different questions, may take a different view about whether these types of issuances should be consolidated. One might, for example, want to consider Toyota Motor North America to be a domestic company of the U.S. with large liabilities (bonds) financing the domestic operations of the same company. Other researchers might disagree emphasizing that Toyota Motor North America enters into many transactions with its parent company that are not necessarily at market value and uses the parent's powerful brand for its products; similarly, it is interesting to speculate whether the credit risk of the bonds reflect the local subsidiary's credit or the global group's credit. We aggregate any subsidiary that is more than 50 percent owned by the parent company, since this is the rule used by most data sources that our procedure is based on. However, our procedure is flexible and can be applied differently to suit

[16] Indeed, the group was created in 1907 but operated as two separate legal companies, one in each country, until a single capital structure was created in 2005 (Joint Boards of Royal Dutch and Shell Transport, 2005).

the needs of various research projects. For example, once could choose to only consider reallocations of subsidiaries resident in tax havens. Similarly, one could focus on aggregations of financial subsidiaries of non-financial parents. We show below various examples of these applications.

The analysis above also offers a glimpse into why firms issue securities via foreign subsidiaries. In some cases, the issuance is connected to local economic activity in the foreign country. This is the case of issuance undertaken by foreign industrial subsidiaries. In other cases, the issuance is purely "opportunistic" in the sense that it is unconnected to any local presence and purely done to lower the cost of capital. This is the case not only for issuance by subsidiaries in tax-havens but also for (some) issuance by subsidiaries in large onshore financial centers such as London and New York.

Bilateral Foreign Investment Reallocations. We next aggregate the security level data to bilateral capital flows in equities and corporate bonds. This allows us to focus on the aggregate difference that our security-firm level reallocation makes for our understanding of global capital flows. We distinguish between the gross and net impact of our procedure on global capital flows. The gross view separately analyzes reallocations toward and away from a particular country. For example, if we consider the bilateral positions between the U.S. and the EMU, the gross view separately considers reallocations away and toward the U.S. *vis-a-vis* the EMU. The net view only considers the net change in the bilateral position.

Tables 6 and 7 show our largest gross bilateral reallocations for bilateral flows involving the U.S., EMU, Great Britain, and Canada, as well as the Cayman Islands and Bermuda, which are the largest tax havens in terms of security holdings in our sample. The left panel of Table 6 focuses on the U.S. and shows that the largest reallocations toward the U.S. in corporate bonds come from the EMU and the Cayman Islands. Thus stressing again the dual role of cross-border aggregation: some of the reallocation comes from onshore issuance by subsidiaries in different countries, while some comes from offshore issuance. The Cayman Islands reallocation at $12.2 billion is sizable and, for easy comparison, it is about one fourth the size of the reallocation coming from Europe.[17] Panel B focuses on reallocations away from the U.S. In this case the reallocation toward the EMU is still the largest, followed by reallocations toward other developed countries (Great Britain, Japan, Canada, and Switzerland). The large reallocations away from the EMU and toward the U.S. in both corporate debt and equity are in part the (gross aggregate) result of "tax inversions" of U.S. corporations headquartered in Ireland, something that we discuss in more detail in Subsection 2.3.

While we have focused our descriptions in the text on the case of the U.S., the tables show that other countries have similar patterns. Of particular interest are the reallocations away from the EMU and toward Russia ($14.6 billion of debt, and $0.8 billion of equity) which reflect the aggregate gross impact of the issuance in Luxembourg and Ireland by large Russian corporations. The central and right panel of Table 7 provide a first view of the activities in tax havens, in this case the Cayman Islands and Bermuda. In the corporate bond market, the three-largest reallocations

[17] We focus here on reallocations of corporate debt. In addition, our procedure also reallocates $41.3 billion of structured finance products from the Cayman Islands back to the U.S.

away from the Cayman Islands are attributed to China ($16.3 billion), the U.S. ($12.2 billion), and Brazil ($6.6 billion). In equities, we observe an extraordinarily large reallocation toward China ($278 billion) which we analyze in the detail in Section 3. The reallocations away from Bermuda are toward the U.S. ($8.4 billion), Jamaica ($1.6 billion), and the UK ($1.3 billion) in corporate bonds, and toward the U.S. ($61.5 billion), the UK ($14.9 billion), and China ($14.1 billion) in equity.

We turn next to the net impact that the above gross reallocations have on the foreign portfolio assets of each country. Figures 1-2 show the shares that each foreign destination country represents in 2017 in the outward portfolio holdings of the USA, EMU, Great Britain, and Canada, respectively. The figures contrast these shares when they are computed using the residency of each security's immediate issuers (*horizontal axis*) versus the nationality of each issuer's ultimate parent (*vertical axis*). As discussed earlier, the residency of each security's immediate issuer is the country associated with that security's CUSIP in the CGS master file. The top panels of each figure show these statistics for corporate bonds, while the bottom panels focus on equity securities.[18]

Figure 1 Panel A focuses on U.S. residents' (i.e., U.S. domiciled open-end funds' and ETFs') bilateral holdings of foreign corporate bonds in various destination countries. If our reclassification algorithm made no difference at this net level of aggregation, then the data would lie on the dashed 45-degree line. Countries that lie below (above) the line are countries that our procedure reclassifies capital allocations away from (toward). Tax-haven countries populate the lower region.[19]

Before our procedure, 11.5 percent of all U.S. holdings of corporate bonds abroad at the end of 2017 are in tax-haven countries, with the Cayman Islands and Bermuda accounting for 50.6 and 16.9 percent of this amount, respectively. After our procedure, only 0.8 percent of all U.S. holdings of corporate bonds abroad are left in tax-haven countries. Our procedure reclassifies these positions as being held in emerging economies such as Brazil, Russia, India, China, which all lie above the 45-degree line. Investment in these four economies goes from being 1.1 percent of total U.S. investment in foreign corporate bonds to being 7.4 percent, an increase of roughly 600 percent. Capital is also reallocated toward South Africa, Israel, Qatar, and Taiwan. Figure 1 Panel C shows a similar pattern for equities with capital being reallocated away from Bermuda and the Cayman Islands and toward China. Figures 1-2 confirm that these patterns also occur for the external investment of other large developed economies such as the EMU, Great Britain and Canada.

Overall, investment in BRIC corporate debt securities by all ten developed countries in our sample is 550 percent larger when using a nationality approach, as compared to a residency approach: the market value of BRIC corporate debt holdings at the end of 2017 in the MNS data goes from $16.9 billion to $111.7 billion. Holdings of BRIC equity securities by all ten countries in our sample also increase, going from $508.4 billion to $806.4 billion (a 59 percent increase). The other large recipients of capital according to our reclassifications are Japan, Korea, Israel, and oil-exporting

[18] Figures A.1-A.2 in the Appendix provide the analysis for the rest of the countries included in our sample.

[19] New Zealand also appears below the 45-degree line because of the large amounts of bonds issued by New Zealand financial corporations that are owned by Australian parents, such as ANZ Bank New Zealand and the Bank of New Zealand, which are owned respectively by the Australia and New Zealand Banking Group, and National Australia Bank.

countries such as Saudi Arabia, Qatar, and Kuwait. In all figures aggregate bilateral flows among large developed economies are largely unchanged by our procedure. This occurs despite Tables 2-5 showing that some of the largest reclassifications of individual issuers occur among these developed economies, and Tables 6-7 showing large gross reallocations among these countries. Cross-country positions among these economies are very large and mostly accounted for by onshore domestic companies, and while reclassifications are also large, their net impact does not change the aggregate numbers. We stress that since issuance in foreign countries is not evenly distributed among firms, with the largest firms doing more foreign issuance, the absence of a net aggregate difference does not mean that foreign issuance is insignificant for understanding these developed economies. For example, studies that look at heterogeneity in firm capital and firm growth dynamics should pay attention to firm-level foreign capital issuance.

We further investigate a subset of countries that stand out as net receivers of reallocations, particularly for corporate bond portfolios: Japan, Brazil, Russia, and China. Figure 3 shows the time-series of the fraction of bonds reallocated to ultimate parent companies located in these selected countries from their foreign subsidiaries in major geographic locations. Tables 8 and 9 show for each country, and separately for bonds and equities, the firms that account for the largest reallocations at the ultimate parent level in order of decreasing importance.

Figure 3 shows that for Brazil the reallocation is a mix of issuance in the Cayman Islands and in the EMU (Netherlands). Offshore financing via EMU-based subsidiaries appears to be a relatively new phenomenon for Brazilian firms: for example, the Netherlands-based financing arm of Petrobras, Petrobras Global Finance B.V., was only established in 2012. Petrobras, however, already had an established presence as an issuer in the Cayman Islands. Panels A and B of Table 8 show that Petrobras accounts for 47 percent of all corporate debt reallocations to Brazil. Another large contributor to these reallocations is JBS, which accounts for 9.7 percent of the corporate debt and 36.2 percent of the equity. JBS is the world's largest meat producer and its offshore financing comes from the Cayman Islands and the EMU (Luxembourg).

In the case of China the reallocation is driven by issuance in the Cayman Islands and British Virgin Islands. Interestingly, these seem to take over (in percentage terms) issuance that before the financial crisis used to take place in the USA. At the security level we have confirmed that this is not happening because the same issuers switched between issuing in the U.S. to issuing in tax havens. Instead, it is happening because in the mid 2000s a set of large technology firms in China (for example, Tencent, Baidu, and Alibaba) started issuing large amounts in the Cayman Islands, and several large Chinese oil companies (such as China National Petroleum Corporation, State Grid Corporation of China, and China National Offshore Oil Corporation) started issuing in the British Virgin Islands. Indeed, Panels C and D of Table 8 show that these companies account for the bulk of debt and equity reallocations towards China. Alibaba for example accounts for 18.9 percent of the equity and 5.9 percent of the debt. Tencent alone accounts for 21.5 percent of the equity. We discuss in Section 3 the Chinese regulations as well as creative offshore capital structures behind the large offshore capital positions in the Cayman Islands.

Figure 3 also shows that the reallocations toward Russia are almost entirely driven by sub-

sidiaries of Russian companies located in the EMU. In particular, many of these subsidiaries are financing arms of large companies, such as Gazprom and Russian Railways (via the financing subsidiary RZD Capital Plc), located in Luxembourg or Ireland. Indeed Panel G of Table 8 shows that Gazprom alone accounts for 44 percent of all corporate debt reallocations toward Russia.

Lastly, for Japan the reclassification is driven by issuance in the U.S. by local subsidiaries, such as Toyota Motor North America, of Japanese multinationals. Large Japanese multinationals such as Toyota, Honda, Nissan as well as financials such as Mizhuo Financial and Softbank issue large amounts of debt in the United States. Clearly this issuance is of a very different nature from the one discussed above for Brazilian or Russian companies. Japanese companies have a large industrial presence in the U.S. and in some cases the U.S. subsidiaries account for sizable fractions of the overall group revenues and profits. As we discussed, we aggregate these subsidiaries in our baseline because they are wholly owned and throughout the paper we use a 50 percent ownership cutoff rule for the aggregation. Different researchers may wish to make different choices and they could apply our algorithm differently if they did not wish to aggregate these companies.

Finally, Table 9 investigates other countries that are large recipient of inflows such as Saudi Arabia, South Africa, and South Korea. Together with Table 8 it shows a very strong pattern across all recipient countries: capital reallocations are driven by a few extremely large global firms. In many countries, the top three firms account for more than 50 percent of all reallocations of debt and equity. At the same time, we have shown above that for corporations in many large emerging economies offshore capital is a large multiple of onshore foreign portfolio investment (for example, the former is roughly 7 times the latter in the BRIC case we studied above). If one combines these two observations, a novel picture emerges of these capital flows. In each country, a few large firms capture the vast majority of foreign investment and they do so by issuing bonds and equities abroad, often in tax haven jurisdictions.

2.2 Calculating Reallocation Matrices

In this subsection, we aggregate across all positions and construct, for each investor country and asset class, reallocation matrices that determine the share of residency-based investment in any given country that should be reallocated to all other countries under a nationality basis. In the next subsection, we apply these reallocation matrices to the residency-based bilateral positions in TIC and CPIS to translate them into nationality-based positions.

For a given asset class, let $x^{\mathcal{R}}_{i,j}$ denote the dollar value of holdings in the MNS data of investor country j in securities issued by country i under a residency basis.[20] Let $x^{\mathcal{R}\to\mathcal{N}}_{i,k,j}$ denote the dollar value of these same holdings that, under nationality rather than residency, would be associated instead with issuer country k rather than i, such that $x^{\mathcal{R}}_{i,j} = \sum_k x^{\mathcal{R}\to\mathcal{N}}_{i,k,j}$. We can then define an

[20] To save on notation, we do not index these values by asset class. Our analyses of TIC separately study equities, corporate bonds, government bonds, and other bonds (sovranationals and structured finance securities). CPIS reporting of separate investment positions in sovereign and corporate bonds is limited, so for CPIS we pool all debt securities and compute the MNS reallocation matrices accordingly.

entry $\omega_{i,k,j}$ in our reallocation matrix for country j as:

$$\omega_{i,k,j} = \frac{x^{\mathcal{R}\to\mathcal{N}}_{i,k,j}}{x^{\mathcal{R}}_{i,j}}. \tag{1}$$

Collecting $\omega_{i,k,j}$ over all rows i and columns k, we have country j's reallocation matrix Ω_j:

$$\Omega_j = \begin{bmatrix} \omega_{1,1,j} & \omega_{1,2,j} & \omega_{1,3,j} & \dots \\ \omega_{2,1,j} & \omega_{2,2,j} & \omega_{2,3,j} & \dots \\ \omega_{3,1,j} & \omega_{3,2,j} & \omega_{3,3,j} & \dots \\ \vdots & \vdots & \vdots & \ddots \end{bmatrix}, \tag{2}$$

where each row of Ω_j sums to one.

As an example, Table 10 shows selected entries from the reallocation matrices for U.S. investments in corporate bonds.[21] If we focus on the row corresponding to the Cayman Islands (CYM), the matrix shows the destinations (columns) to which U.S. corporate bond holdings in the Cayman Islands are reallocated. For example, 12.6 percent of U.S. corporate bond investments in the Cayman Islands is reallocated to Brazil, 20.7 percent to China, and 35.1 percent to the U.S. itself. The diagonal entries of the matrix show the fraction of investments in each destination that are not reallocated elsewhere. Such fractions are very low for tax-haven countries and relatively high for large countries with local domestic financial markets.

Equipped with these reallocation matrices from the MNS data, we can transform bilateral positions in any other dataset from a residency to a nationality basis. Let $q^{\mathcal{R}}_j = \left[q^{\mathcal{R}}_{1,j}, q^{\mathcal{R}}_{2,j}, \dots\right]'$ denote the vector of positions of country j in issuer country i, observed in a residency-based dataset. We use the superscript $'$ for the transpose operator of vectors and matrices. We can then transform these data to a nationality basis by pre-multiplying the residency-based vector by the transpose of the reallocation matrix:

$$q^{\mathcal{N}}_j = \Omega'_j q^{\mathcal{R}}_j, \tag{3}$$

where $q^{\mathcal{N}}_j = \left[q^{\mathcal{N}}_{1,j}, q^{\mathcal{N}}_{2,j}, \dots\right]'$ is the resulting estimate of nationality-based positions for that dataset.

2.3 Estimating TIC and CPIS on a Nationality Basis

We now apply this transformation to the residency-based positions in TIC and CPIS. We emphasize that Ω_j is calculated from the holdings patterns and parent-matching in the MNS data alone. In this sense, equation (3) makes clear that the quality of our transformation of TIC and CPIS (or any other datasets) will depend on the representativeness of the MNS data for those other datasets of each entry $\omega_{i,k,j}$. In particular, the exercise assumes that the share of country j's investment in country i under residency that switches to k under nationality is similar across the datasets. We are effectively assuming that the portfolios of other large investors, such as hedge funds and banks, have

[21] We plan to make these matrices in their entirety available to other researchers for download at globalcapitalallocation.com.

a similar composition of securities to those of mutual funds within each bilateral investment pair and asset class. For example, we assume that the securities (and their proportions) underlying U.S. equity investments in Germany are similar for U.S. mutual funds and other large U.S. investors.

While we cannot directly test this assumption, we can test a related and perhaps more stringent condition, that outward investment bilateral shares by asset class are similar under residency in the MNS data and in TIC and CPIS. Panels B and D of Figure 4 compare the outward bilateral U.S. portfolio shares in the TIC dataset in 2017 to those in the MNS data on a residency-basis, separately for corporate bonds and equities. TIC and MNS offer a similar picture of U.S. bilateral outward portfolio investments, with most data points close to the 45-degree line. We obtain corporate bond positions in TIC starting from private debt and then removing asset-backed securities.[22] Equities in TIC include both common shares, fund shares, and holdings in other types of equity assets such as investment trusts. Our calculations focus only on common shares since for most destinations they account for the vast majority of holdings.[23] The close alignment between MNS and TIC bilateral investment shares is perhaps not surprising since mutual fund positions in stocks and bonds in MNS account for more than 40% of those observed in TIC. This close, even if not perfect, resemblance between MNS and TIC gives us support to our assumptions in restating TIC using reallocation matrices based on MNS data.

Using the CPIS data, we can repeat the same bilateral investment shares analysis for the other countries in the MNS dataset. Panels B and D of Figures 5-7 show that the MNS and CPIS data are also aligned for Canada, the EMU, and Great Britain as well.[24]

One advantage of comparing residency-based and nationality-based statistics in the MNS dataset is that it, unlike TIC and CPIS, includes both domestic and foreign positions. For example, U.S. resident institutions are only required to report to TIC those positions that are cross-border on a residency basis. This means that investments by U.S. residents in securities issued by U.S. subsidiaries of foreign companies are not reported to TIC since on a residency basis they constitute domestic investments. Since the data is not reported to TIC, our procedure even if applied to the micro data in TIC would miss those reallocations. It would instead capture all positions that are considered foreign under the residency principle but domestic under the nationality principle (i.e. all securities issued abroad by subsidiaries of U.S. firms), thus leading to a lopsided reallocation. The MNS data allows us to avoid this asymmetry because it contains all fund positions,

[22] While in many cases asset-backed securities are a small component of private debt holdings, they are a large component (80 percent) of U.S. portfolio holdings of private debt in the Cayman Islands. Even in this dimension, the MNS data is representative of TIC since it shows a similar allocation (66 percent), and while our procedure successfully reallocates these asset-backed securities holdings to the U.S., we exclude them here to maintain our focus on corporate bonds.

[23] For some destinations, like the Cayman Islands, holdings of non-common equity are substantial. They likely reflect holdings of trusts and other sophisticated investment vehicles (like master-feeder structures of hedge funds) that our procedure based on open-end mutual funds would not capture. The Morningstar data do include cross-fund holdings of fund shares, i.e. mutual fund A owns shares in mutual fund B. These holdings are unwound in the MNS treatment of the Morningstar data and they show that they account for 2 percent of total cross-border holdings (see original source for more details). Here we take as a starting point the data after the unwinding of cross-fund shares positions.

[24] Panels B and D of Figures A.3-A.8 in the Appendix show that the MNS and CPIS data are also aligned for the rest of the countries in our sample as well.

whether domestic or foreign under any classification principle. Table 2 already shows that some of the largest reclassifications in the MNS data fall in this category: Anheuser-Busch Inbev Fin Inc., T-Mobile, and Toyota Motor North America are all large issuers incorporated in the U.S. and foreign-owned.[25]

Since TIC and CPIS do not report a total for domestic investment by asset class on a residency basis, we impute this total based on the ratio of domestic to foreign investment in the MNS data. More specifically, the terms $x^{\mathcal{R}}_{j,j}$ exist in the MNS data, but the equivalent terms $q^{\mathcal{R}}_{j,j}$ do not exist in the TIC and CPIS data. We therefore impute them as:

$$q^{\mathcal{R}}_{j,j} = \frac{x^{\mathcal{R}}_{j,j}}{\sum_{i \neq j} x^{\mathcal{R}}_{i,j}} \left(\sum_{i \neq j} q^{\mathcal{R}}_{i,j} \right). \tag{4}$$

Intuitively, we assume that mutual funds and ETFs in the MNS data have a similar share of domestic over total investments as do the universe of all investors covered in TIC and CPIS. This assumption is clearly imperfect but for most countries it is also likely to be conservative since mutual funds and ETFs are perhaps more likely to invest abroad, thus leading to lower reallocations in our procedure. For some countries, such as those in the EMU (excluding Luxembourg and Ireland) it is probably not conservative since the mutual funds domiciled in those countries are more likely to focus on domestic investment.[26] The assumption has the advantage of transparency and only requiring TIC or CPIS and MNS data.[27] Below we provide a sensitivity analysis for this imputation of domestic positions.

We now turn to the results of applying our reallocation matrices to TIC, presented in Tables 11 and 12. Table 11 focuses on U.S. holdings of corporate bonds in G-20 economies, selected tax havens, and the domestic economy. It has long been puzzling to economists that an advanced economy like the U.S. invests so little in rapidly growing emerging economies such as Brazil, China, India, and Russia. For example, U.S. official statistics report investments in corporate bonds in Brazil to be a mere $8 billion, in China $3 billion, in India $6 billion, and in Russia $0.4 billion. These are tiny investments compared to the $390 billion invested in Canada, the $548 billion in the EMU, the $326 billion in the UK and even the $144 billion allocated to Australia. Overall, BRIC economies account for only 1.1 percent of all corporate debt foreign investment by the U.S. in 2017 under a residency view. Panel A of Table 11 shows that our reallocation has a notable impact on these low allocations to emerging economies. Our baseline estimates raise investments from the U.S. to BRIC economies in corporate bonds from $17 to $138 billion, a 700 percent increase. The

[25] In the appendix we compare the MNS nationality-based positions for the U.S. to those that one would obtain if unable to perform this type of domestic-to-foreign reallocation. Table A.4 shows that U.S. corporate debt investments in countries such as Germany, India, the UK, Japan, Canada, Brazil, and South Korea would be all significantly understated, since firms in all these countries have U.S.-based debt-issuing subsidiaries.

[26] This occurs because the mutual fund industry in the EMU is largely concentrated in Luxembourg and Ireland. UCITS funds in Luxembourg and Ireland are then sold to investors in the other countries of the European Union. There is potential selection, along the lines of their domestic vs. global investment mandate, in which funds are domiciled in Luxembourg and Ireland and which are in the rest of the countries.

[27] An alternative assumption that we are considering in ongoing work is to use additional data, like the Flow of Funds, to estimate the level of domestic investments in various asset classes.

increase is broad-based with Brazil increasing from $8 to $61 billion, China from $3 to $44 billion, India from $6 to $21 billion, and Russia from $0.4 to $12 billion. Nor are these economies the only ones to receive capital in the reallocation: South Africa moves from $1 to $6 billions, South Korea from $11 to $17 billion, the U.K. from $326 to $373 billion, and Japan from $80 to $184 billion. The big losers of capital among G-20 economies are Ireland (-24 billions), Luxembourg (-69 billions), and the Netherlands (-65 billions). All three economies have in recent years been the preferred countries of incorporation for foreign debt-issuing vehicles and in this respect are similar to tax haven countries. Indeed, Panel B shows that the other big losers of capital are the tax havens with the Cayman Islands going from $80 to $5 billion, and Bermuda going from $30 to $0 billion.

To highlight the special role of tax havens and financing vehicles and to showcase the flexibility of our estimation procedure, we also include in Tables 11 and 12 an alternative estimation of TIC based on nationality that only reallocates those investments that are in tax haven countries, Ireland, and the Netherlands on a residency basis. We find that the main pattern in the baseline estimate, i.e. the large increase in corporate bond holdings in emerging markets, is largely unchanged if more muted in this alternative estimation. This is because for these destinations most of the reallocation in the baseline is coming from reallocations away from tax havens. For example, investments in Brazil increase $36 billions in this alternative compared to $52 billions in the baseline, in China the increase is $34 rather than $42 billions, and in Russia the increase is unchanged at $12 billions.

Tables 11 and 12 also include a robustness check on our imputation of the U.S. domestic position discussed above. The Column labeled "Ex-Domestic" does not use the imputation in equation (4) and instead only reallocates away from the U.S. those investments that we actually observe (in actual level amounts) in the MNS data. The main effect is to reduce the increase in investments in other developed countries such as Canada and Japan. This occurs because in this robustness check we are not reallocating to Japan the entire estimated value of U.S. investments in debt issued by U.S. subsidiaries of Japanese firms, such as Toyota or Honda, but only the amounts of those investments that we observe directly in the MNS data.

Appendix Table A.2 shows that reallocations are minimal for government bonds. This occurs because governments almost always issue under their own name and not via subsidiaries. Even when governments issue international bonds in foreign markets, e.g. the Brazilian sovereign issuing a global bond, the immediate issuer is always the sovereign and the residency view fully captures the issuance. The asymmetric treatment of sovereign and corporate bonds under the residency view, but not under the nationality view, leads to a systematic understatement of the importance of foreign inflows of capital to private firms compared to the government in emerging markets. For example, TIC reports that only 23 percent of all bond positions of the U.S. in Brazil are corporate bonds.[28] Under the nationality view this percentage is actually 70 percent.[29] The increase is so big as to meaningfully change the total investment in all bonds in Brazil which goes from $34 to $87 billion, thus more than doubling.

[28] TIC reports $8 billion of corporate bonds and $26 billion of government bonds. See Tables 11 and A.2.

[29] Our TIC nationality-based estimates are $61 billion of corporate bonds and $26 billion of government bonds. See Tables 11 and A.2.

Before moving to the analysis of equities, it is worth noting the role of other types of bonds, such as structured finance. In the case of the U.S., foreign investments in structured finance bonds are relatively small in TIC except for one destination, the Cayman Islands in which the U.S. invests $323 billion. These investments are in bonds issued by Special Purpose Vehicles (SPV) registered in the Cayman Islands but almost always backed by U.S. mortgages and sponsored and serviced by U.S. banks. Our procedure successfully reallocates these bonds to be domestic securities of the U.S. and as a result we reallocate $282 billion away from the Cayman Islands.[30]

Table 12 focuses on equity reallocations in TIC and highlights a large and concentrated pattern. In the TIC data, the U.S. holds $547 billion of common equities in the Cayman Islands and $195 billion in Bermuda. For comparison, the size of equity investments in the Cayman Islands is similar to those in Canada and bigger than those in Germany and France. Our procedure completely moves away these investments from tax havens; from the Cayman Islands alone we reallocate the entire $547 billion of equity investments. There are two main recipients of these flows: China and the U.S. itself. We document in the next section that Chinese companies issue equity(-like) securities in the Cayman Islands predominantly to circumvent domestic Chinese legislation precluding foreign ownership of equity in strategic firms. The other large reallocation occurs away from the Ireland and toward the U.S. itself. As we discussed in the previous section, U.S. companies are often headquartered and registered in Ireland for tax purposes, a process called a "tax inversion". Equities of these companies, even when listed on U.S. stock exchanges, are classified as claims on Irish companies on a residency view. Under a nationality view they are classified as claims on U.S. companies and, if held by U.S. investors, constitute domestic rather than cross-border investment.

One final concern with our reallocations, especially those coming from tax havens, is the possibility that mutual funds and ETFs are more likely than other investors to hold securities in tax havens that our algorithm reallocates. If this were the case, our TIC estimates would overstate the reallocations from tax havens. Of course, interested researchers could make our estimates more conservative by applying the reallocation matrices to only part of the amounts observed in TIC (or CPIS) in tax havens. Rather than picking an arbitrary amount, say 50 or 60 percent of the amounts, we benchmark here the baseline reallocations for Chinese equities using external data. At the end of 2017 the stock market capitalization of Chinese companies listed via VIE structures in the Cayman Islands was $1.7 trillion, of which $747 billion corresponds to equities listed on the NYSE or NASDAQ.[31] The MNS data include holdings in these companies by U.S. funds for $165 billion.

In addition to the MNS data, we have investigated the 13F regulatory filings of U.S. institutional

[30]The U.S. domestic position in net actually decreases by $28 billion. This occurs because of an offsetting large outflow from the U.S. due to structured finance issued by U.S. based subsidiaries of foreign banking groups. We are less confident that these reallocations make economic sense since it is difficult to establish, for example, whether Santander structured finance issuance in the U.S. should be aggregated back as a liability of the Spanish banking group. As a result, our preferred estimates for structured finance are the "Tax Haven Only" estimates reported in Table A.3.

[31]Of these the top five companies were: Tencent ($494 billion), Alibaba ($442 billion), Baidu ($64 billion), JD.com ($50 billion), and China Evergrande ($46 billion). Tencent and China Evergrande are listed in Hong Kong; all other three companies are listed on U.S. stock exchanges.

investors. These filings report the holdings of U.S. listed equities (including depositary receipts) of U.S. institutional investors with at least $100 million in equity assets under management. The 13F filings reveal holdings in 13F reportable securities issued by Chinese firms of $366 billion. Additionally, the MNS data reveal holdings in 13F non-reportable equities of Chinese firms, such as the Tencent equities listed in Hong Kong, of $170 billion. Together, this provides a lower bound on U.S. investment in Chinese equities of $566 billion. This is a lower bound because it does not account for all holdings of stocks listed abroad, other than via depositary receipts, that are held by investors other than mutual funds.[32]

Tables 13 and 14 provide an analogous analysis for the EMU's foreign investments based on the CPIS dataset. Many patterns are similar to the U.S. case above: tax havens obfuscate investment from the EMU to emerging economies. The most notable increases in the reallocations are toward China, Brazil, and Russia. In particular, we see here the aggregate impact of the issuance in Luxembourg and Ireland of corporate bonds by Russian firms. These bonds, when held by EMU-resident investors, are classified as domestic investment of the EMU under the residency view. However, they are moved to being cross-border investment in Russia under the nationality view. EMU investments in Russian bonds increase from $35bn to $107 billion.

Panel C of Table 13 focuses on domestic reallocations. For the EMU countries CPIS reports foreign investment for each member state, including investments in other member states. We apply the imputations of domestic investment in equation (4) to each member state of the EMU separately and then aggregate all countries in the EMU. Our baseline estimates show an interesting intra-European pattern with capital flowing out of Ireland, Luxembourg, and the Netherlands and into the rest of the EMU countries. This highlights again the roles of these countries as tax-favored jurisdictions. The last column in the table, labeled "Ex-Domestic", assess the robustness of these imputations, but in the case of the EMU a clear assessment is further complicated by the role of Ireland, Luxembourg, and the Netherlands as global tax-havens.

Table 14 focuses on the EMU's foreign equity investments. It shows the impact of Chinese offshore equity-like structures (Variable Interest Entities, which we discuss at greater length in Section 3) in the Cayman Islands on EMU foreign investment: we reallocate $223 billion of common equity investments away from the Cayman Islands and into (mostly) China. As a result, the EMU's exposure to Chinese equities increases from $96 to $329 billion.[33]

[32] We obtained the 13F data from Thomson Reuters. Investors are not required to disclose short positions in the 13F filings, which might in principle bias our estimated bound — however, long-short portfolios in Chinese equities are not very common.

[33] In CPIS the equity investments also include fund shares. In most destinations fund shares are a small portion of total equity investment. A notable exception is equity investment in Luxembourg that is almost exclusively in fund shares. Most foreign investment in Luxembourg domiciled funds comes from other EMU countries (in CPIS 72% in 2017). For the EMU equity tables, we dropped investments in equity in Luxembourg since the ultimate investments are accounted for by foreign investments of Luxembourg. For other countries in CPIS we do not reallocate equity investments in Luxembourg. We also checked an alternative approach that reallocates non-EMU equity investments in Luxembourg in proportion of Luxembourg foreign investment. We have not included these results since the presence of home-bias and home-currency bias make it unlikely that different countries buy the same composition of funds in Luxembourg. Equity investments in other tax havens such as Cayman Islands and Ireland also suffer from similar issues, but the presence of a large and unknown common equity component make it difficult to provide an exact treatment. In these cases, we maintained the imperfect assumption that all equity investments are in common equity.

As we highlighted before, the data in CPIS do not generally provide a breakdown of bonds between sovereign and corporate and we have therefore focused on total debt securities.[34] However, we are planning to include online the reallocation matrices computed separately for corporate bonds. While these reallocation matrices are not used in restating CPIS, as only the aggregate total debt matrices are, they are useful since they focus the attention on the core source of the reallocations, the corporate debt market.

Tables 15-16 and 17-18 report the restated CPIS estimates for the U.K. and Canada, respectively. They show overall very similar reallocation patterns as those for the U.S. and EMU foreign investments.

Both our restatement of MNS data and the applications to TIC and CPIS focus on portfolio investment, i.e. investment in securities. This type of investment is an important (and growing) part of the international investment position, but not the only one. For example, bank loans and Foreign Direct Investment (FDI) are also important components. To have a full appreciation of the impact of the nationality view on the international investment position, it would be important in future work to restate bank loans and FDI. Consider, for example, the impact of a Brazilian firm issuing a bond offshore; at the same time, the firm might originate an intra-company loan from the offshore subsidiary to the onshore parent. This intracompany loan wold be counted as FDI. This paper focuses only on reallocating the bond issuance, but it would be a great goal in the future to add the study of intracompany loans.

3 Examining Security Issuance in Tax Havens

Tax havens are opaque but important conduits for the allocation of international capital. For example, Figure 8 shows that securities issued in tax havens account for 8-10 percent of all cross-border flows by market values in the MNS data for the period 2005 to 2017. Figure 9 breaks this aggregate numbers down by nationality of the holder of the securities. For example, the top line in Panel A shows that securities issued in tax havens account for 11.5 percent of all U.S. foreign holdings of corporate bonds. The percentage is similarly high for other developed economies: roughly 10 percent for Great Britain, 8 percent for the Eurozone, 3 percent for Canada. These numbers are so high that their reallocation toward the ultimate destinations of the capital has a meaningful economic impact on the analysis of global portfolio investment.

Table 19 shows the extent to which our reclassification algorithm is able to reallocate issuance in tax havens away from its place of immediate origination and toward the ultimate destination of the capital. We focus on ten large developed economies as the investor countries and nine of the largest tax haven countries as immediate destinations of the investment. Each cell in the table reports the fraction of securities (market value) in the bilateral positions that are successfully reallocated away

[34] The only EMU member countries that in 2017 report this split are Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Italy, Latvia, Lithuania, Slovenia, and Spain. Notably, Luxembourg and Ireland do not report this data, and these two countries host the bulk of the European fund industry. Since we are interested in a EMU consolidated view, as well as in other countries such as the UK and Canada that also do not report the split between corporate and sovereign bonds, we only use the data on total debt securities.

form the destination tax haven. For example, the bottom left cell considers investments of the U.S. reported to be in the Cayman Islands: our procedure successfully reallocates 96.8 percent of these investments. These high success ratios are common across most destinations.[35]

Who Issues Securities in Tax Havens? Tables 20 and 21 show the largest reallocations by market value away from the Cayman Islands and Bermuda at the issuer level. Panel A of Table 20 focuses on corporate bonds issued in the Cayman Islands. We see an interesting mix of companies from China, Brazil, Switzerland and Qatar. The largest reallocation occurs for the Chinese retail giant Alibaba, the second for the Brazilian mining and logistics multinational Vale.

Panel B of Table 20, which focuses on equities, is entirely dominated by Chinese companies. These reallocations are large in market value, with the largest two for Tencent and Alibaba valued at $74 billion and $66 billion, respectively. We already discussed in Section 2 that these reallocations massively increase the reported investments of developed countries, such as the U.S. and EMU, into Chinese equities. Many Chinese companies like Alibaba, Tencent, and Baidu are subject to the Chinese government's restriction on foreign ownership of companies in industries designated as strategic. China's domestic regulation makes it difficult for strategic-designated firms to raise capital from foreign investors. It is common for these Chinese companies to skirt this form of capital control via a legal structure known as a Variable Interest Entity (VIE). In the VIE setup, tax-haven based shell companies issue securities that foreign investors can buy. The offshore shell company engages in a series of profit-transfer contracts with the onshore Chinese company through a wholly-owned subsidiary, often located in Hong Kong. These transfers ultimately result in the shell company replicating the cash flows of the onshore Chinese operating company, but with no direct flow of foreign capital to the firm facing the capital controls. This structure effectively creates foreign equity securities for Chinese companies via a mirror pass-through entity in a tax haven.

Surprisingly, the Chinese authorities have tolerated this rather obvious and quantitatively meaningful circumvention of their domestic regulation. Even more surprisingly, developed countries' open-end mutual funds hold substantial amounts of these offshore securities despite risks of expropriation and jurisdictional concerns for any litigation. For example, Alibaba's prospectus for its initial public offering (SEC Form F-1 filing) on the New York Stock Exchange explicitly stated: "If the [Chinese] government deems that the contractual arrangements in relation to our variable interest entities do not comply with [Chinese] governmental restrictions on foreign investment, or if these regulations or the interpretation of existing regulations changes in the future, we could be subject to penalties or be forced to relinquish our interests in those operations." In the U.S., while the U.S.-China Economic and Security Review Commission has issued a staff report (Rosier, 2014) warning about these risks, ownership continues to be widespread by mutual funds and it is unclear whether retail investors in these funds are aware of these offshore holding structures.

Table 21 focuses on issuance of debt and equity in Bermuda. On the debt side, we find Weath-

[35] Naturally, Hong Kong has much lower reallocations. This is to be expected since, as discussed, Hong Kong is a destination for offshore issuance but also has significant domestic issuance by companies actually headquartered and operating there.

erford International, an oil and gas services company whose operational headquarter is in Texas (U.S.), but that over time has switched its legal registration among Bermuda, Ireland, and Switzerland. Our procedure successfully captures the economic location of the firm, which is the USA. A similar example is that of Aircastle Ltd., a Connecticut-headquartered owner of commercial jet aircrafts listed on the New York Stock Exchange. On the equity side, we find a number of companies that are registered in Bermuda but operate in other countries. For example, IHS Markit is a London-based information provider quoted in the U.S. on the Nasdaq via a Bermudian company. Our procedure successfully looks through not only the offshore incorporation in Bermuda, but also the listing in the U.S., and classifies the equity as belonging to a British company.

Tables 22 and 23 aggregate individual issuers to provide a consolidated country-level view of the largest reallocations away from tax havens. The left panel of Table 22 shows that the largest reallocations (in absolute market value) away from the the Cayman Islands are toward China for both debt and equity. The third column in the panel shows the fraction of all foreign investment in the ultimate destination country that is accounted for by securities based in the Cayman Islands. For example the 31.1 percent reported for China means that of all investment that the ten developed countries in our sample make in Chinese corporate debt about 31 percent is done via the Cayman Islands. It provides one simple statistic to assess the impact of our aggregation algorithm on our understanding of global investment patterns. Overall, we find that the impact at the country level is large for emerging economies and much smaller for developed economies. This reveals that, for developed economies, while tax-haven issuance is large in absolute amounts, it is small relative to onshore issuance when focusing on overall cross-border holdings. The opposite is true for emerging economies: a large part of security investments from developed countries into these economies occurs via tax havens.

3.1 Firms' Issuance in Tax Havens and North to South Capital Flows

Given the results that we have discussed so far, it is natural to ask what might be driving the particular patterns of offshore security issuance that we observe in the data. We offer here a number of potential reasons while stressing that further research will be needed to address this question more fully.

A first reason for offshore issuance might simply stem from firms' preferences for the regulatory and reporting regimes available abroad, or from the fact that firms may cater to analogous investor preferences. For example, certain foreign investors may prefer to purchase securities in countries that do not impose tax withholding requirements. Second, firms may issue offshore for tax avoidance purposes, contributing to the profit-shifting motive highlighted by Thomas R Tørsløv, Ludvig S Wier and Gabriel Zucman (2018). By contributing equity to a tax-haven based financing subsidiary and financing operations via loans from that financing subsidiary, companies can shift profits to low-tax jurisdictions (Harvey, 2013). In the US, a number of tax provisions such as the so-called CFC look-through rule allow firms to shelter shifted income from domestic taxation (Shay, 2013;

Harvey, 2013).[36]

We have also documented above, most prominently for China, that avoidance of capital controls plays an important role. Firms issue in tax havens to escape domestic regulations that restrict the amount of capital that can be raised from foreign investors. Similarly, it seems possible that both firms and investors prefer these jurisdictions to the local ones in emerging economies for fear of expropriation and other governmental interventions.

Our data highlight a different use of tax havens by firms in developed and emerging economies. In general, firms in developed countries that issue in tax havens receive the capital from (i.e., the securities are bought by) investors in their country of origin. For example, the equity issued by a U.S. firm registered in the Cayman Islands is bought by U.S. investors. This pattern amounts to moving offshore what truly is a domestic transaction with the results of inflating both external gross assets and liabilities of developed countries. Firms in emerging countries that issue in tax havens receive the capital from (i.e., the securities are bought by) investors in developed markets. For example, the debt issued by a Brazilian firm in the Cayman Islands is bought by developed market investors. The same is not true for the Brazilian firm debt issued in Brazil. This pattern amounts to a capital flow from the "North" to the "South" that is obfuscated by each of the two legs of the flow being against a tax haven country.

4 Conclusion

We have provided a methodology to unwind corporate ownership chains and offshore issuance in tax havens globally. Our methodology is transparent and can be used directly or easily modified by other researchers. We show that correctly resolving global ownership chains is key in forming a consolidated view of global cross-border portfolios. Commonly used datasets significantly understate the magnitude of the corporate financing flowing from developed-market investors to emerging-market firms and incorrectly attribute these flows to tax-haven countries.

While our procedure is certainly still imperfect, it provides the basis for a common measurement framework of capital flows in international macroeconomics. Future research can build on these foundations and move the frontier further toward a fully-resolved and easily accessible set of statistics on global capital flows.

[36] Internal Revenue Code, Section 954(c)(6).

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	Starting from CGS Universe	Starting from Morningstar Sample
1. Unique Securities (CUSIP9)	26,027,455	1,136,120
2. Unique Issuer Codes (CUSIP6)	1,578,235	200,545
3. Unique Ultimate Parents	1,008,532	94,924
4. Unique Issuer Codes Aggregated to Different Issuer Code	571,569	113,451
5. Unique Issuer Codes Aggregated to Different Issuer Code *or* Domicile	585,960	127,195
6. Share of Market Value Covered	—	99.9%
7. Share of Market Value with Updated Issuer Code *or* Domicile	—	49.0%

Table 1: **Aggregation procedure coverage in full CGS universe and Morningstar sample.** We start both from the full universe of CUSIPs from CUSIP Global Services (CGS) and from the set of all CUSIP codes observed in the Morningstar holdings sample (the latter between 2005 and 2017). For each of these, we report: (1) how many unique security identifiers (CUSIP9) are present; (2) how many unique issuer codes (CUSIP6) are present; (3) how many unique ultimate parents we aggregate these issuers to; (4) how many individual issuer codes are linked to a different ultimate parent; (5) how many individual issuer codes are linked either to a different ultimate parent or to a country other than the one of immediate residency; (6) the share of securities' market value that is accounted for in our link tables; (7) the share of securities by market value that are linked to an ultimate parent other than their immediate issuer or a domicile other than their immediate residency (as determined by the immediate issuer's place of incorporation reported by CGS). Row 7 only uses 2017 year-end data.[37]

[37]The difference between rows (2) and (3) does not mechanically equal row (4) for the CGS universe because issuer numbers in the CGS universe may occasionally be assigned to ultimate-parent CUSIP6 codes outside of CGS that appear in our other aggregation data sources.

Issuer CUSIP6	Issuer Name	Issuer Residency	Parent CUSIP6	Parent Residency	Parent Name	Market Value (USD Billions)
A. Corporate bonds reallocated toward country						
00507U	ACTAVIS FDG SCS	LUX	G0177J	USA	ALLERGAN PLC	5.69
36164Q	GE CAP INTL FDG CO	IRL	369604	USA	GENERAL ELEC CO	4.87
G33365	FCE BANK PLC	GBR	345370	USA	FORD MTR CO DEL	3.89
45824T	INTELSAT JACKSON HLDGS SA	LUX	L5140P	USA	INTELSAT SA	3.52
947075	WEATHERFORD INTL LTD	BMU	G48833	USA	WEATHERFORD INTL PLC	2.87
B. Corporate bonds reallocated away from country						
035242	ANHEUSER-BUSCH INBEV FIN INC	USA	B639CJ	BEL	ANHEUSER BUSCH INBEV SA NV	11.62
85207U	SPRINT CORP	USA	J75963	JPN	SOFTBANK CORP	6.66
87264A	T-MOBILE USA INC	USA	251566	DEU	DEUTSCHE TELEKOM AG	5.79
05526D	BAT CAP CORP	USA	G1510J	GBR	BRITISH AMERICAN TOBACCO PLC	5.52
89236T	TOYOTA MTR CR CORP	USA	J92676	JPN	TOYOTA MTR CORP	3.63
C. Equities reallocated toward country						
Y09827	BROADCOM LTD	SGP	Y09827	USA	BROADCOM LTD	52.95
G5960L	MEDTRONIC PLC	IRL	G5960L	USA	MEDTRONIC PLC	49.13
806857	SCHLUMBERGER LTD	CUW	806857	USA	SCHLUMBERGER LTD	40.06
G1151C	ACCENTURE PLC IRELAND	IRL	G1151C	USA	ACCENTURE PLC IRELAND	38.59
H1467J	CHUBB LTD	CHE	H1467J	USA	CHUBB LTD	32.80
D. Equities reallocated away from country						
872590	T-MOBILE US INC	USA	251566	DEU	DEUTSCHE TELEKOM AG	8.02
87236Y	TD AMERITRADE HLDG CORP	USA	891160	CAN	TORONTO DOMINION BK ONT	7.58
36174X	GGP INC	USA	112585	CAN	BROOKFIELD ASSET MGMT INC	6.86
58733R	MERCADOLIBRE INC	USA	58733R	ARG	MERCADOLIBRE INC	4.65
98850P	YUM CHINA HLDGS INC	USA	98850P	CHN	YUM CHINA HLDGS INC	3.99

Table 2: **Largest issuer-asset class level reallocations toward and away from the United States.** Market values are as observed in the 2017 end-of-year Morningstar sample.

Issuer CUSIP6	Issuer Name	Issuer Residency	Parent CUSIP6	Parent Residency	Parent Name	Market Value (USD Billions)
A. Corporate bonds reallocated toward country						
035242	ANHEUSER-BUSCH INBEV FIN INC	USA	B639CJ	BEL	ANHEUSER BUSCH INBEV SA NV	11.62
87264A	T-MOBILE USA INC	USA	251566	DEU	DEUTSCHE TELEKOM AG	5.79
K7S724	NORDEA KREDIT REALKREDIT AS	DNK	X5S8VP	FIN	NORDEA BK ABP	4.74
W5801L	NORDEA HYPOTEK AB	SWE	X5S8VP	FIN	NORDEA BK ABP	3.39
233851	DAIMLER FIN NORTH AMER LLC	USA	D1668R	DEU	DAIMLER AG	2.70
B. Corporate bonds reallocated away from country						
71647N	PETROBRAS GLOBAL FIN B V	NLD	P7836P	BRA	PETROLEO BRASILEIRO SA	9.57
00507U	ACTAVIS FDG SCS	LUX	G0177J	USA	ALLERGAN PLC	5.69
88167A	TEVA PHARMACEUTICAL FIN	NLD	881624	ISR	TEVA PHARMACEUTICAL INDS LTD	5.09
36164Q	GE CAP INTL FDG CO	IRL	369604	USA	GENERAL ELEC CO	4.87
L4191B	GAZ CAPITAL SA LUXEMBOURG	LUX	368287	RUS	GAZPROM PJSC	4.31
C. Equities reallocated toward country						
G7690A	ROYAL DUTCH SHELL PLC	GBR	G7690A	NLD	ROYAL DUTCH SHELL PLC	67.47
780259	ROYAL DUTCH SHELL PLC	GBR	G7690A	NLD	ROYAL DUTCH SHELL PLC	15.21
872590	T-MOBILE US INC	USA	251566	DEU	DEUTSCHE TELEKOM AG	8.02
G98294	XL GROUP LTD	BMU	F06106	FRA	AXA SA	5.33
P0273U	AMBEV SA	BRA	B639CJ	BEL	ANHEUSER BUSCH INBEV SA NV	4.99
D. Equities reallocated away from country						
G5960L	MEDTRONIC PLC	IRL	G5960L	USA	MEDTRONIC PLC	49.13
G1151C	ACCENTURE PLC IRELAND	IRL	G1151C	USA	ACCENTURE PLC IRELAND	38.59
G51502	JOHNSON CTLS INTL PLC	IRL	G51502	USA	JOHNSON CTLS INTL PLC	19.06
G0177J	ALLERGAN PLC	IRL	G0177J	USA	ALLERGAN PLC	18.06
G29183	EATON CORP PLC	IRL	G29183	USA	EATON CORP PLC	13.63

Table 3: **Largest issuer-asset class level reallocations toward and away from the EMU.** Market values are as observed in the 2017 end-of-year Morningstar sample.

Issuer CUSIP6	Issuer Name	Issuer Residency	Parent CUSIP6	Parent Residency	Parent Name	Market Value (USD Billions)
A. Corporate bonds reallocated toward country						
05526D	BAT CAP CORP	USA	G1510J	GBR	BRITISH AMERICAN TOBACCO PLC	5.52
761713	REYNOLDS AMERN INC	USA	G1510J	GBR	BRITISH AMERICAN TOBACCO PLC	3.10
40427H	HSBC BK CDA	CAN	404280	GBR	HSBC HLDGS PLC	2.55
L3701Y	FIAT FINANCE & TRADE LTD SA	LUX	N31738	GBR	FIAT CHRYSLER AUTOMOBILES NV	1.90
40428H	HSBC USA INC	USA	404280	GBR	HSBC HLDGS PLC	1.70
B. Corporate bonds reallocated away from country						
G33365	FCE BANK PLC	GBR	345370	USA	FORD MTR CO DEL	3.89
80283L	SANTANDER UK PLC	GBR	E19790	ESP	BANCO SANTANDER S A NEW	2.01
G2551U	CREDIT AGRICOLE SA	GBR	G2551U	FRA	CREDIT AGRICOLE SA	1.84
80281L	SANTANDER UK GROUP HLDGS PLC	GBR	E19790	ESP	BANCO SANTANDER S A NEW	1.84
G8108W	SANTANDER UK GROUP HLDGS PLC	GBR	E19790	ESP	BANCO SANTANDER S A NEW	1.60
C. Equities reallocated toward country						
G96629	WILLIS TOWERS WATSON PUB LTD CO	IRL	G96629	GBR	WILLIS TOWERS WATSON PUB LTD CO	10.71
N7364X	RELX NV	NLD	G7493L	GBR	RELX PLC	9.42
G9788D	WPP PLC NEW	JEY	G9788D	GBR	WPP PLC NEW	8.43
G47567	IHS MARKIT LTD	BMU	G47567	GBR	IHS MARKIT LTD	7.54
G3408R	FERGUSON PLC	JEY	G3421J	GBR	FERGUSON PLC	6.68
D. Equities reallocated away from country						
G7690A	ROYAL DUTCH SHELL PLC	GBR	G7690A	NLD	ROYAL DUTCH SHELL PLC	67.47
780259	ROYAL DUTCH SHELL PLC	GBR	G7690A	NLD	ROYAL DUTCH SHELL PLC	15.21
G10877	BHP BILLITON PLC	GBR	Q1498M	AUS	BHP BILLITON LTD	10.66
G6518L	NIELSEN HLDGS PLC	GBR	G6518L	USA	NIELSEN HLDGS PLC	7.58
G67395	OLD MUTUAL PLC	GBR	S5790B	ZAF	OLD MUTUAL LTD	3.70

Table 4: **Largest issuer-asset class level reallocations toward and away from Great Britain.** Market values are as observed in the 2017 end-of-year Morningstar sample.

Issuer CUSIP6	Issuer Name	Issuer Residency	Parent CUSIP6	Parent Residency	Parent Name	Market Value (USD Billions)
A. Corporate bonds reallocated toward country						
29250R	ENBRIDGE ENERGY PARTNERS LP	USA	29250N	CAN	ENBRIDGE INC	1.50
29103D	EMERA US FIN LP	USA	290876	CAN	EMERA INC	0.99
G8T77K	TORONTO DOMINION BANK	GBR	891160	CAN	TORONTO DOMINION BANK	0.83
198280	COLUMBIA PIPELINE GROUP INC	USA	87807B	CAN	TC ENERGY CORP	0.80
84756N	SPECTRA ENERGY PARTNERS LP	USA	29250N	CAN	ENBRIDGE INC	0.80
B. Corporate bonds reallocated away from country						
40427H	HSBC BK CDA	CAN	404280	GBR	HSBC HLDGS PLC	2.55
34527A	FORD CR CDA CO	CAN	345370	USA	FORD MTR CO DEL	2.23
892329	TOYOTA CR CDA INC	CAN	J92676	JPN	TOYOTA MTR CORP	1.24
94975Z	WELLS FARGO FINL CDA CORP	CAN	95001K	USA	WELLS FARGO & CO	1.18
438121	HONDA CDA FIN INC	CAN	J22302	JPN	HONDA MTR CO LTD	1.16
C. Equities reallocated toward country						
87236Y	TD AMERITRADE HLDG CORP	USA	891160	CAN	TORONTO DOMINION BK	7.58
36174X	GGP INC	USA	112585	CAN	BROOKFIELD ASSET MGMT INC	6.86
G16252	BROOKFIELD INFRASTRUCTURE PARTNERS	BMU	G16252	CAN	BROOKFIELD INFRASTRUCTURE PARTNERS	3.20
550021	LULULEMON ATHLETICA INC	USA	550021	CAN	LULULEMON ATHLETICA INC	3.14
B4746J	GROUPE BRUXELLES LAMBERT GBL	BEL	739239	CAN	POWER CORP CDA	2.60
D. Equities reallocated away from country						
453038	IMPERIAL OIL LTD	CAN	30231G	USA	EXXON MOBIL CORP	3.08
535919	LIONS GATE ENTMT CORP	CAN	535919	USA	LIONS GATE ENTMT CORP	2.25
57778L	MAXAR TECHNOLOGIES LTD	CAN	57778L	USA	MAXAR TECHNOLOGIES LTD	1.65
575385	MASONITE INTL CORP NEW	CAN	575385	USA	MASONITE INTL CORP NEW	1.02
675222	OCEANAGOLD CORP	CAN	675222	AUS	OCEANAGOLD CORP	0.85

Table 5: **Largest issuer-asset class level reallocations toward and away from Canada.** Market values are as observed in the 2017 end-of-year Morningstar sample.

USA			EMU			United Kingdom		
Origin	**Destination**	**Market Value (USD Billions)**	**Origin**	**Destination**	**Market Value (USD Billions)**	**Origin**	**Destination**	**Market Value (USD Billions)**
A. Corporate bonds reallocated toward country								
LUX	USA	22.3	USA	EMU	44.3	USA	GBR	21.6
GBR	USA	13.8	GBR	EMU	19.5	JEY	GBR	7.9
CYM	USA	12.2	SWE	EMU	12.0	LUX	GBR	6.6
CAN	USA	12.0	BRA	EMU	7.2	NLD	GBR	6.3
NLD	USA	11.9	DNK	EMU	5.1	IRL	GBR	5.5
B. Corporate bonds reallocated away from country								
USA	JPN	24.7	EMU	USA	48.8	GBR	USA	13.8
USA	GBR	21.6	EMU	GBR	24.6	GBR	ESP	10.0
USA	DEU	16.9	EMU	BRA	18.2	GBR	CHE	7.4
USA	BEL	15.8	EMU	CHE	14.8	GBR	AUS	3.8
USA	CAN	10.1	EMU	RUS	14.6	GBR	IND	3.4
C. Equities reallocated toward country								
IRL	USA	160.6	GBR	EMU	88.6	JEY	GBR	33.3
BMU	USA	61.5	BRA	EMU	17.2	IRL	GBR	19.9
CHE	USA	53.6	USA	EMU	12.5	NLD	GBR	19.6
SGP	USA	53.0	BMU	EMU	6.8	BMU	GBR	14.9
CUW	USA	40.7	CHL	EMU	4.0	HKG	GBR	5.3
D. Equities reallocated away from country								
USA	CAN	24.3	EMU	USA	186.3	GBR	NLD	82.7
USA	DEU	8.8	EMU	GBR	44.7	GBR	USA	22.4
USA	ARG	4.7	EMU	CHE	4.5	GBR	AUS	11.0
USA	CHN	4.4	EMU	CAN	3.5	GBR	ZAF	5.3
USA	SWE	4.3	EMU	SWE	3.5	GBR	ESP	4.3

Table 6: **Largest gross country-asset class level reallocations toward and away from the United States, EMU, and Great Britain.** This table computes gross bilateral reallocations by summing over all the position-level gross reallocations as reported in Tables 20 to 5. Market values are as observed in the 2017 end-of-year Morningstar sample.

Canada			Cayman Islands			Bermuda		
Origin	**Destination**	**Market Value (USD Billions)**	**Origin**	**Destination**	**Market Value (USD Billions)**	**Origin**	**Destination**	**Market Value (USD Billions)**
A. Corporate bonds reallocated toward country								
USA	CAN	10.1	—	—	—	—	—	—
GBR	CAN	2.3	—	—	—	—	—	—
LUX	CAN	0.9	—	—	—	—	—	—
AUS	CAN	0.4	—	—	—	—	—	—
MEX	CAN	0.4	—	—	—	—	—	—
B. Corporate bonds reallocated away from country								
CAN	USA	12.0	CYM	CHN	16.3	BMU	USA	8.4
CAN	DEU	3.4	CYM	USA	12.2	BMU	JAM	1.6
CAN	GBR	3.0	CYM	BRA	6.6	BMU	GBR	1.3
CAN	JPN	2.8	CYM	GBR	4.4	BMU	CHN	1.1
CAN	CHE	0.7	CYM	HKG	3.7	BMU	NOR	0.6
C. Equities reallocated toward country								
USA	CAN	24.3	—	—	—	—	—	—
JEY	CAN	4.8	—	—	—	—	—	—
BMU	CAN	4.6	—	—	—	—	—	—
BEL	CAN	2.6	—	—	—	—	—	—
CHE	CAN	1.3	—	—	—	—	—	—
D. Equities reallocated away from country								
CAN	USA	14.4	CYM	CHN	278.0	BMU	USA	61.5
CAN	AUS	0.9	CYM	HKG	17.9	BMU	GBR	14.9
CAN	GBR	0.7	CYM	USA	12.0	BMU	CHN	14.1
CAN	CHE	0.1	CYM	TWN	5.6	BMU	HKG	12.2
CAN	FRA	0.1	CYM	GBR	5.1	BMU	FRA	5.8

Table 7: **Largest gross country-asset class level reallocations toward and away from Canada, Cayman Islands, and Bermuda.** This table computes gross bilateral reallocations by summing over all the position-level gross reallocations as reported in Tables 20 to 5. Market values are as observed in the 2017 end-of-year Morningstar sample.

Name of Ultimate Parent	Firm Share of Country's Total Offshore Financing (Within Asset Class)	Name of Ultimate Parent	Firm Share of Country's Total Offshore Financing (Within Asset Class)
A. Brazil: Corporate Debt	*Tot. Offshore Financing (Amt. Held): 30.2bn*	*E. India: Corporate Debt*	*Tot. Offshore Financing (Amt. Held): 9.4bn*
PETROLEO BRASILEIRO SA	47.3%	TATA MTRS LTD	16.6%
JBS SA	9.7%	HINDALCO INDS LTD	15.6%
VALE SA	8.5%	VEDANTA RES PLC	14.6%
MARFRIG GLOBAL FOODS SA	3.9%	BHARTI AIRTEL LTD	12.8%
BRASKEM SA	3.9%	RAIN COMMODITIES LTD	6.6%
RIO OIL FIN TRUST	3.8%	STATE BK OF INDIA	4.8%
SUZANO HOLDING SA	2.7%	RELIANCE INDS LTD	4.4%
MINERVA SA	2.6%	AZURE PWR GLOBAL LTD	3.7%
METALURGICA GERDAU SA	1.8%	OIL & NATURAL GAS CORP LTD	2.8%
B. Brazil: Equities	*Tot. Offshore Financing (Amt. Held): 1.8bn*	*F. India: Equities*	*Tot. Offshore Financing (Amt. Held): 2.3bn*
JBS SA	36.2%	WNS HLDGS LTD	35.3%
COSAN LTD	22.3%	MAKEMYTRIP LTD	29.3%
COMPANHIA DE SANEAMENTO BASICO, SAO PAULO	10.0%	VEDANTA RES PLC	9.8%
OCEAN WILSONS HOLDINGS LTD	8.9%	SUN PHARMACEUTICAL INDS LTD	5.8%
ADECOAGRO SA	7.7%	MAHINDRA & MAHINDRA LTD	5.3%
NEXA RES SA	4.8%	EROS INTL PLC	5.2%
ATENTO SA	2.7%	INDUS GAS LTD	3.4%
VALE SA	2.2%	DELTA CORP LTD	1.6%
AVIANCA TACA HOLDINGS SA	1.7%	AZURE PWR GLOBAL LTD	0.9%
C. China: Corporate Debt	*Tot. Offshore Financing (Amt. Held): 46.2bn*	*G. Russia: Corporate Debt*	*Tot. Offshore Financing (Amt. Held): 14.1bn*
ALIBABA GROUP HLDG LTD	5.9%	GAZPROM PJSC	43.9%
XINJIANG HUITONG GROUP INC	4.3%	SBERBANK RUSSIA	11.3%
STATE GRID CORP OF CHINA	4.0%	VEB FIN PLC	10.0%
INDUSTRIAL AND COMMERCIAL BK OF CHINA	3.0%	PUBLIC JT STK CO OIL	4.7%
SINOPEC GROUP OVERSEAS DEV 2015 LTD	2.5%	CREDIT BK OF MOSCOW	3.8%
SINOPEC GROUP OVERSEAS DEV 2017 LTD	2.1%	RZD CAP PLC	3.5%
CHINA EVERGRANDE GROUP	2.1%	MINING & METALLURGICAL CO NORILSK NICKEL	2.7%
CHINA NATIONAL CHEMICAL CORP	2.1%	GAZPROMBANK	2.6%
BAIDU INC	1.9%	SEVERSTAL PAO	2.0%
D. China: Equities	*Tot. Offshore Financing (Amt. Held): 349.8bn*	*H. Russia: Equities*	*Tot. Offshore Financing (Amt. Held): 6.3bn*
TENCENT HLDGS LTD	21.5%	YANDEX NV	39.5%
ALIBABA GROUP HLDG LTD	18.9%	MAIL RU GROUP LTD	21.6%
BAIDU INC	6.7%	POLYMETAL INTERNATIONAL PLC	10.4%
CHINA MOBILE LTD	4.4%	IBS GROUP HLDG LTD	7.5%
NETEASE INC	2.8%	TCS GROUP HLDG PLC	6.2%
JD COM INC	2.5%	LENTA LTD	5.9%
CTRIP COM INTL LTD	2.1%	UNITED COMPANY RUSAL PLC	3.6%
CHINA NATIONAL OFFSHORE OIL	2.0%	HIGHLAND GOLD MINING LTD	2.4%
AAC TECHNOLOGIES HOLDINGS INC	1.6%	EN+ GROUP PLC	1.8%

Table 8: **Emerging-market firms with largest amounts of observed foreign financing: Brazil, China, India, Russia.** We list the firms that receive the largest amounts of financing via foreign subsidiaries in sample, separately for debt and equity. We show the market value of each company's offshore financing as observed in the 2017 Morningstar holdings data and the share that this represents in the total observed foreign financing for the corresponding country and asset class.

Name of Ultimate Parent	Firm Share of Country's Total Offshore Financing (Within Asset Class)	Name of Ultimate Parent	Firm Share of Country's Total Offshore Financing (Within Asset Class)
A. Saudi Arabia: Corporate Debt	*Tot. Offshore Financing (Amt. Held): 0.7bn*	*D. South Africa: Equities*	*Tot. Offshore Financing (Amt. Held): 6.4bn*
SAUDI ELECTRICITY CO	18.2%	OLD MUTUAL LTD	63.4%
SAUDI BASIC INDUSTRIES SABIC	17.8%	AL NOOR HOSPS GROUP PLC	12.5%
ACWA PWR MGMT & INVTS ONE LTD	15.4%	STANDARD BK GROUP LTD	5.9%
ARAB PETE INVTS CORP	14.1%	STEINHOFF INTL HLDGS NV	4.0%
DAR ALARKAN REAL ESTATE DEVELOPMENT	13.4%	BRAIT SOUTH AFRICA	2.6%
ACWA PWR MGMT & INVTS ONE LTD	12.4%	FIRSTRAND LTD	2.5%
SABIC CAP II BV	4.9%	NET 1 UEPS TECHNOLOGIES INC	2.2%
SAUDI ELECTRIC COMPANY	2.0%	GROWTHPOINT PROPERTIES LTD	1.9%
SAUDI ELECTRICITY GLOBAL SUKUK	1.4%	PAN AFRICAN RES PLC	1.7%
B. Saudi Arabia: Equities	*Tot. Offshore Financing (Amt. Held): 0.0bn*	*E. South Korea: Corporate Debt*	*Tot. Offshore Financing (Amt. Held): 2.3bn*
SAUDI TELECOM CO	81.7%	HYUNDAI MOTOR CO LTD	79.7%
SAVOLA GROUP	18.3%	SAMSUNG ELECTRONICS CO LTD	12.4%
—	—	MAGNACHIP SEMICONDUCTOR CORP	4.3%
—	—	LOTTE SHOPPING CO LTD	1.8%
—	—	DOOSAN HEAVY INDUSTRIES	0.8%
—	—	KOREAN AIR LINES CO LTD	0.2%
—	—	EXPORT IMPORT BK OF KOREA	0.1%
—	—	HANA FINANCIAL GROUP INC	0.1%
—	—	KOREA LD & HSG CORP	0.1%
C. South Africa: Corporate Debt	*Tot. Offshore Financing (Amt. Held): 4.4bn*	*F. South Korea: Equities*	*Tot. Offshore Financing (Amt. Held): 1.2bn*
NASPERS LTD	29.2%	FILA KOREA CO LTD	29.8%
MTN GROUP LTD	13.2%	NAVER CORP	26.1%
SAPPI LTD	11.1%	LG INNOTEK CO LTD	10.9%
SIBANYE GOLD LTD	10.3%	MAGNACHIP SEMICONDUCTOR CORP	6.6%
STEINHOFF INTL HLDGS NV	7.2%	HANDSOME CORP	6.6%
GOLD FIELDS LTD NEW	6.3%	HYUNDAI WIA CORP	4.5%
GROWTHPOINT PROPERTIES LTD	5.7%	LOTTE CHEM CORP	3.2%
WESTERN DEEP LEVELS LTD	4.2%	KISWIRE CO LTD	2.8%
OLD MUTUAL LTD	4.0%	KOLON LIFE SCIENCE INC	2.2%

Table 9: **Emerging-market firms with largest amounts of observed foreign financing: Saudi Arabia, South Africa, South Korea.** We list the firms that receive the largest amounts of financing via foreign subsidiaries in sample, separately for debt and equity. We show the market value of each company's foreign financing as observed in the 2017 Morningstar holdings data and the share that this represents in the total observed foreign financing for the corresponding country and asset class.

	Share Reallocated To:															
Destination	**BMU**	**BRA**	**CAN**	**CHN**	**CYM**	**DEU**	**GBR**	**HKG**	**IND**	**IRL**	**JPN**	**LUX**	**PAN**	**RUS**	**USA**	**RoW**
BMU	1.6	0.5	1.0	1.1		0.4	9.3	1.2		1.6	1.1				65.7	16.6
BRA		100.0														
CAN		0.1	95.1	0.2		0.1	0.3				0.2				2.9	1.1
CHN				82.8			0.8									16.4
CYM		12.6	0.9	20.7	6.6	0.1	3.3	3.4		3.1	1.4				35.1	12.9
DEU						93.4	6.2								0.3	0.2
GBR		0.2	0.1				86.3		1.4		0.2				4.1	7.7
HKG				54.9		3.7	5.8	28.2	0.2							7.1
IND									100.0							
IRL				0.1		0.5	1.8			29.9	21.7			4.6	39.1	2.3
JPN											100.0					
LUX		4.7	1.2	0.1		2.8	1.5			0.4		4.5		10.9	44.7	29.1
PAN		2.3											5.4		77.2	15.2
RUS														100.0		
USA		0.3	0.7	0.1		0.8	1.3		0.1	0.3	1.7				92.3	2.3

Table 10: **Reallocation matrix, U.S. corporate debt investments.** This table shows the share of U.S. investment into selected destination countries (*rows*) that are distributed to each ultimate place of allocation (*columns*) under a nationality basis. Values are expressed in percentage points. The last column, Rest of World (RoW), shows the sum of the shares allocated to any remaining country. The rows of the matrix therefore sum to 100%. All data as of December 2017.

			Baseline		Tax Haven Only		Ex-Domestic	
Destination	**ISO Code**	**TIC**	**Position**	**Δ**	**Position**	**Δ**	**Position**	**Δ**
A. G-20; Selected EMU Members								
Argentina	ARG	5	5	0	5	0	5	0
Australia	AUS	144	149	5	144	0	146	2
Brazil	BRA	8	61	52	44	36	50	42
Canada	CAN	390	410	20	392	2	383	-7
China	CHN	3	44	42	37	34	41	39
France	FRA	118	109	-9	120	2	104	-14
Germany	DEU	60	117	57	80	20	86	26
India	IND	6	21	15	6	1	16	10
Indonesia	IDN	5	9	4	7	1	9	4
Ireland	IRL	63	39	-24	24	-39	27	-36
Italy	ITA	16	34	18	29	13	33	17
Japan	JPN	80	184	104	95	15	116	35
Luxembourg	LUX	72	3	-69	3	-69	3	-69
Mexico	MEX	58	60	2	58	0	57	-1
Netherlands	NLD	179	115	-65	94	-86	110	-69
Russia	RUS	0	12	12	12	12	12	12
Saudi Arabia	SAU	0	0	0	0	0	0	0
Spain	ESP	16	52	36	19	2	42	25
South Africa	ZAF	1	6	5	5	4	6	5
South Korea	KOR	11	17	6	11	0	12	1
Turkey	TUR	4	4	0	4	0	4	0
United Kingdom	GBR	326	373	47	343	16	321	-5
B. Selected Tax Havens								
Cayman Islands	CYM	80	5	-75	5	-75	5	-75
Bermuda	BMU	30	0	-30	0	-30	0	-30
Hong Kong	HKG	8	7	-1	6	-3	7	-1
Jersey	JEY	14	0	-14	0	-14	0	-14
Curaçao	CUW	0	0	-0	0	-0	0	0
Guernsey	GGY	13	0	-13	0	-13	0	-13
Panama	PAN	3	0	-3	0	-3	0	-3
C. Domestic Reallocation								
United States	USA	5,009*	4,775	-234	5,132	122	5,077	67

Table 11: **Estimated nationality-based outward U.S. corporate debt portfolios.** This table presents estimates of restated outward U.S. corporate debt portfolio positions using a nationality-based criterion, which we compare to the U.S. Treasury's TIC data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *TIC* column with an asterisk (*) are estimated. Corporate debt is defined in TIC as private debt holdings minus holdings of asset-backed securities. All data as of December 2017.

			Baseline		Tax Haven Only		Ex-Domestic	
Destination	**ISO Code**	**TIC**	**Position**	**Δ**	**Position**	**Δ**	**Position**	**Δ**
A. G-20; Selected EMU Members								
Argentina	ARG	9	17	8	11	1	13	4
Australia	AUS	181	184	3	182	1	184	3
Brazil	BRA	119	107	-13	120	1	106	-13
Canada	CAN	493	527	34	500	8	503	11
China	CHN	154	694	540	694	540	691	537
France	FRA	434	458	24	447	14	457	23
Germany	DEU	375	402	27	385	10	394	19
India	IND	179	172	-7	181	2	172	-7
Indonesia	IDN	40	31	-8	40	0	31	-8
Ireland	IRL	385	71	-314	71	-315	71	-314
Italy	ITA	96	114	18	105	9	114	18
Japan	JPN	895	906	12	911	17	903	9
Luxembourg	LUX	33	4	-29	4	-29	4	-29
Mexico	MEX	64	61	-3	64	0	60	-4
Netherlands	NLD	339	372	34	272	-67	371	33
Russia	RUS	55	61	7	62	7	61	7
Saudi Arabia	SAU	0	0	0	0	0	0	0
Spain	ESP	123	130	7	123	0	128	5
South Africa	ZAF	100	101	1	100	0	101	1
South Korea	KOR	226	225	-1	226	0	225	-1
Turkey	TUR	22	22	0	22	0	22	0
United Kingdom	GBR	1,019	1,000	-20	1,140	121	998	-22
B. Selected Tax Havens								
Cayman Islands	CYM	547	0	-547	0	-547	0	-547
Bermuda	BMU	195	1	-194	1	-194	1	-194
Hong Kong	HKG	147	135	-11	135	-12	135	-11
Jersey	JEY	94	0	-94	0	-94	0	-94
Curaçao	CUW	36	0	-36	0	-36	0	-36
Guernsey	GGY	14	0	-14	0	-14	0	-14
Panama	PAN	26	0	-26	0	-26	0	-26
C. Domestic Reallocation								
United States	USA	19,284*	19,977	693	19,810	526	20,030	747

Table 12: **Estimated nationality-based outward U.S. equity portfolios.** This table presents estimates of restated outward U.S. equity portfolio positions using a nationality-based criterion, which we compare to the U.S. Treasury's TIC data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *TIC* column with an asterisk (*) are estimated. All data as of December 2017.

Destination	ISO Code	CPIS	Baseline		Tax Haven Only		Ex-Domestic	
			Position	Δ	Position	Δ	Position	Δ
A. G-20 Member Countries								
Argentina	ARG	37	36	0	37	0	36	0
Australia	AUS	175	193	18	180	4	189	14
Brazil	BRA	49	133	84	119	70	72	22
Canada	CAN	190	203	13	196	6	195	6
China	CHN	19	82	63	68	49	72	53
India	IND	19	47	28	26	7	41	22
Indonesia	IDN	44	54	10	49	5	49	6
Japan	JPN	209	251	42	220	11	242	34
Mexico	MEX	97	110	13	99	2	99	2
Russia	RUS	35	107	72	107	71	45	9
Saudi Arabia	SAU	2	5	2	5	2	4	2
South Africa	ZAF	28	45	16	33	4	32	4
South Korea	KOR	23	25	2	24	1	24	2
Turkey	TUR	39	38	-1	39	0	38	-1
United Kingdom	GBR	1,291	1,211	-80	1,406	115	1,085	-206
United States	USA	1,912	2,092	181	2,111	199	1,934	22
B. Selected Tax Havens								
Cayman Islands	CYM	96	7	-89	7	-89	7	-89
Bermuda	BMU	26	2	-24	2	-24	2	-24
Hong Kong	HKG	20	14	-6	11	-9	12	-8
Jersey	JEY	10	0	-10	0	-10	0	-10
Curaçao	CUW	1	0	-1	0	-1	0	-1
Guernsey	GGY	3	0	-3	0	-3	0	-3
Panama	PAN	8	5	-4	5	-4	5	-4
C. Domestic Reallocations								
France	FRA	1,732*	1,643	-89	1,757	26	1,736	4
Germany	DEU	1,357*	1,635	278	1,622	265	1,435	78
Ireland	IRL	294*	139	-155	133	-161	276	-17
Italy	ITA	1,474*	1,616	142	1,597	123	1,500	26
Luxembourg	LUX	536*	27	-509	27	-509	474	-62
Netherlands	NLD	979*	561	-418	517	-462	926	-53
Spain	ESP	879*	1,011	132	957	77	943	64
European Monetary Union	EMU	8,555*	7,996	-559	7,944	-611	8,647	92

Table 13: **Estimated nationality-based outward EMU total debt portfolios.** This table presents estimates of restated outward EMU total debt portfolio positions using a nationality-based criterion, which we compare to CPIS data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *CPIS* column with an asterisk (*) are estimated. All data as of December 2017.

Destination	ISO Code	CPIS	Baseline		Tax Haven Only		Ex-Domestic	
			Position	Δ	Position	Δ	Position	Δ
A. G-20 Member Countries								
Argentina	ARG	4	5	1	4	0	5	1
Australia	AUS	62	67	4	63	1	67	4
Brazil	BRA	53	46	-7	54	0	46	-7
Canada	CAN	87	95	8	87	1	88	2
China	CHN	96	329	233	331	235	328	233
India	IND	85	85	-1	85	0	85	-1
Indonesia	IDN	18	18	-1	18	0	18	-1
Japan	JPN	316	317	2	316	0	316	1
Mexico	MEX	19	20	1	19	0	19	0
Russia	RUS	47	47	0	48	1	46	-1
Saudi Arabia	SAU	2	2	0	2	0	2	0
South Africa	ZAF	33	34	1	33	0	34	1
South Korea	KOR	96	95	-1	96	0	95	-1
Turkey	TUR	11	11	0	11	0	11	0
United Kingdom	GBR	593	612	18	675	82	541	-52
United States	USA	1,708	2,064	356	2,035	326	1,764	56
B. Selected Tax Havens								
Cayman Islands	CYM	223	0	-223	0	-223	0	-223
Bermuda	BMU	38	1	-37	1	-37	1	-37
Hong Kong	HKG	64	49	-16	48	-16	49	-16
Jersey	JEY	17	0	-17	0	-17	0	-17
Curaçao	CUW	3	0	-3	0	-3	0	-3
Guernsey	GGY	1	0	-1	0	-1	0	-1
Panama	PAN	3	0	-3	0	-3	0	-3
C. Domestic Reallocations								
France	FRA	1,315*	1,329	14	1,319	4	1,323	8
Germany	DEU	1,305*	1,303	-3	1,306	0	1,309	3
Ireland	IRL	695*	346	-349	346	-349	679	-15
Italy	ITA	483*	489	6	488	5	488	5
Netherlands	NLD	329*	329	0	278	-50	368	39
Spain	ESP	262*	257	-5	262	0	266	4
European Monetary Union	EMU	4,761*	4,405	-356	4,357	-404	4,809	48

Table 14: **Estimated nationality-based outward EMU equity portfolios.** This table presents estimates of restated outward EMU equity portfolio positions using a nationality-based criterion, which we compare to CPIS data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *CPIS* column with an asterisk (*) are estimated. All data as of December 2017. We drop holdings of the EMU in Luxembourg since the ultimate investments are accounted for by the foreign investments of Luxembourg (see footnote 33).

Destination	ISO Code	CPIS	Baseline		Tax Haven Only		Ex-Domestic	
			Position	Δ	Position	Δ	Position	Δ
A. G-20; Selected EMU Members								
Argentina	ARG	3	3	0	3	0	3	0
Australia	AUS	34	37	3	34	0	34	0
Brazil	BRA	10	18	8	16	6	17	7
Canada	CAN	28	37	9	29	1	31	3
China	CHN	8	15	7	14	6	15	7
France	FRA	104	103	-1	107	2	99	-6
Germany	DEU	96	122	26	125	28	122	25
India	IND	7	9	3	7	0	8	1
Indonesia	IDN	3	4	0	4	0	4	0
Ireland	IRL	57	20	-37	18	-39	19	-38
Italy	ITA	16	22	6	20	4	21	5
Japan	JPN	44	53	9	47	3	53	9
Luxembourg	LUX	28	0	-28	0	-28	0	-28
Mexico	MEX	12	14	2	12	0	14	2
Netherlands	NLD	75	39	-35	33	-42	36	-38
Russia	RUS	2	5	3	5	3	5	3
Saudi Arabia	SAU	1	1	0	1	0	1	0
Spain	ESP	15	33	18	19	4	21	6
South Africa	ZAF	6	7	1	6	0	7	1
South Korea	KOR	6	6	0	6	0	6	0
Turkey	TUR	5	5	0	5	0	5	0
United States	USA	422	461	39	450	28	435	13
B. Selected Tax Havens								
Cayman Islands	CYM	36	1	-35	1	-35	1	-35
Bermuda	BMU	2	1	-2	1	-2	1	-2
Hong Kong	HKG	7	5	-3	2	-5	2	-5
Jersey	JEY	5	0	-5	0	-5	0	-5
Curaçao	CUW	0	0	0	0	0	0	0
Guernsey	GGY	0	0	0	0	0	0	0
Panama	PAN	0	0	0	0	0	0	0
C. Domestic Reallocation								
United Kingdom	GBR	861*	836	-25	903	42	905	45

Table 15: **Estimated nationality-based outward UK total debt portfolios.** This table presents estimates of restated outward UK total debt portfolio positions using a nationality-based criterion, which we compare to CPIS data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *CPIS* column with an asterisk (*) are estimated. All data as of December 2017.

Destination	ISO Code	CPIS	Baseline		Tax Haven Only		Ex-Domestic	
			Position	Δ	Position	Δ	Position	Δ
A. G-20; Selected EMU Members								
Argentina	ARG	1	1	1	1	0	1	1
Australia	AUS	44	56	13	44	0	46	2
Brazil	BRA	15	13	-2	15	0	13	-2
Canada	CAN	34	36	2	34	0	35	1
China	CHN	48	98	50	98	50	98	50
France	FRA	104	107	3	105	1	107	3
Germany	DEU	83	84	1	83	0	84	1
India	IND	28	28	0	28	0	28	0
Indonesia	IDN	7	6	-1	7	0	6	-1
Ireland	IRL	199	140	-60	138	-61	138	-61
Italy	ITA	30	32	2	31	1	31	2
Japan	JPN	144	143	-1	144	0	143	-1
Luxembourg	LUX	85	85	0	85	0	85	0
Mexico	MEX	7	10	3	7	0	7	0
Netherlands	NLD	54	133	79	41	-12	62	8
Russia	RUS	11	12	0	12	0	12	0
Saudi Arabia	SAU	0	0	0	0	0	0	0
Spain	ESP	38	47	8	38	0	40	2
South Africa	ZAF	12	16	4	12	0	13	1
South Korea	KOR	40	40	0	40	0	40	0
Turkey	TUR	4	4	0	4	0	4	0
United States	USA	811	879	68	864	53	870	59
B. Selected Tax Havens								
Cayman Islands	CYM	41	0	-41	0	-41	0	-41
Bermuda	BMU	10	0	-10	0	-10	0	-10
Hong Kong	HKG	56	39	-18	39	-18	39	-18
Jersey	JEY	17	0	-17	0	-17	0	-17
Curaçao	CUW	1	0	-1	0	-1	0	-1
Guernsey	GGY	4	0	-4	0	-4	0	-4
Panama	PAN	0	0	0	0	0	0	0
C. Domestic Reallocation								
United Kingdom	GBR	1,510*	1,407	-103	1,544	34	1,516	6

Table 16: **Estimated nationality-based outward UK equity portfolios.** This table presents estimates of restated outward UK equity portfolio positions using a nationality-based criterion, which we compare to CPIS data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *CPIS* column with an asterisk (*) are estimated. All data as of December 2017. We do not reallocate investments in Luxembourg (see footnote 33).

Destination	ISO Code	CPIS	Baseline		Tax Haven Only		Ex-Domestic	
			Position	Δ	Position	Δ	Position	Δ
A. G-20; Selected EMU Members								
Argentina	ARG	1	1	0	1	0	1	0
Australia	AUS	9	8	0	9	0	8	0
Brazil	BRA	2	3	2	3	1	3	2
China	CHN	0	2	2	2	1	2	2
France	FRA	8	6	-2	8	0	6	-2
Germany	DEU	8	19	11	9	1	13	5
India	IND	2	3	1	2	0	3	1
Indonesia	IDN	1	1	0	1	0	1	0
Ireland	IRL	2	2	0	2	-1	2	0
Italy	ITA	2	3	0	2	0	3	0
Japan	JPN	5	19	13	5	0	12	6
Luxembourg	LUX	4	0	-4	0	-4	0	-4
Mexico	MEX	3	3	0	3	0	3	0
Netherlands	NLD	4	5	0	3	-2	5	0
Russia	RUS	1	1	0	1	0	1	0
Saudi Arabia	SAU	0	0	0	0	0	0	0
Spain	ESP	1	2	1	2	0	2	1
South Africa	ZAF	1	1	0	1	0	1	0
South Korea	KOR	1	1	0	1	0	1	0
Turkey	TUR	1	1	0	1	0	1	0
United Kingdom	GBR	16	27	11	17	1	19	3
United States	USA	227	251	24	230	3	224	-2
B. Selected Tax Havens								
Cayman Islands	CYM	4	0	-4	0	-4	0	-4
Bermuda	BMU	0	0	0	0	0	0	0
Hong Kong	HKG	0	0	0	0	0	0	0
Jersey	JEY	1	0	-1	0	-1	0	-1
Curaçao	CUW	0	0	0	0	0	0	0
Guernsey	GGY	0	0	0	0	0	0	0
Panama	PAN	0	0	0	0	0	0	0
C. Domestic Reallocation								
Canada	CAN	961*	901	-61	961	0	947	-14

Table 17: **Estimated nationality-based outward Canadian total debt portfolios.** This table presents estimates of restated outward Canadian total debt portfolio positions using a nationality-based criterion, which we compare to CPIS data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *CPIS* column with an asterisk (*) are estimated. All data as of December 2017.

Destination	ISO Code	CPIS	Baseline		Tax Haven Only		Ex-Domestic	
			Position	Δ	Position	Δ	Position	Δ
A. G-20; Selected EMU Members								
Argentina	ARG	0	1	0	0	0	1	0
Australia	AUS	16	16	0	16	0	15	0
Brazil	BRA	12	11	-1	12	0	11	-1
China	CHN	24	51	27	52	28	51	27
France	FRA	38	40	1	38	0	40	1
Germany	DEU	31	32	1	31	0	32	1
India	IND	16	16	0	16	0	16	0
Indonesia	IDN	2	2	-1	2	0	2	-1
Ireland	IRL	16	6	-10	6	-10	6	-10
Italy	ITA	5	6	1	5	0	6	1
Japan	JPN	70	69	0	70	0	69	0
Luxembourg	LUX	6	6	0	6	0	6	0
Mexico	MEX	6	5	-1	6	0	5	-1
Netherlands	NLD	20	22	2	17	-3	22	2
Russia	RUS	2	2	0	2	0	2	0
Saudi Arabia	SAU	0	0	0	0	0	0	0
Spain	ESP	7	8	1	7	0	8	1
South Africa	ZAF	5	5	0	5	0	5	0
South Korea	KOR	22	22	0	22	0	22	0
Turkey	TUR	1	1	0	1	0	1	0
United Kingdom	GBR	72	69	-3	77	5	69	-3
United States	USA	767	800	33	781	14	790	22
B. Selected Tax Havens								
Cayman Islands	CYM	29	0	-29	0	-29	0	-29
Bermuda	BMU	9	0	-8	0	-8	0	-8
Hong Kong	HKG	12	11	-1	11	-1	11	-1
Jersey	JEY	2	0	-2	0	-2	0	-2
Curaçao	CUW	1	0	-1	0	-1	0	-1
Guernsey	GGY	0	0	0	0	0	0	0
Panama	PAN	1	0	-1	0	-1	0	-1
C. Domestic Reallocation								
Canada	CAN	974*	966	-7	978	4	978	4

Table 18: **Estimated nationality-based outward Canadian equity portfolios.** This table presents estimates of restated outward Canadian equity portfolio positions using a nationality-based criterion, which we compare to CPIS data. We present our baseline estimates (*Baseline*) as well as estimates obtained under an alternative estimation treatments: exempting from reallocation any non-tax haven dollars (*Tax Haven Only*); exempting from reallocation any domestic investment dollars in excess of those directly observed in Morningstar (*Ex-Domestic*). Positions in the *CPIS* column with an asterisk (*) are estimated. All data as of December 2017. We do not reallocate investments in Luxembourg (see footnote 33).

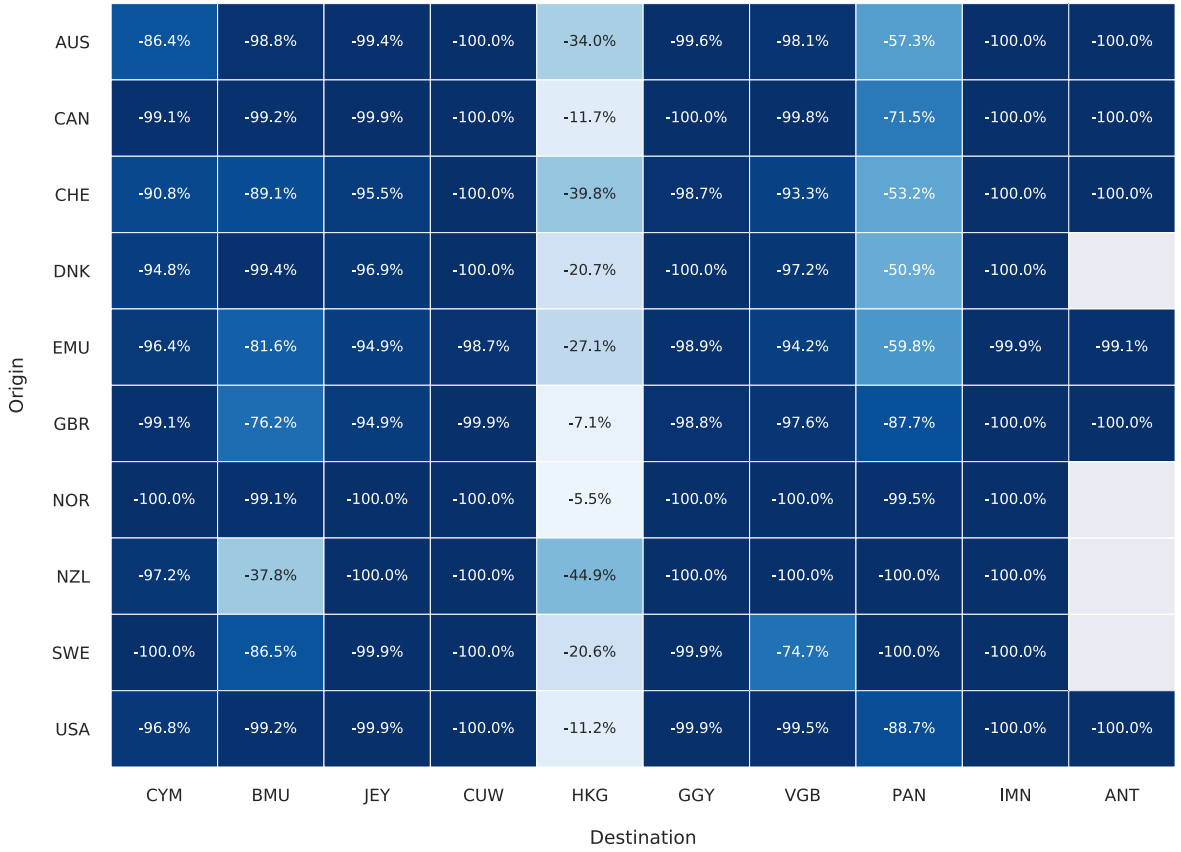


Table 19: **Change in holdings due to nationality restatement for selected country pairs: all securities, 2017.** This heatmap shows the percentage change in bilateral holdings when establishing portfolio composition using a nationality criterion, as opposed to a residency criterion. We show data for the tax haven destinations accounting for the largest holdings amounts across our sample (*horizontal axis*). All holdings are from the 2017 Morningstar sample. Grey cells correspond to bilateral pairs for which the residency-based position volume is lower than $1,000$ USD. For intuition, suppose A is the market value of positions held by US-domiciled funds in securities that are are assigned to the Cayman Islands on a residency basis. Also, let B be the market value of the subset of these positions that stay in the Cayman Islands on a nationality basis. Then the relevant percentage (*bottom-left corner*) is $B/A - 1$.

Issuer CUSIP6	Issuer Name	Issuer Residency	Parent CUSIP6	Parent Residency	Parent Name	Market Value (USD Billions)
A. Corporate bonds reallocated away from country						
01609W	ALIBABA GROUP HLDG LTD	CYM	01609W	CHN	ALIBABA GROUP HLDG LTD	2.72
91911T	VALE OVERSEAS LTD	CYM	P96620	BRA	VALE SA	2.52
70014L	PARK AEROSPACE HLDGS LTD	CYM	Y9722D	CHN	XINJIANG HUITONG GROUP INC	1.97
893830	TRANSOCEAN INC	CYM	H8817H	CHE	TRANSOCEAN LTD	1.73
G7302V	QNB FIN LTD	CYM	74727C	QAT	QATAR GOVT	1.70
B. Equities reallocated away from country						
G87572	TENCENT HLDGS LTD	CYM	G87572	CHN	TENCENT HLDGS LTD	73.89
01609W	ALIBABA GROUP HLDG LTD	CYM	01609W	CHN	ALIBABA GROUP HLDG LTD	65.73
056752	BAIDU INC	CYM	056752	CHN	BAIDU INC	23.56
64110W	NETEASE INC	CYM	64110W	CHN	NETEASE INC	9.73
47215P	JD COM INC	CYM	47215P	CHN	JD COM INC	8.80

Table 20: **Largest issuer-asset class level reallocations away from the Cayman Islands.** Market values are as observed in the 2017 end-of-year Morningstar sample.

Issuer CUSIP6	Issuer Name	Issuer Residency	Parent CUSIP6	Parent Residency	Parent Name	Market Value (USD Billions)
A. Corporate bonds reallocated away from country						
947075	WEATHERFORD INTL LTD	BMU	G48833	USA	WEATHERFORD INTL PLC	2.87
00928Q	AIRCASTLE LTD	BMU	G0129K	USA	AIRCASTLE LTD	1.27
94707V	WEATHERFORD INTL LTD BERMUDA	BMU	G48833	USA	WEATHERFORD INTL PLC	0.91
G27631	DIGICEL GROUP LTD	BMU	G27631	JAM	DIGICEL GROUP LTD	0.85
44962L	IHS MARKIT LTD	BMU	G47567	GBR	IHS MARKIT LTD	0.80
B. Equities reallocated away from country						
G47567	IHS MARKIT LTD	BMU	G47567	GBR	IHS MARKIT LTD	7.54
G491BT	INVESCO LTD	BMU	G491BT	USA	INVESCO LTD	6.58
G66721	NORWEGIAN CRUISE LINE HLDGS LTD	BMU	G66721	USA	NORWEGIAN CRUISE LINE HLDGS LTD	6.29
G98294	XL GROUP LTD	BMU	F06106	FRA	AXA SA	5.33
G0450A	ARCH CAPITAL GROUP LTD	BMU	G0450A	USA	ARCH CAPITAL GROUP LTD	5.26

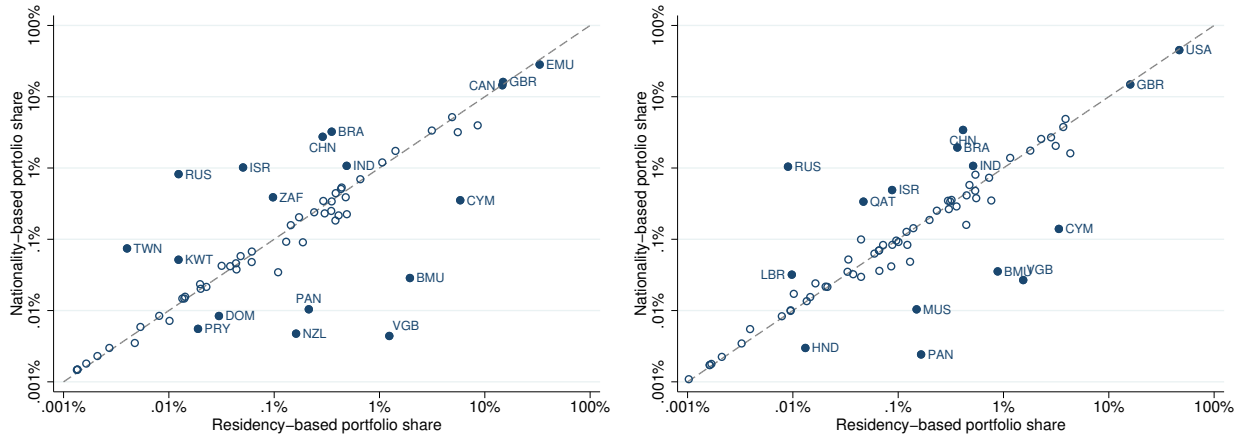
Table 21: **Largest issuer-asset class level reallocations away from Bermuda.** Market values are as observed in the 2017 end-of-year Morningstar sample.

Top CYM Users in Absolute Terms				Top CYM Users in Relative Terms			
	Observed in Cross-Border Holdings:				*Observed in Cross-Border Holdings:*		
Country	**Routed via CYM (USD Billions)**	**Total (USD Billions)**	**Share via CYM**	**Country**	**Routed via CYM (USD Billions)**	**Total (USD Billions)**	**Share via CYM**
A. Corporate bond positions				*A. Corporate bond positions*			
CHN	16.3	52.3	31.1%	UAE	0.4	0.4	100.0%
BRA	6.6	35.3	18.6%	COD	0.2	0.2	97.0%
USA	3.7	540.6	0.7%	DOM	0.1	0.2	78.0%
GBR	2.7	239.4	1.1%	QAT	2.2	3.8	58.4%
CHE	2.5	71.4	3.5%	SAU	0.3	0.7	49.2%
QAT	2.2	3.8	58.4%	GTM	0.1	0.3	39.4%
ARE	1.5	7.2	20.8%	TWN	0.4	1.1	32.5%
EMU	1.4	241.7	0.6%	OMN	0.2	0.5	31.7%
JPN	0.6	77.1	0.8%	CHN	16.3	52.3	31.1%
SGP	0.5	10.9	4.8%	ARE	1.5	7.2	20.8%
B. Equity positions				*B. Equity positions*			
CHN	270.3	503.5	53.7%	KHM	0.2	0.2	100.0%
TWN	5.3	178.2	3.0%	CHN	270.3	503.5	53.7%
USA	3.7	1,358.5	0.3%	MNG	0.0	0.0	39.1%
GBR	3.5	706.7	0.5%	NGA	0.0	0.7	4.9%
EMU	1.1	1,077.6	0.1%	TWN	5.3	178.2	3.0%
CAN	0.5	262.4	0.2%	THA	0.5	44.3	1.2%
THA	0.5	44.3	1.2%	ARE	0.1	7.7	1.1%
KHM	0.2	0.2	100.0%	GBR	3.5	706.7	0.5%
CHE	0.1	336.3	0.0%	VNM	0.0	4.6	0.4%
SGP	0.1	60.0	0.2%	USA	3.7	1,358.5	0.3%

Table 22: **Countries with largest financing amounts routed via Cayman Islands in sample: absolute and relative terms.** This table shows which countries account for security issuances that are routed through the Cayman Islands and reallocated toward the ultimate destination country. All amounts are as observed in the end of 2017 Morningstar holdings sample, and therefore *do not* reflect the actual amounts outstanding of each security. The left portion of the table shows the countries with the highest dollar amounts of observed Cayman-routed security issuance, while the right panel shows the countries with the highest share of total observed cross-border position amounts that is routed through the Cayman Islands.

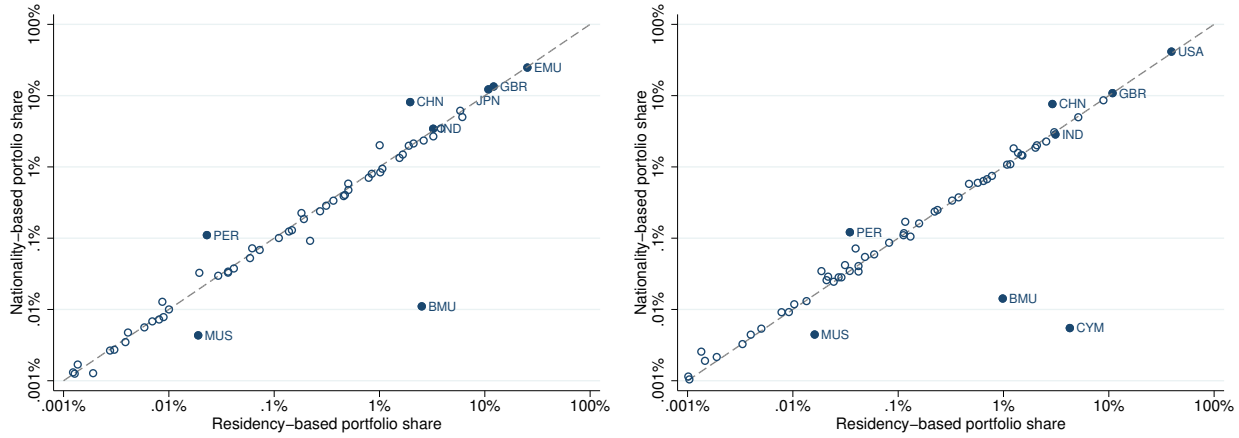
Top BMU Users in Absolute Terms				Top BMU Users in Relative Terms			
	Observed in Cross-Border Holdings:				*Observed in Cross-Border Holdings:*		
Country	**Routed via BMU (USD Billions)**	**Total (USD Billions)**	**Share via BMU**	**Country**	**Routed via BMU (USD Billions)**	**Total (USD Billions)**	**Share via BMU**
A. Corporate bond positions				*A. Corporate bond positions*			
USA	3.7	540.6	0.7%	JAM	1.6	1.6	97.1%
JAM	1.6	1.6	97.1%	QAT	0.5	3.8	13.9%
GBR	1.2	239.4	0.5%	LBR	0.1	1.3	10.1%
CHN	1.1	52.3	2.2%	CHL	0.2	5.4	3.7%
QAT	0.5	3.8	13.9%	PER	0.1	3.9	3.2%
NOR	0.4	19.2	2.1%	CHN	1.1	52.3	2.2%
EMU	0.4	241.7	0.2%	NOR	0.4	19.2	2.1%
CHE	0.3	71.4	0.5%	SGP	0.1	10.9	1.0%
JPN	0.2	77.1	0.3%	USA	3.7	540.6	0.7%
CHL	0.2	5.4	3.7%	GBR	1.2	239.4	0.5%
B. Equity positions				*B. Equity positions*			
CHN	13.2	503.5	2.6%	PER	4.8	6.6	72.9%
GBR	13.0	706.7	1.8%	SGP	5.1	60.0	8.6%
USA	8.9	1,358.5	0.7%	NOR	1.1	37.0	2.9%
EMU	6.1	1,077.6	0.6%	CHN	13.2	503.5	2.6%
SGP	5.1	60.0	8.6%	GBR	13.0	706.7	1.8%
PER	4.8	6.6	72.9%	MUS	0.0	0.7	1.7%
CAN	1.2	262.4	0.5%	MYS	0.4	25.3	1.5%
NOR	1.1	37.0	2.9%	USA	8.9	1,358.5	0.7%
TWN	0.7	178.2	0.4%	EMU	6.1	1,077.6	0.6%
BRA	0.4	106.0	0.4%	CAN	1.2	262.4	0.5%

Table 23: **Countries with largest financing amounts routed via Bermuda in sample: absolute and relative terms.** This table shows which countries account for security issuances that are routed through Bermuda and reallocated toward the ultimate destination country. All amounts are as observed in the end of 2017 Morningstar holdings sample, and therefore *do not* reflect the actual amounts outstanding of each security. The left portion of the table shows the countries with the highest dollar amounts of observed Bermuda-routed security issuance, while the right panel shows the countries with the highest share of total observed cross-border position amounts that is routed through Bermuda.



(a) USA, Corporate Bonds

(b) EMU, Corporate Bonds



(c) USA, Equities

(d) EMU, Equities

Figure 1: **Bilateral shares of outward portfolios from USA and EMU, on a residency vs. nationality basis.** This plot shows the shares that each foreign destination country represents in the outward portfolio holdings of the USA and EMU on a residency basis (*horizontal axis)* and on a nationality basis (*vertical axis).* Top panel shows corporate bond portfolios; bottom panel shows equity portfolios. All data is for the year 2017, using the Morningstar end-of-year sample. The plot is on a logarithmic scale.

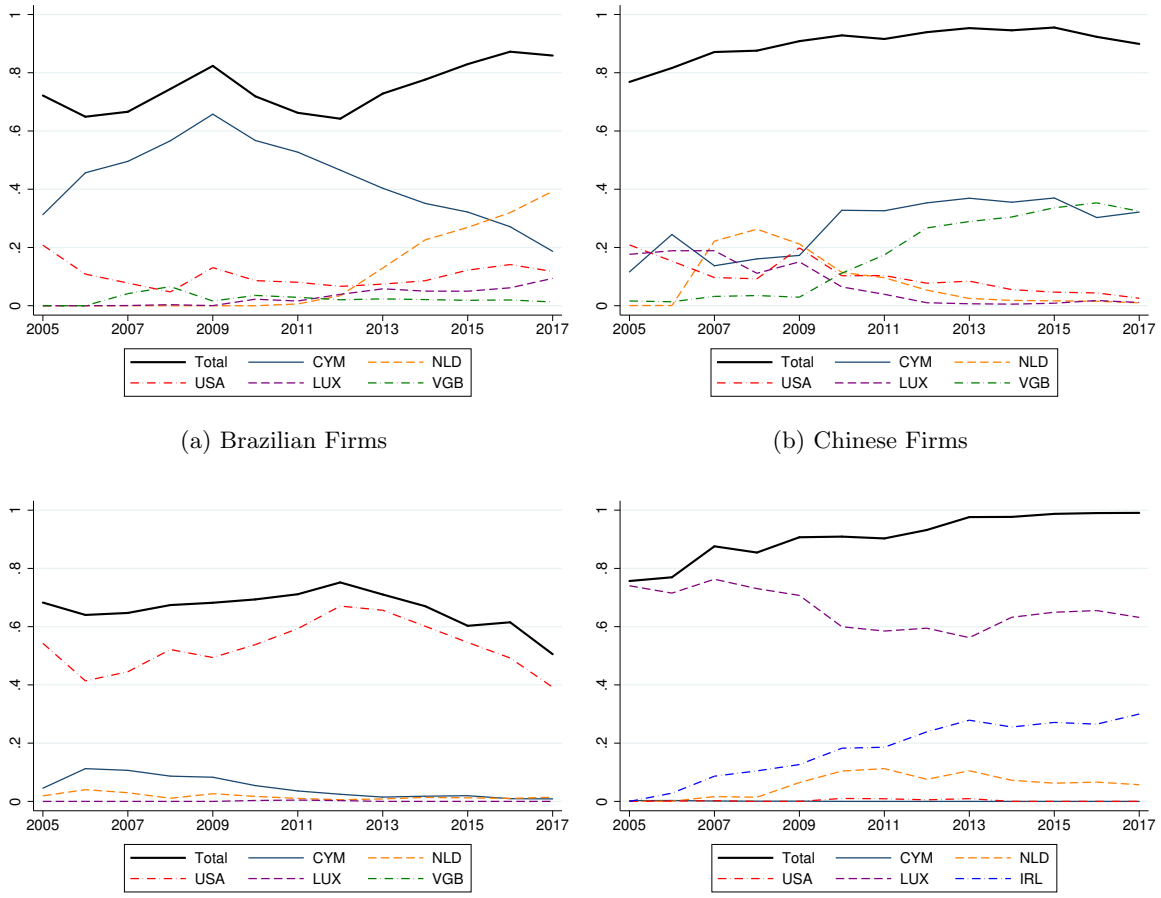
(a) GBR, Corporate Bonds

(b) CAN, Corporate Bonds

(c) GBR, Equities

(d) CAN, Equities

Figure 2: **Bilateral shares of outward portfolios from UK and Canada, on a residency vs. nationality basis.** This plot shows the shares that each foreign destination country represents in the outward portfolio holdings of Great Britain and Canadaon a residency basis (*horitzontal axis)* and on a nationality basis (*vertical axis).* Top panel shows corporate bond portfolios; bottom panel shows equity portfolios. All data is for the year 2017, using the Morningstar end-of-year sample. The plot is on a logarithmic scale.



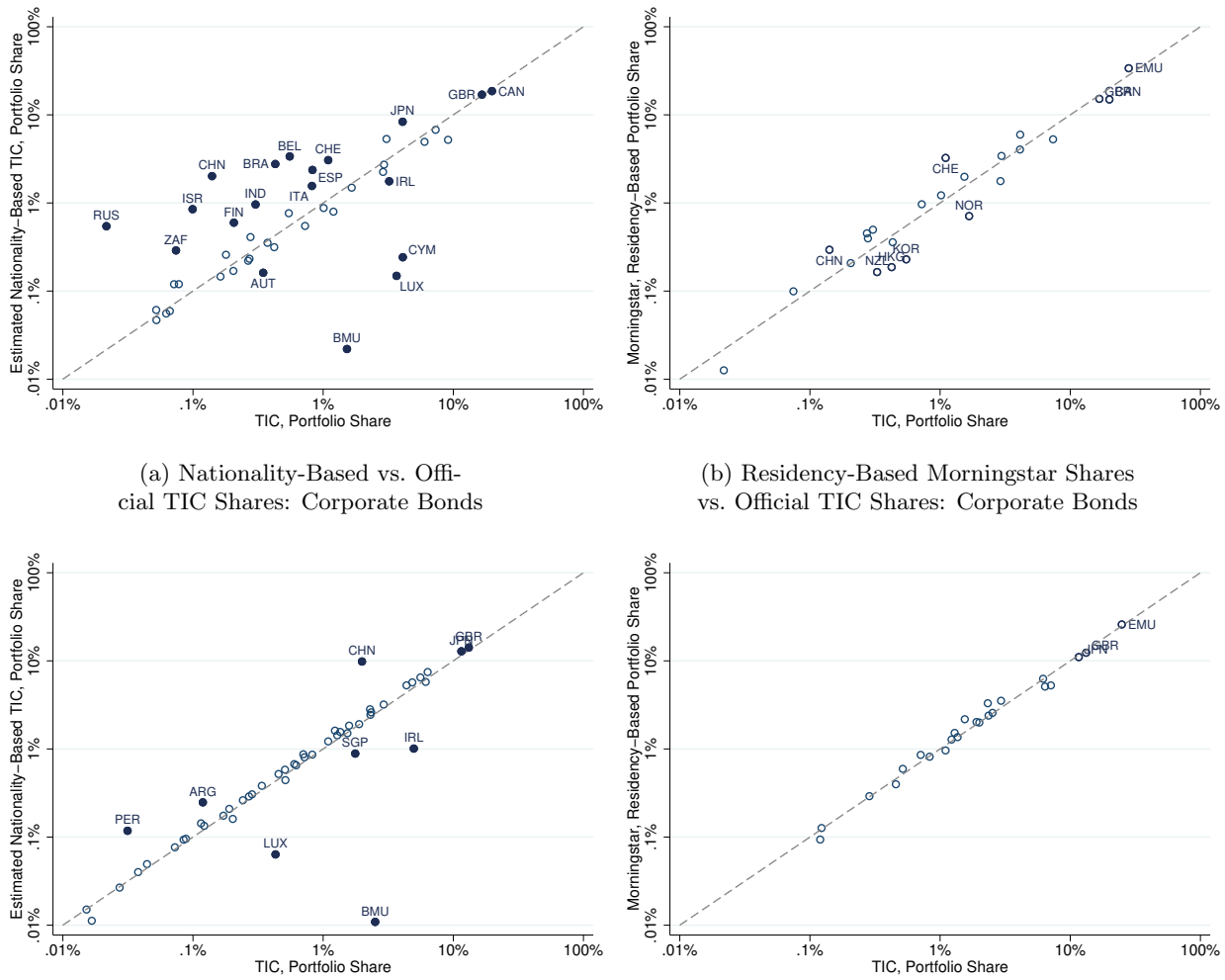
(a) Brazilian Firms

(b) Chinese Firms

(c) Japanese Firms

(d) Russian Firms

Figure 3: **Share of holdings of corporate liabilities issued through foreign subsidiaries, by country: total and by subsidiary residency.** The *solid black lines* show the shares of the holdings of debt by firms domiciled in each of Brazil, China, Japan, and Russia that are issued through subsidiaries located in a foreign country. The holdings data come from the yearly Morningstar sample. The *colored lines* break down these statistics according to the country of residency of the issuing subsidiaries, for selected residencies. For example, the *blue line* in panel (a) shows the share of holdings of the debt of Brazilian firms that are issued via Cayman-resident subsidiaries. Panel (a) shows a gradual transition of Brazilian firms toward Netherlands-based financing subsidiaries such as Petrobras Global Finance NV. Panel (b) shows the rise of issuance done through tax havens such as the Cayman Islands and the British Virgin Island by Chinese firms, contemporaneously with the emergence of the VIE structure, and in contrast with the financing of U.S.-based industrial subsidiaries that prevails in the early sample. Cayman issuance accrues in particular to high-tech Chinese firms such as JD.com, Baidu, and Alibaba, while issuance in the British Virgin Islands is done by a number of large Chinese energy companies (e.g. China National Petroleum Corporation, State Grid Corporation of China, China National Offshore Oil Corporation). Panel (c) shows that the foreign issuance of Japanese firms is dominated by U.S.-based industrial subsidiaries of firms such as Toyota, Honda, Nissan, Kyocera, Mizhuo Financial, and Softbank. Panel (d) shows that prominent EMU-based financing subsidiaries, located primarily in Luxembourg and Ireland, account for the bulk of the foreign financing of Russian firms, the largest of which include Gazprom and Russian Railways. Sample only includes positions held by funds domiciled in USA, EMU, GBR, CAN, CHE, AUS, SWE, DNK, NOR, and NZL



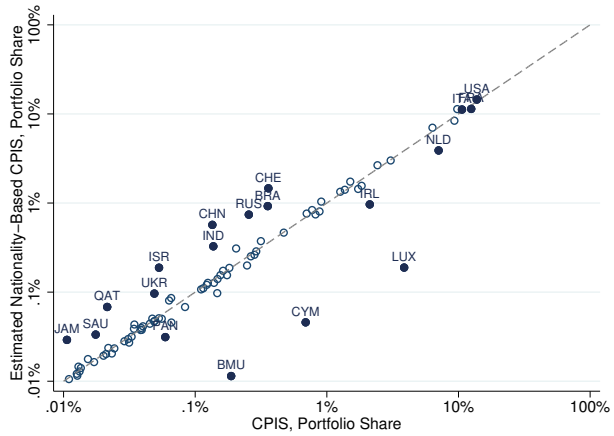
(a) Nationality-Based vs. Official TIC Shares: Corporate Bonds

(b) Residency-Based Morningstar Shares vs. Official TIC Shares: Corporate Bonds

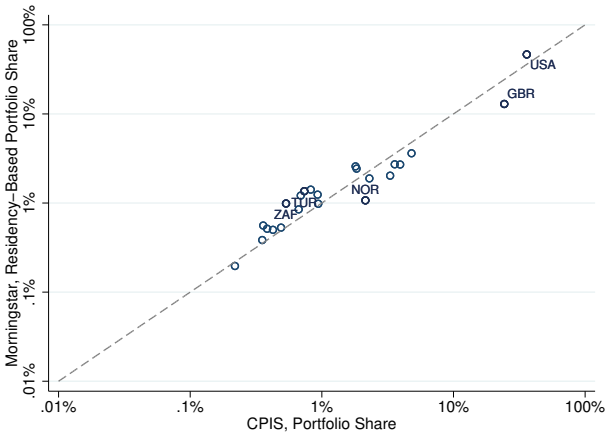
(c) Nationality-Based vs. Official TIC Shares: Equities

(d) Residency-Based Morningstar Shares vs. Official TIC Shares: Equities

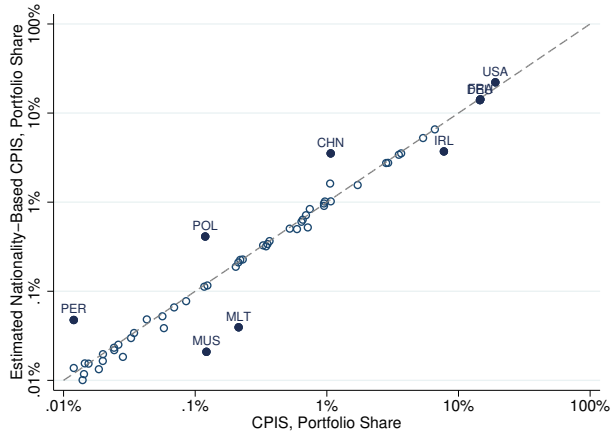
Figure 4: **Bilateral shares of outward portfolios from USA: Estimated nationality-based TIC shares vs. residency-based TIC shares.** Panels (a) and (c) show the shares that each foreign destination country represents in USA outward portfolio holdings, both as computed in the Morningstar 2017 end-of-year sample using a nationality criterion (*vertical axis*), and as reported in the 2017 TIC data published by the U.S. Treasury (*horizontal axis*). Panel (a) includes corporate debt securities; panel (c) includes all equity securities. Panels (b) and (d) show the alignment between the Morningstar data on a residency-based criterion (*vertical axis*) and the published TIC shares (*horizontal axis*). Corporate debt positions are defined in TIC as holding of private debt minus holdings of asset-backed securities; TIC equity positions exclude holdings of fund shares.



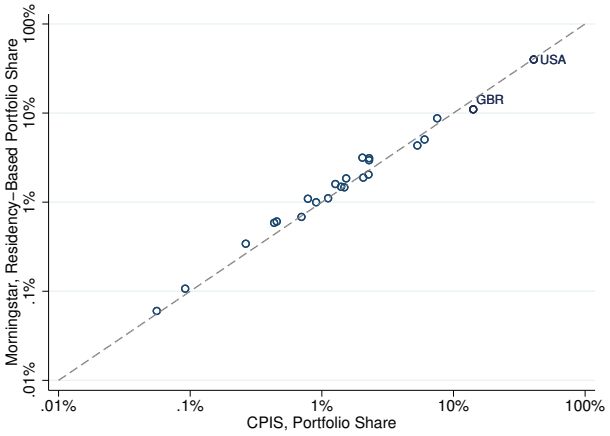
(a) Nationality-Based vs. Official CPIS Shares: All Bonds



(b) Residency-Based Morningstar Shares vs. Official CPIS Shares: All Bonds

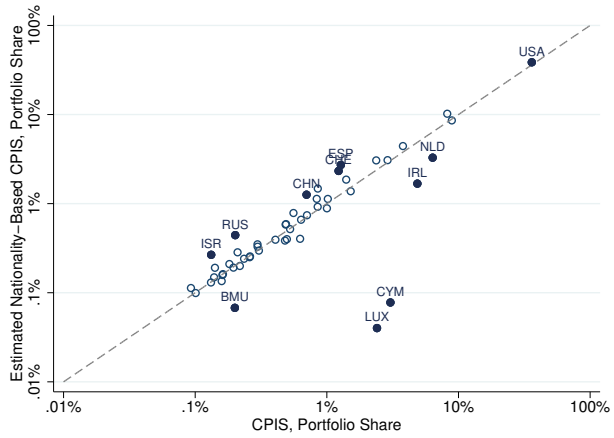


(c) Nationality-Based vs. Official CPIS Shares: Equities

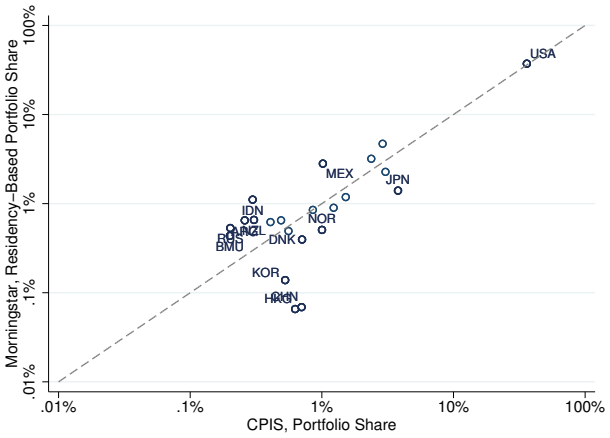


(d) Residency-Based Morningstar Shares vs. Official CPIS Shares: Equities

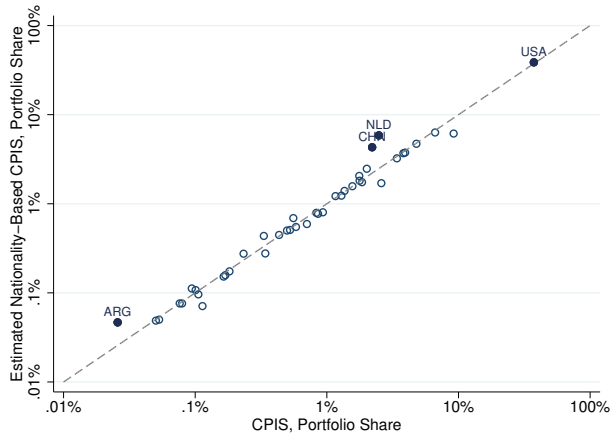
Figure 5: **Bilateral shares of outward portfolios from EMU: Estimated nationality-based CPIS shares vs. residency-based CPIS shares.** Panels A and C show the shares that each foreign destination country represents in EMU outward portfolio holdings, both as computed in the Morningstar 2017 end-of-year sample using a nationality criterion (*horizontal axis*), and as reported in the 2017 residency-based CPIS data published by the IMF (*vertical axis*). Panel A includes all debt securities; panel C includes all equity securities. Panels B and D show the alignment between the Morningstar data on a residency-based criterion (*horizontal axis*) and the official CPIS shares (*vertical axis*).



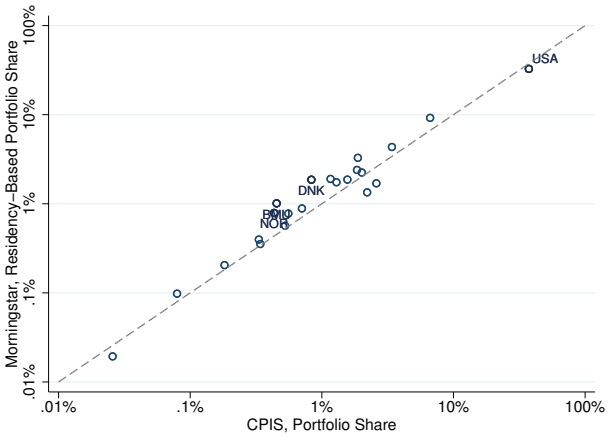
(a) Nationality-Based vs. Official CPIS Shares: All Bonds



(b) Residency-Based Morningstar Shares vs. Official CPIS Shares: All Bonds

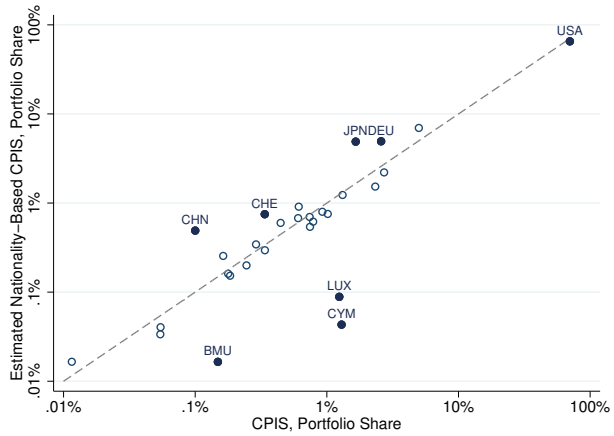


(c) Nationality-Based vs. Official CPIS Shares: Equities

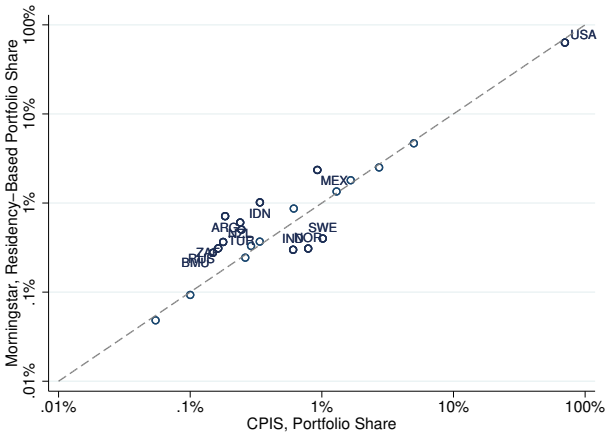


(d) Residency-Based Morningstar Shares vs. Official CPIS Shares: Equities

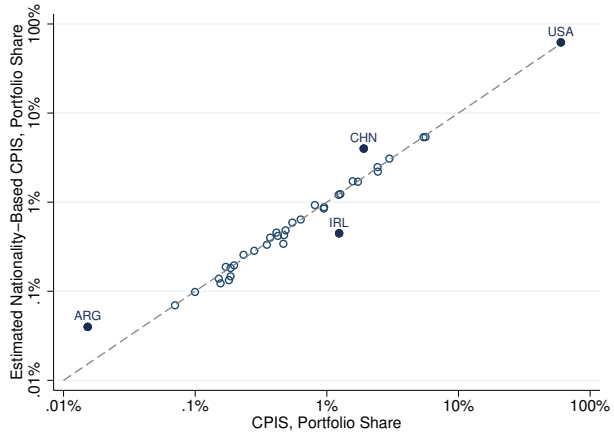
Figure 6: **Bilateral shares of outward portfolios from Great Britain: Estimated nationality-based CPIS shares vs. residency-based CPIS shares.** Panels (a) and (c) show the shares that each foreign destination country represents in Great Britain's outward portfolio holdings, both as computed in the Morningstar 2017 end-of-year sample using a nationality criterion (*horizontal axis*), and as reported in the 2017 residency-based CPIS data published by the IMF (*vertical axis*). Panel (a) includes all debt securities; panel (c) includes all equity securities. Panels (b) and (d) show the alignment between the Morningstar data on a residency-based criterion (*horizontal axis*) and the official CPIS shares (*vertical axis*).



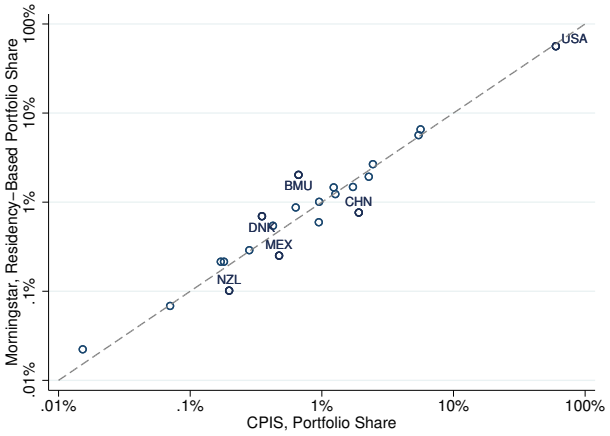
(a) Nationality-Based vs. Official CPIS Shares: All Bonds



(b) Residency-Based Morningstar Shares vs. Official CPIS Shares: All Bonds



(c) Nationality-Based vs. Official CPIS Shares: Equities



(d) Residency-Based Morningstar Shares vs. Official CPIS Shares: Equities

Figure 7: **Bilateral shares of outward portfolios from Canada: Estimated nationality-based CPIS shares vs. residency-based CPIS shares.** Panels (a) and (c) show the shares that each foreign destination country represents in Canada's outward portfolio holdings, both as computed in the Morningstar 2017 end-of-year sample using a nationality criterion (*horizontal axis*), and as reported in the 2017 residency-based CPIS data published by the IMF (*vertical axis*). Panel (a) includes all debt securities; panel (c) includes all equity securities. Panels (b) and (d) show the alignment between the Morningstar data on a residency-based criterion (*horizontal axis*) and the official CPIS shares (*vertical axis*).

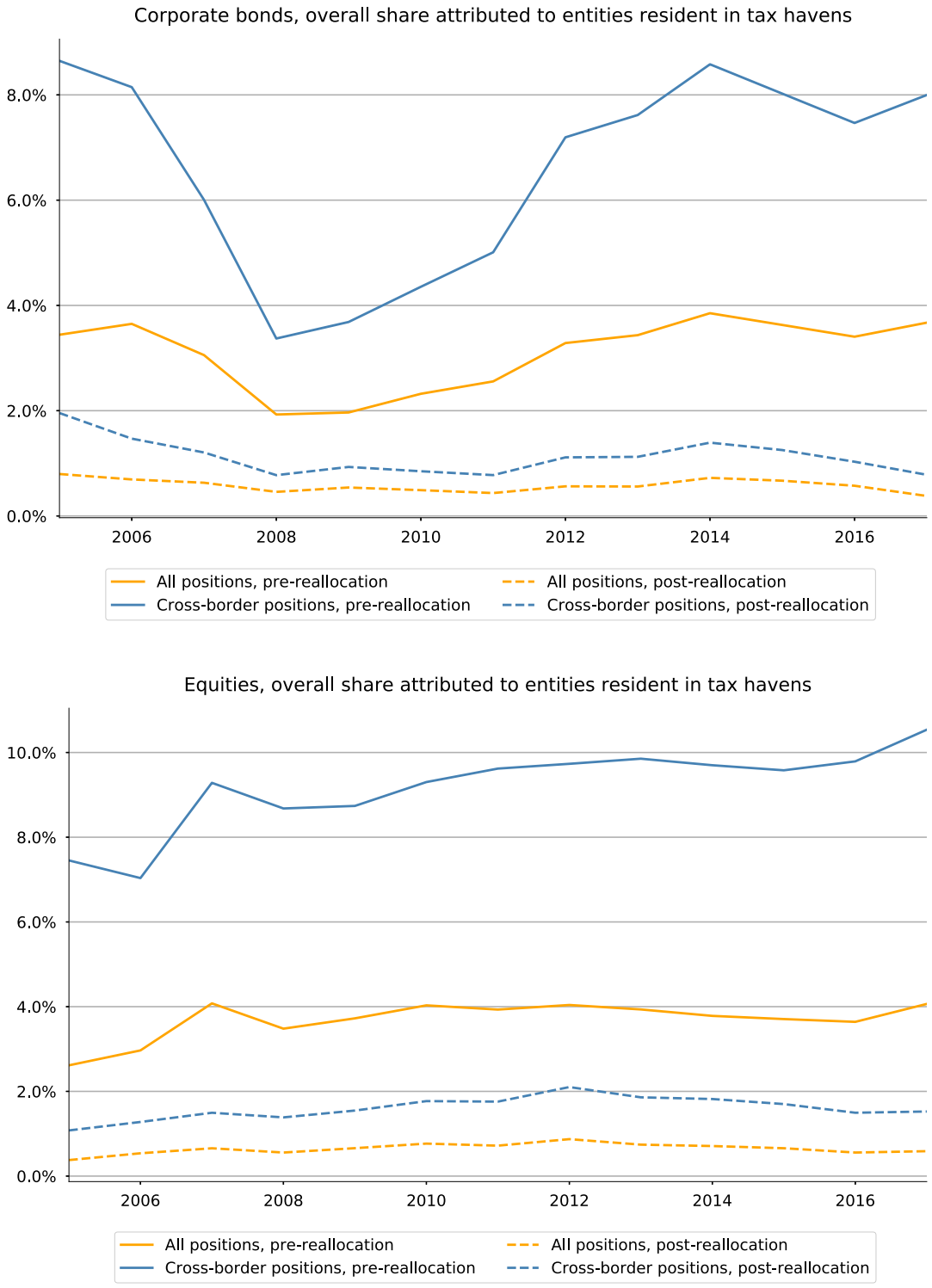


Figure 8: **Overall share of corporate bond and equity issuance attributed to entities located in tax havens, *pre* and *post* ultimate parent resolution.** This figure shows the overall shares of total issuance of corporate bonds (*top panel*) and equities (*bottom panel*) that are attributed to entities located in tax havens in the Morningstar sample, both in the sample of all positions (*orange lines*) and in a sample that only includes cross-border positions (*blue lines*). *Solid lines* show these shares prior to the reallocation procedure described in this paper, while *dashed lines* show the same shares after the reallocation is performed. Sample only includes positions held by funds domiciled in USA, EMU, GBR, CAN, CHE, AUS, SWE, DNK, NOR, and NZL.

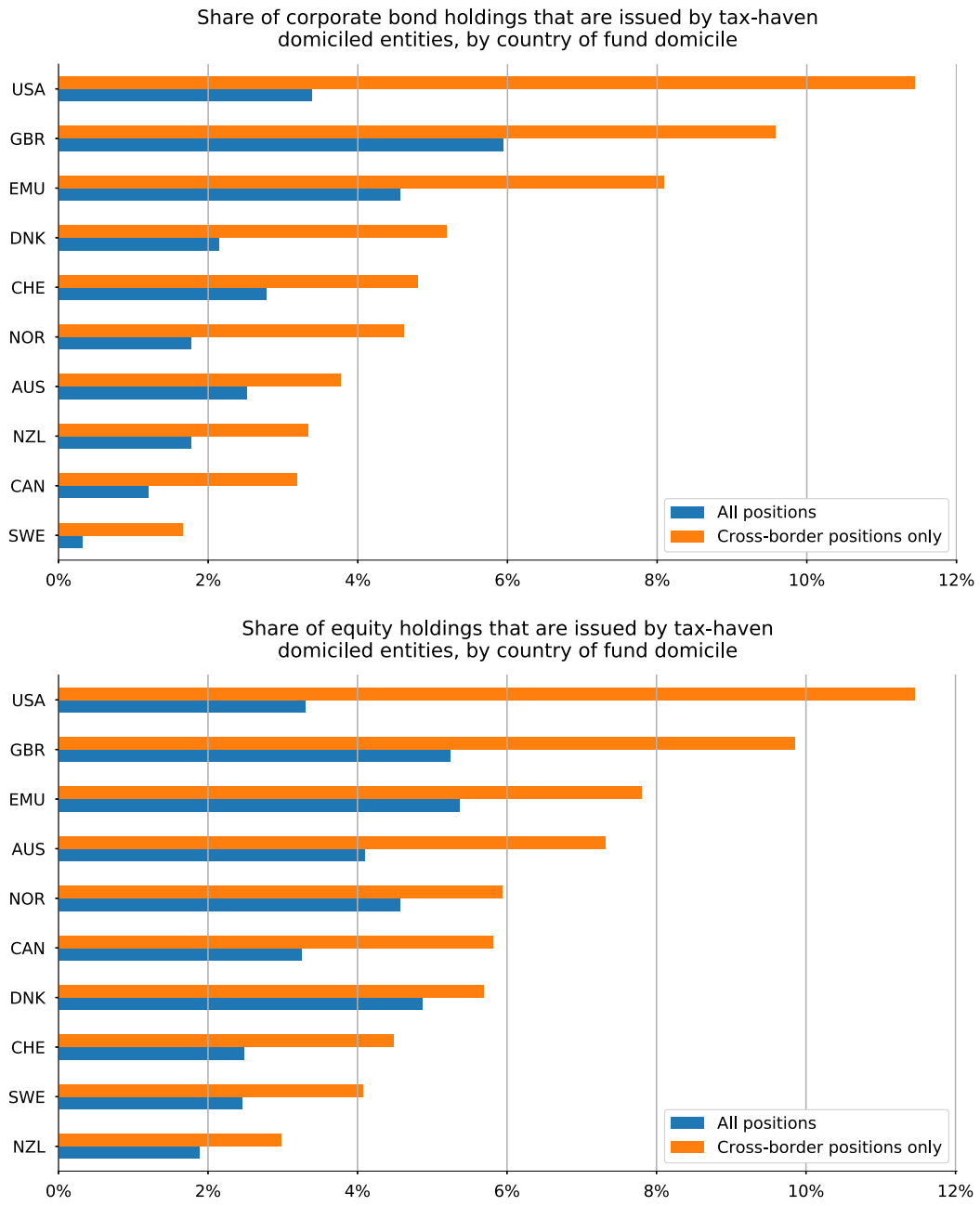


Figure 9: **Share of portfolio holdings in securities issued by entities located in tax havens, by country of fund domicile.** This figure shows the 2017 year-end ratio of holdings of securities issued by entities located in tax havens to total portfolio holdings (*blue bars*) or cross-border portfolio holdings (*orange bars*), by country of fund domicile. This is shown separately for portfolio holdings of corporate bonds (*top panel*) and of equities (*bottom panel*). For example, the USA orange bar in the top panel shows how much of the cross-border corporate bond holdings of USA-domiciled mutual funds and ETFs at the end of 2017 were by immediate issuers located in tax havens; the corresponding blue bar has the same numerator, but includes domestic holdings of corporate bonds in the denominator as well.