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

Antonio Coppola † Matteo Maggiori ‡ Brent Neiman § Jesse Schreger ¶

June 2019

Preliminary and Incomplete

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 introduce a methodology that associates the universe of traded equity and debt securities with their issuer's ultimate parent and provide the underlying code online in a format that is easy for other researchers to download and use. We apply our algorithm to revise bilateral investment positions from commonly used datasets and 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.

Keywords: Tax Havens, Offshore, Lucas Paradox, Consolidated National Statistics.
JEL Codes: E01, E44, F21, F23, F32, F34, G11, G15, G32.

*We thank the Becker-Friedman Institute, the NSF (1653917), the Guggenheim Foundation, the Sloan Foundation, and the Weatherhead Center for financial support. We offer particular thanks to Steve Kaplan for his generous help with the project. Our analysis makes use of data that are proprietary to Morningstar and/or its content providers. Neither Morningstar nor its content providers are responsible for any of the views expressed in this article.

†Coppola: Harvard University, Department of Economics. Email: acoppola@g.harvard.edu.
‡Maggiori: Harvard University, Department of Economics, NBER, and CEPR. Email: maggiori@fas.harvard.edu.
§Neiman: University of Chicago, Booth School of Business, and NBER. Email: brent.neiman@chicagobooth.edu.
¶Schreger: Columbia Business School and NBER. Email: jesse.schreger@columbia.edu.

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. As a result, understanding the underlying financial linkages across countries has become both more important and more difficult.

We provide a methodology for associating equity and debt securities issued by subsidiaries with the ultimate parent company of the issuer and use it to restate bilateral investment positions to better reflect which borrowers and savers bear the true underlying economic exposures. We find that cross-border flows from developed countries like the U.S. and Eurozone members to firms in large emerging economies – for example, to the "BRIC" countries of Brazil, Russia, India, and China – are substantially larger than previously thought.

Our methodology is based on 26 million securities, nearly the entire universe of securities traded globally, which are associated with 1.6 million immediate issuers. We map each issuer to one of 1.1 million ultimate-parent entities and then aggregate all securities issued by affiliates of each ultimate parent, including domestic and foreign subsidiaries, and including securities issued in tax havens such as Bermuda and the Cayman Islands. This integrated view of the issuer's worldwide debt and equity exposures can then be connected to the country and industry of the parent, who most likely deploys the financing and faces the resulting liabilities.

We associate subsidiaries with ultimate parents using 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. There is overlapping information across these seven sources, but each one makes an important marginal contribution. 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. Further, in addition to corporate securities, our procedure also applies to all issuance done by sovereigns, state- and local-level entities, and sovranational institutions. This is useful as individual governments commonly issue under multiple 6-digit CUSIPs, often using a different code for domestic and international issuances. Finally, our algorithm is important for understanding structured finance vehicles as they are often resident in tax havens.[1]

To enable other researchers to use this methodology and to make the details of the algorithm fully transparent, we have posted our code and an associated readme guide at the website: globalcapitalallocation.com. The seven key datasets used as inputs are commonly available at large research and policy institutions and universities, but are commercially licensed and cannot be posted online for download. With this in mind, we designed the code in a way that facilitates use by researchers that may only have access to a subset of these databases. The website provides a sample of the required formatting of each input file and the code runs to completion even if the

[1]For example, 80 percent of all bonds that the U.S. buys in the Cayman Islands are asset-backed securities, with a total value of $323 billion in 2017. The vast majority of these bonds are issued by special purpose vehicles registered in the Cayman Islands but sponsored by U.S. banks and backed by U.S. assets such as U.S. mortgages. Our procedure reclassifies these positions as domestic investments of the United States.

user does not supply all of them.[2]

Next, we use our subsidiary-to-parent mapping and aggregation procedure together with the Morningstar dataset of global securities portfolios assembled in Maggiori, Neiman and Schreger (2019a, henceforth MNS) to impute corrected bilateral portfolio investment positions that better reflect multinationals' complicated corporate hierarchies and financing chains. The MNS data cover global mutual fund and exchange-traded fund (ETF) portfolios domiciled throughout the world and account for a significant share of all cross-border security holdings. We compare bilateral positions in these data before and after applying our algorithm to calculate a correction factor. For example, the raw MNS data includes $1.48 billion of Brazilian corporate bonds held by U.S. investors at the end of 2017. After we apply our parent-matching procedure and aggregate across foreign affiliates, the position grows to $14.7 billion. Dividing the latter position by the former, we calculate an adjustment factor for U.S. holdings of Brazilian corporate bonds equal to roughly 900 percent.[3] A positive adjustment factor for a country pair implies that flows between borrowers and lenders in those two countries are routed through immediate issuers resident either in third countries or in the investor country. In contrast, a negative adjustment factor implies that many of the securities underlying the bilateral capital flows between these countries are issued by local subsidiaries of parent companies located elsewhere.

We calculate these adjustment factors for corporate debt and equity investments for many country pairs in the MNS data and apply them to two widely-used and publicly available datasets on bilateral investment positions: the U.S. Treasury International Capital (TIC) data and the IMF's Coordinated Portfolio Investment Survey (CPIS) 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. Both datasets are based on the "residency principle", which links economic actions, including security issuances, to the place of operations of the immediate actor that engages in them. As such, they are most similar to the positions in the MNS data *before* aggregating the issuance of subsidiaries to their parents.

Economists, instead, are mostly interested in a "consolidated" or "domicile-based" approach that links these actions to the place of operations of the entity that has ultimate economic interest in them, which would more closely resemble the positions in the MNS data *after* applying our parent-mapping and aggregation.[4] We therefore compile domicile-based versions of TIC and CPIS by multiplying the bilateral positions they contain by our adjustment factors. For example,

[2]Users who run the code using a subset of the input data will, of course, generate a mapping from subsidiaries to parents that differs from ours. We ultimately plan to offer our final mapping for users to download using the open-source Financial Instrument Global Identifier (FIGI) standard for identifying securities. We hope to continue expanding the input data we use and improving our methodology, and will therefore clearly identify the version of our latest procedure and results on the web page.

[3]We subtract 1 from this ratio in order to state the adjustment factor in net terms.

[4]Consider, for example, a U.S. investor holding a bond issued by Petrobras, a Brazilian oil company, via its Cayman Islands subsidiary, Petrobras International Finance Company. The residency principle would count this as a foreign asset of the U.S. held in the Cayman Islands. A domicile-based approach would instead classify this as a foreign asset of the U.S. held in Brazil. For a review of these approaches see Avdjiev, Everett, Lane and Shin (2018).

applying the adjustment factor discussed above of approximately 900 percent to the $8.5 billion in U.S. holdings of Brazilian corporate bonds in TIC yields the estimate that U.S. investment in Brazilian corporate debt under the residency approach is understated by $75 billion relative to the consolidated approach. We plan to post the adjustment factors and restated domicile-based TIC and CPIS statistics online at globalcapitalallocation.com.

Why can academic researchers not adjust TIC and CPIS data directly from the residence to the consolidated approach, without using our adjustment factors? 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 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.[5]

We emphasize three main findings from our analysis. First, capital flows from developed countries, like the U.S. and Eurozone members, to large emerging economies like Brazil, Russia, India, and China are dramatically underestimated in existing statistics from the perspective of the consolidated approach. Emerging market corporate bonds that are issued through tax havens in fact represent a larger share of foreign portfolios than do the bonds they issue in their local markets. They are large enough that they significantly alter the share of emerging markets in total external bond portfolios that additionally include sovereign and asset-backed debt securities. Second, the revised positions expose large and likely under-appreciated risk exposures. Accounting for debt and equity issuance in the Cayman Islands more than doubles the exposure of developed country investors to China. Russian corporations play a dramatically more prominent role in global portfolios once one takes account of their issuance in Luxembourg and Ireland. Third, the consolidated positions imply that capital flows to emerging markets are even more concentrated than previously thought. The top three companies in each country account for more than half of the adjustment of these flows.

In accounting for these key facts, our procedure redraws the map of global capital flows. 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 Allocation puzzle, and the desirability and effectiveness of capital controls. Further, 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. In domestic macroeconomics and finance, it is of interest to have a consolidated view of firms' capital structure. In international finance and trade, it is of interest to compare flows of goods and assets

[5]Our TIC and CPIS restatement is of course only as good as our assumption that the MNS data, expressed in residency terms, are representative of overall international investment positions in securities. We investigate this assumption extensively for ten developed economies that are the focus of our analysis as they have the highest quality data: the U.S., the European Monetary Union (EMU), Great Britain, Canada, Switzerland, Australia, New Zealand, Sweden, Denmark, and Norway. While the assumption is of course not perfect, we are satisfied by how closely the MNS data track both TIC and CPIS, including the similarity in their bilateral bond and equity shares of the U.S. investment portfolio. Throughout the paper we point out cases, as they arise, in which the assumption is less likely to be satisfied.

among related parties, often using firm-level data. 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 and unconsolidated views that assign all economic activity to the immediate actor. 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 consolidated basis. Avdjiev, Everett, Lane and Shin (2018) and Bertaut, Bressler and 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 focuses on the economic role of tax havens (Hines and Rice, 1994; Gravelle, 2009; Zucman, 2013; Tørsløv, Wier and Zucman, 2018).

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.[6] We take the universe of existing securities to be the 26,027,455 securities present in the CUSIP master file.[7] 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 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.[8]

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 Debt Capital

[6] 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.

[7] 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.

[8] By contrast CUSIP9 codes are unique identifiers for individual securities, with the exception of commercial paper for which the CUSIP9 codes are sometimes reused.

Structure Database, and (vii) the Morningstar holdings sample of open-end mutual funds and ETFs.[9]

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 record analogous data on corporate ownership chains. 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.[10] 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 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, some datasets identify issuing entities and securities via ISIN or LEI codes, without reporting a CUSIP. In these cases, we translate these identifiers to CUSIP codes using the

[9] 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.

[10] 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.

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.[11] 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 each of our data sources.[12]

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.[13] 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 in a tax haven, we presume that the true country of operation is different – in this case, we presume it is most likely to be another country reported by funds in the Morningstar data.

Next, we resolve any multi-layer ownership chain occurring both within each data source and across data sources, and harmonize the headquarter country codes reported by each 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 domicile is Italy, not the Cayman Islands or Bermuda.

Finally, we construct an estimate for each issuer's ultimate parent via the following procedure:

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

[12] 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.

[13] We classify countries as tax havens by taking the union of lists provided several by several sources, including the European Council; 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 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.

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.[14]

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 sector GICS code. Names and sector codes are obtained from the CUSIP master files, while the country of operation (i.e., the domicile) 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 Consolidated Cross-Border Positions

We use the newly developed aggregation 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 estimate correction factors, at the country and asset class level, that allow us to go from residency-based to consolidated reporting, (ii) we then apply these correction factors to TIC and CPIS to provide estimates of these datasets on a consolidated basis. The first step in the procedure above is not only necessary for the second step, but is also of independent interest. It provides a unique, security-level view of how capital *actually* flows across countries and of security issuances and purchases in tax havens.

2.1 Applying The Aggregation Algorithm to the Morningstar Holdings Data

In order to assess the quality of our unwinding procedure and to measure its quantitative impact on portfolio holdings patterns, we apply our aggregation algorithm to the complete position-level mutual fund and ETF holdings data collected by Morningstar. We encourage the interested reader to refer to Maggiori, Neiman and Schreger (2019a) for further details on the Morningstar data.[15]

[14] 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.

[15] See Lilley, Maggiori, Neiman and Schreger (2019) and Maggiori, Neiman and Schreger (2019b) for applications using these these and related data.

Funds 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 excellent 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.

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.[16] We assess the quality of the links between immediate issuers and ultimate parents that are established using the methodology described in Section 1 in three dimensions: overall coverage, case studies, and unwinding of tax-haven based issuance.

Table 1 shows the coverage as well as impact of our aggregation algorithm. The left column focuses on the universe of securities covered in the CUSIP master file. We start with 26 million individual securities (CUSIP9) corresponding to 1.6 million unique issuer codes (unique CUSIP6). Our procedure aggregates these issuer codes into 1.1 million ultimate parent entities, with 481,000 issuer codes (CUSIP6) aggregated into different entities (different CUSIP6). In a number of cases, while our procedure does not aggregate the CUSIP6 to a different issuer, it does change the country of business for a given CUSIP6. We change either the issuer code or the country for 497,000 entities.

The second column focuses on securities held by open-end mutual funds in the MNS sample from 2005 to 2017. We start with 1.1 million individual securities (CUSIP9) corresponding to 201,000 unique issuer codes (unique CUSIP6). Our procedure aggregates these issuer codes into 127,000 ultimate parent entities. Using the MNS sample we can also express the coverage and impact of the aggregation in terms of the market value of the holdings of these securities. For most applications this is the most relevant metric since larger multinational companies are both the biggest issuers of securities and more likely to have complex ownership structures and issue in tax havens. Correctly capturing the issuance structure of these firms is the main focus of our aggregation procedure. Table 1 shows that our procedure covers 99.9 percent of the market value of holdings in MNS. This is not surprising since we use the CUSIP master file as a starting point for our procedure and this file approximately covers the universe of securities.[17] Our procedure aggregates and/or changes the country of domicile (relative to their place of immediate residency as reported in CGS) for entities that account for 42 percent of the entire market value of holdings in MNS. The rest of the paper delves in detail into these changes.

Table 2 provides a breakdown of the algorithm matches by data source. The percentages reflect both the actual source that was used in a specific match and all other sources that provided

[16] 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.

[17] The part that is not covered relates to two main issues: (i) there are entries in the Morningstar data with positive market value but no security identifier, and (ii) there exist securities for which a CUSIP has not been assigned.

identical information. Therefore, the percentages sum to more than 100 percent. We are cognizant that other scholars wishing to use or build on our procedure may only have access to a subset of these commercially-available datasets. Our procedure can be used with a subset of these sources and this table provides information on the most useful sources. Overall, many sources provide a meaningful contribution to our final results. The CGS Associated Issuer File, Dealogic, and Capital IQ account for the highest contributions.

Firm Level Reallocations by Country. Tables 3-6 report the largest reallocations by market value toward and away from the U.S., EMU, Great Britain, and Canada, respectively.[18] We focus on individual issuers but break down separately equities and corporate bonds. For example, Panel A of Table 3 shows that the largest reallocations toward the U.S. in corporate bonds came 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.

Table 4 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.[19] 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.

[18] 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.

[19] 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 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. In this paper, given its focus on the universe of securities globally and its goal of providing a transparent algorithm for aggregation that can be used by other researchers, we take a simple view: 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.

The analysis above also offers a glimpse into why firms issue securities abroad. 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 or issuance by a foreign company in a country in which it sells a non-trivial share of its products. 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 in tax-havens but also for (some) issuance 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 7 and 8 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 7 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 $11.3 billion is sizable and, for easy comparison, it is about one fourth the size of the reallocation coming from Europe.[20] 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 2.2.

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 8 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 away from the Cayman Islands are attributed to China ($17.3 billion), the U.S. ($11.3 billion), and Brazil ($6.4 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. ($8.3 billion), Jamaica ($1.6 billion), and the UK ($1.4 billion) in corporate bonds, and toward the U.S. ($67.4 billion), the UK ($14.9 billion), and China ($13.2 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 (*vertical axis*) versus the nationality of each issuer's ultimate parent (*horizontal 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.[21]

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

[20] 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.

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

45-degree line. Countries that lie above (below) the line are countries that our procedure reclassifies capital allocations away from (toward). Tax-haven countries populate the upper region.[22]

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 1.1 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 below 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 consolidated domicile criterion, as compared to a residency-based 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 $807.5 billion (a 59 percent increase). The other large recipients of capital according to our reclassifications are Japan, Korea, Israel, and oil-exporting 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 3-6 showing that some of the largest reclassifications of individual issuers occur among these developed economies, and Tables 7-8 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. Figures 3-6 show 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 9 and 10 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.

[22] New Zealand also appears above 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.

Figure 5 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 9 show that Petrobras accounts for 48 percent of all corporate debt reallocations to Brazil. Another large contributor to these reallocations is JBS, which accounts for 9.8 percent of the corporate debt and 36.3 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).

Figure 5 shows that 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 9 show that these companies account for the bulk of debt and equity reallocations towards China. Alibaba for example accounts for 18.8 percent of the equity and 5.8 percent of the debt. Tencent alone accounts for 21.3 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 shows that the reallocations toward Russia are almost entirely driven by subsidiaries 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 Panels G and H of Table 9 show that Gazprom alone accounts for 43 percent of all corporate debt reallocations toward Russia.

Figure 6 shows that 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 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 modify our algorithm if they did not wish to aggregate these companies.

Finally Table 10 investigates other countries that are large recipient of inflows such as Saudi Arabia, South Africa, and South Korea. Together with Table 9 it shows a very strong pattern across all recipient countries: capital reallocations are driven by a few extremely large global firms.

In most 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.

Industry-Level Reallocations. We examine the impact of the reallocation on investment patterns at the sector- and industry-level. Figure 7 shows the share of positions globally that are in financial-sector companies using the GICS1 sector code of the immediate issuer versus the GICS1 sector code of the issuer's ultimate parent. Corporate bond positions are consistently shifted away from the financial sector and toward ultimate obligors that are in non-financial sectors, reflecting the fact that many non-financial companies issue debt via specialized financing subsidiaries that are classified as financial firms.

2.2 Estimating TIC and CPIS on a Consolidated Basis

In this subsection we extend the analysis that we carried out so far to provide new estimates of global bilateral portfolio holdings, resulting in versions of TIC and CPIS that are restated on a consolidated basis. We stress that the analyses in this subsection rely more on imputations and representativeness assumptions than do our earlier arguments. In large part the uncertainty around these imputations is due to the limited transparency of public sources that do not provide full details about how the datasets are constructed.

In order to restate the TIC and CPIS databases on a consolidated basis we first have to establish that on a residency basis the MNS data closely matches both TIC and CPIS. Panels B and D of Figure 8 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 an extremely 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. 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. Equities in TIC include both common shares and fund shares. Our calculations focus only on common shares since for most destinations they account for the vast majority of holdings. For some destinations, like the Cayman Islands, fund share holdings 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.[23]

Using the CPIS data, we can repeat the same analysis for the other countries in the MNS dataset. Panels B and D of Figures 9-11 show that the MNS and CPIS data are aligned to varying degrees for Canada, the EMU, and Great Britain as well. There are two reasons for such alignment among MNS, TIC, and CPIS. First, mutual funds and ETFs account for a substantial fraction of outward investments from most developed countries. Second, despite the presence of heterogeneous investors such as banks, insurance companies, and other investment vehicles not included in the MNS data, foreign investment patterns are positively correlated among many of these types of investors.[24]

Having established that the security-level holdings data in MNS is representative of the overall holdings in TIC and CPIS, we use adjustment factors between the residency and consolidated view estimated on the MNS data to restate TIC and CPIS on a consolidated basis. Let $q_{i,j,x}$ be the holdings of country j in country i of asset class x, where x could be equities, all bonds, corporate bonds, government bonds, or structured finance securities.[25] If these holdings are on a residency basis we denote them by a superscript r, and use a superscript c for the consolidated basis. We estimate the adjustment factors $\omega_{i,j,x}$ using MNS data as:

$$\omega_{i,j,x} = \frac{q^c_{i,j,x}}{q^r_{i,j,x}} - 1. \tag{1}$$

Equipped with a full set of adjustment factors, we proceed to restate TIC and CPIS on a consolidated basis using the estimating equations:

$$\begin{aligned} CPIS^c_{i,j,x} &= (1+\omega_{i,j,x})\, CPIS^r_{i,j,x}, \\ TIC^c_{i,j,x} &= (1+\omega_{i,j,x})\, TIC^r_{i,j,x}, \end{aligned}$$

where $CPIS^r_{i,j,x}$ and $TIC^r_{i,j,x}$ are the CPIS and TIC positions publicly available, and $CPIS^c_{i,j,x}$ and $TIC^c_{i,j,x}$ are our estimates based on the consolidated-domicile view.[26] Note that since the

[23] 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 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 well-aligned for the rest of the countries in our sample as well.

[25] CPIS reporting of separate investment positions in sovereign and corporate bonds is limited, so for CPIS we let x be equal to equities or all debt and compute the MNS adjustment factors accordingly.

[26] Having estimated consolidated-domicile versions of outward gross cross-border flows in our restated versions of TIC and CPIS, we can also impute the associated change in domestic investments for the investing countries. For TIC and CPIS respectively, the changes in country i's domestic holdings of asset class x are given by

$$\sum_i TIC^r_{i,j,x} - \sum_i TIC^c_{i,j,x},$$

$$\sum_i CPIS^r_{i,j,x} - \sum_i CPIS^c_{i,j,x},$$

where we sum over all destinations i for which we have available data, and a positive value indicates an *increase* in

adjustment factors $\omega_{i,j,x}$ are estimated from micro data, the constraining factor is the availability of finer splits of the public versions of TIC and CPIS. In principle, an adjustment factor could be estimated for any available bilateral split (for example, by country, asset class, maturity, and sector) and then be applied subject to the maintained, but verifiable, assumption of the representativeness of MNS data.[27] The estimating equations make it clear that three elements influence the accuracy of our estimates: (i) the accuracy of TIC and CPIS existing datasets, (ii) the quality of our aggregation algorithm, (iii) the representativeness of MNS expressed on a residency basis of overall bilateral investment positions. The concern in (i) is largely outside of our control and both datasets are routinely used in existing research. Of the two datasets, the concern mostly applies to CPIS which is based on surveys administered by the IMF and is likely to be more prone to measurement error. The concerns in (ii) and (iii) are the subject of the present paper. For both, we aim to provide a step forward in the research methodologies and available data. We do not claim our procedures to be perfect, in fact we stress their misses and limitations, but we find them to be a substantial improvement over those currently available and aim to provide a first step for other researchers and statistical agencies to build upon.

Applying our aggregation to a dataset, like the MNS one, that includes both domestic and foreign positions offers an advantage over datasets that only capture cross-border positions like TIC. 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 all 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 consolidated 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, whether domestic or foreign under any classification principle. Table 3 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. In the appendix we compare our estimated consolidated positions for the U.S. to those that one would obtain if unable to perfom this type of reallocation. We find that in the aggregate this would lead to a large understatement of consolidated U.S. outward debt flows.[28]

Before presenting restated versions of the data in TIC and CPIS, we note two difficulties that

the relevant domestic position.

[27] Similarly, our aggregation algorithm could be applied directly to the underlying security level data of TIC if it were made available to researchers.

[28] This analysis is in Tables A.2-A.3, which are direct counterparts of the Tables 11-12 discussed in this section, but whose adjustment factors are computed by first excluding any investments that are domestic under a residency criterion. Debt flows to countries such as the EMU, the UK, Canada, Brazil, and South Korea are all significantly understated, since firms in all these countries have U.S.-based debt-issuing subsidiaries. This is reflected in the fact that the domestic corporate debt reallocation toward the U.S. in this asymmetric estimation is $391 billion larger than in our baseline estimation.

emerge if country portfolio shares in TIC or CPIS differ from those in the MNS data. First, when reallocating external positions from one foreign country to another, our procedure may spuriously change the total scale of foreign assets.[29] We have verified that the change in external positions due to this issue is relatively small in most cases other than the reassignment of equity positions resident in the Cayman Islands. Second, when we use adjustment factors to reallocate domestic positions to foreign domiciles, we need to know the total scale of domestic positions to apply the adjustment to. As discussed above, while our data contain information on such domestic positions, they are omitted from both TIC and CPIS. We therefore impute the scale of domestic investment to apply our adjustments to by assuming the ratio of domestic to total investment in the MNS dataset is representative of that for total portfolio investment in securities. In continuing work on our algorithm, we hope to make improvements that minimize the implications for our work of these difficulties.

We now turn to the results of applying our adjustment factors to TIC, presented in Table 11. Panels A, B, and C focus on U.S. total holdings of bonds in G-20 economies, selected tax havens, and the domestic economy, respectively. Panels D, E, and F restrict the attention to corporate bonds. 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 $8.4 billion, in China $2.8 billion, in India $5.9 billion, and in Russia $0.4 billion. These are tiny investments compared to the $780 billion invested in Canada, the $548 billion in EMU, the $326 billion in the UK and even the $144 billion allocated to Australia. Overall, BRIC economies account for 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 estimates raise investments from the U.S. to BRIC economies in corporate bonds from $17.5 to $158.5 billion, a 806 percent increase. The increase is broad-based with Brazil moving from $8.4 to $83.5 billion, China from $2.8 to $29.2 billion, India from $5.9 to $14.4 billion, and Russia from $0.4 to $31.4 billion. Nor are these economies the only ones to receive capital in the reallocation: South Africa moves from $1.5 to $6.2 billion, South Korea from $10.7 to $26.3 billion, the U.K. from $326.4 to $408 billion, and Japan from $80.2 to $141 billion. The big losers of capital are the tax havens with the Cayman Islands going from $80.5 to $10 billion, and Bermuda going from $30 to $1 billion (see Panel E).

Panel A of Table 11 shows that these increases are large not only for corporate bonds, but also at the country total debt level. For sovereign bonds the difference between the residency and the nationality principle is often muted. While sovereigns do issue abroad, most often they

[29] For example, imagine hypothetically that in the MNS dataset, the size of U.S. positions were equal for bonds resident in the Cayman Islands and in China. And imagine that our mapping led us to wish to relabel all of those Cayman Island positions instead as investments in China, implementable with an adjustment factor of -100 percent for the Cayman Islands and 100 percent for China. In making this change alone, we would not want to alter the total amount of U.S. external investment, only its distribution across countries. If the size of the Cayman Islands positions were larger than the positions in China in the TIC data, however, our adjustment factors would change total foreign assets because the elimination of the Cayman Islands positions would be a larger-magnitude subtraction than the addition from doubling the positions in China.

do so directly and not via a local subsidiary. This means that the foreign issuance of bonds by sovereigns, for example Brazil, is classified as a liability of the sovereign under both the residency and the nationality view. The differences in the total debt, therefore, largely reflect corporate reallocations plus (in a few cases) structured finance and sovranational reallocations. TIC states that U.S. total debt holdings in Brazil are $34 billion, of which $8.4 billion are corporate. Our restated TIC reports that the total holdings are $110.3 billion, of which $83.5 billion are corporate. The corporate reallocation accounts for the bulk of the increase in overall U.S. exposure to Brazilian debt (both sovereign and corporate debt). Our reallocation also changes the nature of the debt investment. In TIC official data U.S. investments are concentrated in sovereign bonds, with only 25 percent of the holdings coming from corporate bonds. Our restated TIC estimates that 76 percent of the holdings come from corporate bonds.

Other than our general success in removing positions from tax havens there are two striking patterns worth highlighting. First, comparing Panels B and E we see that for the Cayman Islands we successfully reallocate not only the corporate issuance but also the asset-backed securities. After our procedure only $88.9 billion of the initial $404.6 billion of total debt are left in this tax haven. Second, Hong Kong despite being a tax haven receives an influx of capital with corporate debt allocations increasing from $8.3 to $18.8 billion. This net increase masks the effect of larger gross reallocations. On the one hand, we correctly reallocate capital away from this country by penalizing it in our procedure as a tax haven for those companies that are not headquartered and operating there. On the other hand, we correctly reallocate capital toward it by removing the penalty for those companies that our sources confidently classify as located and operating in Hong Kong. This latter category dominates quantitatively and includes global conglomerates such as Hutchison Whampoa.

Table 12 focuses on equity reallocations in TIC and highlights a large and concentrated pattern for equities. In the TIC data, the U.S. holds $884.8 billion of common equities in the Cayman Islands and $213.8 billion in Bermuda. For comparison, the size of equity investments in the Cayman Islands is similar to those in Japan. Our procedure completely moves away these investments from tax havens; from the Cayman Islands alone we re-allocate $883 billion of equity investments. There are two main recipients of these flows: China (plus Hong Kong) 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 EMU 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 EMU companies on a residency view. Under a domicile view they are classified as claims on U.S. companies and, if held by U.S. investors, constitute domestic rather than cross-border investment.

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 domicile view. Table 14 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 $34.5 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 408 percent from $8.2 to $41.7 billion.

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.[30] However, we have included in the CPIS tables the adjustment factors computed separately for corporate bonds. While these adjustments factors are not used in restating CPIS, as only the aggregate total debt factors are, they are useful since they focus the attention on the core source of the reallocations, the corporate debt market. For example, Table 13 shows that the 77 percent increase in total debt investments in Brazil mostly comes from the 1,348 percent increase in corporate debt. In some cases, foreign investors only buy corporate debt issued by offshore subsidiaries. In these cases the corporate adjustment factors are close to infinity and their precise numerical value becomes unreliable. We have capped these adjustment factors at 5,000 percent. For example, EMU investment in Russian debt in CPIS is $35 billion. In the MNS data, EMU funds hold $22 billion of Russian debt of which $9.9 billion are corporate bonds. However, only 76m of the corporate debt investments are onshore: almost the entire amount comes from foreign subsidiaries of Russian companies. This shows that in many cases the surprisingly high adjustment factors are not the result of poor coverage or little overall investment, but actually reflect substantial investments that only ever occur via foreign subsidiaries of emerging market companies.

3 Examining Security Issuance in Tax Havens

Tax havens are opaque but important conduits for the allocation of international capital. For example, Figure 12 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 13 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.

[30] 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, we only use the data on total debt securities.

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 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 93.5 percent of these investments. These high success ratios are common across most destinations.[31]

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 company through a wholly-owned subsidiary in China. 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 by creating 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

[31] 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.

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 Weatherford 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 32.7 percent reported for China means that of all investment that the ten developed countries in our sample make in Chinese corporate debt about 33 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 Tørsløv, Wier and 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).[32]

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 debt issued by a U.S. firm 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. 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.

[32] 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	1,097,949	126,933
4. Unique Issuer Codes Aggregated to Different Issuer Code	481,420	80,190
5. Unique Issuer Codes Aggregated to Different Issuer Code *or* Domicile	496,904	97,052
6. Share of Market Value Covered	—	99.9%
7. Share of Market Value with Updated Issuer Code *or* Domicile	—	42.2%

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 domicile other than their 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.[33]

[33]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.

	Share of Issuers Linked to Different Ultimate Parent or Domicile Using Source for Attribution	
	(1) CGS Universe	**(2) Morningstar Sample**
SDC	9.7%	15.5%
Dealogic	26.0%	36.5%
Capital IQ	28.7%	47.3%
Orbis	17.4%	31.0%
Factset	11.1%	23.7%
CGS Associated Issuer File	76.4%	25.8%
Morningstar	3.6%	17.4%

Table 2: **Breakdown of inter-issuer links by source.** Starting from the set of all issuers (distinct CUSIP6 codes) in the full CGS universe (column 1) and in the Morningstar holdings sample (column 2) that our procedure links to an ultimate parent other than themselves or a domicile other than their immediate residency, we report the share that rely on each of our sources for establishing these links. Note that the percentages in this table sum to more than 100 percent because multiple sources can agree on a particular child-to-parent or domicile assignment. The Morningstar holdings sample covers the years 2005 to 2017.

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	EMU	G0177J	USA	ALLERGAN PLC	5.69
36164Q	GE CAP INTL FDG CO	EMU	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	EMU	45790V	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	EMU	ANHEUSER BUSCH INBEV SA NV	11.62
87264A	T-MOBILE USA INC	USA	251566	EMU	DEUTSCHE TELEKOM AG	5.79
05526D	B A T CAP CORP	USA	G1510J	GBR	BRITISH AMERICAN TOBACCO PLC	5.52
89236T	TOYOTA MTR CR CORP	USA	J92676	JPN	TOYOTA MOTOR CORP	3.63
761713	REYNOLDS AMERN INC	USA	G1510J	GBR	BRITISH AMERICAN TOBACCO PLC	3.10
C. Equities reallocated toward country						
Y09827	BROADCOM LTD	SGP	Y09827	USA	BROADCOM LTD	52.95
G5960L	MEDTRONIC PLC	EMU	G5960L	USA	MEDTRONIC PLC	49.13
806857	SCHLUMBERGER LTD	CUW	806857	USA	SCHLUMBERGER LTD	40.06
G1151C	ACCENTURE PLC IRELAND	EMU	G1151C	USA	ACCENTURE PLC IRELAND	38.59
G51502	JOHNSON CTLS INTL PLC	EMU	G51502	USA	JOHNSON CTLS INTL PLC	19.06
D. Equities reallocated away from country						
872590	T-MOBILE US INC	USA	251566	EMU	DEUTSCHE TELEKOM AG	8.02
87236Y	TD AMERITRADE HLDG CORP	USA	C891LV	CAN	TORONTO DOMINION BANK	7.58
58733R	MERCADOLIBRE INC	USA	58733R	ARG	MERCADOLIBRE INC	4.65
98850P	YUM CHINA HLDGS INC	USA	98850P	CHN	YUM CHINA HLDGS INC	3.99
92927K	WABCO HLDGS INC	USA	92927K	EMU	WABCO HLDGS INC	3.68

Table 3: **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	EMU	ANHEUSER BUSCH INBEV SA NV	11.62
87264A	T-MOBILE USA INC	USA	251566	EMU	DEUTSCHE TELEKOM AG	5.79
W5801L	NORDEA HYPOTEK AB	SWE	X5S8VP	EMU	NORDEA BK ABP	3.39
233851	DAIMLER FIN NORTH AMER LLC	USA	D1668R	EMU	DAIMLER AG	2.70
80282K	SANTANDER HLDGS USA INC	USA	05971K	EMU	BANCO SANTANDER SA	2.33
B. Corporate bonds reallocated away from country						
71647N	PETROBRAS GLOBAL FIN B V	EMU	P7836P	BRA	PETROLEO BRASILEIRO SA	9.57
00507U	ACTAVIS FDG SCS	EMU	G0177J	USA	ALLERGAN PLC	5.69
88167A	TEVA PHARMACEUTICAL FIN	EMU	881624	ISR	TEVA PHARMACEUTICAL INDS LTD	5.09
36164Q	GE CAP INTL FDG CO	EMU	369604	USA	GENERAL ELEC CO	4.87
L4191B	GAZ CAPITAL SA LUXEMBOURG	EMU	368287	RUS	GAZPROM PJSC	4.31
C. Equities reallocated toward country						
G7690A	ROYAL DUTCH SHELL PLC	GBR	G7690A	EMU	ROYAL DUTCH SHELL PLC	67.47
780259	ROYAL DUTCH SHELL PLC	GBR	G7690A	EMU	ROYAL DUTCH SHELL PLC	15.21
872590	T-MOBILE US INC	USA	251566	EMU	DEUTSCHE TELEKOM AG	8.02
P0273U	AMBEV SA	BRA	B639CJ	EMU	ANHEUSER BUSCH INBEV SA NV	4.99
92927K	WABCO HLDGS INC	USA	92927K	EMU	WABCO HLDGS INC	3.68
D. Equities reallocated away from country						
G5960L	MEDTRONIC PLC	EMU	G5960L	USA	MEDTRONIC PLC	49.13
G1151C	ACCENTURE PLC IRELAND	EMU	G1151C	USA	ACCENTURE PLC IRELAND	38.59
G51502	JOHNSON CTLS INTL PLC	EMU	G51502	USA	JOHNSON CTLS INTL PLC	19.06
G0177J	ALLERGAN PLC	EMU	G0177J	USA	ALLERGAN PLC	18.06
G29183	EATON CORP PLC	EMU	G29183	USA	EATON CORP PLC	13.63

Table 4: **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	B A T 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
40428H	HSBC USA INC	USA	404280	GBR	HSBC HLDGS PLC	1.70
G00005	AA BD CO LTD	JEY	G0013T	GBR	AA LTD	1.54
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	05971K	EMU	BANCO SANTANDER SA	2.01
G2551U	CREDIT AGRICOLE SA	GBR	G2551U	EMU	CREDIT AGRICOLE SA	1.84
80281L	SANTANDER UK GROUP HLDGS PLC	GBR	05971K	EMU	BANCO SANTANDER SA	1.84
G8108W	SANTANDER UK GROUP HLDGS PLC	GBR	05971K	EMU	BANCO SANTANDER SA	1.60
C. Equities reallocated toward country						
G96629	WILLIS TOWERS WATSON PUB LTD CO	EMU	G96629	GBR	WILLIS TOWERS WATSON PUB LTD CO	10.71
G9788D	WPP PLC NEW	JEY	G9788D	GBR	WPP PLC NEW	8.43
G47567	IHS MARKIT LTD	BMU	G47567	GBR	IHS MARKIT LTD	7.54
G32655	EXPERIAN PLC	JEY	G4209W	GBR	EXPERIAN FINANCE PLC	6.62
G7S00T	PENTAIR PLC	EMU	G7S00T	GBR	PENTAIR PLC	5.69
D. Equities reallocated away from country						
G7690A	ROYAL DUTCH SHELL PLC	GBR	G7690A	EMU	ROYAL DUTCH SHELL PLC	67.47
780259	ROYAL DUTCH SHELL PLC	GBR	G7690A	EMU	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 5: **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
84756N	SPECTRA ENERGY PARTNERS LP	USA	29250N	CAN	ENBRIDGE INC	0.80
91911X	VALEANT PHARMACEUTICALS INTL	USA	071734	CAN	BAUSCH HEALTH COS INC	0.71
91829K	VPI ESCROW CORP	USA	071734	CAN	BAUSCH HEALTH COS INC	0.54
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 MOTOR CORP	1.24
94975Z	WELLS FARGO FINL CDA CORP	CAN	95001K	USA	WELLS FARGO BK N A	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	C891LV	CAN	TORONTO DOMINION BANK	7.58
G16252	BROOKFIELD INFRASTRUCTURE PARTN...	BMU	G16252	CAN	BROOKFIELD INFRASTRUCTURE PARTN...	3.20
550021	LULULEMON ATHLETICA INC	USA	550021	CAN	LULULEMON ATHLETICA INC	3.14
B4746J	GROUPE BRUXELLES LAMBERT GBL	EMU	739239	CAN	POWER CORP CDA	2.60
752344	RANDGOLD RES LTD	JEY	067901	CAN	BARRICK GOLD CORP	2.54
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
675222	OCEANAGOLD CORP	CAN	675222	AUS	OCEANAGOLD CORP	0.85
67000B	NOVANTA INC	CAN	67000B	USA	NOVANTA INC	0.72

Table 6: **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			Great Britain		
Origin	**Destination**	**Market Value (USD Billions)**	**Origin**	**Destination**	**Market Value (USD Billions)**	**Origin**	**Destination**	**Market Value (USD Billions)**
A. Corporate bonds reallocated toward country								
EMU	USA	42.7	USA	EMU	41.0	USA	GBR	21.7
CYM	USA	11.3	GBR	EMU	12.8	EMU	GBR	17.1
CAN	USA	10.3	SWE	EMU	7.2	JEY	GBR	8.2
GBR	USA	9.8	CAN	EMU	3.9	CYM	GBR	4.8
BMU	USA	8.3	JEY	EMU	3.2	CAN	GBR	2.9
B. Corporate bonds reallocated away from country								
USA	EMU	41.0	EMU	USA	42.7	GBR	EMU	12.8
USA	GBR	21.7	EMU	BRA	18.0	GBR	USA	9.8
USA	JPN	12.2	EMU	GBR	17.1	GBR	CHE	4.9
USA	CAN	9.2	EMU	CHE	15.1	GBR	IND	3.4
USA	CHE	6.3	EMU	RUS	14.6	GBR	AUS	3.2
C. Equities reallocated toward country								
EMU	USA	178.7	GBR	EMU	88.8	EMU	GBR	31.8
BMU	USA	67.4	USA	EMU	16.2	JEY	GBR	25.4
SGP	USA	53.0	BRA	EMU	14.6	BMU	GBR	14.9
CUW	USA	40.6	AUS	EMU	3.5	HKG	GBR	5.3
GBR	USA	19.3	IND	EMU	2.7	IMN	GBR	4.8
D. Equities reallocated away from country								
USA	CAN	16.8	EMU	USA	178.7	GBR	EMU	88.8
USA	EMU	16.2	EMU	GBR	31.8	GBR	USA	19.3
USA	ARG	4.7	EMU	CHE	4.2	GBR	AUS	12.8
USA	CHN	4.4	EMU	CAN	3.5	GBR	ZAF	4.0
USA	SWE	4.3	EMU	SWE	3.4	GBR	MEX	3.3

Table 7: **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 6. 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	9.2	—	—	—	—	—	—
EMU	CAN	0.9	—	—	—	—	—	—
GBR	CAN	0.6	—	—	—	—	—	—
CHL	CAN	0.4	—	—	—	—	—	—
MHL	CAN	0.3	—	—	—	—	—	—
B. Corporate bonds reallocated away from country								
CAN	USA	10.3	CYM	CHN	17.3	BMU	USA	8.3
CAN	EMU	3.9	CYM	USA	11.3	BMU	JAM	1.6
CAN	GBR	2.9	CYM	BRA	6.4	BMU	GBR	1.4
CAN	JPN	2.8	CYM	GBR	4.8	BMU	CHN	1.2
CAN	CHE	0.7	CYM	HKG	3.0	BMU	QAT	0.5
C. Equities reallocated toward country								
USA	CAN	16.8	—	—	—	—	—	—
JEY	CAN	4.8	—	—	—	—	—	—
BMU	CAN	4.6	—	—	—	—	—	—
EMU	CAN	3.5	—	—	—	—	—	—
CHE	CAN	1.3	—	—	—	—	—	—
D. Equities reallocated away from country								
CAN	USA	13.3	CYM	CHN	278.29	BMU	USA	67.4
CAN	AUS	0.9	CYM	HKG	17.53	BMU	GBR	14.9
CAN	GBR	0.7	CYM	USA	11.82	BMU	CHN	13.2
CAN	CHE	0.1	CYM	TWN	5.4	BMU	HKG	12.0
CAN	EMU	0.1	CYM	GBR	3.6	BMU	PER	4.8

Table 8: **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 6. 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): 29.9bn*	*E. India: Corporate Debt*	*Tot. Offshore Financing (Amt. Held): 9.3bn*
PETROLEO BRASILEIRO SA	48.3%	TATA MTRS LTD	16.9%
JBS SA	9.8%	HINDALCO INDS LTD	15.9%
VALE SA	8.6%	VEDANTA RES PLC	14.8%
MARFRIG GLOBAL FOODS S A	3.9%	BHARTI AIRTEL LTD	13.1%
BRASKEM SA	3.9%	RAIN COMMODITIES LTD	6.7%
RIO OIL FIN TR	3.9%	STATE BK OF INDIA MUMBAI	4.8%
MINERVA SA	2.7%	RELIANCE INDS LTD	4.5%
METALURGICA GERDAU SA	1.8%	AZURE PWR GLOBAL LTD	3.8%
COSAN LTD	1.7%	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): 2.4bn*
JBS SA	36.3%	WNS HLDGS LTD	34.4%
COSAN LTD	22.4%	MAKEMYTRIP LIMITED, MAURITIUS	28.5%
COMPANHIA DE SANEAMENTO BASICO...	10.1%	VEDANTA RES PLC	9.6%
OCEAN WILSONS HOLDINGS LTD	9.0%	SUN PHARMACEUTICAL INDS LTD	5.6%
ADECOAGRO SA	7.7%	INDUS GAS LTD	3.3%
NEXA RES SA	4.8%	DELTA CORP LTD	1.6%
ATENTO SA	2.7%	AZURE PWR GLOBAL LTD	0.9%
LITEL PARTICIPACOES SA LITEL PART	2.3%	POLYPLEX CORP LTD	0.6%
AVIANCA TACA HOLDINGS SA	1.3%	MERCANTILE PORTS & LOGISTICS LTD	0.5%
C. China: Corporate Debt	*Tot. Offshore Financing (Amt. Held): 46.6bn*	*G. Russia: Corporate Debt*	*Tot. Offshore Financing (Amt. Held): 14.6bn*
ALIBABA GROUP HLDG LTD	5.8%	GAZPROM PJSC	43.0%
BOHAI FINL INVEST HLDG CO LTD	4.2%	SBERBANK RUSSIA	12.2%
STATE GRID CORP OF CHINA	4.0%	VEB FIN PLC	9.6%
CHINA NATIONAL OFFSHORE OIL	3.7%	PUBLIC JT STK CO OIL	4.6%
SINOPEC GROUP OVERSEAS DEV 2015 LTD	2.5%	CREDIT BK OF MOSCOW	3.4%
CHINA NATIONAL CHEMICAL CORP	2.5%	RZD CAP PLC	3.3%
CHINA HUARONG ASSET MGMT CO LTD	2.3%	SEVERSTAL PAO	3.0%
SINOPEC GROUP OVERSEAS DEV 2017 LTD	2.1%	GAZPROMBANK	2.3%
CHINA EVERGRANDE GROUP	2.1%	MINING & METALLURGICAL CO NORILSK NICKEL	2.3%
D. China: Equities	*Tot. Offshore Financing (Amt. Held): 349.4bn*	*H. Russia: Equities*	*Tot. Offshore Financing (Amt. Held): 4.0bn*
TENCENT HLDGS LTD	21.3%	MAIL RU GROUP LTD	33.6%
ALIBABA GROUP HLDG LTD	18.8%	POLYMETAL INTERNATIONAL PLC	16.1%
BAIDU INC	6.7%	IBS GROUP HLDG LTD	11.7%
CHINA MOBILE LTD	4.4%	TCS GROUP HLDG PLC	9.6%
NETEASE INC	2.8%	LENTA LTD	9.1%
JD COM INC	2.5%	GLOBALTRANS INVT PLC	8.9%
CTRIP COM INTL LTD	2.1%	UNITED COMPANY RUSAL PLC	5.6%
CHINA NATIONAL OFFSHORE OIL	2.0%	EN+ GROUP PLC	2.8%
AAC TECHNOLOGIES HOLDINGS INC	1.6%	ROS AGRO PLC	1.3%

Table 9: **Emerging-market firms with largest amounts of observed offshore financing: Brazil, China, India, Russia.** We list the firms that receive the largest amounts of financing via offshore 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 offshore 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): 5.4bn*
SAUDI BASIC INDUSTRIES SABIC	21.6%	OLD MUTUAL LTD	68.8%
SAUDI ELECTRICITY CO	19.2%	STANDARD BK GROUP LTD	7.1%
ACWA PWR MGMT & INVTS ONE LTD	14.7%	MAS REAL ESTATE INC	5.3%
APICORP SUKUK LTD	13.4%	STEINHOFF INTL HLDGS N V	4.7%
DAR ALARKAN REAL ESTATE DEV CO	12.7%	BRAIT SA LUXEMBOURG	3.1%
ACWA PWR MGMT & INVTS ONE LTD	11.8%	NET 1 UEPS TECHNOLOGIES INC	2.7%
NATIONAL COML BK	2.5%	GROWTHPOINT PROPERTIES LTD	2.3%
MAF SUKUK LTD	2.4%	PAN AFRICAN RES PLC	2.1%
SAUDI ELECTRICITY GLOBAL SUKUK CO	1.3%	SANLAM LTD	1.6%
B. Saudi Arabia: Equities	*Tot. Offshore Financing (Amt. Held): 0.1bn*	*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	6.0%
—	—	MINERA Y METALURGICA DEL BOLEO SAPI DE CV	4.5%
—	—	KINGSTON SOLAR LP	3.8%
—	—	SOUTHGATE SOLAR LP	2.6%
—	—	LOTTE SHOPPING CO LTD	1.8%
—	—	DOOSAN HEAVY INDUSTRIES AND CONSTRUCTION	0.8%
—	—	EXPORT IMPORT BK OF KOREA	0.1%
—	—	HANA BK	0.1%
C. South Africa: Corporate Debt	*Tot. Offshore Financing (Amt. Held): 4.2bn*	*F. South Korea: Equities*	*Tot. Offshore Financing (Amt. Held): 1.1bn*
NASPERS LTD	30.2%	FILA KOREA CO LTD	31.9%
MTN GROUP LTD	13.6%	NAVER CORP	27.9%
SAPPI LTD	11.5%	LG INNOTEK CO LTD	11.7%
SIBANYE GOLD LTD	10.7%	HANDSOME CORP	7.0%
GOLD FIELDS LTD NEW	6.5%	HYUNDAI WIA CORP	4.8%
GROWTHPOINT PROPERTIES LTD	5.9%	LOTTE CHEM CORP	3.4%
STEINHOFF INTL HLDGS N V	5.8%	KISWIRE CO LTD	3.0%
ANGLOGOLD ASHANTI LTD	4.4%	KOLON LIFE SCIENCE INC	2.4%
OLD MUTUAL LTD	3.3%	OCI COMPANY LTD	1.2%

Table 10: **Emerging-market firms with largest amounts of observed offshore financing: Saudi Arabia, South Africa, South Korea.** We list the firms that receive the largest amounts of financing via offshore 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 offshore financing for the corresponding country and asset class.

Destination	Destination ISO Code	Official TIC Position (USD bn)	Estimated Consolidated TIC Position (USD bn)	Difference (USD bn)	Adjustment Factor
A. Total Debt Portfolios: G-20 Countries					
Argentina	ARG	35.3	35.9	0.6	1.7%
Australia	AUS	158.1	164.2	6.1	3.9%
Brazil	BRA	34.3	110.3	76.0	221.2%
Canada	CAN	483.6	537.3	53.7	11.1%
China	CHN	4.3	32.0	27.7	644.4%
EMU	EMU	725.1	737.1	12.0	1.7%
India	IND	13.8	21.8	8.0	58.0%
Indonesia	IDN	33.4	35.2	1.8	5.3%
Japan	JPN	229.9	315.4	85.6	37.2%
Mexico	MEX	95.6	98.6	3.0	3.2%
Russia	RUS	13.5	44.6	31.1	230.4%
Saudi Arabia	SAU	—	—	—	23.7%
South Africa	ZAF	14.4	19.2	4.8	33.0%
South Korea	KOR	21.5	37.7	16.2	75.3%
Turkey	TUR	17.2	17.0	-0.2	-1.3%
United Kingdom	GBR	382.4	464.2	81.9	21.4%
B. Total Debt Portfolios: Selected Tax Havens					
Cayman Islands	CYM	404.6	88.9	-315.7	-78.0%
Bermuda	BMU	34.3	2.7	-31.7	-92.2%
Hong Kong	HKG	8.4	18.9	10.5	123.9%
Jersey	JEY	15.8	0.1	-15.6	-99.1%
Curaçao	CUW	—	—	—	-100.0%
Guernsey	GGY	13.0	0.0	-13.0	-100.0%
Panama	PAN	8.3	5.2	-3.1	-37.7%
C. Total Debt Portfolios: Domestic Reallocations					
USA	USA	—	—	-94.8	—
D. Corporate Debt Portfolios: G-20 Countries					
Argentina	ARG	5.3	5.2	-0.1	-2.6%
Australia	AUS	143.9	149.7	5.9	4.1%
Brazil	BRA	8.4	83.5	75.0	889.7%
Canada	CAN	389.8	429.7	39.9	10.2%
China	CHN	2.8	29.2	26.5	961.9%
EMU	EMU	548.5	508.3	-40.2	-7.3%
India	IND	5.9	14.4	8.5	142.3%
Indonesia	IDN	5.4	7.1	1.6	30.0%
Japan	JPN	80.2	141.0	60.8	75.8%
Mexico	MEX	57.8	59.9	2.1	3.6%
Russia	RUS	0.4	31.4	31.0	>5,000.0%
Saudi Arabia	SAU	—	—	—	>5,000.0%
South Africa	ZAF	1.5	6.2	4.8	328.5%
South Korea	KOR	10.7	26.3	15.6	145.3%
Turkey	TUR	4.0	3.8	-0.2	-6.0%
United Kingdom	GBR	326.4	408.0	81.6	25.0%
E. Corporate Debt Portfolios: Selected Tax Havens					
Cayman Islands	CYM	80.5	10.0	-70.5	-87.6%
Bermuda	BMU	30.0	1.0	-29.0	-96.7%
Hong Kong	HKG	8.3	18.8	10.5	127.3%
Jersey	JEY	14.1	0.0	-14.1	-99.8%
Curaçao	CUW	—	—	—	-100.0%
Guernsey	GGY	13.0	0.0	-13.0	-100.0%
Panama	PAN	3.4	0.4	-3.0	-88.4%
F. Corporate Debt Portfolios: Domestic Reallocations					
USA	USA	—	—	-301.2	—

Table 11: **Estimated consolidated outward USA debt portfolios vs. official TIC data.** This table presents estimates of restated outward USA debt portfolio flows using a domicile-based criterion, which we compare to the U.S. Treasury's official TIC data. Our estimated consolidated positions use adjustment factors as outlined in equation (1). We show data for all debt positions and for corporate debt positions (defined as private debt holdings minus holdings of asset-backed securities). Missing cells correspond to missing Morningstar or TIC data. For panels A through C, adjustment factors are applied separately for corporate bonds, government bonds, and structured finance securities, and aggregated to obtain an overall adjustment factor.

Destination	Destination ISO Code	Official TIC Position (USD bn)	Estimated Consolidated TIC Position (USD bn)	Difference (USD bn)	Adjustment Factor
A. Equity Portfolios (Excluding Holdings of Fund Shares): G-20 Countries					
Argentina	ARG	9.3	20.2	11.0	118.6%
Australia	AUS	194.3	201.3	7.0	3.6%
Brazil	BRA	144.1	129.8	-14.3	-9.9%
Canada	CAN	504.8	552.5	47.7	9.5%
China	CHN	156.9	586.7	429.7	273.8%
EMU	EMU	1,983.4	1,767.1	-216.2	-10.9%
India	IND	180.4	174.6	-5.7	-3.2%
Indonesia	IDN	39.8	36.1	-3.8	-9.4%
Japan	JPN	902.0	923.2	21.2	2.4%
Mexico	MEX	66.9	62.8	-4.1	-6.2%
Russia	RUS	55.6	57.5	1.9	3.3%
Saudi Arabia	SAU	—	—	—	0.7%
South Africa	ZAF	100.9	99.5	-1.3	-1.3%
South Korea	KOR	241.6	240.6	-0.9	-0.4%
Turkey	TUR	22.5	22.2	-0.4	-1.7%
United Kingdom	GBR	1,070.5	1,058.4	-12.1	-1.1%
B. Equity Portfolios (Excluding Holdings of Fund Shares): Selected Tax Havens					
Cayman Islands	CYM	884.8	1.5	-883.3	-99.8%
Bermuda	BMU	213.8	4.8	-209.0	-97.8%
Hong Kong	HKG	154.7	132.3	-22.4	-14.5%
Jersey	JEY	104.1	0.0	-104.1	-100.0%
Curaçao	CUW	—	—	—	-99.9%
Guernsey	GGY	31.1	0.0	-31.1	-100.0%
Panama	PAN	25.6	0.0	-25.6	-100.0%
C. Equity Portfolios (Excluding Holdings of Fund Shares): Domestic Reallocations					
USA	USA	—	—	1,005.3	—

Table 12: **Estimated consolidated outward USA equity portfolios vs. official TIC data.** This table presents our estimates of restated outward USA equity portfolio flows using a domicile-based criterion, which we compare to the U.S Treasury's TIC data. For each destination country, we show the official TIC figures for U.S. outward portfolio holdings, as well as our estimated consolidated positions, which use adjustment factors as outlined in equation (1). The TIC figures exclude holdings of fund shares. Missing cells correspond to missing Morningstar or TIC data.

Destination	Destination ISO Code	Official CPIS Position (USD bn)	Estimated Consolidated CPIS Position (USD bn)	Difference (USD bn)	Adjustment Factor	Adj. Factor for Corporate Debt
A. Total Debt Portfolios: G-20 Countries						
Argentina	ARG	36.7	37.1	0.4	1.1%	-5.1%
Australia	AUS	175.3	189.1	13.9	7.9%	9.2%
Brazil	BRA	49.3	88.5	39.2	79.4%	462.7%
Canada	CAN	189.9	199.0	9.0	4.8%	5.4%
China	CHN	18.7	118.1	99.4	530.8%	799.6%
India	IND	19.0	32.0	13.0	68.1%	122.3%
Indonesia	IDN	43.7	47.9	4.1	9.5%	60.7%
Japan	JPN	208.9	252.5	43.7	20.9%	30.7%
Mexico	MEX	97.4	100.7	3.3	3.3%	6.1%
Russia	RUS	35.4	63.6	28.2	79.7%	>5,000.0%
Saudi Arabia	SAU	2.4	3.9	1.5	60.0%	>5,000.0%
South Africa	ZAF	28.4	33.4	5.0	17.7%	188.8%
South Korea	KOR	22.6	24.9	2.3	10.4%	21.3%
Turkey	TUR	39.1	38.0	-1.1	-2.8%	-12.1%
United Kingdom	GBR	1,290.9	1,365.5	74.6	5.8%	5.2%
USA	USA	1,911.7	1,962.1	50.4	2.6%	3.3%
B. Total Debt Portfolios: Selected Tax Havens						
Cayman Islands	CYM	95.7	8.0	-87.7	-91.6%	-96.3%
Bermuda	BMU	26.0	2.4	-23.6	-90.9%	-93.3%
Hong Kong	HKG	20.4	13.2	-7.2	-35.4%	-40.5%
Jersey	JEY	—	—	—	-99.4%	-99.4%
Curaçao	CUW	—	—	—	-96.8%	-96.8%
Guernsey	GGY	—	—	—	-99.2%	-99.4%
Panama	PAN	8.2	4.8	-3.4	-41.8%	-91.7%
C. Total Debt Portfolios: Domestic Reallocations						
EMU	EMU	—	—	-305.5	—	—

Table 13: **Estimated consolidated outward EMU debt portfolios vs. official CPIS data.** This table presents our estimates of restated outward EMU debt portfolio flows using a domicile-based criterion, which we compare to the CPIS data released by the IMF. For each destination country, we show the official CPIS figures for EMU outward debt portfolio holdings and our estimated consolidated positions, which use adjustment factors as outlined in equation (1). Missing cells correspond to missing Morningstar or CPIS data.

Destination	Destination ISO Code	Official CPIS Position (USD bn)	Estimated Consolidated CPIS Position (USD bn)	Difference (USD bn)	Adjustment Factor
A. Equity Portfolios: G-20 Countries					
Argentina	ARG	3.8	5.0	1.2	30.6%
Australia	AUS	62.2	66.9	4.7	7.5%
Brazil	BRA	53.2	47.0	-6.2	-11.7%
Canada	CAN	86.7	94.3	7.6	8.8%
China	CHN	95.9	252.3	156.4	163.1%
India	IND	85.4	80.3	-5.1	-5.9%
Indonesia	IDN	18.2	16.6	-1.6	-9.0%
Japan	JPN	315.8	331.4	15.7	5.0%
Mexico	MEX	19.1	18.0	-1.0	-5.5%
Russia	RUS	46.9	49.8	2.9	6.2%
Saudi Arabia	SAU	2.2	2.2	0.0	0.6%
South Africa	ZAF	32.9	32.9	0.0	0.0%
South Korea	KOR	96.0	95.2	-0.8	-0.8%
Turkey	TUR	11.1	10.7	-0.4	-3.3%
United Kingdom	GBR	593.2	579.3	-13.9	-2.3%
USA	USA	1,708.2	1,797.8	89.6	5.2%
B. Equity Portfolios: Selected Tax Havens					
Cayman Islands	CYM	223.2	0.7	-222.5	-99.7%
Bermuda	BMU	38.0	2.0	-36.0	-94.7%
Hong Kong	HKG	64.3	44.3	-19.9	-31.0%
Jersey	JEY	—	—	—	-100.0%
Curaçao	CUW	—	—	—	-96.0%
Guernsey	GGY	—	—	—	-100.0%
Panama	PAN	—	—	—	-100.0%
C. Equity Portfolios: Domestic Reallocations					
EMU	EMU	—	—	-76.9	—

Table 14: **Estimated consolidated outward EMU equity portfolios vs. official CPIS data.** This table presents our estimates of restated outward EMU equity portfolio flows using a domicile-based criterion, which we compare to the CPIS data released by the IMF. For each destination country, we show the official CPIS figures for EMU outward portfolio holdings, as well as our estimated consolidated positions, which use adjustment factors as outlined in equation (1). Missing cells correspond to missing Morningstar or CPIS data.

Destination	Destination ISO Code	Official CPIS Position (USD bn)	Estimated Consolidated CPIS Position (USD bn)	Difference (USD bn)	Adjustment Factor	Adj. Factor for Corporate Debt
A. Total Debt Portfolios: G-20 Countries						
Argentina	ARG	3.0	3.4	0.3	10.7%	-16.4%
Australia	AUS	33.9	36.0	2.1	6.2%	14.7%
Brazil	BRA	10.0	17.7	7.7	77.1%	1,347.8%
Canada	CAN	27.8	31.1	3.4	12.1%	20.4%
China	CHN	8.2	41.7	33.5	407.6%	441.4%
EMU	EMU	427.9	404.4	-23.5	-5.5%	-6.8%
India	IND	6.5	9.9	3.3	51.0%	108.1%
Indonesia	IDN	3.5	3.6	0.1	4.0%	72.7%
Japan	JPN	44.3	61.2	16.9	38.2%	105.5%
Mexico	MEX	11.9	12.3	0.4	3.0%	10.3%
Russia	RUS	2.4	3.6	1.3	54.5%	>5,000.0%
Saudi Arabia	SAU	1.2	1.2	0.0	2.6%	1,900.8%
South Africa	ZAF	5.7	6.4	0.7	11.8%	562.2%
South Korea	KOR	6.2	6.2	0.1	1.4%	5.9%
Turkey	TUR	4.8	4.7	-0.1	-1.2%	-11.1%
USA	USA	421.9	449.8	27.9	6.6%	10.2%
B. Total Debt Portfolios: Selected Tax Havens						
Cayman Islands	CYM	35.6	1.1	-34.5	-96.9%	-97.2%
Bermuda	BMU	2.3	1.0	-1.3	-57.2%	-57.6%
Hong Kong	HKG	7.3	38.1	30.8	419.5%	442.4%
Jersey	JEY	—	—	—	-99.6%	-99.6%
Curaçao	CUW	—	—	—	-96.6%	-96.6%
Guernsey	GGY	—	—	—	-96.0%	-99.4%
Panama	PAN	0.1	0.1	-0.1	-37.4%	-73.0%
C. Total Debt Portfolios: Domestic Reallocations						
United Kingdom	GBR	—	—	-111.3	—	—

Table 15: **Estimated consolidated outward GBR debt portfolios vs. official CPIS data.** This table presents our estimates of restated outward debt portfolio flows of Great Britain using a domicile-based criterion, which we compare to the CPIS data released by the IMF. For each destination country, we show the official CPIS figures for British outward portfolio holdings, as well as our estimated consolidated positions, which use adjustment factors as outlined in equation (1). Missing cells correspond to missing Morningstar or CPIS data.

Destination	Destination ISO Code	Official CPIS Position (USD bn)	Estimated Consolidated CPIS Position (USD bn)	Difference (USD bn)	Adjustment Factor
A. Equity Portfolios: G-20 Countries					
Argentina	ARG	0.6	1.3	0.8	134.6%
Australia	AUS	43.6	56.5	12.8	29.4%
Brazil	BRA	15.3	13.7	-1.6	-10.6%
Canada	CAN	33.9	37.7	3.7	11.0%
China	CHN	47.9	160.5	112.6	235.0%
EMU	EMU	628.7	726.0	97.3	15.5%
India	IND	28.0	27.4	-0.6	-2.3%
Indonesia	IDN	7.4	6.9	-0.4	-6.0%
Japan	JPN	144.1	155.5	11.4	7.9%
Mexico	MEX	7.2	9.3	2.1	29.7%
Russia	RUS	11.4	12.9	1.5	13.5%
Saudi Arabia	SAU	0.1	0.1	0.0	0.0%
South Africa	ZAF	12.1	14.5	2.4	19.9%
South Korea	KOR	40.1	39.7	-0.4	-1.1%
Turkey	TUR	4.0	3.9	0.0	-0.4%
USA	USA	810.7	868.4	57.7	7.1%
B. Equity Portfolios: Selected Tax Havens					
Cayman Islands	CYM	40.7	0.0	-40.7	-100.0%
Bermuda	BMU	9.8	0.3	-9.6	-97.1%
Hong Kong	HKG	56.3	47.0	-9.2	-16.4%
Jersey	JEY	—	—	—	-100.0%
Curaçao	CUW	—	—	—	-98.3%
Guernsey	GGY	—	—	—	-98.5%
Panama	PAN	—	—	—	-100.0%
C. Equity Portfolios: Domestic Reallocations					
United Kingdom	GBR	—	—	-263.7	—

Table 16: **Estimated consolidated outward GBR equity portfolios vs. official CPIS data.** This table presents our estimates of restated outward equity portfolio flows of Great Britain using a domicile-based criterion, which we compare to the CPIS data released by the IMF. For each destination country, we show the official CPIS figures for British outward portfolio holdings, as well as our estimated consolidated positions, which use adjustment factors as outlined in equation (1). Missing cells correspond to missing Morningstar or CPIS data.

Destination	Destination ISO Code	Official CPIS Position (USD bn)	Estimated Consolidated CPIS Position (USD bn)	Difference (USD bn)	Adjustment Factor	Adj. Factor for Corporate Debt
A. Total Debt Portfolios: G-20 Countries						
Argentina	ARG	0.6	0.6	0.0	1.9%	0.0%
Australia	AUS	8.8	8.6	-0.2	-2.8%	-3.4%
Brazil	BRA	2.0	3.4	1.4	69.7%	412.2%
China	CHN	0.3	3.1	2.7	848.5%	1,537.5%
EMU	EMU	33.0	41.8	8.8	26.7%	41.4%
India	IND	2.0	3.5	1.5	76.7%	149.3%
Indonesia	IDN	1.1	1.1	0.0	2.7%	13.7%
Japan	JPN	5.4	15.3	9.9	185.4%	730.9%
Mexico	MEX	3.0	3.0	0.0	1.0%	1.9%
Russia	RUS	0.5	1.0	0.5	92.9%	>5,000.0%
Saudi Arabia	SAU	0.0	0.0	0.0	24.0%	>5,000.0%
South Africa	ZAF	0.6	0.7	0.1	18.3%	83.2%
South Korea	KOR	0.9	1.3	0.3	36.9%	359.2%
Turkey	TUR	0.8	0.8	0.0	-1.1%	-4.9%
United Kingdom	GBR	16.2	29.8	13.7	84.6%	102.8%
USA	USA	226.9	266.5	39.6	17.4%	19.9%
B. Total Debt Portfolios: Selected Tax Havens						
Cayman Islands	CYM	4.2	0.3	-3.9	-93.4%	-96.9%
Bermuda	BMU	0.5	0.1	-0.4	-84.0%	-94.6%
Hong Kong	HKG	0.2	0.3	0.1	67.2%	70.9%
Jersey	JEY	—	—	—	-100.0%	-100.0%
Curaçao	CUW	—	—	—	-100.0%	-100.0%
Guernsey	GGY	—	—	—	-100.0%	-100.0%
Panama	PAN	0.2	0.1	0.0	-25.9%	-98.5%
C. Total Debt Portfolios: Domestic Reallocations						
Canada	CAN	—	—	-76.6	—	—

Table 17: **Estimated consolidated outward CAN debt portfolios vs. official CPIS data.** This table presents our estimates of restated outward debt portfolio flows of Canada using a domicile-based criterion, which we compare directly to the CPIS data released by the IMF. For each destination country, we show the official CPIS figures for Canadian outward portfolio holdings, as well as our estimated consolidated positions, which use adjustment factors as outlined in equation (1). Missing cells correspond to missing Morningstar or CPIS data.

Destination	Destination ISO Code	Official CPIS Position (USD bn)	Estimated Consolidated CPIS Position (USD bn)	Difference (USD bn)	Adjustment Factor
A. Equity Portfolios: G-20 Countries					
Argentina	ARG	0.2	0.5	0.3	169.5%
Australia	AUS	15.8	15.9	0.1	0.9%
Brazil	BRA	12.1	11.0	-1.1	-9.4%
China	CHN	24.4	86.7	62.2	254.8%
EMU	EMU	133.9	129.1	-4.8	-3.6%
India	IND	16.2	16.1	-0.1	-0.5%
Indonesia	IDN	2.3	1.9	-0.4	-19.0%
Japan	JPN	69.5	71.1	1.6	2.3%
Mexico	MEX	6.1	5.3	-0.8	-13.0%
Russia	RUS	2.2	2.3	0.1	3.4%
Saudi Arabia	SAU	—	—	—	>5,000.0%
South Africa	ZAF	5.4	5.4	0.0	-0.3%
South Korea	KOR	22.1	21.9	-0.2	-0.9%
Turkey	TUR	0.9	0.9	0.0	-0.4%
United Kingdom	GBR	72.0	71.3	-0.7	-1.0%
USA	USA	767.4	819.1	51.7	6.7%
B. Equity Portfolios: Selected Tax Havens					
Cayman Islands	CYM	29.1	0.1	-29.1	-99.8%
Bermuda	BMU	8.5	0.1	-8.4	-99.1%
Hong Kong	HKG	12.2	11.3	-0.9	-7.5%
Jersey	JEY	—	—	—	-100.0%
Curaçao	CUW	—	—	—	-100.0%
Guernsey	GGY	—	—	—	-100.0%
Panama	PAN	—	—	—	-100.0%
C. Equity Portfolios: Domestic Reallocations					
Canada	CAN	—	—	-70.0	—

Table 18: **Estimated consolidated outward CAN equity portfolios vs. official CPIS data.** This table presents our estimates of restated outward equity portfolio flows of Canada using a domicile-based criterion, which we compare directly to the CPIS data collected and released by the IMF. For each destination country, we show the official CPIS figures for Canadian outward portfolio holdings, as well as our estimated consolidated positions, which use adjustment factors as outlined in equation (1). Missing cells correspond to missing Morningstar or CPIS data.

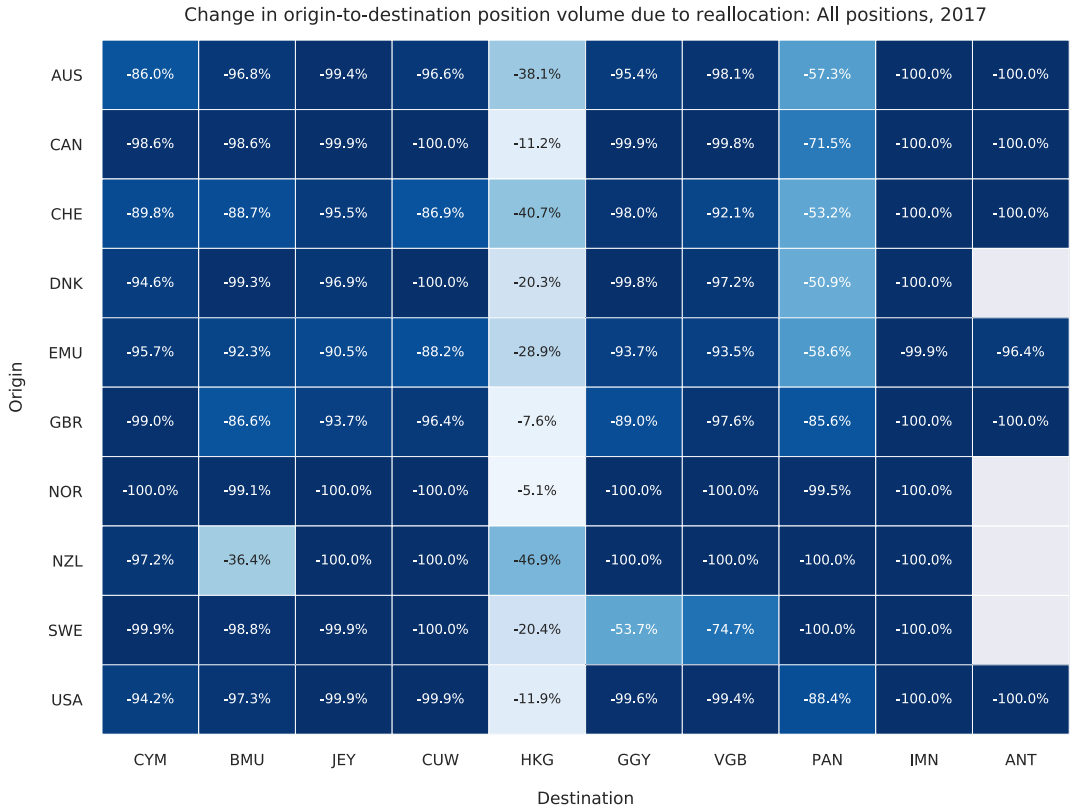


Table 19: **Change in origin-to-destination position volumes due to ultimate-parent and domicile resolution for selected country pairs: all securities, 2017.** This heatmap shows the percentage change in origin-to-destination position volume when the nationality of each security's issuer is established using our consolidated domicile criterion, as opposed to the residency of the immediate issuer (*baseline*). We show data for the tax-haven destinations with the 10 highest total reallocation volumes across our entire sample, in descending volume order (*horizontal axis*). Data is computed at year-end. Grey cells correspond to origin-destination pairs for which the baseline position volume is lower than $1,000$ USD. To gain better intuition for how to understand the values in the figure, suppose A is the total market value of positions held by US-domiciled funds in securities that have immediate-issuer domicile equal to CYM. Also, let B be the total market value of the subset of these positions whose ultimate-parent domicile best guess is equal to CYM. The n 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	5E8824	CHN	BOHAI FINL INVEST HLDG CO LTD	1.97
893830	TRANSOCEAN INC	CYM	H8817H	CHE	TRANSOCEAN LTD	1.73
G7302V	QNB FIN LTD	CYM	M81802	QAT	QATAR NATIONAL BANK	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	00928Q	USA	AIRCASTLE LTD	1.27
94707V	WEATHERFORD INTL LTD BERMUDA	BMU	G48833	USA	WEATHERFORD INTL PLC	0.91
G27631	DIGICEL GROUP LIMITED	BMU	G27631	JAM	DIGICEL GROUP LIMITED	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	G98294	USA	XL GROUP LTD	5.33
G0450A	ARCH CAPITAL GROUP LTD	BMU	G0450A	USA	ARCH CAPITAL GROUP LTD	5.26

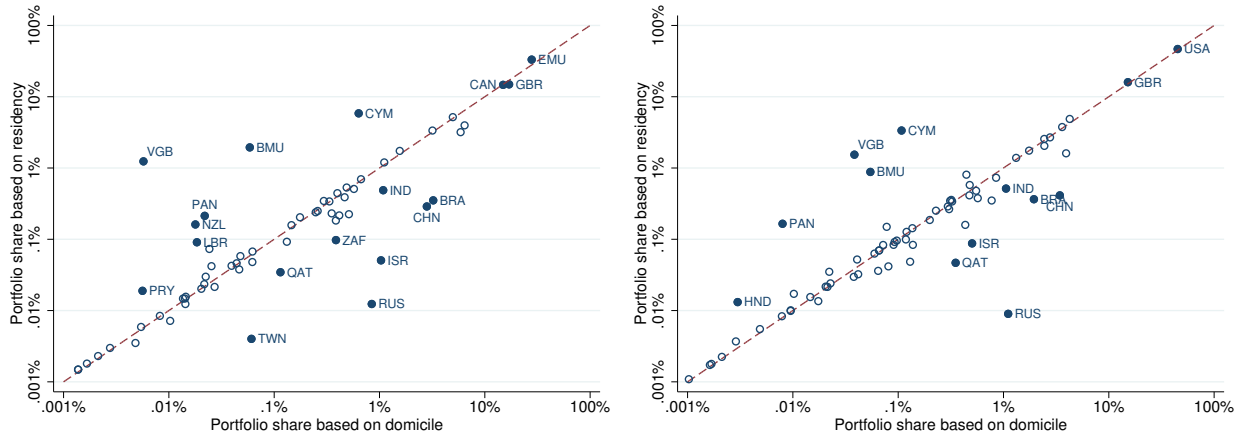
Table 21: **Largest issuer-asset class level reallocations away from Bermuda.** Market values are as observed in the 2017 end-of-year Morningstar sample.

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	17.2	52.5	32.7%	UAE	0.4	0.4	100.0%
BRA	6.5	34.9	18.5%	QAT	2.5	3.9	62.9%
USA	3.6	537.5	0.7%	GTM	0.3	0.5	57.6%
GBR	3.0	243.5	1.2%	DOM	0.1	0.3	51.0%
QAT	2.5	3.9	62.9%	SAU	0.4	0.7	49.2%
CHE	2.3	69.6	3.4%	CHN	17.2	52.5	32.7%
ARE	1.6	7.5	20.8%	TWN	0.3	1.0	26.8%
SGP	1.4	12.6	10.9%	ARE	1.6	7.5	20.8%
EMU	1.2	226.3	0.5%	PHL	0.3	1.2	20.5%
JPN	0.4	59.0	0.7%	BRA	6.5	34.9	18.5%
B. Equity positions				*B. Equity positions*			
CHN	270.4	502.9	53.8%	KHM	0.2	0.2	100.0%
TWN	5.2	172.0	3.0%	CHN	270.4	502.9	53.8%
USA	3.6	1,352.9	0.3%	MNG	0.0	0.0	39.1%
GBR	2.0	694.1	0.3%	PNG	0.0	0.0	12.9%
EMU	1.2	1,094.5	0.1%	NGA	0.0	0.9	4.0%
CAN	0.5	261.1	0.2%	TWN	5.2	172.0	3.0%
THA	0.5	44.4	1.2%	THA	0.5	44.4	1.2%
SGP	0.4	53.1	0.7%	ARE	0.1	8.5	1.0%
KHM	0.2	0.2	100.0%	SGP	0.4	53.1	0.7%
CHE	0.2	384.2	0.0%	VNM	0.0	4.7	0.4%

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 absolute 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.

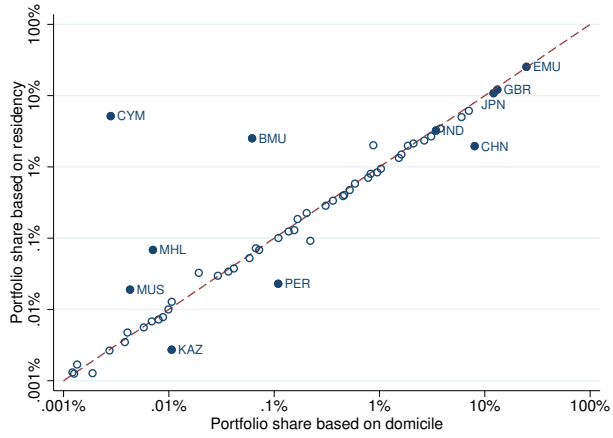
Top BMU Users in Absolute Terms				Top BMU Users in Relative Terms			
	Observed in Cross-Border Holdings:				*Observed in Cross-Border Holdings:*		
Country	**Routed via BMU (USD Billions)**	**Total (USD Billions)**	**Share via BMU**	**Country**	**Routed via BMU (USD Billions)**	**Total (USD Billions)**	**Share via BMU**
A. Corporate bond positions				*A. Corporate bond positions*			
USA	3.7	537.5	0.7%	LBR	0.1	0.1	99.8%
JAM	1.6	1.6	97.1%	JAM	1.6	1.6	97.1%
GBR	1.3	243.5	0.5%	QAT	0.5	3.9	13.4%
CHN	1.1	52.5	2.2%	CHL	0.2	5.8	3.4%
QAT	0.5	3.9	13.4%	CHN	1.1	52.5	2.2%
CHE	0.3	69.6	0.4%	NOR	0.3	21.0	1.4%
NOR	0.3	21.0	1.4%	ISR	0.1	10.0	1.2%
CHL	0.2	5.8	3.4%	SGP	0.1	12.6	1.1%
JPN	0.2	59.0	0.3%	USA	3.7	537.5	0.7%
EMU	0.2	226.3	0.1%	GBR	1.3	243.5	0.5%
B. Equity positions				*B. Equity positions*			
GBR	13.0	694.1	1.9%	PER	4.8	6.6	72.9%
CHN	12.3	502.9	2.5%	SGP	2.8	53.1	5.2%
USA	9.6	1,352.9	0.7%	NOR	1.1	36.7	2.9%
PER	4.8	6.6	72.9%	CHN	12.3	502.9	2.5%
SGP	2.8	53.1	5.2%	GBR	13.0	694.1	1.9%
EMU	1.2	1,094.5	0.1%	MYS	0.3	25.3	1.3%
CAN	1.2	261.1	0.5%	USA	9.6	1,352.9	0.7%
NOR	1.1	36.7	2.9%	CAN	1.2	261.1	0.5%
TWN	0.7	172.0	0.4%	TWN	0.7	172.0	0.4%
BRA	0.4	107.0	0.4%	BRA	0.4	107.0	0.4%

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 absolute 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.

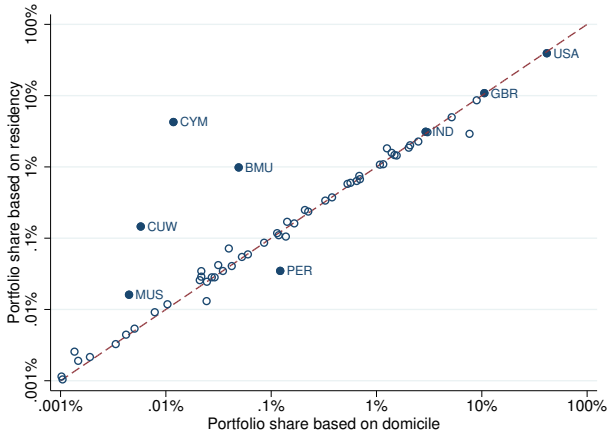


(a) USA, Corporate Bonds

(b) EMU, Corporate Bonds

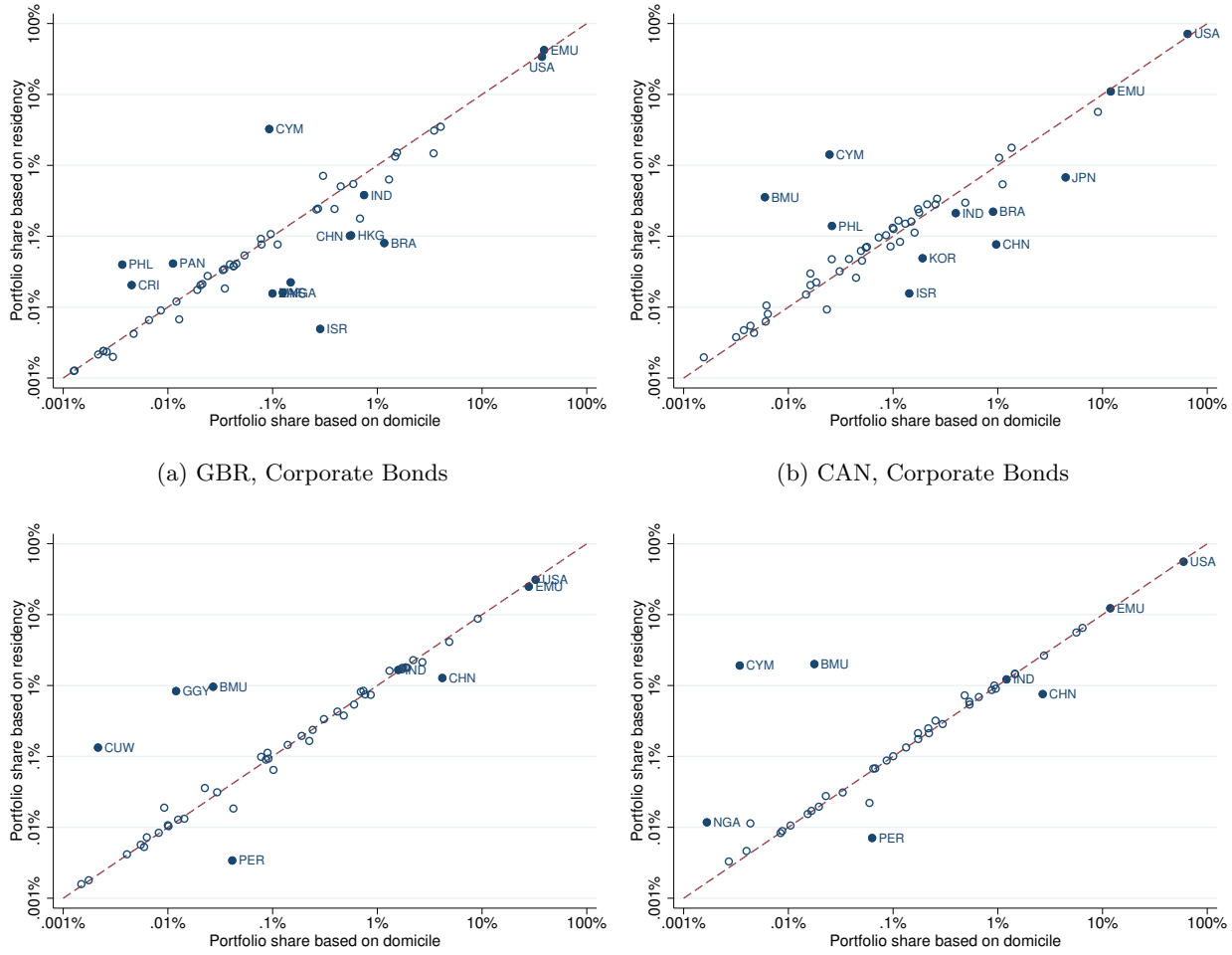


(c) USA, Equities



(d) EMU, Equities

Figure 1: **Bilateral shares of outward portfolios from USA and EMU, across countries, using immediate-issuer residency vs. consolidated domicile criterion for destinations.** The plot shows the shares that each foreign destination country represents in the USA's and the EMU's outward portfolio holdings, both using the residency of the immediate issuers to identify destinations (*vertical axis)* and using the issuer's consolidated domicile (*horizontal 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. Note that 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 Great Britain and Canada, across countries, using immediate-issuer residency vs. issuer domicile criterion for destinations.** The plot shows the shares that each foreign destination country represents in Great Britain's and Canada's outward portfolio holdings, both using the residency of the immediate issuers to identify destinations (*vertical axis)* and using the issuer's consolidated domicile (*horizontal 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. Note that the plot is on a logarithmic scale.

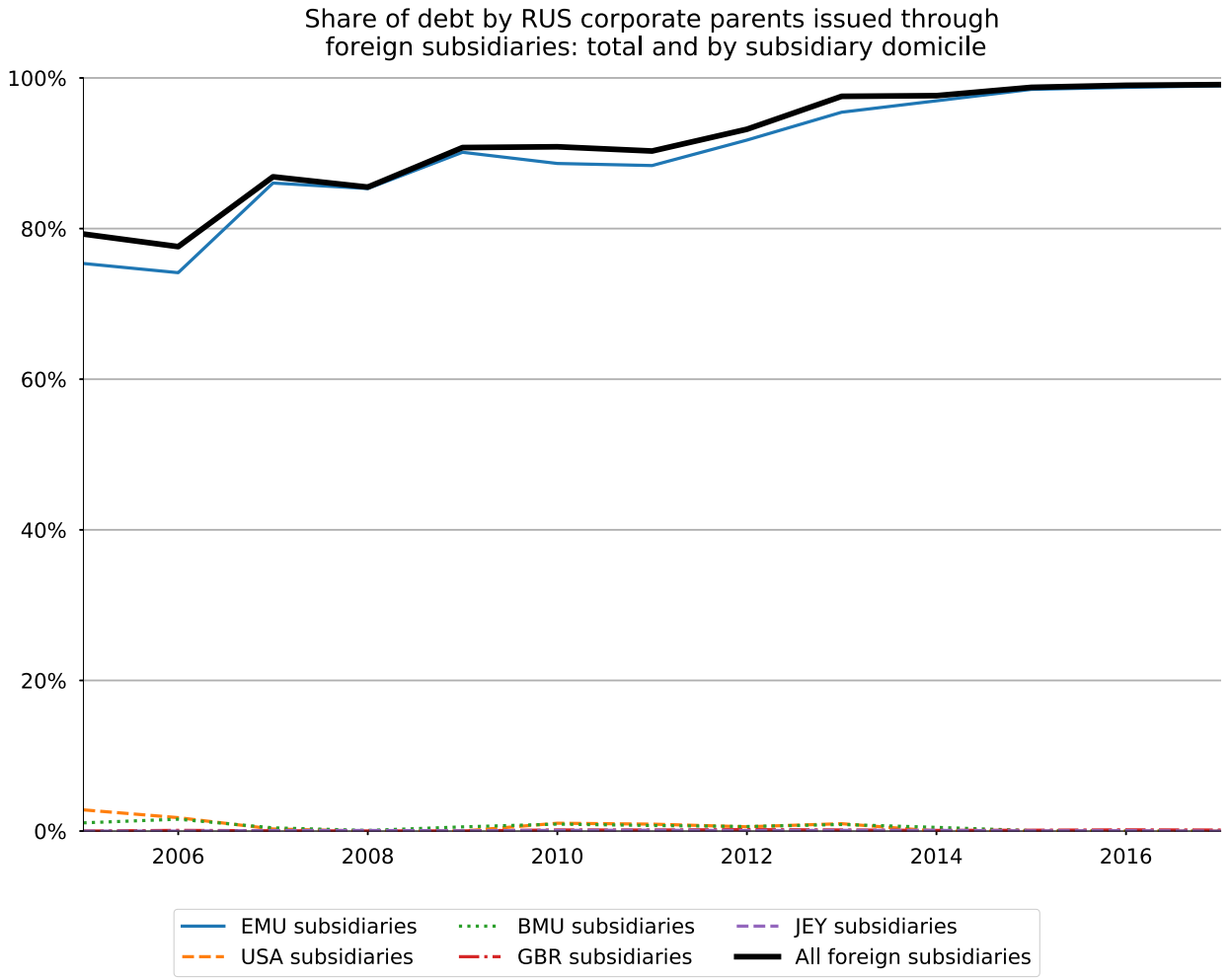


Figure 3: **Share of corporate liabilities of Russia-domiciled ultimate parents issued through imputed foreign subsidiaries: total and by subsidiary residency.** The *solid black line* shows the share of total debt by ultimate corporate parents domiciled in Russia that is issued through imputed subsidiaries located in a foreign country. Note that issuances captured in this figure reflect those that appear in the Morningstar sample only; not total quantities outstanding. The *colored lines* break down this statistic according to the country of residency of the issuing subsidiaries for the top 5 such residencies (across the entire sample): for example, the *blue line* shows the share of corporate liabilities of Russian parents that are issued through EMU-resident subsidiaries: the high relative magnitude of such issuance reflects the fact that large Russian companies such as Gazprom and Russian Railways have prominent financing subsidiaries located primarily in Luxembourg and Ireland. Sample only includes positions held by funds domiciled in USA, EMU, GBR, CAN, CHE, AUS, SWE, DNK, NOR, and NZL.

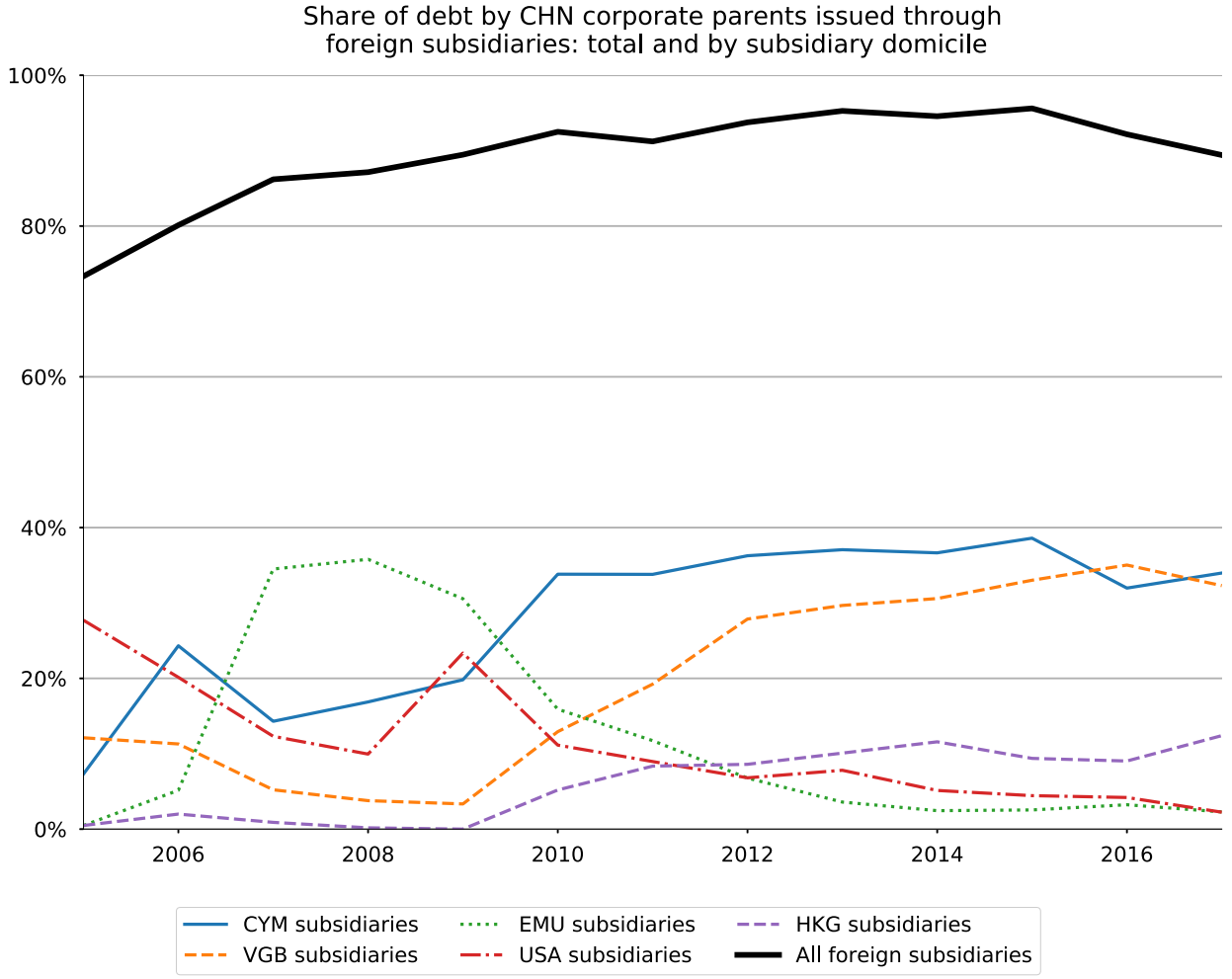


Figure 4: **Share of corporate liabilities of China-domiciled ultimate parents issued through imputed foreign subsidiaries: total and by subsidiary residency.** The *solid black line* shows the share of total debt by ultimate corporate parents domiciled in China that is issued through imputed subsidiaries located in a foreign country. Note that issuances captured in this figure reflect those that appear in the Morningstar sample only; not total quantities outstanding. The *colored lines* break down this statistic according to the country of residency of the issuing subsidiaries for the top 5 such residencies (across the entire sample). The shift over time away from the USA and toward CYM reflects the changing nature of Chinese firms' offshore financing practices. While in 2005 mutual fund investments into China were predominantly via US-based subsidiaries of Chinese companies, arrangements such as the VIE loop-around gradually took prominence over the sample period, culminating into a large part of portfolio investments captured via shell companies in the Cayman Islands, and accruing in particular to high-tech Chinese firms (e.g., JD.com, Baidu, Alibaba), as discussed in Section 3. Issuance in the British Virgin Islands is accounted for primarily by a number of large Chinese energy companies (e.g., China National Petroleum Corporation, State Grid Corporation of China, China National Offshore Oil Corporation). These firms are all largely absent at the beginning of the sample. Sample only includes positions held by funds domiciled in USA, EMU, GBR, CAN, CHE, AUS, SWE, DNK, NOR, and NZL.

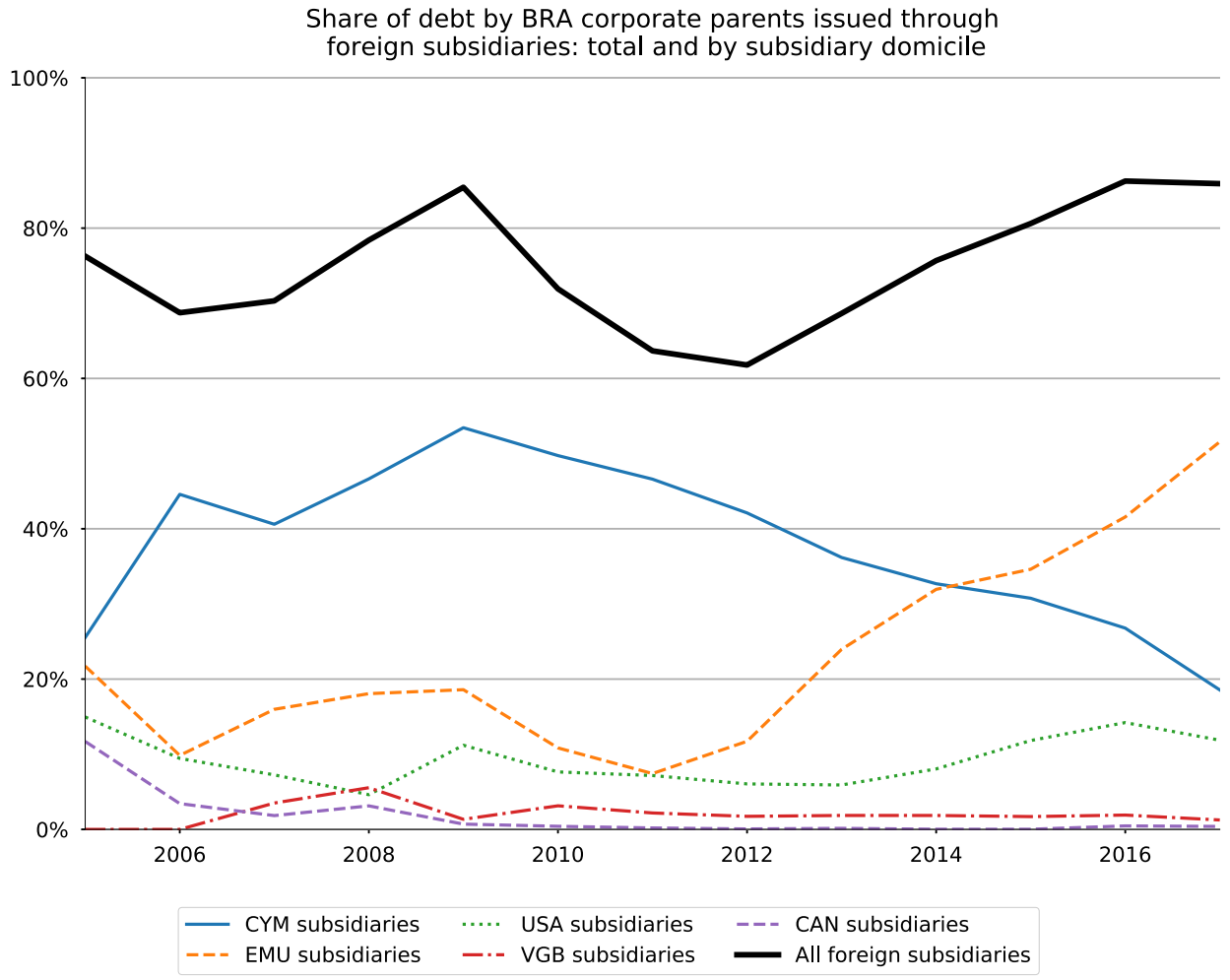


Figure 5: **Share of corporate liabilities of Brazil-domiciled ultimate parents issued through imputed foreign subsidiaries: total and by subsidiary residency.** The *solid black line* shows the share of total debt by ultimate corporate parents domiciled in Brazil that is issued through imputed subsidiaries located in a foreign country. Note that issuances captured in this figure reflect those that appear in the Morningstar sample only; not total quantities outstanding. The *colored lines* break down this statistic according to the country of residency of the issuing subsidiaries for the top 5 such residencies (across the entire sample). The increasing importance of the EMU as a subsidiary over the sample period reflects the establishment of large European financing arms of Brazilian companies in recent years. For example, the Brazilian oil company Petrobras established its Netherlands-based financing arm Petrobras Global Finance B.V. in 2012, complementing pre-existing financing subsidiaries in tax havens such as the Cayman Islands. Sample only includes positions held by funds domiciled in USA, EMU, GBR, CAN, CHE, AUS, SWE, DNK, NOR, and NZL.

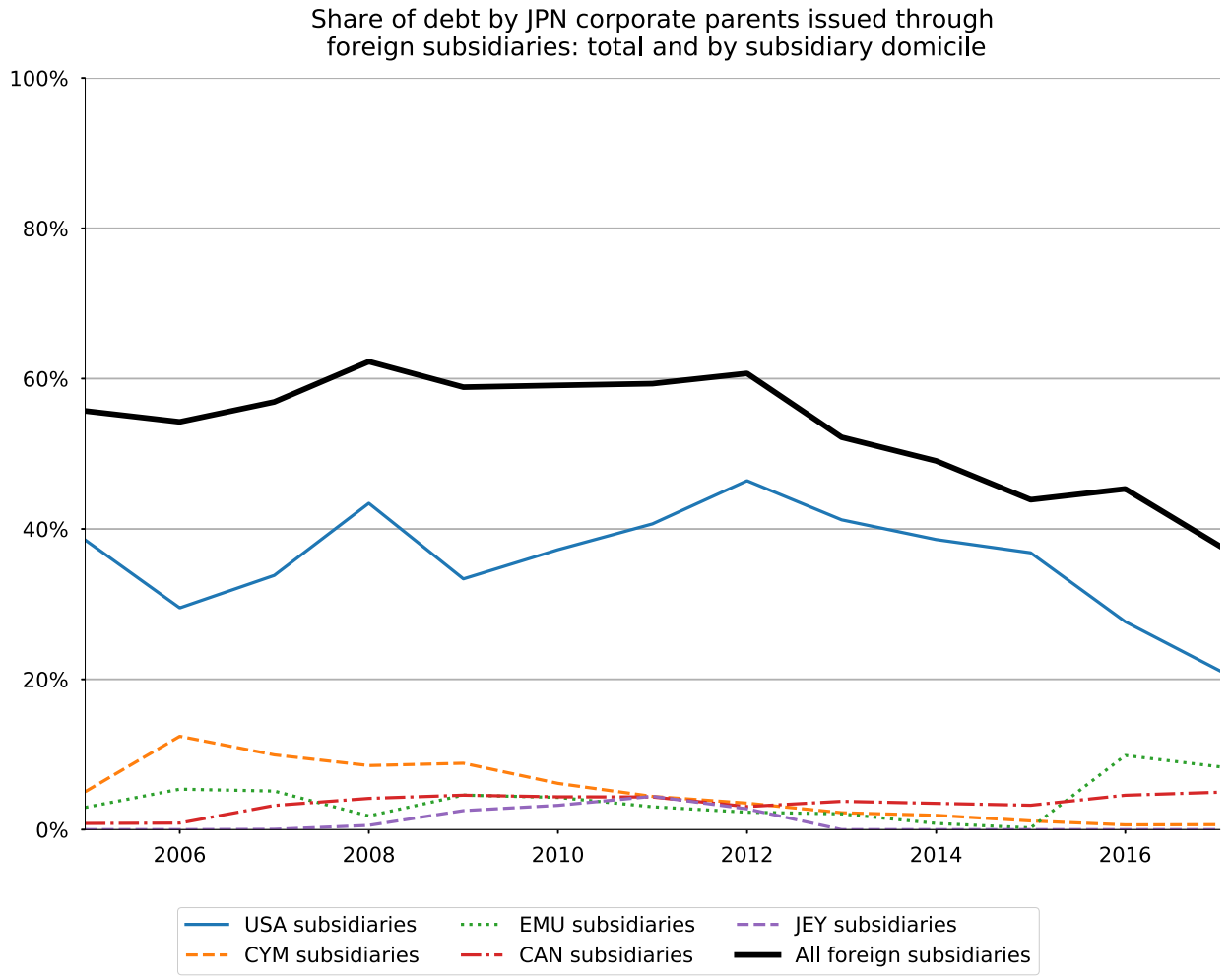


Figure 6: **Share of corporate liabilities of Japan-domiciled ultimate parents issued through imputed foreign subsidiaries: total and by subsidiary residency.** The *solid black line* shows the share of total debt by ultimate corporate parents domiciled in Japan that is issued through imputed subsidaries located in a foreign country. Note that issuances captured in this figure reflect those that appear in the Morningstar sample only; not total quantities outstanding. The *colored lines* break down this statistic according to the country of residency of the issuing subsidiaries for the top 5 such residencies (across the entire sample). The large relative magnitude of issuance through USA-resident subsidiaries reflects the fact that several large Japanese companies have prominent USA-based subsidiaries (among the largest of which are, for example, Toyota, Honda, Nissan, Kyocera, Mizhuo Financial, and Softbank). Sample only includes positions held by funds domiciled in USA, EMU, GBR, CAN, CHE, AUS, SWE, DNK, NOR, and NZL.

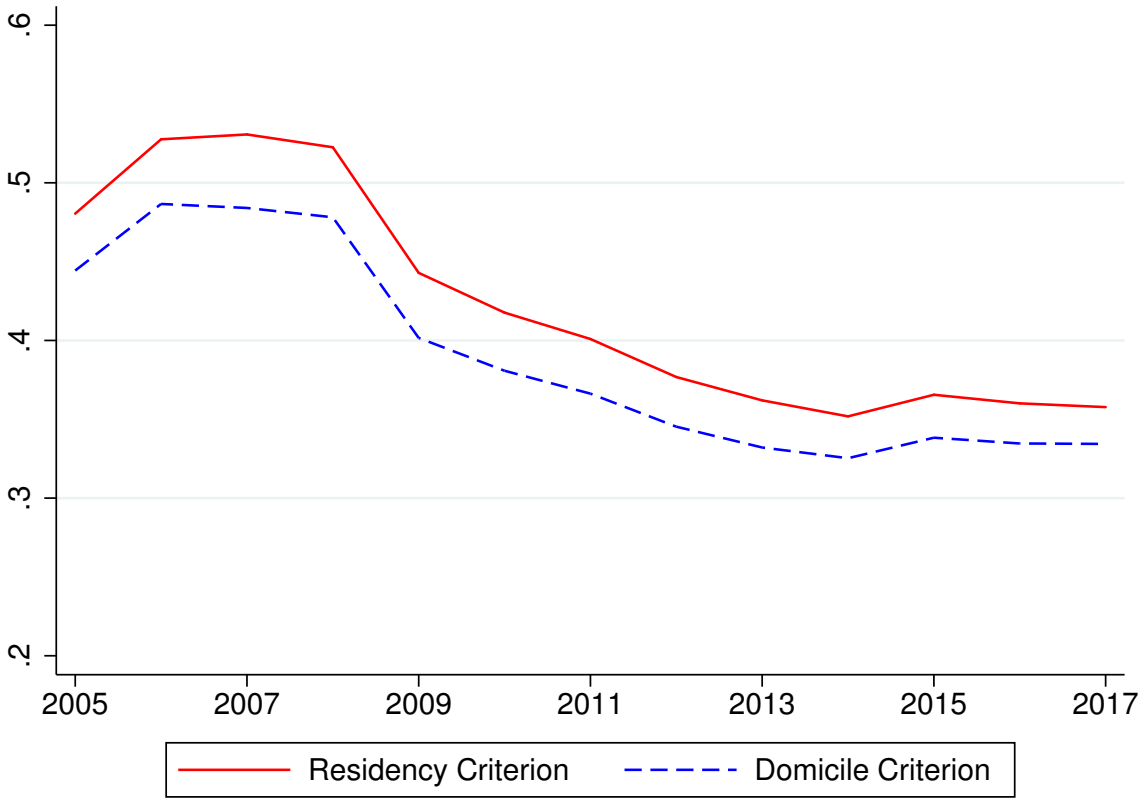
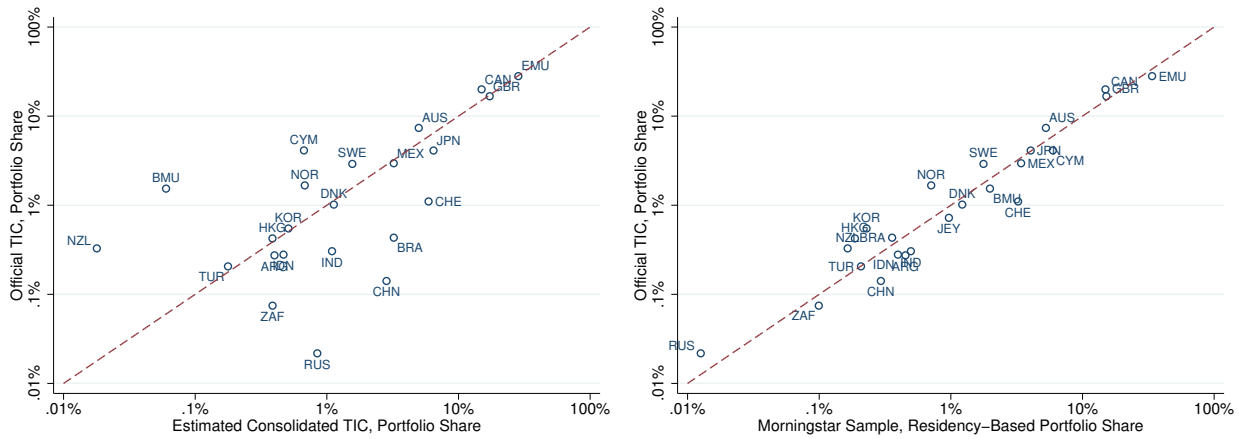


Figure 7: **Share of corporate bond positions in the Morningstar sample that are classified as liabilities of financial corporations using immediate-issuer residency criterion vs. consolidated domicile criterion.** All data computed at year end. Sector classification uses GICS codes.



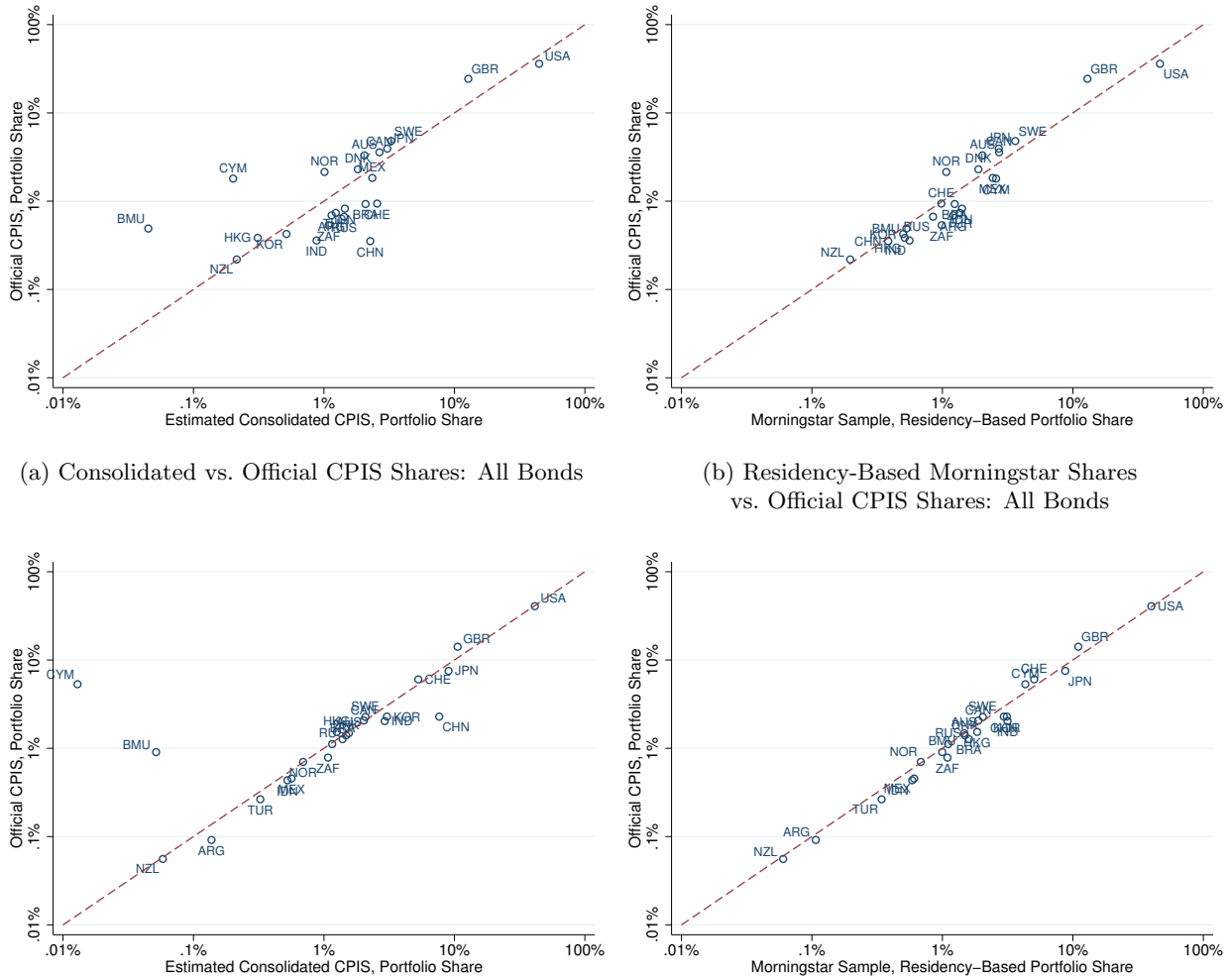
(a) Consolidated vs. Official TIC Shares: Corporate Bonds

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

(c) Consolidated vs. Official TIC Shares: Equities

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

Figure 8: **Bilateral shares of outward portfolios from USA: Estimated consolidated TIC shares vs. official 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 consolidated domicile-based criterion (*horizontal axis*), and as reported in the 2017 TIC data published by the U.S. Treasury (*vertical 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 (*horizontal axis*) and the official TIC shares (*vertical 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.



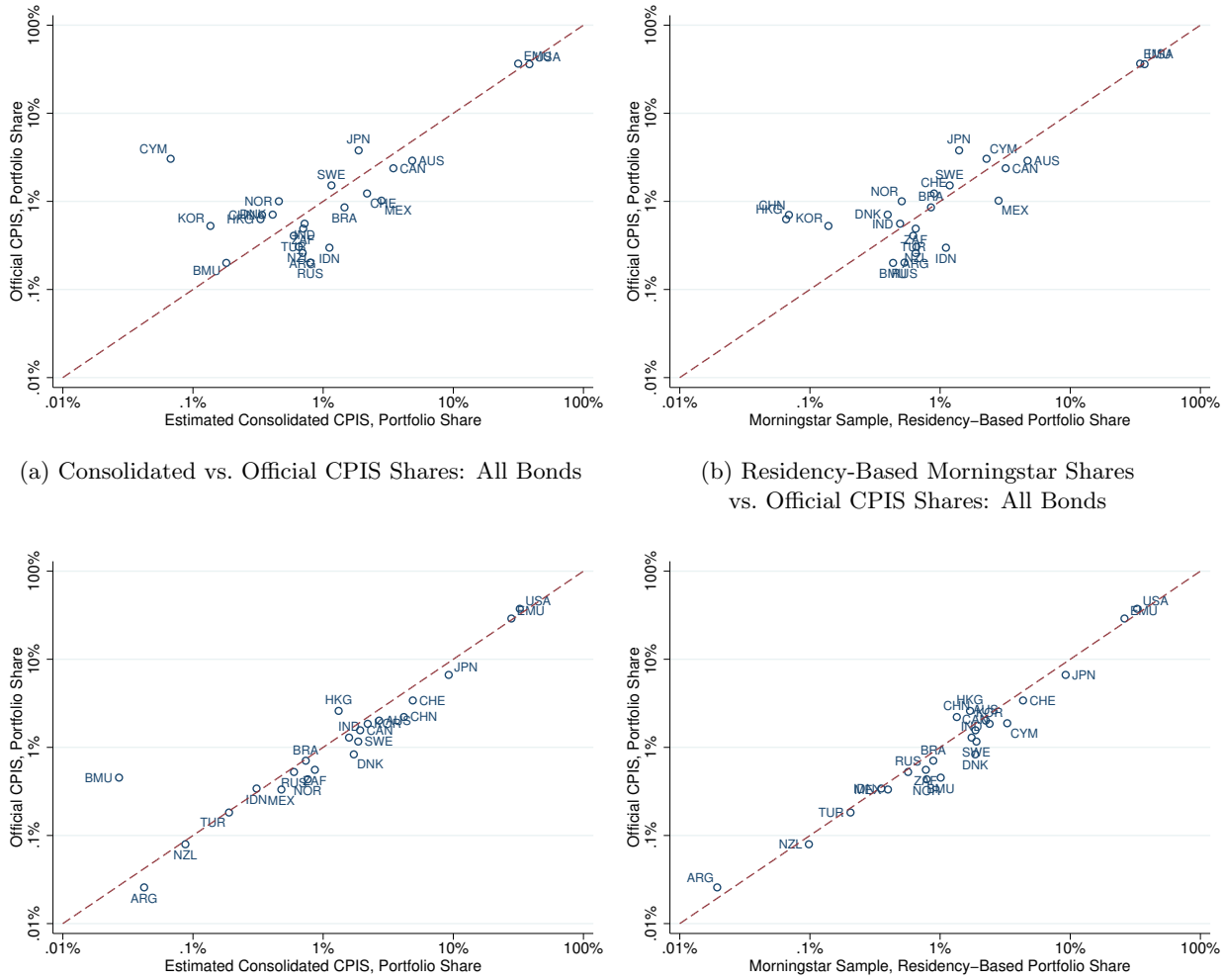
(a) Consolidated vs. Official CPIS Shares: All Bonds

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

(c) Consolidated vs. Official CPIS Shares: Equities

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

Figure 9: **Bilateral shares of outward portfolios from EMU: Estimated consolidated CPIS shares vs. official 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 consolidated domicile-based criterion (*horizontal axis*), and as reported in the 2017 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*).



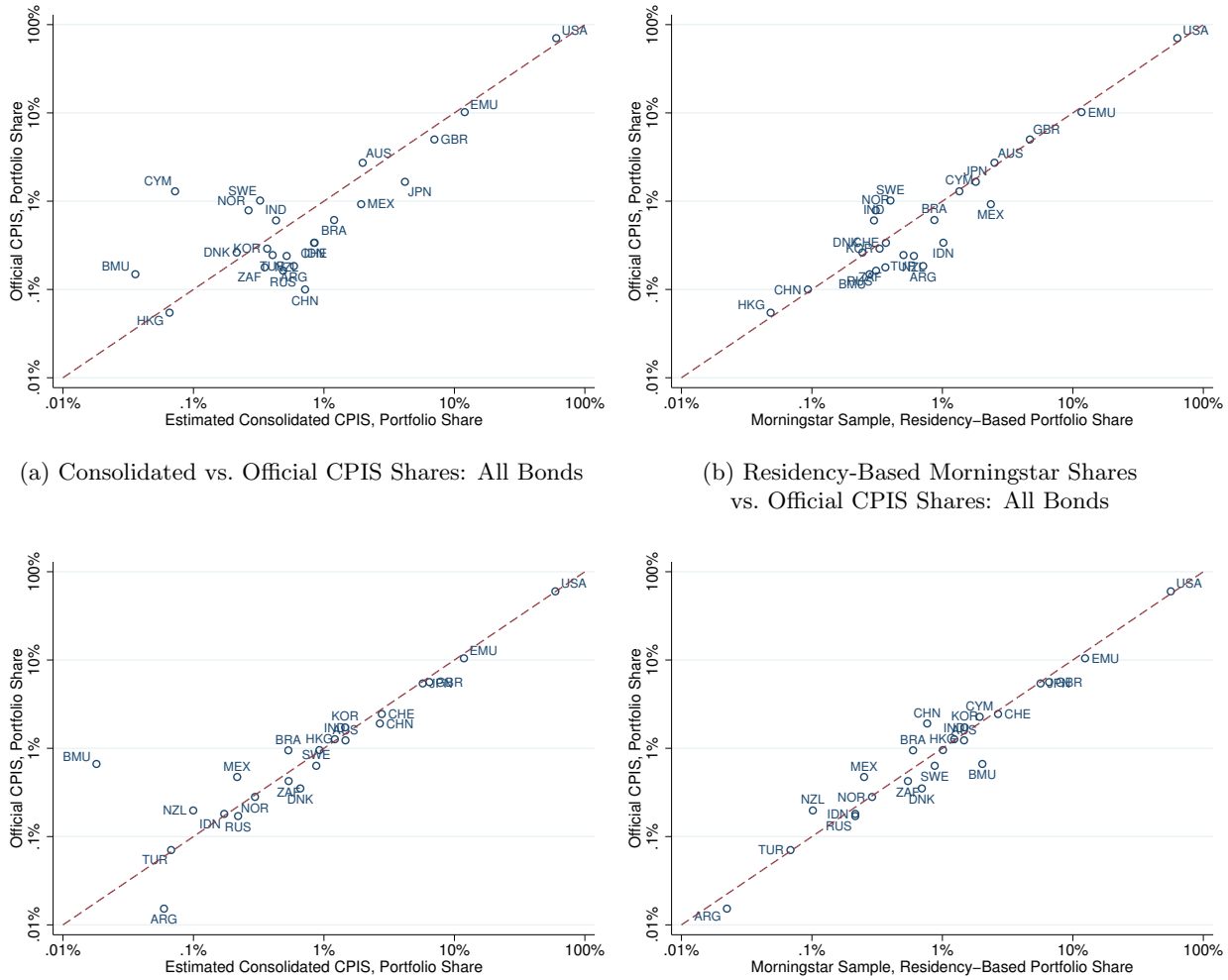
(a) Consolidated vs. Official CPIS Shares: All Bonds

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

(c) Consolidated vs. Official CPIS Shares: Equities

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

Figure 10: **Bilateral shares of outward portfolios from Great Britain: Estimated consolidated CPIS shares vs. official 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 consolidated domicile-based criterion (*horizontal axis*), and as reported in the 2017 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) Consolidated vs. Official CPIS Shares: All Bonds

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

(c) Consolidated vs. Official CPIS Shares: Equities

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

Figure 11: **Bilateral shares of outward portfolios from Canada: Estimated consolidated CPIS shares vs. official 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 consolidated domicile-based criterion (*horizontal axis*), and as reported in the 2017 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*).

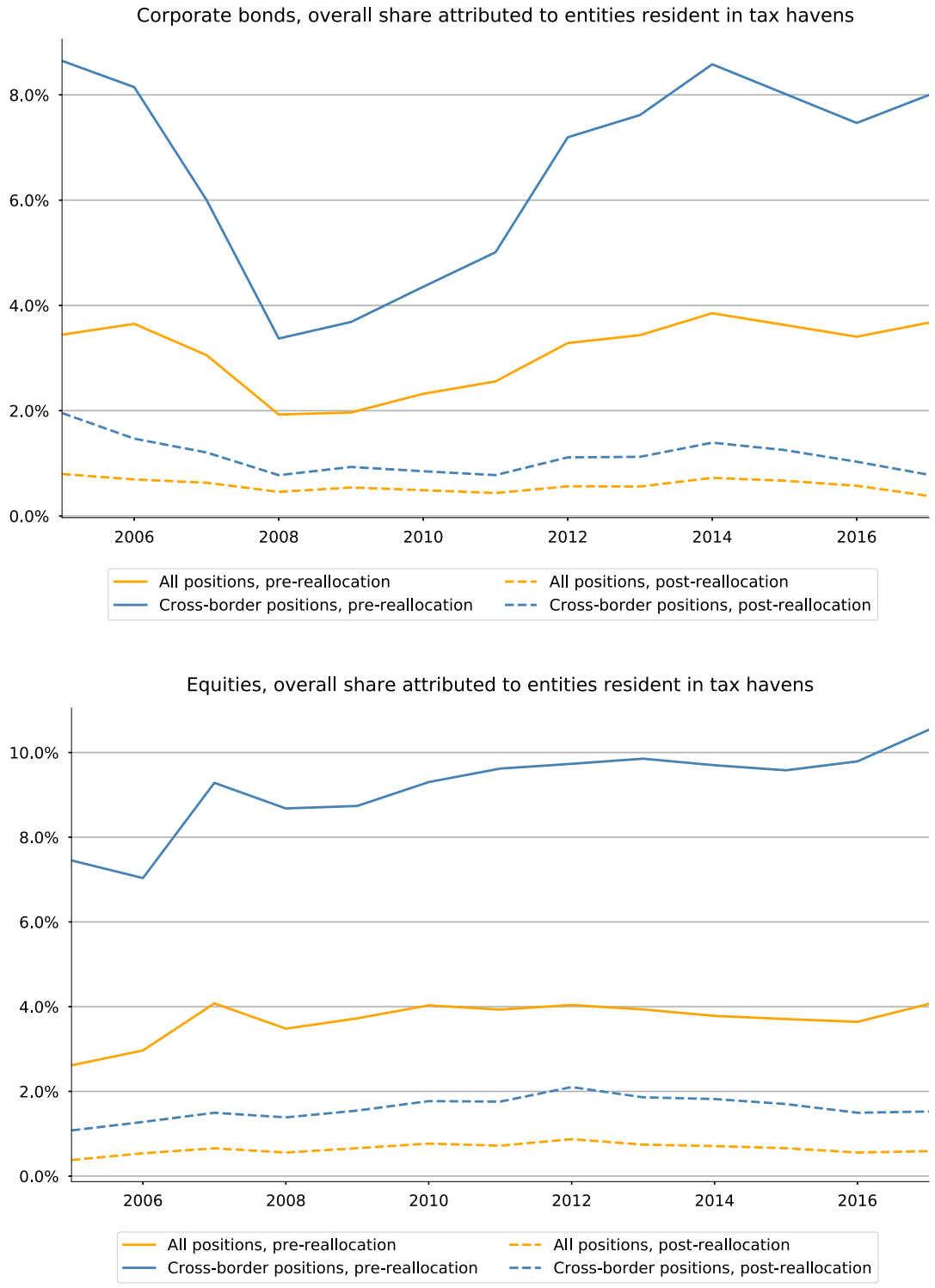


Figure 12: **Overall share of corporate bond and equity issuance attributed to entities located in tax havens, *pre* and *post* ultimate parent resolution.** This figure shows the overall shares of total issuance of corporate bonds (*top panel*) and equities (*bottom panel*) that are attributed to entities 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.

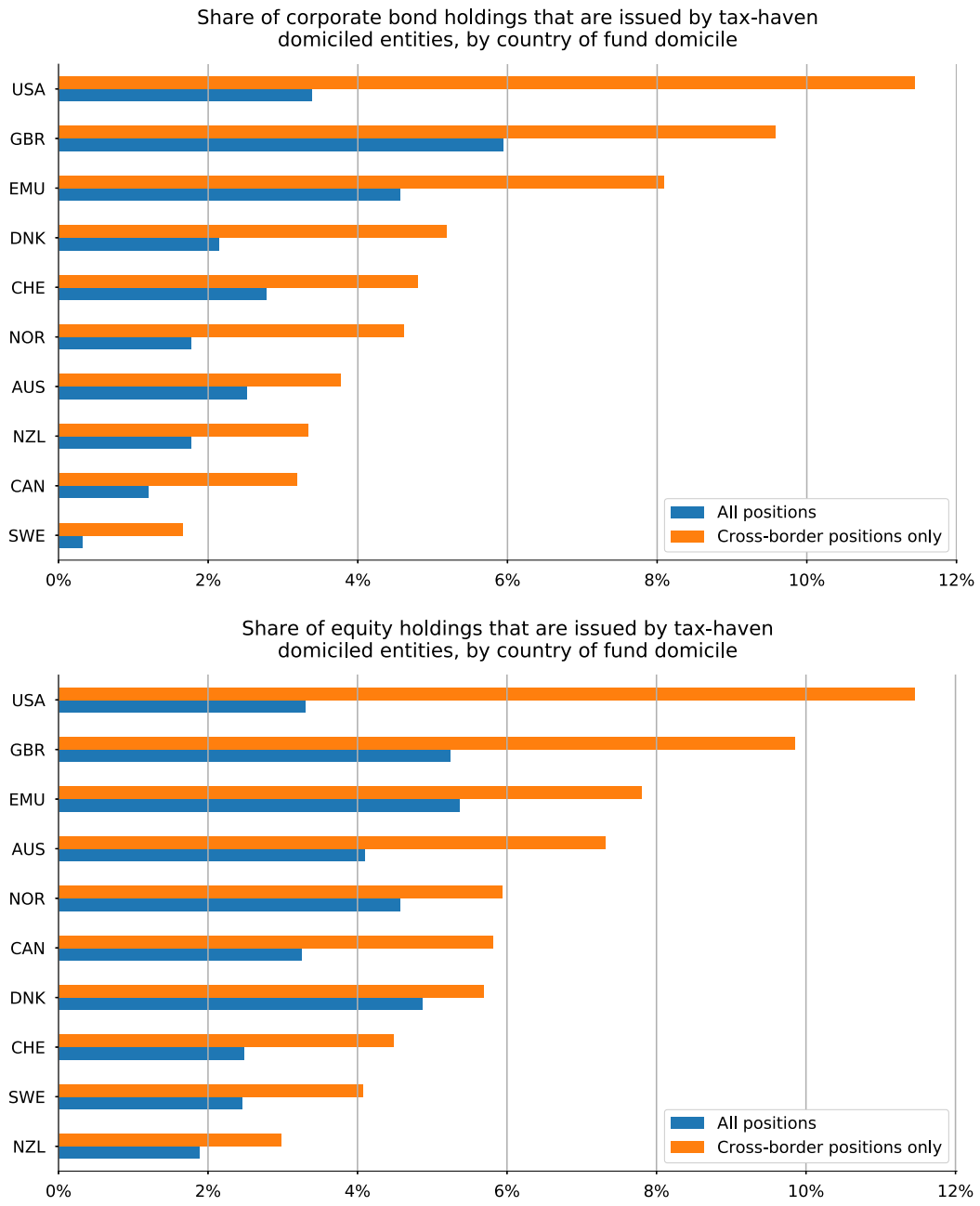


Figure 13: **Share of portfolio holdings in securities issued by entities located in tax havens, by country of fund domicile.** This figure shows the 2017 year-end ratio of holdings of securities issued by entities located in tax havens to total portfolio holdings (*blue bars*) or cross-border portfolio 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.