Experimental Ultimate Host Economy Statistics for U.S. Direct Investment Abroad

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Abstract Following international guidelines, BEA statistics on bilateral U.S. direct investment abroad are compiled and presented by immediate partner economy. While this approach is well suited for many purposes, it can lead to difficulty in interpreting direct investment statistics, especially in identifying the economies that are the ultimate destinations, or hosts, of direct investment. BEA's initial effort to produce U.S. direct investment abroad statistics by ultimate host economy (UHE), described in this paper, focused on producing statistics on equity position by UHE using six different methods to reallocate the equity position by immediate host economy. The methods are implemented using direct investment data reported on BEA's Quarterly Survey of U.S. Direct Investment Abroad and activities of multinational enterprises data reported on BEA's Benchmark Survey of U.S. Direct Investment Abroad. The paper concludes that three of the six methods merit further exploration and presents summary country and sector-level results for the selected methods.

Keywords Foreign direct investment, official statistics

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The views expressed in this paper are those of the authors and do not necessarily represent the U.S. Bureau of Economic Analysis, or the U.S. Department of Commerce.

1. Introduction

The U.S. Bureau of Economic Analysis (BEA) produces statistics on direct investment that are essential to the compilation of the U.S. economic accounts and for the analysis of multinational enterprises (MNEs). Statistics produced include direct investment by country and industry, which supplement the direct investment financial transactions and income statistics presented in the International Transactions Accounts (ITAs) and the direct investment position statistics in the International Investment Position (IIP) Accounts. Statistics are produced for both U.S. direct investment abroad (USDIA or "outward" investment) and for foreign direct investment in the United States (FDIUS or "inward" investment).[1]

Following international guidelines for the compilation and presentation of bilateral direct investment statistics, BEA produces statistics on direct investment income, financial transactions, and positions by immediate partner economy, which is the economy where the first entity in the ownership chain outside of the United States is located. While this approach is well suited for ITA purposes in understanding the countries involved in cross-border flow of funds with the United States, it can lead to difficulties in interpreting bilateral direct investment statistics, especially in identifying the ultimate origin or destination of direct investments.[2] On the immediate partner economy basis, U.S. direct investment abroad is highly concentrated, with the top 14 host countries accounting for over 80 percent of the position (figure 1). The rest of the world combined accounted for less than 20 percent of the position in 2019.

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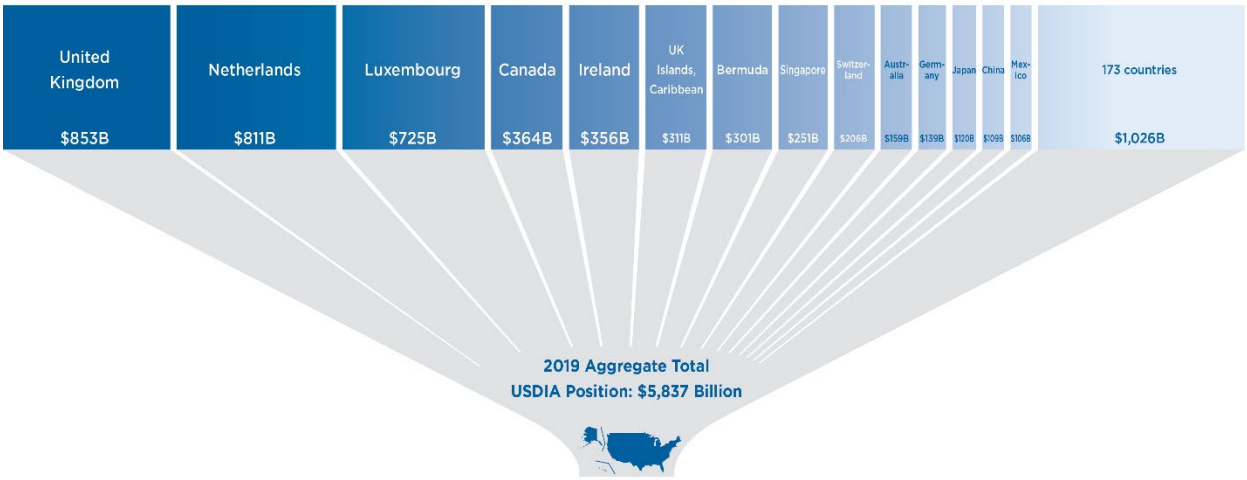
[1] The direct investment by country and industry statistics are generally consistent with the counterpart measures featured in the ITAs and the IIP Account. For a discussion of the differences between these statistics, see Chapter 32 of BEA's U.S. International Economic Accounts: Concepts and Methods.

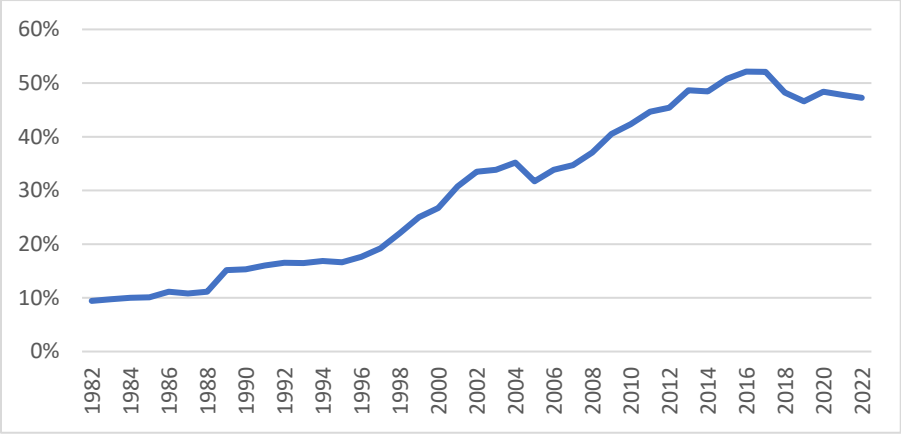
[2] These data are needed on an immediate counterparty basis to adequately monitor cross-border flows and positions. For instance, if a jurisdiction of convenience that is the home to large special purpose entities (SPEs) were to experience a currency or other financial crisis, data users would find data sets that look through the SPEs (or that net data for SPEs without separate identification of gross levels) to be of limited help. SPEs and other entities may transform debt to equity, a long-term instrument to short-term, local currency to foreign currency, fixed to variable rates, and so on, and these transformations alter risk characteristics in important ways. (BPM6 paragraph 6.44)

Figure 1. U.S. Direct Investment Position Abroad, by Country



The primary reason for this concentration of investment is that MNEs increasingly set up complex global structures to maximize their worldwide profits. These structures include holding companies and other special purpose entities (SPEs)—legal entities with little or no employment or physical presence—that are set up to take advantage of different tax or regulatory regimes and are used to channel investments to third (or fourth, etc.) countries. The prevalence of holding companies in U.S. outward direct investment has increased from 9.4 percent in 1982 to 52.1 percent at its peak in 2017 and currently accounts for 47.3 percent in the preliminary 2022 USDIA position (chart 1).

Chart 1. Holding Companies as a Share of the U.S. Direct Investment Abroad Position



The increased prevalence of holding companies and other SPEs heightened the need for separate statistics on their activities to facilitate the analysis and interpretation of macroeconomic statistics. The International Monetary Fund's (IMF's) Task Force on Special Purpose Entities encouraged national statistical compilers to produce statistics on resident SPEs.[3] BEA produced those statistics in December

[3] Final Report of the Task Force on Special Purpose Entities (https://www.imf.org/external/pubs/ft/bop/2018/pdf/18-03.pdf).

2021 and expanded the SPE presentation for the United States to include foreign SPE affiliates of U.S. MNEs in June 2022 due to their prevalence in the ownership structures of U.S MNEs. Foreign SPEs accounted for 44.7 percent of the U.S. direct investment asset position in 2022[4,5]

One result of the prevalence of holding companies is that outward direct investment statistics may not reflect where foreign affiliates of U.S. MNEs produce and sell goods and services. Bilateral outward direct investment statistics reflect the industries and countries of the foreign affiliates with which the U.S. parent companies have direct transactions and positions, but these industries and countries do not represent the full range and distribution of the industries and countries of the affiliates whose operations the U.S. parents ultimately own or control.

Data from BEA's activities of U.S. multinational enterprises (AMNE) dataset show the degree to which indirect ownership structures may affect the country and industry distributions of the outward position data.[6] The AMNE statistics are collected for every entity in the outward ownership chain regardless of whether they are directly or indirectly owned by the U.S. MNE. AMNE statistics are classified in the country where the foreign affiliate's physical assets are located or where its primary activity is carried out and in the industry that reflects the affiliate's primary activity based on its revenues. Thus, the AMNE statistics more closely reflect the countries and industries in which the goods and services are produced by the foreign affiliates than the direct investment statistics classified by the country and industry of the affiliate with which the parent company has a direct position.

The 10 countries with the largest U.S. direct investment abroad positions in 2019 are included in chart 2, which shows each country's share of the total position (in orange) and share of total value added from the AMNE statistics (in blue). The value-added statistics measure where U.S. MNEs produce goods and services. For example, while foreign affiliates in the Netherlands accounted for 13.9 percent of the total outward position in 2019, they accounted for 3.9 percent of total value added of foreign affiliates. On the other hand, there are countries, such as Canada and Ireland, that account for proportionally more value added than position, suggesting that investments are likely routed there through third countries.

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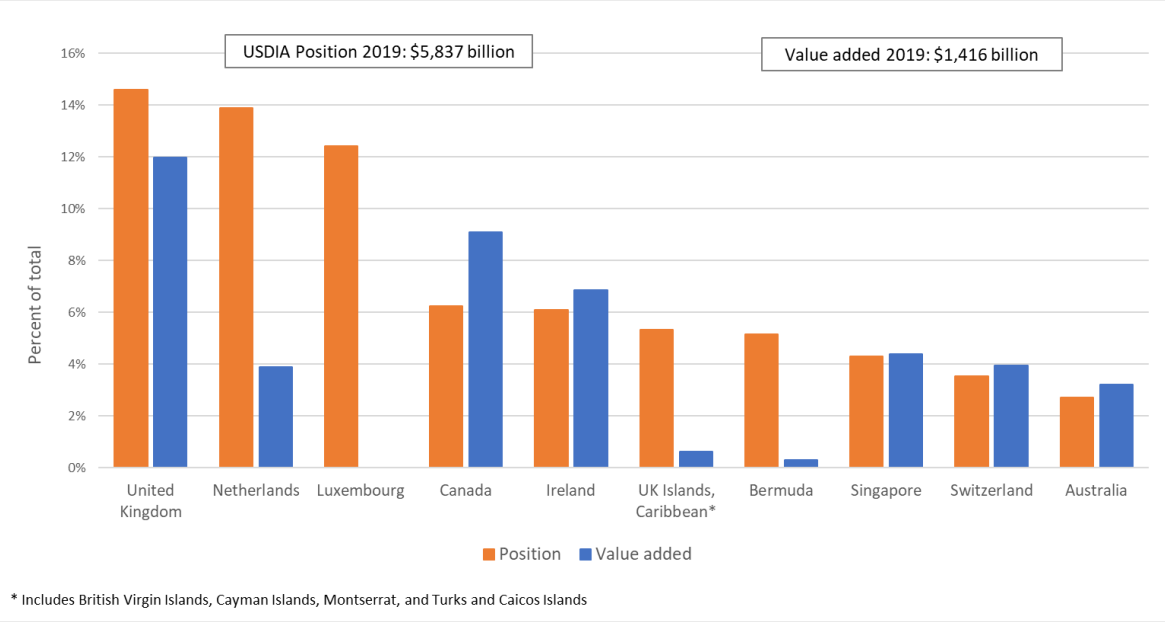
[4] U.S. Bureau of Economic Analysis, "Table 2.2. U.S. Direct Investment Positions in Special Purpose Entities (SPEs) at the End of the Year" (accessed Tuesday, August 15, 2023).

[5] In accordance with international guidelines, BEA's direct investment by country and industry statistics are presented on the directional basis, which is organized according to the direction of the direct investment relationship (outward versus inward). The direct investment statistics featured in BEA's ITAs and IIP Accounts are presented on the asset/liability basis, which is organized according to whether the investment relates to a U.S. asset or U.S. liability.

[6] BEA's activities of U.S. multinational enterprises statistics are available on BEA's website at https://www.bea.gov/data/intl-trade-investment/activities-us-multinational-enterprises-mnes.

Chart 2. Comparison of U.S. MNE Outward Position and Value Added by Country



BEA's statistics on inward direct investment are also affected in a similar manner. However, BEA produces inward direct investment income and position statistics classified by the country of ultimate beneficial owner (UBO), which is the controlling entity at the top of the global ownership chain, in addition to the country of the foreign parent, which is the country of the first entity outside the United States with direct ownership in the U.S. affiliate. The statistics by UBO identify the country and industry of the entity that ultimately owns or controls and thus ultimately derives the benefits and assumes the risks from owning or controlling a U.S. affiliate.

This paper is BEA's initial effort to produce statistics on the ultimate host economy (UHE) of U.S. direct investment abroad. It explores six different approaches to producing UHE statistics. Each approach represents a distinct method for reallocating the direct investment abroad position to its ultimate destination from the country where the immediate, or directly owned, foreign affiliate is located. The rest of the paper proceeds as follows: Section 2 reviews related research at BEA, international organizations, and foreign national statistical compilers to develop UHE statistics. Section 3 explains each of the six position reallocation methods that are investigated in this paper and discusses the merits and limitations of each approach. Section 4 provides the technical details regarding how each of the six reallocation methods was implemented and the BEA survey data that were used in the analysis. Section 5 presents the results of the analysis and provides a discussion of the paper's key findings. Section 6 discusses reallocation methods that BEA is planning to pursue. Section 7 concludes and discusses potential next steps.

2. Related Research

This project builds on Noonan's (2019) work on SPEs and passthrough equity in BEA's direct investment data. SPEs are legal entities with little or no employment or physical presence, and passthrough equity is equity that passes through an economy before arriving at its destination in another country. Noonan

found that the use of both is widespread among U.S. MNEs, indicating that BEA's published statistics on outward direct investment equity position by immediate partner economy are likely to be meaningfully different from positions by UHE. Noonan also found that U.S. MNEs' passthrough equity in majority-owned foreign affiliates accounted for slightly more than half of all owners' equity in majority-owned foreign affiliates in 2016.

Recently, the IMF's Direct Investment Task Team and the Organisation for Economic Cooperation and Development's (OECD's) Working Group on International Investment Statistics recommended that national statistical compilers develop supplemental presentations of direct investment statistics by UHE.[7] These recommendations are part of the process to update the IMF's Balance of Payments Manual, 6th edition (BPM6) and the OECD's Benchmark Definition of FDI, 4th edition (BD4).

Few countries have produced outward direct investment statistics by UHE. Germany is the only country that produces UHE statistics as part of its regular direct investment statistical releases.[8] Brazil produced a special official release that included outward direct investment statistics by UHE covering 2017.[9] Denmark and Portugal have produced pilot studies of outward direct investment statistics by UHE. Some of the common themes between the different approaches used by these countries to produce the statistics include the focus on redistributing the position, particularly the equity position, and doing so for only majority-owned/controlled foreign affiliates of domestically controlled parents, both due to data source constraints and other practical considerations. In all cases, these reallocations tended to result in decreases in the equity position in financial centers and increases in the position in countries where productive activities are more likely to be carried out, although positions in the former do not decrease to zero and can remain significant in some cases.

3. Position Reallocation Methods

There are several methods that could be used to reallocate the U.S. direct investment abroad position from the immediate countries and industries—that is, the countries and industries of the affiliates that are directly owned by the U.S. parent and hence are the first entities outside the United States in the ownership chain—to the country and industry of the affiliates where the investment ultimately is located. While the eventual goal is to reallocate the total position, as a practical first step, this paper explores using these methods to distribute the equity position only.[10] The methods investigated here can be conceptualized in terms of three broad categories: (1) push-down methods, (2) financial

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[7] https://www.imf.org/-/media/Files/Data/Statistics/BPM6/approved-guidance-notes/d6-ultimate-investing-economyultimate-host-economy-and-passthrough-funds.ashx.

[8] https://www.bundesbank.de/en/press/press-releases/german-foreign-direct-investment-in-2021-2022-903736.

[9] https://www.bcb.gov.br/content/publications/directinvestmentreport/2017/dir_2017.pdf.

[10] The U.S. direct investment abroad position is comprised of equity and net debt instruments positions—that is, U.S. parents' equity in, and net outstanding loans to, their affiliates. In addition to practical considerations that make the reallocation of the equity position more straightforward, the equity position is also vastly larger than the net debt position, particularly for more recent periods. In 2019, the year covered by this study, the equity position accounted for 98.5 percent of the total outward position.

structure methods, and (3) apportionment methods. The six specific methods investigated, which include a hybrid of categories 2 and 3, are summarized in table 1.

Table 1. Position Reallocation Methods

<table>
<tr><th>Category</th><th>1. Push-down</th><th>2. Financial structure</th><th>3. Apportionment</th></tr>
<tr><td rowspan="3">Sub-type</td><td rowspan="2">First operating affiliate</td><td>Passthrough with ownership chains</td><td rowspan="3">Employment / fixed capital / sales</td></tr>
<tr><td rowspan="2">Parent's equity share of affiliate's assets (PESAA)</td></tr>
<tr><td>Last affiliate</td></tr>
<tr><td colspan="3">Hybrid: passthrough-apportionment</td></tr>
</table>

Within the push-down category, there are two main sub-types: the first-operating affiliate method and the last affiliate method. Push-down methods, as the name implies, move (push) the position down the ownership chain to a single entity, without considering intermediate or subsequent linkages, if any. Push-down methods include the first-operating unit method, in which the position of the directly held affiliate gets assigned to the first unit that engages in productive (non-holding) activities, and the last-unit method, where the entire position of the directly held affiliate gets assigned to the last unit at the bottom of that chain. There are different possible approaches to defining an "operating" entity, but the approach adopted by the present analysis is to define it as any entity not classified as a holding company. [11]

One of the main advantages of the methods in the push-down category is that, since they only require information on a subset of the entities in a U.S. MNE's ownership structure, they are relatively easy to implement, at least when compared to the financial structure methods. This practical consideration was a major reason the IMF's Direct Investment Task Team recommended the first-operating unit method as its method of choice.[12] The drawback of push-down methods, though, is that, since these methods do not involve all of the units in an MNE's ownership chain, they may fail to capture many of the details of its global financial structure, which could be of interest to data users. Other potential downsides are that there are likely to be some cases where the first-operating or last unit may not be large enough to support the U.S. parent's equity position in the directly held affiliate (e.g., due to external financing in affiliates further down the chain). There might also be affiliates with negative positions in the ownership chain that can complicate the reallocation.

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[11] BEA data indicate there is significant overlap between holding companies and SPEs. In 2019, 91 percent of the direct equity position in SPEs was accounted for by holding companies, and 98 percent of the direct equity position in holding companies was accounted for by SPEs.

[12] D.6 Ultimate Investing Economy/Ultimate Host Economy and Pass-through Funds (https://www.imf.org/-/media/Files/Data/Statistics/BPM6/approved-guidance-notes/d6-ultimate-investing-economyultimate-host-economy-and-passthrough-funds.ashx).

Methods that look at the financial structure of U.S. MNEs can provide the best picture in terms of how U.S. parents organize their global financial structure. Under these methods, the position of the directly held affiliate is distributed *along* the affiliates in the chain, reflecting how much of the position "stays" at each tier. While these methods could arguably provide a better picture of MNEs' global financial structure, they are the most information-intensive methods because compilers would need accurate and detailed information on every foreign affiliate of the MNE. These methods could also create difficulties from a statistical compilation perspective because of the complex organizational structures MNEs use to maximize their worldwide profits. For example, distributing the ownership of the directly held foreign affiliate can be tricky if a unit along the chain has negative equity or an affiliate in a lower tier is larger than the one above, so all methods would need to account for these scenarios. [13]

The present analysis examines two main types of financial structure methods: the passthrough with ownership chains and the parent's equity share of affiliates' assets (PESAA) methods. The passthrough with ownership chains method attempts to reallocate the U.S. parent's equity position in the directly held affiliate by calculating the proportion of the equity position that "passes through" to the affiliate(s) beneath it in the ownership chain, while also performing a similar calculation for all indirectly held foreign affiliates with at least one child affiliate. This method produces a new, adjusted equity position for every affiliate in the ownership structure. As will be explained in section 4, the passthrough method uses detailed information on every unit in the U.S. MNE's ownership chain (i.e., for every foreign affiliate, the affiliates that own it and their voting ownership percentages are identified) to iteratively calculate passthrough equity and the resulting adjusted equity position for each foreign affiliate.

The other financial structure method is the parent's equity share of affiliates' assets method. In the PESAA method, the parent's equity position in directly owned affiliates is reallocated to indirectly owned affiliates in proportion to the equity ownership shares connecting the affiliates to each other and to the parent company, and in proportion to the share of the total financing of the affiliates accounted for by equity funding supplied directly or indirectly by the parent company. The equity position for directly owned foreign affiliates is then adjusted by subtracting that portion of the unadjusted position that has been reallocated to the indirectly owned affiliates. In cases where the ownership chain extends beyond the second tier, this process becomes an iterative one, in which the reallocation procedure is repeated at each tier.

The third category analyzed here, the apportionment method, is distinct from the other methods in that it does not require micro-level data. As such, it is the least demanding of the methods in terms of its informational requirements and is arguably the easiest to implement. One method in this category involves reapportioning the directly held positions based on a third dataset, such as the AMNE statistics. The position could be apportioned using country-level statistics, such as foreign affiliates' employment, physical assets (property, plant, and equipment), or sales/turnover. If employment were used, for example, then the value of U.S. parents' position in a given country would be calculated as the worldwide total of their positions in directly held foreign affiliates multiplied by the proportion of their

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[13] MNEs can structure their worldwide operations with affiliates that consistently report losses or are net lenders to their parent companies and have negative positions. Additionally, an affiliate in a lower tier might be larger than the affiliate in a higher tier due to investment from unaffiliated parties ("external financing"). The two financial structure methods presented here can account for these situations.

total worldwide foreign employment that occurs in the country in question. Potential drawbacks of this approach include that, like the push-down methods, it will not provide a full picture of MNEs' financial structure. In addition, its results can be sensitive to the metric chosen for the reapportionment. As an example, the apportioned position could be skewed towards countries and industries with labor-intensive affiliates if employment is used to apportion, or it could be skewed towards countries and industries with capital-intensive affiliates if physical assets are used to apportion.

Lastly, it is possible to combine aspects of the methods presented above to develop hybrid methods. For this analysis, a sixth, hybrid, method was also tested. This method made use of aspects of the passthrough and apportionment methods discussed above. Using BEA's AMNE company-level data, the amount of owners' equity, scaled by the U.S. parent's ownership in the affiliate, that stays in each foreign affiliate was calculated. The equity remaining in affiliates was then aggregated by country to arrive at the percent of total owners' equity accounted for by each country. Those percentages were then used to apportion the immediate outward direct investment position by country.

It is worth noting the methods that other countries have used to produce or attempt to produce outward direct investment statistics by UHE. Germany and Brazil, the only countries to have included UHE statistics as part of their official direct investment publications so far, both use the first-operating method. Denmark and Portugal, on the other hand, have used hybrid methods that reallocate the outward position by apportioning the directly held position along a direct investors' ownership chain based on a key metric (for example, non-financial assets).

4. Data and Methodology

This analysis makes use of direct investment data reported on BEA's Quarterly Survey of U.S. Direct Investment Abroad and AMNE data reported on BEA's Benchmark Survey of U.S. Direct Investment Abroad. The quarterly survey must be submitted by any U.S. person (in the broad legal sense including an individual, partnership, corporation, or other form of organization) that has direct transactions or positions with a foreign business enterprise in which it has an ownership interest of 10 percent or more and that meets other reporting requirements related to the size of its foreign affiliate(s).[14] The benchmark survey is only conducted every 5 years (in place of the Annual Survey of U.S. Direct Investment Abroad). It was most recently conducted in 2019, which is why data for 2019 were chosen for the present analysis. The Benchmark Survey of U.S. Direct Investment Abroad is collected from all U.S. persons (referred to here and in BEA publications as U.S. parents) that have at least a 10 percent voting ownership interest in one or more foreign affiliates. A separate survey form is submitted for each affiliate for which the 10-percent ownership threshold is passed, where the detail and complexity of the form depends on the size of the affiliate and whether it is majority- or minority-owned by the U.S. parent.

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[14] The Quarterly Survey of U.S. Direct Investment Abroad is collected through the BE-577 form. A BE-577 form is required for every directly owned foreign affiliate whose assets, annual sales, or annual net income(loss) is greater than $60 million and for every indirectly owned foreign affiliate that meets the $60 million threshold and has an intercompany receivable or payable balance with the U.S. parent that exceeds $10 million.

The key difference, for present purposes, between the benchmark survey and the annual survey is that the benchmark uses lower thresholds for determining whether detailed balance sheet and ownership information is collected on each foreign affiliate. The benchmark survey thus provides data on the universe of foreign affiliates. Two survey items are of particular importance in this regard. First, this paper's analysis uses information collected on each affiliate's direct and indirect ownership to reconstruct the ownership chain of each MNE. This ownership chain information is used by all of the methods except for the apportionment method, though some methods require more detailed information on the ownership chain than others. The benchmark survey collects the information used to construct ownership chains for each affiliate whose assets, sales, or net income (loss) is greater than $25 million, whereas the annual survey only collects this information on affiliates for which one of these items is above $60 million. Second, the passthrough with ownership chains and the passthrough-apportionment hybrid methods use data collected on affiliates' equity investments in other foreign affiliates (i.e., equity in subsidiaries or child affiliates). The benchmark survey collects this information for majority-owned foreign affiliates whose assets, sales, or net income (loss) is greater than $80 million, while the annual survey only collects this information for majority-owned affiliates whose assets, sales, or net income (loss) is greater than $300 million.

4.1. First Operating Affiliate

The first approach to reallocating the equity position involves identifying, for each affiliate that is directly owned by the U.S. parent, the first operating affiliate beneath it in the ownership structure and reassigning all of the U.S. parent's equity position in the directly held affiliate to the operating affiliate. Operating affiliates are defined as affiliates whose primary industry,[15] defined by largest sales, is not classified as a holding company.[16] If an affiliate directly held by the U.S. parent was an operating company, then the U.S. parent's equity in that affiliate was not reassigned. Appendix B provides an example of how to apply the first operating affiliate method, as well as the other methods that use ownership chain data (last affiliate, passthrough with ownership chains, and PESAA), using a hypothetical MNE.

Due to the complexity of MNE ownership structures, it is not always possible to identify a single operating affiliate that unambiguously comes first beneath a given directly held affiliate. Operating affiliates were treated as being "first" if a direct line could be drawn to them through the MNE ownership chain from the directly held holding company affiliate without passing through another operating affiliate. Consider the hypothetical ownership structure in figure 2, where affiliate A is the affiliate in which the U.S. parent (USP) has a direct equity position that potentially needs to be reallocated. If affiliate A is an operating company, then the equity position is not reallocated. If affiliate A is a holding company and affiliate B is an operating company, the entire equity position is reassigned from A to B, even if there are additional lower tier affiliates owned by B. If affiliates A and B are holding companies and affiliates C and D are operating companies, then the equity position in A is split between

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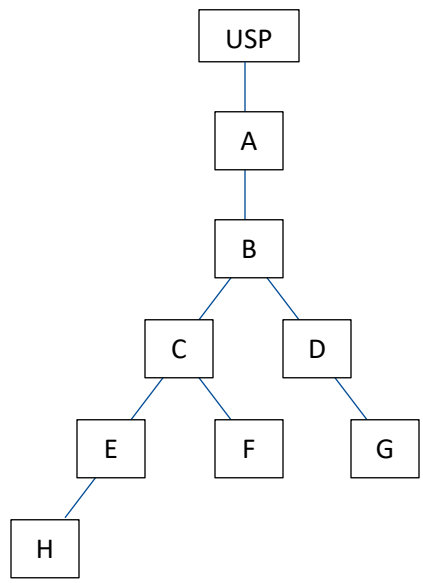
[15] BEA's direct investment statistics uses industry classifications adapted from the North American Industry Classification System (NAICS). In 2019, BEA survey industry classifications were adapted from the 2017 NAICS.

[16] Holding companies are businesses engaged in holding the securities or financial assets of companies and enterprises for the purpose of owning a controlling interest in them or influencing their management decisions. Businesses in this industry do not manage the day-to-day operations of the firms whose securities they hold.

C and D (the methodology for dividing equity is explained below). If A, B, and D are holding companies and C and G are operating companies, then the equity in A is split between C and G. Finally, if A, B, C, D, and E are holding companies and F, G, and H are operating companies, then the equity position in A is split between F, G, and H.

Figure 2. Hypothetical MNE Ownership Structure



When an equity position is reassigned to multiple first operating affiliates, the quantity reassigned to each affiliate is proportional to the ownership interest of the directly held affiliate. If there are n first operating affiliates and if the ownership interest of a directly held affiliate is denoted as *PctOwnership*, then the proportion of the immediate equity position, *PositionEquityDirect*, reassigned to the *i*th first operating affiliate is calculated as:

$$ReassignedEquityPosition_i = \frac{PctOwnership_i}{\sum_{l=1}^{n} PctOwnership_l} \times PositionEquityDirect \qquad (1)$$

4.2. Last Affiliate

The second method for reallocating the equity position involves reassigning it to the last affiliate (or affiliates) beneath the affiliate directly held by the USP. Last affiliates are defined as any affiliates that the USP holds directly or holds indirectly (through a directly held affiliate) and that do not have an ownership interest in any other affiliates. With this reallocation method, the industries in which affiliates operate are not considered. In the example in figure 2, the USP's equity in A would be reallocated to affiliates F, G, and H regardless of the industry codes reported by each affiliate. The method for splitting the equity position when multiple last affiliates are identified is the same as the method for splitting equity in the case of multiple first operating affiliates.

4.3. Passthrough With Ownership Chains

The passthrough with ownership chains method builds upon the work of Borga and Caliandro (2018) by applying their passthrough methodology to BEA data on U.S. MNEs' ownership chains. In this method, the USP's directly held equity position is reallocated by taking into account the equity investments that its foreign affiliates have in one another. The basic idea behind this approach is to calculate the USP's share of its affiliates' equity investment(s) in their child affiliates and to use this information to reallocate some or all of the directly held direct investment equity position among indirectly held affiliates.

As indicated above, passthrough equity refers to the portion of the USP's equity position in a given affiliate that "passes through" the affiliate and can thus be treated as a position in the next affiliate(s) down the ownership chain. For each affiliate, the value of the USP's passthrough equity is a function of the equity that the USP has in it (inward equity), the equity that it has in its subsidiaries (outward equity), and the USP's ownership interest in the affiliate in question. Once inward equity and passthrough equity have been determined for each affiliate, the final adjusted equity position in the affiliate can be calculated as inward equity minus passthrough equity—a subtraction that ensures there is no double (or triple, etc.) counting of equity positions along an ownership chain. Passthrough equity is calculated according to the following formulas, where *PTE* = passthrough equity, *IE* = inward equity, *OE* = outward equity, and *USPPctOwn* is the USP's ownership share (out of 100 percent) in the affiliate in question:

$$If\ IE\ \geq 0\ and\ OE \geq 0, then\ PTE = \min(IE, OE \times USPPctOwn). \quad (2)$$

$$Else\ if\ IE \leq 0\ and\ OE \leq 0, then\ PTE = \max(IE, OE \times USPPctOwn). \quad (3)$$

$$Else\ PTE = 0. \quad (4)$$

The passthrough equity method is similar to the PESAA method in that it draws on detailed ownership chain information to determine what proportion of the USP's equity position in the directly held affiliate to reallocate to each affiliate along the chain. Also, like the PESAA and push-down methods, its focus is on reallocating, at the micro-level, the equity positions reported on the Quarterly Survey of U.S. Direct Investment Abroad. This reported equity position of the USP is, for affiliates that are directly (and only directly) held by the USP, treated as the value of inward equity. In the case of affiliates that are only indirectly held by the USP, their inward equity equals the passthrough equity of the affiliate (or affiliates) that directly own them. Passthrough equity is thus calculated iteratively, beginning with directly held affiliates and then moving down the ownership chain affiliate by affiliate. For affiliates that are both directly and indirectly owned by the USP, inward equity is the sum of the USP's direct equity position and any passthrough equity from affiliate(s) that are direct owners.

When an affiliate has two or more child affiliates, its passthrough equity is divided among its children affiliates (to become their inward equity) in a manner that is proportional to its direct ownership interest in each child affiliate and the total owners' equity of each subsidiary. If there are m affiliate subsidiaries, then the inward equity for the *j*th subsidiary is calculated as follows:

$$IE_j = PTE \times \frac{PctOwnership_j \times owners'\ equity_j}{\sum_{l=1}^{m} PctOwnership_l \times owners'\ equity_l} \quad (5)$$

When an affiliate has multiple parents, its inward equity is the sum of the passthrough equity received from each of its parents.

4.4. PESAA

The third method for reallocating the equity position derives its name from the fact that it is based, in part, on the U.S. parent's equity share in affiliates' assets (PESAA). This method involves a two-part algorithm, which is laid out in detail below. The first part calculates an "unadjusted" equity position for each affiliate. This unadjusted position is equivalent to the value of the equity position that the method assigns to the affiliate in question plus the value of the equity positions the method assigns to the affiliates in which it has a direct or indirect ownership interest. The second part of the algorithm calculates, for each affiliate, the portion of its unadjusted equity position that belongs to its child affiliates and then subtracts this amount from the unadjusted position—thereby preventing double (or triple, etc.) counting of equity positions that must be reallocated multiple times along an ownership chain—to determine the final adjusted equity position.

1. Each affiliate's unadjusted equity position is calculated by working iteratively downward through the ownership structure, starting with directly held affiliates. As explained in steps a, b, and c below, the calculation of unadjusted equity position differs according to whether an affiliate is directly (and only directly) held by the USP, directly and indirectly held by the USP, or only indirectly held by the USP. For each affiliate with child affiliates, after unadjusted equity position is calculated, the value of PESAA is calculated as unadjusted equity position divided by assets.[17] Its PESAA value is then used in the calculation of its directly held child affiliates' unadjusted equity positions.
    a. For affiliate *k* that is directly (and only directly) held by the USP, its unadjusted equity position, $UnadjEqPos_k$, equals the USP's reported equity position.
    b. For affiliate *k* that is directly and indirectly held by the USP and has $i = 1, \ldots, n$ affiliate parents each of whom has $PctOwned_i$ interest in affiliate *k*, unadjusted equity position is calculated as:

$$UnadjEqPos_k = USP's\ direct\ equity_k + \sum_{i=1}^{n} PctOwned_i \times PESAA_i \times owners' equity_k \quad (6)$$

    c. For affiliate *k* that is only indirectly held by the USP, the unadjusted equity position is calculated using a modified version of equation 6:

[17] The assets and owners' equity of each affiliate were reported on the 2019 Benchmark Survey of U.S. Direct Investment Abroad.

$$UnadjEqPos_k = \sum_{i=1}^{n} PctOwned_i \times PESAA_i \times owners'equity_k \quad (7)$$

2. After unadjusted equity position is calculated, the algorithm calculates the portion of each affiliate's unadjusted equity position that belongs to the affiliate(s) beneath it, designated here as $ReassignedPortion$. The final adjusted equity position of affiliate *k* is equal to $UnadjEqPos_k - ReassignedPortion_k$. Note that while an affiliate's unadjusted equity position partly depends, if it is indirectly held, on the PESAA value of its affiliate parent(s), the amount of its unadjusted equity position that belongs to the affiliates beneath it in the ownership chain is a function, in part, of its own PESAA value.
    a. For affiliates that do not own any other foreign affiliates, $ReassignedPortion$ equals zero, and unadjusted equity position thus equals the final adjusted equity position.
    b. For affiliate *k* with $j = 1, \ldots, m$ directly owned child affiliates where its ownership in each is represented as $PctOwnership_j$, the value to subtract from unadjusted equity position is:

$$ReassignedPortion_k = \sum_{j=1}^{m} PctOwnership_j \times PESAA_k \times owners'equity_j \quad (8)$$

It is important to note that a shortcoming of the PESAA method is that, in certain circumstances, the second step—the calculation and subtraction of equity positions belonging to child affiliates—can lead to the creation of negative equity positions even when the initial direct investment equity position is positive.[18] When a child affiliate is larger than its parent affiliate in terms of its owners' equity, then the PESAA algorithm has a tendency to reallocate more equity from the parent affiliate to the child than exists in the parent affiliate, thereby making the equity position in the parent affiliate negative. The calculation of country and industry-level reallocated equity positions can then be misleadingly skewed by the inclusion of these negative equity positions produced by the PESAA method.

4.5. Apportionment

The apportionment method was implemented using three different data items from the 2019 Benchmark Survey of U.S. Direct Investment Abroad: net property, plant, and equipment (PP&E), sales, and employment. That is, three different sets of results were created, each of which reallocated country-level position data based on one of the above three metrics. For each of these data items, the percentage that each country and industry accounts for of the total was then applied to the total immediate outward direct investment position to reallocate it accordingly.

[18] It can also lead to the creation of positive equity positions when the initial direct investment position is negative, though that scenario is less common.

4.6. Passthrough-Apportionment Hybrid

The hybrid reallocation method combines aspects of the passthrough and apportionment methods. Instead of reallocating the USP's immediate equity position at the micro-level by moving down the ownership chain, it involves calculating an estimate of the passthrough in each affiliate based on each affiliate's owners' equity and equity investment in other foreign affiliates, both scaled by the USP's ownership interest in the affiliate from the 2019 Benchmark Survey of U.S. Direct Investment Abroad. The owners' equity of each affiliate, scaled by the direct and indirect ownership interest the USP has in the affiliate, is treated as its inward equity similar to the passthrough method described above. Passthrough equity is then calculated, using equations 2 to 4, as the minimum (or maximum) of owners' equity and equity investments in other foreign affiliates, both of them scaled by the direct and indirect USP ownership interest. The amount of equity that stays in each affiliate, designated here as $EstEqPos$, is calculated as the USP's share of the affiliate's owners' equity (i.e., the product of the affiliate's owners' equity and the USP's ownership interest in it) minus the affiliate's passthrough equity.

These estimates of the equity remaining in every affiliate are aggregated within each country and then across all *n* countries to determine the percentage of the global total of owner's equity that stays for country *k*. These percentages are then used to recalculate the country-level totals for the outward direct investment equity positions. For all *n* countries, the adjusted equity position of country *k*, $AdjEqPos_k$, is the product of the global total of the U.S. direct investment abroad equity position, $USDIAEqPos$, and the proportion of the global total estimated equity position accounted for by country *k*. The procedure described in this paragraph is represented in the following equation.

$$AdjEqPos_k = USDIAEqPos \times \frac{EstEqPos_k}{\sum_{l=1}^{n} EstEqPos_l} \tag{9}$$

5. Results

Tables 2 through 6 provide a summary of some of the key similarities and differences between the results produced by the reallocation methods analyzed. Table 2 provides information on the proportion of the total U.S. direct investment abroad equity position—$5.75 trillion in 2019—that is reallocated by each of the methods based on the reallocation of micro-level data. The quantity under the "Equity reallocated" heading includes any part of the position in a directly held affiliate that is reallocated to an indirectly held affiliate. Double (or triple, etc.) counting of equity that is reallocated multiple times along a chain in the PESAA and passthrough (with chains) methods has been eliminated so that each dollar of equity position is only counted as being reallocated once or not at all. Note that these figures cannot be computed for the apportionment and the hybrid passthrough-apportionment methods because these methods are not based on reallocating directly held equity positions at the micro level.

The results in table 2 indicate that the first operating affiliate, PESAA, and passthrough methods all reallocate roughly similar proportions of the total U.S. direct investment equity position abroad—approximately $2.17 to $2.35 trillion of the total $5.75 trillion equity position in 2019. The last affiliate method is distinct in that it reallocates over half—approximately $3.34 trillion—of the total equity

position abroad. These results suggest that the adjusted equity positions generated by the last affiliate method are likely to differ more significantly from the published directly held equity positions than are the adjusted equity positions generated by the other three methods—a conclusion that is borne out by the results in table 3.

Table 2. Total Equity Position Reallocated by Method
[Billions of dollars]

Reallocation method	Equity reallocated	% of total
First operating affiliate	2,351	40.88
Last affiliate	3,336	58.01
PESAA	2,171	37.76
Passthrough with ownership chains	2,274	39.54

Table 3 provides the correlation of the country-level U.S. direct investment abroad equity positions in BEA's published data with the country-level adjusted equity positions resulting from each of the reallocation methods analyzed in this paper. Values close to one indicate that the country-level totals resulting from the reallocation method are relatively similar to the country-level totals in the published data, while values farther from one indicate relatively different country-level values. The three financial structure methods—PESAA and the two passthrough methods—led to country-level equity positions that have the highest correlation with the original directly held country-level positions, as all three of these methods have a correlation coefficient of 0.93 or higher. Next come the push-down methods, with the last affiliate method having a value that is well below any of the non-apportionment methods at approximately 0.86, indicating its country-level results are significantly different from the published country-level totals. The apportionment methods, and especially apportionment based on employment, have country-level correlations that are significantly lower than those created by any of the other methods, indicating the largest difference in the country level results from the published statistics.

Table 3. Correlations with Direct Investment Equity Position at Country Level by Method

Reallocation method	Correlation coefficient
First operating affiliate	0.9127
Last affiliate	0.8547
PESAA	0.9586
Passthrough with ownership chains	0.9479
Apportionment (employment)	0.4591
Apportionment (sales)	0.7172
Apportionment (net PP&E)	0.6248
Passthrough-apportionment hybrid	0.9310

The results in Table 4 further explore the differences between the country-level results generated by each of the reallocation methods. This table presents correlations between the country-level equity positions generated by each method and total employment and net PP&E (property, plant, and

equipment) attributable to foreign affiliates in each country.[19] For comparison, the table also provides the correlations between the directly held country-level equity positions in BEA's published data and foreign affiliate employment and net PP&E. The results in table 4 indicate that every reallocation method tends to reallocate equity position away from entities that are primarily engaged in holding securities toward entities engaged in activities traditionally considered productive (i.e., pursuits that involve employing workers and physical plant and equipment). In other words, for every reallocation method, the correlations between country-level adjusted equity positions and foreign affiliate employment and net PP&E are higher than the correlations between directly held equity positions and foreign affiliate employment and net PP&E. The results are also consistent with those in the previous two tables in that the financial structure methods tend to change the country-level equity positions the least and the apportionment methods tend to change them the most, while the last affiliate method also produced relatively significant changes in the country-level equity positions.

Table 4. Correlations with Total Employment and Net PP&E at Country Level by Method

Reallocation method	Employment	Net PP&E
Directly held equity position	0.4591	0.6248
First operating affiliate	0.6543	0.8017
Last affiliate	0.7265	0.8383
PESAA	0.5656	0.7279
Passthrough with ownership chains	0.5853	0.7485
Apportionment (employment)	1.0000	0.7846
Apportionment (sales)	0.7856	0.8874
Apportionment (net PP&E)	0.7846	1.0000
Passthrough-apportionment hybrid	0.5698	0.7402

Table 5 provides insight into another important difference between the reallocation methods: their relative tendencies to create additional dollars of positive and negative equity position.[20] The results in table 5 indicate that the push-down methods never create additional dollars of positive and negative equity position but that the financial structure methods, and especially the PESAA method, tend to do so. [21] As explained in section 4, PESAA often does this when a child affiliate is larger than its parent affiliate in terms of its owners' equity. To be sure, when these additional positive and negative positions

[19] Foreign affiliates' employment and net PP&E were collected on the 2019 Benchmark Survey of U.S. Direct Investment Abroad.

[20] Direct investment positions are usually positive but can be negative. A negative position means that U.S. parent companies are in a net liability position vis-à-vis their foreign affiliate(s). This can occur because the USPs' foreign affiliate(s) have incurred sufficiently large losses or the parent has removed equity in excess of their investment. For more information, see http://www.bea.gov/help/faq/1189.

[21] The reason the total positive and negative equity positions that result from the push-down methods are lower in magnitude than the published positive and negative positions is that sometimes an indirectly held affiliate is reassigned both positive and negative equity positions from different directly held affiliates. When that happens, the positive and negative positions are combined, which does not change their net value, but does reduce the total of positive and negative equity positions when considered separately.

are created, they always cancel one another out at the aggregate level so that the total net equity position is unchanged. Nonetheless, the presence of these "invented" positions in the microdata have the potential to skew the results when calculating country and industry-level aggregates, and the tendency of PESAA to generate these additional positions is thus a severe limitation of the method.

Table 5. Total Positive and Negative Equity Positions Before and After Reallocation [Billions of dollars]

Reallocation method	Total of positive equity positions	Total of negative equity positions
Published	5,963	-213
First operating affiliate	5,961	-211
Last affiliate	5,960	-210
Passthrough with ownership chains	6,043	-293
PESAA	6,507	-757

An important caveat regarding the results in the preceding tables is that a portion of the equity position that remained with directly held affiliates did so not for methodological reasons but because of shortcomings in the microdata. In some cases, a directly held affiliate's equity could not be reallocated, because BEA did not have all of the data needed to determine how much to reallocate and/or to which child affiliates it should be reallocated. To be sure, the lion's share of the equity that remained with directly held affiliates did so for valid methodological reasons—such as directly held affiliates that are operating affiliates in the case of the first operating affiliate method or directly held affiliates without child affiliates in the case of the last affiliate method. Table 6 provides information on the proportion of the U.S. direct investment abroad equity position, divided into positive and negative components, that could not be reallocated due to data limitations.

To an extent, the four methods faced the same data limitations. None of them could reallocate direct equity positions in affiliates for which ownership chains could not be constructed due to respondents to the 2019 Survey of U.S. Direct Investment Abroad not providing all of the requested ownership information. These affiliates accounted for $237 billion, or 4 percent, on a net basis in directly held equity positions. The last affiliate method, arguably the method with the fewest information requirements, did not face any other data limitations.

The financial structure methods require more data than the push-down methods, and, as a result, the former were able to reallocate fewer direct equity positions than the latter due to data limitations. Before discussing the precise data limitations faced by the financial structure methods, it is important to note that future iterations of this project will continue to attempt to overcome some of these limitations by making reasonable assumptions about the missing data. In other words, not all data limitations are the same and some may be overcome by making informed assumptions about what the missing data are likely to be. The feasibility of increasing the proportion of the direct equity position that can be reallocated through such assumptions is a topic for future research.

One key limitation faced by the financial structure methods is that they require more detailed information about ownership percentages between the USP and affiliates and between parent affiliates

and child affiliates—meaning that ownership chains that are usable by the push-down methods might not be useable by the financial structure methods if these percentages were not provided by survey respondents. In addition, the PESAA method cannot be applied when PESAA takes a negative value, which happens when the USP's equity position is negative, and the affiliate's assets are not negative or vice versa (a situation that accounts for –$26 billion on a net basis of the direct equity position). Regarding the passthrough method, there was $113 billion on a net basis, or 2 percent, in directly held equity positions that could not be reallocated due to directly held affiliates with zero equity in child affiliates (even though the ownership chain data indicated they owned other affiliates) or having equity in child affiliates that had a different sign (i.e., positive or negative) than the USP's direct equity position, making it impossible to compute a value for the directly held affiliate's passthrough equity.

Table 6. Equity Position Not Reallocated Due to Data Limitations
[Billions of dollars]

Reallocation method	Positive	Negative	Net	Net as % of total
First operating affiliate	259	-22	237	4.13
Last affiliate	258	-21	237	4.12
PESAA	326	-55	271	4.72
Passthrough with ownership chains	460	-51	409	7.11

Finally, even though the different methods' results are similar in a variety of ways, the results in this section clearly demonstrate that there is considerable variation among them, in terms of both the amount of directly held equity that is reallocated and the economies to which it is reassigned. In other words, the choice of reallocation method does matter. Although there are many nuances in regard to how the methods' results differ, at a broad level, the financial structure methods produce results that are most similar to the published direct investment equity positions on an immediate counterpart basis. Of all of the methods examined here, the apportionment methods produce results that tend to differ the most from the published outward direct investment positions on an immediate basis. The push-down methods occupy a middle position, between the financial structure and the apportionment methods in terms of how much they differ from the published, directly held equity positions.

6. Preferred Methods

One of the purposes of this paper is to guide BEA's future efforts to produce official statistics for U.S. direct investment abroad by ultimate host economy. BEA proposes to further explore the two push-down methods and the passthrough with ownership chains method. A key strongpoint of these three methods is that they make use of BEA's rich survey microdata and especially of detailed data on the structure of U.S. MNEs' ownership chains. The use of the ownership chain data is particularly valuable since it allows these methods to reallocate each piece of the U.S. direct investment abroad equity position based on the actual relationships between the U.S. parent and its foreign affiliates.

To be sure, the PESAA method also has these features, and, as can be seen in table 6, the PESAA method currently faces fewer data limitations than the passthrough with ownership chains method in regard to the proportion of the total position it is able to reallocate. This method is not included in the group that merits further exploration primarily because of its tendency to generate additional positive and negative positions (see table 5). These additional positions, although they do not have a significant impact at the global aggregate level, are a major drawback given their likely impact on the country and industry-level aggregates that BEA is ultimately aiming to produce. Moreover, as indicated above, many of the shortcomings currently faced by the passthrough with ownership chains method in regard to data limitations can likely be overcome in future iterations of this project by making informed assumptions about likely values of missing data.

The hybrid method also makes use of survey microdata, although, like the apportionment method, it does not use ownership chain data to guide the reallocation of direct equity positions. The fact that the hybrid and apportionment methods do not use ownership chain data means that they ultimately have to make more assumptions than do the methods that use the ownership chain data about where it is appropriate to reallocate each dollar of the U.S. direct investment abroad equity position. Regarding the apportionment methods in particular, tables 3 and 4 indicate that the post-reallocation country-level equity positions generated by these methods differ enormously from the post-reallocation positions generated by the methods that use ownership chain data, strongly suggesting that the assumptions on which the former methods rely may be problematic.

Country and Industry Results

Appendix tables A1 through A6 present summary country-level and sector-level experimental statistics for the first operating affiliate, last affiliate, and passthrough with ownership chains methods. This information is also presented graphically in charts 3 to 6. The country tables provide information, for each method, on the five countries whose total equity position decreased the most and the 10 whose position increased the most.[22] One key takeaway is that there are broad areas of agreement between the different methods' results. For all methods, the Netherlands and Luxembourg are the two countries with the largest decrease in their equity positions. Beyond these two countries, the decreases are concentrated and countries with the largest decreases for all methods tend to be countries that are known as financial centers. The countries with the largest increases are, in general, not known as financial centers and are thus countries where productive activities are likely taking place.
Despite the shift of equity positions away from financial centers in all methods, significant equity still remains in financial centers, as shown in tables A1 through A3. This finding is consistent with those obtained by national statistical compilers in other countries that have attempted to reallocate outward direct investment positions to ultimate host economies (see section 2).

[22] While this presentation choice is asymmetric, it allows us to show the vast majority of the decreases without confidentiality concerns. Expanding the decreases to the top ten countries would result in confidentiality protections for some countries due to the limited number of affiliates impacting the changes in those countries.

Chart 3. Largest Country Changes Using the First-Operating Affiliate Method

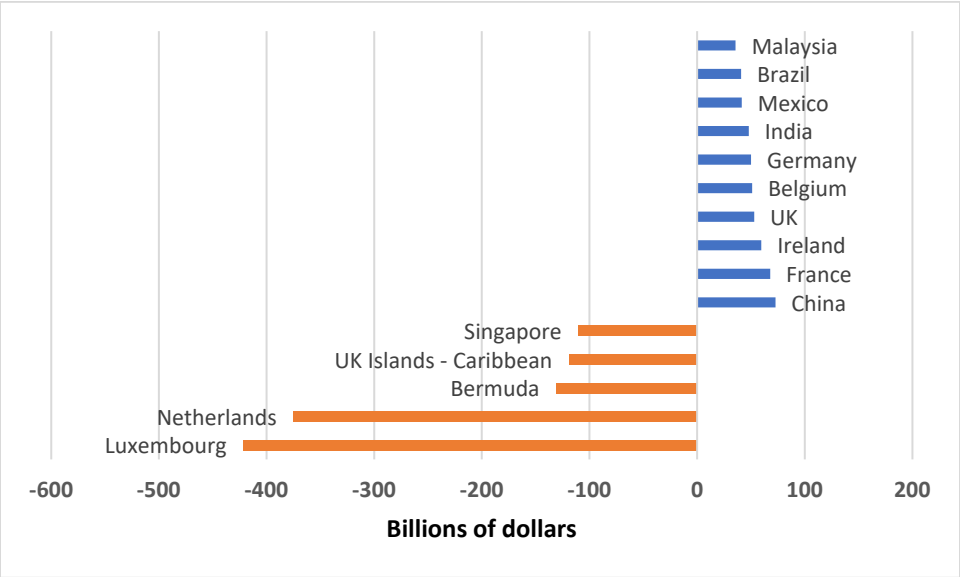


Chart 4. Largest Country Changes Using the Last Affiliate Method

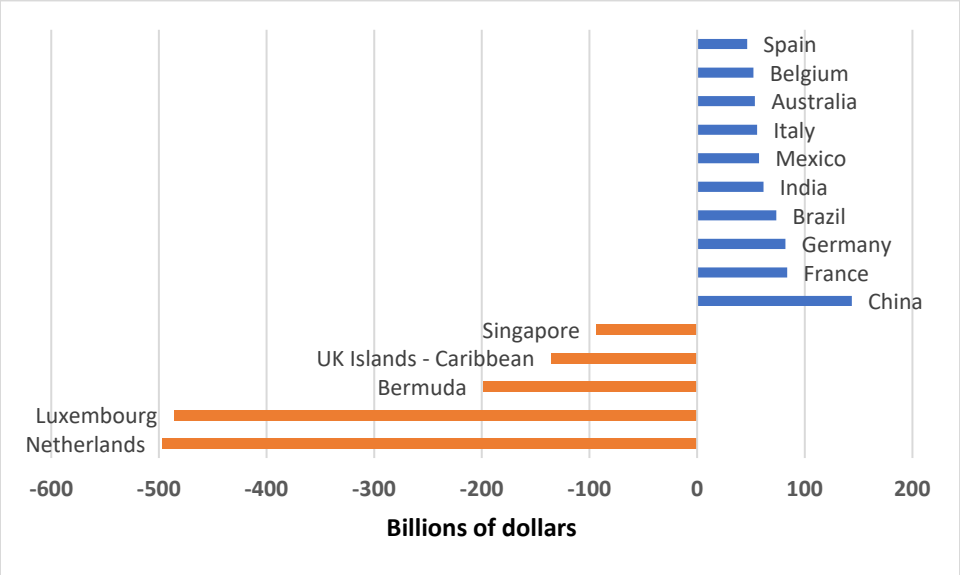
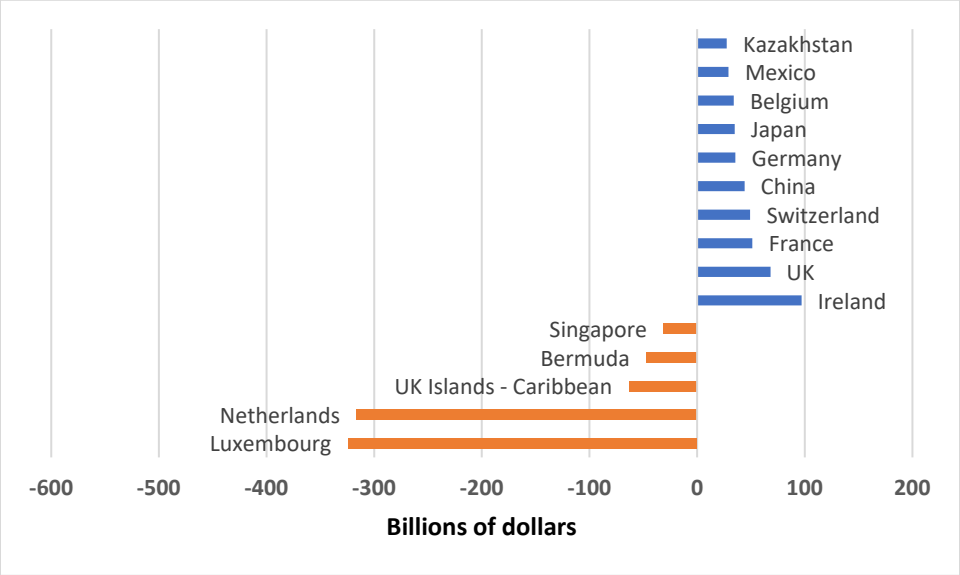


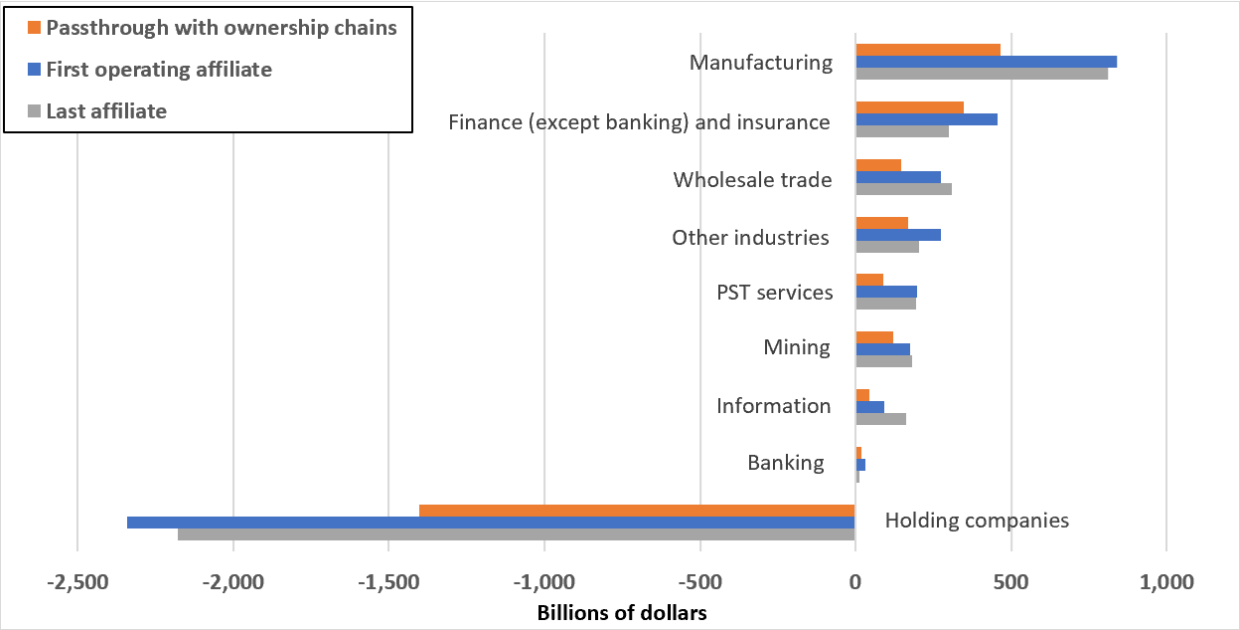
Chart 5. Largest Country Changes Using the Passthrough with Ownership Chains Method



The sector results indicate that all three methods had the effect of decreasing the equity position in holding companies and increasing the position in all other sectors. While some detailed industries (4-digit ISI codes) also saw decreases, they accounted for between 1 and 6 percent of the directly held equity position across the three methods.

It is noteworthy that some of the industries with the largest increases in equity positions are finance related. For three of the four microdata-based methods, “Other financial investment activities and exchanges” was the detailed industry with the largest increase in equity position, and, for all four methods, this code and, “Non-depository credit intermediation, except branches and agencies” and, “Securities and commodity contracts intermediation and brokerage” were among the 10 detailed industries with the largest increases in equity position. These industries, which include foreign affiliates performing intra-company financing, such as holding portfolio securities or providing loans to other affiliates, can be in financial centers. However, on a sector level, such as the statistics presented in chart 6 and appendix A, affiliates in manufacturing received the largest amount of reallocated equity positions. At the detailed industry level, the manufacture of "pharmaceuticals and medicines" and "semiconductors and other electronic components" were both among the 10 industries with the largest increases for all three methods. At the sector level, the finance sector receives the second or third largest amount of reallocated equity position, depending on the method.

Chart 6. Sector Changes by Method



7. Conclusion and Next Steps

This paper presents the results of BEA's initial attempt to re-allocate the U.S. direct investment abroad position on an immediate basis to the countries and industries where it is ultimately invested. It presents six different broad methods on how the direct investment position could be reallocated, how these methods were applied to BEA's circumstances, and presents summary results. It then proposes three methods for BEA to further explore: the two push-down methods and the passthrough with ownership chains methods.

BEA will continue to explore producing outward direct investment statistics by UHE for these three methods, which includes the possibility of further refining these methods to alleviate some of their limitations. In addition to some of the limitations specific to each method which are further explained above, there are additional aspects of the project that affect all the methods proposed for further exploration that could be further studied. For example, as was briefly mentioned in section 3, these three methods only distribute the equity position but do not intrinsically distribute the debt position. Also, as currently implemented, these methods do not account for ownership chains where a U.S. parent routes its investment through the United States at some point along the ownership chain. BEA's statistics on the activities of U.S. multinational enterprises collect information on U.S. parents and their foreign affiliates (defined as the foreign business enterprises it owns), so they do not include information on U.S. operations and affiliates further down the chain, if any.[23] Any further analysis on

[23] BEA's statistics on foreign direct investment in the United States (FDIUS) position by country of ultimate beneficial owner (UBO), the controlling entity at the top of the global ownership chain, can shed light on this phenomenon. The UBO ultimately owns or controls, and thus ultimately derives the benefits and assumes the risks from owning or controlling, an affiliate. The country of the UBO is often the same as that of the foreign parent, but

these and other aspects will have to balance its relative importance within the statistics, data availability and resource requirements, and data user interest.

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phenomenon. The UBO ultimately owns or controls, and thus ultimately derives the benefits and assumes the risks from owning or controlling, an affiliate. The country of the UBO is often the same as that of the foreign parent, but it may be a different country or the United States. This last scenario occurs when a U.S. parent owns its U.S. operations through a foreign entity, which can happen for worldwide profit maximization strategies or as the product of merger and acquisition activity where a U.S. parent acquires a foreign business which itself already had U.S. operations. Until (or if) the company re-structures their global ownership structure the U.S. operations they own through the foreign entity will be presented in BEA's statistics as an inward investment with a U.S. UBO. In 2019, 1.8 percent of the FDIUS position was accounted for by U.S. UBOs, but the number has increased, and in 2022, the latest year available, U.S. UBOs accounted for 4.7 percent of the total FDIUS position.

Appendix A. Country and Industry Results[24]

Table A1. Largest Increases and Decreases in Equity Position by Country for First Operating Affiliate Method [Preliminary results, billions of dollars]

	New position	Difference		New position	Difference
Decrease in position			Increase in position		
Luxembourg	260	–420	China	170	70
Netherlands	400	–380	France	150	70
Bermuda	210	–130	Ireland	400	60
U.K. Islands–Caribbean	180	–120	United Kingdom	890	50
Singapore	180	–110	Belgium	110	50
			Germany	180	50
			India	90	50
			Mexico	140	40
			Brazil	110	40
			Malaysia	50	40

Table A2. Largest Increases and Decreases in Equity Position by Country for Last Affiliate Method [Preliminary results, billions of dollars]

	New position	Difference		New position	Difference
Decrease in position			Increase in position		
Netherlands	280	–500	China	240	140
Luxembourg	200	–490	France	170	80
Bermuda	150	–200	Germany	210	80
U.K. Islands–Caribbean	170	–140	Brazil	140	70
Singapore	190	–90	India	100	60
			Mexico	160	60
			Italy	80	60
			Australia	160	50
			Belgium	110	50
			Spain	80	50

[24] Preliminary results in this appendix have been rounded to the nearest tens of billions as an extra layer of confidentiality protection for these experimental results.

Table A3. Largest Increases and Decreases in Equity Position by Country for Passthrough with Ownership Chains Method [Preliminary results, billions of dollars]

	New position	Difference		New position	Difference
Decrease in position			Increase in position		
Luxembourg	360	–320	Ireland	440	100
Netherlands	460	–320	United Kingdom	910	70
U.K. Islands–Caribbean	240	–60	France	140	50
Bermuda	300	–50	Switzerland	270	50
Singapore	260	–30	China	150	40
			Germany	170	40
			Japan	180	30
			Belgium	100	30
			Mexico	130	30
			Kazakhstan	50	30

Table A4. Changes in Equity Position by Sector for First Operating Affiliate Method [Preliminary results, billions of dollars]

	New position	Difference
Holding companies (nonbank)	300	–2,340
Depository institutions (banking)	180	30
Information	370	90
Mining	340	180
Professional, scientific, and technical services	360	200
Other industries	680	270
Wholesale trade	510	280
Finance (except depository institutions) and insurance	1,400	460
Manufacturing	1,620	840

Table A5. Changes in Equity Position by Sector for Last Affiliate Method
[Preliminary results, billions of dollars]

	New position	Difference
Holding companies (nonbank)	460	–2,180
Depository institutions (banking)	160	10
Information	440	160
Mining	340	180
Professional, scientific, and technical services	360	200
Other industries	610	200
Finance (except depository institutions) and insurance	1,240	300
Wholesale trade	540	310
Manufacturing	1,600	810

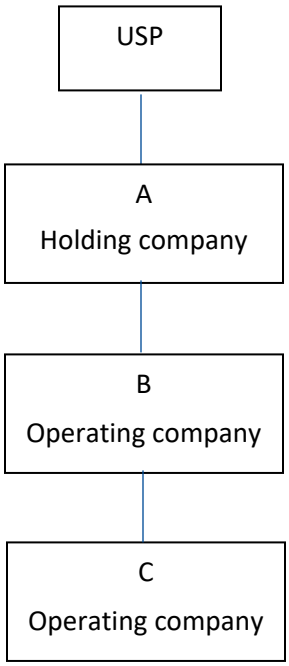
Table A6. Changes in Equity Position by Sector for Passthrough with Ownership Chains Method
[Preliminary results, billions of dollars]

	New position	Difference
Holding companies (nonbank)	1,240	–1,400
Depository institutions (banking)	160	20
Information	320	40
Professional, scientific, and technical services	250	90
Mining	280	120
Wholesale trade	380	150
Other industries	580	170
Finance (except depository institutions) and insurance	1,290	350
Manufacturing	1,250	470

Appendix B. Example Calculations

This appendix uses a hypothetical MNE to provide example calculations for the four methods that use ownership chain data (first operating affiliate, last affiliate, passthrough with chains, and PESAA). Consider the MNE in figure B1 where the USP has, on an immediate basis, a $100 million equity position in affiliate A, which is a holding company. Under the first operating affiliate method, the entirety of this position is reallocated to affiliate B, despite the existence of another operating affiliate beneath B, because B is the first operating affiliate after A in the ownership chain. Under the last affiliate method, the entire $100 million position is reallocated to affiliate C, despite the existence of B, because C is the last affiliate in the ownership chain. If affiliate A were an operating company, the first operating affiliate method would leave the entire $100 million position with A, but the last affiliate method would still give affiliate C the entire equity position.

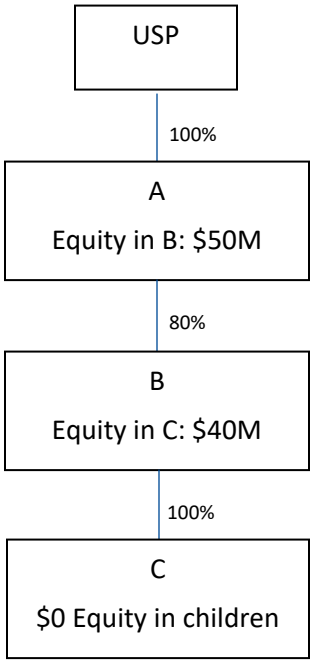
Figure B1. First Operating Affiliate and Last Affiliate Example



To apply the passthrough with ownership chains method, additional information is needed, including ownership percentages for each link in the ownership chain and the equity investment of affiliates A and B in their respective child affiliates. Suppose that the USP still has a $100 million direct equity position in affiliate A and that we have the following additional information (see figure B2): Affiliate A is 100 percent directly owned by the USP and has $50 million in equity in affiliate B, of which A owns 80 percent. In turn, affiliate B has $40 million in the equity of C of which affiliate B owns 100 percent. The passthrough equity (*PTE*) of each affiliate is calculated as the minimum of inward equity (*IE*) and outward equity (*OE*) times the USP's ownership interest (see equation 2), and its adjusted equity

position (*AdjEqPos*) is then calculated as its inward equity minus its passthrough equity. After reallocating the equity position with this procedure, the USP has a $50 million equity position in affiliate A, $18 million in affiliate B, and $32 million in affiliate C.

Figure B2. Passthrough with Ownership Chains Example



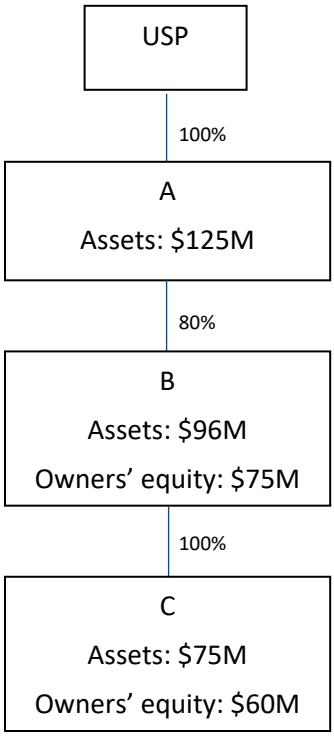
$IE = 100\ (USP's\ direct\ equity)$
$OE = 50\ (Equity\ in\ B)$
$PTE = \min(IE, OE \times USPPctOwn) = \min(100{,}50 \times 1) = 50$
$AdjEqPos = IE - PTE = 100 - 50 = 50$

$IE = 50\ (A's\ PTE)$
$OE = 40\ (Equity\ in\ C)$
$PTE = \min(50{,}40 \times 0.8) = 32$
$AdjEqPos = 50 - 32 = 18$

$IE = 32\ (B's\ PTE)$
$OE = 0$
$PTE = \min(32{,}0 \times 0.8) = 0$
$AdjEqPos = 32 - 0 = 32$

Applying the PESAA method requires additional information on the value of the assets of affiliate A and on the value of the assets and owners' equity of affiliates B and C. Suppose that, as shown in figure B3, affiliate A has $125 million in assets, B has $96 million in assets and $75 million in owners' equity, and C has $75 million in assets and $60 million in owners' equity. Using this information in addition to the same ownership percentages as in the passthrough example and the same $100 million direct equity position of the USP in affiliate A, the PESAA reallocation method is applied as follows.

Figure B3. PESAA Example



The first step is to calculate the unadjusted equity positions (*UnadjEqPos*) for A, B, and C. For A, the unadjusted equity position equals the USP's direct equity position, while, for B and C, unadjusted equity position is calculated using equation 7. For A and B, after unadjusted equity position is calculated, PESAA is calculated and used in the calculation of unadjusted equity position for their respective child affiliates.

PESAA step 1: Calculate unadjusted equity position

Affiliate A	$UnadjEqPos = USP's\ direct\ equity = 100$ $PESAA = \frac{UnadjEqPos}{Assets} = \frac{100}{125} = 0.8$
Affiliate B	$UnadjEqPos = A's\ ownership\ \% \times A's\ PESAA \times B's\ owners'equity$ $= 0.8 \times 0.8 \times 75 = 48$ $PESAA = \frac{48}{96} = 0.5$
Affiliate C	$UnadjEqPos = B's\ ownership\ \% \times B's\ PESAA \times C's\ owners'equity$ $= 1 \times 0.5 \times 60 = 30$

The second step is to calculate the final adjusted equity position for A, B, and C. This step involves using equation 8 to calculate the portion of each affiliate's unadjusted equity position that belongs to the affiliate(s) beneath it, denoted *ReassignedPortion*. The final adjusted equity position for each affiliate is then calculated as its unadjusted equity position minus the portion to be reassigned to the affiliates

beneath it in the ownership chain. After the equity position has been reallocated with these steps, the USP has a $52 million equity position in affiliate A, $18 million in affiliate B, and $30 million in affiliate C.

PESAA step 2: Calculate final adjusted equity position

Affiliate A	$ReassignedPortion = Ownership\ \%\ of\ B \times A's\ PESAA \times B's\ owners'equity$ $= 0.8 \times 0.8 \times 75 = 48$ $AdjEqPos = UnadjEqPos - ReassignedPortion = 100 - 48 = 52$
Affiliate B	$ReassignedPortion = Ownership\ \%\ of\ C \times B's\ PESAA \times C's\ owners'equity$ $= 1 \times 0.5 \times 60 = 30$ $AdjEqPos = 48 - 30 = 18$
Affiliate C	$ReassignedPortion = 0$ $AdjEqPos = 30 - 0 = 30$

References

Banco Central Do Brasil (2018), "Direct Investment Report – 2018," accessed from https://www.bcb.gov.br/content/publications/directinvestmentreport/2017/dir_2017.pdf.

Borga, Maria and Cecilia Caliandro (2018), "Eliminating the Pass-through: Towards FDI Statistics that better Capture the Financial and Economic Linkages between Countries," NBER Working Paper 25029, Cambridge, Massachusetts.

Deutsche Bundesbank (2023), "German foreign direct investment in 2021/2022," accessed from https://www.bundesbank.de/en/press/press-releases/german-foreign-direct-investment-in-2021-2022-903736.

International Monetary Fund (2009), "Balance of Payments and International Investment Position Manual, 6th Edition (BPM6)." Washington, DC.

International Monetary Fund (2022), "D.6 – Ultimate Investing Economy/Ultimate Host Economy and Pass-through Funds" BPM6 update Direct Investment Task Team (DITT) Guidance Note.

Noonan, Ryan (2019), "Special Purpose Entities and Pass-Through Equity: A Micro-Analysis with BEA Data." Presented at the *62nd ISI World Statistics Congress*, Kuala Lumpur.