TAX JUSTICE NETWORK

What does the global FDI network actually look like? Opening the black box of offshore investment

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What does the global FDI network actually look like? Opening the black box of offshore investment

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Abstract

There is a growing recognition that offshore structures fundamentally distort the world map of foreign direct investment (FDI). This paper advances efforts to map the ultimate owners hidden behind offshore or 'phantom' FDI, by using a novel methodology to deconstruct the ultimate origins of FDI in 18 major economies representing 75% of world GDP. In contrast to previous studies, this methodology unpicks distortions created by the offshore re-domiciliation of corporate groups at the parent level, by determining the 'true' ultimate nationality of 12,000 offshore domiciled group ultimate owners (GUOs) in Orbis. By combining this offshore GUO 'census' with a Monte Carlo simulation approach to integrating micro-level Orbis data with macro-level official FDI data, the analysis estimates a 4D matrix of inward FDI in major world economies that is cross-disaggregated by (1) host economy, (2) immediate investing, (3) 'ostensible' ultimate investing, and (4) 'true' ultimate investing country. The results show that offshore structures are widely constituted at the group parent as well as subsidiary level, with groups that have 'inverted' to offshore jurisdictions at the parent level disproportionately engaged in offshore FDI round-tripping in their own home countries. This substantially increases estimated round-tripping in major economies, with nearly two thirds of all offshore FDI found to consist of either round-tripping, or outward investment by offshore-inverted groups more broadly. This has important implications for our understanding of offshore investment, suggesting that it is principally a byproduct of the home-country-oriented logic of corporate inversions and round-tripping, and not primarily a means for channeling investment between economies. The results also show that offshore investment is no longer overwhelmingly dominated by western multinational corporations. Rather, the offshore world has become an predominantly tripolar Sino–American-European system, that principally serves as an arena for the outward as well as round-trip investments of United States (US), Western European, and Chinese firms, and the integration of the US and Chinese capital markets.

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1. Introduction

Foreign direct investment (FDI) consists of controlling investments by companies and individuals that cross international borders. It is often considered to be the organizational backbone of globalization, as it is created whenever a company makes a bricks-and-mortar cross-border investment in a factory or other facility, or acquires or merges with a company in another country. However, FDI also consists largely of 'offshore FDI,' mediated through shell company structures in specialized offshore jurisdictions, that have little direct attachment to productive activity (Haberly and Wójcik 2022). Data from the International Monetary Fund (IMF) shows that more than two thirds of the world's FDI is either in or from jurisdictions where it is likely to be linked to shell company structures (see figure 1), and it is likely that 40–50 percent of the underlying capital represented by FDI passes through such structures (Damgaard, Elkjaer and Johannesen 2024; Haberly 2024; UNCTAD 2015).

Offshore companies are not only central to the architecture of global investment, but also preform diverse functions within it. While this often entails a relatively mundane and innocuous role in the structuring of international transactions and investment structures (e.g. securities offerings and purchases; see Haberly and Wojcik 2022; Sharman 2012), offshore companies have also been widely linked to more harmful activities. The veil of secrecy that they afford is often exploited for illicit purposes, ranging from the hiding of assets by corrupt elites, to the laundering of funds by international terrorist and criminal organizations, to the evasion of international sanctions (Baker 2005; Cooley and Heathershaw 2017; Findley, Nielson and Sharman 2014; Gullo and Montalbano 2022; Haberly 2025; Haberly, Shipley and Barrington 2023; Nougayrède 2017; Netyaev 2026; Reuter 2012; Sharafutdinova and Dawisha 2017). Moreover, offshore companies widely facilitate tax and regulatory arbitrage strategies, which, while often not technically illegal, can undermine international fiscal and financial stability (Clausing 2020; Garcia-Bernardo et al. 2022; Haberly and Wójcik 2022; Janský and Palanský 2019; Garcia-Bernardo and Janský 2024; Palan, Murphy and Chavagneux 2010; Palan, Peterson and Phillips 2023; Torslov, Wier and Zucman 2023; Shaxson 2011; Zucman 2015).

In addition to having economic, fiscal, and other impacts, offshore investments become aggregated, at the macroscopic level, in ways that cloud our understanding of basic questions of national and global economic organization. Nowhere is this issue more prominent than in FDI statistics. Indeed, the distortions that offshore companies have created in FDI have become so large as to undermine assumptions of even a basic correspondence between official reported statistics, and the substantive organization of the global economy (Linsi and Mügge 2019). Due to the critical importance of FDI statistics to economic research and policymaking, there is an increasingly concerted effort by

researchers, governments, and international organizations to develop data sources and methodologies that can pierce the veil of paper offshore distortions in official statistics (Borga and Caliandro 2018; Casella 2019; Garcia-Bernardo et al. 2017; Haberly 2024; Haberly and Wójcik 2015; Damgaard and Elkjaer 2017; Damgaard et al. 2024). However, progress remains incomplete, with persistent gaps in officially reported data continuing to necessitate the use of estimation techniques to gain a clearer picture of offshore investments.

This paper aims to advance the development of these estimation techniques, to help shed additional light on both the 'offshore' and 'real' geographies of world FDI. Building on the approaches explored by Borga and Caliandro (2018) and Damgaard et al. (2024), it extends the technique developed in Haberly (2024) for bringing together multiple imperfect macro- and micro-level international investment datasets, to extract more information from all of these datasets that can be derived from any one individually. Specifically, by combining micro-level multinational corporate structure data from Orbis, with data on bilateral international FDI from the IMF and the Organization for Economic Co-operation and Development (OECD), the analysis is able to produce a 'four-dimensional' (4D) matrix of FDI that is geographically cross-disaggregated on a (1) immediate investing, (2) 'ostensible' ultimate investing, and (3) 'true' ultimate investing country basis (established by manually researching nearly 12,000 offshore-incorporated group parent companies), across (4) 18 major developed and developing host economies—namely, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Kazakhstan, Mexico, Nigeria, Russia, South Africa, Turkey, and the UAE, UK and USA. Together, these hosts encompass three quarters of total world gross domestic product (GDP).

The FDI estimates produced are subject to substantial uncertainty due to both the limitations of underlying source datasets, and the methodology used to integrate these datasets. Consequently, rather than generating a single set of investment estimates, the analysis here, following Haberly (2024) employs a Monte Carlo approach to simulating what the values of FDI positions *could be* in light of the constraints imposed by, as well as the gaps in, currently available information. The final dataset thus records a probability distribution—defining varying levels of uncertainty—for each 4D investment pathway. This allows it to simultaneously expand our understanding of offshore FDI, and to highlight areas where our understanding of this investment remains incomplete.

The dataset produced sheds new light on the role of offshore jurisdictions in the world economy. It shows that the scale of offshore investment is enormous, with 46 percent of all FDI in the 18 host economies examined estimated to be 'offshore' FDI entering via shell company structures. The results also deepen our understanding of international variation

in offshore FDI. Most notably, they show that the North–South divide in offshore FDI patterns is smaller than often assumed. FDI 'round tripping,' in particular—wherein a country's own firms and citizens use offshore structures to hold assets at home—is shown to be widespread across developed as well as developing countries, with levels of this investment much higher in the former than previously estimated in other studies. While an international divide in round-tripping intensity is found, this does not appear to run between countries based on overall development or income level, but rather based on their history of communist rule, with post-socialist countries exhibiting far higher levels of round-tripping than other economies. The results also show that the use of the offshore system is no longer overwhelmingly dominated by western multinational corporations. Rather, the offshore world has become an essentially tripolar Sino–American-European system, that principally serves as an arena for the outward as well as round-trip investments of United States (US), Western European, and Chinese firms, and the integration of the US and Chinese capital markets. Notably, the results suggest that the Chinese government itself, via its state-owned enterprises, is likely by far the single most important participant in this tripolar offshore system.

The remainder of the paper is organized as follows. Section 2 reviews the conceptual and methodological issues surrounding the use of existing official FDI and micro-level company data to analyze offshore investment. Section 3 details the methodology developed here for deriving the structure of a 4D inward FDI matrix in major world economies. Finally, sections 4-7 presents the findings of the analysis, with section 8 discussing their implications.

2. Background

In a world enmeshed by high-tech systems of data collection and processing, it would be natural to assume that we have a reasonably clear picture of how the world economy is organized. However, such an assumption would be largely misplaced. To be fair, there have been continuous advances in the scope and sophistication of official economic statistics. However, as noted by Linsi and Mügge (2019), these advances are forced to chase a continuously moving target of ever-growing global economic complexity. Indeed, even while growing volumes of data are compiled, what Linsi and Mügge (2019) dub the 'concept-measurement gap'—or the discrepancy between the phenomenon that data is supposed to represent, and the definitions and methodologies used to construct this data –often appears to be widening.

The relationship between growing economic complexity, and the widening concept-measurement gap, is not entirely accidental. Complex and opaque structures are rather

often deliberately engineered by firms and individuals to distort the geography of their activities, from the standpoint of tax and other authorities. Playing the central role in this engineering of economic geographic illusion is the global offshore system. 'Offshore finance' (and 'offshore financial center') is a term that is notoriously resistant to easy definition. Broadly speaking, however, it can be described as the strategic separation of the 'paper' legal-regulatory geography of financial structures from the 'real' geography of the underlying activities that they represent (Haberly and Wójcik 2022; Palan et al. 2010; Picciotto 1999). Ironically, even as information and communications technologies have boosted state data collection capabilities, they have also made it easier for firms to stay one step ahead of state taxation and regulation through the construction of offshore legal-geographic ambiguity for tax and regulatory purposes—particularly within the context of a knowledge economy dominated largely by intellectual property and other intangible assets (Bryan, Rafferty and Wigan 2017; Elkjaer and Damgaard 2018; Linsi and Mügge 2019).

At the center of the offshore system's operational logic is the ability of firms and individuals to exist in multiple places at once, under different legal identities, from the standpoint of different governments or functions (Haberly and Wójcik 2022; Shaxson 2011). What makes this possible is the creation of networks of offshore legal entities, broadly referred to as shell companies. These have little or no substantive attachment to the jurisdictions where they are formed, but rather establish a narrow legal presence there for specific purposes (Haberly and Wójcik 2015, 2022; Nougayrède 2019). These purposes range from the mundane—such as helping firms to raise capital on multiple securities markets in different jurisdictions (Buckley et al. 2015; Sharman 2012)—to the morally questionable—for example, multinational corporate profit shifting and tax avoidance (Clausing 2020; Cobham and Janský 2019; Garcia-Bernardo and Janský 2024; Garcia-Bernardo et al. 2022; Janský and Palanský 2019; Torslov et al. 2023; Zucman 2015)—to the outright illegal—for example, international money laundering by criminal organizations or corrupt elites (Baker 2005; Ding 2000; Cooley and Heathershaw 2017; Findley et al. 2014; Gullo and Montalbano 2022; Haberly et al. 2023; Ledyaeva et al. 2015; Sharafutdinova and Dawisha 2017).

Taken together, these activities produce very large distortions in the apparent shape of the world economy as recorded in official statistics (Borga and Caliandro 2018; Casella 2019; Damgaard and Elkjaer 2017; Damgaard et al. 2024; Linsi and Mügge 2019). Above all, they distort our picture of FDI. Due to the fact that it represents controlling as opposed to arms-length investments across international borders, FDI is often assumed to represent the 'real' geography of multinational corporate activities (e.g. greenfield investments and mergers and acquisitions). Based on this assumption, economists often use FDI statistics to, for example, study the impact of multinational corporate (MNC) production offshoring on technology transfer to developing countries, while politicians point to rising FDI as

evidence of successful economic policymaking. However, there is an enormous gulf between these assumptions about what FDI is or should represent, and the technical details of how FDI is actually defined and measured. Typically, this simply entails categorizing FDI as any cross-border investment above a particular ownership concentration threshold (typically 10%) in an asset or legal entity—regardless of whether these have any substantive attachment to their jurisdictional domicile.

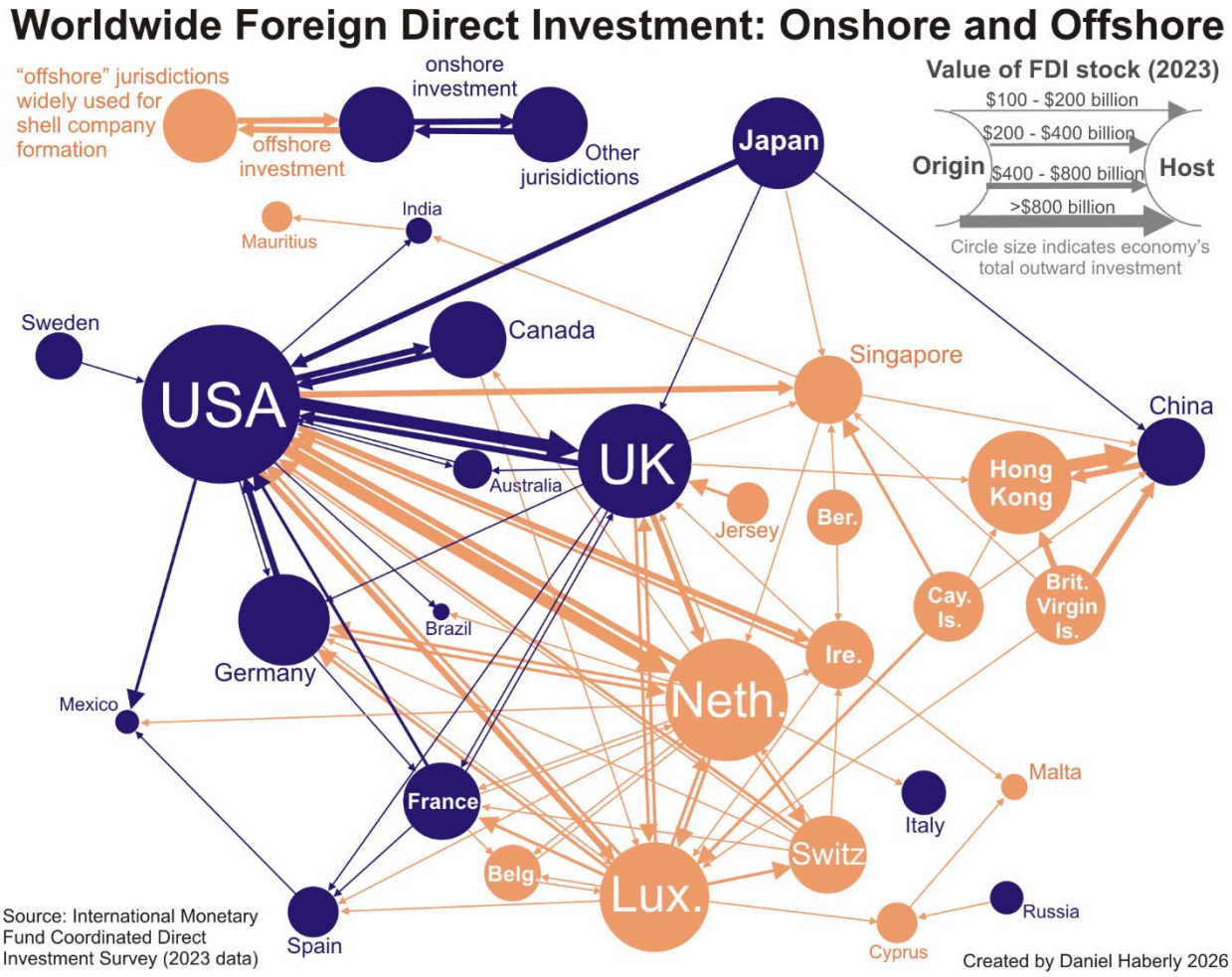


Figure 1. Worldwide FDI network, 2023

Figure 1 shows the impact that this has on the apparent shape of the world economy recorded in official FDI statistics. The figure shows the global FDI network, as of year-end 2023, as recorded by the IMF's Coordinated Direct Investment Survey (CDIS). Jurisdictions, and the FDI positions entering and leaving them, are classified for clarity into to two categories: 'offshore' jurisdictions (peach) for which a large proportion of (and typically most) FDI is generally acknowledged to be linked to foreign-controlled shell companies with little local substance, and 'onshore' jurisdictions (blue) where this is less likely to be

the case.[3] Both investments in and investments from 'offshore' jurisdictions are classified as 'offshore' (peach) in the figure.

Figure 1 underscores the rather literal as opposed to figurative nature of Maurer's (2008) observation that 'offshore in many ways *is* the global economy.' As can be seen, more than two thirds of all FDI is either in or from jurisdictions where it is likely to be linked to shell company structures, rather than substantive economic activities. Some of the individual comparisons in Figure 1 are eye-catching—the combined FDI footprint of Germany and Italy, for example, could be parked inside of Luxembourg. In the case of the world's most important shell company hub, the Netherlands (see Weyzig 2013), there would just about be space for France alongside Germany and Italy. Meanwhile, China, with its $18tn (2023) economy and 1.4 billion inhabitants, is overshadowed in the map by the British Virgin Islands, with a population of 30,000.

Given that offshore investment is often counted multiple times (both entering and leaving offshore jurisdictions), it is difficult to know how much of the underlying capital in the global FDI network is represented by these structures. UNCTAD (2015) suggests a figure of 30 percent based on special purpose entity (SPE) use. However, Damgaard *et al.* (2024) estimate a worldwide 'phantom FDI' share of 40 percent, and the analysis in this paper (following Haberly 2024) suggests an even higher figure—closer to 50 percent—when offshore 'inversions' at the parent company level are taken into account.

Much of the investment that passes through offshore structures does in some sense constitute 'real' FDI, insofar as an investor in one country owns some asset in another country via these structures (see Casella 2019; Stal and Cuervo-Cazurra 2011). However, offshore FDI is also largely driven by 'round-tripping', wherein firms and individuals control assets in their own home countries through offshore holding structures (Aykut, Sanghi and Kosmidou 2017; Ledyaeva *et al.* 2015; Sharman 2012). It has been estimated that round-tripping could account for as much as half of all inward FDI in mainland China, for example, with most intermediated through offshore jurisdictions such as the British Virgin Islands (BVI), Hong Kong, or the Cayman Islands (Sharman 2012; Xiao 2004). Ultimately, however, we generally have only a rough idea of where the funds intermediated through offshore jurisdictions ultimately originate or go, as official data usually only records the immediate bilateral FDI relationships between countries.

Recognition of the declining correspondence between FDI statistics, and the substantive shape of the world economy, has prompted a growing response by both researchers, and

[3] In simple terms, the key characteristic of "offshore" jurisdictions, as very broadly defined here, is that foreign actors play a leading role in driving *outward* rather than simply inward investment—i.e. these jurisdictions act as foreign investment transit points.

the national agencies and international organisations who compile official statistics. Among the latter organisations, the OECD has begun to compile and publish data from several major developed economies (including the US, France, Germany, and Italy) on the **ultimate** rather than only the **immediate** geographic origin of FDI in these economies (Damgaard and Elkjaer 2017; Damgaard *et al*. 2024). The growing international push towards mandatory country-by-country-reporting and beneficial ownership have also yielded further improvements in official data on the nationality of the firms driving FDI (e.g. Brown, Jorgensen and Pope 2019; Wójcik 2015; Garcia-Bernardo and Janský 2024; Garcia-Bernardo *et al*. 2022).

Various factors have combined to result in rather slow and uneven, even if substantial overall progress in official data collection and publication efforts. However, researchers have been able to multiply the utility of existing data through the development of inferential techniques. Where FDI data is only available on an immediate investing country basis, for example, principal component analysis can be used to infer stylised organisational features of the underlying networks represented by this data (Haberly and Wójcik 2015). Moreover, with the advent of OECD data recording bilateral FDI in some economies on an *ultimate* rather than simply immediate investing country basis, it has become possible to statistically infer the likely origin of offshore investment in countries that do not directly report this data (Casella 2019; Damgaard and Elkjaer 2017).

Even more importantly, massive datasets of global corporate structure and financial data such as Orbis, which contains data on more than 400m companies, have revolutionised our ability to study the micro-level structure of offshore investment. These databases allow us to, in effect, reconstruct the map of global FDI from the ground up, at a much higher level of resolution than official data. The most comprehensive such work has been conducted by the CORPNET project at the University of Amsterdam, in the form of a global analysis of offshore 'sink' and 'conduit' structures as revealed in Orbis micro data (e.g. Garcia-Bernardo *et al*. 2017). In addition, the massive leaked datasets of offshore shell companies published by the International Consortium of Investigative Journalists (ICIJ) (Panama Papers, Paradise Papers, and Offshore Leaks) have been used to shed light on some of the more opaque areas of global shell company network structure that are likely underrepresented in datasets such as Orbis (Dominguez, Pantoja and González 2018; Haberly *et al*. 2023).

These efforts have substantially advanced our understanding of the global offshore FDI network. However, they all have limitations, due largely to the underlying data on which they rely. Principal component analysis—based on bilateral FDI reported on an immediate investing country basis—can only resolve stylised organisational features of FDI networks, and produces an essentially qualitative rather than quantitative understanding of network

organisation. Statistical inferential approaches such as Casella (2019) and Damgaard and Elkjaer (2017) likely produce reasonably good estimates of the overall ultimate sources of FDI entering countries that do not report this data; however, they mostly abstract away from the structure of offshore conduit linkages between ultimate source and destination countries. Furthermore, the 'ultimate' investing-country FDI data recorded by the OECD often looks through one layer of offshore illusions—produced by group subsidiary-level offshore structures—only to dead-end at a higher level of illusions created whenever group parent companies themselves are incorporated offshore (referred to broadly in this paper as offshore 'inversions'). The level of 'ultimate' investing country in the OECD data can thus be more accurately described as 'ostensible ultimate' investing country, as it does not directly record the substantive underlying geography of ownership or control of multinational corporations, but rather only the legal domicile of controlling shareholders. Finally, micro-data-based studies—particularly those using Orbis—are forced to contend with hugely uneven data quality across different countries and investment relationships (see Cobham and Loretz 2014; Torslov *et al.* 2023).

Crucially, the various source datasets on which these approaches are based have complementary strengths. Micro-level corporate structure databases such as Orbis offer extremely fine-grained resolution. Meanwhile, official FDI data provides somewhat more consistent and accurate data than Orbis on the aggregate value of investment positions. Exploiting on this complementarity, as an alternative to a purely micro- or macro-data-based approach to studying offshore investment, is what can be described as a hybrid micro–macro 'triangulation' approach. This is explored by Borga and Caliandro (2018) to estimate the share of FDI in major conduit jurisdictions linked to pass-through investment (i.e. not actually invested in productive activities in these jurisdictions). Noting that micro-level Orbis data on shareholder equity only appears to capture roughly a quarter of total outward FDI leaving major conduit jurisdictions, Borga and Caliandro (2018) do not simply use aggregated Orbis company-level financial data in raw form. Rather, they treat it as a sample of MNE investment that is used to estimate the share of officially reported bilateral FDI that originates from, or is invested in, a particular source or host economy on an ultimate basis—i.e. as a guide for reallocating the officially reported bilateral FDI totals between various ultimate FDI pathways.

Damgaard *et al.* (2024) employ a similar approach to combining micro-level Orbis company data with macro-level IMF and OECD FDI data to conduct an even more ambitious analysis of worldwide FDI—with the aim of estimating the value of 'phantom FDI' that enters various countries on an immediate basis via jurisdictions other than ultimate country of origin. Importantly, Damgaard *et al.* (2024) also take advantage of OECD data that records the value of FDI in some reporting countries on a bilateral ultimate

investing country basis, rather than an immediate investing country basis. They thus limit their reliance on estimating ultimate FDI parentage from Orbis-based sampling to cases where the data on the former is not already directly available from the OECD.

The analysis in this paper extends the methodology developed in Haberly (2024), which advances previous micro–macro hybrid or triangulation approaches in several key respects. Firstly, existing studies have primarily been conducted with the goal of removing the offshore elements of the global FDI network from view, in order to reveal the underlying substantive FDI positions between ultimate investing and host countries. In contrast, the approach here aims to reveal the architecture of the chains of offshore FDI connections between ultimate origin and destination economies. Rather than only constructing a bilateral matrix of FDI relationships between countries at the ultimate investor and destination levels, this entails constructing a multi-dimensional matrix of inward FDI in major economies that is cross-disaggregated on a combined ultimate and immediate investor basis.

Secondly, other methodologies have only accounted for offshore FDI at the corporate subsidiary (FDI immediate investing jurisdiction) level—with the reported ultimate nationality of firms, as recorded in either in micro (Orbis) or FDI in macro (OECD FDI) data, being taken at face value. This yields highly misleading estimates of FDI origin, due to fact that corporate groups and their controlling shareholders often relocate to offshore jurisdictions at the ultimate parent level itself, in so-called ‘inverted’ offshore holding arrangements (see Haberly 2024; Hurst and Sutherland 2025). To account for this, the analysis here has re-engineered the micro-level company ownership data from Orbis, by undertaking painstaking research into the individual backgrounds of nearly 12,000 corporate parent companies (i.e. group ultimate owners, or GUOs) that are domiciled in offshore jurisdictions (extending the library of 6,500 offshore-domiciled GUOs compiled in Haberly 2024). This allows for the analysis (following Haberly 2024) to identify the ‘true’ ultimate nationality of the investors behind FDI relationships—i.e. from the standpoint of beneficial ownership and control—as opposed to simply capturing the narrow legal definition of ultimate investor (or parent) country as recorded in the Orbis and OECD data (i.e. ‘ostensible’ ultimate investing country). As we show, nearly half of all offshore FDI consists of ‘inverted’ offshore structures that are constituted at the parent rather than simply subsidiary level, and are thus represented in a misleading manner in prior studies.

The estimates produced here are, like those from other studies, subject to substantial uncertainty due to the uneven quality of underlying source data. Consequently, rather than simply generating a single ‘best guess’ estimate of the value of offshore investments, the analysis here uses a Monte Carlo simulation procedure to estimate a probability distribution of possible FDI network structures. This takes into account both the observed

distribution of errors (benchmarked against known values) in Orbis-derived FDI estimates, and constraints on FDI network structure imposed by the aggregate IMF and OECD bilateral FDI data at the immediate and ultimate investing country levels. This allows for the level of uncertainty surrounding any given offshore FDI position estimate to be directly quantified and conveyed in the results.

The end product of this analysis is a 4D matrix of inward FDI estimate *ranges* for 18 of the world's largest developed and developing countries. This is cross-disaggregated on a (1) true ultimate investing country, (2) ostensible ultimate investing country (3), immediate investing country, and (4) host country basis, and directly gauges the uneven impact of source data quality on any given FDI estimate. The following sections outline the methodology used to construct this matrix, before moving on to discuss the key features that it reveals in the global offshore FDI network.

3. Methodology

The methodology used to estimate a 4D matrix of inward FDI in major world economies (following Haberly 2024), is based on the multi-stage integration of multiple micro- and macro-level source datasets (see Appendix B for details). First, Orbis data was obtained on the financials and ownership structures of all foreign-owned subsidiaries in the 18 host economies examined—i.e. Brazil, Canada, China, France, Germany, India, Indonesia, Japan, Kazakhstan, Mexico, Nigeria, Russia, South Africa, Turkey, the UAE, UK, and US. As shown in table 1, these hosts include the world's 12 largest economies (in 2023) by both nominal and PPP GDP, with four additional countries added to ensure coverage of key economies across all world regions. The latter counties are Nigeria and South Africa (largest GDP in Africa by PPP and nominal GDP respectively), Kazakhstan (largest GDP in Central Asia by PPP and nominal GDP), and the UAE (leading financial center in the Middle East). Taken together, the hosts examined here encompass 75% of the world economy by nominal GDP, and 70% of the world economy by PPP GDP.[4]

Next, the Orbis data for these 18 countries was augmented through painstaking research into the backgrounds of more than 12,000 offshore-domiciled corporate GUOs, which allowed for the determination of the 'true' ultimate nationality of offshore 'inverted' parent companies. This augmented Orbis data was used to estimate an initial 3D inward FDI matrix for each host economy (i.e. cross-disaggregated on an immediate, ostensible

[4] We have also constructed a separate "3D" matrix of FDI in 37 additional host economies, which traces the origin of FDI back to only the ostensible as opposed to true ultimate investing country (i.e. without incorporating the manual reclassification of offshore GUO true nationality). This is used, along with the 4D matrix of FDI in the 18 hosts here, as a basis for the analysis in Haberly, Palansky, and Tuinsma (2026).

ultimate, and true ultimate investor basis), with this 3D inward FDI matrix in turn used to proportionally reallocate officially reported (IMF and OCED) bilateral FDI positions in each host economy (along both the immediate and ostensible investing country dimensions) between various 3D investment pathways. This entailed iteratively adjusting the initially estimated (i.e. Orbis-based) 3D FDI matrix to force it into agreement with known data points in officially reported IMF and OECD bilateral FDI data, for each host economy.

Table 1. Key indicators for countries examined in analysis

Region	Country	2023 nom. GDP $B.	% World GDP	Nom. GDP rank	2023 PPP GDP $B.	% World GDP	PPP GDP rank	2023 in-FDI $B.	% World In-FDI	Comments
Americas	Brazil	2,191	2.1%	9	4,471	2.4%	7	747*	1.8%	#7 PPP GDP world
	Canada	2,173	2.0%	10	2,574	1.4%	16	1,026*	2.5%	#10 nom GDP world
	Mexico	1,794	1.7%	12	3,275	1.7%	13	798*	1.9%	#12 nom GDP world
	USA	27,721	26.1%	1	27,721	14.7%	2	5,394*	13.1%	#1 nom GDP world
W. Europe	France	3,052	2.9%	7	4,160	2.2%	9	1,015*	2.5%	#7 nom GDP world
	Germany	4,526	4.3%	3	5,970	3.2%	6	1,092*	2.7%	#3 nom GDP world
	Italy	2,305	2.2%	8	3,541	1.9%	12	500*	1.2%	#8 nom GDP world
	UK	3,370	3.2%	6	4,103	2.2%	10	2,619*	6.4%	#6 nom GDP world
E. Europe & C. Asia	Kazakhstan	262	0.2%	51	783	0.4%	38	157	0.4%	#1 GDP C. Asia
	Russia	2,072	1.9%	11	6,476	3.4%	4	374	0.9%	#4 PPP GDP world
Middle East	Turkey	1,118	1.1%	18	3,651	1.9%	11	191*	0.5%	#11 PPP GDP world
	UAE	514	0.5%	27	817	0.4%	37	367	0.9%	#1 IFC MENA
SS. Africa	Nigeria	364	0.3%	41	1,984	1.1%	19	78*	0.2%	#1 PPP GDP SS. Afr.
	S. Africa	381	0.4%	40	961	0.5%	32	111*	0.3%	#1 nom GDP SS. Afr.
S. Asia	India	3,638	3.4%	5	14,846	7.9%	3	729*	1.8%	#3 PPP GDP world
SE. Asia	Indonesia	1,371	1.3%	16	4,335	2.3%	8	292*	0.7%	#8 PPP GDP world
E. Asia	China	18,270	17.2%	2	35,520	18.8%	1	3,650*	8.9%	#1 PPP GDP world
	Japan	4,213	4.0%	4	6,308	3.3%	5	223*	0.5%	#4 nom GDP world
All		79,334	74.7%		131,497	69.7%		19,364	47.1%	
World		106,172			188,531			41,121		

*2023 IMF CDIS reporting

Rather than only performing this bilateral FDI allocation process a single time based on the initial 3D FDI matrix estimated from Orbis, a Monte Carlo simulation procedure was used to generate a large number of scenarios of what the initially estimated 3D FDI matrix 'could have been' in light of the observed accuracy of the Orbis-derived FDI estimates (as benchmarked against known aggregate bilateral FDI figures). Combining the 3D inward FDI probability distribution matrices for each of the 18 host economies yielded a 4D inward FDI probability distribution matrix for all hosts as a group. This matrix, notably, also includes Orbis-based estimates for the numerous data points that are missing in official bilateral FDI datasets (see Appendix B).

As shown in the following sections, the level of uncertainty surrounding FDI estimates varies greatly between different investment positions, and both the level and unevenness of this uncertainty must be taken into account in the interpretation of results (see detailed country results with uncertainty ranges in Appendix A). Crucially, the Monte Carlo procedure here can only gauge the sensitivity of the final FDI estimates to the likely error in the initial Orbis-derived FDI estimates, within the parameters of the assumptions of the estimation methodology itself. It will thus not necessarily account for all sources of error and uncertainty. A more detailed discussion of the methodology, and its various advantages and limitations, can be found in Appendix B.

4. The Structure of the Global Offshore FDI Network

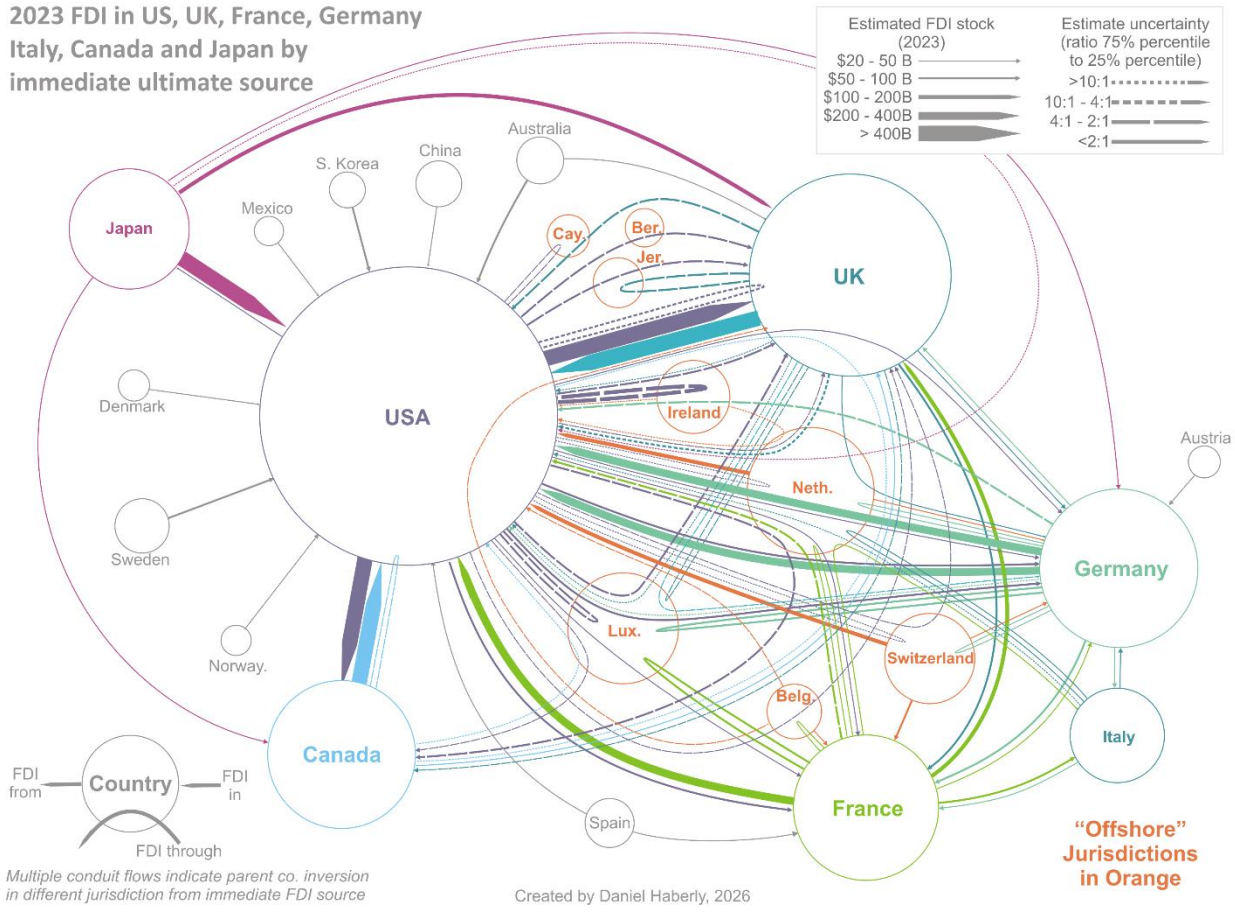


Figure 2. FDI stock in major developed economies by immediate, ostensible ultimate, and true ultimate origin (2023)

The final output of the procedure used here is a four-dimensional FDI estimate matrix that contains an FDI value probability distribution for each combination of (1) 'true' ultimate

investing country, (2) 'ostensible' ultimate investing country, (3) immediate investing country, and (4) host country. This 4D matrix captures the various ultimate and intermediate layers of the inward FDI that ultimately enters the 18 host economies examined.

Figures 2 and 3 show the new map of world FDI revealed by this matrix, which can be compared to the map in Figure 1. Figure 2 shows the immediate and true ultimate origins of FDI in the six developed host countries (Canada, France, Germany, Italy, Japan, UK, US), while Figure 3 shows this for the eight developing countries with individual inward investment positions meeting the minimum size threshold ($20 billion) for map inclusion (Brazil, China, India, Indonesia, Kazakhstan, Mexico, Russia, UAE). The two maps show both the 'true' and 'ostensible' ultimate investing countries in FDI pathways, where the latter differs from immediate investing country. For example, Chinese companies that have assumed nominal Cayman Islands nationality at the parent level, and control their China-based operations via Hong Kong subsidiaries, are indicated by the prominent loop from China back to itself via the Cayman Islands and Hong Kong (figure 3).

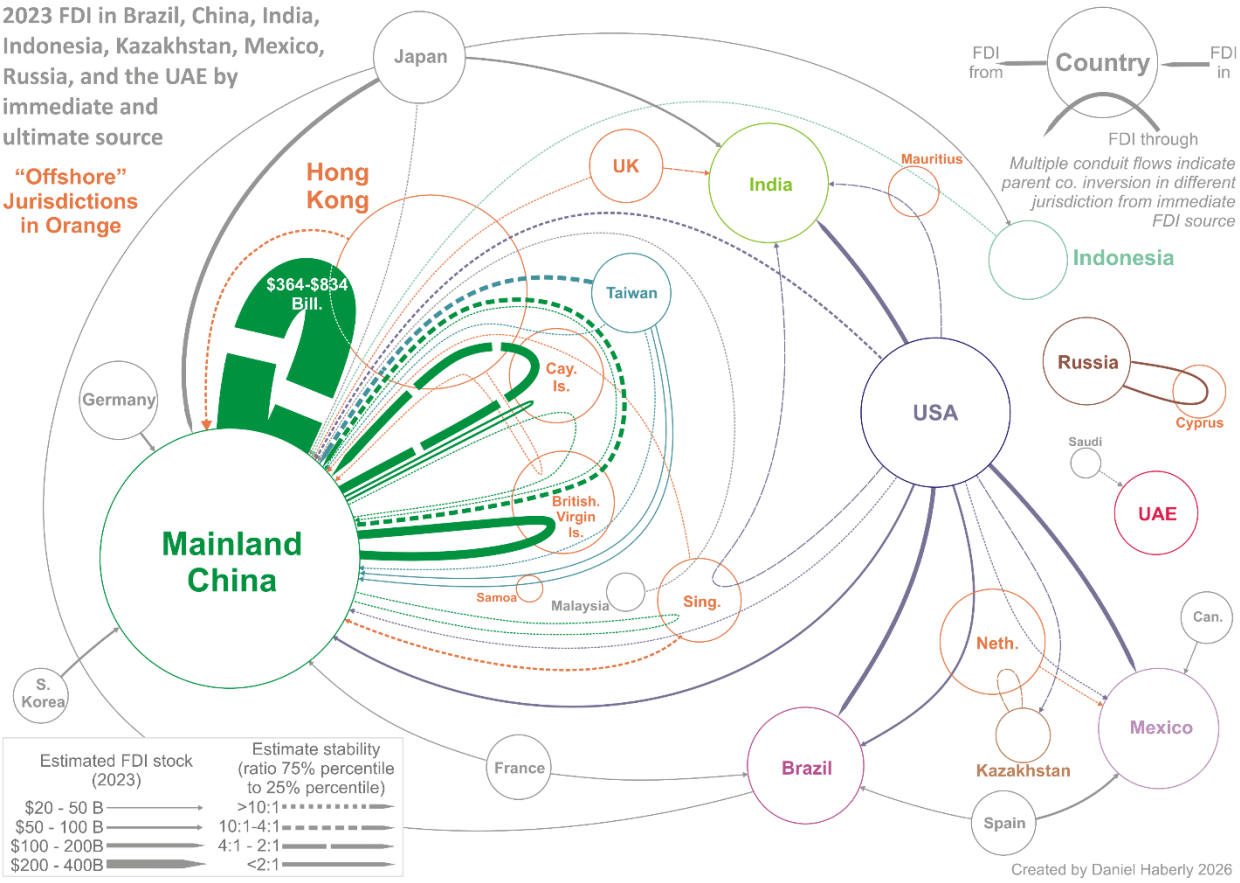


Figure 3. FDI stock in major developing and transition economies by immediate, ostensible ultimate, and true ultimate origin (2023)

Figures 4-9 and tables 2-3 show the key features, at an aggregated level, of the offshore FDI networks in Figures 2 and 3. Figure 4 shows the breakdown of the ultimate countries of origin of offshore FDI entering the 18 hosts, while figure 5 flips this data to show the ultimate destinations (among these 18 hosts) of outward offshore FDI from these same 18 countries. Meanwhile, figure 6 shows the breakdown of the offshore intermediary jurisdictions used by the world's largest overall source countries for offshore FDI (both within and beyond the 18 hosts examined), while figure 7 shows the breakdown of ultimate investment sources in the world's leading offshore intermediary jurisdictions.[5] Figure 8 and Tables 2-3 show the simplified structure of the global offshore FDI network by ultimate investment source and destination regions. Finally, figure 9 shows the largest overall sources of offshore FDI including (left) and excluding (right) "round-trip" investment wherein actors use offshore structures to hold assets in their own home countries—with figure 9 also showing the ranges of estimate uncertainty produced by the Monte Carlo modeling procedure itself (and other figures showing estimate means). Figures showing more detailed inward offshore FDI estimates in the 18 host countries, including ranges of estimate uncertainty, can be found in Appendix A.

'Offshore FDI' is defined throughout the discussion here as FDI entering a host from a designated list of offshore jurisdictions that does not originate from the native firms of these jurisdictions. For example, if an Irish multinational, with its origin and seat of management in Ireland, invests in the US, this would not be counted as offshore FDI. However, if, for example, a British company invests in the US via an Irish conduit structure, or an American multinational inverts to Irish nationality at the parent level—thus causing that firm's ownership of its US operations to be reclassified as 'foreign' direct investment—these would be counted as offshore FDI. The metric of offshore FDI thus seeks to capture cases where the legal geography of investment is decoupled from the substantive geography of corporate control and beneficial ownership. Importantly, it should be noted that the term 'inverted' or 'invert' is used here to refer to all forms of corporate offshore re-domiciliation at the parent entity level—including not only the holding companies of public and private multinational corporate groups, but also offshore private equity fund domiciliation, and the assumed residence of majority-owning families and individuals in tax havens other than their country of origin (see Appendix B).

[5] Figures 6 and 7, notably, double-count investment passing through multiple layers of offshore jurisdictions.

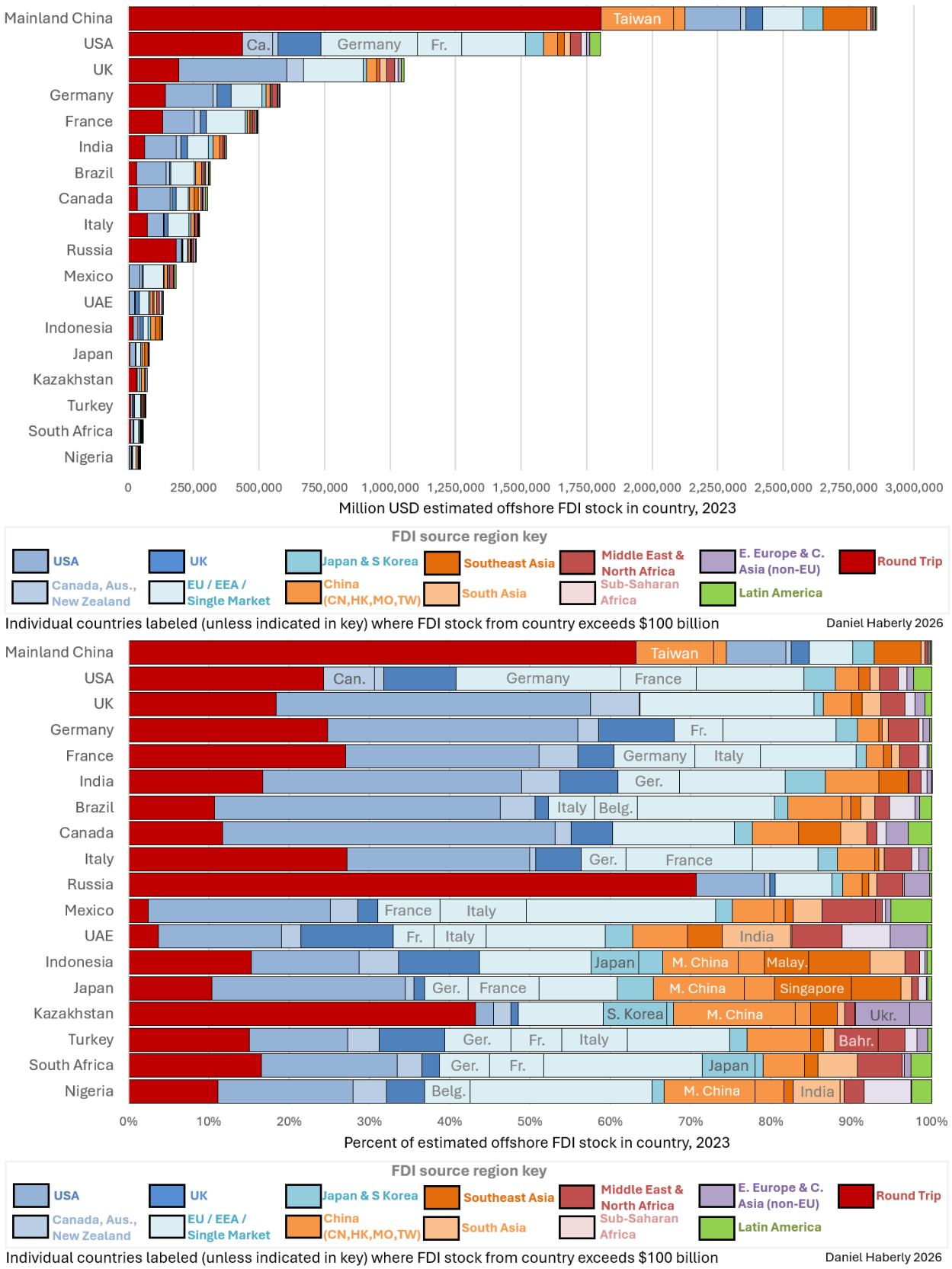


Figure 4. Ultimate sources of offshore FDI in selected major economies, 2023

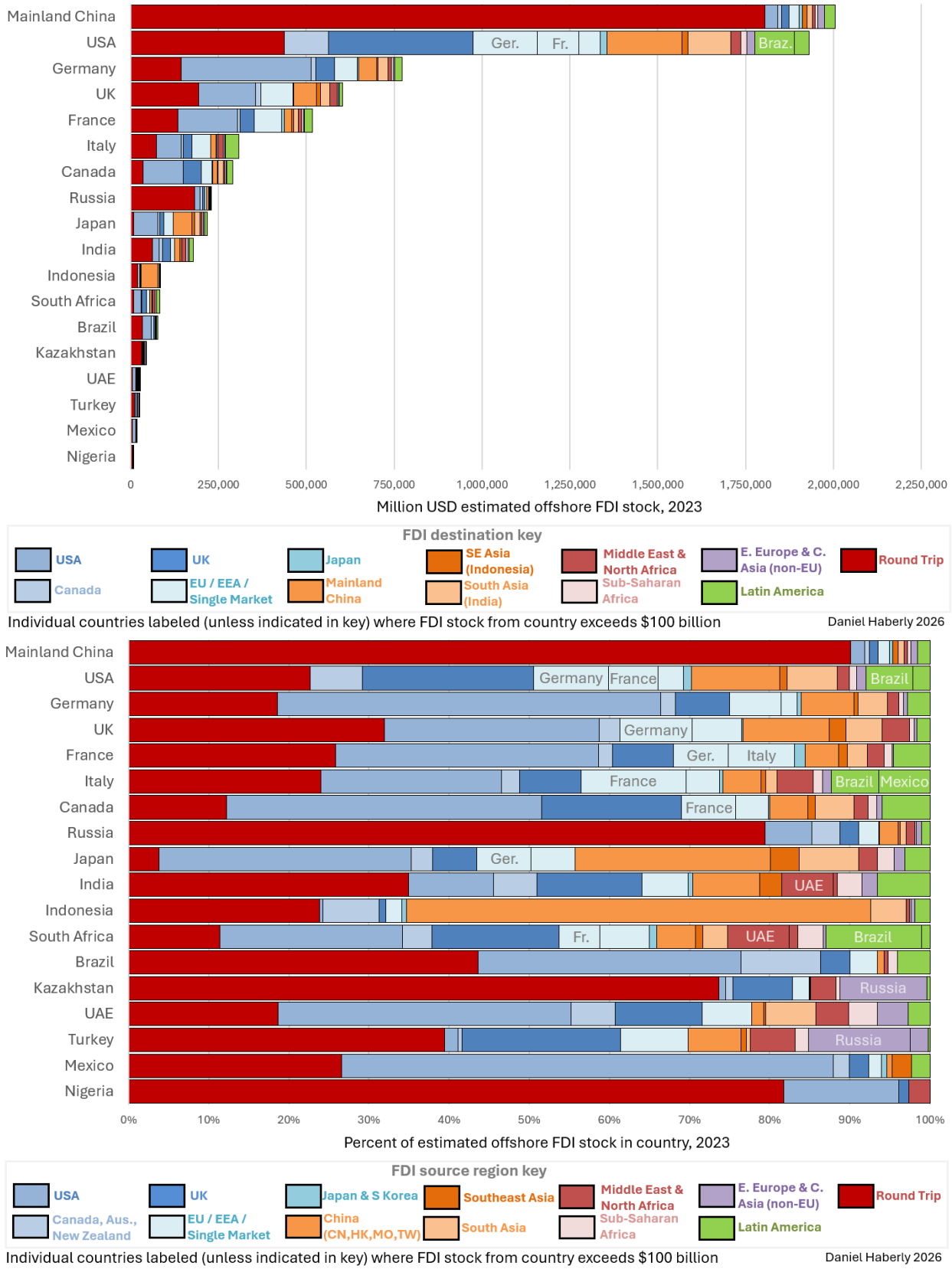


Figure 5. Ultimate destinations for offshore FDI from selected major economies, 2023

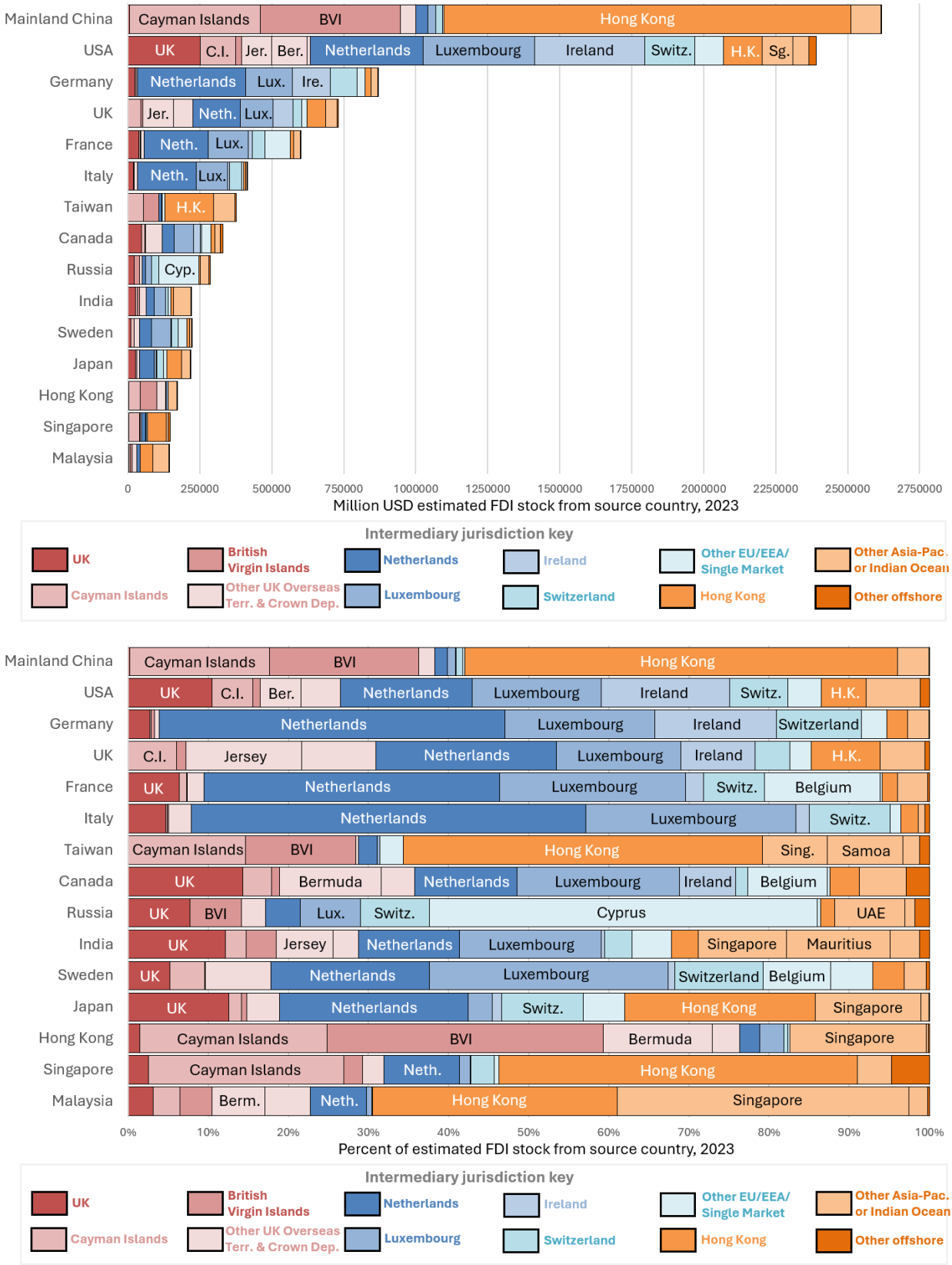


Figure 6. Intermediary jurisdictions used by leading offshore investor countries

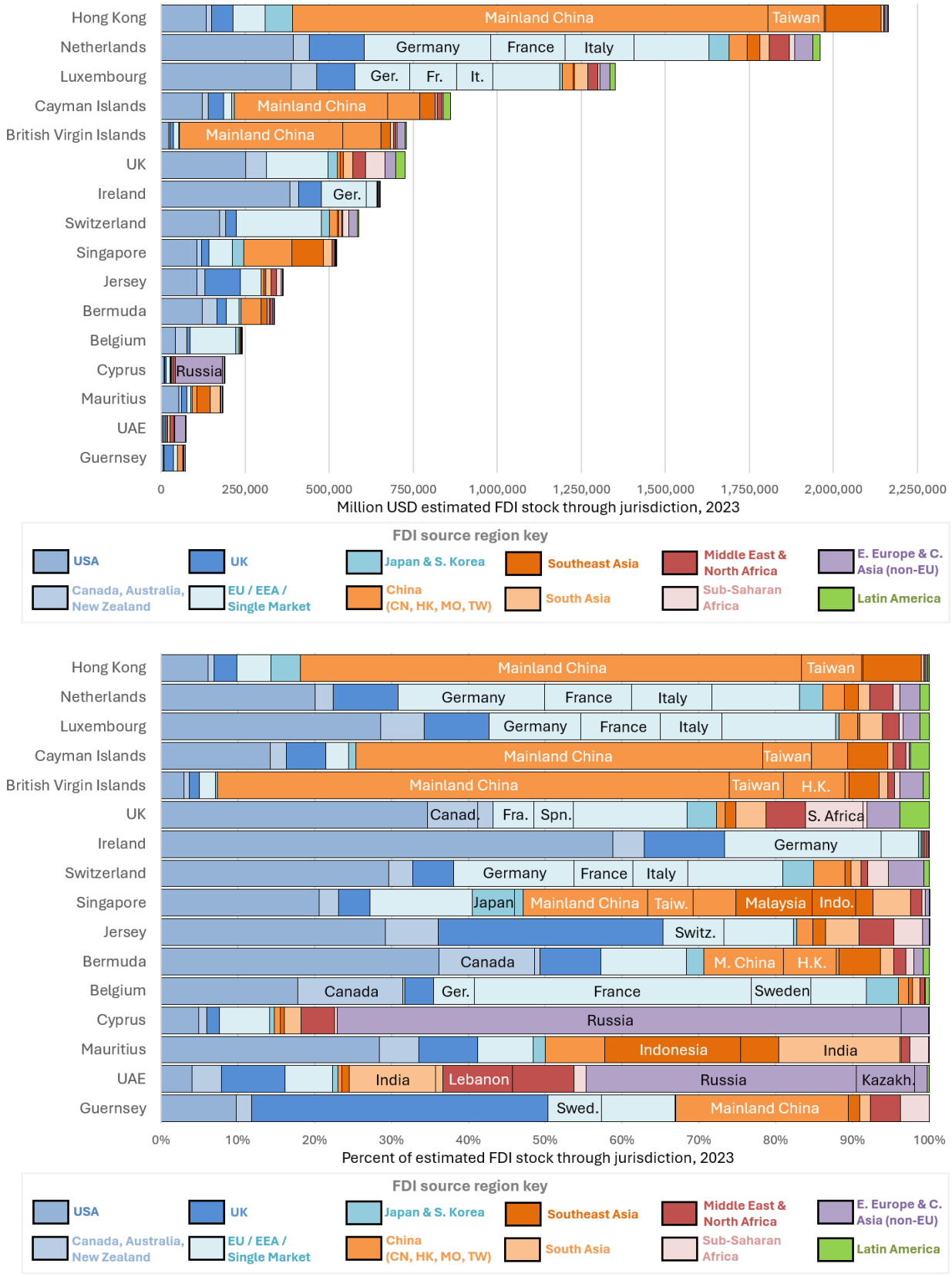


Figure 7. Estimated source of FDI intermediated through leading offshore jurisdictions

Table 2. Total offshore FDI by ultimate source and destination*, 2023 (billion $)

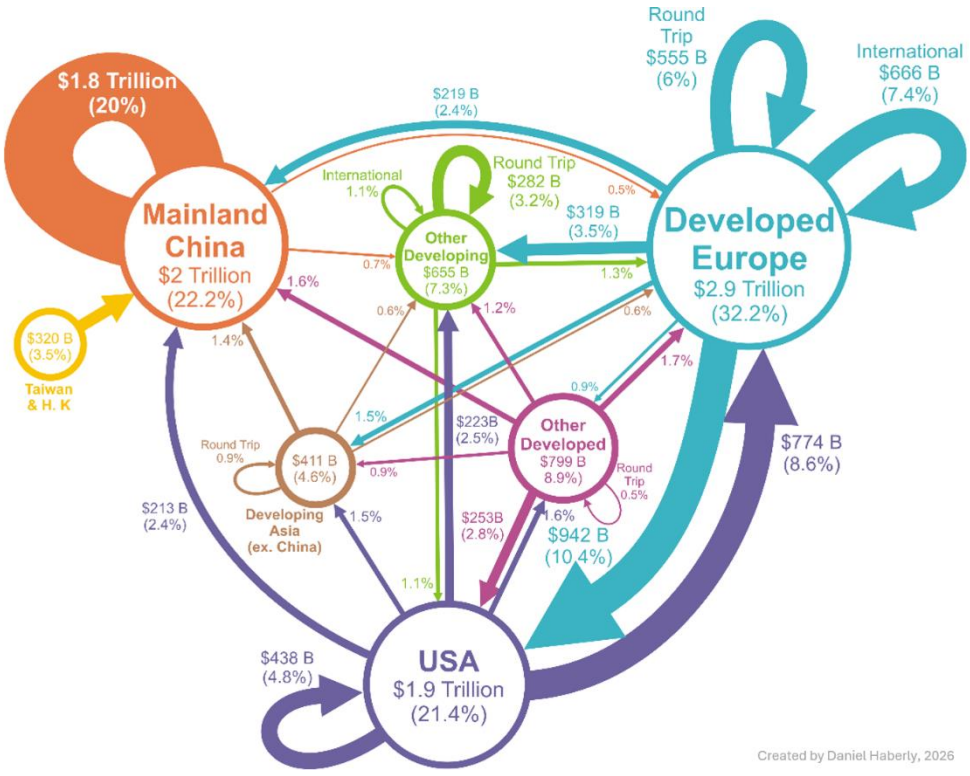
	FDI Source								
FDI Host	M. China	Taiwan & H.K.	Developed Europe Round trip	Developed Europe Intl.	USA	Other Developed round-trip	Other Developed intl.	Developing Asia Round trip	Developing Asia Intl.	Other Developing round-trip	Other Developing intl.	All
Mainland China	1,806	320	219		213	147		131		22		2,857
Developed Europe	50		544	666	774	149		53		114		2,349
USA	35		942		438	253		34		102		1,803
Other Developed	22		82		145	44	26	31		26		375
Developing Asia	28		137		138	78		82	29	13		505
Other Developing	59		319		223	103		52		282	96	1,134
All	1,999	320	2,908		1,930	799		411		655		9,023

*True ultimate origin of FDI stock in BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB

Table 3. Total offshore FDI by ultimate source and destination*, 2023 (% world)

	FDI Source								
FDI Host	M. China	Taiwan & H.K.	Developed Europe Rnd. trip	Developed Europe Intl.	USA	Other Developed Rnd. trip	Other Developed Intl.	Developing Asia Rnd. trip	Developing Asia Intl.	Other Developing Rnd. trip	Other Developing Intl.	All
Mainland China	20.0%	3.5%	2.4%		2.4%	1.6%		1.4%		0.2%		31.7%
Developed Europe	0.5%		6.0%	7.4%	8.6%	1.7%		0.6%		1.3%		26.0%
USA	0.4%		10.4%		4.8%	2.8%		0.4%		1.1%		20.0%
Other Developed	0.2%		0.9%		1.6%	0.5%	0.3%	0.3%		0.3%		4.2%
Developing Asia	0.3%		1.5%		1.5%	0.9%		0.9%	0.3%	0.1%		5.6%
Other Developing	0.7%		3.5%		2.5%	1.1%		0.6%		3.2%	1.1%	12.6%
All	22.2%	3.5%	32.2%		21.4%	8.9%		4.6%		7.3%		100%

*True ultimate origin of FDI stock in BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB



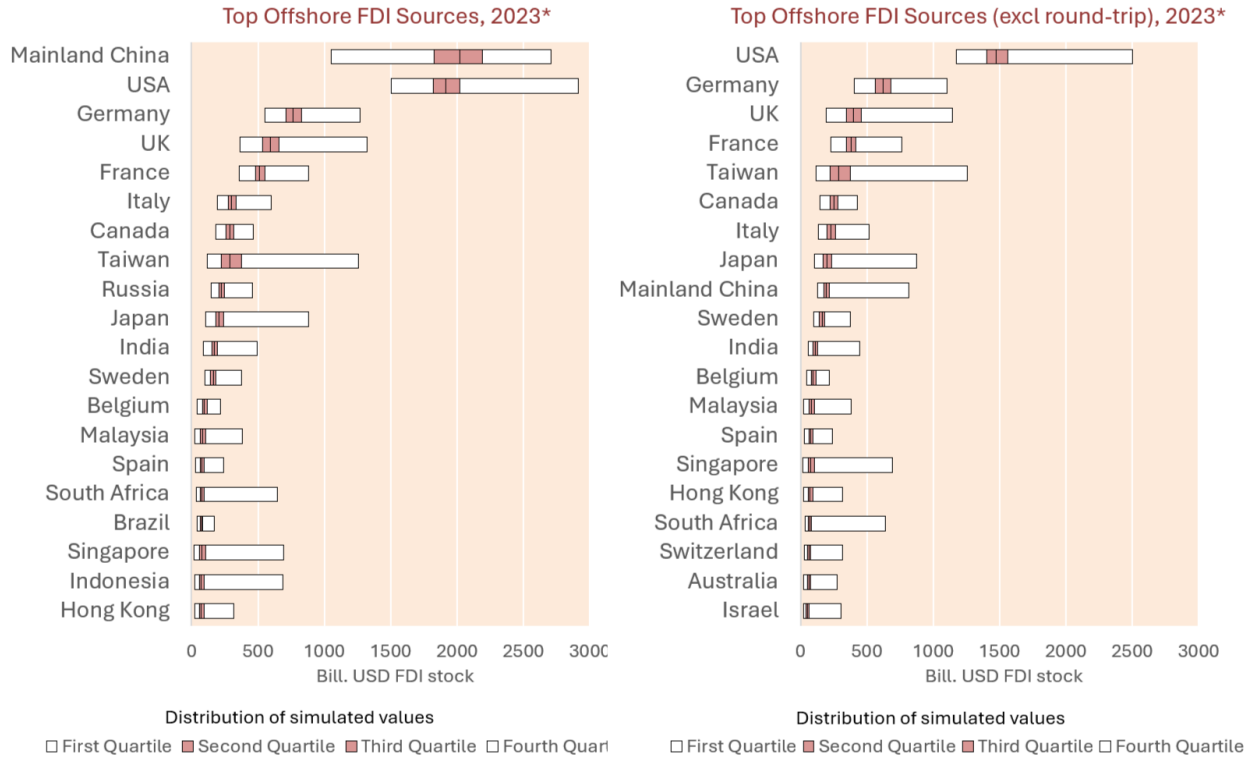
*True ultimate origin of FDI stock in BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB

Figure 8. Global offshore FDI network by true ultimate source and destination*, 2023

As shown in figure 8, the global offshore FDI network has an essentially triangular structure dominated by Western Europe, Mainland China, and the United States, which are together estimated to be responsible for 76% of worldwide offshore investment (within the three quarters of the world economy covered at the host level in this analysis). At a regionally aggregated level, Western Europe is the largest driver of offshore FDI, controlling nearly one third of the total worldwide offshore FDI stock ($2.9 trillion). Meanwhile, China and the United States are estimated to be by far the largest sources of offshore FDI on an individual national basis, with each controlling just over one fifth of the worldwide total ($2 trillion and $1.9 trillion respectively).

Notably, the results suggest that China may have now surpassed the United States to become the world's largest offshore investor, with China's offshore FDI stock estimated to be roughly twice as large as all other developing countries combined (including Russia). However, China's offshore investment also appears to be largely self-contained geographically, with an estimated 90% of Mainland Chinese offshore FDI consisting of round-trip investment in the Mainland itself. Indeed, when round tripping is removed, Mainland China drops from the first to the nineth largest source of offshore FDI (figure 9). As shown in figure 8, Mainland Chinese round tripping is by far the largest structure in the

global offshore FDI network, accounting for an estimated one fifth of all offshore FDI worldwide. Also showing outsized offshore footprints, in relation to the sizes of their economies, are Taiwan and Hong Kong, with Taiwan estimated to have a larger stock of offshore FDI than either Russia or India. Nearly all of this investment is directed at Mainland China (figures 3 & 8).



*True ultimate origin of FDI stock in BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB

Figure 9. Top-20 estimated sources of offshore FDI in major economies (2023), including (left) and excluding (right) round trip investment

In addition to being almost entirely directed at Mainland China, as an ultimate host, both Mainland and broader Chinese offshore investment is heavily concentrated at the intermediary jurisdiction level in Hong Kong and the Cayman and British Virgin Islands—with Mainland China estimated to be the source of 53% and 66% of all FDI in the latter two British Overseas Territories respectively, and broader China estimated to account for 64% and 82% of FDI in each respectively (figure 7). Across the British Overseas Territories as a whole (i.e. excluding Crown Dependencies), Mainland China is estimated to be the source of more than 60% of all FDI.[6] Broadly speaking, the intermediary jurisdictions used by

[6] This only encompasses the portion of FDI which passes through jurisdictions before entering the 18 ultimate host economies examined, meaning that actual contribution of China to total FDI in the UK Overseas Territories could be somewhat different (taking into account e.g. ownership chains which do not pass through

investors from Hong Kong and Taiwan mirrors those used by Mainland Chinese investors, albeit with a few variations (notably the prominent role of Bermuda in Hong Kong investment, and of Samoa in Taiwanese investment; figure 6).

In contrast to China, the bulk of American and Western European offshore FDI is invested abroad—and above all in each other, with bilateral transatlantic investment estimated to be the second largest feature of the global offshore FDI network after Mainland Chinese round-tripping (accounting for 19% of global offshore FDI, or $1.7 trillion). Notably, the offshore FDI stock held by American and European investors in each others' economies ($770 and $940 billion respectively) is larger than the total estimated value of offshore FDI, from each, in all other world regions combined. Germany has an especially large stock of offshore FDI in the United States, estimated at roughly $370 billion (figures 2 and 4), which accounts for nearly half of Germany's worldwide offshore FDI. This large stock of offshore investment in the US is principally responsible for Germany's status as the third largest overall source of offshore FDI, after China and the US. Meanwhile, American offshore investment in Europe is heavily (53%) concentrated in the UK, which hosts an estimated $432 billion of offshore FDI from the US. Intra-European investment, both round-trip and international, accounts for an additional 13% of worldwide (and nearly half of European) offshore FDI, with American round-tripping estimated to account for a further 5%.

The bulk of this American and European offshore FDI is generated by the tax avoidance strategies of wealthy families, multinational corporations and private equity funds (see below), with most of this investment concentrated in the three leading EU tax havens: Ireland, Luxembourg, and the Netherlands (see Garcia-Bernardo and Jansky 2024; Palan et. al 2010; Zucman 2015). However, a divide can also be observed in the geography of offshore investment between Continental European countries on the one hand, and English-speaking developed countries on the other—with Switzerland tending to feature more prominently in the offshore structures of the former, while the latter are more strongly linked to the British Overseas Territories and Crown Dependencies, as well as to the UK itself in the case of Canadian and American investment (see section 6). Notably, in contrast to the leading role of East Asian FDI in the British Overseas Territories, the Crown Dependencies of Jersey, Guernsey and the Isle of Man appear to have a predominantly Anglo-American client orientation, with the UK itself estimated to be the single largest source of FDI through all three (figure 6).

In comparison with the enormous scale of American, European, and Chinese investment, all other elements of the global offshore FDI network are relatively small, even at the level

offshore jurisdictions to an onshore host, but are rather only used to hold offshore companies themselves used for e.g. profit shifting).

of international aggregates (figure 8 and table 2-3). Across the developing world as a whole, inward (North-South) offshore investment from Europe and the United States, and developed countries more broadly, is estimated to be substantially larger than outward (i.e. South-North and South-South) offshore investment by developing country investors (see section 7). As seen in figure 3, the largest North-South offshore FDI positions run from the US and Japan to Mainland China via Hong Kong and Singapore; from the US to India via Mauritius and Singapore; and from the US to Brazil and Mexico via the Netherlands. The largest North-South offshore FDI position ($213 billion) is estimated to be held by the US in China, making China the second largest destination for American offshore FDI after the UK.

Even beyond the dominant role of China, offshore investment from developing countries is heavily concentrated geographically by source, destination, and intermediary jurisdictions. As shown in figures 3 and 8, China is by far the largest destination for offshore FDI from other developing countries in Asia, due primarily to the enormous scale of overseas Chinese investment from Southeast Asia (also see section 7). Most of this overseas Chinese investment in Mainland China is intermediated through Hong Kong, Singapore, and the British Overseas Territories (see figure 4). Meanwhile, Russia is estimated to account for nearly half (42%) of the total combined offshore investment of all developing and transition economies outside of Asia ("Other Developing" in figure 8). This is due primarily to the scale of Russian round-tripping, which accounts for 79% of Russia's total outward offshore FDI (see section 5). As shown in figure 6, this investment is at present still concentrated in Cyprus as an intermediary jurisdiction, although the estimates here indicate that Russia (and the former USSR broadly) may now also play the leading role in driving FDI via the UAE as an intermediary jurisdiction (figure 6).

Looking at the developing world more broadly, a series of overlapping offshore investment networks can be seen running in roughly an arc from the Eastern Mediterranean, through the Indian Ocean, to Southeast Asia. Moving from west to East, both Cyprus and the UAE play an important role in African and Middle Eastern offshore investment, with the UAE also featuring prominently in offshore investment from these regions as well as India. Meanwhile, Mauritius serves as a key hub for round-trip, South-South, and South-North investment in Africa, South Asia, and Southeast Asia, with Singapore playing a similar role in South, Southeast and East Asia. Notably, while Asian countries are the largest sources of investment via Mauritius and Singapore at a regionally aggregated level, the US is estimated to be the single largest individual national source of offshore FDI through both—with both jurisdictions, for example, estimated to intermediate a larger stock of US FDI in India, than Indian FDI round-tripping (figure 3). Finally, Latin American offshore investment appears to be largely oriented towards the Caribbean, and in particular the Cayman Islands, Panama, and Bahamas (with the latter strongly linked to Brazil as a client base).

5. The Central Role of Round-Tripping and Inversions in Offshore FDI

Beyond these major structures, several key stylized features of the global offshore FDI network can be discerned. Probably the most striking is the scale and pervasiveness of round-tripping, wherein firms and investors use offshore structures to hold assets in their own home countries. As described in Haberly (2024), this has tended to be dramatically underestimated in previous studies due to the lack of systematic accounting for parent-level (i.e. "inverted") offshore ownership structures (also see Hurst and Sutherland 2025). The results here indicate that round-tripping accounts for more than one third (35%) of all offshore FDI, and nearly one fifth (18%) of *all* FDI, within the 75% of the world economy covered by the present study. Just as importantly, the same offshore-inverted groups that drive FDI round tripping, in particular countries, also tend to be leading sources of *outward* offshore FDI from these countries. The result, as shown in figure 10, is that nearly two thirds of all offshore FDI, in the countries examined, is driven either by round-tripping itself, or by outward investment from offshore-inverted groups.[7]

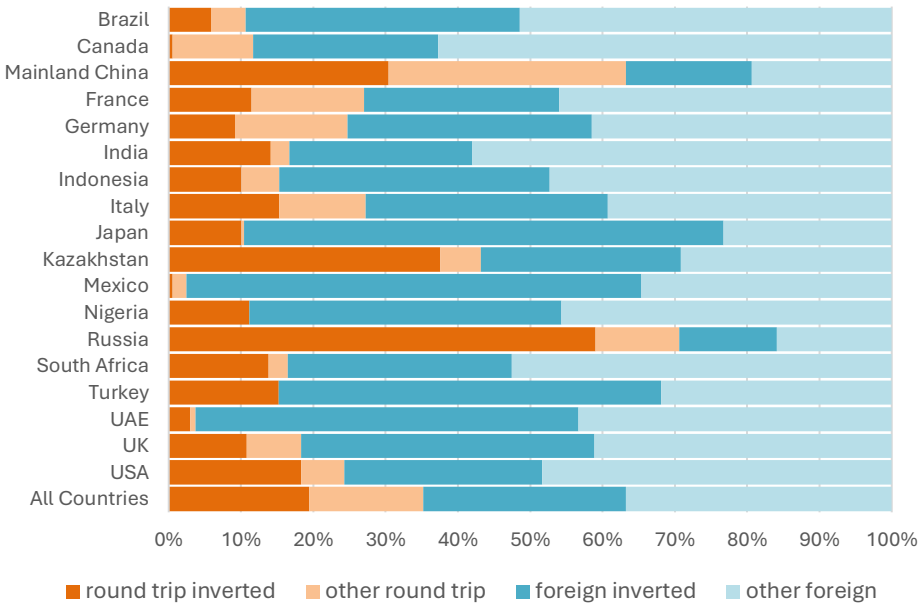


Figure 10. Round-trip and inverted group investment as a share of total inward offshore FDI stock in major economies (2023)

[7] Notably, the impact of inversions here (both on round-trip and non-trip offshore FDI) is actually underestimated, as inverted groups that are recorded in Orbis as being majority owned by a shareholder in their country of origin are not counted as "inverted" in figure 10. This excludes, for example, some very large inverted Chinese SOEs, which are incorporated offshore at the level of stock market-listed nominal parent entity, while remaining >50% state owned (see discussion below).

What this means is that most offshore FDI can be considered to be, in effect, a byproduct of the predominantly home country-oriented logic of offshore inversions and round-tripping—rather than as primarily a means through which actors in one country invest in another country. Notably, the principal international divide in round-tripping intensity (as a percent of FDI or GDP) does not appear to run between developed and developing countries broadly, but rather appears to be defined by communist history—with far higher levels of round-tripping observed for the three post-socialist host economies here (China, Russia, and Kazakhstan) than for any other economies (figures 10-11 and table 4). Indeed, round tripping from these three countries accounts for two thirds (65%) of the total stock of offshore FDI observed in the present study from all developing and post-socialist transition economies combined. Meanwhile, half of *all* inward FDI in Russia and China is estimated to be controlled by local rather than foreign actors.

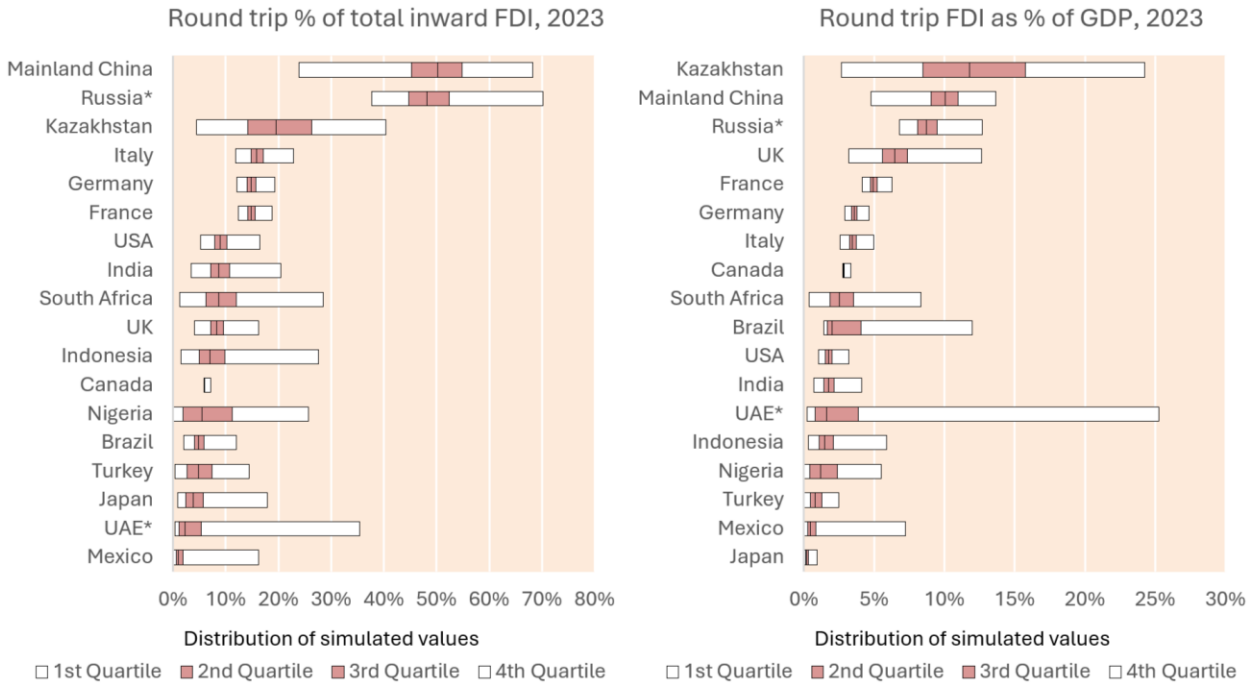


Figure 11. Estimated round trip investment as a percentage of total inward FDI (left) and GDP (right) for major economies

Conceptually, this pattern lends weight to arguments that very high levels of round tripping are a characteristic institutional byproduct of the post-socialist reform process. This offshoring of the institutional framework of national business appears to emerge as a response to the development of a capitalist economic system within what is initially a capitalist institutional vacuum (with respect to e.g. the basic property and legal framework)—and subsequently becomes perpetuated run in a path-dependent institutional evolutionary trajectory (Haberly and Wojcik 2022; Nougayrede 2013;

Sharafutinova and Dawisha 2017; Wojcik and Camilleri 2015). However, the results here also underscore that the details of how this institutional offshoring unfolds can differ across post-socialist reform contexts. Most importantly, there is a basic ambiguity in post-socialist economies between the use of offshore structures to facilitate and house the proceeds of the *abuse* of underdeveloped capitalist institutional frameworks (e.g. from corrupt privatization programs; see e.g. Cooley and Heathershaw 2017; Freeland 2000; Ledyaeva et al. 2015; Nougayrede 2017), as opposed to the use of offshore structures by local firms to *compensate* for domestic institutional weakness by "piggybacking" (Shen 2010) on stronger financial institutional frameworks abroad (also see e.g. Hurst and Sutherland 2024; Luo and Tung 2007; Maurer and Martin 2012; Sharman 2012; Wojcik and Camilleri 2015).

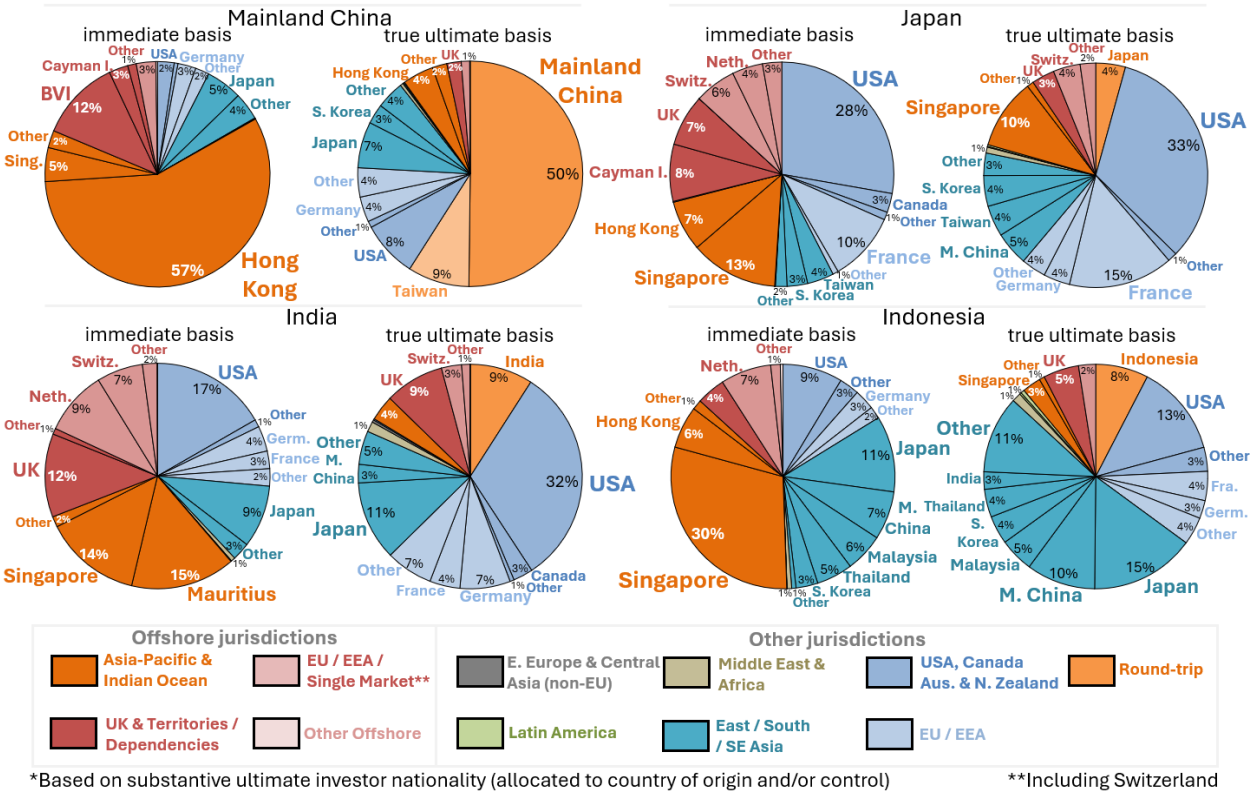
Table 4. Estimated amounts and pathways of round-trip FDI in major economies (2023)

Country	#1 round trip jurisdiction		#2 round trip jurisdiction		#3 round trip jurisdiction		Total est. round trip FDI 2023	Round trip FDI as a percent of:		
		% round trip FDI*		% round trip FDI*		% round trip FDI*		Offshore FDI	Total FDI	GDP
Mainland China	Hong Kong	72%	BVI	19%	Cayman I	4%	1,819,492	64%	50%	10%
USA	Ireland	24%	Lux.	18%	UK	16%	492,331	27%	9%	2%
UK	Jersey	25%	Lux.	23%	Neth.	7%	220,729	21%	8%	7%
Russia**	Cyprus	65%	UAE	11%	Switz.	8%	185,479	72%	50%	9%
Germany	Lux.	40%	Neth.	23%	Switz.	13%	163,619	28%	15%	4%
France	Lux.	42%	Belgium	20%	Neth.	15%	151,476	31%	15%	5%
Italy	Neth.	40%	Lux.	33%	Switz.	9%	80,398	30%	16%	3%
India	Mauritius	34%	UK	19%	Sing.	18%	66,118	18%	9%	2%
Canada	USA	34%	Neth.	20%	UK	18%	61,758	20%	6%	3%
Brazil	Cayman I.	33%	Lux.	16%	Bahamas	13%	38,399	12%	5%	2%
Kazakhstan	Neth.	79%	Cyprus	5%	Switz.	4%	31,983	43%	20%	12%
Indonesia	Sing.	57%	Hong Kong	14%	Malaysia	9%	22,945	17%	8%	2%
UAE**	Egypt	64%	Cayman I.	14%	Iran	4%	18,945	14%	5%	4%
Mexico	USA	42%	Neth.	18%	Canada	12%	12,234	7%	2%	0.7%
South Africa	UK	60%	Neth.	14%	Cyprus	7%	10,630	18%	10%	3%
Turkey	Neth.	81%	Switz.	6%	Lux.	4%	9,908	15%	5%	0.9%
Japan	Sing.	38%	Hong Kong	36%	Cayman I	8%	9,744	12%	4%	0.2%
Nigeria	Bermuda	60%	Cayman I.	31%	UK	3%	5,380	12%	7%	1.5%

*Percent of round-trip inward FDI stock in country entering via jurisdiction on immediate basis.
**CDIS non-reporting country

By far the most important manifestation of this latter dynamic of institutional compensation or "piggybacking," in post-socialist transition economies, is the use of offshore structures to facilitate international exchange-listings (and more broadly securities offerings) by publicly listed multinationals (Buckley 2015; Haberly and Wojcik 2022; Wojcik and Camilleri 2015; Sharman 2012; Vlcek 2014). Notably, the analysis here

suggests that this is likely the leading driver of Mainland Chinese round tripping, which appears to be largely generated as a byproduct of the structuring of HKEX, NYSE, and SGEX stock market listings by multinational firms (and their major shareholders). This behavior is observed pervasively across both private and state-owned Chinese multinationals (see Haberly 2024; Haberly and Wojcik 2022; Wei and Palan 2023), with the analysis here suggesting that firms under state control (including by local governments and via <50% shareholdings) account for perhaps 1/3 of total round tripping. As described by Wei and Palan (2023), this often entails a convoluted and seemingly paradoxical logic of offshore arbitrage, wherein the Chinese state itself is, in effect, circumventing various elements of its own tax and regulatory frameworks. At the same time, however, as observed by Maurer and Martin (2012), Chinese offshore exchange listing structures generally seem to be designed to offer investors greater transparency and legal certainty compared to what could be obtained in the mainland itself (also see Sharman 2012).



*Based on substantive ultimate investor nationality (allocated to country of origin and/or control) **Including Switzerland

Figure 12. Immediate and estimated true ultimate* origin of FDI in major economies in East, South and Southeast Asia (2023)

As described in Haberly (2024), the logic of this behavior implies that much of what is recorded in official statistics as foreign *direct* investment entering China should actually be regarded as inward foreign, and in particular American, *portfolio* investment (also see Sharman 2012; Vlcek 2014). Rather than entering China directly, this portfolio investment

is, in effect, first transformed into FDI via foreign investment in offshore-incorporated listed Chinese firms. The geography of the offshore structures used by Chinese firms reflects this logic of tapping into international, and in particular US securities markets, with the strongly New York-linked Cayman Islands—with its high level of US reputational and regulatory embeddedness—particularly widely used as a registration jurisdiction for the nominal parent entities of Chinese firms (and in particular private sector technology firms) listed on international exchanges (Fichtner 2016; Sharman 2012). Importantly, while the analysis here finds that Chinese firms likely constitute the majority of FDI passing through the Cayman Islands, the total stock of FDI in the Caymans is dwarfed by roughly a factor of 5 by portfolio investment, which appears to be much more American-dominated in composition. From this standpoint, the Cayman Islands can be seen as a connecting point between the American and Chinese securities markets, with the enormous stock of Chinese FDI in the Caymans ultimately just as much a reflection of the weight of American investment in this jurisdiction (also see Fichtner 2016). Companies linked to a single NYSE-listed Chinese internet technology group are estimated to account for nearly one fifth of all Chinese round tripping via the Caymans.

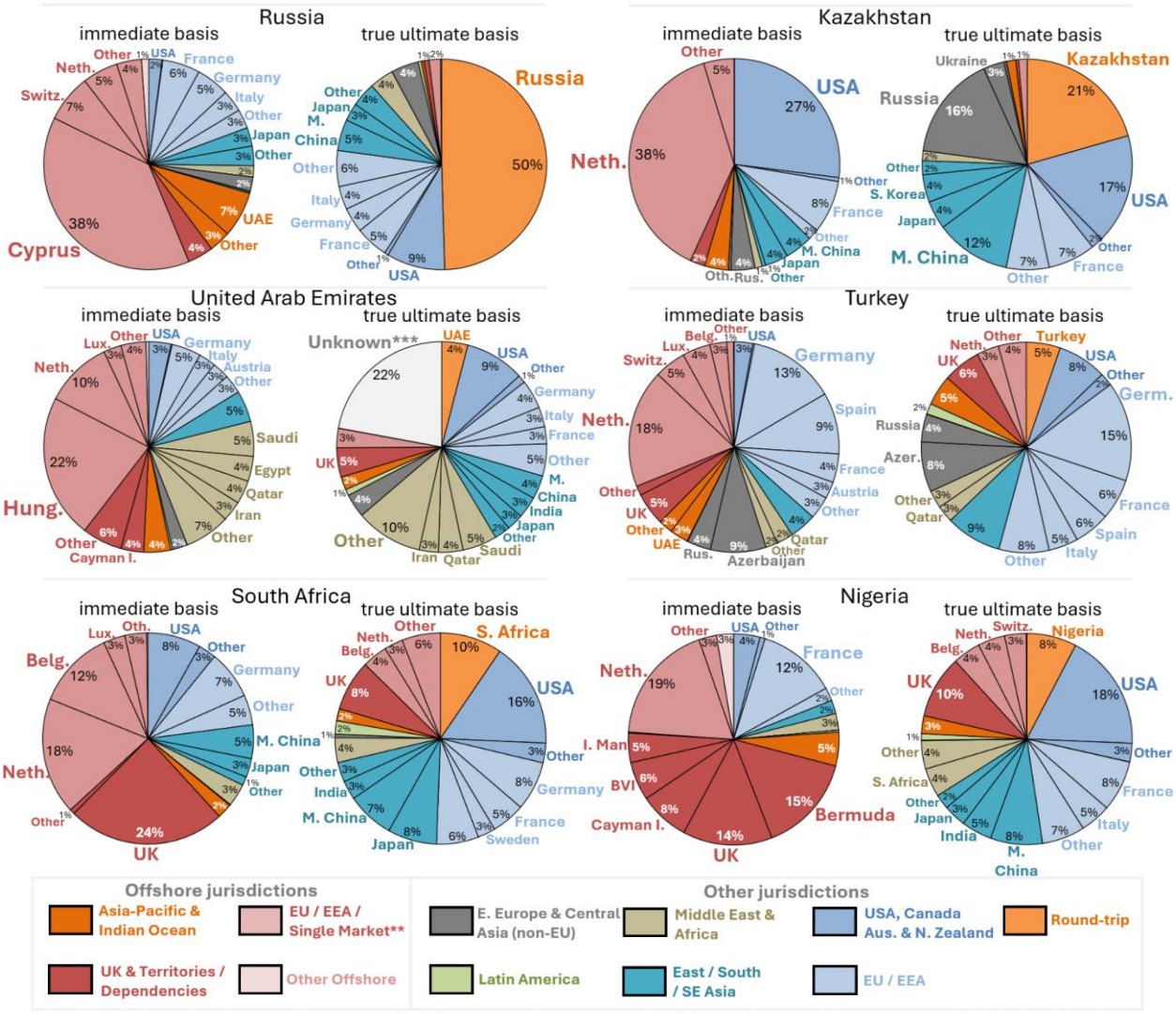
In contrast to private sector firms, Chinese state-owned multinationals are less frequently domiciled in the Cayman Islands, with the (nominal parent) listing vehicles of these firms rather usually registered in Hong Kong. Meanwhile, British Virgin Islands (BVI) companies are seldom used as listing/parent vehicles by either state-owned or private firms, rather playing what can be described as a connective tissue role within corporate structures. This typically involves large numbers of BVI companies being used both as holding companies for shareholders (both private and state) in Hong Kong and Caymans-based listed entities, and as investment conduits / special purpose vehicles under the latter listed entities (see Haberly and Wojcik 2022; Maurer and Martin 2012; Wei and Palan 2023). Notably, while not typically listed on stock exchanges, such BVI vehicles do often appear to be used to issue bonds (Wei and Palan 2023). As described by Maurer and Martin (2012), the existence as well as beneficial ownership of the BVI-based holding companies and subsidiaries of listed Chinese multinationals is usually publicly disclosed in securities regulatory filings in either Hong Kong or the US. Like Cayman Islands round-tripping, BVI round tripping is highly concentrated at the actor level, with a small number of large overseas-listed SOEs appearing to drive the majority of BVI round-tripping by value. The largest of these SOEs is estimated to account for more than 10% of BVI's entire worldwide FDI stock. More broadly, two SOEs are estimated to account for more than 10% of all Mainland Chinese FDI round tripping, while ten SOEs are estimated to account for more than a quarter.

White-collar criminal activities and proceeds (from e.g. corruption, fraud, etc.) are in practice rife in Chinese offshore networks (see e.g. Ding 2000), both alongside and in

conjunction with offshore networks linked to publicly listed multinationals. However, the underlying capital in these networks mostly either belongs to the state itself, or represents the proceeds of private sector entrepreneurship, accumulated within the context of a long-term economic boom. In contrast, the bulk of Russian and Kazakh offshore investment can be described as representing, in effect, the direct and indirect proceeds of corruption, obtained during poorly managed early reform-era privatization programs—wherein the bulk of the assets of the former state-owned economy were transferred to a handful of politically connected oligarchs, within the context of a broader economic collapse (Cooley and Heathershaw 2017; Freeland 2000; Hoff and Stiglitz 2005).[8] The analysis here indicates that these oligarchs overwhelmingly dominate Russian and Kazah offshore FDI—with companies linked to seven individuals accounting for half of Russia's total identified FDI, and companies linked to just two individuals accounting for three quarters of identified Kazakh round-tripping.

Notwithstanding the fundamental differences in the historical origins and composition of offshore investment from Russia and Kazakhstan, as compared to China, there are also substantial points of organizational and functional convergence between offshore round-tripping (and more broadly offshore investment) from all three countries. This can be most notably seen in the widespread use of offshore structures by both state owned and private firms to support overseas exchange listings and securities offerings. In this respect, while Chinese firms are predominantly oriented towards the New York and Hong Kong markets, Russian and Kazakh firms have traditionally been oriented primarily towards London, with listings focused on the LSE (Timmons 2006; Wojcik and Burger 2010). Reflecting this, Russian and Kazakh oligarch as well as state-controlled corporate listing entities are frequently registered in either the UK itself, or in the largely UK market-focused Crown Dependencies (e.g. Jersey). In some cases (e.g. VTB, formerly Moscow Nardony bank) this link to London dates back to the communist era, when the offshore Eurodollar market served as the principal focus of the international financial operations of the USSR (Burn 1999; CIA 1969; Haberly and Wojcik 2022; Shaxson 2011).

[8] As the head of Russia's first privatization program put it: "They are stealing absolutely everything and it is impossible to stop them. But let them steal and take their property. They will then become owners and decent administrators of this property." (Freeland 2000, p. 70). As shown more recently by Ledyaeva et al. (2015), there appears to be a persistent empirical connection between corruption and FDI round-tripping in Russia, with episodes such as the Ablyazov case in Kazakhstan also highlighting the ongoing role played by offshore structures in post-Soviet republic corruption more broadly (Nougayrede 2017).



*Based on substantive ultimate investor nationality (allocated to country of origin and/or control) **Including Switzerland

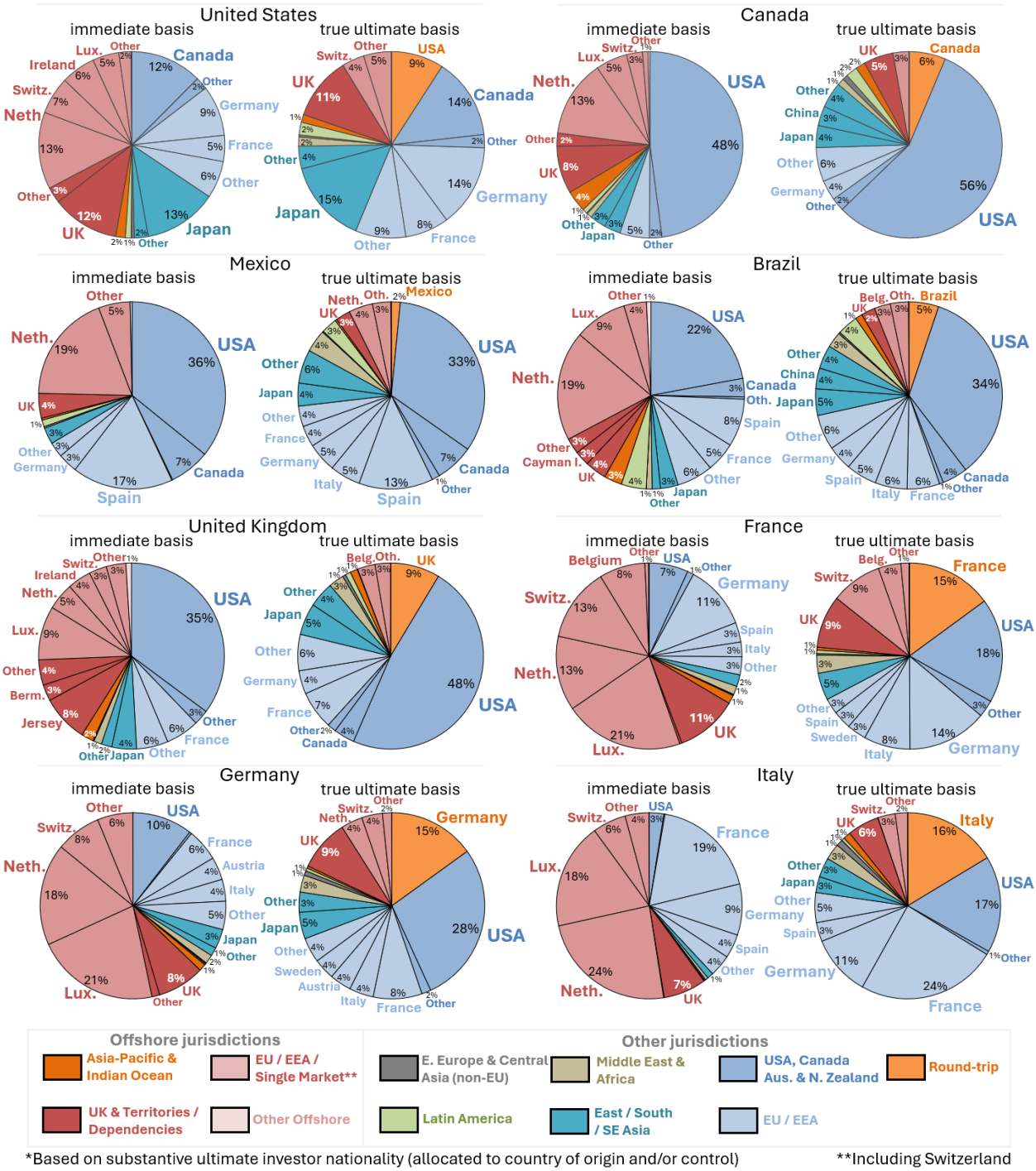
***Orbis coverage of FDI in the UAE from Hungary was too incomplete to support the effective analysis of true ultimate FDI origin

Figure 13. Immediate and estimated true ultimate* origin of FDI in major economies in the Middle East, Africa, Eastern Europe, and Central Asia (2023)

While most Russian offshore investment still appears to be concentrated in European offshore jurisdictions, and above all in Cyprus, the results here suggest that the ongoing Ukraine war and accompanying western sanctions have triggered a major geographic shift in the geography of this investment (also see Haberly 2025). Indeed, the data here indicates that very few new Russian companies have been formed since 2022 in either Europe or the British Overseas Territories and Crown Dependencies, with the enormous stock of Russian offshore FDI in jurisdictions such as Cyprus or the British Virgin Islands rather a legacy of the pre-war period. Meanwhile, the focus of new Russian offshore company formation—and in particular of the round-trip holding structures used to control Russian business groups—appears to have moved, since 2022, to the UAE. This has surged from being

virtually nonexistent in Russian investment structures in 2015 (see Haberly 2024), to being likely the second largest Russian round-tripping jurisdiction after Cyprus—with our analysis indicating that many Russian holding companies that were previously registered in Cyprus, have been reregistered in the UAE since 2022. Notably, while this shifts mirrors, and has indeed partly been driven by, the geography of Russian sanctions evasion (see Haberly 2025; Haberly et al. 2024), it appears to extend just as strongly to non-sanctioned as to sanctioned Russian business groups. This indicates that it needs to be conceptualized as a broad reconfiguration of Russian international business, rather than simply as a mechanism for circumventing western sanctions. This same geographic shift also appears to extend to the offshore investment of former Soviet Republics not subject to western sanctions—with Kazakh business groups also among the largest investors in/through the UAE (see figure 7).

Contrary to the typical assumption that FDI round-tripping is mostly associated with developing rather than developed countries, the analysis here does not find any evidence for a generalized North-South divide in round tripping among countries with no history of communist rule. Rather, a more complex international landscape of round tripping is observed that cuts across different groups of developed and developing countries. After the three post-socialist countries, the highest intensities of round-tripping are found in Western Europe, with the three continental European economies showing the highest levels of round tripping as a percent of FDI (i.e. ca. 30% of offshore FDI, and >15% all FDI, in Italy, France, and Germany), while the UK is estimated to have the highest domestic economic impact of round-tripping outside of the post-socialist world in relation to GDP (see figure 11 and table 4). Meanwhile, round tripping appears to be somewhat lower, albeit still quite significant, in the rest of the world—with no developed or developing country outside of Europe or the post-socialist world estimated to have a round-tripping intensity >10% in relation to either total inward FDI or GDP (table 4). Sitting at the bottom of international rankings of round-tripping intensity are Mexico and Japan, while most other developed and developing countries (including e.g. the US, Brazil, India, Indonesia, Canada, South Africa) appear to have what can be described as middling levels of round-tripping intensity (normalized by either GDP or FDI).



*Based on substantive ultimate investor nationality (allocated to country of origin and/or control) **Including Switzerland

Figure 14. Immediate and estimated true ultimate* origin of FDI in major economies in Europe and the Americas (2023)

The composition, as well as likely the motivation for round-tripping, varies across countries. Family-controlled business groups appear to drive the bulk of round-trip FDI across most developed as well as developing economies without a history of communist rule, via a combination of offshore family holding entities, offshore registered business

group parent entities, and the offshore redomiciliation (to e.g. Switzerland, Monaco, Singapore) of family shareholders themselves. The offshore sheltering of these family fortunes and associated business groups appears to be the largest component of round-tripping in continental European economies (mostly via Luxembourg, Switzerland, and the Netherlands), as well as in most developing world economies. As in former communist countries, these family holding structures usually take an inverted form, wherein the nominal group parent shareholder (legal or human) is itself located offshore. The actor-level concentration of investment in this context is also often comparable to or even higher than that of oligarchs in Russian investment. Companies linked to a mere six families and individuals, for example, account for 85% of identified Indonesian offshore round tripping, while companies linked to the same number of families and individuals are estimated to drive more than half of all Brazilian round tripping. In Italy, roughly one quarter of all round tripping is estimated to be driven by companies linked to a single family.

The most prominent motivation for this offshore domiciliation of family business groups in general is likely the avoidance of home country and other international taxes. However, there are also often more complex factors at play. For developing country families and family firms, these may entail, as in post-socialist countries, an often ambiguous mixture of both exploiting and compensating for or circumventing weak home country institutional environments (with respect to e.g. rule of law, asset protection, the structuring of international securities offering, or the hiding proceeds of illicit activity; see e.g. Nougayrede 2017; Palan et al. 2010; Stal and Cuervo-Cazurra 2011; Hurst and Sutherland 2024). As described in Haberly and Wojcik (2022), some offshore jurisdictions, such as Delaware within the United States, also serve as corporate legal hubs that largely attract business incorporations by offering specialized corporate governance frameworks, and supporting legal institutions. In this respect, major EU offshore jurisdictions increasingly appear to play a Delaware-like role as legal hubs in EU corporate governance—with the large number of Italian family business inversions to the Netherlands, for example, reportedly being driven partly by the flexibility of local rules on dual-class share structures used to preserve family control (van Olffen 2025).

There are notable variations in the detailed pattern of offshore round tripping across different countries and regions. Brazilian round tripping, for example, appears to be largely driven by Cayman Islands-domiciled US stock market listing vehicles similar to those to those widely used by Chinese firms—albeit largely controlled by family business groups, rather than SOEs or entrepreneurial founders.[9] Meanwhile, Continental European countries show a regionally specific pattern of what can be described as multinational champion

[9] Also see Fichtner (2016) and Stal and Cuervo-Cazurra (2011) on Brazilian investment in the Caymans

round tripping, characterized by the formation of large multinational firms (e.g. Airbus or Stellantis) as de-facto consortiums of multiple governments as well as family and other business groups. These European multinational champions are invariably registered in offshore jurisdictions such as the Netherlands, and constitute a substantial component of European offshore investment (both round-trip and generally) via their ownership of subsidiaries outside of their jurisdiction of incorporation.

British and Canadian round tripping also show elements of the continental European and developing world family-dominated pattern—largely centered on the use of Channel Islands and Belgium-based holding companies respectively. However, the Anglo-American economies generally, including some developing countries such as South Africa, generally exhibit a somewhat different pattern of FDI round-tripping, which is primarily driven by a combination of widely held firms and private equity funds. Historically, the largest driver of Anglo-American offshore round-tripping was tax-inversions by widely held American multinationals (see Marples and Gravelle 2014; Morse and Allen 2013; Talley 2015), above all to Ireland (which is still by far the largest US round-tripping jurisdiction). However, the undertaking of new such inversions by US firms appears to have largely ceased since the 2017 (TCJA) US corporate tax restructuring (Clausing 2020; DeNovio et al. 2022), with total US round-trip FDI increasing by only 25% from 2015 to 2023, while total offshore FDI in the US increased by 55% (based on comparison with Haberly 2024). This resulted in a fall in US round-tripping intensity from 12% of inward FDI in 2015, to 9% in 2023 (based on comparison to Haberly 2024). Outside of the US, the parent level offshore registration of widely held business groups is also a major driver of British round-tripping—mostly via registrations in Jersey—as well as South African round-tripping, with the latter mostly driven by a handful of UK-domiciled Anglo-South African multinationals.

Apart from family, state-owned, and widely held multinational firms, the data here suggests that private equity (PE) is one of the largest drivers of offshore round-tripping, as well as offshore FDI in general—due the fact that these funds, at least when investing outside of the US, are almost invariably registered in offshore jurisdictions. These PE-linked structures are mostly classified as offshore "inversions" here, as it is typically the offshore domiciled funds themselves, rather than their onshore managers (in e.g. New York, London, etc.), that are recorded as the ultimate parent shareholders in ownership chains. Most commonly used as domiciles for these funds are Luxembourg, as well as several British Overseas Territories and Crown Dependencies including the Cayman Islands, Bermuda, and Jersey. The data here (mirroring available rankings for PE assets under management) finds that offshore PE fund investment is dominated by managers from the US and UK, where the institutional form was originally pioneered, and is most deeply entrenched in the national financial and corporate governance landscape. Reflecting its broader influence within the

international financial "Anglosphere" (Fichtner 2017), private equity also plays a disproportionately large role in Canadian offshore investment, with the analysis here suggesting that as much as half of all Canadian round tripping may be driven a single fund manager (mostly via Bermuda; see figures 6 and 7[10]). However, private equity has also become increasingly diffused as an institutional form across continental Europe, as well as much of the developing world.

The details of how private equity is constituted and funded exhibits substantial diversity across these contexts, with European, Asian, and Middle Eastern PE funds often closely affiliated with individual or multiple wealthy families and/or governments (in addition to the more traditional types of PE backers and investors, e.g. major investment banks and pension funds)—and in some cases apparently acting as de facto family or multi-family offices and/or sovereign investment vehicles. Sweden appears to be home to the largest PE sector outside of the English-speaking world (see Eccles et al. 2020), with the scale of this sector almost entirely responsible for Sweden's extremely high overall ranking as a source of offshore FDI (i.e. between India and China, when round-tripping is excluded; see figure 10). Elsewhere in continental Europe, a large number of smaller boutique PE funds appear to have proliferated, alongside larger continental European financial group-affiliated PE funds, as offshore-domiciled vehicles for what in practice largely appear to be round-trip domestic investments. These PE funds sometimes appear to be controlled by the same families who have traditionally controlled major industrial groups in the countries that serve as their base of management and focus of investment.

Many European PE funds also appear to blend in capital from other regions, and in particular from the Persian Gulf. Indeed, both state and family investors from the latter region appears to be key backers of a growing number of PE funds more broadly, as registered both in European jurisdictions such as Luxembourg, and in jurisdictions within the Persian Gulf itself. Similarly, the private equity sector in East and Southeast Asia appears to be largely a vehicle for investment by sovereign wealth funds and other state financial institutions, often acting in concert with various private investors. These hybrid parastatal East and Southeast Asian PE funds, along with the usually private capital-dominated Indian PE funds, are typically based in either Hong Kong or Singapore, and in most cases seem to be heavily focused on round-trip investment within the home countries of their respective backers. Also showing a large private equity footprint in both outward and round-trip offshore investment is Brazil, with round-trip PE investments in Brazil itself appearing to largely consist of the landholdings of Brazilian-controlled

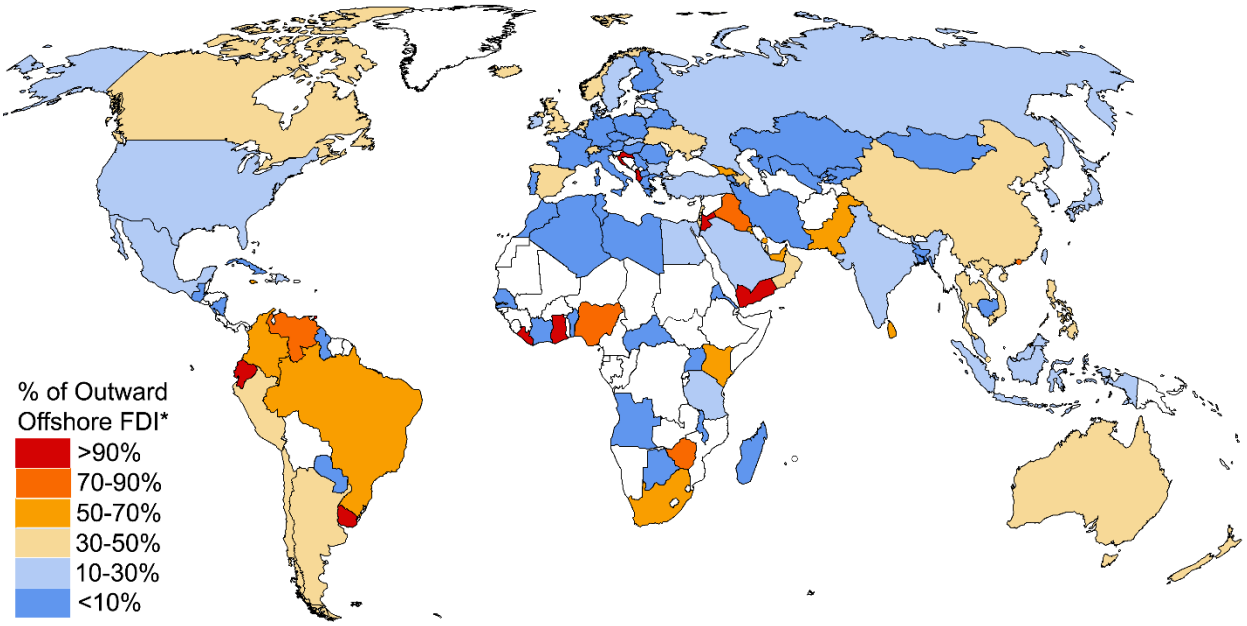
[10] Most of this investment is subsequently intermediated through companies in the US and other jurisdictions before re-entering Canada, with the leading role of Bermuda in this context thus not visible in table 4.

agribusiness-focused funds (often domiciled in British Overseas Territories and Crown Dependencies).

5. Geographic variegation and historical path dependency

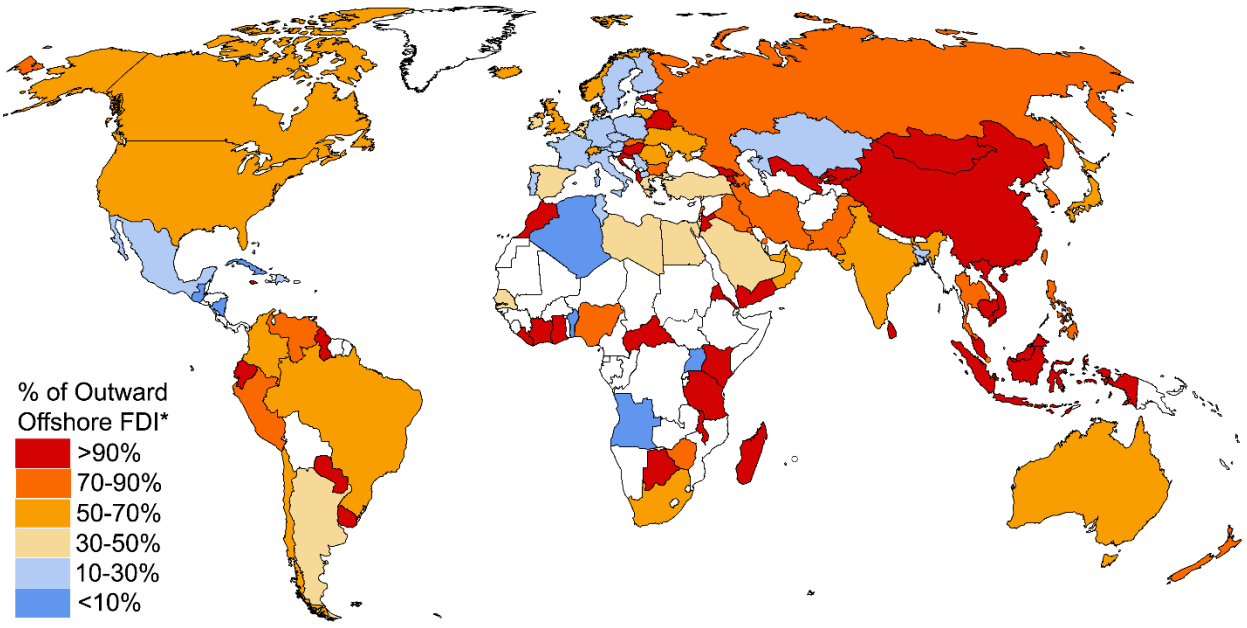
The geographies of round tripping shown in table 4, as well as the broader investment architectures revealed by the analysis here, also underscore a second stylized feature of the global offshore FDI network, beyond the central role of offshore round-tripping and inversions. This is the deep institutional and relational embeddedness of the global offshore FDI network in historical as well as contemporary cultural and political ties (see Haberly and Wojcik 2022). As has been widely observed, the architecture of the global offshore system has above all been shaped by the historical legacy of colonial ties—as most importantly centered on Britain—with the influence of these ties perpetuated in finance, over long historical timescales, via path-dependent institutional and relational evolutionary interdependencies (Haberly 2025; Haberly and Wojcik 2015; 2022; Palan et al 2010; Shaxson 2011). In addition to the direct contemporary role of the UK/London itself, together with the British Overseas Territories and Crown Dependencies (OTs and CDs), a key element of this is the enduring legacy of the British free port system throughout Asia. This historically encouraged the consolidation of both western and regional diaspora (e.g. Arab, Indian, Persian, Chinese) business activities in liberal international financial and trading hubs such as Hong Kong or Singapore, which have maintained a paramount importance in regional business and financial networks to the present day, as well as strong financial connections to London (Davidson 2008; Haberly 2025; Shenk 2002; Vlcek 2008). Also helping to anchor the long-term durability of the geographic architecture of the international financial "Anglosphere" (Fichtner 2016), at an institutional level, is the enduring influence of Common Law, which continues to provide the principal institutional matrix for international finance (Haberly and Wojcik 2022).

This British historical legacy in the geography of offshore finance is mapped in figures 15 and 16. These show the extent to which offshore investment from particular countries is mediated a) through the UK itself and its current OTs and CDs (figure 15), and b) through the broader offshore financial "Anglosphere" (Fichtner 2016), i.e. including offshore jurisdictions that were politically linked to the UK in recent historical times (figure 16).



*Percent of offshore FDI originating from country, on a true ultimate investor basis, that is intermediated through the UK and its Overseas Territories and Crown Dependencies; based on 2023 FDI in BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB.

Figure 15. Estimated percent of outward offshore FDI from countries intermediated through the UK and Overseas Territories and Crown Dependencies.



*Percent of offshore FDI originating from country, on a true ultimate investor basis, that is intermediated through the UK and its Overseas Territories and Crown Dependencies, together with offshore jurisdictions that were historically UK-governed in the 20th century or later; based on 2023 FDI in BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB.

Figure 16. Estimated percent of outward offshore FDI from countries intermediated through the UK and currently or recently (20th century) UK-governed jurisdictions.

As can be seen in figure 15, many formerly British-ruled countries in Sub-Saharan Africa and the Middle East (e.g. Nigeria, Zimbabwe, Kenya, South Africa, Yemen, Iraq, Pakistan), as well as most countries in South America (e.g. Venezuela, Brazil, Ecuador and Colombia), appear to be primarily incorporated into the global offshore network via direct linkages to the UK itself, and its current OTs and CDs. Also showing strong direct offshore investment ties to the UK and its OTs and CDs are Canada, Australia, New Zealand, and several countries in East and Southeast Asia, including Mainland China. As shown in figure 16, however, the full scope of the British historical footprint in the global offshore system is only apparent when the role of offshore jurisdictions with recent political ties to the UK, such as Cyprus, Hong Kong, Singapore, Mauritius, Malta, and the Bahamas and UAE, are also accounted for. As can be seen, the offshore investment of nearly all developing and post-socialist transition countries, as well as of all English-speaking developed countries, is primarily mediated through this greater offshore financial Anglosphere—with more than 90% of all offshore FDI from China, for example, and more than 70% of offshore FDI from Russia, mediated either directly through the UK and its current OTs and CDs, or via jurisdictions which were recently linked to the UK politically.

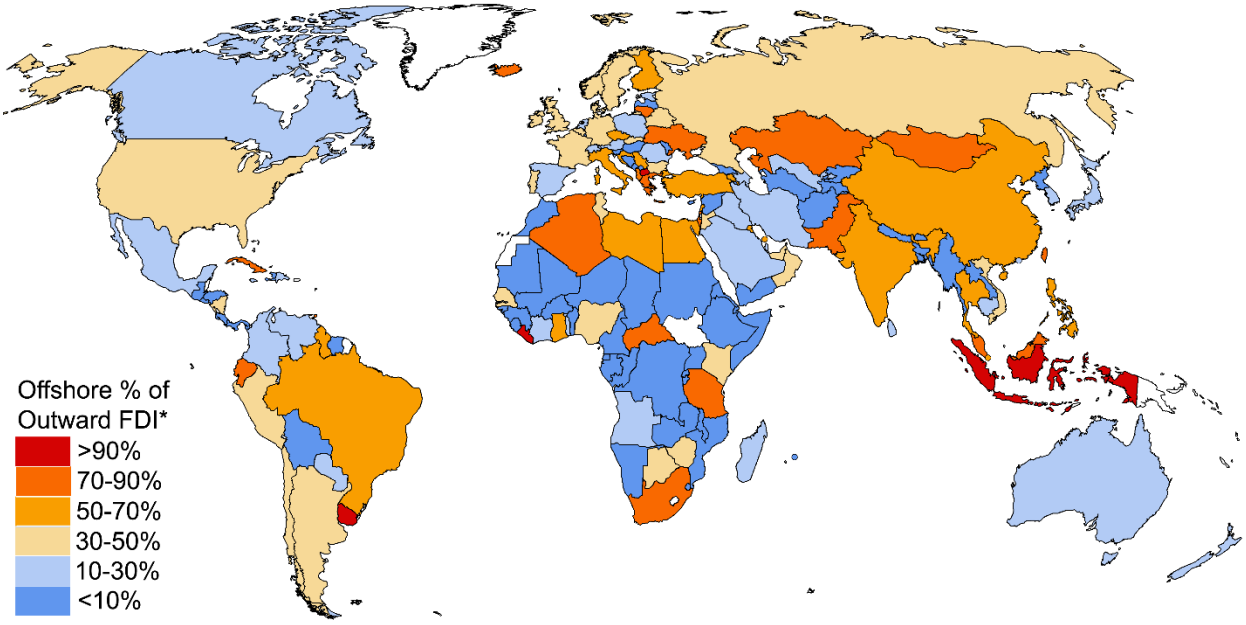
Notably, mounting international political stresses, as well as broader long-term changes in international economic structure (e.g. the growing importance of increasingly Asia-centric South-South relationships), mostly appear to have prompted the reconfiguration of financial networks *within* the overarching architecture of these historically UK-linked offshore networks, rather than driving their movement outside of this architecture. The beneficiaries of this have tended to be Asia-Pacific and Indian Ocean rim offshore jurisdictions with strong historical and institutional ties to the UK, such as the UAE and Hong Kong, which in addition to becoming key hubs for Russian business also increasingly appear to be, for example, supplanting roles formerly played by London in African business networks (see de Olivera 2026; Haberly 2025; Haberly et al. 2024).

Standing out as something of an anomaly, in figure 16, are the economies of continental Europe, which rather than the offshore Anglosphere are primarily linked to geographically proximate continental European offshore jurisdictions with strong local linguistic, business diaspora, and regulatory ties (i.e. via the EU). In this respect, the German, French, and Italian-speaking cantons of Switzerland play key roles as offshore financial centers in relation to their three linguistically contiguous neighboring countries, while Belgium principally attracts the offshore financial operations of French business groups. Meanwhile, Luxembourg and the Netherlands function as offshore hubs for continental European business generally. Also showing unusually weak ties to British(and historically British offshore jurisdictions are Mexico and Central America, which appear to primarily

engage with the global financial system via the United States, and the historically US-linked Panama.

6. Offshore FDI from the Global South

A final key stylized feature of the global landscape of offshore FDI is the mismatch between the importance of developing countries *in* offshore investment, versus the importance of offshore investment *for* developing countries. With respect to the former, China, and to a lesser extent Russia, are the essentially the only two developing and transition economies that can be said to play a substantial role, at an individual country level, in driving total world offshore FDI. Moreover, nearly all offshore FDI from China and Russia consists of round-trip investment. All told, *non-round-trip* South-South and South-North investment (including from China and Russia) is only estimated to comprise 10% of worldwide offshore FDI (5.2% for South-North investment, and 4.8% for South-South investment). This compares to an estimated 17.5% share of North-South investment, and 33.7% share of non-round-trip North-North investment, in world offshore FDI.



*Percentage of FDI originating from country on a true ultimate investor basis (excluding round-tripping) in BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB that enters via offshore jurisdictions, 2023.

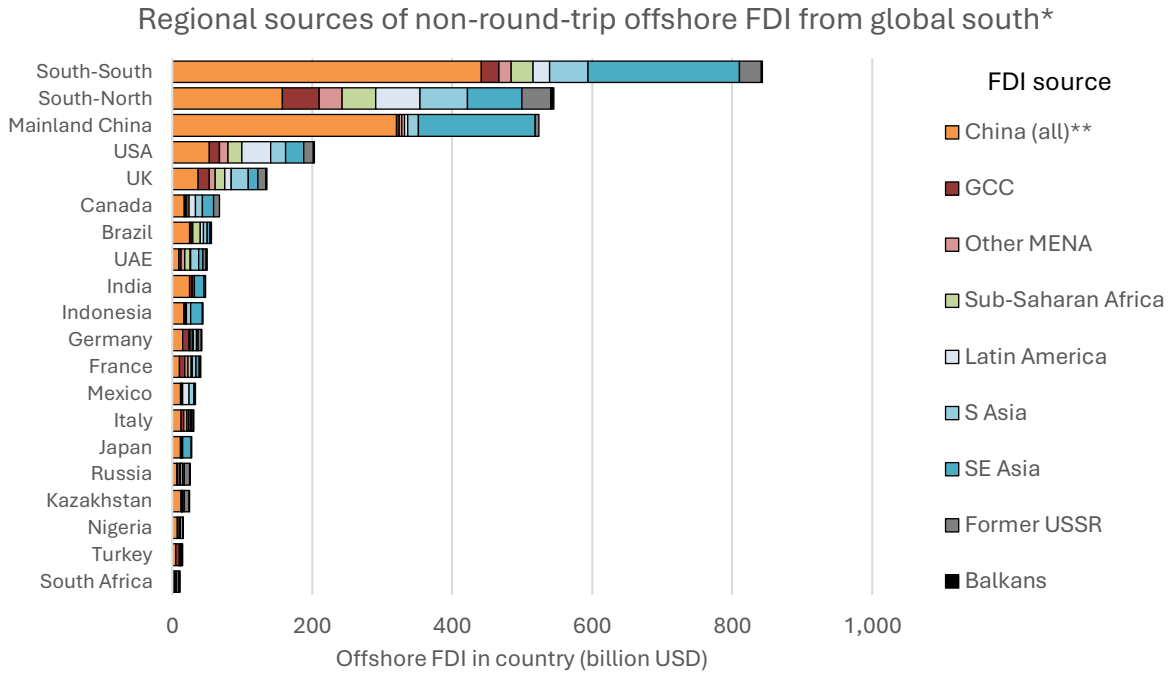
Figure 17. Estimated percent of total outward FDI from country (excluding round-tripping) intermediated through offshore jurisdictions (2023).

Crucially, this small contribution of developing countries to cross-border (as opposed to round-trip) offshore investment is not due to any lower proclivity on the part of investors

from these countries to use offshore structures (also see Hurst and Sutherland 2024; Stal and Cuervo-Cazurra 2011). Rather, it is simply a reflection of the small share of world FDI under their control. Indeed, as shown in figure 17, *most* of the total outward FDI from *most* of the world's largest developing and transition economies is mediated through offshore structures—with the share of total outward FDI passing through offshore jurisdictions exceeding half for Brazil, China and India, two thirds for South Africa and Kazakhstan, and 90% for Indonesia.

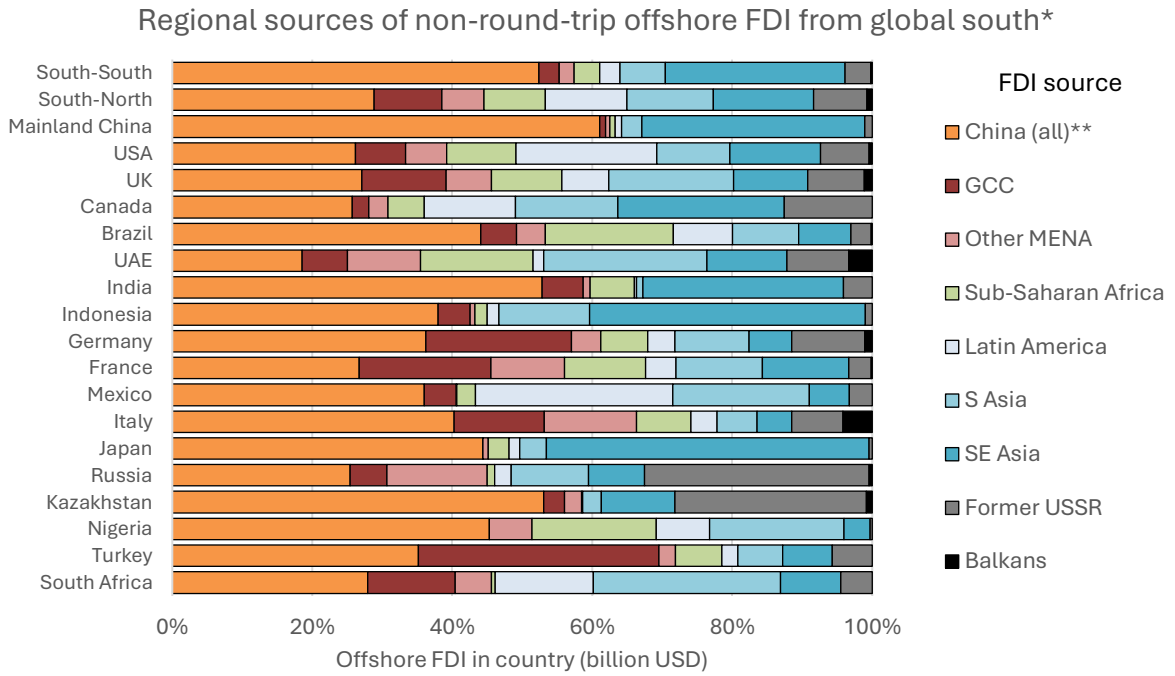
A crucial implication is that existing official FDI statistics reveal very little about the true geography or scale of worldwide South-South and South-North investment. A new window into this investment is provided in figures 18-21, with figures 18-19 showing the regional sources of South-North and South-South offshore FDI in each of the 18 host countries examined here, while figures 20-21 show the breakdown of countries hosting offshore-mediated investment from various regions. Notably, the figures suggest that by far the largest driver of South-South offshore FDI is investment *in* Mainland China by overseas Chinese business groups, which is estimated here to account for more than half of the entire world stock of South-South offshore FDI. By far the largest component of this is investment in the Mainland from the various other Chinese political and jurisdictional units, and above all Taiwan—with the stock of Taiwanese FDI in Mainland China, including hidden offshore investments, estimated to be over $300 billion (as compared to only $43 billion reported in official FDI statistics).[11] However, even excluding Taiwan from the definitional scope of South-South investment, Southeast Asian FDI in Mainland China accounts for an estimated 31% of worldwide South-South offshore FDI, with this Southeast Asian offshore investment driven almost entirely by overseas Chinese business groups. Meanwhile, outward investment from Mainland China is estimated to be the *second* largest driver of world South-South offshore FDI—with the largest developing world destination for Chinese offshore investment estimated to be Brazil, followed by India, Indonesia and Kazakhstan. Notably, India and Indonesia are estimated to host large stocks of Taiwanese, in addition to Mainland Chinese offshore FDI.

[11]As described by Vlcek (2014), the large-scale use offshore structures by Taiwanese firms to invest in the Mainland appears to, at least historically, have largely reflected deliberate efforts to obscure the origin of this investment, for political reasons.



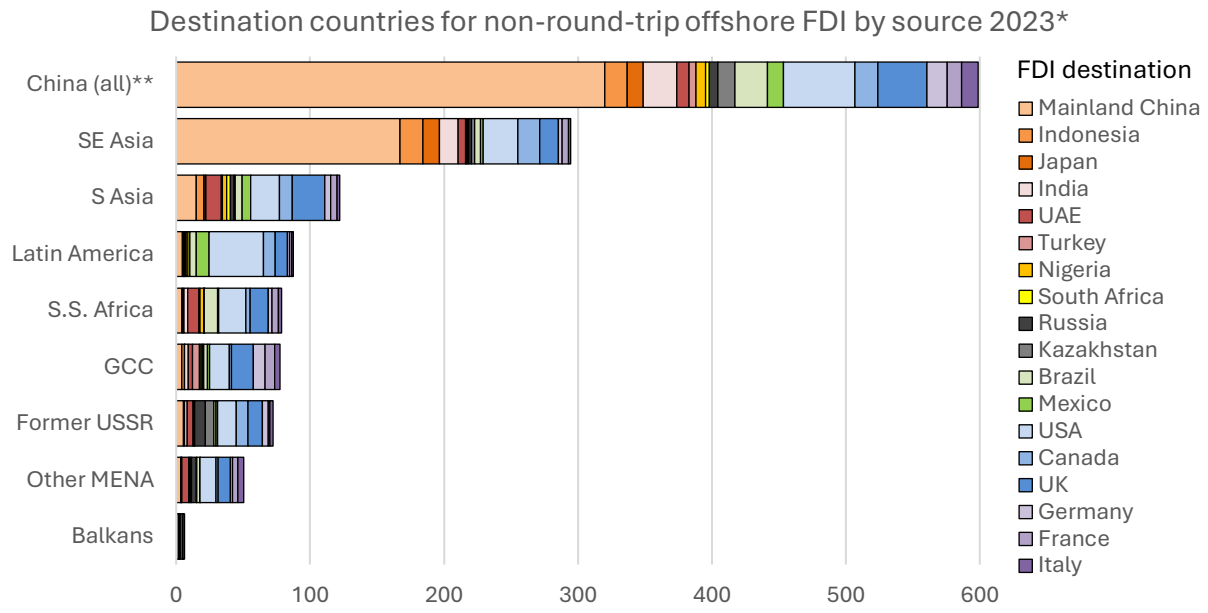
*True ultimate origin of FDI BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB **CN, HK, MO, TW

Figure 18. Regional sources of non-round-trip offshore FDI from the global south, in selected major host economies, 2023 (billion USD)



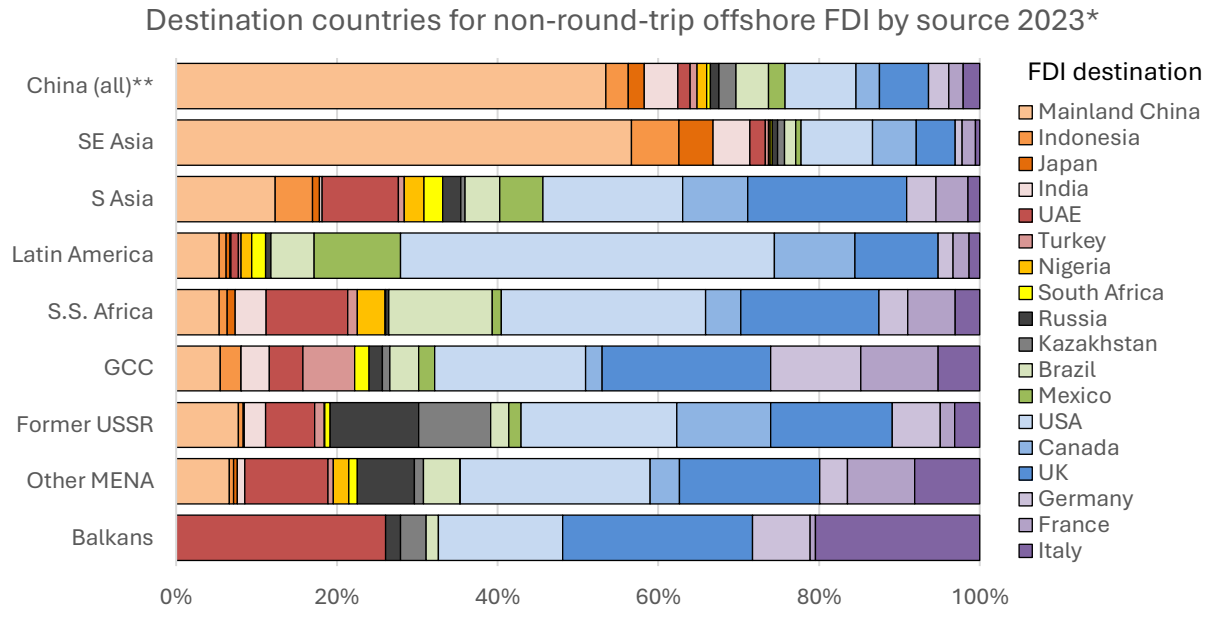
*True ultimate origin of FDI BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB **CN, HK, MO, TW

Figure 19. Regional sources of non-round-trip offshore FDI from the global south, in selected major host economies, 2023 (% of total hosted by country)



*True ultimate origin of FDI BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB **CN, HK, MO, TW

Figure 20. Destination counties for non-round-trip offshore FDI by source region, 2023 (billion USD)



*True ultimate origin of FDI BR, CA, CN, FR, DE, ID, IN, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, US, GB **CN, HK, MO, TW

Figure 21. Destination counties for non-round-trip offshore FDI by source region, 2023 (% of outward offshore FDI from source region)

In contrast to South-South offshore FDI, which appears to be strongly centered on investment in and from Mainland China, the geography of South-North offshore FDI is largely focused on the US and UK as investment destinations, while at the same time being much more diverse at the level of regional origins. As for South-South FDI, China is estimated to be the single largest overall source of South-North offshore FDI. However, very large stocks of South-North offshore FDI are also estimated to be held (in order of size) by investors from the Middle East, Southeast Asia, South Asia, Latin America, Sub-Saharan Africa, and the former USSR. The US and UK are estimated to be the two largest destinations for South-North offshore FDI from every region apart from the Balkans and SE Asia, with Canada estimated to be third most important overall host for South-North offshore FDI. Also collectively (but not individually) important as hosts for South-North offshore FDI are the three largest EU economies, Germany, France, and Italy, with all three combined estimated to host a slightly smaller stock of this investment than the UK. Latin American offshore FDI is the most geographically concentrated category of South-North offshore FDI by destination, being primarily directed at the US, followed by the UK and Canada. Meanwhile, offshore FDI from China, South Asia, the Middle East, Africa, and former USSR, is roughly evenly split between the US and UK as destinations. Middle Eastern offshore FDI also shows an unusually strong focus on continental Europe, with Italy, France and Germany together hosting a larger stock of GCC-origin offshore investment than either the US and UK. Other prominent South-North offshore FDI links include Southeast Asian investment in Canada, and Balkans investment in Italy.

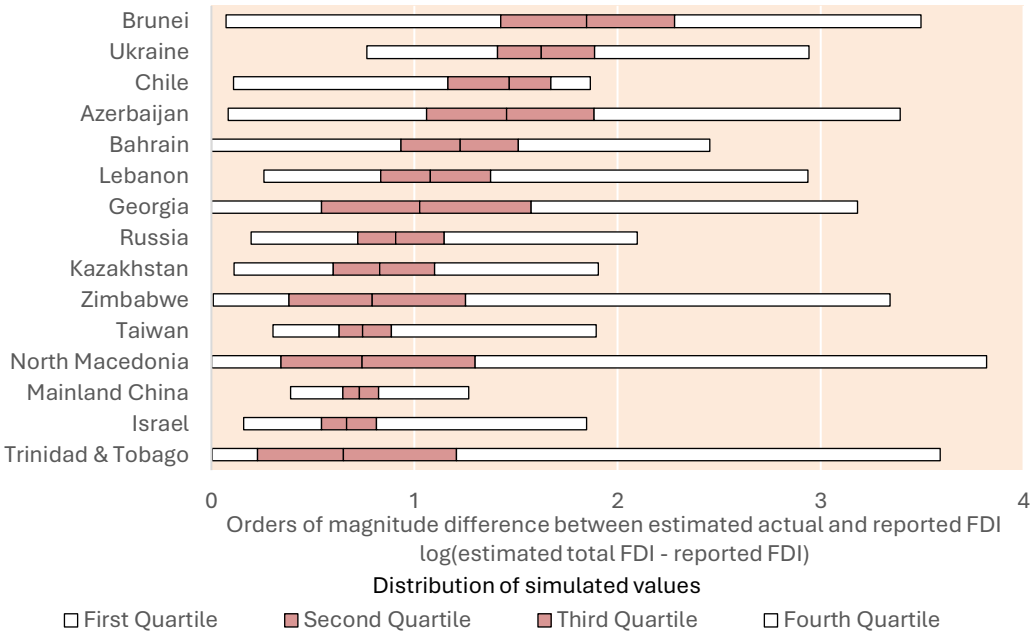


Figure 22. Orders of magnitude difference between estimated actual (including offshore) and officially reported (IMF CDIS) FDI from countries in the UK, 2023

In practice, the hidden, offshore-mediated South-North FDI positions between pairs of developing and developed countries are often many times higher than the FDI between these countries reported on a direct, immediate basis. While some host economies do report part of this offshore-mediated investment in OECD bilateral FDI data recorded on an "ultimate" investing country basis, this crucially does not capture the true origin of investment by offshore inverted groups (and thus of the bulk of developing world offshore FDI; see section 4). Even this type of data, moreover, is either largely or entirely lacking for many host economies, including the UK.[12]

Figure 22 shows the impact of accounting for these hidden offshore investments on the estimated FDI positions of various countries in the UK, with the x-axis showing how much larger the actual stock of each country's FDI in the UK is estimated to be in relation to officially recorded FDI data. The x-axis scale is in orders of magnitude (factors of 10). As can be seen, when offshore-mediated investments are included, many countries are estimated to have a stock of FDI in the UK that is anywhere from several times to more than an order of magnitude higher than what is recorded in official FDI statistics. This includes FDI from several post-Soviet republics (including Russia, Kazakhstan and Ukraine), as a well as a number of other developing (and in some cases developed) economies including Lebanon, Zimbabwe, Taiwan and Mainland China.

Conclusion:

The estimates presented in this paper are inherently uncertain (see Appendix A). However, they nevertheless shed substantial light on the architecture as well as rationale for offshore FDI. Aside from the sheer scale of offshore FDI—which we estimate to account for nearly half of all FDI in the 18 host economies examined—several key findings stand out.

The first is the finding that the diversity in offshore FDI patterns *among* developed and developing countries appears to be larger, in general, than the differences in offshore FDI patterns between these two groups of countries.[13] High levels of offshore FDI round-tripping, in particular, appear to be found across most developed as well as developing countries. Indeed, while the overall estimated offshore share of FDI in the 18 hosts examined here, at 46 percent, is only slightly higher than the 40 percent 'phantom FDI' share estimated by Damgaard et al. (2024), the estimates of round-tripping derived here

[12] While some pilot studies have been conducted of ultimate FDI in the UK, these lack comprehensive coverage, particularly of FDI originating from countries that account for a relatively small share of total FDI (see ONS 2022).

[13] Keeping in mind that the analysis here does not directly account for many types of illicit financial flows; see e.g. Kar and Freitas (2012).

are far higher than those calculated in the latter study. For China and Russia, for example, Damgaard et al. (2024) estimate that round-tripping accounts for 20–30 percent of inward FDI, and for the US cite the OECD-reported round-trip FDI figure of just a few percent. In contrast, the analysis here suggests that round-tripping accounts for roughly half of all FDI in both China and Russia, and nearly one tenth of all FDI in the US, with European economies exhibiting even higher round-tripping intensities than the US.

Above all, this discrepancy between the estimates of round-tripping here, as compared to previous studies, reflects the fact that round-tripping is mostly undertaken by *inverted* firms—or, in other words, by firms that have nominally shifted their nationality to offshore jurisdictions at the group parent level. Such firms have not been systematically accounted for in prior studies of offshore FDI.[14] Notably, while countries with a history of communist rule appear to have unusually high intensities of this inversion-driven round-tripping, this behavior can be observed pervasively across both developed and developing country firms. These range from, for example, Russian business groups organizing themselves around holding structures spanning Cyprus and the British Virgin Islands, to Chinese firms locating stock-exchange listing vehicles in the Cayman Islands, to US firms inverting to Ireland, to Italian family business groups incorporating in the Netherlands as a parent domicile. Indeed, the analysis here shows that most offshore FDI can be considered to be, in effect, a byproduct of the predominantly home country-oriented dynamics of offshore inversions and round-tripping. This is due to the fact that the same offshore inverted groups that drive round-tripping, in particular countries, also tend to also be the leading drivers of outward offshore investment by actors from these same countries—with nearly two thirds of all offshore FDI estimated here to be either directly driven by round-tripping, or by inverted groups more broadly.

What makes these North-South commonalities in the overall scale and architecture of offshore FDI particularly interesting is that there are often deeper underlying *qualitative* differences in offshore FDI composition, as well as rationale, between cases where the level and geographic structure of offshore FDI looks superficially similar. While Russian, Chinese, and US corporate inversions to Cyprus, the Cayman Islands, or Ireland respectively, for example, employ broadly similar forms, these structures are created for radically different purposes. In other words, there appears to be a convergent evolutionary logic at the level of offshore financial network structure, that emerges out of a much higher level of diversity in offshore financial network functions (see Maurer and Martin 2012).

A particularly large divide in the functions of offshore financial networks can be observed for firms from the two countries that play the largest role in driving world offshore

[14] With the partial exception of Hurst and Sutherland (2025), which does not estimate FDI stocks.

investment—the US and China. For US firms, which are the leading users of offshore jurisdictions as conduits to invest in other economies, tax avoidance usually appears to be the primary motivation for offshore structure use (Talley 2015)—including in the context of the parent company-level inversions that generate the bulk of US FDI round-tripping. In contrast, for Chinese firms, the single most important function of offshore structures appears to be the facilitation of securities issues on overseas markets. Given a choice between onshore as opposed to offshore securities issuing vehicles, there appear to be clear incentives to use the latter—which offer not only minimal tax and other costs, but also a substantial measure of both jurisdictional neutrality, and flexibility in constructing, and resolving disputes involving, various types of contractual and corporate governance arrangements (see Buckley et al. 2015; Haberly and Wójcik 2022; Maurer and Martin 2012; Sharman 2012; Vlcek 2014).

Notably, in both the US and China, technology/knowledge-industry firms tend to be disproportionately prolific users of offshore structures, typically in conjunction with intellectual property-based profit-shifting arrangements. However, whereas US firms actively use these profit-shifting arrangements to concentrate profits offshore, in the Chinese case they are typically put in place as passive structures to achieve a nominal condition of accounting consolidation (in relation to overseas listing requirements) in the context of so-called variable interest entity (VIE) structures. These VIE structures are widely used by offshore-inverted Chinese technology firms to circumvent the restrictions imposed by their own home government on 'foreign' investment—including by inverted mainland firms—in domestic high technology sectors. Since the 2008 Chinese tax reform, these structures do not seem to perform any viable mainland tax avoidance function, and indeed any attempt to use them to shift profits offshore may generate a risk of punitive taxation (Whitehall 2017). At the same time, many of these Chinese corporate offshore structures intersect in complex ways with personal offshore holdings structures, which may themselves serve as vehicles facilitating activities such as the illicit evasion of capital controls, and more broadly the hiding and sheltering of various types of assets as well as liabilities (see Ding 2000; Wei and Palan 2023).

The structure-function ambiguities and inconsistencies highlighted by such examples have important normative and political implications. Perhaps most importantly, they imply that the potential harm caused by offshore financial structures—for example, as defined in such terms as total taxes avoided, or illicitly derived funds intermediated—is not necessarily closely related to the total size of offshore-mediated investment stocks or flows. Indeed, given that offshore structures are typically quite inexpensive to establish, from the standpoint of multinational corporations or other deep-pocketed actors, an enormous total volume of investment may be routed offshore, in some cases, even if the

total fiscal or other benefits derived are very small. This is not to say that offshore structures do not sometimes cause a great deal of harm, in various contexts; rather, the key implication is that this harm needs to be gauged directly in each context, rather than simply assumed based on the total size of offshore capital stocks or flows. The depth, as well as qualitative nature of the impact of these structures, may vary dramatically for any given breadth of capital implicated within them.

Further complicating the analysis of the geographic and social distribution of costs and benefits of offshore investment are the complex relationships between states and the offshore system. One of the key implications of the analysis here is the impossibility of positing some generic relationship between 'the state' and the offshore world. What one rather sees are concrete networks of offshore geo-financial power, whereby different states engage with the offshore world in fundamentally different ways. As has been widely noted, there is a North–South dimension to this tilted international playing field of offshore governance and impacts, as well as a national economic and political power dimension (Garcia-Bernardo et al. 2022; Haberly and Wójcik 2022; Palan et al. 2010; Shaxson 2011). However, beyond such questions of quantitative national power, the analysis here also underscores the need to account for the qualitatively different ways in which different states interact with the offshore world. A particularly important aspect of this is the role played by states as direct participants in offshore investment, via state-owned multinational corporations and investment funds (Wei and Palan 2023; Wójcik and Camilleri 2015). This offshore state capitalism is not a footnote in overall offshore jurisdiction use; rather, it may be the single most important component of Chinese offshore investment (albeit with substantial uncertainty in valuation), which now rivals, and may have indeed overtaken, American capital as the largest overall component of the global offshore system. More broadly, large-scale offshore state capitalism appears to be prevalent across contexts ranging from continental Europe (e.g. offshore-inverted Airbus or ST Microelectronics) to the Persian Gulf and Russia (e.g. offshore structures created by state-controlled financial and oil companies, including increasingly to facilitate sanctions evasion). Going hand-in-hand with this footprint of the state in global offshore investment networks is a rising impact of geopolitical tensions on the architectures of these networks; with offshore investment from countries under western geopolitical pressure being reconfigured geographically, even while reproducing key institutional and relational path dependencies at the level of financial network architectures more broadly (see De Olivera 2026; Haberly 2025; Haberly and Wojcik 2022).

The analysis here also highlights the extent to which the global offshore system poses internal political dilemmas and contradictions for individual countries. In this respect, it is doubtful that any country has a more complex relationship with the offshore world than the

UK. Beyond its role in administering a global network of dependent offshore jurisdictions—and more broadly the historically path-dependent role of the British Empire in laying down the overall architecture of the global offshore system (also see Garcia-Bernardo et al. 2017; Haberly and Wójcik 2022; Palan et al. 2010; Shaxson 2011)—the results here underscore the role of the UK itself as a major FDI transit hub (also see Cobham, Garcia-Bernardo and Mansour 2020). Indeed, the analysis here suggests that only roughly half of the UK's total outward FDI originates from local British business groups, with the remainder representing the UK's use by foreigners as a holding company and FDI intermediary jurisdiction.

Given changes to the British corporate and individual, as well as to US corporate tax frameworks (e.g. the 2017 TCJA), it is doubtful that the UK can still be described as a tax haven in the sense that it was a decade ago (with respect to e.g. non-doms and the widespread hosting of US corporate tax inversions). The UK's financial transparency requirements, moreover (with respect to e.g. public beneficial ownership reporting) are also now among the strongest in the world. As such, while the UK remains an attractive international holding company jurisdiction (and thus "offshore" in the very broad sense used here), this attraction mostly appears to be linked to factors that cannot be said to be particularly harmful.[15] At the same time, however, a very substantial volume of illicit financial activity clearly continues to be undertaken via London, if for no other reason than simply its broader leading role as a global financial and business services hub, as well as asset market (e.g. in property). More broadly, the volume of international investment in and through the UK, combined with its persistent structural role as a key central node in the broader global offshore "Anglosphere"—most of which now lies outside of the scope of the Overseas Territories and Crown Dependencies under direct UK political influence—poses complex and poorly understand risks for the UK itself (and potentially also for other countries), at the same time that this investment comprises part of the core national base industry of financial services.

Notably, the results here suggest that when offshore structures are accounted for, the actual stock of investment in (as well as through) the UK from a number of developing countries, particularly in the post-socialist world, is many times higher than what is reported in official FDI statistics. Beyond this, however, the findings also suggest that the UK itself is, compared to other countries, likely exceptionally strongly impacted by the offshore activities of its own local investors and business groups. Indeed, the UK's stock of

[15] Key drivers of the UK's role as an FDI transit hub appear to the be its extensive tax treaty network and favorable tax treatment of foreign-sourced holding company income, along its strong common law-based legal system and the status of London as a leading global financial center. The Tax Justice Network's most recent Corporate Tax Haven Index assigns the UK a "haven score" of 59, placing it between Germany (55) and France (65) with respect to the availability of corporate tax avoidance facilities (Tax Justice Network 2025).

round-trip offshore FDI—as above all mediated through the UK's own Crown Dependencies—is estimated to be higher in relation to GDP than the round-trip FDI stock of any other developed or developing country outside of the former communist world (at least among the 18 countries examined here). While a direct estimation of the fiscal implications of this are beyond the scope of this analysis, it seems likely the scale of this apparent abuse by UK nationals of the UK's own dependent jurisdictions as a tax-shelter to hold assets in the UK itself, is generating substantial tax losses for HMRC.

Above all, the analysis here underscores the need for data to be more systematically collected and published, by both national and international statistical agencies, on the composition and function of the two thirds of world FDI that enters or leaves offshore jurisdictions. While not all of this offshore investment is necessarily harmful, this ambiguity only adds to the urgency of shedding additional light on what remains a yawning void at the very center of our map of the world economy. Indeed, the gaps in our understanding of the world economy created by offshore activities may be, in some respects, just as harmful as any impacts of underlying offshore activities themselves, as they undermine the ability of governments to formulate informed economy policy. The analysis here, and others like it, have made progress in producing estimates to partially fill this gap. However, as highlighted by the methodology here, the uncertainty surrounding these estimates remains enormous, and statistical inferential techniques are ultimately no substitute for the systematic collection of official data. By far the largest gap in worldwide basic FDI statistics, which substantially undermines the precision with which we can deconstruct global offshore investment broadly, surrounds the British Overseas Territories and Crown Dependencies—none of which report any official data on bilateral FDI to the IMF, even on an immediate investing country basis. Another notable gap in international FDI statistics is the UK itself, which unusually among leading OECD economies does not systematically record or report data (apart from in limited pilot studies) on the composition of inward FDI on an ultimate as opposed to immediate investing country basis. This is directly reflected in higher levels of FDI estimation uncertainty here for the UK, in comparison to other major European economies (see figures B1 and B2). Efforts should be made, as a matter of urgency, to resolve these gaps in basic international investment data reporting in the UK itself, as well as in the Overseas Territories and Crown Dependencies.

Equally important to the publication of basic international investment statistics, by the jurisdictions at the heat of the global financial system, is the publication of micro-level beneficial ownership data revealing who is behind particular investment structures—including structures which might potentially be used for illicit purposes. Notably, the methodology used here means that the core output of our analysis is limited to estimates of aggregate international investment positions, rather than the placement of precise

figures on the micro-level activities of individual actors. However, sufficient data exists here to broadly conclude that the offshore FDI positions recorded in official data, which might be assumed to be driven by fluid financial "flows" composed of numerous actors, are in reality frequently generated by just a handful of major actors—and in many cases even a single dominant actor—in any particular situation. In other words, while the architecture of the offshore system is at one level highly complex, a close examination of its structure typically reveals a remarkably small world in which agency is centralized in surprisingly few hands. This has particularly important implications for political debates surrounding public beneficial ownership reporting, as the arguments in favor of individual privacy here—which are implicitly premised on the idea that investment is driven by large numbers of individually unimportant actors—effectively break down when individual actors, operating via complex and opaque offshore structures, play a systemically important role from a national and international economic governance standpoint. A strong argument can be made that such high levels of economic concentration must be balanced by correspondingly high levels of public transparency and accountability.

A particularly important loophole in beneficial ownership reporting identified by this analysis surrounds the capital intermediated through private equity funds. Although usually assumed to manage capital from diverse sources, these in practice often appear to act as de facto family offices or sovereign investment vehicles, which are at present required to disclose essentially no information on the identity of true ultimate beneficiaries/controlling parties (as opposed to fund managers). As a growing share of businesses in Europe, in particular, have come under the control of such funds, a widening veil of secrecy has been cast over the actual ownership these businesses, even as the scope of beneficial ownership reporting requirements has steadily expanded. Furthermore, there appear to be cases in which sovereign (and potentially other) investors have attempted to use the veil of beneficial ownership secrecy afforded by private equity funds to surreptitiously obtain control over sensitive firms and assets (Gershberg et al. 2017). Consequently, as for trusts, a strong argument can be made for ensuring substantive regulatory parity in beneficial ownership reporting between investment funds and companies (by e.g. applying the same 25% concentration threshold to the reporting of investment fund beneficiaries, as is currently applied to companies in the UK).

Perhaps most importantly, from a reform perspective, there are strong incentives for individual jurisdictions to unilaterally implement public beneficial ownership reporting, regardless of the extent to which such reforms are implemented in other jurisdictions. This is due the fact that beneficial ownership transparency, rather than primarily being constrained by lower levels of transparency elsewhere, is projected outwards into less transparent jurisdictions via international ownership chains. Indeed, one of the most

important tools used here for researching beneficial ownership worldwide was the UK public beneficial ownership register, which due to the position of the UK at the center of international investment networks, provides a critical window into the ownership and control of these networks globally. Building on this, the analysis here suggests that the international adoption of similarly transparent and comprehensive registers to that currently maintained by the UK, in even a modest number of other major economies and international financial hubs, could have a transformative impact on global financial transparency. Far from a race to the bottom, the international dynamics of such reform, once it assumed sufficient momentum, would fundamentally entail a race to the top, wherein the de facto *global* transparency standard would be in effect be unilaterally set by the reform leaders, rather than laggards.

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Appendix A: Estimated sources and pathways of offshore FDI in major economies

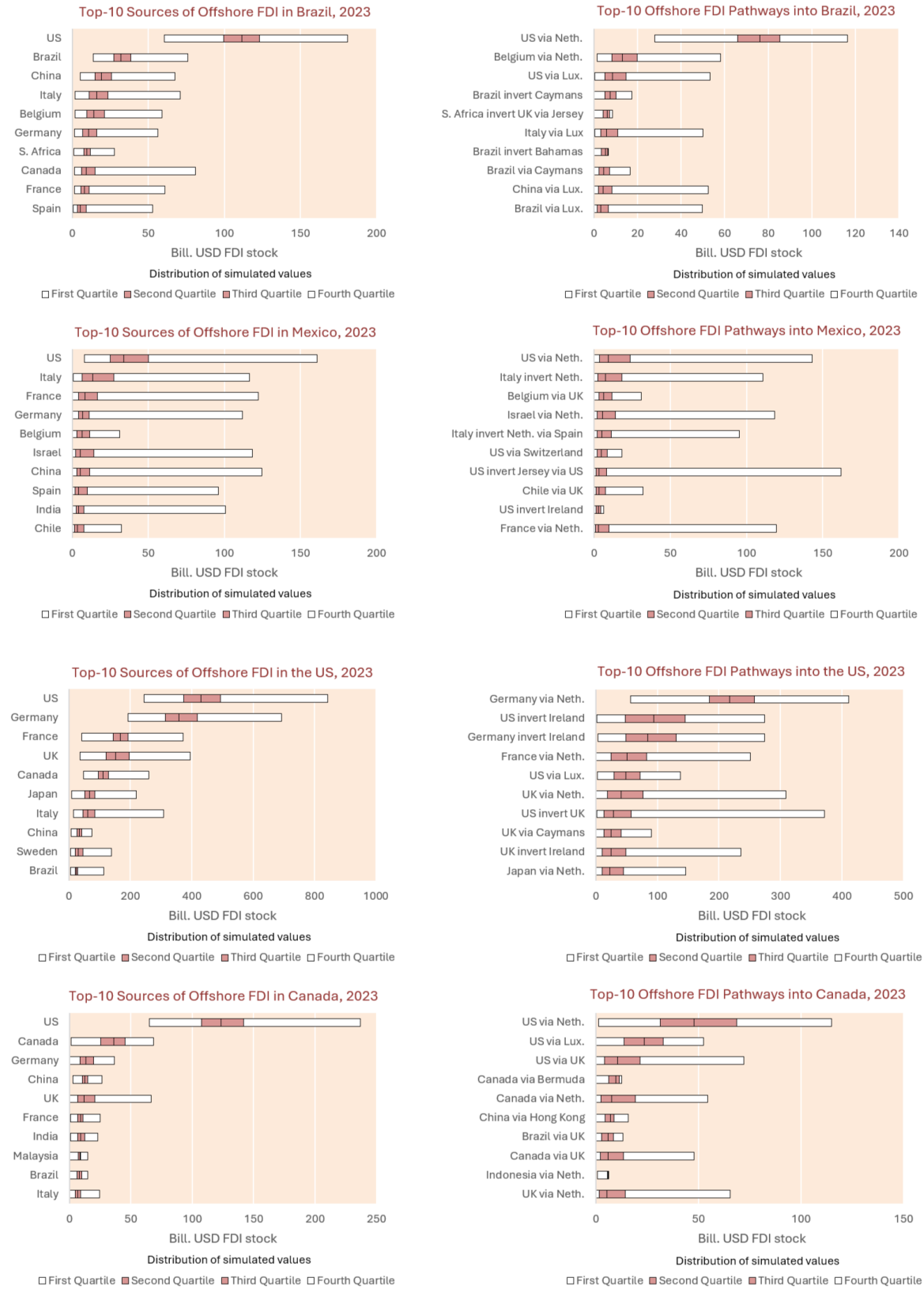


Figure A1. Sources and pathways of offshore FDI in major economies - Americas



Figure A2. Sources and pathways of offshore FDI in major economies - Europe

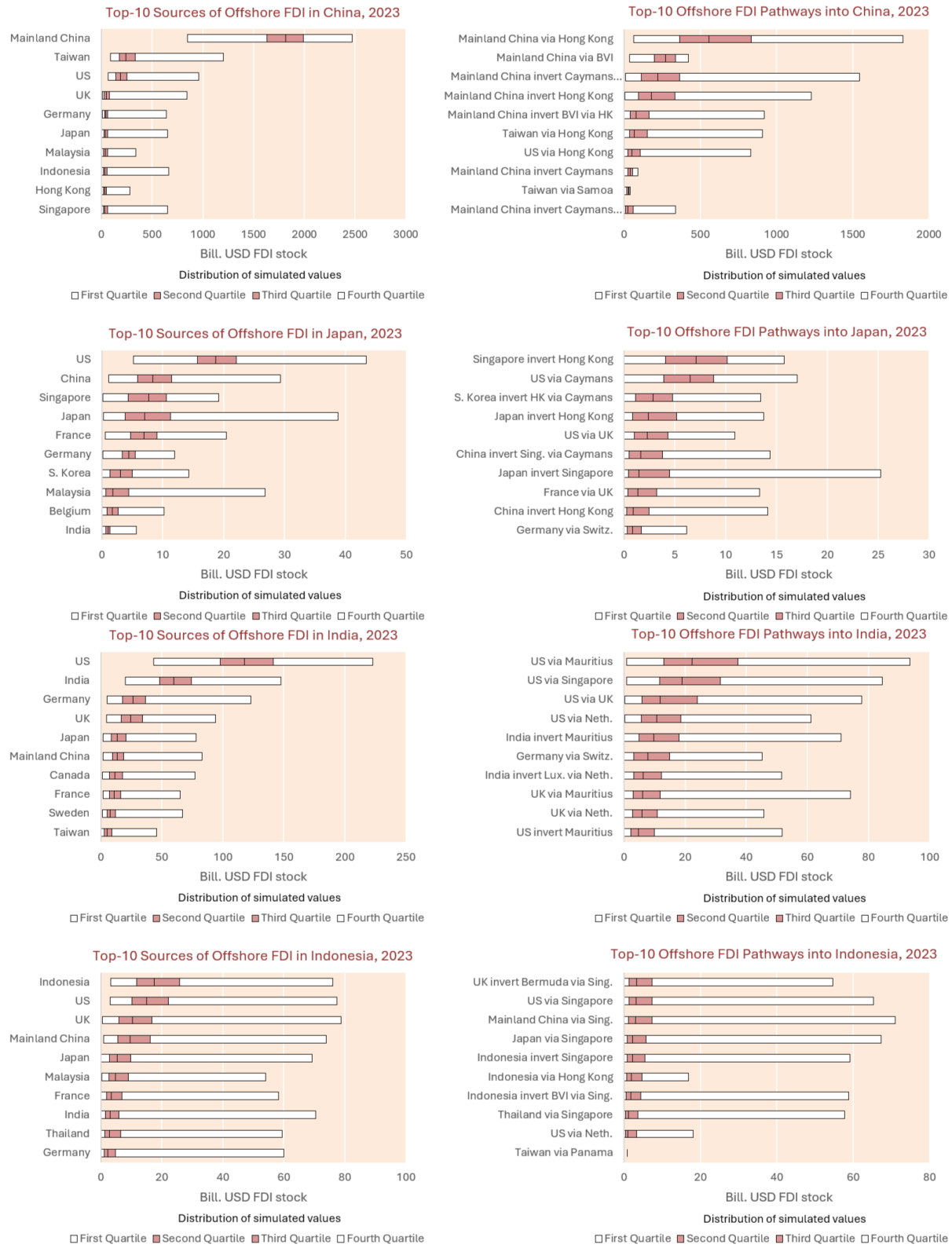


Figure A3. Sources and pathways of offshore FDI in major economies – East, South and Southeast Asia

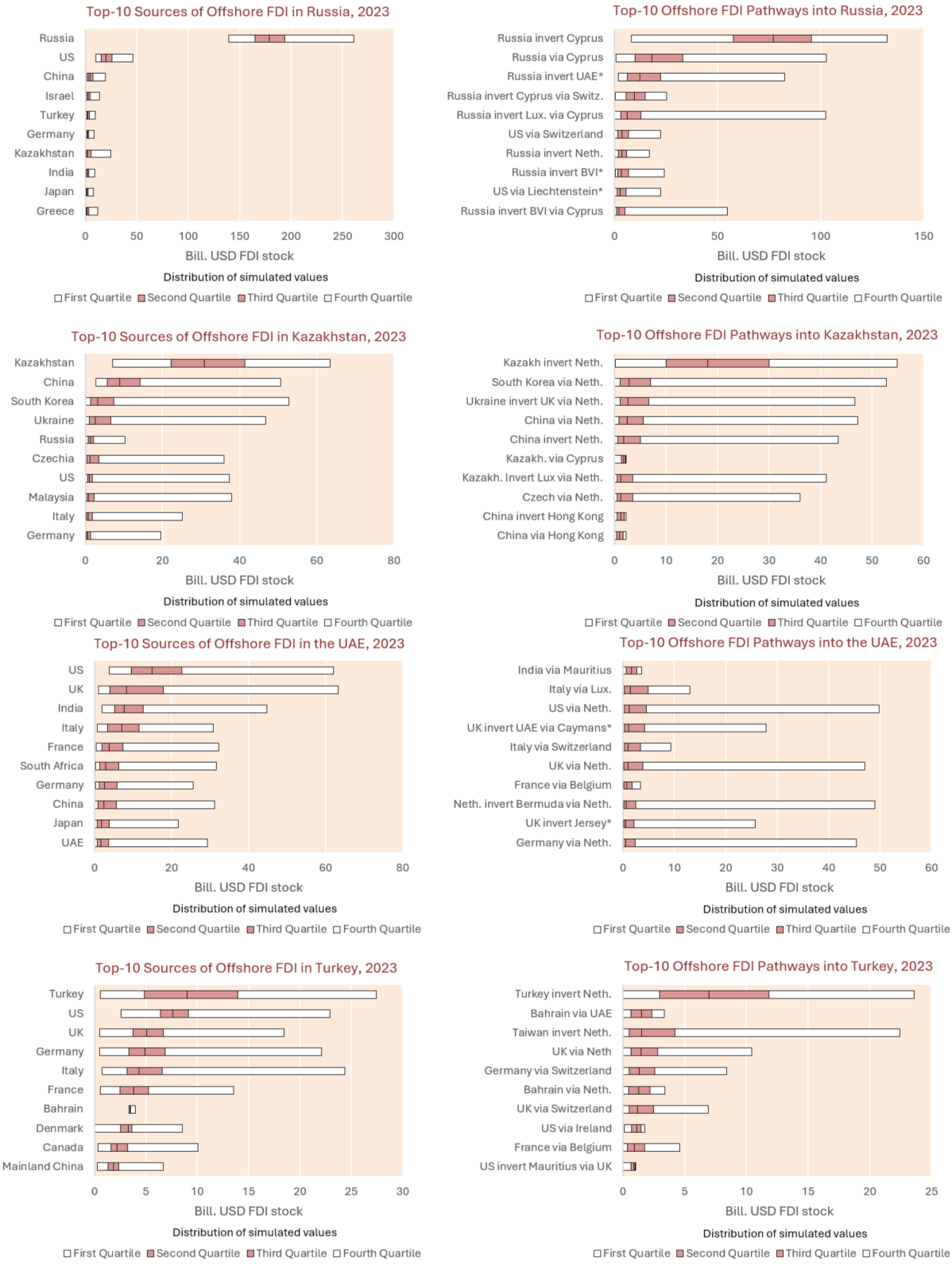


Figure A4. Sources and pathways of offshore FDI in major economies – Eastern Europe, Central Asia and the Middle East



Figure A5. Sources and pathways of offshore FDI in major economies – Africa

Appendix B. Extended discussion of FDI dataset construction methodology

B1.1. Introduction

The methodology used here brings together multiple micro- and macro-level source datasets to estimate a 4D matrix of inward FDI, in 18 major world economies, through the following steps. First, Orbis data was obtained on the financials and ownership structures of all foreign-owned subsidiaries in the 18 host economies examined—Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Kazakhstan, Mexico, Nigeria, Russia, South Africa, Turkey, and the UAE, UK, and US. Next, this Orbis data was augmented through research into the backgrounds of roughly 12,000 offshore-domiciled corporate group ultimate owners (GUOs), allowing for the determination of the 'true' ultimate nationality of offshore 'inverted' parent companies. This augmented Orbis data was then used to estimate an initial 3D inward FDI matrix for each host economy (i.e. cross-disaggregated on an immediate, ostensible ultimate, and true ultimate investor basis). This 3D inward FDI matrix was in turn used to proportionally allocate officially reported (IMF and OCED) bilateral FDI positions in each host economy (along both the immediate and ostensible investing country dimensions) between various 3D investment pathways. This entailed iteratively adjusting the initially estimated 3D FDI matrix to force it into agreement with known data points in officially reported (IMF and OECD) bilateral (for each host country 1D) FDI data. Rather than only performing this bilateral FDI allocation process once, based on the initial 3D FDI matrix estimated from Orbis data, a Monte Carlo simulation approach was used to generate a large number of possible scenarios of what the initially estimated 3D FDI matrix 'could have been' in light of the observed accuracy of Orbis-derived FDI estimates (as benchmarked against known datapoints). Combining the 3D inward FDI probability distribution matrices for each of the 18 host economies yielded a 4D inward FDI probability distribution matrix for all 18 together.

B1.2. Source data collection and processing

Data from three principal sources was used in this analysis: the IMF Coordinated Direct Investment Survey (CDIS), OECD FDI Statistics, and Orbis. These were supplemented by additional sources (news articles, company websites and reports, etc.) used to determine the true nationality of offshore-headquartered ('inverted') groups.

A summary of data sources used to shed light on each level of FDI geography is shown in Table B1. The micro–macro triangulation approach used here relies on two levels of (general) geographic correspondence between officially reported macro-level (bilateral international) FDI data from the OECD and IMF, and micro-level (company) financial data from Orbis:

- The correspondence between the OECD and IMF bilateral inward FDI statistics by immediate investing country, and the Orbis definition of an immediate shareholder (ISH) (where this shareholder is in a foreign country).
- The (general) correspondence between the OECD bilateral inward FDI statistics by ultimate investing country (available for France, Germany, Italy, and the US), and the Orbis definition of a group ultimate owner (GUO).[16]

Table B1. Overview of data sources by level of FDI geography

	Country-level data	Company-level data
Host country	OECD FDI stats. and IMF CDIS: Inward FDI data (year-end 2015) for 18 countries: BR, CA, CN, FR, DE, IN, ID, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, GB, US	Orbis: Query selecting all foreign-owned (>50 percent owned) companies in BR, CA, CN, FR, DE, IN, ID, IT, JP, KZ, MX, NG, RU, ZA, TR, AE, GB, US (most recent data as of early 2025): NAICS industry, assets, revenue, no. of subsidiaries
Immediate investing country	OECD FDI stats. and IMF CDIS: bilateral FDI data by immediate investing country (for all hosts)	Orbis: Immediate shareholders (ISH) of all foreign-owned companies in host economy: jurisdiction, assets, revenue
(Ostensible) ultimate investing country	OECD FDI stats.: bilateral FDI data by ultimate investing country (for CA, FR, DE, IT, JP, TR, US)	Orbis: Group ultimate owner (GUO) of all foreign-owned companies in host economy: jurisdiction, assets, revenue, no. of cos. in corporate group
True ultimate investing country		Orbis, news, websites, reports, etc.: Hand-classification of true nationality of 12,000 GUOs in 'offshore' jurisdictions

As the first step in data collection, Orbis queries were conducted (in early-mid 2025) to

[16] Notably, bilateral SPE FDI data is not used in the analysis, as it is reported at the level of outward FDI from conduit jurisdictions, which as detailed by Angulo and Hierro (2017) often has massive discrepancies with the inward bilateral FDI data reported by host countries. For example, the inward (UK) versus outward (Luxembourg) reporting *discrepancy* for the value of Luxembourg's FDI in the UK is more than 10% as large as the UK's *entire* 2023 inward FDI stock).

capture every subsidiary in each of the 18 host countries that was majority owned by a foreign shareholder. For each foreign-controlled subsidiary, the following data was downloaded: (1) subsidiary name, year of latest data, shareholder funds, assets, revenue, and North American Industry Classification System (NAICS) industry designation; (2) the name, jurisdiction, assets, and revenue of the immediate foreign shareholder (ISH); and (3) the name, jurisdiction, assets, and revenue of the GUO, and total number of companies in the corporate group. Queries were constructed to download the most recent data available as of early-mid 2025, which for company financials was typically 2023 (or older).[17]

Once the source data above was obtained, data processing prior to Monte Carlo FDI simulation involved three steps: (1) determining the 'true' ultimate nationality of offshore GUOs, (2) generating an initial matrix of FDI estimates from raw Orbis micro data, and (3) validating these initial Orbis-based FDI estimates against officially reported bilateral FDI data, to estimate host country-specific estimate error functions. Each of these steps is examined in turn below.

B1.2.1 Determination of the 'true' nationality of offshore-resident GUOs

As noted in section 2, the concept of a 'true' ultimate investing country—defined based on the underlying geography of the beneficial ownership and control of a corporate group—is not represented in any existing FDI or corporate structure dataset. While some datasets capture the level of 'ultimate' investing country (e.g. OECD inward FDI data for some countries, and Orbis GUO data), these do not account for the fact that offshore structures are widely constituted at the group parent level, in addition to the subsidiary level. Consequently, the tendency is for these datasets, and analyses based on them, to largely trade one level of offshore fictions, at the subsidiary level, for a higher level of offshore fictions at the group parent level (see Haberly 2024; Hurst and Sutherland 2025). Here we use the general term 'inversion' to describe arrangements wherein a group parent entity is itself redomiciled offshore. In contrast to existing datasets and studies, the present analysis seeks to look through the geography of the 'ostensible' ultimate group parentage

[17] This data structure implied two significant compromises, which were necessitated by considerations of analytical feasibility. The first is that the analysis only captures the top (ostensible ultimate investing jurisdiction) and bottom (immediate investing jurisdiction) levels of what are often lengthy chains of offshore ownership. The second is that the analysis uses an 'all-or-nothing' approach to attributing ownership at each link in these chains, rather than trying to split the ownership of individual companies fractionally between multiple ultimate investing countries. The latter compromise is particularly important, as it is critical to analytical feasibility (see ONS 2022), but may result in methodological differences in some cases with official-reported bilateral FDI totals. This is particularly true with respect to official FDI data on an ultimate investing country basis, which is defined in different ways by various reporting countries despite the OECD's attempts at harmonisation.

created by corporate inversions, to the level of the 'true' ultimate investing country from which such inverted companies originate, and/or where their underlying control or beneficial ownership is located.

Table B2. Jurisdictions designated as 'offshore' in analysis

Investment from:	Total outward FDI (immediate bilateral), 2023	% of total world outward FDI, 2023	GUO true nationality classified
Netherlands	3,607,881	8.77	x
United Kingdom	3,038,842	7.39	x
Luxembourg	2,877,864	7.00	x
Hong Kong	2,551,121	6.20	x
British Virgin Islands	1,490,844	3.63	x
Switzerland	1,427,002	3.47	x
Cayman Islands	1,138,475	2.77	x
Singapore	1,083,200	2.63	x
Ireland	1,069,250	2.60	x
Bermuda	695,770	1.69	x
Belgium	692,659	1.68	x
Jersey	382,295	0.93	x
Cyprus	364,398	0.89	x
UAE	282,398	0.69	x
Mauritius	197,053	0.48	x
Malta	138,230	0.34	x
Guernsey	103,314	0.25	x
Liechtenstein	93,012	0.23	x
Bahamas	90,067	0.22	x
Barbados	69,455	0.17	x
Curaçao	60,110	0.15	x
Hungary	55,113	0.13	
Isle of Man	48,289	0.12	x
Samoa	43,492	0.11	x
Panama	41,773	0.10	x
Uruguay	25,850	0.06	x
Macao	18,915	0.05	x
Gibraltar	17,326	0.04	x
Liberia	9,921	0.02	x
Marshall Islands	9,329	0.02	x
Seychelles	8,469	0.02	x
Bahrain	4,181	0.01	x
Monaco	3,141	0.01	x
St. Vincent & the Gren.	2,499	0.01	
Anguilla	1,814	0.004	
Belize	1,651	0.004	x
St. Lucia	968	0.002	
St. Kitts and Nevis	967	0.002	
Antigua and Barbuda	131	0.0003	
All offshore jurisdictions	21,747,072	52.89	

Source: FDI totals from IMF CDIS.

To account for the geographic distortions created by offshore inverted group structures, a 'true' nationality was manually assigned to thousands of GUOs resident in designated offshore jurisdictions (see Table B2). To render classification feasible, true nationality classification was limited to GUOs whose total FDI in a host country was estimated to exceed a threshold size.[18] Based on these thresholds, the true nationality of roughly 12,000 offshore GUOs was classified.

The classification of offshore GUO 'true' nationality has a semi-subjective element, and aspects of it could be approached in various ways. The approach used here is based on a combination of 'history and control', as determined by the hierarchy of questions below:

(i) Does the offshore GUO have a dominant (>ca. 25–30 percent) minority shareholder based in another jurisdiction, in a position to exercise managerial control? This determination is applied backwards through ownership chains/pyramids, until the effective controlling beneficial owner is reached. Importantly, given that the purpose of the analysis is to develop estimates of aggregate international FDI positions, rather than construct a definitive micro-level ownership database, the determination of 'probable' nationality of beneficial ownership is considered sufficient for true nationality classification.

(ii) For offshore-domiciled private equity funds, in what country is the fund manager based (also on a true nationality basis)?

(iii) For offshore GUOs with no dominant controlling shareholder, is the primary seat of management located in a different jurisdiction?

(iv) For offshore GUOs with managerial seats in multiple jurisdictions, is one of the seats located in a country where the company has a long history of operation, as opposed to an offshore jurisdiction where the company has more recently become resident?

(v) Further to (iii) and (iv), does the shareholder base (and, where applicable, primary exchange listing) of a firm continue to be primarily located in its historical country of origin, as opposed to adopted offshore home country?

(vi) For offshore-resident individual and family GUOs (in locales such as Monaco, Switzerland, the UK, etc.), what is the principal historical country of origin of wealth? This test, crucially, focuses on identifying the geographic movements of capital embodied by wealthy individual and family migration, rather than on the nationality of citizenship or identity of the relevant individuals and families

[18] This threshold was set at $10- $50 million depending on the total amount of investment entering particular countries via particular jurisdictions (with a target of capturing >75% of offshore FDI where this could be achieved at a threshold of $10 million or higher). Name-matching was used to automatically share GUO true nationality designations across all sample host countries, which meant that the vast majority of investments were in in practice usually classified down to a size substantially lower than the minimum threshold.

themselves. This is often particularly important in relation to the substantive tracking of round-trip investment, as the outward leg of this investment is often driven by the offshore migration of ultimate owners themselves, who continue to hold assets in their country of origin.

As noted above, feasibility considerations meant that a winner-takes-all approach was used to define ultimate controlling nationality in ownership chains. This sometimes necessitated tie-breaking determinations of the dominant 'true' nationality of offshore GUOs, as only one such nationality could be assigned. Table B3 lists some of the largest multinational offshore GUOs for which difficult tie-breaking determinations had to be made. In cases where it was clear that Orbis had made an error in designating an offshore subsidiary as a GUO (e.g. in some cases the publicly disclosed subsidiaries of listed US or Chinese state-owned multinational corporations), this error was corrected (along with various other obvious types of errors in Orbis, for example obviously broken ownership chains, or misplaced decimal points in company accounts).

Table B3. 'True' nationality designations for selected multinational firms

Parent company name	Jurisdiction of incorporation	True nationality designation
Airbus NV	Netherlands	France
Schlumberger NV	Curacao	France
Stellantis NV	Netherlands	Italy
ArcelorMittal SA	Luxembourg	India
CVC Capital Partners	Luxembourg	UK
Nordic Capital	Jersey	Sweden
Anglo American PLC	UK	South Africa
SABMiller PLC	UK	South Africa
Glencore PLC	Jersey	Switzerland
BHP Billiton PLC	UK	Australia

Source: Author's own.

B1.2.2. Estimation of FDI from Orbis company-level data

Once Orbis data was downloaded and processed, the next step was to estimate the individual firm-level FDI represented by every foreign-controlled subsidiary in each of the nine host countries. These firm-level FDI estimates were in turn aggregated into a matrix of initial Orbis-based 3D FDI estimates in each host economy on a cross-disaggregated (1) immediate investor, (2) 'ostensible' ultimate investor, and (3) 'true' ultimate investing country basis.

Table B. Industry-specific ratios for converting subsidiary assets and revenue to shareholder funds

NAICS code	Industry	revenue / shareholder funds	assets / shareholder funds
11	Agriculture, Forestry, Fishing and Hunting	1.11	1.89
21	Mining, Quarrying, & Oil and Gas Extraction	1.08	1.93
22	Utilities	0.91	2.71
23	Construction	1.87	2.57
31	Manufacturing (Food, Beverage, Tobacco, Apparel and Textiles)	1.95	1.79
32	Manufacturing (Petrochemicals, Plastics, Paper, Wood Products)	1.39	2.01
33	Manufacturing (Metals, Machinery, Transport Equipment, Electronics)	2.16	2.38
42	Wholesale Trade	3.47	2.49
44	Retail Trade (Store-based Retail other than Miscellaneous)	4.34	2.73
45	Retail Trade (Nonstore & Miscellaneous Retail)	3.42	2.54
48	Transportation & Warehousing (Air, Ground, Water & Pipeline Transport)	1.72	2.42
49	Transportation & Warehousing (Postal, Couriers, and Warehousing)	1.27	1.75
51	Information	1.00	2.03
52	Finance and Insurance	0.68	5.03
53	Real Estate & Rental and Leasing	0.66	3.72
54	Professional, Scientific, & Technical Services	1.63	1.94
55	Management of Companies & Enterprises	0.64	2.30
56	Administrative & Support & Waste Management & Remediation Serv.	0.99	2.04
61	Educational Services	1.33	2.80
62	Health Care & Social Assistance	2.79	2.32
71	Arts, Entertainment, & Recreation	1.37	1.14
72	Accommodation & Food Services	1.64	2.48
81	Other Services (except Public Administration)	0.79	1.50
92	Public Administration	1.77	1.04
None	Mean	1.32	2.72

The approach to estimating the contribution of individual subsidiaries to FDI combined elements of the methodologies previously used by Haberly (2024) (with estimation based

on assets and revenue) and Borga and Caliandro (2018) and Damgaard *et al*. (2024) (with estimation based on shareholder funds). As a first resort, the FDI represented by each subsidiary was estimated as directly reported subsidiary shareholder funds, where this data was available. However, for countries where the overall coverage of data on foreign-controlled subsidiary shareholder funds was poor (<50%), missing data on subsidiary shareholder funds was filled in through estimates derived from subsidiary asset and revenue data—and if no subsidiary data was available, on overall corporate group assets and revenues (see table B5 for details of estimation approach by country). To estimate this missing shareholder funds data, industry-specific asset and revenue to shareholder funds conversion ratios were applied to the available asset and revenue data (with the conversion ratios empirically derived from Orbis financial data on foreign-invested subsidiaries in the countries examined; see table B4). A hierarchical approach to estimation was employed in which available asset data was prioritized over revenue data (due to its superior accuracy at predicting FDI, see Haberly 2024), and estimation from available subsidiary data was prioritized over estimation from group-level data. As shown in Haberly (2024), this hierarchical approach to group-based estimation of missing subsidiary financial data yields substantial improvements in FDI estimation accuracy, in countries with low-quality Orbis data, as compared to the estimation of FDI from subsidiary-level financial data alone.

In cases where no subsidiary level financial data was available, the total balance sheet of the group ultimate owner (GUO) was assumed to be partitioned equally between all group companies (with the allocation to each immediately foreign-invested group subsidiary thus depending on the number of subsidiaries which it in-turn controlled—as these lower tiers of subsidiaries owned locally by directly foreign-invested subsidiaries are not represented in the data itself). As described in Haberly (2024), a significant challenge in the estimation of missing subsidiary financials from group data is posed by large business groups with family or state GUOs, as these do not have financial data for Orbis to report. In these cases (where GUO financial data was missing), the estimation algorithm automatically resorted to drawing on immediate parent (ISH) financial data, where available.

Table B5. Methodological differences in FDI estimation procedure by host country

	IMF CDIS FDI reporting	OECD ultimate FDI reporting	FDI estimation from subsidiary shareholder funds	FDI estimation from subsidiary assets & revenue	Group-based estimation of missing subsidiary data
France	Yes	Yes	Yes	No	No
Germany	Yes	Yes	Yes	No	No
Italy	Yes	Yes	Yes	No	No
Canada	Yes	Yes	Yes	Yes	Yes
Japan	Yes	Yes	Yes	Yes	Yes
USA	Yes	Yes	Yes	Yes	Yes
China	Yes	No	Yes	No	No
India	Yes	No	Yes	No	No
UK	Yes	No	Yes	No	No
Brazil	Yes	No	Yes	Yes	Yes
Indonesia	Yes	No	Yes	Yes	Yes
Kazakhstan	Yes	No	Yes	Yes	Yes
Mexico	Yes	No	Yes	Yes	Yes
Nigeria	Yes	No	Yes	Yes	Yes
S. Africa	Yes	No	Yes	Yes	Yes
Turkey	Yes	No	Yes	Yes	Yes
Russia	No	No	Yes	No	No
UAE	No	No	Yes	Yes	Yes

B1.2.3. Estimation of host country-specific error-functions for Orbis-derived FDI estimates, for purposes of parameterising FDI matrix randomisation in Monte Carlo simulations

As noted in section 3, the methodology here uses the initial FDI estimates derived from Orbis data to guide the proportional reallocation of official (IMF and OECD) data on total bilateral FDI between investment pathways that are cross-disaggregated at a higher level of geographic dimensionality than the official data (2D and 3D inward FDI matrices for each host country, and 4D for all host countries together). Importantly, if the initial FDI estimates constructed from Orbis data were simply used to produce a single set of final FDI estimates in this manner, these estimates would be highly sensitive, in a poorly understood manner, to errors in the Orbis-based FDI estimation procedure.

To render this error sensitivity visible, the Orbis-derived initial FDI estimates are not used directly to guide the allocation of official bilateral FDI totals between 3D investment pathways. Rather, they are used as a template to generate a large number of randomised Monte Carlo simulations of what the initial Orbis-based estimates 'could just as easily have been'. Each of these randomised FDI matrices is in turn used to separately guide the

reallocation of officially reported bilateral FDI totals between 3D FDI pathways—i.e. to construct a possible FDI scenario. The final 3D FDI database thus takes the form of a set of probability distributions for the value of each investment position that is based on these simulations of possible FDI matrix structure, rather than a single estimate for each investment position. Crucially, this procedure allows for the officially reported bilateral FDI data to be used to constrain the distribution of final FDI estimate values to a much narrower range than what would be expected based on the accuracy of the Orbis-based FDI estimation procedure alone.

The randomised FDI matrices used for Monte Carlo simulation are generated from the initial Orbis-derived FDI estimates according to a log-normal random distribution wherein the (log-transformed) Orbis-derived FDI estimate is treated as the mean, and the standard deviation is calculated from a host country-specific error function. The latter function is derived by validating the goodness of fit of the initial Orbis FDI estimates at an aggregated, bilateral level against corresponding official statistics from the IMF and OECD.

The overall goodness of fit of the Orbis-derived FDI estimates with official bilateral FDI statistics is shown in Figure B1 for the 18 host countries examined. As can be seen, there is substantial variation in goodness of fit between hosts, with r^2 ranging from 0.81 for Russia and Brazil, to <0.5 for Kazakhstan, Nigeria, South Africa and the UAE. For all countries, however, the scatterplots are strongly heteroskedastic, with pronounced outward fanning towards the lower left, and convergence between Orbis-estimated FDI values and official FDI values at the upper right. What this heteroskedasticity means is that the accuracy of FDI estimates is strongly dependent on the size of an investment position, with the Orbis-based estimates of small positions being relatively noisy and error-prone, but errors tending to cancel out as the size of investment positions increases. Consequently, the standard deviation of the log-normal random function used to generate the randomised FDI matrix needs to be calculated, for each estimated investment position, as a function of initial Orbis-based estimate size (i.e. the mean in the log-normal distribution used in the Monte Carlo simulation).

Figure B1. Goodness of fit between Orbis-derived FDI estimates (y-axis) and official inward FDI (x-axis) on immediate investor basis, for 18 FDI hosts, 2023

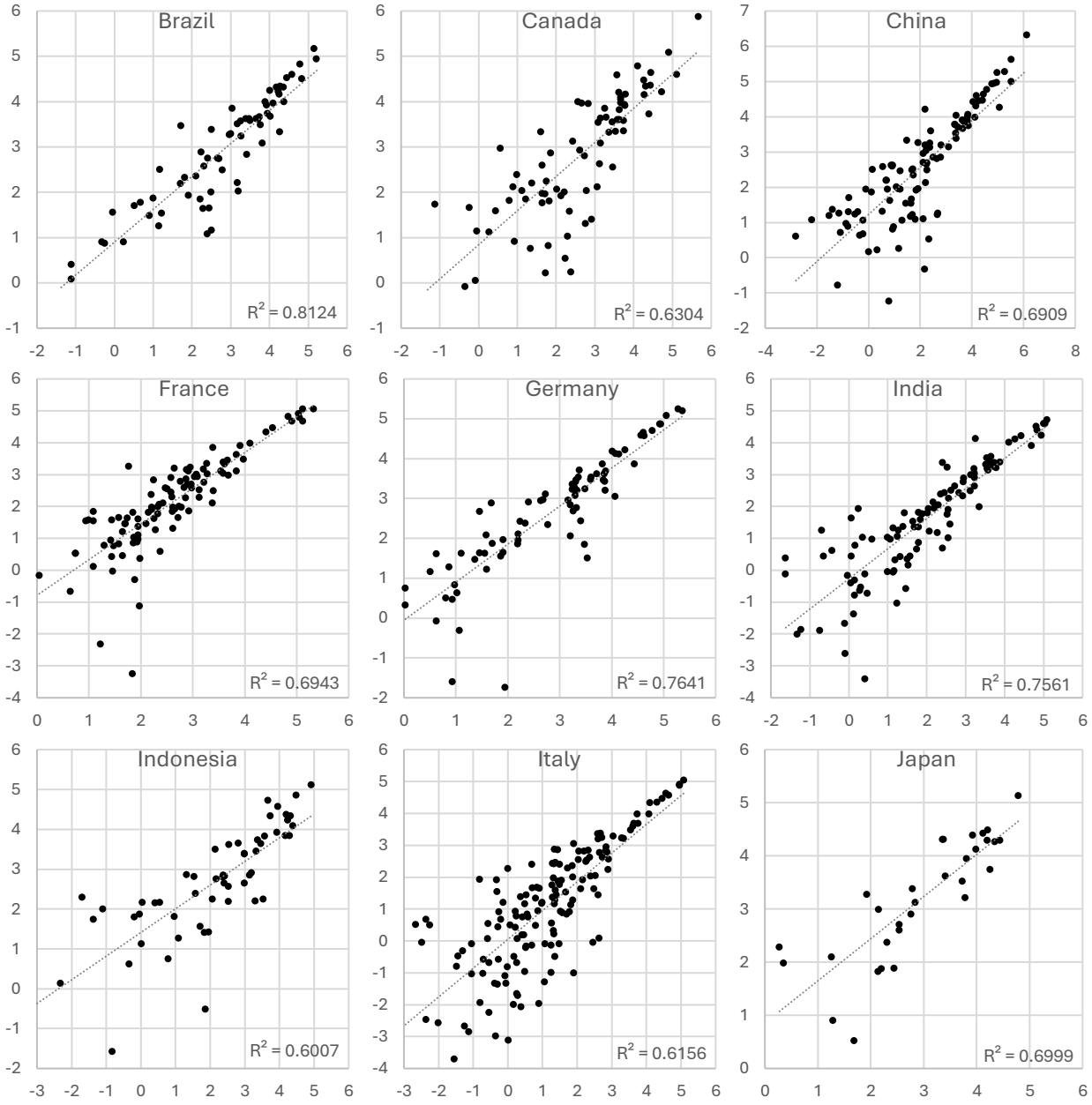


Figure B1 cont. Goodness of fit between Orbis-derived FDI estimates (y-axis) and official inward FDI (x-axis) on immediate investor basis, for 18 FDI hosts, 2023

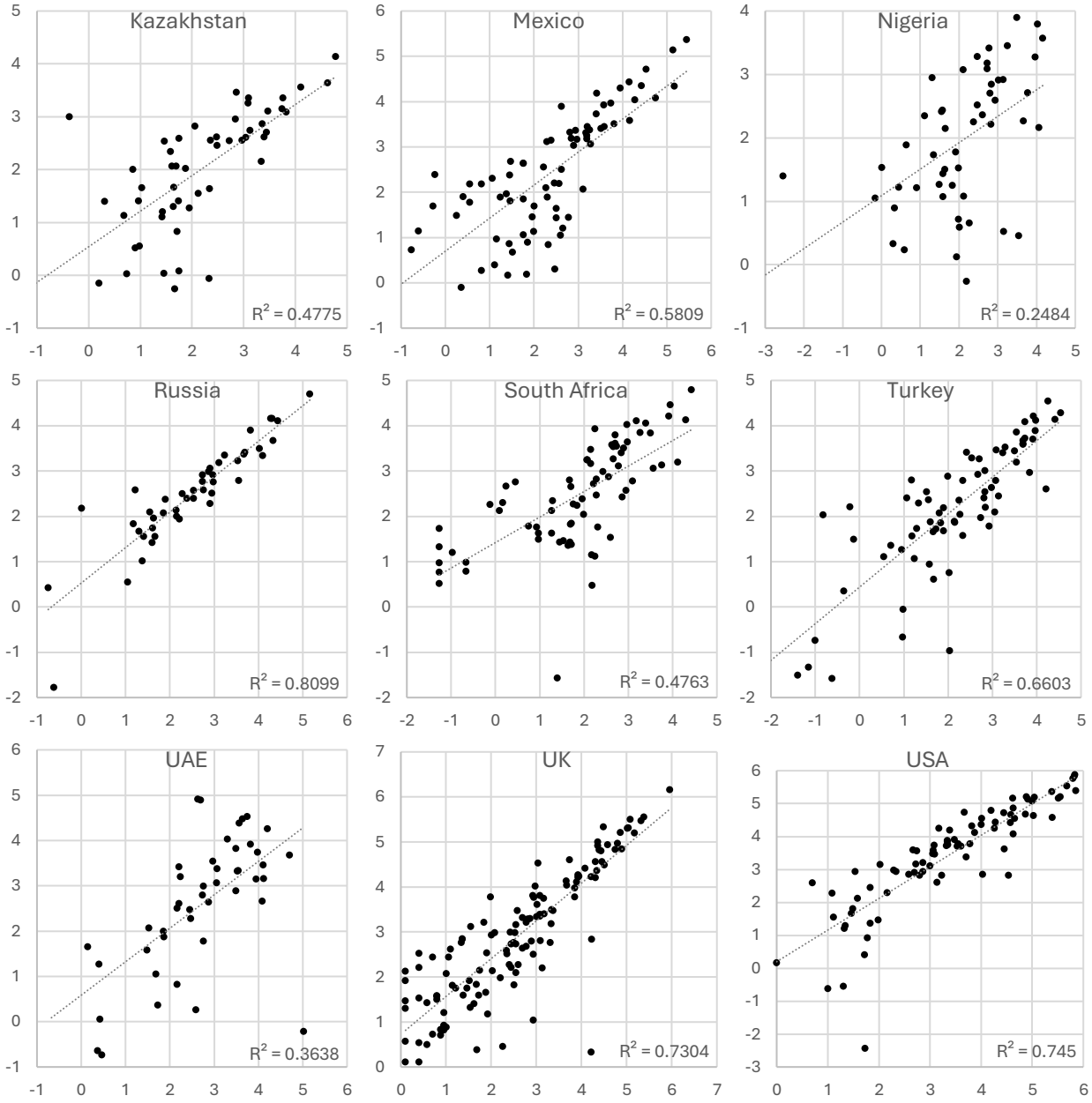
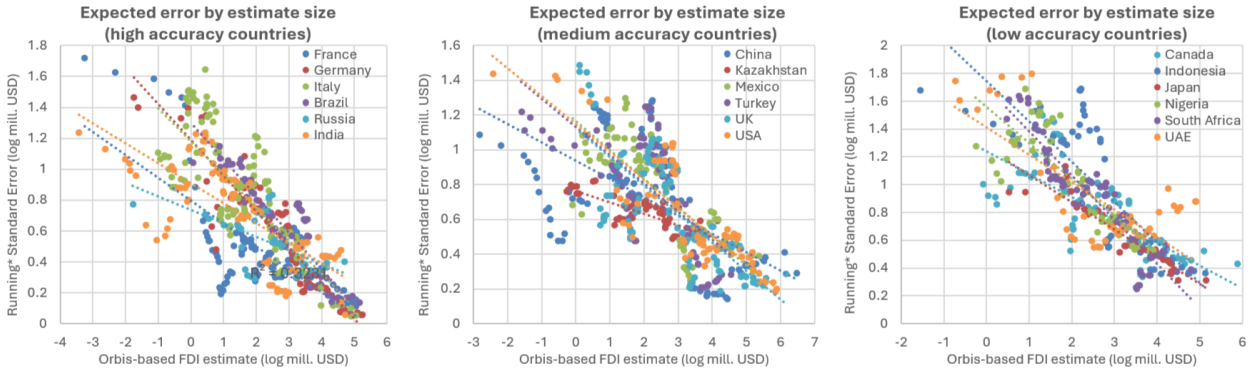


Figure B2. Dependence of Orbis-based FDI estimate error on estimate size for sample countries



* Observation and five nearest neighbours in positive and negative direction (11 observations total).
Source: Author's own.

Table B6. Size-dependent estimated error function terms for sample countries

	Orbis-based FDI estimate error function*			Standard error (ratio) for estimated FDI value:	
Country	**R^2**	**Coefficient****	**Constant****	**$10m**	**$10bn**
France	0.51	-0.1485	0.7976	4.46	1.6
Germany	0.85	-0.2315	1.1898	9.08	1.84
Italy	0.64	-0.214	1.181	9.27	2.11
Brazil	0.86	-0.2363	1.2976	11.52	2.25
Russia	0.32	-0.0877	0.7374	4.46	2.44
India	0.55	-0.1294	0.9105	6.04	2.47
S. Africa	0.85	-0.3169	1.7011	24.22	2.71
UK	0.57	-0.1636	1.1193	9.03	2.92
Japan	0.87	-0.1951	1.2628	11.69	3.04
Turkey	0.49	-0.1625	1.1326	9.33	3.04
Kazakhstan	0.59	-0.0657	0.7617	4.97	3.15
Mexico	0.56	-0.1662	1.1632	9.93	3.15
USA	0.72	-0.1608	1.1496	9.75	3.21
China	0.32	-0.1053	0.9384	6.81	3.29
Nigeria	0.67	-0.2594	1.5589	19.93	3.32
Indonesia	0.67	-0.2898	1.7429	28.39	3.83
Canada	0.57	-0.1648	1.243	11.97	3.84
UAE	0.53	-0.1975	1.414	16.46	4.21

* Running standard error (observation and five next largest and smallest observations) as function of Orbis-based FDI estimate size (both in log US$m).
Source: Author's own.

Figure B2 plots the running standard error of FDI estimates (for an observation and its five nearest larger and smaller neighbours) in relation to official FDI data, as a function as FDI estimate size for all nine host economies. As can be seen, the investment size-dependence of FDI estimation error is very strong for most countries, and moreover shows a high level of international consistency. Notably, when FDI **quantity** is controlled for, the countries for which group-level data had to be used to estimate missing subsidiary financial data (Figure B2 left) exhibit far higher levels of error than the countries where FDI

could be estimated purely on the basis of subsidiary level shareholder funds. The central role of total FDI quantity in driving FDI estimate accuracy also means that some countries with relatively low quality Orbis data, but a large total quantity of inward FDI—such as the United States—have more accurate FDI estimates than would be expected based on their underlying Orbis data quality. Table B6 shows the size-dependent error function coefficients and constants estimated (in log terms) for each of the 18 host economies, as well as the standard errors yielded by this function (in de-logged, ratio terms) for a few specific estimate sizes.[19]

B1.3. Monte Carlo simulation

The coefficients in Table B6 were used to parameterise an estimate size-dependent standard deviation, in a log-normally distributed random function for each host country (with the initial Orbis-estimated FDI value used as distribution mean). This served as the basis of a Monte Carlo procedure wherein 1,000 randomised matrices of 2D and 3D inward FDI were generated for each host, with each randomised matrix in turn being used to reallocate the official bilateral FDI statistics between 2D and 3D FDI investment pathways (Figure A1). The purpose of this Monte Carlo procedure was to quantify the likely sensitivity of FDI estimates in the final (for each host 3D) FDI matrix—which combines information from both Orbis and official bilateral FDI data—to the level of error in the initial Orbis-derived FDI estimates. This error-sensitivity can be (more-or-less) treated as defining probability distributions for 3D FDI position estimates, thus allowing estimate confidence bands to be constructed (keeping in mind that this interpretation depends on the chain of assumptions underpinning the methodology as a whole). A 'brute force' Monte Carlo simulation approach is used due to the difficulty of otherwise accounting for the interactions here between multiple dimensions of officially reported and randomised simulated FDI data (particularly where randomised FDI matrices need to be simultaneously reconciled in two dimensions with officially reported ultimate and immediate bilateral FDI data).

As shown in Figure A1, the generation of log-normal randomised versions of the Orbis estimate-derived FDI matrix occurs separately at two different dimensionalities. Specifically, for each host country, both a randomised 2D inward FDI matrix (ostensible

[19] For China, for example, the expected standard error of an FDI position estimated based on Orbis data to be $10bn is a factor of 3.29; for France, however, the expected standard error is only a factor of 1.6. These expected standard errors would in turn be translated, in the log normal randomisation of the FDI matrix in the Monte Carlo simulation stage of the methodology, into standard deviations (in de-logged, ratio terms) of 3.29 and 1.6 for the randomisation of an FDI position initially estimated at $10bn in China or France respectively.

ultimate investing country and immediate investing country) and a randomised 3D inward FDI matrix (true ultimate investing country, ostensible investing country, and immediate investing country) is generated in each Monte Carlo simulation. The randomised 2D matrix here serves as a bridge between the 3D level of disaggregation of the final FDI estimate matrix for each country, and the 1D level of disaggregation for each host economy of the officially reported bilateral FDI statistics. First, the randomised 2D matrix is used to proportionally allocate official bilateral FDI statistics between 2D investment pathways. Next, the randomised 3D matrix is used to proportionally allocate the investment pathways in this adjusted 2D matrix between 3D investment pathways.

The manner in which the randomised 2D FDI matrix is used to allocate the official bilateral FDI data for a particular host between 2D investment pathways depends on whether a host reports inward bilateral FDI data on only an immediate investing country basis (the Brazil, China, India, Indonesia, Kazakhstan, South Africa, and UK), versus on both an immediate and an 'ostensible' ultimate investing country basis (the Canada, France, Germany, Italy, Japan, Turkey, and the US), or does not report FDI data at all (Russia and the UAE) (see table B6). For the first group of countries, the process of proportionally allocating the officially reported immediate bilateral FDI between ostensible ultimate investing countries, based on the randomised 2D FDI matrix, is a simple one-step procedure. For example, if the UK (hypothetically) reports $200bn in inward bilateral FDI from the Netherlands, and the randomised 2D inward FDI matrix generated by a particular Monte Carlo simulation records $100bn of FDI in the UK via the Netherlands—of which $25bn (25%) originates from the US, while $75bn (75%) originates from the Netherlands itself—then 25% of the IMF-reported $200bn entering the UK via the Netherlands would be allocated to the US on an ostensible ultimate basis ($50bn), while 75% ($150bn) would be allocated to the Netherlands itself on an ostensible ultimate basis.[20] This same basic partitioning procedure is also applied to the two IMF CDIS non-reporting countries, Russia and the UAE, using a combination of counterparty reported CDIS FDI positions, and Orbis-derived estimates for the remaining missing FDI positions (see below).

The situation is more complicated for countries that report inward FDI data to the OECD on both an immediate and (ostensible) ultimate investing basis, as it is necessary to adjust the values in the initial randomised 2D inward FDI matrix so that both the columns and rows of the matrix sum to the 'correct' (i.e. OECD reported bilateral FDI) totals. For these

[20] Notably, to avoid making erroneous extrapolations in cases where very little data is present, immediate investing jurisdictions are dropped from the analysis when less than 2% of the officially reported FDI can be accounted for in Orbis (above this threshold poor data coverage becomes less of a concern as it becomes more consistently reflected in the width of confidence bands).

countries, an iterative procedure is used to force the matrix to converge with the OECD bilateral FDI totals along both dimensions. At each step in this iterative convergence procedure—which can be expressed as the equation below, where $x_{i,j,n}$ represents FDI in the host economy from ultimate investing country *j* via immediate investing country *i* (in a 246 x 246 country matrix) as of iteration *n*, and y_i and y_j represent the OECD (known) bilateral FDI totals from each immediate and ultimate investing country respectively—there is an independent proportional reallocation (based on the randomised 2D matrix) of the OECD bilateral FDI along both the ostensible ultimate investing country and immediate investing country dimensions. This produces two adjusted 2D FDI values—one of which is consistent with the OECD bilateral FDI total in the immediate investing country dimension, and one of which is consistent with the OECD bilateral FDI total in the (ostensible) ultimate investing country dimension—which are averaged together to yield $x_{i,j,n+1}$ in the equation below. One hundred iterations of this procedure are performed, which was sufficient to produce tightly converged solutions for the 3D FDI matrices in all of the host countries.

$$x_{i,j,n+1} = \frac{y_i \cdot \frac{x_{i,j,n}}{\sum_{i=0}^{246} x_{i,j,n}} + y_j \cdot \frac{x_{i,j,n}}{\sum_{j=0}^{246} x_{i,j,n}}}{2}$$

The end result of the allocation procedures used for both groups of countries is an adjusted randomised matrix of 2D inward FDI in a host country—cross-disaggregated on an immediate and ostensible ultimate investor basis—wherein the sum of the matrix along one or both of these dimensions (depending on whether both official ultimate and immediate bilateral FDI data, or only the latter, is available) has been forced into agreement with official bilateral FDI statistics. In the final step of the Monte Carlo procedure, each of the FDI values in this adjusted 2D matrix is in turn proportionally allocated between 3D investment pathways based on the randomised 3D inward FDI matrix (see Figure A1), to add the additional geographic dimension of true ultimate investing country. This follows the same one-step proportional allocation procedure used for countries reporting only immediate bilateral FDI.[21]

One thousand Monte Carlo simulations are run for each host country, yielding an estimate

[21] For example, if the adjusted 2D matrix of inward FDI in the US records a value for Irish FDI (on an ostensible ultimate investing basis) via Luxembourg (on an immediate investing country basis) of $200bn, and the randomised 3D matrix records a figure of $100bn of investment from ostensible Irish ultimate investors in the US via Luxembourg—of which $75bn (75%) is attributed on a 'true' ultimate investor basis to American companies that have inverted to Ireland, while $25bn is attributed to legitimately Irish companies—the final adjusted randomised 3D inward FDI matrix in the US would record, for this particular Monte Carlo simulation, a figure of $150bn for US companies inverted to Ireland investing in the US via Luxembourg conduits (75% of $200bn), and a figure of $50bn (25% of $200bn) for 'legitimately' Irish companies investing in the US via Luxembourg conduits.

probability distribution for each 3D FDI pathway into that host (as well as aggregated 2D and bilateral FDI investment pathways). Importantly, the Monte Carlo procedure here is, strictly speaking, only gauging the sensitivity of the final FDI estimates to the likely error in the initial Orbis-derived FDI estimates, within the parameters of the assumptions of the estimation methodology itself. It will thus not necessarily account for all sources of error and uncertainty. A particularly important limitation of the analysis is the fact that the simulations, for reasons of feasibility (i.e. a roughly three orders of magnitude reduction of computational demands) only account for uncertainty in the value of FDI relationships, and not the structure of FDI relationships. Conversely, an advantage of the methodology is that the same micro data-based estimation procedure used to construct the 2D and 3D FDI matrices can be used to estimate a range of randomised possible values where there are gaps in the official bilateral FDI data. This is particularly important to the reconstruction of inward FDI in the two IMF CDIS non-reporting countries here (the UAE and Russia) from countries for which no counterparty-reported data is available on this same position (including e.g. FDI links between the UAE and Russia, which are estimated entirely from the ground-up based on Orbis data). Ultimately, it must be remembered that all of the FDI figures generated by this analysis are, in the absence of directly reported official data, inherently rough estimates. The level of uncertainty surrounding estimates varies greatly between different investment positions, and both the level and unevenness of this uncertainty must be taken into account in any interpretation of results.