ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Damgaard, Jannick; Elkjær, Thomas

Working Paper

The global FDI network: Searching for ultimate investors

Danmarks Nationalbank Working Papers, No. 120

Provided in Cooperation with:
Danmarks Nationalbank, Copenhagen

Suggested Citation: Damgaard, Jannick; Elkjær, Thomas (2017) : The global FDI network: Searching for ultimate investors, Danmarks Nationalbank Working Papers, No. 120, Danmarks Nationalbank, Copenhagen

This Version is available at:
https://hdl.handle.net/10419/202860

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

WORKING PAPER

DANMARKS NATIONALBANK

2 NOVEMBER 2017 — NO. 120

The Global FDI Network: Searching for Ultimate Investors

Jannick Damgaard
jda@nationalbanken.dk
DANMARKS NATIONALBANK

Thomas Elkjaer
telkjaer@imf.org
INTERNATIONAL MONETARY FUND (IMF)

The Working Papers of Danmarks Nationalbank describe research and development, often still ongoing, as a contribution to the professional debate.

The viewpoints and conclusions stated are the responsibility of the individual contributors, and do not necessarily reflect the views of Danmarks Nationalbank.

The Global FDI Network: Searching for Ultimate Investors

Abstract
This paper addresses three types of geographical decoupling in foreign direct investment (FDI), i.e., challenges when using traditional FDI data as a proxy for real economic integration between economies: (i) large bilateral asymmetries between inward and outward FDI, (ii) the role of special purpose entities (SPEs), and (iii) the effect of moving from immediate counterpart economy to ultimate investing economy (UIE). A unique global FDI network is estimated, where SPEs are removed and FDI positions are broken down by the UIE. Total inward FDI in the new network is reduced by one-third, and financial centers are less dominant.

Resume
Dette papir adresserer tre former for geografisk afkobling i direkte investeringer, FDI, dvs. udfordringer, når traditionelle FDI-data benyttes som indikator for realøkonomisk integration mellem økonomier: (i) bilaterale asymmetrier mellem indadgående og udadgående FDI, (ii) gennemløbsinvesteringers rolle og (iii) effekten af at gå fra umiddelbart til ultimativt modpartsland. Der estimeres et unikt globalt FDI-netværk, hvor gennemløbsinvesteringer fjernes, og indadgående FDI-beholdninger nedbrydes i henhold til det ultimative modpartsland. De totale indadgående FDI-beholdninger i det nye netværk reduceres med en tredjedel, og finansielle centre er mindre dominerende.

Key words
FDI; multinational enterprises; special purpose entities; financial globalization

JEL classification
F21; F23; F30

Acknowledgements
The authors are grateful for suggestions from Martin Nygaard Jørgensen, Paul Lassenius Kramp, and Robert Wederkinck, all Danmarks Nationalbank, and from Emma Angulo, Tamim Bayoumi, Claudia Dziobek, Gamal El-Masry, Marco Espinosa-Vega, Padma Sandhya Hurree Gobin, Artak Harutyunyan, Alicia Hierro, Nir Klein, Kwangwon Lee, Yevgeniya Korniyenko, Gian Maria Milesi-Ferretti, Rene Piche, Damien Puy, Roberto Rosales, Carlos Sanchez-Munoz, and Thierry Tressel all IMF. The authors are responsible for any remaining errors. This paper is also published in the IMF Working Paper Series.

Contents **Page**

Abstract 2

I. Introduction 4

II. Bilateral Asymmetries in Official FDI Data 5

III. The Role of Special Purpose Entities 8

IV. FDI by Ultimate Investing Economy 11

V. Constructing New Global FDI Estimates 13

VI. Global FDI Networks 17

VII. Conclusion 20

VIII. References 21

Tables
1. List of Low-Tax Economies 9

Figures
1. Asymmetries in FDI between Economy Pairs 6
2. Top 20 Inward FDI Economies 11
3. Inward FDI Positions by Immediate and Ultimate Investing Economy 12
4. Round-Tripping 13
5. SPE Adjustment Model 15
6. Discrepancies between Reported and Estimated Inward FDI Positions 17
7. Network of FDI Positions Based on the CDIS 18
8. Network of FDI Positions Based on New Global FDI Estimates 19

Box
1. Fellow Enterprises and Geographical Asymmetries 7

Annexes
I. SPE Breakdown 23
II. Construction of the New Global FDI Network 24

I. INTRODUCTION

Foreign direct investment (FDI) is a key link in global economic interconnectedness and is widely used to analyze globalization of production, attractiveness of an economy, long-term relationships between economies, technology transfer, and real economic activity generated by foreign companies and investors, etc. Central to understanding these economic relations is the geographical breakdown of FDI by counterpart economy. Such analyses, however, are hampered by the geographical decoupling in FDI, i.e., challenges when using traditional FDI data as a proxy for real economic integration between economies. Similarly, the decoupling poses challenges for the *balance sheet approach*, which uses the aggregate balance sheets of the main sectors of an economy to identify risks created by maturity, currency, and capital structure mismatches to explain how problems in one sector can spill over to other sectors, eventually triggering a balance of payments crisis (Allen *et al.*, 2002). The decoupling is particularly pronounced when the investments involve offshore financial centers, special purpose entities (SPEs), or intangibles, e.g., intellectual property rights that are easily moved between economies in an increasingly digitalized global environment.

This paper analyzes the three main ways that FDI measures are geographically decoupled and then estimates the first global FDI network to address them. First, there are bilateral asymmetries between FDI positions for most economy pairs in the published numbers: one economy's outward FDI does not match the counterpart economy's inward FDI from that economy. For instance, in the IMF's Coordinated Direct Investment Survey (CDIS) for end-2015, one economy's published number is at least twice as high as the counterpart economy's published number for 44 percent of the economy pairs and at least 10 times higher for 10 percent of the pairs.

Second, some smaller economies are very important for global FDI, suggesting a decoupling between FDI and real economic activity. For instance, the Netherlands and Luxembourg are the world's largest recipients of FDI, and are also ranked in the global top three for outward FDI along with the United States. Since FDI is often considered to be a proxy for "brick and mortar" investments, how can two small economies play such a significant role in global FDI? Essentially, FDI is a measure of purely financial investments. It includes all cross-border investments between enterprises in an FDI relationship, where a company owns at least 10 percent of the equity in another company directly or through a chain of subsidiaries. The 10 percent ownership share is the statistical threshold set to capture long-term strategic and stable investments. However, some economies, including the Netherlands and Luxembourg, host many foreign-owned SPEs and multinational enterprises (MNEs) that often carry out FDI through SPEs, which typically focus on group financing, financial holding activities or tax planning and do not nessecarily reflect stable investment motives. While SPEs have no or very limited real economic activity in the economy they are domiciled in, they can significantly inflate FDI.

Third, as MNEs often carry out FDI through complex ownership chains, the immediate counterpart economy may not be the economy of the ultimate owner who carries the ultimate

risks and rewards, or the investments' end destination. FDI has traditionally been broken down by the immediate counterpart economy, which provides a good measure for direct exposures, but lacks information about the ultimate investing economy (UIE). To close this data gap, OECD countries are now encouraged to also break down inward FDI by the UIE. The global geographical FDI network is very different according to the immediate counterpart economy compared to the UIE. Financial centers that typically host SPEs are much less important as ultimate FDI economies, reflecting the transitory nature of investments flowing through these centers.

To address the decoupling in FDI measures, this paper constructs a unique FDI network, where SPEs are removed and FDI positions are broken down by the UIE for a large number of economies. This FDI network combines the details of the new OECD data and the broad coverage of the CDIS. It is based on inward FDI, which is generally of higher quality than outward FDI due to better data sources. Total inward FDI positions in the new network are reduced by approximately one-third compared to the CDIS, and economies hosting financial centers play a less dominant role. The new FDI network provides a clearer picture of real economic integration and ultimate financial linkages between economies than current available data and thus offers new insights into global interconnectedness.

The paper is organized as follows. Section II analyzes the bilateral asymmetries between inward and outward FDI reported by economy pairs and provides explanations for these asymmetries. The role and treatment of SPEs in FDI are discussed in Section III, while Section IV compares inward FDI broken down by the immediate counterpart economy and the UIE. In Section V, new global FDI estimates are developed and tested against reported data. The global FDI networks based on CDIS data and the new FDI estimates are analyzed in Section VI, and Section VII summarizes the key conclusions of the paper.

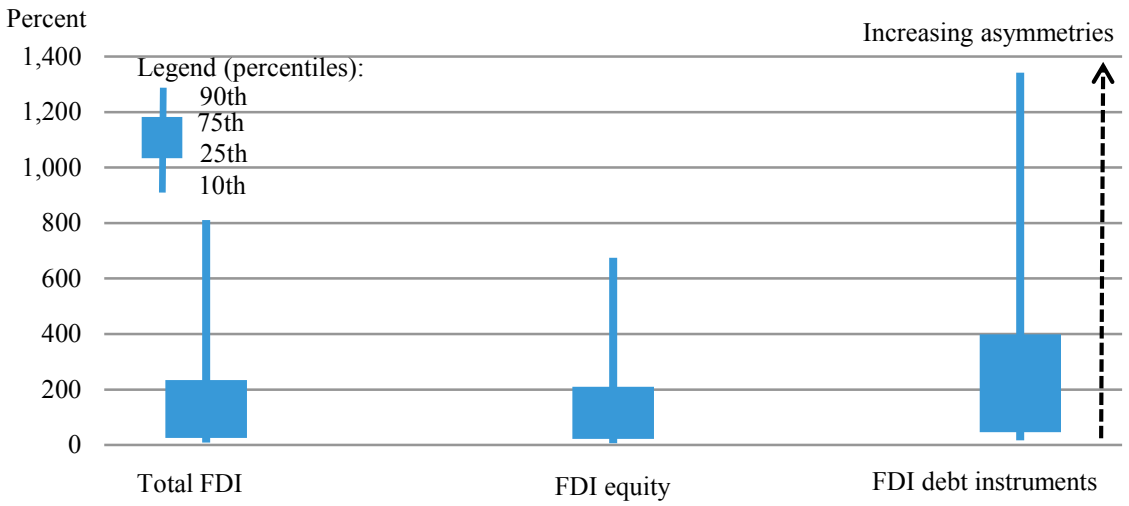
II. Bilateral Asymmetries in Official FDI Data

There are bilateral asymmetries in official FDI data, which can make their analytical intepretation difficult. To better understand cross-economy linkages, the IMF has since 2010 published the CDIS on annual basis, with a global coverage of 116 economies, including most major economies.[2] Since the CDIS breaks FDI positions down by the immediate counterpart economy, bilateral economy data can be compared. For instance, outward FDI to Japan shown in German FDI statistics should in principle match inward FDI from Germany in Japanese FDI statistics, but such symmetric recordings are rare in practice and, in fact, asymmetries exist for all economies. In relative terms, the asymmetries are large. For 44 percent of the 1,805 published bilateral economy pairs in the CDIS, one economy's number is at least twice as high as the counterpart economy's number, and for almost

[2] Data for a reference year are published in December of the following year, but some economies report with a longer time lag. The CDIS follows the FDI methodology set out in the *IMF Balance of Payments and International Investment Position Manual, Sixth Edition (BPM6)* and the *OECD Benchmark Definition of Foreign Direct Investment, 4th Edition (BMD4)*, with further clarifications in the *Coordinated Direct Investment Survey Guide – 2015 (CDIS Guide)*. While *BPM6* uses the term *direct investment,* this paper uses the term *FDI*.

10 percent of the pairs, one number is at least 10 times higher than the mirror number (Figure 1). In absolute terms, the average discrepancy between inward and outward FDI for the 1805 economy pairs is also large, namely USD 5.9 billion. Interestingly, the average inward and outward FDI positions are close (USD 12.3 billion and USD 13.0 billion, respectively), indicating no systematic overstatement of inward FDI compared to outward FDI, or vice versa.

Figure 1. Asymmetries in FDI between Economy Pairs



Source: Own calculations based on the IMF's CDIS data.

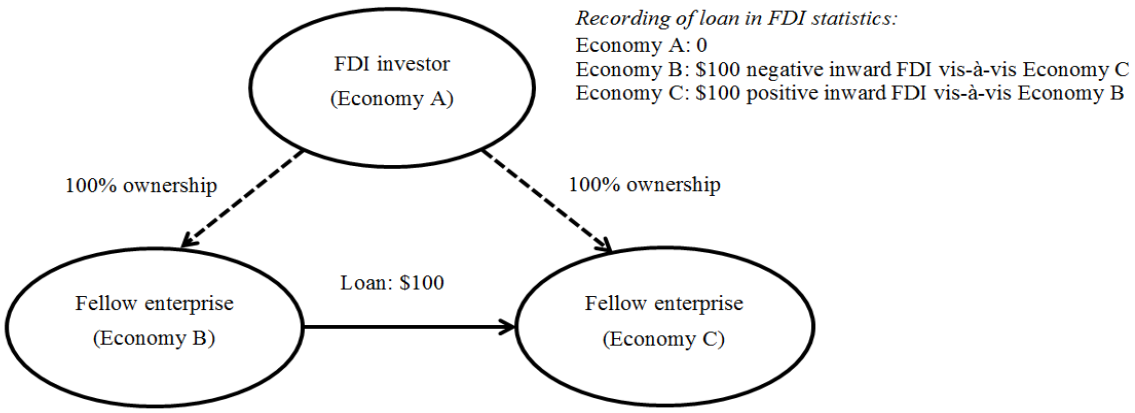
Note: Inward FDI position as reported by an economy compared to outward FDI position as reported by the counterpart economy. For each economy pair, the asymmetry is shown as the difference between the highest and lowest position in percent of the lowest position. Only pairs, where both economies provided a non-confidential number exceeding USD 1 million, are included. Total FDI, equity, and debt instruments cover 1805, 1403, and 906 pairs, respectively, reflecting data availability at the initial release of the 2015 CDIS in December 2016. FDI equity accounts for approximately 80 percent of total FDI and FDI debt instruments for 20 percent.

The bilateral asymmetries can stem from differences in applying the macroeconomic statistical methodology and from compilation practices. These differences apply to FDI statistics in general and not just the CDIS data. As for the methodology, FDI can be valued using different valuation methods and estimation techniques, which can contribute to geographical asymmetries. When FDI equity consists of unlisted equity, which is the most common type of FDI, no market prices exist and valuation is estimated using fair valuation methods. Damgaard and Elkjaer (2014) show that choice of valuation method can have a significant impact on FDI data. Using Danish micro level company data, they also find that unlisted FDI equity liabilities vary from 22 to 156 percent of GDP when applying different estimation techniques, but just one fair valuation method, price to earnings. While the most common FDI valuation method, own funds at book value (OFBV), promotes cross-economy comparability, it does not necessarily lead to current market-value approximations if companies value their assets and liabilities at outdated historical costs or if accounting

standards only capture intangibles to a limited extent. Lipsey (2010) finds that the latter is becoming increasingly important for FDI. The CDIS Guide recommends to value unlisted FDI equity at OFBV and listed equity at market value, but 18 economies use other valuation principles for unlisted equity for inward and/or outward FDI, and 52 economies deviate from the recommended valuation principle for listed equity. Moreover, the methodology allows FDI to be presented under different principles, which also can generate asymmetric geographical data (Box 1).

Box 1. Fellow Enterprises and Geographical Asymmetries

The statistical methodology can itself cause economy pair asymmetries. The methodology allows two ways to present FDI: the *directional principle* (inward and outward positions netted according to direction of influence) and the *asset-liability principle* (gross positions). The CDIS recommends the directional principle. Under this principle, reverse investment from an FDI enterprise to its parent is measured as negative outward FDI in the economy of the parent and negative inward FDI in the economy of the FDI enterprise, providing for symmetric recording. However, for instance when there is a loan from an FDI enterprise located in economy B to a fellow enterprise (an enterprise related through a common investor in the ownership hierarchy) located in economy C and the ultimate controlling parent resides in economy A, it is negative inward FDI in economy B and positive inward FDI in economy C, thereby generating bilateral geographical asymmetries (see illustration below). The advantage of this approach is that it does not inflate aggregated FDI as the asset-liability principle would do for economy B. Since fellow enterprises primarily have FDI in debt instruments, the larger bilateral asymmetries for FDI debt instruments than FDI equity (Figure 1) may be explained by the asymmetric treatment of investments between fellow enterprises.



Practical compilation issues can also generate asymmetries. For instance, the United States includes the Channel Islands as part of the United Kingdom, but the United Kingdom does not (U.S. Bureau of Economic Analysis, 2014). In addition, some economies report the geographical breakdown on the UIE basis, and sometimes no counterpart economy is allocated to SPEs (IMF, 2014). Differences in coverage and sample uncertainties also

contribute to bilateral asymmetries. Some economies survey all FDI enterprises while others gross up. Also, changing company demographics – e.g., new FDI, mergers, splits, and bankruptcies – make it difficult to keep the reporting population updated. Angulo and Hierro (forthcoming) list potential reasons for asymmetries from a statistical compilation viewpoint. To improve data, the European Central Bank and Eurostat (2014) facilitate confidential information sharing between European Union (EU) compilers on FDI. The IMF also plans information sharing based on the CDIS and to work further on issues related to SPEs.

III. The Role of Special Purpose Entities

The decoupling between FDI and real economic activity is growing as corporate structures and financing mechanisms become more global. Even though FDI measures financial investments, it is traditionally used as a proxy for real economic activity generated by foreign-owned companies and long-term relations between economies. However, with increasingly complex and flexible MNE structures and widespread use of SPEs, FDI may be a less useful indicator for real activity, long-term relations between economies, or even for stable external financing.

The strong SPE presence in certain economies is an important reason for the decoupling between FDI and real economic activity. The SPEs break the direct link between the receiving economy and the ultimate owner, and "inflate" FDI because the SPEs have large gross foreign positions but very small net foreign positions, reflecting their role as pure financial intermediaries rather than final investment targets. Consequently, SPEs make it difficult to separate real financial integration and diversification from financial engineering. While there is no uniform international definition of SPEs, statistical manuals provide similar criteria for identifying an SPE. These include: formally registered legal entity that is subject to national law, ultimate owners are not residents of the territory of incorporation, few or no employees, little or no production in the host economy, little or no physical presence, most assets and liabilities are vis-à-vis non-residents, and the core business of the enterprise consists of group financing or holding activities (*BMD4*, Box 6.2).

FDI financing through SPEs is often only transitory. For instance, Blanchard and Acalin (2016) find a high positive correlation between quarterly FDI inflows and outflows in several economies, suggesting that FDI inflows are often just passing through an economy on the way to their final destination. Moreover, Lane and Milesi-Ferretti (2017) find that FDI positions, unlike positions in portfolio investment and other investment, have continued to expand in the aftermath of the financial crisis. This increase primarily stems from FDI positions vis-à-vis financial centers and can be attributed to the growing complexity of the corporate structures of large MNEs.

Tax, regulatory, and confidentiality benefits – utilized through SPEs that are typically set up in offshore financial centers – drive much of the expansion in FDI. These benefits are potentially large, for instance for the United States the annual tax revenue loss from offshore tax exploitations is estimated to be around USD 100 billion (U.S. Senate Permanent

Subcommittee on Investigations, 2008). Therefore, both SPE funding and location are likely less stable than for other types of FDI because even small legislative changes – domestically or abroad – can significantly shift investment patterns and lead to capital outflows. Table 1 provides an overview of the 50 economies, mostly Caribbean and European, appearing on various low-tax economy lists (see the note to Table 1).

Table 1. List of Low-Tax Economies

Asia:	**Hong Kong SAR**, **Macao SAR**, Maldives, **Singapore**
Caribbean:	Anguilla, Antigua and Barbuda, **Aruba**, Bahamas, **Barbados**, British Virgin Islands, Cayman Islands, Dominica, Grenada, Montserrat, Netherlands Antilles, St. Kitts and Nevis, St. Lucia, St. Vincent and Grenadines, Turks and Caicos Islands, U.S. Virgin Islands
Central America:	Belize, **Costa Rica**, **Panama**
Eastern Africa:	**Mauritius**, **Seychelles**
Europe:	Andorra, **Cyprus**, Gibraltar, Guernsey, **Ireland**, Isle of Man, Jersey, **Latvia**, Liechtenstein, **Luxembourg**, **Malta**, Monaco, San Marino, **Switzerland**
Northern America:	Bermuda
Middle East:	**Bahrain**, **Jordan**, **Lebanon**
Oceania:	Cook Islands, Marshall Islands, Nauru, Niue, **Samoa**, Vanuatu
Western Africa:	Liberia

Source: Government Accountability Office (2008).

Note: Includes economies that appeared in at least one of the following lists: (i) OECD's list of committed jurisdictions and uncooperative tax havens (no jurisdictions have been included in this list since 2009), (ii) the tax haven list by Dharmapala and Hines (2006), and (iii) the IRS list of offshore haven or financial privacy jurisdictions. Economies in bold report to the CDIS.

FDI has become more responsive to taxation over time (OECD, 2007). MNEs can optimize taxes through SPEs or regular operating units, and tax optimization often involves shifting profits to a low-tax jurisdiction through debt allocation, transfer pricing, or corporate inversions. For example, MNEs may allocate most of their debt to a high-tax economy to take advantage of high interest deductions while shifting profits to low-tax jurisdictions.

Moreover, MNEs can use distorted transfer pricing to shift profits to low-tax jurisdictions through sales of goods and services between affiliates. Such practices can substantially affect FDI through profits and retained earnings. In principle, the transfer pricing should be at arm's-length prices, but it can be very difficult for tax authorities to determine if a fair price has been used for transfers of intellectual property rights and intangibles. For the United States, intra-group trade in goods accounts for 48 percent of total imports and 30 percent of exports, and 22 and 26 percent of services imports and exports, respectively (Lanz and Miroudot, 2011). In a string of high-profile cases, the European Commission has ruled that

the tax authorities in Ireland, Luxembourg, and the Netherlands have allowed Apple, Fiat, and Starbucks to use transfer prices that do not reflect underlying economic prices. This practice was found to violate EU state aid rules, and the three countries have been instructed to collect significant additional taxes from the companies involved, but the countries disagreed with the rulings and have appealed them in court.

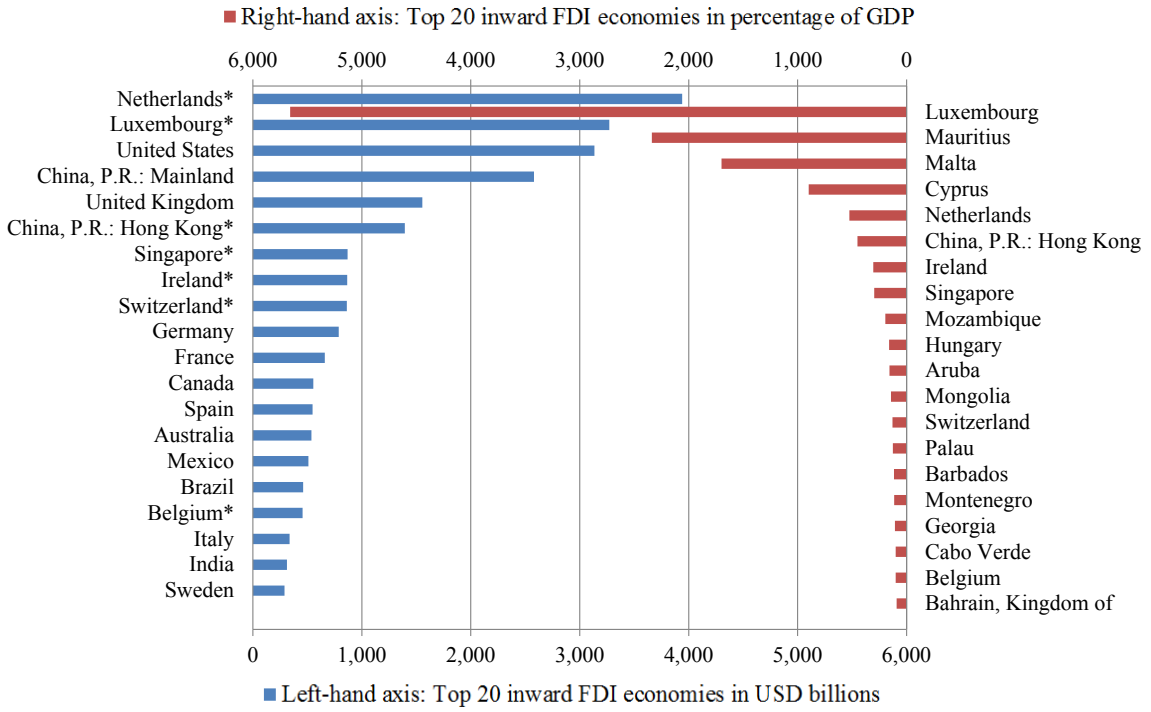
Finally, international corporate structures can be used to shift profits away from high-tax jurisdictions. Recently, some US-based MNEs have been involved in corporate inversions, where the parent company's headquarter is moved abroad to a low-tax jurisdiction through a merger with a foreign company, effectively changing the domicile of the parent company but not providing new FDI funding. While such MNE corporate structures may not technically meet the SPE criteria, they still function to some extent as near-SPE structures and can contribute to the geographical decoupling in FDI, see for instance Lane and Milesi-Ferretti (2017) for an analysis of FDI in Ireland. This practice has also had a significant impact on Irish GDP data (OECD, 2016). Near-SPEs may become more common with the implementation of the principles of the G-20/OECD Base Erosion and Profit Shifting (BEPS) Project because MNEs will need to have more presence in low-tax jurisdictions to be able to claim permanent establishment and have taxable presence in such jurisdictions.

Globally, the largest recipients of FDI in absolute terms include major economies like the United States, China (Mainland), United Kingdom, Germany, and France, but also smaller economies such as the Netherlands, Luxembourg, Hong Kong SAR, Singapore, Ireland, and Switzerland (Figure 2). All economies in the latter group host financial centers, and a large share of the high FDI in these economies can most likely be attributed to SPE presence.

The top recipient economies change somewhat when looking at FDI intensity, measured as *inward FDI*-to-*GDP*. Luxembourg is now the largest recipients by a wide margin, followed by Mauritius, Malta, and Cyprus, which are all included in the list of low-tax economies (Table 1). The Netherlands, Hong Kong SAR, Ireland, Singapore, and Switzerland remain near the top whereas the major economies are no longer present. More economies appearing on the list of low-tax economies are likely to be top recipients of FDI in relative terms, but only economies that report to the CDIS are included in Figure 2, and many offshore financial centers, e.g., British Virgin Islands and Cayman Islands, do not report to the CDIS.

SPEs have no or very limited real economic activity in the economy they are domiciled in, but can have significant FDI, essentially "inflating" the FDI numbers. Most OECD countries report FDI data including and excluding SPEs separately to the OECD while the CDIS does not currently include such a breakdown. Economies that host SPEs tend to have high *FDI-to-GDP* ratios. For Luxembourg, the inward FDI position excluding SPEs is 393 percent of GDP, compared to 5,658 percent when SPEs are included (Annex I). The large non-SPE FDI in Luxembourg largely reflects investments in the financial sector. For the Netherlands, the corresponding numbers are 97 percent and 525 percent.

Figure 2. Top 20 Inward FDI Economies



Source: IMF (CDIS and World Economic Outlook Database).
Note: End-2015 inward FDI positions published with the initial release of the 2015 CDIS in December 2016 and GDP for 2015 from the October 2016 World Economic Outlook Database. In the few cases where data for 2015 are not available, latest available data are used. Economies with an asterisk are in both top 20 lists.

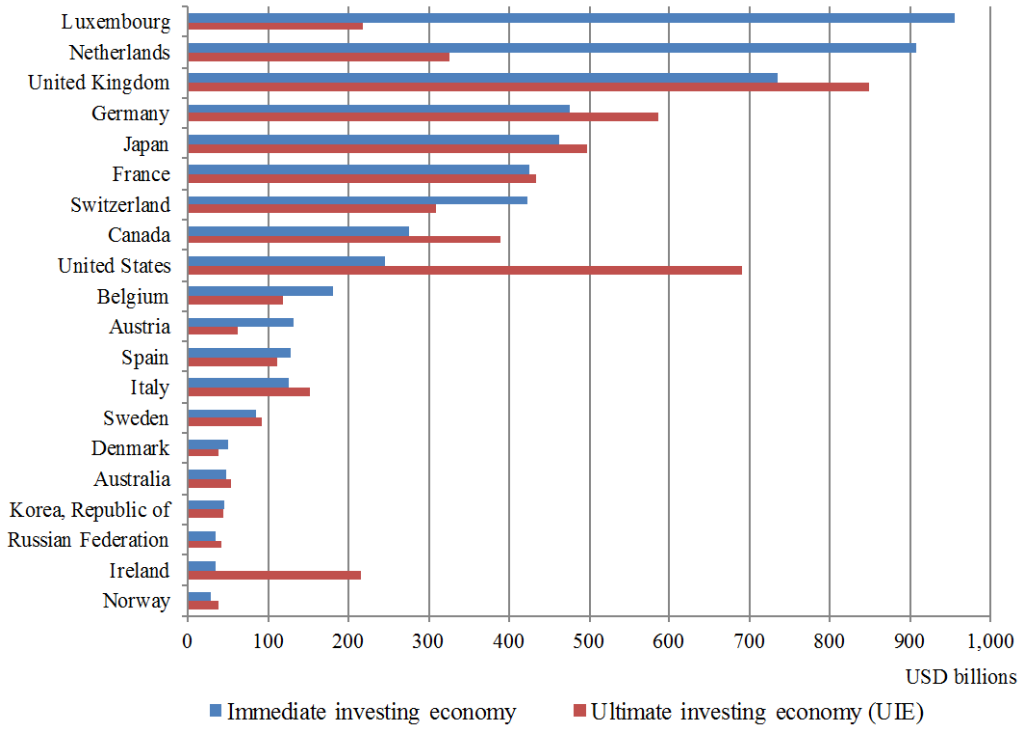
IV. FDI BY ULTIMATE INVESTING ECONOMY

FDI by the UIE, i.e., the economy of the ultimate controlling parent, provides important insights into the underlying interconnectedness between economies, including real economic interpendencies and ultimate financial benefits and risks incurred by the ultimate investors.

There is a strong push for more comprehensive data on cross-border exposures and "ultimate risk", including in the report *The Financial Crisis and Information Gaps* by the IMF and Financial Stability Board (2009) that led to the G-20 *Data Gaps Initiative.* Also, the OECD, in the *BMD4* (para. 355), strongly encourages economies to provide supplementary data on inward FDI positions on a UIE basis using the following method (*BMD4*, para. 610–611): "*[The ultimate investor] is identified by proceeding up the immediate direct investor's ownership chain through the controlling links (ownership of more than 50 percent of the voting power) until an enterprise is reached that is not controlled by another enterprise. If there is no enterprise that controls the immediate direct investor, then the direct investor is effectively the ultimate investor in the direct investment enterprise. The country in which the ultimate investor is resident is the ultimate investing country (UIC) for the investment in the direct investment enterprise.*" [UIE is referred to as ultimate investing country, UIC, in *BMD4*.]

By January 2017, 12 OECD countries – Austria, Czech Republic, Estonia, Finland, France, Germany, Hungary, Iceland, Italy, Poland, Switzerland, and the United States – had reported inward FDI positions by the UIE for the annual update of the OECD's BMD4 Partner Country Database, and more countries are expected to follow. Economies with significant SPE presence, e.g., Luxembourg and the Netherlands, tend to be much more dominant when inward FDI positions are measured by the immediate investing economy than by the UIE (Figure 3). This pattern suggests that investments from financial centers are often pass-through investments, which originate from other economies.

Figure 3. Inward FDI Positions by Immediate and Ultimate Investing Economy



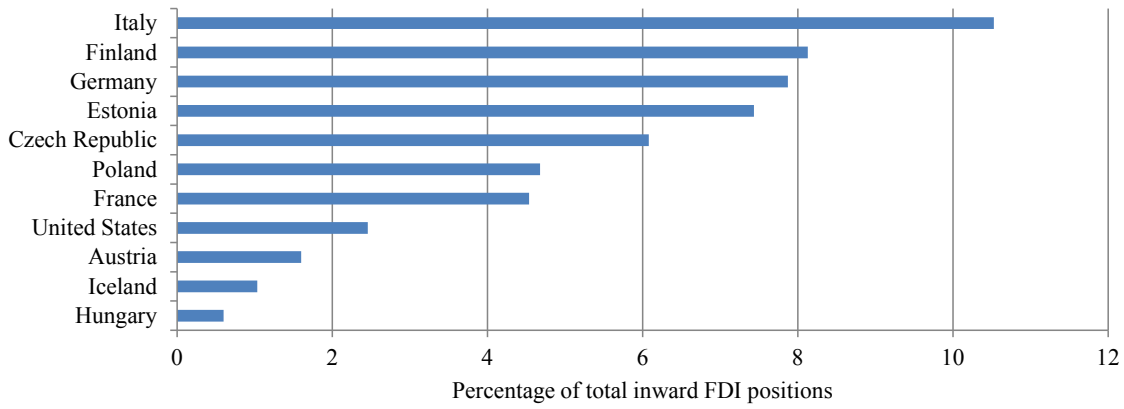
Source: OECD (BMD4 Partner Country Database).
Note: Top 20 total inward FDI positions by immediate investing economy and the corresponding inward positions by the UIE based on the 12 OECD countries that report FDI on an UIE basis. Excludes resident SPEs and positions, where either the immediate or ultimate investing economy is confidential. End-2015; in a few cases end-2014.

Economies like the United States and Germany with no or few resident SPEs, however, are more dominant when inward FDI positions are measured by the UIE rather than the immediate investing economy. This result suggests that these economies are home to the parent companies of MNEs that invest through chains of subsidiaries and holding companies abroad. Ireland is also more dominant when inward FDI positions are measured by the UIE rather than the immediate investing economy even though the country is known to host many SPEs and is included in the list of low-tax economies. The Irish pattern can be attributed to US FDI data and may in part be explained by the corporate inversions in recent years, where several US parent companies have moved their domiciles to Ireland for tax reasons, in

particular to avoid the United States' global taxation principle. As a result, many entities in the United States will have Ireland as the UIE through complex MNE holding structures.

The ultimate investor may be from the same economy as the direct investment enterprise, which effectively "inflates" FDI since the ultimate funding source is the domestic economy. Tax planning may motivate such round-tripping. In Italy, round-tripping exceeds 10 percent of inward FDI, and the average for the reporting OECD countries is 5 percent (Figure 4).

Figure 4. Round-Tripping



Source: OECD (*BMD4* Partner Country Database).
Note: Resident SPEs excluded. End-2015; in a few cases end-2014.

V. Constructing New Global FDI Estimates

This section constructs new global FDI estimates by combining the details of the OECD data with the broad coverage of the CDIS. In the new estimates, SPEs are excluded, and FDI is broken down by the UIE. FDI, including SPEs and broken down by the immediate counterpart economy, provides useful analytical details on the flow of funds and direct exposures. However, FDI with SPEs removed and broken down by the UIE provides a better measure for real economic integration and long-term financial linkages because it shows the ultimate source of control/influence and is less sensitive to the volatile group financing, SPE relocation decisions, and holding activities of MNEs.

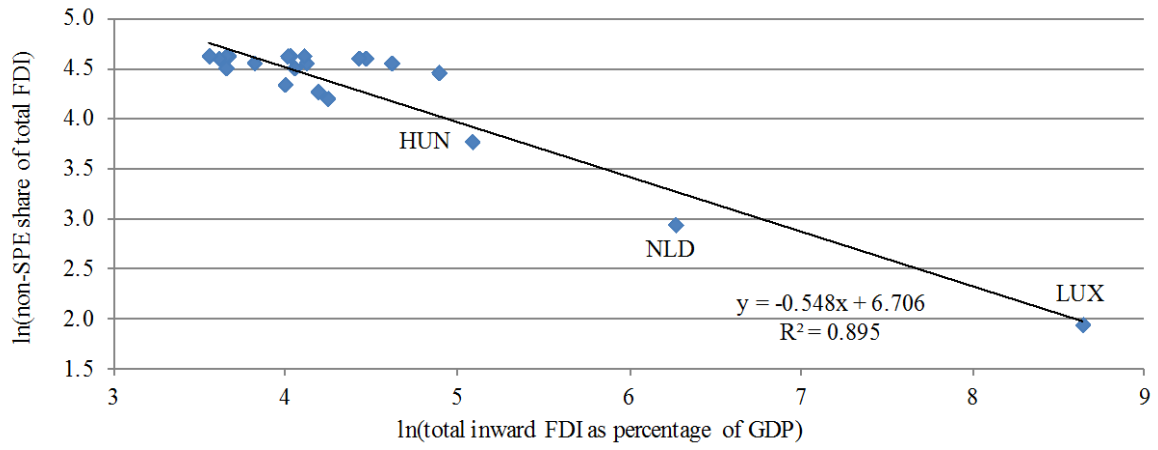
By combining the details of the data reported to the OECD and the broad coverage of the CDIS, it is possible to estimate FDI, excluding SPEs and broken down by the UIE, with global coverage. The new estimates are based on inward FDI positions for two reasons. First, inward FDI data are generally of better quality than outward FDI data because it is easier to identify and obtain information about resident rather than non-resident direct investment enterprises via business registers, particularly for unlisted companies. Second, information about ultimate ownership is currently only available for inward FDI. Since the new global FDI estimates are based on inward FDI, estimates for "ultimate outward FDI" are generated as the mirror data from the new FDI network.

For OECD countries that report data excluding SPEs and broken down by the UIE, these data are included directly in the new estimates. For the remaining economies, the CDIS data are first adjusted for SPEs and then the geographical breakdown is transformed from the immediate counterpart to the UIE. To remove the SPEs, the starting point is the clear tendency that economies with high *total inward FDI*-to-*GDP* ratios are more likely to host SPEs than economies with low ratios (Annex I). Except for Luxembourg, no OECD country has reported an inward FDI position for non-SPEs that exceeds 114 percent of GDP. This finding suggests that there is a structural limit to an economy's capacity to attract or absorb non-SPE FDI, e.g., due to skilled labor constraints, infrastructure, and regulatory market entry barriers. To adjust for these structural limits, a model based on data for the SPE-reporting OECD countries is used to estimate SPE adjustment factors. For a given economy, the same SPE adjustment factor is then applied to all its counterpart economies, equivalent to assuming that investors from each counterpart economy use SPEs proportional to their total FDI in the economy. The model results show that the non-SPE share of total inward FDI positions decreases when the FDI intensity (measured as the total inward FDI position as a share of GDP) increases (Figure 5). While the two main outliers, Luxembourg and the Netherlands, to some extent drive this relationship, it still holds if these two outliers are excluded. Luxembourg and the Netherlands are included in the SPE adjustment model because they contain important information on *non-SPE inward FDI*-to-*total inward FDI* ratios for economies with high FDI intensity.

The model is specified as a univariate regression with the *non-SPE inward FDI*-to-*total inward FDI* ratio as the dependent variable and the FDI intensity as the explanatory variable. A log-log transformation is made to achieve linearity. Only economies with FDI intensity above 30 percent are included in the estimation since none of the reporting OECD countries with ratios below this threshold host SPEs. The model generates SPE adjustment factors, i.e., *non-SPE inward FDI*-to-*total inward FDI* ratios, below 1 for economies with FDI intensity higher than 46 percent and adjustment factors above 1 for economies with FDI intensity lower than 46 percent. For economies with FDI intensity below 46 percent, no SPE adjustments are made, reflecting that these economies host few or no SPEs. For economies with FDI intensity above 46 percent, SPE adjustments are made to adjust down total inward FDI, reflecting that these economies host many SPEs.

Alternatively, a multivariate model for the structural level of non-SPE FDI in an economy could be estimated based on economy-specific characteristics, including size, openness, taxation rules, and financial sophistication. However, this approach would entail a risk of overfitting due to the limited number of reporting economies. An advantage of the simple model is that it can easily and uniformly be used to estimate the non-SPE share of total FDI for all economies that do not report the SPE breakdown.

Figure 5. SPE Adjustment Model



Source: Own calculations based on OECD's *BMD4* Database and IMF's World Economic Outlook Database. Note: Data refer to end-2015. Univariate regression model with the *non-SPE inward FDI*-to-*total inward FDI* ratio as the dependent variable and the *total inward FDI*-to-*GDP* ratio as the explanatory variable (log-log transformation). The slope is significantly negative (p-value<0.001), with the 95 percent confidence interval ranging from -0.639 to -0.458. Estimated using SPE-reporting OECD countries with a *total inward FDI*-to-*GDP* ratio above 30 percent.

Next, the geographical breakdown is transformed from the immediate counterpart to the UIE basis. The geographical UIE adjustment factors, a_c, which are based on the UIE to immediate counterpart relationships for the 12 UIE-reporting OECD countries (Figure 3), are constructed in the following manner:

$$a_c = \frac{\sum_{i=1}^{n} FDI(UIE)_{i,c}}{\sum_{i=1}^{n} FDI(IIE)_{i,c}} \text{ for } i \neq c,$$

where c denotes the counterpart economy, i the OECD reporting country, n the number of reporting economies, *FDI(UIE)* the inward FDI position according to the UIE breakdown, and *FDI(IIE)* the inward position according to the immediate investing economy breakdown. For instance, the 12 OECD reporting countries have an aggregate inward FDI position of USD 326 billion from the Netherlands on the UIE basis and USD 906 billion on the immediate counterpart basis, so the adjustment factor for positions vis-à-vis the Netherlands, a_{NLD}, is 0.36. To avoid extreme adjustments, for instance due to limited data availability for some counterpart economies, the adjustment factors are capped between 0.33 and 3. For economies appearing on the list of low-tax economies, which are likely to have significant SPE presence, the adjustment factors are capped between 0.2 and 1 so FDI from these economies can never be higher under the UIE breakdown than under the immediate counterpart economy breakdown.

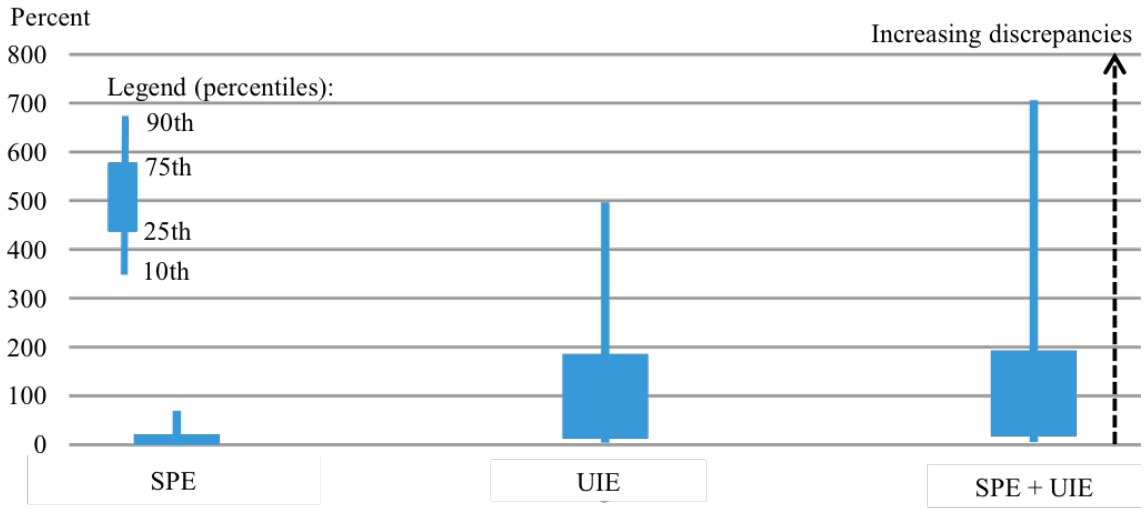
Then, the round-tripping adjustment factor, *b*, is calculated as the simple average for reporting economies:

$$b = \frac{1}{n} * \sum_{i=1}^{n} \frac{FDI(UIE)_{i,c}}{FDI(total)_i} \text{ for } i = c.$$

For each economy, the adjustment factor, *b*, is applied to total non-SPE inward FDI, effectively allocating 5 percent of the inward FDI back to its own economy. Finally, the total adjustments are constrained so that on an economy level, adjusted FDI cannot exceed reported total inward FDI for the economy. Annex II provides a detailed description of the construction of the new FDI estimates. The new global FDI estimates, i.e., the full economy-by-economy matrix, are published along with this paper.

The new global FDI estimates fit relatively well when the estimated FDI is contrasted with the reported FDI from the OECD countries that report detailed breakdowns. As a model verification, the SPE adjustment factors are applied to the CDIS data for the SPE-reporting OECD countries, and the UIE adjustment factors are applied to reported non-SPE data for the UIE-reporting OECD countries. The discrepancies for the SPE estimations are generally small (Figure 6), mainly because only a few OECD countries have a large SPE presence, meaning that the adjustments are modest in most cases. As an illustration, the SPE adjustment model generates an adjustment factor of 0.8 for an economy with an *inward FDI*-to-*GDP* ratio of 70 percent, effectively adjusting down inward FDI by 20 percent, and only seven OECD countries have ratios above that threshold. The UIE estimations are more uncertain because large adjustments are made for all reporting economies, and investment patterns can vary greatly across economies. For instance, Haberly and Wójcik (2015) show that FDI patterns are influenced by historical and political relationships between economies. The joint model test, where the UIE estimations are based on *estimated* SPE data, shows the highest discrepancies. Interestingly, the discrepancies between estimated and reported inward FDI are smaller than the bilateral discrepancies in the reported data (Figure 1). Nevertheless, model FDI estimates based on data from a subset of economies, the reporting OECD countries, will inevitably be uncertain because investment patterns may vary across economies, regions, and economic development levels, and therefore any single data point should not be over-interpreted. When more countries start reporting the SPE and UIE breakdowns, the estimation method can be further fine-tuned to make FDI estimates more robust.

Figure 6. Discrepancies between Reported and Estimated Inward FDI Positions



Source: Own calculations based on data from the IMF (CDIS) and the OECD (*BMD4* Database).
Note: Reported inward FDI positions broken down by counterpart economy compared to estimated inward FDI positions, where the discrepancy is shown as the difference between the highest and lowest position in percent of the lowest position. Only discrepancies for non-confidential estimates exceeding USD 1 million are shown. SPE, UIE, and joint (SPE + UIE) cover 1229, 514, and 481 comparisons, respectively, which reflects data availability.

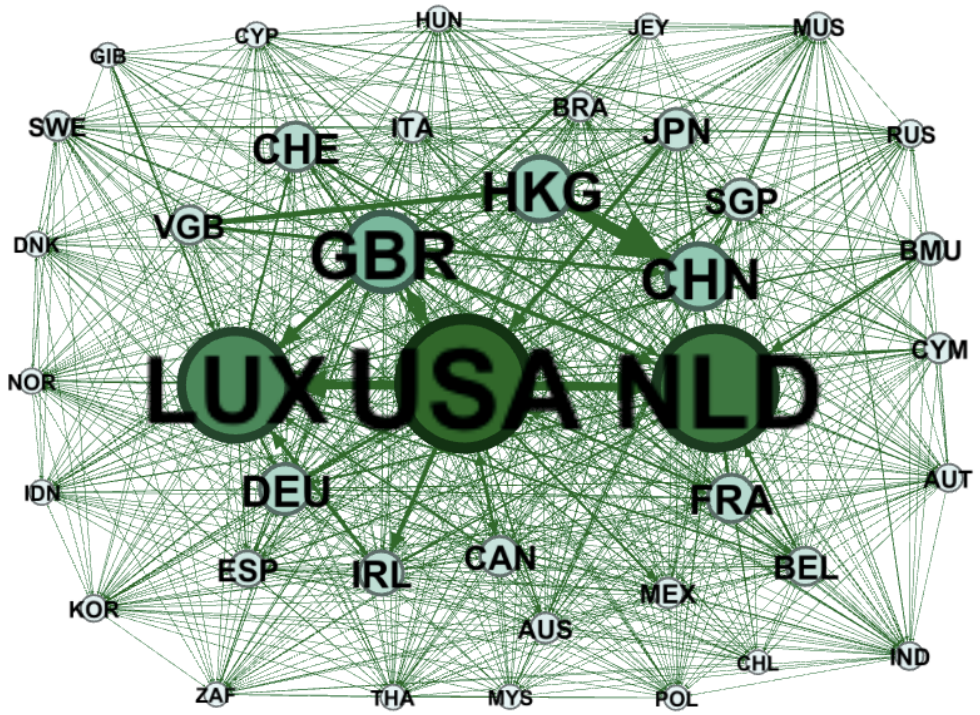
VI. Global FDI Networks

The new FDI estimates make it possible to compare global FDI networks based on different FDI measures. The United States, Netherlands, and Luxembourg dominate the FDI network based on the CDIS, reflecting the difficulties in untangling traditional FDI economies (United States) from transitory FDI economies (the Netherlands and Luxembourg) (Figure 7). The network also reveals a very high degree of connectedness where most economies have FDI links vis-à-vis each other. Guerin (2006) finds a negative effect of distance on FDI flows, but CDIS data show that the reporting economies typically receive inward FDI from 60–90 different economies. Put differently, FDI is not only regionally clustered, but investments are also spread out between many economies with direct FDI links.

Investment gateways or hubs can also be identified in the network. For instance, the strong link between China (Mainland) and Hong Kong SAR likely reflects that many foreign investors use Hong Kong as a third jurisdiction or gateway for investments in China because of various tax agreements. Hong Kong also reports large sums of inward FDI from British Virgin Islands, suggesting that some MNEs invest in China through complex SPE ownership chains passing through the British Virgin Islands and then Hong Kong before entering China.

Some offshore financial centers – British Virgin Islands, Bermuda, Cayman Islands, Gibraltar, and Jersey – are included in the global top 40 even though they do not report to the CDIS. Thus, they are only part of the network because they are counterparts to the inward FDI of reporting economies. These five economies would have been even more important in the network if they reported to the CDIS.

Figure 7. Network of FDI Positions Based on the CDIS



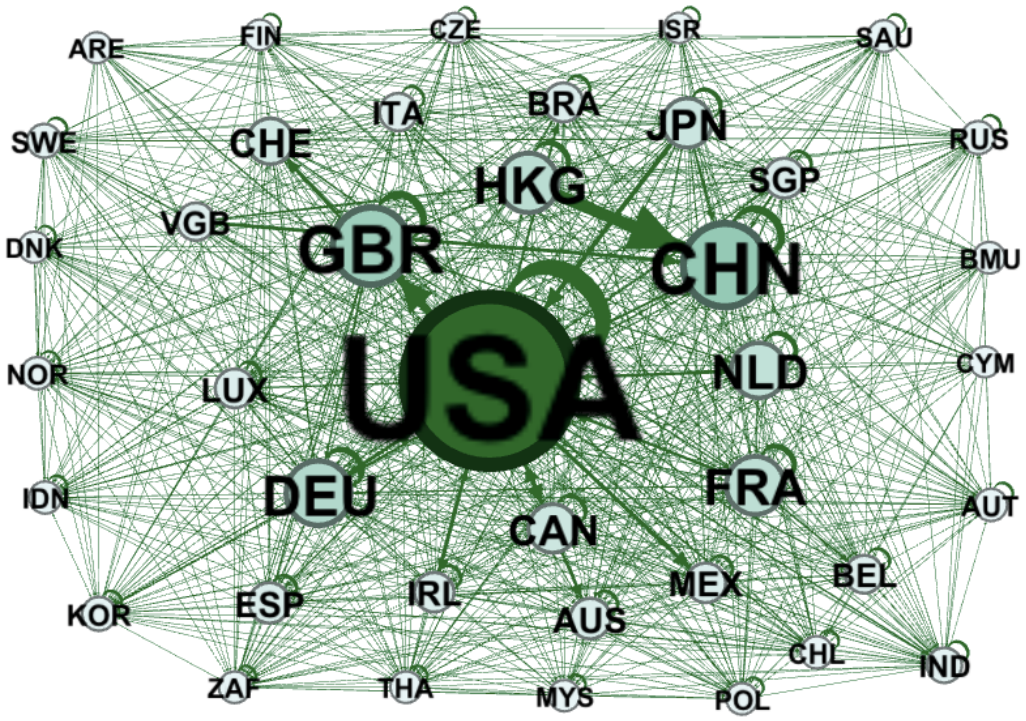
Source: Own calculations based on the IMF's CDIS.
Note: Top 40 economies according to the size of bilateral FDI positions. Reported inward FDI positions including SPEs and by the immediate counterpart economy.

In the new FDI network, i.e., with SPEs removed and broken down by the UIE, the United States still dominates (Figure 8), while the role of the Netherlands and Luxembourg is much smaller compared to the CDIS network (Figure 7). The substantial presence of SPEs has been removed for the Netherlands and Luxembourg, and other economies' inward FDI from these two countries has been adjusted significantly downwards when moving from the immediate counterpart economy to the UIE. However, compared to the size of their economies, FDI remains substantial for the Netherlands and Luxembourg.

The new global FDI estimates also show how much SPEs inflate global FDI; total inward FDI positions are now 34 percent lower compared to the CDIS. SPEs would probably account for an even larger share of worldwide FDI if data for all economies were available, suggesting that the 34 percent is the lower limit of SPEs' share of global FDI. The reason is

that most major economies report to the CDIS and are therefore included in the new network whereas most economies appearing on the list of low-tax economies that typically domicile SPEs are not.

Figure 8. Network of FDI Positions Based on New Global FDI Estimates



Source: Own calculations based on the IMF's CDIS and the OECD's *BMD4* Partner Country Database.
Note: Top 40 economies according to the size of bilateral FDI positions. Reported/estimated inward FDI positions with SPEs removed and by UIE. Circular links back to own economy reflect round-tripping.

While Hong Kong SAR's inward FDI is significantly lower when SPEs are removed, there are still strong FDI links between Hong Kong and China (Mainland). In fact, China's inward FDI from Hong Kong remains almost unchanged compared to the CDIS because the reporting OECD countries do not have higher levels of inward FDI from Hong Kong according to immediate counterpart principle compared to the UIE principle. Therefore, no UIE adjustment is made for inward FDI from Hong Kong. If China had reported FDI based on the UIE, it is likely that the ultimate link between China and Hong Kong would be significantly weaker.

Some economies appearing on the list of low-tax economies (Cyprus, Gibraltar, Jersey, and Mauritius) and Hungary, which is hosting many SPEs, are no longer in the top 40 in the new network. They have been replaced by more traditional FDI economies, namely the Czech Republic, Finland, Israel, Saudi Arabia, and the United Arab Emirates. Moreover, the new

network takes round-tripping into account, reflected in the circular links back to own economy.

VII. Conclusion

FDI is important to understand both financial and real economic links between economies, but the presence of offshore financial centers and SPEs may, however, hide ultimate bilateral linkages. This paper's main contribution is to estimate adjusted global FDI data, which are the first to explicitly account for SPEs and ultimate ownership in a consistent and comparable way across more than 100 economies using OECD and CDIS data. The new global FDI network offers several insights and stylized facts that provide a different picture of long-term relations between economies and final investment patterns than traditional FDI data. First, when SPEs are removed, total inward FDI positions are reduced by one-third compared to the CDIS. Second, "traditional" major economies become more dominant in the adjusted global FDI network. Third, financial centers remain important for FDI even after removing SPEs, suggesting that some entities located in financial centers also take an active role in managing FDI rather than only acting as passive holding companies, or alternatively that even economies that separate out SPEs in their data cannot fully identify SPEs. Fourth, round-tripping, where an economy is ultimately providing FDI to itself, is on average 5 percent of FDI.

This paper illustrates how a more globalized and interconnected world economy poses new challenges to traditional macroeconomic statistics that are based on the concept of national economic territory. To describe a globalized world, where national borders are less relevant, economic statistics also need to adapt: information on the "national economy" needs to be supplemented with information on global interconnectedness. Looking ahead, financial statistics, including the CDIS, could be supplemented with ultimate counterpart economy information for a comprehensive picture of ultimate cross-economy financial linkages and risks.

VIII. References

Allen, Mark, Christoph Rosenberg, Christian Keller, Brad Setser, and Nouriel Roubini (2002), "A Balance Sheet Approach to Financial Crisis," IMF Working Paper WP/02/210.

Angulo, Emma and Alicia Hierro (forthcoming), "Asymmetries in the Coordinated Direct Investment Survey: What Lies Behind?" IMF Working Paper.

Blanchard, Olivier and Julien Acalin (2016), "What Does Measured FDI Actually Measure?" PIIE Policy Brief 16-17, Peterson Institute for International Economics.

Damgaard, Jannick and Thomas Elkjaer (2014), "Foreign Direct Investment and the External Wealth of Nations: How Important Is Valuation?" Review of Income and Wealth, v60 (2), pp. 245-260.

Dharmapala, Dhammika and James R. Hines Jr. (2006), "Which Countries Become Tax Havens?" NBER Working Paper Series, Working Paper 12802.

European Central Bank and Eurostat (2014), "European Networking Exercises: The FDI Network," note prepared for the Twenty-Seventh Meeting of the IMF Committee on Balance of Payments Statistics.

Government Accountability Office (2008), "Large U.S. Corporations and Federal Contractors with Subsidiaries in Jurisdictions Listed as Tax Havens or Financial Privacy Jurisdictions," Report to Congressional Requesters.

Guerin, Selen Sarisoy (2006), "The Role of Geography in Financial and Economic Integration: A Comparative Analysis of Foreign Direct Investment, Trade and Portfolio Investment Flows," The World Economy, v29 (2), pp. 189-209.

Haberly, Daniel and Dariusz Wójcik (2015), "Regional Blocks and Imperial Legacies: Mapping the Global Offshore FDI Network," Economic Geography, v91 (3), pp. 251-280.

IMF (2009), Balance of Payments and International Investment Position Manual, Sixth Edition (*BPM6*).

IMF (2014), Coordinated Direct Investment Survey (CDIS): Project on Bilateral Asymmetries.

IMF (2015), The Coordinated Direct Investment Survey Guide – 2015.

IMF and Financial Stability Board (2009), "The Financial Crisis and Information Gaps," Report to the G20 Finance Ministers and Central Bank Governors.

Lane, Philip and Gian-Maria Milesi-Ferretti (2017), "International Financial Integration in the Aftermath of the Global Financial Crisis," IMF Working Paper WP/17/115.

Lanz, Rainer and Sébastien Miroudot (2011), "Intra-Firm Trade: Patterns, Determinants and Policy Implications," OECD Trade Policy Working Paper No. 114.

Lipsey, Robert E. (2010), "Measuring the Location of Production in a World of Intangible Productive Assets, FDI, and Intra-Firm Trade," Review of Income and Wealth, v56 (1), pp. S99-S110.

OECD (2007), "Tax Effects on Foreign Direct Investment – Recent Evidence and Policy Analysis," OECD Tax Policy Studies, No. 17.

OECD (2008), OECD Benchmark Definition of Foreign Direct Investment, Fourth Edition (*BMD4*).

OECD (2016), "Are the Irish 26.3% better off?", OECD Insights.

U.S. Bureau of Economic Analysis (2014), "Research by the U.S. Bureau of Economic Analysis on Large Bilateral Asymmetries in FDI Based on the CDIS 2011 Results," note prepared for the Twenty-Seventh Meeting of the IMF Committee on Balance of Payments Statistics.

U.S. Senate Permanent Subcommittee on Investigations (2008), "Dividend Tax Abuse: How Offshore Entities Dodge Taxes on U.S. Stock Dividends," Staff Report.

ANNEX I: SPE BREAKDOWN

Table I.1. Inward FDI Positions Broken Down by SPEs and Non-SPEs

	FDI (percent of GDP)			FDI country rank		Change in rank
	Total	SPEs	Non-SPEs	Total	Non-SPEs	
Luxembourg	5,658	5,266	393	1	1	0
Netherlands	525	428	97	2	3	-1
Hungary	161	92	69	3	7	-4
Switzerland	132	19	114	4	2	2
Belgium	100	6	94	5	4	1
Chile	87	1	85	6	5	1
Estonia	84	2	82	7	6	1
Austria	70	24	46	8	14	-6
Iceland	66	19	47	9	13	-4
Sweden	61	4	57	10	9	1
Czech Republic	60	0	60	11	8	3
Portugal	58	6	51	12	12	0
Slovak Republic	56	0	56	13	10	3
Latvia	55	0	55	14	11	3
United Kingdom	54	14	41	15	16	-1
Spain	46	3	42	16	15	1
New Zealand	39	0	39	17	17	0
Poland	39	0	38	18	18	0
Denmark	38	4	34	19	21	-2
Norway	37	0	36	20	19	1
Finland	35	0	35	21	20	1
Slovenia	29	0	29	22	22	0
France	27	0	27	23	23	0
Germany	23	0	23	24	24	0
Turkey	21	0	21	25	25	0
Italy	19	0	19	26	26	0
United States	17	0	17	27	27	0
Korea	12	0	12	28	28	0
Greece	12	0	12	29	29	0
Japan	4	0	4	30	30	0

Source: IMF (World Economic Outlook Database) and OECD (*BMD4* Partner Country and Main Aggregates Databases).
Note: Includes all countries as reported as of end-2015 to the OECD for publication by January 2017. Some OECD countries may have reported zero when no information about SPEs was available.

ANNEX II: CONSTRUCTION OF THE NEW GLOBAL FDI NETWORK

The new global FDI estimates are developed in the following steps:

Step 1. Data input (from latest available year, mostly 2015)

- *Inward FDI (CDIS)*: Inward FDI positions broken down by immediate counterpart economy for all 116 reporting CDIS countries.
- *Aggregate SPE/non-SPE breakdown (OECD BMD4 Partner Country and Main Aggregates Databases)*: Inward total FDI positions split by resident SPEs and non-SPEs for the 30 reporting OECD countries.
- *Nominal GDP (IMF World Economic Outlook Database)*: For all CDIS countries.
- *Detailed non-SPE breakdown (OECD BMD4 Partner Country Database):* Inward FDI positions for resident non-SPEs broken down by the immediate counterpart economy for the 25 reporting OECD countries.
- *Detailed UIE breakdown (OECD BMD4 Partner Country Database):* Inward FDI positions for resident non-SPEs broken down by the UIE for the 12 reporting OECD countries.

Step 2. Estimation of SPE adjustment model

To exclude SPEs for non-reporting economies, an SPE adjustment model is estimated based on the split between total SPE/non-SPE data for the 30 reporting OECD countries. It is specified as a univariate regression model with the *non-SPE inward FDI*-to-*total inward FDI* ratio as the dependent variable and the *total inward FDI*-to-*GDP* ratio as the explanatory variable. A log-log transformation is made to achieve linearity (Figure 5).

Step 3. Construction of global FDI estimates for non-SPEs

The estimates contain a breakdown of inward FDI positions by the immediate counterpart economy "cleaned" for resident SPEs: (i) for the 25 OECD countries reporting non-SPE data by immediate counterpart economy, the data are used directly, (ii) for the five OECD countries that only split between total SPE/non-SPE data, the aggregate data are used to calculate an SPE adjustment factor for each economy and apply it to all its counterpart economy positions, and (iii) for the remaining economies that do not split between SPEs and non-SPEs, the CDIS data are used with an economy-specific SPE adjustment factor based on the model from step 2. For a given economy, the same SPE adjustment factor is applied to all its counterpart economies, equivalent to assuming that investors from each counterpart economy use SPEs proportional to their total FDI in the economy.

Step 4. Calculation of UIE adjustment factors

Two types of adjustment factors are calculated to move from immediate counterpart economy breakdown to UIE and to adjust for round-tripping.

(i) Based on the 12 UIE-reporting OECD countries, UIE adjustment factors are calculated:

$$a_c = \frac{\sum_{i=1}^{n} FDI(UIE)_{i,c}}{\sum_{i=1}^{n} FDI(IIE)_{i,c}} \text{ for } i \neq c,$$

where *a* denotes the UIE adjustment factor, *c* the counterpart economy, *i* the reporting economy, *n* the number of reporting economies, *FDI(UIE)* the inward FDI position according to the UIE breakdown, and *FDI(IIE)* the inward position according to the immediate investing economy breakdown. To avoid extreme adjustments, for instance due to limited data availability for some counterpart economies, the adjustment factors are capped between 0.33 and 3 For economies appearing on the list of low-tax economies, which are likely to have a significant SPE presence, the adjustment factors are capped between 0.20 and 1 so that FDI from these economies can never be higher under the UIE breakdown than under the immediate counterpart economy breakdown.

(ii). The round-tripping adjustment factor, *b*, is calculated as a simple average across reporting economies:

$$b = \frac{1}{n} * \sum_{i=1}^{n} \frac{FDI(UIE)_{i,c}}{FDI(total)_i} \text{ for } i = c.$$

Step 5. **Construction of the new global FDI estimates**

The new estimates contain FDI excluding SPEs and broken down by the UIE. For the 12 UIE-reporting OECD economies, the data are used directly. For the remaining economies, data from the global estimates for non-SPEs (step 3) are adjusted to UIE by applying the UIE adjustment factor, a_c, to each inward position broken down by the immediate counterpart economy. Next, round-tripping is calculated for each economy by applying the adjustment factor, *b*, to total non-SPE inward FDI, effectively allocating 5 percent of the inward FDI back to its own economy. Finally, the adjustments are constrained so that on an economy level, adjusted FDI data cannot exceed reported total inward FDI.

DANMARKS NATIONALBANK
HAVNEGADE 5
DK-1093 COPENHAGEN K
WWW.NATIONALBANKEN.DK

As a general rule, Working Papers are not translated, but are available in the original language used by the contributor.

Danmarks Nationalbank's Working Papers are published in PDF format at www.nationalbanken.dk. A free electronic subscription is also available at this Website. The subscriber receives an e-mail notification whenever a new Working Paper is published.

Text may be copied from this publication provided that Danmarks Nationalbank is specifically stated as the source. Changes to or misrepresentation of the content are not permitted.

Please direct any enquiries to Danmarks Nationalbank, Communications, *kommunikation@nationalbanken.dk*

DANMARKS NATIONALBANK