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Consolidated foreign wealth of nations: nationality-based measures of international exposure[1]

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Abstract

This paper presents novel estimates of foreign holdings from a consolidated-by-nationality perspective for a sample of fourteen developed countries over multiple years. It describes the stylized facts that emerge from this new data-set on the international exposure of countries. It shows that aggregate international financial integration is larger from a nationality-based approach relative to the conventional residence-based data. These novel data are used to analyze (1) profit shifting activities and (2) spillovers from U.S. monetary policy shocks. I find evidence suggesting that nationals of relatively high-tax countries may shift assets to low-tax countries in ways not fully captured in residence-based statistics. I also find that a tightening in U.S. monetary policy is associated with a decline in consolidated-by-nationality foreign asset holdings by non-financial multinational enterprises. Such findings highlight the usefulness of this new data-set in international macroeconomics.

Keywords: International financial integration, financial globalisation, consolidated-by-nationality statistics.

JEL classification: F36, F21, F23.

Contents

1. Introduction

How can policymakers assess the exposure its households and firms have to international risk factors? The conventional approach uses data on countries' foreign holdings to sort out these exposures. These data are collected using the residence of economic agents as the key criterion. For any given country, its external assets (liabilities) represent claims (liabilities) its residents have with respect to non-residents. It follows that only cross-border positions are recorded in residence-based statistics. Furthermore, this approach does not consider ties that exist between entities within the same corporate group. The local positions held by the affiliate of a multinational enterprise operating abroad may not be part of the foreign holdings of its home and host countries using this approach.

These two features of the residence-based approach pose a challenge given the increasing importance of multinational enterprises (MNEs). These corporate groups have affiliates operating in multiple countries. The local assets held by these affiliates in host countries represent investments made by an MNE away from its home country. Yet they may only be recorded in foreign balance sheets of host and home countries if there are cross-border transactions involved. If these investments are funded by raising resources with local agents, no exposure would be recorded for both home and host countries.

Decisions made by MNEs can affect employment and production in foreign countries hosting their affiliates. Blomstrom and Kokko (1998) provide evidence of these spillovers from activities of MNEs. Avdjiev et al (2020) have shown how monetary policy changes in the home country of multinational banks affect conditions in foreign countries hosting their affiliates. These studies point to the need for developing measures able to capture these international linkages more comprehensively.

The alternative used in this paper is to adopt a consolidated-by-nationality approach when computing foreign assets and liabilities. Under such approach, assets and liabilities held by affiliates operating abroad are consolidated to the parent group. It considers local and cross-border positions. These positions are then sorted according to the nationality of the ultimate owners of such investments. The fact that all positions are taken into account and that positions held by the affiliate are consolidated provide a more nuanced view around countries' international exposure.

The recent literature on nationality-based foreign holdings have revealed important stylized facts. Coppola et al (2021) show that China's net foreign assets position is substantially smaller from a nationality-based perspective. Bénétrix and Sanchez Pacheco (2023) show that the U.S. economy is more financially integrated with the rest of the world when compared to the conventional residence-based data. Despite the recent progress, there is currently no dataset containing information on the entire foreign balance sheet of countries from a consolidated-by-nationality perspective.

In this paper, I construct estimates of foreign assets and liabilities from a consolidated-by-nationality perspective for a group of 14 developed countries. This data contribution contains yearly estimates for the period between 2012 and 2019. It

is the first such dataset containing nationality-based estimates of foreign holdings for any group of countries.

Then I compare these novel data on foreign holdings with the residence-based ones from Lane and Milesi-Ferretti's External Wealth of Nations. A key variable in this analysis is the index of international financial integration (IFI). It measures the relative size of a country's foreign balance sheet and is equal to the sum of its foreign assets and liabilities divided by its GDP.

One relevant stylized fact that emerges from the analysis is that on aggregate these fourteen countries present a larger foreign balance sheet from a nationality-based perspective relative to the residence-based one. This result indicates these economies are more internationally financially integrated than previously thought. Such difference is associated with the fact that the consolidated-by-nationality approach considers both local and cross-border positions. In contrast, the residence-based approach only considers the latter.

Individually, most but not all countries present a larger consolidated-by-nationality foreign balance sheet. Countries with a sizeable presence of foreign companies engaging in international financial intermediation tend to have larger residence-based foreign balance sheets. These companies' cross-border holdings inflate their host country's residence-based foreign balance sheet. Meanwhile, these holdings are instead consolidated to their parent country using the nationality approach. Most notably, Ireland stands out as having a substantially larger residence-based balance sheet in line with Sanchez Pacheco (2022). Lane (2019) argues that the presence of these financial intermediaries opaques the positions held by Irish nationals in the residence-based data. In this sense, the nationality-based approach provides a clearer view on the international exposure these agents have.

These novel data are then used to study two macroeconomic issues. The first one is on profit shifting from high-tax countries to low-tax countries. Wier and Zucman (2022) estimate that around 37% of profits earned by multinational enterprises are shifted to tax havens. Dischinger and Riedel (2011) have shown that multinational firms tend to shift their intangible assets to affiliates located in low-tax countries. I use consolidated-by-nationality estimates of foreign holdings and the existing residence-based data to focus on their relationship with differences in corporate income tax rates.

A key variable in this analysis is the difference between the consolidated-by-nationality and residence-based measures of foreign holdings. Such difference is a proxy of the foreign holdings not captured by the residence-based approach. I find that the difference between these two measures of foreign holdings is negatively correlated with corporate income tax differentials in a sample of low-tax countries. In contrast, the coefficient estimate is positive when estimated in a sample of high-tax countries. These results provide indirect evidence that nationals from high-tax countries may shift assets and profits to low-tax countries in ways that are not entirely captured by the residence-based approach. This finding is in line with Bénétrix and Sanchez Pacheco (2023) and points to the relevance of consolidated-by-nationality data when analyzing profit shifting activities.

The second application of these novel data presented in this paper is on assessing spillovers from U.S. monetary policy shocks on multinational enterprises. Bergant et al. (2023) show that a tightening in U.S. financial conditions is associated

with a decline in global cross-border M&A activities. In this paper, I analyze the relationship between U.S. monetary policy shocks and foreign asset holdings by non-financial multinational enterprises.

I find that a tightening U.S. monetary policy shock is correlated with a decrease in consolidated-by-nationality foreign asset holdings by non-financial multinationals. This result is robust with respect to alternative estimation methods for these monetary policy shocks. Such result suggests that a tightening in U.S. monetary policy generates spillovers that are associated with multinationals reducing their foreign asset holdings.

More broadly, these two sets of results indicate that consolidated-by-nationality estimates of foreign holdings can be useful in tackling important questions across different topics in international macroeconomics. As noted by Lane (2021), the consolidated approach should complement the existing residence-based data given each approach offers advantages depending on the question at hand.

2. Nationality- and residence-based statistics

There are two main data dimensions in which the consolidated-by-nationality approach differs from the residence-based approach. The first one relates to the set of positions that are considered when estimating foreign assets and liabilities. In residence-based statistics, external holdings are recorded when there is an exposure of a resident economic agent relative to a non-resident economic agent. As a result, the residence-based approach focuses exclusively at cross-border positions. Local positions that represent exposures between resident agents of different nationalities within the same country are not captured by this approach. In contrast, the consolidated-by-nationality approach takes into consideration both local and cross-border positions when estimating foreign holdings.

The second difference relates to how entities within the same corporate group are treated under each approach. In residence-based statistics, an affiliate of a foreign multinational enterprise operating in a given host country is seen as a resident of that country. There is no direct linkage between that entity and the corporate group it belongs to. Cross-border assets and liabilities held by this affiliate will be recorded as external holdings of the host country even if the company is controlled by foreign agents. Meanwhile, the consolidated-by-nationality approach takes the assets and liabilities held by this affiliate and consolidates them to the parent company.

One example can illustrate how these differences impact the measurement of foreign assets and liabilities. Consider an affiliate of a foreign multinational enterprise from country A that is operating in host country B. Through this affiliate, the multinational enterprise wants to buy a factory in country B worth $5 million. Such investment is entirely financed by taking a loan from a local bank in country B.

Under the consolidated-by-nationality approach, this factory is an asset the foreign MNE owns in country B. Therefore, it would be recorded as a foreign asset of country A and a foreign liability of country B. Meanwhile, the loan taken by the affiliate to finance this investment represents a liability the MNE from country A has relative to a bank from country B. This loan would be recorded as a foreign liability of country

A and a foreign liability of country B. In this example, both foreign assets and liabilities of countries A and B rise by $5 million as a result of this investment.

Meanwhile, no exposure would be recorded under the residence-based approach. This affiliate operating in country B is not seen as a foreign entity. There is no cross-border transactions taking place as the investment made by the foreign MNE is funded locally. Crucially, this international exposure a foreign multinational from country A takes on country B would not be recorded in residence-based statistics. Similarly, the exposure the local bank B has relative to a foreign multinational would also not be recorded.

These two data differences are associated with a set of issues raised in the international finance literature. The first one relates to the identification of the ultimate exposure to financial risks. Under the residence-based approach, the foreign affiliate of country A's MNE is treated as a separate entity. Its local exposure is not captured in external residence-based statistics. As a result, relying exclusively on residence-based data pose a challenge for policymakers in country A to identify the exposure its multinational enterprises have. In contrast, local and cross-border positions held by this and others affiliates relative to foreign agents would appear in country A's consolidated-by-nationality foreign balance sheet. This feature makes it easier for policymakers to evaluate the ultimate exposure their agents have when using the consolidated data. In this context, Borio (2013) points to the need for constructing consolidated statistics in order to assess the exposure global firms have to different risk factors, countries and sectors.

During the Global Financial Crisis, European banks held a sizeable exposure to U.S. mortgage-backed securities through their U.S. affiliates as noted by McCauley (2018). Such exposure would not be captured by residence-based measures of foreign exposure but would appear in consolidated-based data. The consolidated-by-nationality approach also provides a more detailed view on the banking developments that came after the crisis. Using nationality-based data, McCauley et al. (2019) show that what appears to be a broad-based decline in international lending post-crisis was in fact related to European banks reducing their global footprint. These two studies highlight that the identification of exposure to financial risks can change in important ways when assessed from a consolidated perspective.

A second issue relates to the triple coincidence literature as in Avdjiev et al. (2016) and Avdjiev et al. (2018). In the standard international finance models, the decision-making unit coincides with the GDP area and currency area. In reality, however, multinational enterprises make decisions at the home country that affect production in foreign countries where their affiliates operate in. These affiliates may be spread across different currency areas. As a result, treating each entity separately according to their residence fails to capture this complex decision-making and production structure. In contrast, the consolidated-by-nationality approach provides a more nuanced view on these global corporate structures.

The consolidated-by-nationality offers an advantage relative to the residence-based approach when considering the ultimate exposure to financial risks. It also provides a more detailed view on the global footprint of multinational enterprises. This is particularly useful given their increased relevance over the past decades. However, there are also some relative disadvantages too. Unlike the residence-based approach, there is still no unified manual on how national authorities should collect

consolidated-by-nationality data. In this sense, Lane (2021) notes that the consolidated-by-nationality approach should complement rather than replace the existing residence-based framework.

Furthermore, residence-based statistics have proven useful in different applications in international finance. For example, Catão and Milesi-Ferretti (2014) show that residence-based data can be employed to construct informative early warning systems around the risk of an external crisis. This is particularly helpful for policymakers when considering how to set macroeconomic policy appropriately.

Another important relative disadvantage of the consolidated-by-nationality approach is that there is no data-set containing estimates of foreign holdings from a nationality perspective for multiple countries as in Lane and Milesi-Ferretti's seminal External Wealth of Nations (2001, 2007, 2018). This paper seeks to fill this gap by producing the first dataset on estimates of consolidated-by-nationality foreign holdings for a group of countries over multiple years. Relative to Coppola et al. (2021), this paper presents estimates for the entire foreign balance sheet of countries while their work focuses on portfolio investment.

3. Data

I construct consolidated-by-nationality estimates of foreign holdings for a group of countries using data from the U.S. Bureau of Economic Research, the International Monetary Fund, the Bank for International Settlements and from Orbis Europe. Foreign assets and liabilities are divided into similar functional categories as in BIS (2015) and Sanchez Pacheco (2022). More specifically, foreign assets and liabilities are divided into holdings related to the activities of national companies operating abroad; holdings related to activities of foreign companies operating in the country; portfolio investment and official assets. Furthermore, holdings related to these multinational enterprises are divided according to their activities into three sectors: banks, financial non-banks and non-financial companies.

The dataset includes the following countries: the United States, the United Kingdom, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Sweden and Switzerland. For most countries, data is available from 2012 to 2019 while for some the first observation starts later due to data limitations. Data for Ireland are taken from Sanchez Pacheco (2022) while data for the U.S. are taken from Bénétrix and Sanchez Pacheco (2023).

In section 4, I compare these novel nationality-based data to conventional residence-based holdings. Residence-based estimates of foreign assets and liabilities come from Lane and Milesi-Ferretti's External Wealth of Nations dataset.

3.1 Bank-related holdings

Consolidated-by-nationality estimates of foreign holdings related to the banking sector are constructed using data from the Bank for International Settlements (BIS). The methodology follows that employed in BIS (2015) also used in Bénétrix and

Sanchez Pacheco (2023) and Sanchez Pacheco (2022). Bank-related holdings are associated to the activities of both national banks as well as to foreign banks.

For any country i, foreign assets related to its national banks are equal to the claims held by them relative to all counterparts except those with same nationality. Foreign assets of country i related to foreign banks operating in it are given by the local liabilities of such banks relative to country i nationals.

Foreign liabilities of country i related to its national banks are estimated as the local liabilities of these banks operating abroad plus their cross-border liabilities excluding those to related offices. Foreign liabilities related to foreign banks are equal to the total claim of foreign banks on country i nationals.

3.2 Non-financial MNEs

3.2.1 Foreign MNEs

The holdings associated with foreign MNEs operating in European countries are computed using Orbis Europe. For a given country i, I download financial, employment and ownership data for all entities operating in it that have foreign nationals as their ultimate owners. I also download data on companies; status which indicates whether they are active or have been liquidated. Companies are sorted according to their 4-digit NACE code into two groups: financial non-banks and non-financial multinational enterprises.[3] Companies identified as banks are excluded from the sample as the assets and liabilities related to their sector are computed using BIS data.

The financial data used in this paper are companies' total asset holdings and shareholders' equity. These data may contain reporting gaps. Whenever there is a reporting gap, I follow the same procedure used in Sanchez Pacheco (2022). If a company is active, a reporting gap in period T would be filled with data from period T − z where z > 0 is the smallest possible. If a company's status is not listed as active, then a reporting gap in period T would be filled with data from T −z only if there is at least one future period T +k, k > 0 in which financial information is available. In case there is no financial information available for subsequent periods, it is assumed that this company became inactive in period T. Therefore, its total assets and shareholders' equity will be set to zero for all t ≥ T. Such decision rule generates inputted data whenever there is a reporting gap in the sample.

Nationality-based foreign liabilities of country i related to foreign non-financial MNEs operating in it are estimated as the sum of these companies' total assets. Meanwhile, nationality-based foreign assets related to these companies are computed as the sum of their total assets minus their shareholders' funds. Given existing data limitations, such calculations imply that the estimates of foreign holdings presented in this paper represent upper bound estimates. More specifically, these calculations imply that the total asset holdings of foreign multinationals operating in country i have country i nationals as counterparts. They also imply that the financing these companies receive other than shareholders' funds come from

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[3] The NACE codes used to identify financial non-banks are all of those included in group K 'Financial and Insurance' activities excluding the codes 6411 and 6419.

country i nationals. As it is possible that these assumptions may not always hold for all companies, the estimates related to the activities foreign multinationals represent upper bounds.

3.2.2 National MNEs operating abroad

Consolidated-by-nationality foreign assets and liabilities related to national MNEs operating abroad are computed using data from Orbis Europe and the U.S. BEA. These data sources contain information on multinational activities in Europe and the United States. It is possible that a given country has many of its MNEs operating outside of these two regions. This would pose a challenge when computing assets and liabilities related to these companies given this regional coverage limitation. Therefore, I first construct a proxy of how well the two data sources cover the activities of MNEs using the IMF Coordinated Direct Investment Survey.

For country i and year y, I compute the share of outbound FDI position to countries included in these two regions relative to the total outbound FDI made by country i. I exclude non-EU tax haven countries from this analysis.[4] Then I compute the average of such share for the period between 2009 and 2020. A share equal to one would indicate that these two regions receive all the FDI made by country i. Meanwhile, a share equal to zero would indicate that all the FDI made by country i is received by countries outside of Europe and the United States. The highest average share value in our sample comes from Ireland at 95%. The lowest share comes from the U.K. with 78%. Even at this lower bound, the two regions represent the vast majority of the direct investment made by the United Kingdom. While the regional coverage could potentially pose a challenge to this methodology, this does not appear to be the case for the countries included in the dataset given the elevated average coverage share across countries.

Foreign holdings related to affiliates of country i companies operating in Europe are constructed using Orbis Europe. First, I download financial and sectoral data on all companies who have country i as the country of its ultimate owner. I exclude companies located in country i and focus instead on those located elsewhere in the region. Then I apply the same procedure described in the subsection above to fill any reporting gaps that might exist. It is possible that the ultimate owners of some of these companies are not from country i but rather have redomiciled there for tax-related purposes. In this case, Orbis Europe will inaccurately indicate that these affiliates have country i as the country of its ultimate owner. To correct for this, I use the Bloomberg Tax Inversion Tracker from Mider (2017) to identify companies that have redomiciled. If an ultimate owner is identified as having redomiciled from country j to country i, the country of its affiliates are changed from j to i in the dataset.

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[4] For country i, the share is computed as the sum of outbound FDI position to all countries in the Orbis Europe database plus the United States divided by the total outbound FDI position of that country excluding to non-EU tax havens. The countries included in Orbis Europe are: Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Greenland, Hungary, Iceland, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, the United Kingdom. The non-EU tax havens are Bermuda, Cayman Islands and Jersey.

Country i's consolidated-by-nationality foreign assets related to its companies operating in Europe are computed as the sum of their total asset holdings. Its foreign liabilities related to these entities are calculated as the sum of the difference between their total asset holdings and shareholders' funds.

Consolidated-by-nationality foreign assets related to country i's non-financial MNEs are equal to the sum of country i's foreign assets related to these companies operating in the U.S. plus in Europe. Similarly, its foreign liabilities related to its non-financial MNEs are equal to the sum of its foreign liabilities related to these companies operating in these two regions.

3.3 Financial non-bank holdings

3.3.1 Foreign Financial non-banks

Consolidated-by-nationality foreign assets and liabilities related to foreign financial nonbanks operating in European countries are computed using Orbis Europe. For a country i, I proceed by focusing on the group of companies whose NACE code is associated with financial non-banking activities as described in subsection 3.2.1. I use the same procedure described in that subsection to fill any reporting gaps that may exist.

Before computing aggregate holdings, an additional step is taken to address the potential presence of Special Purpose Entities (SPEs) in the sample. These financial non-bank companies often engage in cross-country financing as documented by Galstyan et al. (2021). Their presence inflate residence-based foreign balance sheet of host country i but virtually no economic to country i nationals or firms. As a result, these companies must be identified and removed when estimating the consolidated-by-nationality foreign holdings related to foreign financial non-banks. The procedure adopted in this paper follows that in Sanchez Pacheco (2022). In particular, a financial non-bank is removed from the sample if it has never reported a number of employees or it has last reported having zero employees.

Once potential SPEs are removed, country i's consolidated foreign assets related to foreign financial non-banks operating in it are given by the sum of the difference between their total asset holdings and their shareholders' funds. Analogously, country i's foreign liabilities are given by the sum of these companies' total asset holdings.

3.3.2 National Financial non-banks operating abroad

Foreign holdings related to country i's financial non-banks operating abroad are constructed using data from Orbis Europe and the U.S. BEA. The procedure adopted is akin to that used in section 3.2. We separately estimate the foreign holdings that result from the activities of these companies operating in Europe and the holdings that come from activities in the United States.

For country i's companies operating in Europe, its foreign holdings related to its financial non-banks are computed using the same procedure as that described in subsection 3.2.2. Accordingly, ultimate owners who are identified as having redomiciled to country i are excluded from the sample. Country i's consolidated foreign assets related to its financial non-banks operating in Europe are equal to the sum of their total asset holdings. Its foreign liabilities related to these companies are

equal to the sum of the difference between their total asset holdings and shareholders' funds.

3.4 Portfolio Investment

I rely on data from the International Monetary Fund's Coordinated Portfolio Investment Survey when estimating foreign assets and liabilities. Notwithstanding the important contribution by Coppola et al. (2021), relatively little is known regarding the nationality of the ultimate owners of global portfolio investments. As a result, I use the residence-based estimates of portfolio holdings when constructing the consolidated-by-nationality balance sheet of countries. For a given country, its foreign portfolio assets are equal to the total investment assets from the CPIS survey. Its foreign liabilities are equal to the total investment liabilities from the CPIS survey.

3.5 Official assets

Official assets are equal to the official reserve assets from the International Monetary Fund International Reserves and Foreign Currency Liquidity database. For the United States, official assets are equal to the U.S. reserve assets from its International Investment Position released by the U.S. BEA.

4. Stylized Facts

4.1 Aggregate dynamics

To assess broad dynamics, I construct aggregate indices of international financial integration using both the consolidated-by-nationality approach as well as the residence-based one. For any given year, the aggregate index is calculated as the sum of foreign assets and liabilities of selected countries divided by the sum of their GDP. The countries included when computing the aggregate index are the United States, the United Kingdom, Austria, Belgium, France, Germany, Italy, Netherlands, Sweden, Switzerland, Finland, Greece and Ireland. Denmark is removed from the sample given its nationality-based data starts in 2016. This index is computed for the period between 2013 and 2019 using both approaches.

Figure 1 shows the evolution of this aggregate IFI under the nationality-based and residence-based approach for the period between 2013 and 2019. It reveals that the consolidated-by-nationality aggregate IFI is larger than the residence-based one for all years in this period. This stylized fact indicates that these developed economies are more financially integrated with foreign agents than what resident-based measures suggest. Such result is due to the fact that the consolidated-by-nationality approach takes into account both cross-border as well as local positions while the residence-based approach focuses exclusively on the former. As such, an important part of the international exposure of countries is not captured by the residence-based approach.

Figure 2 shows the difference between the nationality-based and residence-based aggregate IFI over time. This figure reveals that the nationality-based IFI is not only

larger than the residence-based one but the difference between the two increased between 2013 and 2019. There is an important increase in the difference between 2014 and 2017 while it remained largely unchanged from then to 2019.

4.2 Country-level analysis

Figure 3 shows the index of international financial integration (IFI) under both the nationality-based and residence-based approaches per country for 2019. It reveals that most countries present a larger consolidated-by-nationality IFI relative to their residence-based balance sheet. This result is expected as the consolidated-by-nationality approach considers both cross-border and local positions while the residence-based one only considers cross-border positions.

The two exceptions to that are Ireland and Greece. In addition, Switzerland and the Netherlands have a nationality-based foreign balance sheet approximately the same size as their residence-based analogues as of 2019. In general, a country will have a relatively smaller consolidated-by-nationality foreign balance sheet if they are host to proportionally relevant number of foreign-owned entities whose activities involve holding cross-border assets and liabilities. These holdings inflate the size of the host country's residence-based foreign balance sheet. However, they are identified as being foreign-owned under the nationality-based approach. Therefore, these cross-border holdings do not appear in the host country's consolidated-by-nationality foreign balance sheet.

Ireland stands out as having a substantially smaller nationality-based foreign balance sheet relative to its residence-based one. Galstyan (2019) and Sanchez Pacheco (2022) discuss how the vast presence of SPEs in Ireland inflate its residence-based balance sheet. These companies have virtually no economic ties to Irish agents and are often involved in international financial intermediation. Their relatively large cross-border holdings enter Ireland's residence-based foreign balance sheet and opaque the positions held by Irish nationals as noted by Lane (2018). In contrast, these holdings do not enter Ireland's consolidated-by-nationality foreign holdings.

Figure 4 shows the evolution of the consolidated-by-nationality and residence-based IFI for all countries over the sample period. While the two measures of IFI are positively correlated across countries, the difference between them is not constant over time. Bénétrix and Sanchez Pacheco (2023) show that the time varying difference between the U.S. consolidated-by-nationality and residence-based IFI is positively correlated with tax differentials between the U.S. and the rest of the world. In the sections 5 and 6, these data on multiple countries are used in a panel setting to study profit shifting and spillovers of U.S. monetary policy shocks respectively.

Figure 5 shows the evolution of consolidated-by-nationality foreign assets and liabilities per country over time. In general, consolidated-by-nationality foreign assets and liabilities move in tandem. However, the difference between foreign assets and liabilities in Greece, Italy and Belgium moved in important ways during the sample period.

5. Tax differentials and foreign holdings

Multinational enterprises have an incentive to shift assets and profits to affiliates located in low-tax countries. Dischinger and Riedel (2011) document that the lower an affiliate's corporate tax rate is relative to other subsidiaries within the same group, the higher the level of intangible assets held by this affiliate. Wier and Zucman (2022) estimate that 37% of profits earned by such companies were booked in tax havens in 2019. That compares to only 2% in the 1970s, according to their estimates.

Using data for the United States, Bénétrix and Sanchez Pacheco (2023) provide indirect evidence that asset/profit shifting activities by U.S. multinational enterprises may extend beyond what residence-based statistics can capture as local positions are also considered in the consolidated approach.

In this section, I examine whether consolidated-by-nationality foreign assets are associated with corporate income tax differentials using a panel of fourteen developed countries. I proceed by examining the relationship between foreign holdings and corporate income tax differentials. This analysis is done using both the existing residence-based data as well as the novel consolidated-by-nationality data. Then I focus on the difference between the consolidated-by-nationality and residence-based measures of foreign holdings to assess whether these time-varying differences are also associated with tax differentials. Such difference is a proxy for the foreign exposure countries have that is not captured by the residence-based approach. The regressions also include control variables that have been documented to such as GDP per capita and trade openness as in Lane and Milesi-Ferretti (2001).

Data on GDP per capita comes from the World Bank. Trade openness also comes from the World Bank and is measured as a country's trade in goods and services divided by GDP. The difference in the corporate income tax rate for country i is computed as its statutory corporate income tax rate minus the median statutory tax rate from the set of countries included in the OECD Tax database.

These empirical relationships are examined through panel regressions shown in equation 1. The dependent variables $Y_{i,t}$ used are foreign assets, liabilities and IFI under both the consolidated-by-nationality as well as the residence-based approach. Furthermore, I also estimate this regression using the difference between the nationality-based and the residence-based measures as dependent variables as well. The panel dataset includes observations on fourteen developed countries over the period between 2012 and 2019.

$$Y_{i,t} = \alpha_i + \beta_1 * GDPpc_{i,t} + \beta_2 * Open_{i,t} + \beta_3 * TaxDiff_{i,t} + \epsilon_{i,t} \quad (1)$$

The coefficient α_i captures country i fixed effect. $GDPpc_{i,t}$ is the GDP per capita of country i at time t, $Open_{i,t}$ is country i's trade in goods and services as a % of GDP at time t. $TaxDiff_{i,t}$ is the difference between country i's statutory corporate income tax rate at time t minus the median corporate tax rate from the OECD Tax database for the same year.

Table 1 shows the regression results using data for all countries in the sample. The coefficient estimate associated with income per capita is positive and statistically significant at the 5% level for both nationality-based foreign assets, liabilities and IFI. This result is in line with Lane and Milesi-Ferretti (2001) that shows a positive

correlation between income per capita and foreign assets in a cross-section analysis using residence-based data.

Importantly, this table shows that the difference between nationality- and residence-based measures are also positively correlated with income per capita. The coefficient estimates in the regressions that use the difference between the two approaches are positive and statistically significant for foreign assets, liabilities and IFI. This result indicates that the time-varying difference between foreign holdings using these two alternative approaches is related to macroeconomic factors rather than being orthogonal to them.

The coefficient estimates associated with corporate income tax differentials are not statistically significant across specifications. At a first glance, this result seems to be at odds with Bénétrix and Sanchez Pacheco (2023) that show a positive correlation between the difference in U.S. nationality- and residence-based IFI and U.S. corporate income tax differentials.

One possibility for such result is that the sample used in Table 1 includes both high and low-tax countries. Consider a high-tax country A and a low-tax country B. Nationals of country A want to benefit from lower taxes in country B thus they shift holdings to that country. If country A nationals shift assets and profits to low tax country B, there would be a positive relationship between country A's tax rate and its foreign holdings. However, there would be a negative relationship between country B's tax rate and its foreign holdings. Therefore, including both high tax country A and low tax country B in the same sample could result in coefficient estimates that are not statistically significant.

To overcome such challenge, I divide the countries into two groups: a relatively high-tax group and a relatively low-tax group. A country i will be in the relatively high tax group if its statutory corporate income tax rate is greater than the median tax rate from the OECD database for most years in the sample. Conversely, it will be in the relatively low-tax group if its statutory corporate income tax rate is smaller than the median tax rate for most years in the sample.

This criterion puts the United States, Austria, Belgium, Denmark, France, Italy, the Netherlands, Sweden and Greece into the relatively high tax group. The United Kingdom, Germany, Switzerland, Finland and Ireland are in the relatively low tax group. I then estimate regression 1 focusing on the difference between nationality- and residence-based measures of foreign holdings for these different country sub-samples.

The coefficient β_3 should be positive for high-tax countries and negative for low-tax countries if MNEs shift profits due to differences in taxation. Consider an economy with a high-tax country A and low-tax country B with respective corporate income tax differentials $TaxDiff_{iA}$ and $TaxDiff_{iB}$. As country A has a relative higher tax rate, $TaxDiff_{iA} > 0$ and $TaxDiff_{iB} < 0$.

Consider a tax cut in country B. Such reduction increases $TaxDiff_{iA}$ for country A while $TaxDiff_{iB}$ for country B becomes more negative. If this tax cut encourages companies in country A to shift profits and holdings to country B, this increase in $TaxDiff_{iA}$ should be multiplied by a positive coefficient β_3 to increase the dependent variable measuring foreign holdings for country A (Y_A). In a sample of relatively high

tax countries, a positive β3 would be consistent with profit shifting away from these countries.

The tax cut in country B makes $TaxDiff_{iB} < 0$ more negative. Crucially, the decision by companies in country A to shift holdings to country B following the tax cut implies an increase in foreign holdings in both countries A (Y_A) and B (Y_B). This can only be achieved if $\beta_3 < 0$ when estimated in a sample of low tax countries. Therefore, profit shifting would be consistent with $\beta_3 > 0$ when estimated in a sample of high-tax countries and $\beta_3 < 0$ when estimated in a sample of low-tax countries.

Table 2 shows the regression results for the difference between the nationality- and residence-based foreign assets, liabilities and IFI estimated using these sub-samples. The coefficient estimates associated with *TaxDiff* are negative and statistically significant in the regressions focused on relatively low tax countries. Meanwhile, the coefficient estimates are positive albeit not statistically significant in the regressions focused on relatively high tax countries.

Taken together, these results are consistent with the notion that nationals of relatively high tax countries shift holdings to relatively low tax countries in a way that is not completely captured by conventional residence-based data. A policy implication of such finding is that there could be more asset and profit shifting activities than what policymakers can observe if focused only on the residence-based data. Similarly, tax differentials may generate an even more significant incentive for agents to shift assets than what analysis relying on existing residence-based data suggest.

6. U.S. monetary policy spillovers and non-financial MNEs

The dominant role the U.S. dollar plays in international finance indicates that U.S. monetary policy can generate spillover effects in non-U.S. economic agents. Miranda-Agrippino and Rey (2020) demonstrate how U.S. monetary policy shocks generate co-movements in international financial variables. They also show that a tightening in U.S. monetary policy generates a decline in global capital flows to both banks and non-banks.

Focusing on the banking sector, Avdjiev et al. (2018) show that an easing in U.S. monetary policy increases cross-border bank lending. Similar results analyzing spillovers to cross-border capital flows in the banking sector were found by Bruno and Shin (2015). In this sense, an easing in U.S. monetary policy would be associated with an increase in foreign asset holdings by global banks.

Recent research has also focused on the U.S. monetary policy spillovers to non-bank multinationals. Arbatli-Saxegaard et al. (2022) examine different channels through which U.S. monetary policy shocks affect companies' investments in foreign countries. They find that U.S. monetary policy shocks have a larger effect on firms that present higher share of debt denominated in foreign currency and on firms that are more leveraged. Bergant et al. (2023) document spillover effects from U.S. financial conditions to cross-border merger and acquisition activities.

In this section, I investigate whether U.S. monetary policy shocks are associated with changes in consolidated-by-nationality foreign assets by non-financial

multinational enterprises. The novel data on such assets for the sample group of developed countries are used in a panel regression setting.

I proceed by estimating the following panel regression of the change in foreign assets by these companies on a series of U.S. monetary policy shocks identified by Bu, Rogers and Wu (2021) as well as some control variables. Among such variables, I include the real exchange rate, the home country's monetary policy rate and an index of U.S. financial conditions. In the robustness check subsection, I use different series of U.S. monetary policy shocks based on alternative estimation methodologies.

$$\Delta FA^{MNES}_{i,t} = \alpha_i + \beta * USMP_t + \gamma * USFCI_t + \delta \Delta REER_{i,t} + \theta * HomeMP_{i,t} + \epsilon_{i,t} \quad (2)$$

The dependent variable $\Delta FA^{MNES}_{i,t}$ is computed as the first difference in consolidated-by-nationality foreign asset holdings by country i's non-financial MNEs as a percentage of GDP between year t and t − 1. $USMP_t$ captures changes in U.S. monetary policy. In the baseline specification, it is equal to the sum of the unified U.S. monetary policy shocks estimated by Bu, Rogers and Wu (2021) in year t. An alternative specification is presented in which $USMP_t$ is equal to the average U.S. effective Federal Funds rate for any given year t. $USFCI_t$ is the average U.S. National Financial Conditions Index computed by the Federal Reserve Bank of Chicago. $\Delta REER_{i,t}$ is the percent change in the real exchange rate of country i between years t and t− 1. $HomeMP_{i,t}$ represents the average monetary policy rate in country i at year t. α_i captures country fixed effects[5].

Table 3 shows the regression results for the baseline specification shown in column (3) as well as alternative specifications. The coefficient estimates associated with $USMP_t$ defined as the unified monetary policy shocks are negative and statistically significant at the 5% level across specifications. Similarly, the coefficient estimates associated with the U.S. effective Fed Funds Rate is also negative. These results suggest that a tightening shock in U.S. monetary policy is associated with a decrease in foreign asset holdings by non-financial multinational enterprises. Such finding stands even when incorporating U.S. financial conditions in the regression analysis.

Furthermore, these regression results suggest that the home country's monetary policy is not correlated with changes in foreign asset holdings by non-financial multinationals. They also indicate there is a negative correlation between the changes in the real exchange rate of the home country and the change in foreign assets.

Taken together, I interpret these results as indicating that U.S. monetary policy appears to be a relevant factor in the decision-making of non-financial multinationals. Tighter (easier) U.S. monetary policy is associated with a decrease (increase) in consolidated-by-nationality foreign assets by these companies.

This finding complements the well-documented spillovers of U.S. monetary policy on global financial firms. Using firm level data, this paper provides evidence that U.S. monetary policy shocks also produce spillovers to non-financial multinational enterprises.

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[5] For Euro Area countries, the policy rate is the ECB's deposit rate. For Switzerland, it is the Swiss overnight average rate. For Sweden, it is the Swedish effective repo rate. For the U.K., the policy rate is the BoE's official bank rate. For Denmark, it is the Danish repo rate.

The empirical strategy adopted in this subsection does not allow for the disentanglement of the underlying channels through which a tightening U.S. monetary policy shock is associated with a reduction of foreign holdings by non-financial MNEs. A tightening in U.S. monetary policy is often associated with rising funding costs. It is possible that nonfinancial multinational enterprises react to this by reducing investment and/or shedding assets abroad.

It is also possible that a part of this reduction in foreign assets is driven by valuation effects. A tightening in U.S. monetary policy is associated with lower asset prices. These lower asset prices could potentially explain this decline in foreign assets. Further research is needed to better understand the channels through which U.S. monetary policy shocks affect investment decision by nonfinancial MNEs.

6.1 Robustness

It is possible that the negative and statistically significant coefficients associated with U.S. monetary policy shocks may be related to the estimation method adopted to compute these shocks. As a robustness check, I use different measures of U.S. monetary policy shocks when estimating equation 2. One such measure is the U.S. monetary policy news shocks from Nakamura and Steinsson (2018). The other set of measures are the target and path policy shocks from Gurkaynak, Sack and Swansson (2005). These updated series are taken from Acosta (2023). For each year, the monetary policy shocks used in the regression are equal to the sum of the respective shocks that took place during that year.

Table 4 shows the regression results for equation 2 using these different measures of policy shocks. These results show that these alternative measures of U.S. monetary policy shocks are also negatively correlated with changes in foreign asset holdings by nonfinancial multinationals. They indicate that the association between U.S. monetary policy shocks and changes in foreign assets is not related to the specific identification strategy used by Bu, Rogers and Wu (2021). Rather, such negative correlation also emerges once different estimation methodologies are adopted.

In sum, I find evidence that a tightening shock in U.S. monetary policy is associated with a decrease in foreign asset holdings by non-financial multinational enterprises. Such negative correlation is robust with respect.

7. Conclusion

Consolidated-by-nationality data on foreign holdings can be particularly helpful for policymakers to identify the ultimate exposure its national economic agents have relative to several risk factors. This approach also provides a more detailed view on the decision-making units as affiliates operating abroad are consolidated to their ultimate parent. In this paper, I construct the first dataset containing nationality-based estimates of foreign holdings for a group of developed economies over time. This dataset should complement the existing residence-based data from the seminal External Wealth of Nations project by Lane and Milesi-Ferretti (2001, 2007, 2018).
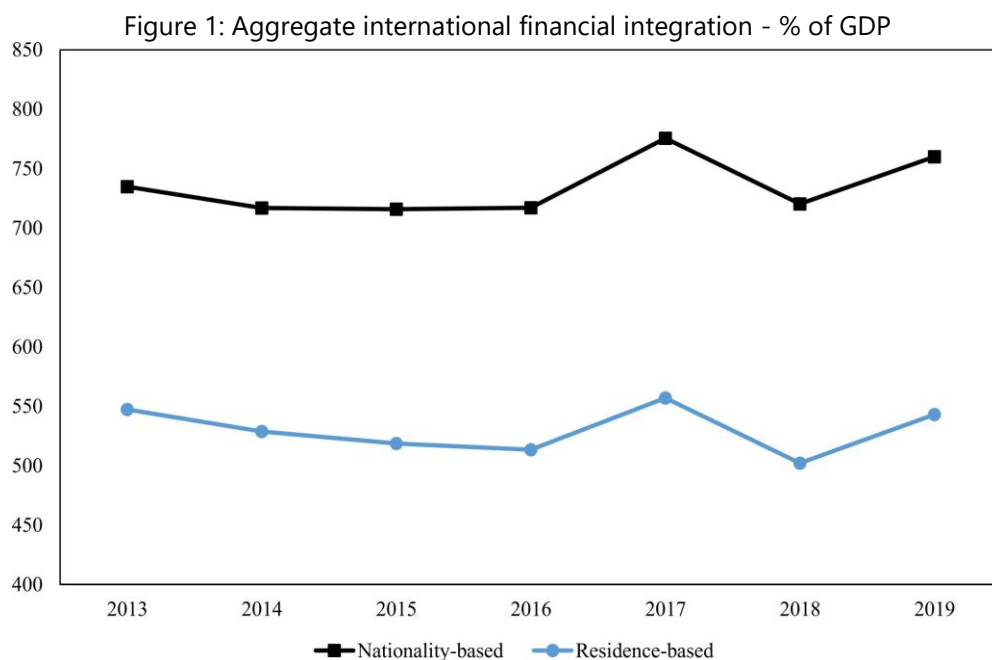
These novel data reveal that these developed economies are on aggregate more internationally financially integrated to the world than what is shown in the residence-based data. Such difference comes from the fact that all positions are taken into account when constructing consolidated-by-nationality data. In contrast, only cross-border positions are considered in residence-based statistics. The country-level data reveals that most but not all countries present a larger foreign balance sheet from a consolidated-by-nationality perspective relative to the residence-based approach. Countries with a significant presence of SPEs - most notably Ireland - can have a smaller consolidated-by-nationality balance sheet. Such result comes from the fact that the cross-border holdings related to these foreign entities do not enter their host's nationality-based balance sheet but still appears in their residence-based one.
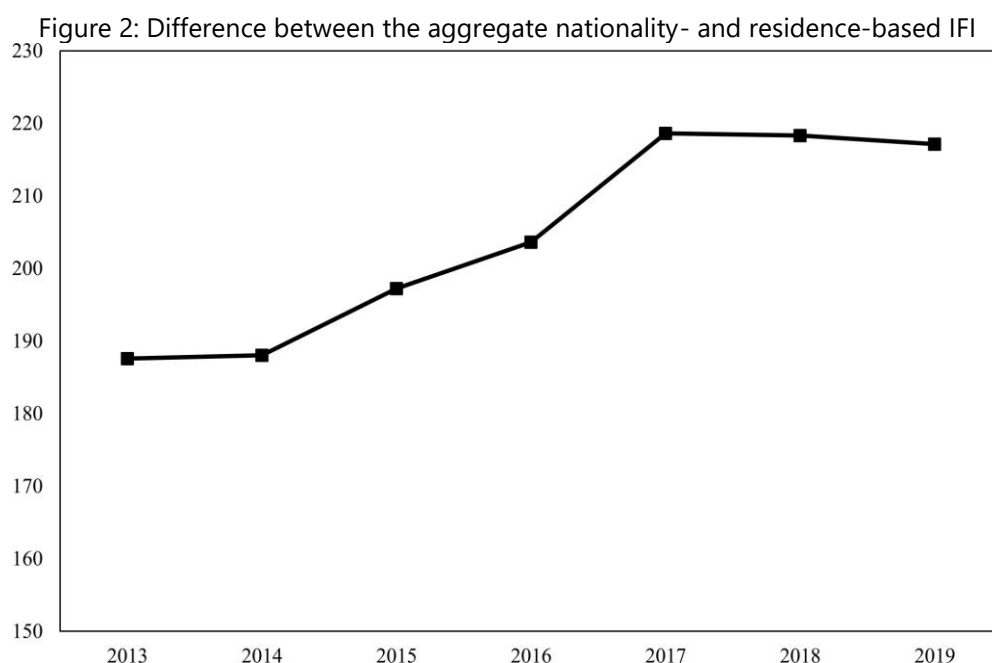
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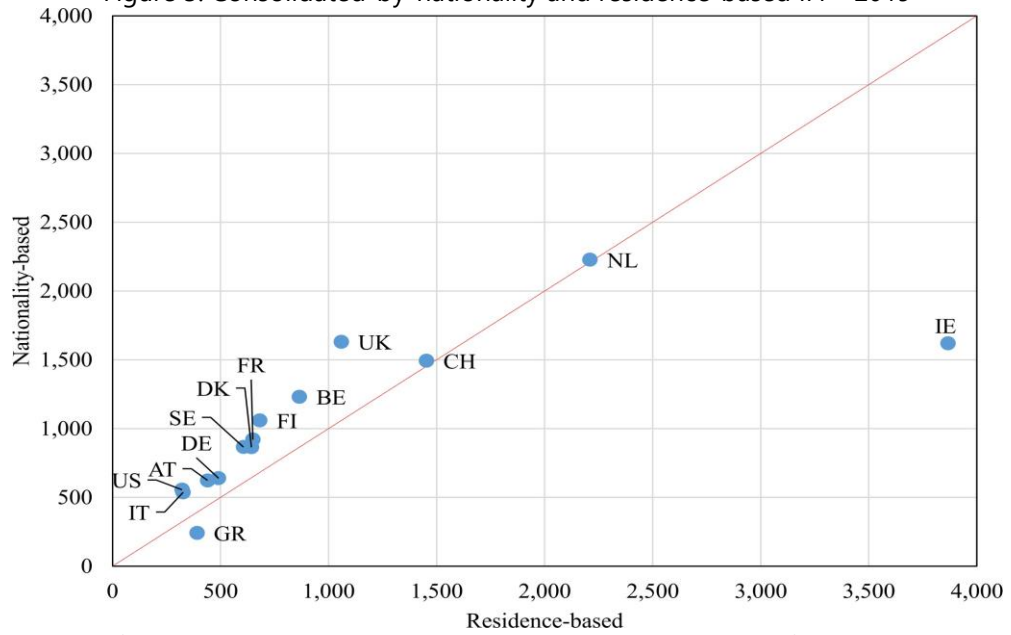## Figure 1: Aggregate international financial integration - % of GDP

Note: This figure shows the aggregate index of international financial integration under the consolidated-by-nationality and residence-based approach. For a given year, the aggregate index is calculated as the sum of foreign assets and liabilities of selected countries divided by their GDP. It is expressed as a percentage of GDP. The countries included are the United States, the United Kingdom, Austria, Belgium, France, Germany, Italy, Netherlands, Sweden, Switzerland, Finland, Greece and Ireland. The residence-based measures come from Lane and Milesi-Ferretti's External Wealth of Nations database.

Figure 2: Difference between the aggregate nationality- and residence-based IFI

Note: This figure shows the difference between the aggregate index of international financial integration under the consolidated-by-nationality relative to the residence-based approach. It is expressed as a percentage of GDP. The countries included to construct the aggregated are the United States, the United Kingdom, Austria, Belgium, France, Germany, Italy, Netherlands, Sweden, Switzerland, Finland, Greece and Ireland. The residence-based measures come from Lane and Milesi-Ferretti's External Wealth of Nations database.
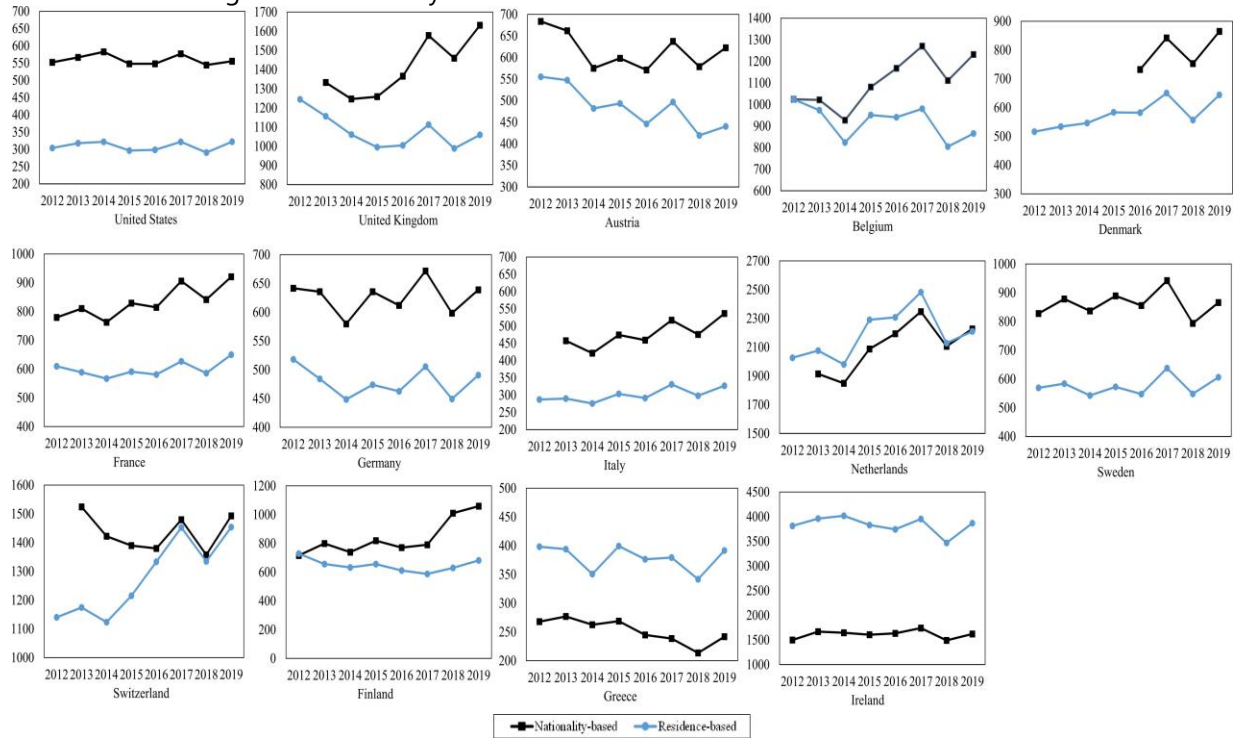
Figure 3: Consolidated-by-nationality and residence-based IFI – 2019

Note: This figure shows the consolidated-by-nationality and residence-based IFI for all countries in the dataset for 2019. The residence-based measures come from Lane and Milesi-Ferretti's External Wealth of Nations database. Data is computed as the sum of foreign assets and liabilities divided by GDP and is expressed as percentage of GDP. Countries located above the 45 degree line presented a larger consolidated-by-nationality foreign balance sheet in 2019 relative to their residence-based foreign balance sheet.

Figure 4: Nationality-based and residence-based IFI

Note: This figure shows the index of international financial integration under both the consolidated-by-nationality and residence-based approaches. It is computed as the sum of a country's foreign assets and liabilities divided by GDP. It is expressed as a percentage of GDP. The residence-based measures come from Lane and Milesi-Ferretti's External Wealth of Nations database.
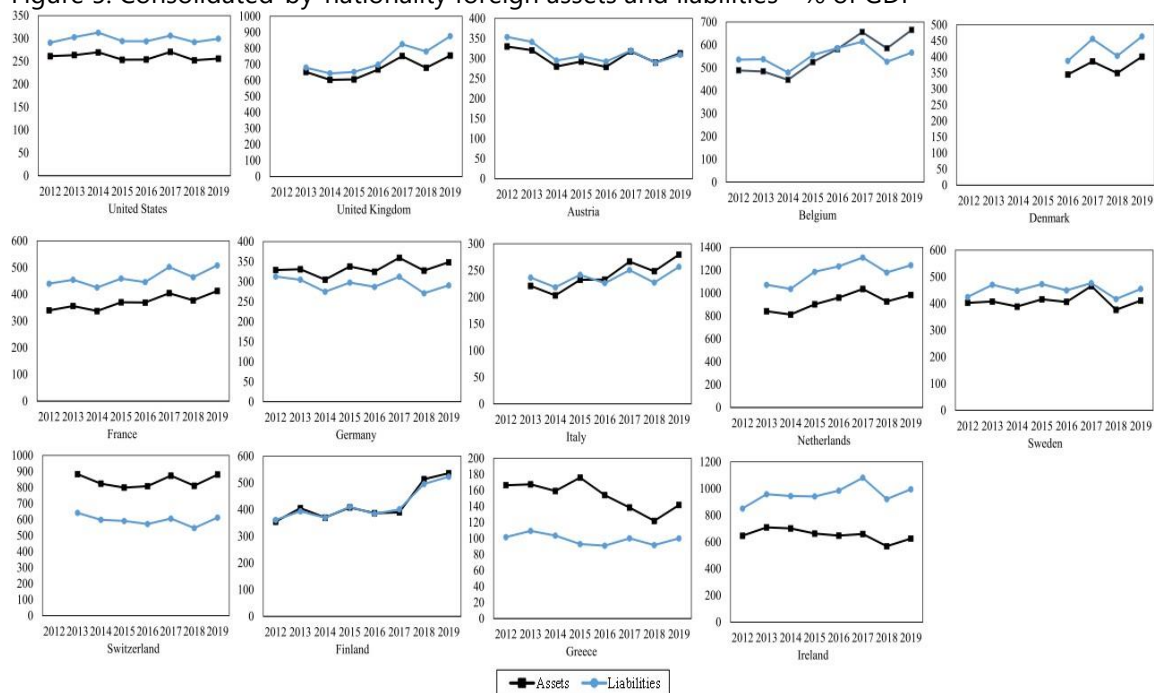
Figure 5: Consolidated-by-nationality foreign assets and liabilities - % of GDP

Note:This figure shows estimates of consolidated-by-nationality foreign assets and holdings per country. These holdings are expressed as a percentage of GDP.

Table 1: Regression Results using full sample of countries

| | Assets | | | Liabilities | | | IFI | | |
	Nationality	Residence	Difference	Nationality	Residence	Difference	Nationality	Residence	Difference
GDP pc.	2.52**	-0.95	3.94***	2.59**	-1.34	4.10***	5.11**	-2.29	8.04***
	(1.19)	(1.05)	(1.07)	(1.12)	(0.98)	(1.00)	(2.19)	(2.01)	(1.94)
Open	-1.31	0.06	-1.50	0.50	0.45	0.06	-0.82	0.51	-1.44
	(1.03)	(0.94)	(0.93)	(0.97)	(0.88)	(0.87)	(1.90)	(1.81)	(1.69)
Tax Diff.	0.09	1.27	-0.75	0.09	0.83	-0.32	0.18	2.10	-1.06
	(2.05)	(1.89)	(1.85)	(1.94)	(1.77)	(1.73)	(3.78)	(3.62)	(3.35)
R^2	0.19	0.23	0.31	0.44	0.34	0.12	0.00	0.00	0.03
Obs.	105	112	105	105	112	105	105	112	105

Note: $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Note: This table shows regression results of foreign assets, liabilities and IFI under both the consolidated-by-nationality as well as the residence-based approach. Dependent variables as expressed as a percentage of GDP. The independent variables are GDP per capita, trade as a percentage of GDP and the difference between the statutory corporate income tax rate relative to the median of a large set of countries. All regressions include country fixed effects. The number of observations vary due to missing data for some country-year pairs in the *Consolidated Foreign Wealth of Nations* dataset.

Table 2: Regression Results of the difference between nationality- and residence-based measures

| | Difference in Assets | | | Difference in Liabilities | | | Difference in IFI | | |
	Full Smpl.	High Tax	Low Tax	Full Smpl	High Tax	Low Tax	Full Smpl.	High Tax	Low Tax
GDP pc.	3.94***	5.93***	5.00**	4.10***	4.14***	6.89***	8.04***	10.07***	11.89***
	(1.07)	(1.31)	(1.82)	(1.00)	(0.84)	(1.78)	(1.94)	(1.93)	(3.43)
Open	-1.50	-0.75	-1.82	0.06	-0.42	-0.37	-1.44	-1.18	-2.18
	(0.93)	(1.23)	(1.41)	(0.87)	(0.78)	(1.38)	(1.69)	(1.80)	(2.66)
Tax Diff.	-0.75	1.06	-24.04**	-0.32	1.77*	-35.13***	-1.06	2.83	-59.17***
	(1.85)	(1.45)	(9.60)	(1.73)	(0.92)	(9.36)	(3.35)	(2.13)	(18.10)
R^2	0.31	0.10	0.06	0.12	0.50	0.19	0.03	0.41	0.04
Obs.	105	66	39	105	66	39	105	66	39

Note: $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Note: This table shows regression results of the difference in foreign assets, liabilities and IFI between the consolidated-by-nationality approach relative to the residence-based approach. Regressions are estimated using (1) the full sample of countries, (2) a sample of relatively high tax countries and (3) a sample of relatively low tax countries. Relatively high tax countries are the United States, Austria, Belgium, Denmark, France, Italy, the Netherlands, Sweden and Greece. Relatively low tax countries are the United Kingdom, Germany, Switzerland, Finland and Ireland. The independent variables are GDP per capita, trade as a percentage of GDP and the difference between a country's statutory corporate income tax rate and a median of a large sample of countries. All regressions include country fixed effects. The number of observations vary due to missing data for some country-year pairs in the *Consolidated Foreign Wealth of Nations* dataset.

Table 3: Regression Results of the first difference in foreign assets related to national non-financial MNEs (% of GDP)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
U.S. Monetary Policy Shock	-0.579**	-0.510**	-0.923***				
	(0.070)	(0.251)	(0.256)				
U.S. FCI			-0.420***	-0.162	-0.249**	-0.231**	
			(0.111)	(0.107)	(0.108)	(0.107)	
U.S. Fed Funds Rate						-0.128*	-0.142**
						(0.070)	(0.071)
Real Exchange Rate		-0.011*	-0.015**		-0.018***	-0.015**	-0.012**
		(0.006)	(0.006)		(0.006)	(0.006)	(0.006)
Home Policy Rate		0.052	0.019		-0.080	0.066	0.134
		(0.122)	(0.113)		(0.118)	(0.141)	(0.141)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.07	0.10	0.23	0.03	0.10	0.15	0.09
Obs.	91	91	91	91	91	91	91

Note: $^*\,p < 0.1$; $^{**}\,p < 0.05$; $^{***}\,p < 0.01$

Note: This table shows regression results of first difference in foreign assets related to national non-financial MNEs as a percentage of GDP. The independent variables are (1) the unified measure of U.S. monetary policy shocks by Bu, Rogers and Wu (2021), (2) the U.S. National Financial Conditions Index from the Federal Reserve Bank of Chicago, (3) the U.S. Effective Federal Funds Rate, (4) the real exchange rate for the home country from the International Monetary Fund and (5) the monetary policy rate from the home country. For Euro Area countries, the monetary policy rate is the ECB's deposit rate. For Switzerland, the rate is the Swiss overnight average rate. For Sweden, it is the Swedish effective repo rate. For the U.K., the monetary policy rate is the BoE's official bank rate. For Denmark, the policy rate is the Danish repo rate. All regressions include country fixed effects.

Table 4: Regression Results of the first difference in foreign assets related to MNEs using alternative measures of policy shocks

	(1)	(2)	(3)
BRW - Unified Policy shock	-0.923***		
	(0.256)		
NS - Policy News shock		-1.277**	
		(0.561)	
GSS - Target shock			-0.910*
			(0.458)
GSS - Path shock			-0.579**
			(0.265)
US Financial Conditions Index	-0.420***	-0.427***	-0.458***
	(0.111)	(0.131)	(0.139)
Real Exchange Rate	-0.011*	-0.015**	-0.016**
	(0.006)	(0.006)	(0.006)
Home Monetary Policy	0.019	-0.001	0.033
	(0.113)	(0.120)	(0.130)
Country Fixed Effects	Yes	Yes	Yes
R^2	0.23	0.16	0.17
Obs.	91	91	91

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$

Note: This table shows regression results of first difference in foreign assets related to national nonfinancial MNEs as a percentage of GDP. Three different measures of U.S. monetary policy shocks are used in this analysis. The baseline specification uses the unified monetary policy shocks from Bu, Rogers and Wu (2021). Another specification uses the policy news shock from Nakamura and Steinsson (2018). A third specification uses the target and path U.S. monetary policy shocks from Gurkaynak, Sack and Swansson (2005). The independent variables are (1) a measure of U.S. monetary policy shock, (2) the U.S. National Financial Conditions Index from the Federal Reserve Bank of Chicago, (3) the U.S. Effective Federal Funds Rate, (4) the real exchange rate for the home country from the International Monetary Fund and (5) the monetary policy rate from the home country. For Euro Area countries, the monetary policy rate is the ECB's deposit rate. For Switzerland, the rate is the Swiss overnight average rate. For Sweden, it is the Swedish effective repo rate. For the U.K., the monetary policy rate is the BoE's official bank rate. For Denmark, the policy rate is the Danish repo rate. All regressions include country fixed effects.

Consolidated Foreign Wealth of Nations: Nationality-based measures of international exposure

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BIS-ECB-Banco de España External Statistics Conference

12 February 2024

Multinationals and international exposure: Ford do Brasil

Ford set up its affiliate in Brazil in 1919.

Ford do Brasil has relied heavily on local funding to finance its expansion.

Until recently, Ford employed over 5,000 workers in the country.

Multinationals and international exposure: Ford do Brasil

Ford to close Brazil manufacturing operations, take $4.1 billion in charges

By Ben Klayman, Alberto Alerigi   3 MIN READ   f   y

DETROIT/SAO PAULO (Reuters) - Ford Motor Co said on Monday it will close its three plants in Brazil this year and take pretax charges of about $4.1 billion as the COVID-19 pandemic amplified the company's under use of its manufacturing capacity.

Despite this significant presence in the country, relatively little exposure appeared in the U.S. and Brazil external balance sheet. **Why?**

Features of the residence-based data

Residence: Foreign assets and liabilities are booked according to the residence of the immediate counterparts.

(1) Only cross-border transactions are taken into account.
Local positions Ford has do not enter U.S. nor Brazil's foreign balance sheet.

(2) Does not consider ties that exist between entities within the same corporate group.
Assets and liabilities owned by Ford do Brasil are not consolidated to the U.S. parent company Ford.

Takeaway: External accounts of both countries did not fully capture the international exposure created by Ford's operation in Brazil.

How to assess the international exposure of countries?

Conventional approach: Use **residence**-based data of foreign holdings.

This paper: Constructs the first dataset on **consolidated-by-nationality** estimates of foreign holdings for 14 countries between 2012 and 2019.

Findings:

(1) Countries are on aggregate more internationally financially integrated than what residence-based data indicate.

(2) Countries heavily engaged in international financial intermediation have smaller nationality-based exposure.

(3) Data can be used to analyze monetary and fiscal policy spillovers.

Consolidated-by-nationality approach

Consolidated-by-nationality: Foreign assets and liabilities are booked according to the **nationality** of the ultimate counterparts.

Consolidated-...: All local and cross-border positions held by Ford do Brasil are attributed to its parent company Ford.

...by-Nationality: Exposures sorted according to nationality of ultimate counterparts (US vis-a-vis Brazil).

Key measures of gross international exposure

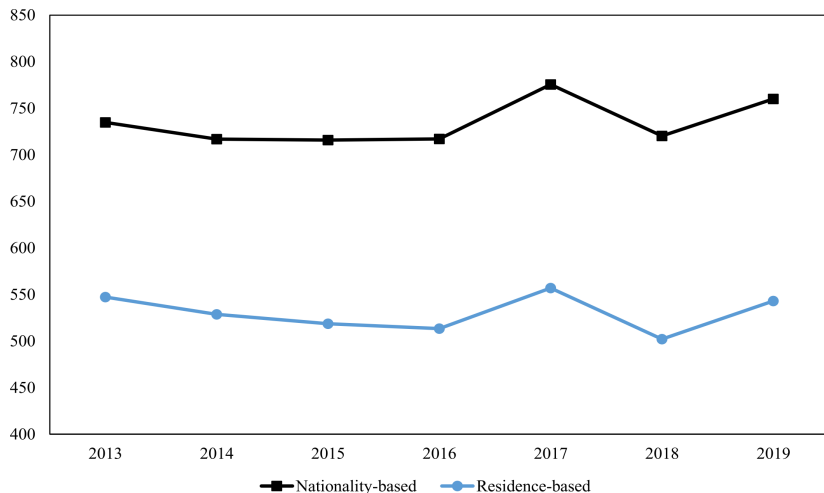International Financial Integration - Lane and Milesi-Ferretti (2003):

$$IFI_t^i = \frac{(FAssets_t^i + FLiab_t^i)}{GDP_t^i} \tag{1}$$

Aggregate IFI - Bénétrix and Sanchez Pacheco (2022):

$$IFI_t^{AGG} = \frac{\sum_{i=1}^{N}(FAssets_t^i + FLiab_t^i)}{\sum_{i=1}^{N} GDP_t^i} \tag{2}$$
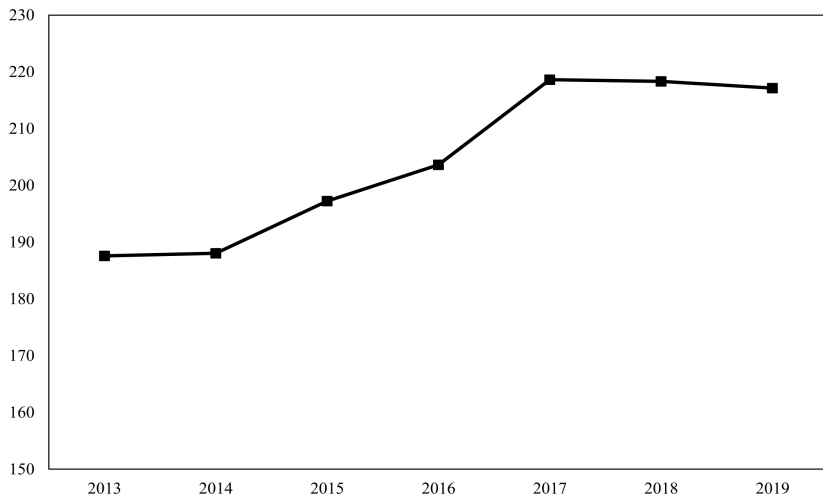
Aggregate IFI larger from a nationality-based perspective

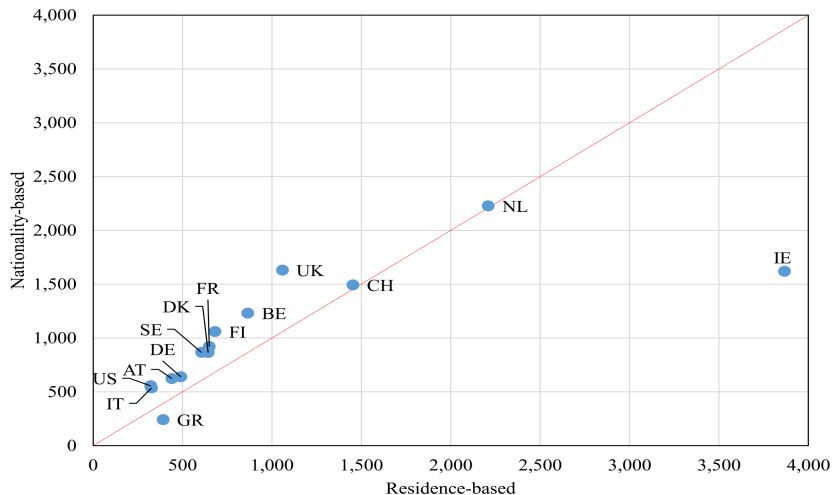Figure: **Consolidated-by-Nationality** and **Residence**-based IFI (% of GDP)

Difference is not time-invariant

Figure: Difference between **Consolidated-by-Nationality** and **Residence** IFI

Heterogeneity across countries

Figure: **Consolidated-by-Nationality** and **Residence**-based IFI per country

Data-set characteristics

Data sources: BIS, IMF, U.S. BEA, Orbis Europe.

Time frame: 2012 - 2019 (yearly).

Countries: United States, United Kingdom, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Sweden and Switzerland.

Methodology similar to BIS (2015) and Sanchez Pacheco (2022).

Consolidated-by-nationality foreign balance sheet (Non-US)

Bank-reported	Assets	Liabilities
Domestic banks	BIS	BIS
Foreign banks	BIS	BIS
Financial non-banks		
Domestic Multinationals		
Operating in the U.S.	U.S. BEA	U.S. BEA
Operating in Europe	Orbis Europe	Orbis Europe
Foreign Multinationals	Orbis Europe	Orbis Europe
Non-financial		
Domestic Multinationals		
Operating in the U.S.	U.S. BEA	U.S. BEA
Operating in Europe	Orbis Europe	Orbis Europe
Foreign Multinationals	Orbis Europe	Orbis Europe
Portfolio Investment	IMF	IMF
Official assets	IMF	

Foreign MNEs operating in Country X

Use Orbis Europe dataset to download financial and ownership information for all companies located in the host country X.

Remove companies that never reported total assets and have a country X national as ultimate owner.

Identify and remove foreign-owned special purpose entities.

Use industry codes to separate entities accordingly.

From company-level data to country aggregates

Orbis Europe makes available data on firms' total asset holdings and shareholders' equity.

Rationale behind the methodology is similar to BIS (2015): Infer local positions based on available data.
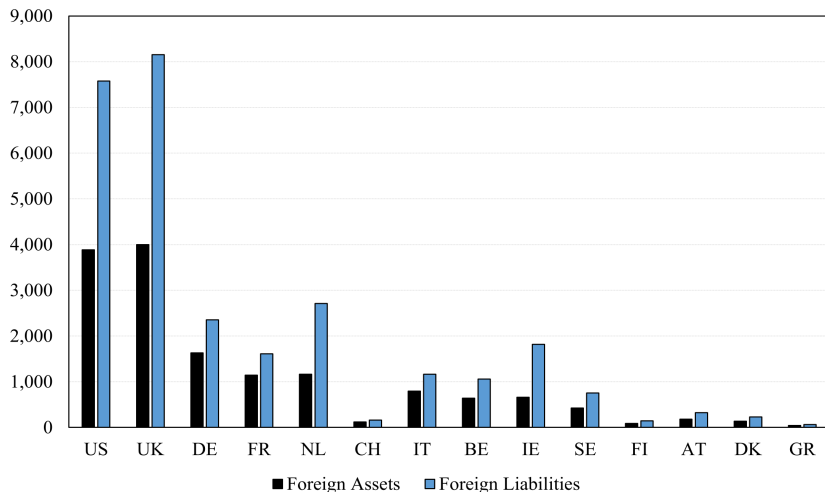
Country X foreign assets and liabilities related to **F**oreign **MNE**s:

$$FA_{X,t}^{FMNE} = \sum_{i=1}^{N} Liabilities_t^i - Equity_t^i \tag{3}$$

$$FL_{X,t}^{FMNE} = \sum_{i=1}^{N} Assets_t^i \tag{4}$$

Holdings related to foreign non-financial MNEs

Figure: Consolidated foreign holdings related to foreign non-financial MNEs

■ Foreign Assets ■ Foreign Liabilities

Empirical Analysis

Two exercises using these novel data:

- Correlation between tax differentials and foreign holdings for low and high-tax countries.

- Correlation between U.S. monetary policy shocks and foreign asset holdings.

U.S. Monetary Policy Shocks and Foreign Assets

Panel regression to analyze the relationship between changes in foreign assets holdings by non-financial MNEs and U.S. monetary policy shocks:

$$\Delta FA_{i,t}^{MNES} = \alpha_i + \beta * USMP_t + \gamma * USFCI_t + \delta \Delta REER_{i,t} + \theta * HomeMP_{i,t} + \epsilon_{i,t}$$
(5)

$USMP_t$: U.S. Monetary Policy shocks (Bu, Rogers and Wu (2021); Gürkaynak, Sack and Swansson (2005) and Nakamura and Steinsson (2018).)

$USFCI_t$: U.S. National Financial Conditions Index

$REER_{i,t}$: Real Effective Exchange Rate

$HomeMP_{i,t}$: Home country monetary policy rate.

U.S. Monetary Policy Shocks and Foreign Assets

Table 4: Regression Results of the first difference in foreign assets related to MNEs using alternative measures of policy shocks

	(1)	(2)	(3)
BRW - Unified Policy shock	-0.923***		
	(0.256)		
NS - Policy News shock		-1.277**	
		(0.561)	
GSS - Target shock			-0.910*
			(0.458)
GSS - Path shock			-0.579**
			(0.265)
US Financial Conditions Index	-0.420***	-0.427***	-0.458***
	(0.111)	(0.131)	(0.139)
Real Exchange Rate	-0.011*	-0.015**	-0.016**
	(0.006)	(0.006)	(0.006)
Home Monetary Policy	0.019	-0.001	0.033
	(0.113)	(0.120)	(0.130)
Country Fixed Effects	Yes	Yes	Yes
R^2	0.23	0.16	0.17
Obs.	91	91	91

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Conclusion

First data-set on consolidated-by-nationality foreign holdings for multiple countries and years.

Countries are on aggregate more internationally financially integrated than what residence-based data indicate.

Countries heavily engaged in international financial intermediation have smaller nationality-based exposure.

U.S. Monetary Policy Shocks are associated with a decrease in foreign asset holdings by MNEs.