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Corporate Taxation and International Financial Integration: U.S. evidence from a consolidated perspective*

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Abstract

We document a robust relation between corporate tax differentials and U.S. international financial integration (IFI). While this is the case for traditional IFI based on cross-border positions, the positive link also emerges for its larger consolidated-by-nationality version. The gap between these IFI measures, the key outcome variable in our analysis, exhibits a strong positive correlation with tax differentials too. This is in part due to consolidated assets of multinational enterprises being more strongly correlated with tax differentials than their cross-border counterpart. We interpret this as indirect evidence of U.S. multinationals taking advantage of tax differentials in ways that go beyond what is captured by traditional Balance of Payments procedures.

Keywords: International financial integration, financial globalisation, multinational enterprises, corporate taxation.

JEL: F36, F21, F23, H87.

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1 Introduction

The study of financial globalisation has historically focused on the cross-border positions. Under this traditional approach, assets and liabilities are attributed according to the geographic location of the immediate counterparts based on the residency principle. International financial integration (IFI) is then conventionally measured as the sum of the external assets and liabilities divided by GDP. However, focusing only on cross-border positions can mask the true extent of nations' global financial links.

Consider the affiliate of a U.S. multinational enterprise (MNE) operating in a foreign country, say the Netherlands. The local assets held by this affiliate represent assets of a U.S. company located outside the U.S. (in the Netherlands) and liabilities of Dutch agents relative to a company whose ultimate owner does not reside within the same border. These assets can be characterised as international investments made by an U.S. company in a foreign country. Yet, local assets held by this affiliate are not recorded as U.S. foreign assets nor Dutch foreign liabilities when using the cross-border approach. As a result, these will be left out when computing the IFI of both countries.[1]

An alternative approach that correctly accounts for these international investments is to apportion assets and liabilities according to the nationality of the ultimate owner. This is equivalent to consolidating the local assets and liabilities of affiliates to the parent company and then assessing the international exposure of countries. In our example, this consolidated (or ultimate ownership-based) approach would imply recording the local assets of the U.S. affiliate in the Netherlands as U.S. foreign assets and Dutch foreign liabilities, despite the fact that these are not cross-border investments. In principle, we can apportion any asset or liability to their ultimate owner. One can aggregate assets and liabilities according to the nationality of their owners and construct the entire external balance sheet of a country using this consolidation procedure as in BIS (2015).

Multinational enterprises make decisions on how to geographically distribute assets and liabilities taking into account the different tax codes of the countries they operate in. Dischinger and Riedel (2011) show that multinational enterprises shift the location of their intangible assets towards low-tax affiliates within the group. Zucman (2014) shows that the share of profits made abroad in U.S. corporate profits has increased sharply since the start of the century. More recently, Tørsløv et al. (2018) estimate that close to 40% of multinational profits are shifted to tax havens globally.

While some of these geographical decisions by MNEs can be captured by cross-border

[1]It is not necessarily the case that the cross-border approach will lead to an underestimation of the true degree of international financial integration of countries as in this example. Countries that host a significant amount of pass-through companies can observe a decrease in their international financial integration when analysed through the consolidated approach. See Damgaard and Elkjaers (2017).

statistics, this may not always be the case. In our example, suppose the U.S. MNE transfers one asset worth $100 to its Dutch affiliate. If this purchase is funded via an inter-company loan of the same amount, the U.S. cross-border balance sheet will register a $100 increase in assets due to this outward FDI activity by the parent company. The U.S. consolidated balance sheet will also increase by $100, but not due to the inter-company funding. Rather, this increase reflects the fact that the transferred asset is no longer an U.S. domestic asset. Thus, the cross-border and consolidated IFI indicators will increase by $100.

However, if the purchase made by the affiliate is funded by borrowing $100 from a Dutch bank, this transaction would no longer lead to an increase in U.S. external assets using the cross-border methodology. This is because there is no cross-border financing from the home country involved. However, this transaction would still produce a $100 increase in U.S. consolidated foreign assets for the reason exposed above. In addition, consolidated foreign liabilities would also increase by $100 as this loan represents a liability of a U.S. company with respect to a Dutch agent. Thus, the IFI indicator based on consolidated data would increase by $200 while no change would be recorded in its cross-border analogue. The difference between the two measures widens.

Although companies often engage in more complex transactions than in our simple example, the general principle is that asset acquisitions conducted by affiliates that are not financed via cross-border funding from the home country cause the gap between the two IFI measures to increase. Crucially, these acquisitions are not recorded as U.S. external assets when using the cross-border approach despite the fact that they represent international investments by U.S. firms in foreign countries. These are still recorded as U.S. foreign assets when employing the consolidated approach, regardless of their source of funding.

Some of these asset acquisitions, not captured by cross-border statistics, may be associated with tax planning by MNEs. In that case, relying solely on cross-border statistics could lead to an understatement of the extent to which tax planning is associated with changes in financial globalisation.

This paper analyses the link between the corporate income tax differential between the U.S. and the rest of the world and the change in international financial integration after consolidation.

We proceed by constructing the U.S. foreign balance sheet based on ultimate ownership for the period between 1999 and 2018, using a methodology similar to BIS (2015). This is part of the larger *Consolidated Foreign Wealth of Nations* project aimed at constructing a data set with estimates of consolidated assets and liabilities for a large country sample. This project complements the seminal work by Lane and Milesi-Ferretti's *External Wealth*

of Nations.

We use these novel estimates to compute the U.S. consolidated-based IFI. We find that non-bank multinational enterprises were responsible for around half of the expansion in IFI. Given this prominent role played by MNEs, we then study whether the statutory corporate income tax differential is associated with the consolidated- and cross-border based measures of IFI as well as the time-varying difference between the two.

We document a robust relation between corporate tax differentials and U.S. international financial integration (IFI). While this is the case for traditional IFI based on cross-border positions, the positive link also emerges for its larger consolidated-by-nationality version. The gap between these IFI measures, the key outcome variable in our analysis, exhibits a strong positive correlation with tax differentials too. This is in part due to consolidated assets of multinational enterprises being more strongly correlated with tax differentials than their cross-border counterpart. We interpret this as indirect evidence of U.S. multinationals taking advantage of tax differentials in ways that go beyond what is captured by traditional Balance of Payments procedures.

The remainder of the paper is structured as follows: Section 2 provides additional reasons for analysing international exposures using consolidated-based statistics. It also explores the documented link between multinational enterprises and tax planning activities. Section 3 describes key stylized facts that emerge from of our analysis by comparing estimates based on the U.S. consolidated balance sheet to those based on cross-border positions. Section 4 details our analysis on the relation between corporate income tax differential and international financial integration. Section 5 provides an estimate of how much is missed by relying solely on cross-border statistics when assessing the link between the tax differential and foreign assets held by multinationals. Section 6 concludes.

2 Motivation

Our work is related to two main strands of the literature. The first one is on the shortcomings of traditional cross-border (or residence-) based international economic accounts and the need to elaborate consolidated- (or nationality-) based measures. The second one is on the geographic decisions by multinational enterprises around where to locate assets and liabilities given the different tax codes of countries they operate in.

Baldwin et al. (1998) pointed to the importance of compiling economic accounts based on the location of the ultimate owners of assets and liabilities rather than on their geographic location as the two approaches can generate very different conclusions. Baldwin and Kimura (1998) show that adopting such approach when analysing the U.S. trade balance of goods and services yields an opposite conclusion when compared to that

obtained using the cross-border approach. For the year of 1992, they show that the net sales of goods and services by Americans to foreigners reached a surplus of USD 46.4 billion. This compares to a -USD 39.7 billion deficit in the cross-border trade balance of goods and services registered for the same year. Such difference underscores the need to evaluate international accounts not only using the traditional cross-border approach but also considering the ultimate ownership of international investments. Doing so is even more relevant when studying international financial integration given the larger scale of financial openness relative to trade.

Following the Global Financial Crisis, Borio (2013) pointed to the renewed need for collecting data on a consolidated basis to provide a more accurate picture of the decision-making units. More recently, Lane (2021) pointed to the importance of developing a consolidated accounting framework that should complement the existing residence-based framework. This is particularly relevant given the complexity of global firms that operate in a geographically dispersed way as noted by Avdjiev et al. (2018). Di Nino et al. (2020) describes some of the challenges to the existing framework of international statistics that emerges from the activities of MNEs.

Recent research has identified additional reasons to construct and analyse international exposures based on the consolidated approach besides assessing the degree of financial globalisation. Avdjiev et al. (2016) show that relying solely on cross-border metrics could pose a challenge when studying financial risks. Specifically, it is difficult to identify which agents would face balance sheet losses in case a particular set of assets falls in value. For example, hedge funds in Brazil frequently use investment vehicles in the Cayman Islands to hold offshore positions. In case these international positions fall sharply in value, relying solely on the cross-border metrics may lead one to conclude that investors in the Cayman Islands would face balance sheet losses as these assets are booked as external assets of that country while in reality Brazilian investors would be the ones facing such hit. This example illustrates how properly identifying the ultimate owner of an international investment is needed to determine who would bear the losses if this asset plunges in value, as it is frequently the case in financial crises.

Damgaard and Elkjaer (2017) show that the global network of foreign direct investments changes significantly when the FDI positions are allocated on a ultimate beneficiary basis rather than on a locational basis. Low-tax countries experience a drastic reduction in their FDI positions when using a consolidated approach as these positions are allocated to the countries their ultimate beneficiary reside which also increases the relevance of larger economies. In the case of Ireland, Galstyan (2019) reports that the country's external liabilities fall by three quarters when pass-through companies are excluded from the calculations. Such finding implies that Irish international financial integration as

conventionally measured using cross-border external assets and liabilities overstates the true degree of financial globalisation of the country as noted by Lane (2019). Globally, Damgaard et al. (2019) show that cross-border FDI statistics are distorted by offshore financial centers with enormous FDI positions.

Similarly, Coppola et al. (2019) show that the map of international portfolio investments also changes drastically when the positions are allocated on a ultimate beneficiary basis compared to the locational basis. For instance, the authors show that China's net foreign asset position is USD 1.1 trillion smaller when compared to the official cross-border statistics. More broadly, they also show that important findings in empirical international macroeconomics are put into question when analysed from a consolidated perspective relative to the traditional residence perspective. Among such findings, analysing holdings based on the consolidated approach reveals that north-to-south capital flows are more significant than previously thought as in the famous Lucas (1990) paradox.

Another important reason to analyse international exposure using the consolidated approach is to assess policy spillovers, prominently in the banking sector. Global banks operating in multiple countries react not only to policy decisions made in the host countries but also to those made in its home country. McCauley et al. (2019) point to the importance of analysing bank positions based on the nationality of its parent company rather than on their location to identify the factors driving their decisions on a global scale. An affiliate operating in a foreign country could be more responsive to decisions made in its home country than those made in the country it operates. Avdjiev et al. (2020) show that macro-prudential decisions taken in the home country affects cross-border lending in foreign affiliates more so than those taken by the host country. Similarly, Avdjiev et al. (2018) shows that global banks' cross-border lending is affected by the monetary policy decisions taken at their home countries.

Lastly, the consolidated approach provides a more nuanced picture of the international exposure of a country compared to the cross-border approach. Such feature is key for policymakers to better assess financial risks. In the case of the Global Financial Crisis, McCauley (2018) shows that U.S. affiliates of European banks produced and held a quarter of a trillion dollars in mortgage-backed securities in mid-2007. While this large exposure would be captured by consolidated-based statistics, relying exclusively on cross-border statistics would have meant failing to account for a substantial exposure to the U.S. housing market at a period in which housing prices fell sharply.

Our work contributes to this literature on nationality-based international economic accounts by constructing the U.S. consolidated external balance sheet for the period between 1999 and 2018. To the best of our knowledge, this is the first paper to elaborate time series estimates for the consolidated external balance sheet of any country. We use

a methodology similar to BIS (2015) that is detailed in Appendix A.

Regarding tax planning and multinational enterprises, Karkinsky and Riedel (2012) argue that multinational enterprises have an incentive to locate patents at low-tax affiliates to minimize the corporate tax burden. Dischinger and Riedel (2011) show that multinational enterprises shift the location of their intangible assets towards low-tax affiliates within the group. Hájková et al. (2007) also provide evidence that differences in corporate taxation has a significant impact on choices around FDI location.

The decisions by multinationals to hold assets in low-tax countries is closely associated with profit shifting activities. Multinational enterprises can lower their overall tax bill by transferring assets to subsidiaries located in low-tax countries. Zucman (2014) calculates that the share of profits made abroad by U.S. companies has increased significantly since the start of this century. Tørsløv et al. (2018) provide estimates around the scale of profit shifting among MNEs and find that close to 40% of multinational profits are shifted to low-tax countries globally.

Our paper provides evidence that the corporate income tax rate differential between the U.S. and the rest of the world is positively associated with the part of the U.S. foreign balance sheet not captured by cross-border statistics. This is an indicative that multinational enterprises and tax differentials play an even more important role in financial globalisation than previously thought when relying solely on cross-border measures.

3 Stylized facts

Figure 1 shows the evolution of U.S. international financial integration based on the consolidated approach and compares it to the same measure calculated using the cross-border approach from the U.S. international investment position database. The estimate of international financial integration is calculated as the sum of U.S. foreign assets and foreign liabilities divided by U.S. GDP as in Lane and Milesi-Ferretti (2003). Due to challenges in properly identifying the ultimate beneficiary of financial derivatives, we exclude them from all the calculations presented in this paper. Figure 2 shows the sum of U.S. assets and liabilities reported in trillions of U.S. dollars.

These two figures indicate that U.S. IFI is on average two times larger when calculated using the consolidated approach relative to the cross-border approach. Such finding is consistent with a similar order of magnitude found by the BIS (2015). It indicates that U.S. nationals hold sizeable amounts of assets and liabilities relative to foreigners that are not captured by cross-border statistics. This includes local assets and liabilities held by affiliates of U.S. multinational enterprises operating abroad. The stark difference between the two measures of financial globalisation provides yet another reason for statistical

offices across countries to produce consolidated-based estimates of external accounts. As noted by Lane (2019), evidence-based policy-making relies on useful information about international macroeconomic developments.

Another important finding that stands out is that U.S. international financial integration based on the consolidated approach continued to increase after the Global Financial Crisis following a contraction during the crisis. This result is not fully consistent with the stability seen in the years following the crisis when measured using the cross-border estimate as also documented by Lane and Milesi-Ferretti (2018). In particular, we find that the U.S. international financial integration increased from 502 percent of GDP in 2007 to 547 percent of GDP in 2015. In contrast, the cross-border estimate of U.S. IFI went from 260 percent to 271 percent of GDP during the same period. While our consolidated-based estimate indicates that U.S. international financial integration continued to increase during that period, we also find that U.S. IFI remained largely unchanged between 2014 and 2018. A similar pattern can be observed in the cross-border based estimate.

Figures 3 and 4 show the evolution of U.S assets and liabilities separately. Our estimates suggest that both increased from 2007 to 2015. Consolidated assets increased from USD 34.2tn in 2007 to USD 46.2tn in 2015. Similarly, consolidated liabilities increased from USD 38.4tn in 2007 to USD 53.6tn in 2012 and then to USD 60.0tn in 2018. Both U.S. consolidated assets and liabilities fell in the years of 2008 and 2015 while only the former fell in 2018.

Despite the significantly larger balance sheet, the U.S. net international investment position when calculated using the consolidated approach is relatively close to that computed using cross-border estimates. Figure 5 shows the evolution of the U.S. net international investment position calculated as the difference between assets and liabilities using the two approaches. The consolidated-based net IIP stood at USD -8.0 trillion in 2018 which compares to a USD -9.7 trillion net IIP when calculated through the cross-border approach. Such finding is also consistent with BIS (2015) that has found similar estimates for the two measures of net IIP for the year of 2012. While the consolidated net IIP does not meaningfully change relative to the cross-border estimate, the sizeable difference in gross positions is an important reason to rely on consolidated based statistics. As Avdjiev et al. (2016) indicate, gross positions matter when analyzing the international exposure of countries.

Table 1 shows the U.S. consolidated balance sheet for 2018, the last year in our sample. This table reveals that U.S. non-financial multinational enterprises operating abroad represent the single largest source of U.S. international financial integration. Relying on data from the U.S. BEA, we estimate that U.S. non-financial multinationals operating abroad have total assets worth USD 19.5tn in 2018 and total liabilities worth USD 14.6tn. The

prominent role played by U.S. MNEs indicates that factors associated with changes in their asset holdings abroad can also produce relevant changes in U.S. IFI. Most notably, Dischinger and Riedel (2011) and Karninsky and Riedel (2012) have identified that the corporate income tax differential between the home country and other economies is a factor that influences the decisions by multinationals on where to hold their assets. We empirically investigate the link between U.S. IFI an the corporate income tax differential in the following section.

3.1 Decomposition of the external balance sheet growth

In order to evaluate the components driving the growth of the consolidated balance sheet, we decompose the contribution to growth generated by each item. As is standard, we can decompose the cumulative growth rate of foreign assets and liabilities between periods t and T according to the formula:

$$R_{t,T}^{type} = \sum_{i=1}^{N} w_{i,t}^{type} R_{t,T}^{i} \tag{1}$$

Where *type* can be foreign assets, liabilities or the sum of both and can be applied both to the consolidated approach as well as to the cross-border approach. Note that the number of components N will vary according to the type selected. $R_{t,T}^{i}$ represents the cumulative growth rate of component $i \in N$ between periods t and T. $w_{i,t}^{type}$ represents the share of component i relative to *type* at time t. We call $w_{i,t}^{type} R_{t,T}^{i}$ the contribution of component i to the growth rate of *type* between t and T. In order to avoid breaks in the time series due to the methodological changes described in the Appendix, we group non-bank financial enterprises with non-financial enterprises into a single non-bank enterprises group when decomposing the consolidated external balance sheet. All components are perfectly matched besides 'other non-financial reported' pre-2013 and 'other non-bank reported' post-2013 which are pooled into a 'other reported' subgroup.[2] As shown below, this new subgroup is irrelevant when decomposing the growth of the external balance sheet.

We can then normalise the contribution of each item $w_{i,t} R_{t,T}^{i}$ by the growth rate of each *type*. Doing so provides a clearer visualisation around the relative contribution delivered by each item as the sum of the individual contributions adds up to one for each *type*. As such, the relative contribution $Contrib_{i,t,T}^{type}$ of item i on the cumulative growth *type* is

[2]This is due to the fact that TIC reporting changed the breakdown from banking/non-banking to financial/non-financial in 2013. The pre-2013 'other non-bank reported' and post-2013 'other non-financial reported' are two tiny components in the U.S. consolidated balance sheet.

given by:

$$Contrib_{i,t,T}^{type} = \frac{w_{i,t}^{type} R_{t,T}^{i}}{R_{t,T}^{type}} \tag{2}$$

Table 2 shows the cumulative growth rate for each item. The last column shows the growth rate of the sum of the assets and liabilities of that item. It reveals that official assets and liabilities and U.S. non-bank multinationals experienced the two highest cumulative growth rates over this period. While the growth in official assets and liabilities has been widely discussed by policymakers since at least Bernanke (2005), the latter has received far less public attention until recently.

Table 3 describes the relative contribution of each of the components to consolidated foreign assets, liabilities and the sum of both items between 1999 and 2018. The table reveals that almost half of the cumulative growth rate observed in the sum of consolidated assets and liabilities during this period can be attributed to U.S. non-bank multinational enterprises. In order of relevance, this component is followed by private portfolio investments and the non-bank affiliates of foreign multinationals. Interestingly, the activities of U.S. banks and foreign banks accounted for only 6% and 4% of the observed expansion of the consolidated balance sheet during the period respectively.

Figures 6 and 7 illustrate the decomposition of consolidated foreign assets and liabilities respectively over the sample period. As it can be seen, the share of U.S. non-bank MNE assets grows between 1999 and 2018. U.S. non-bank MNE assets represent 38.2% of total U.S. foreign assets in 1999 and 52.5% in 2018. Similarly, the share of U.S. non-bank MNE liabilities also increased during that period. U.S. non-bank MNE liabilities represent 25.0% of total U.S. foreign assets in 1999 and 35.8% in 2018.

The increasing importance of U.S. non-bank MNEs over our sample period overlaps with the significant increase in the share of profits made abroad among U.S. corporates documented by Zucman (2014). It is possible that tax-motivated profit shifting activities by MNEs have led to both an increase in the share of profits as well as in asset holdings abroad. The following session empirically explores the link between the U.S. foreign balance sheet and the corporate income tax differential.

While the share of U.S. non-bank MNE assets and liabilities has grown over time, the opposite has happened to U.S. affiliates of foreign multinational enterprises. The share of U.S. assets related to U.S. affiliates of foreign multinationals fell from 27.1% in 1999 to 15% in 2018. Likewise, the share of their liabilities have decreased from 30.2% in 1999 to 19.5% in 2018.

The share of bank-related foreign assets had grown prior to the Global Financial Crisis. Since then, it has fallen back to back to the level register in the first year of our sample. After reaching its peak at 15.1% in 2008, the share of bank-related U.S. foreign assets

returned to 11.0% in 2018 which is the same share registered in 1999. Such dynamics is largely driven by foreign banks as its share went from 5.5% in 1999 to a peak of 10% in 2008 and has since then declined to 4.4% in 2018. Such findings are in line with that of McCauley et al. (2019) that show that the decline in bank positions following the Global Financial Crisis has been driven by European banks rather than U.S. banks.

4 Empirical Analysis

The prominent role played by U.S. non-bank multinationals suggests that factors associated with firm-wide decision-making on the geographic allocation of assets and liabilities can also be associated with the increase in U.S. consolidated-based IFI (IFI^{CO}) over the sample period. In this section, we investigate whether the corporate tax differential between the U.S. and the rest of the world is associated with the consolidated measure of international financial integration (IFI_t^{CO}), the cross-border measure of IFI (IFI_t^{XB}) and the time-varying difference between the two series.

Tørsløv et al. (2018) estimate that close to 40% of multinational profits are shifted to low-tax countries globally. These tax-motivated decisions to shift profits and assets abroad lead to an increase in the IFI of the home country. Once an asset previously located in the home country is sold to a subsidiary abroad, it also enters the consolidated balance sheet of that country.

While some of these geographical decisions by MNEs can be correctly captured by cross-border statistics, this may not always be the case. In our example, suppose the U.S. MNE transfers one asset worth $100 to its Dutch affiliate. If this purchase is funded via an inter-company loan of the same amount, the U.S. cross-border balance sheet will register a $100 increase in assets due to this outward FDI activity by the parent company. For a different reason, the U.S. consolidated balance sheet will also increase by $100 not because of the inter-company funding but rather due to the fact that the transferred asset is no longer an U.S. domestic asset. As a result, the cross-border and consolidated IFI indicators will increase by $100.

However, if the purchase made by the affiliate is funded by borrowing $100 from a Dutch bank, this transaction would no longer lead to an increase in U.S. foreign assets using the cross-border methodology. This is because there is no cross-border financing from the home country involved. However, this transaction would still produce a $100 increase in U.S. consolidated foreign assets for the reason exposed above. In addition, U.S. consolidated foreign liabilities would also increase by $100 as this loan represents a liability of a U.S. company with respect to a Dutch agent. In this sense, the U.S. consolidated-based IFI would increase by $200 while no change would be recorded in its

cross-border analogue. The difference between the two measures would widen.

As a first step, we empirically test whether the two measures of international financial integration are associated with the corporate income tax differential between the U.S. and the rest of the world. We compute the tax differential between the U.S. and the rest of the world as the difference between the U.S. statutory corporate income tax rate and a weighted average of the statutory corporate tax rate of other countries. In our baseline specification, this average is calculated by weighting the statutory corporate tax rate of twenty-six countries based on the sum of bilateral FDI positions vis-à-vis the U.S. for each year.[3] Data on statutory corporate income tax rates come from the OECD and is available for the period between 2000 and 2018. Data on bilateral FDI positions to compute the time-varying weights come from the U.S. BEA.

The two measures of IFI present a positive time trend. We proceed by detrending the two variables IFI_t^{CO} and IFI_t^{XB} by running two separate regressions of each variable on a constant and a linear trend. Throughout our analysis, we focus on the resulting residuals $IFIC_t^{CO}$ and $IFIC_t^{XB}$. We focus on the cycle as the two measures of IFI move slowly and we want to study the dynamics of the two variables with respect to the tax differential. As the corporate income tax rate differential also presents a time trend, we detrend it by applying the same procedure generating the variable $CorpTax_t$.

Then we run the following linear regression of $IFIC_t^i$ where $i = XB$ or CO on the corporate income tax differential $CorpTax_t$ and a set of control variables $\mathbf{X}$.

$$IFIC_t^i = \alpha + \beta CorpTax_t + \mathbf{X}_t\mathbf{B} + \epsilon_t \tag{3}$$

We include trade openness as a control variable given the linkages between international trade and financial integration. The stock market capitalisation is also included as a control variable to proxy for the degree of financial deepening of the U.S. economy. Data on both variables come from the World Bank.

Table 4 shows the results of the regressions of both dependent variables. We find positive and statistically significant coefficient estimates associated with $CorpTax_t$ in both univariate and multivariate regressions of the two measures of IFI. These results indicate that there is a positive relation between corporate income tax differential and IFI both when measured using cross-border statistics as well as when computed using our consolidated estimate of international exposure. Such finding is in line with what one would expect given the well-documented increase in profit shifting activities and its effects on international accounts.

[3]The countries include Austria, Belgium, Bermuda, Brazil, Canada, Chile, China, Denmark, France, Germany, Hong Kong, India, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, Norway, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland and the United Kingdom.

The results also suggest that the corporate income tax differential is more strongly correlated with the consolidated-based measure IFI_t^{CO} than to its cross-border analogue IFI_t^{XB}. Given the faster growth registered by the consolidated measure of IFI, we investigate whether the corporate income tax differential is also positively associated with the time-varying difference between the two measures. If so, it would be an indication that the corporate income tax differential leads agents to expand their global financial footprint beyond what is captured by cross-border statistics.

As the U.S. consolidated-based IFI grew more rapidly than the cross-border analogue, the difference between the two series also present a positive time trend. In order to remove this trend, we first run a regression of the difference $(IFI_t^{CO} - IFI_t^{XB})$ on a constant and a linear trend. We use the resulting residuals $(DIFI_t)$ as the detrended difference between the two series.[4] Once again, we focus on the cycle as the difference moves slowly and we want to study the dynamics of this difference with respect to the tax differential.

We run the following linear regression of $DIFI_t$ on the corporate income tax differential $CorpTax_t$ and the same set of control variables $\mathbf{X}$ as in the separate regressions.

$$DIFI_t = \alpha + \beta CorpTax_t + \mathbf{X}_t\mathbf{B} + \epsilon_t \tag{4}$$

Results are shown in Table 5. We find positive and statistically significant coefficient estimates associated with the corporate income tax rate differential in both uni-variate and multivariate regressions. In the simple linear regression shown in column (1), a one percentage point increase in the corporate income tax differential is associated with a five percentage points of GDP increase in the difference between IFI^{CO} and IFI^{XB}. The positive coefficient is statistically significant at the 1% level. Column (2) displays the results of the multivariate linear regression with control variables. The coefficient estimate associated with $CorpTax$ is positive and statistically significant at the 5% level. It indicates that a one percentage point increase in the corporate income tax differential is associated with a 3.75% of GDP increase in $DIFI$.

These results suggest that the difference between the U.S. consolidated and cross-border IFI is positively associated with the corporate income tax differential. We interpret this as an indication that there is a systematic link between the corporate income tax differential and the part of the U.S. international balance sheet that is not captured by cross-border statistics. The main implication of this finding is that international financial integration is more closely associated with the corporate tax differential than when considering only cross-border measures.

[4] $DIFI_t = (IFI_t^{CO} - IFI_t^{XB}) - (\widehat{IFI_t^{CO} - IFI_t^{XB}})$ where $(\widehat{IFI_t^{CO} - IFI_t^{XB}})$ are the fitted values of the difference on a constant and a time trend.

Despite the prominent role played by multinational enterprises in expanding U.S. IFI, it is possible that this positive link between $DIFI_t$ and $CorpTax_t$ is driven by components of the external balance sheet that are unrelated to these companies. To test this hypothesis, we decompose both the consolidated and cross-border measures of IFI into one part that is related to activities of multinational enterprises and one that is not.[5]

We follow the same procedure implemented to compute $DIFI$: We calculate the difference between the consolidated and cross-border measures for each of the two components and separately detrend the two time-varying differences. This procedure generates the detrended difference in part of IFI related to multinationals $DMNE_t$ and the detrended difference in the part of IFI that is not related to multinationals $DXME_t$. We then separately regress these two variables on the set of controls and $CorpTax_t$ to investigate the link between the tax differential and MNEs.

Columns (3) and (4) in Table 5 show the regression results for $DMNE_t$. The coefficient estimates associated with the corporate income tax differential are positive and statistically significant in both specifications. This indicates that the difference between the two measures of multinational-related IFI is positively associated with the corporate income tax differential. As such, it is evidence that the part of the U.S. balance sheet not captured by cross-border statistics that is related to MNEs is positively related to the corporate income tax differential.

Similarly, columns (5) and (6) in Table 5 show the regression results for $DXME_t$. The coefficient estimates associated with the corporate income tax differential are also positive and statistically significant in both specifications albeit smaller in magnitude compared to the results from the regression on $DMNE_t$. We see this as evidence that the part of the U.S. balance sheet not captured by cross-border statistics and not related to multinational enterprises is also positively correlated with the corporate income tax differential.

Taken together, the regression results shown in columns (4) and (6) approximately decompose the coefficient estimates of the regression (2) of $DIFI_t$ into a part associated with $DMNE_t$ and another associated with $DXME_t$. Such decomposition shows that around 80% of the coefficient estimate associated with $CorpTax_t$ comes from the part related to multinational enterprises while only 20% is attributed to the part that is not related to MNEs.[6] This indicates that the positive relation between $CorpTax_t$ and $DIFI_t$

[5]For the consolidated balance sheet, the multinationals-related measure of IFI is computed as the sum of U.S. assets and liabilities with respect to U.S. MNEs and foreign MNEs operating in the U.S. divided by GDP. The part that is not related to MNEs is simply the difference between total IFI and this measure related to multinationals. For the cross border balance sheet, the measure related to multinationals is imperfectly approximated by the sum of U.S. FDI assets and liabilities divided by GDP. Similarly, the part not related to MNEs is the difference between total IFI and this FDI-related measure.

[6]Calculated as the coefficient estimate associated with $CorpTax_t$ in the regression of $DMNE_t$ (3.03) divided by the coefficient estimate in the regression of $DIFI_t$ (3.75). The latter can be approximated by the sum of the coefficient estimate that comes from the regression of $DMNE_t$ (3.03) plus the coefficient

is largely driven by the difference associated with multinational enterprises $DMNE_t$.

In sum, the results shown in Table 5 indicate that the difference between the two measures of IFI, which captures the part of the U.S. balance sheet not captured by cross-border statistics, is positively associated with the corporate income tax differential. This positive link emerges both when analysing only the part of the balance sheet related to multinational enterprises as well as to the part not related to these companies. When quantitatively decomposing the link between $CorpTax_t$ and $DIFI_t$, we estimate that around 80% of the coefficient estimate of the regression can be attributed to the difference in the part related to MNEs.

4.1 Robustness

As a first robustness check, we run the same analysis on $DIFI_t$ using alternative definitions of the corporate income tax rate differential between the U.S. and the rest of the world. Besides the baseline specification using FDI-based weights, we calculate it as the difference between the U.S. corporate tax rate and (1) the average corporate tax rate from the OECD database, (2) the median corporate tax rate, (3) the trade-weighted average corporate tax rate and (4) the portfolio-weighted average corporate tax rate.

The trade-weighted average corporate tax rate is constructed based on the relative sum of exports and imports of goods and services for the main U.S. trading partners. Table 6 lists the countries included in the construction of this index. We use yearly data from the U.S. Federal Reserve Board to compute the time-varying weights and apply these weights on the statutory corporate income tax rate of the trading partners.[7]

Similarly, the portfolio-weighted average corporate tax rate is constructed using IMF Coordinated Portfolio Investment Survey (CPIS) data to compute time-varying weights. After selecting a group of 31 countries shown in Table 6, we compute the weights as the relative sum of inward and outward portfolio between country i and the United States in any given year. Once again, we apply these weights on the statutory corporate income tax rate of these countries to calculate portfolio-weighted average corporate tax rate.

Table 7 shows the results for both the uni-variate and multivariate regressions on each alternative definition of $CorpTax$. We find positive and statistically significant estimates for three out of the four alternative specifications. In particular, we find the coefficient estimate associated with the tax differential to be positive and statistically significant at the 5% level when we compute the tax differential using the average corporate tax rate

estimate that comes from the regression of $DXME_t$ (0.715).

[7] In a separate exercise, we estimated the trade-weighted average corporate income tax rate using the relative sum of exports and imports of goods only for all U.S. trading partners. The results were similar to those shown in Table 6. Importantly, we find that the coefficient associated with $CorpTax_t$ remains positive and statistically significant.

and the trade-weighted average corporate tax rate. When the tax differential is measured using the median statutory corporate income tax rate from the OECD database, the coefficient estimate associated with $CorpTax$ is still positive but statistically significant at the 10% level. Lastly, we find positive but statistically indistinguishable from zero coefficient estimates when using the portfolio-weighted average corporate tax rate to calculate $CorpTax$.[8]

Then we conduct a similar exercise using these five alternative measures of $CorpTax$ but replacing the stock market capitalisation by the natural logarithm of the Financial Development Index ($ln(FIX)$) as a different proxy for the degree of financial deepening. The FIX is elaborated by the IMF and includes nine different measures of financial development as described in Svirydzenka (2016).

Results are shown in Table 8. We find that the coefficient estimate on $CorpTax$ is positive and statistically significant at the 5% level when calculated using four out of the five different specifications. In particular, we find statistically significant estimates when using FDI-based and trade-based weights as well as when using the average and median corporate tax rates. As before, we find a positive but statistically indistinguishable from zero coefficient estimate when using the portfolio-based weights.

Another robustness check we conduct is including real GDP growth-related variables in our baseline regression using FDI-based $CorpTax$. The main reason behind this check is that agents could direct their international investments to regions presenting higher growth rates when compared to alternatives. In such case, one would expect U.S. IFI to be correlated with the growth differential between the U.S. and the rest of the world. We proceed by computing the weighted-average annual real GDP growth rate of counterpart economies using FDI-based weights described above. Data on real GDP growth rates come from the World Bank. Then we calculate the differential between the U.S. annual real GDP growth rate and this weighted-average series. We include both the real GDP growth differential and the weighted-average real GDP growth rate of counterpart economies separately in our baseline model to test if our findings stand.

Table 9 shows that the coefficient estimate associated with $CorpTax$ does not materially change in the regressions including growth-related variables. It remains statistically significant at the 5% level across specifications. Neither the coefficient associated with growth differential nor that associated with the real GDP growth rate of counterpart economies are statistically significant at the 10% level.

Overall, we conclude that there is supportive evidence that the corporate income tax differential is positively associated with the difference between the consolidated and

[8]We also estimated these regressions using a common set of counterpart countries. The results were similar to those shown in Table 7 using the different set of countries described in Table 6.

cross-border measures of U.S. IFI. This indicates that international financial integration is more closely associated with the corporate tax differential than when considering only cross-border measures.

5 U.S. Multinationals and missing foreign assets

Profit shifting activities often involve transferring a domestic asset to an affiliate located in a low-tax country. As discussed in the introduction, such inter-company sale leads to an increase in consolidated assets. This can also produce an increase in cross-border assets if the sale is financed by the parent company via cross-border funding from the home country. Motivated by the result that both IFI measures are positively correlated with tax differentials and by the leading role played by multinational enterprises, we turn our focus to the association between tax differentials and their assets.

We proceed by decomposing consolidated and cross-border assets into MNE-related and MNE-unrelated. Using our methodology, the part associated with non-bank MNEs is computed as foreign assets related to U.S. multinational enterprises abroad. This produces an estimate of MNEs consolidated foreign assets ($AMNE_t^{CO}$). The part unrelated to MNE activities ($AXME_t^{CO}$) is computed as the difference between total (A_t^{CO}) and MNEs consolidated assets ($AXME_t^{CO} = A_t^{CO} - AMNE_t^{CO}$). Regarding cross-border measures, the estimate of U.S. external assets (A_t^{XB}) comes directly from the U.S. IIP database. For cross-border assets related to multinationals, ($AMNE_t^{XB}$) we take FDI assets.[9] Lastly, cross-border assets not related to multinationals ($AXME_t^{XB}$) is computed as the difference between total cross-border assets and FDI assets. After decomposing foreign assets, we divide all six by GDP and detrend them using the same procedure in Section 4.[10]

For each cycle variable $z \in Z = \{AC_t^{CO}, AMNE_t^{CO}, AXME_t^{CO}, AC_t^{XB}, AMNE_t^{XB}, AXME_t^{XB}\}$, we estimate the following regression on the same set of control variables $\mathbf{X}$ as in the baseline regression and FDI-weighted $CorpTax_t$:

$$z_t = \alpha + \beta CorpTax_t + \mathbf{X}_t\mathbf{B} + \epsilon_t \tag{5}$$

Table 10 displays the regression results for all six dependent variables. Columns (2) and (4) show that the coefficient estimate associated with $CorpTax_t$ (1.61) for MNEs

[9] This is an imperfect estimate of multinationals-related assets as it includes bank-related positions. Other potential issues with the usage of FDI positions are described by Blanchard and Acalin (2016).

[10] We separately estimate regressions of each variable on a constant and a time trend and store the resulting residuals as the detrended variables. In terms of notation, we add a capital letter C at the end of each variable name to denote cycle variables. For example, we label AC_t^{CO} the detrended consolidated foreign assets as a percentage of GDP.

is substantially larger than the its cross-border analogue (0.69). We see this as further evidence that tax related reasons lead U.S. MNEs to expand their global footprint beyond what is captured by cross-border statistics.

Using the coefficient estimates from Table 10 on 2018 values, we estimate that a 1% increase in $CorpTax_t$ is associated with a USD 332bn increase in consolidated assets related to MNEs. The same increase is associated with a mere USD 142bn increase in cross-border assets.[11] Ultimately, these estimates indicate that a 1% increase in the tax differential is associated with a USD 190bn increase in the difference between consolidated and cross-border assets related to U.S. MNEs, a dimension not captured by traditional Balance of Payments procedures.

These results are also in line with our previous findings showing that the an increase in $CorpTax_t$ is associated with a larger gap between the two IFI measures. Focusing on cross-border statistics potentially misses out a key dimension related to how multinational enterprises expand their global financial footprint.

6 Conclusion

Multinational enterprises make decisions on how to geographically distribute assets and liabilities considering the tax codes of the countries they operate in. Since these generate holdings that constitute part of countries foreign balance sheets, they directly impact de-facto measures of international financial integration (IFI).

The industry-standard IFI measure relies on publicly available cross-border statistics. While this is a useful approach for studying financial globalisation, it presents limitations related with the complexity of international investments and ownership structure. In addition, this approach leaves out international investments such as local positions of national affiliates in foreign countries and leaves in intra-group positions.

An alternative approach that correctly accounts for these international investments is to apportion assets and liabilities according to the nationality of the ultimate owner. By employing such methodology, assets and liabilities would not be recorded focusing on cross-border transactions only, but considering all international investments based on the nationality of the ultimate counterparts.

We construct the U.S. consolidated balance sheet for the period between 1999 and 2018. Adopting such consolidated approach reveals that U.S. international financial integration is on average two times larger than when computed using the traditional cross-

[11] The two dollar amounts are estimated by multiplying the coefficient estimates associated with $CorpTax_t$ on the respective consolidated and cross-border assets related to multinational enterprises by the U.S. 2018 GDP. These values represent 0.64% of U.S. consolidated assets and 0.60% of cross-border assets respectively.

border approach, as reported by BIS (2015) for 2012.

In line with that finding, our exercise confirms that U.S. non-bank multinational enterprises represent the largest source of U.S. international financial integration. In addition, they deliver the most relevant contribution to the expansion of IFI over our sample period. Around half of the expansion in consolidated-based IFI can be attributed to these firms. Given the well-documented link between the geographical decisions by multinational enterprises and tax planning, we investigate whether the corporate income tax differential between the U.S. and the rest of the world is associated with the consolidated- and cross-border based measures of IFI.

Using these novel data, we document that both IFI measures and their difference are positively correlated with tax differentials. Such finding is robust with respect to alternative specifications, control variables and tax differential definitions. Furthermore, we find that an increase in tax differentials is associated with a larger increase in consolidated than in cross-border assets of multinational enterprises. We interpret this as an indication that MNEs expand their global financial footprint beyond what is captured by cross-border statistics. Thus, we provide further evidence on the importance of elaborating consolidated-based measures of international financial positions as indicated by Lane (2021).

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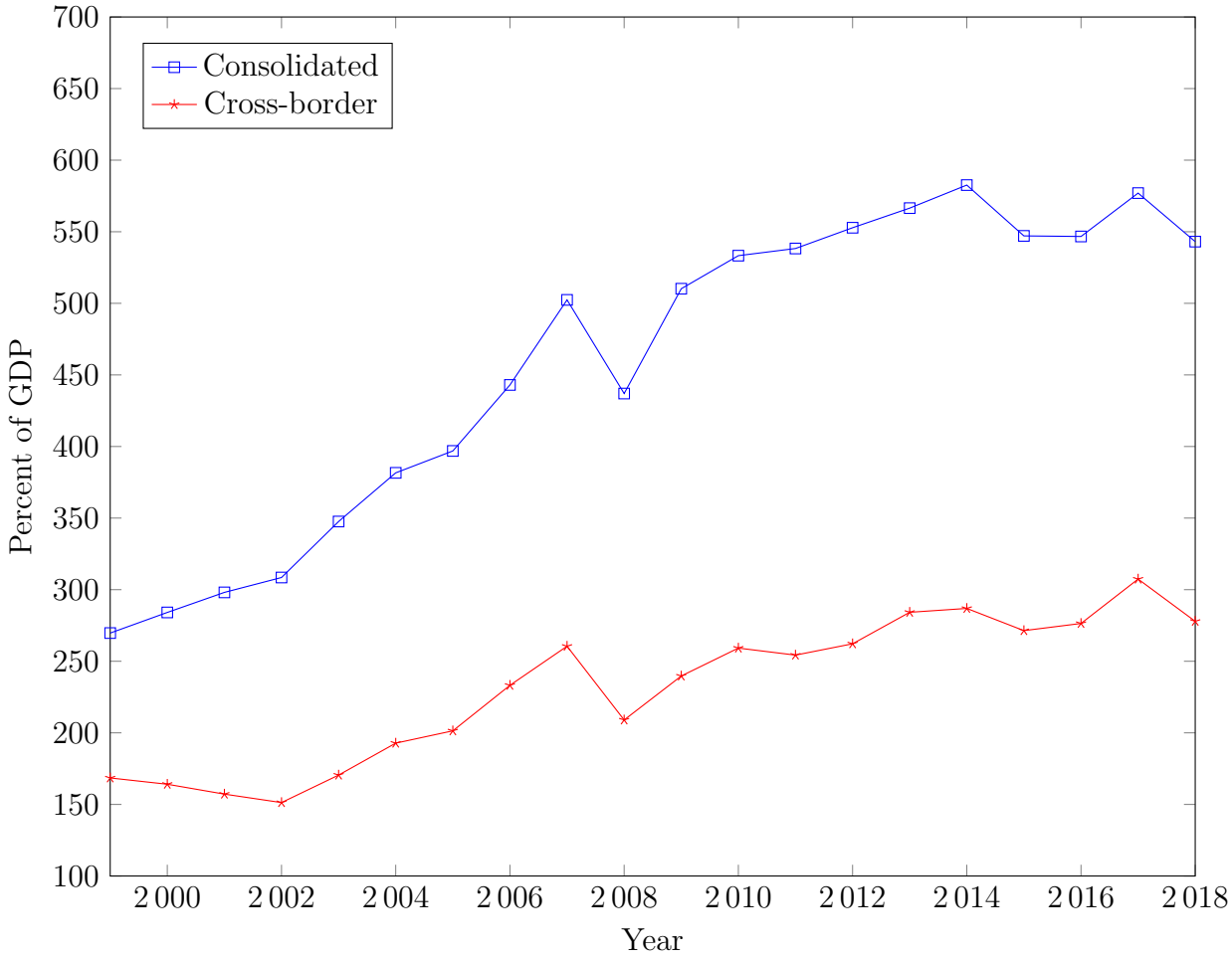
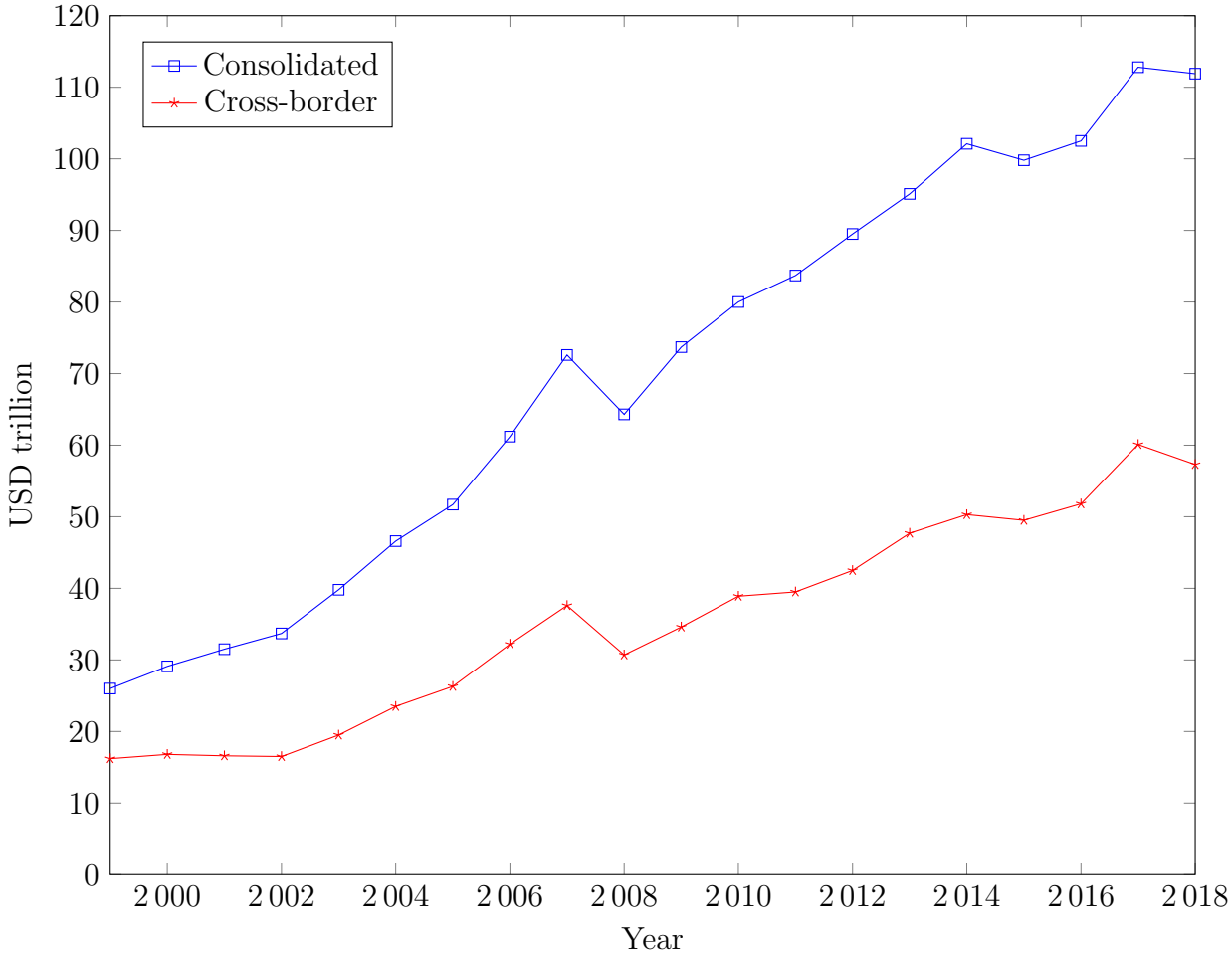
Figure 1: U.S. International Financial Integration



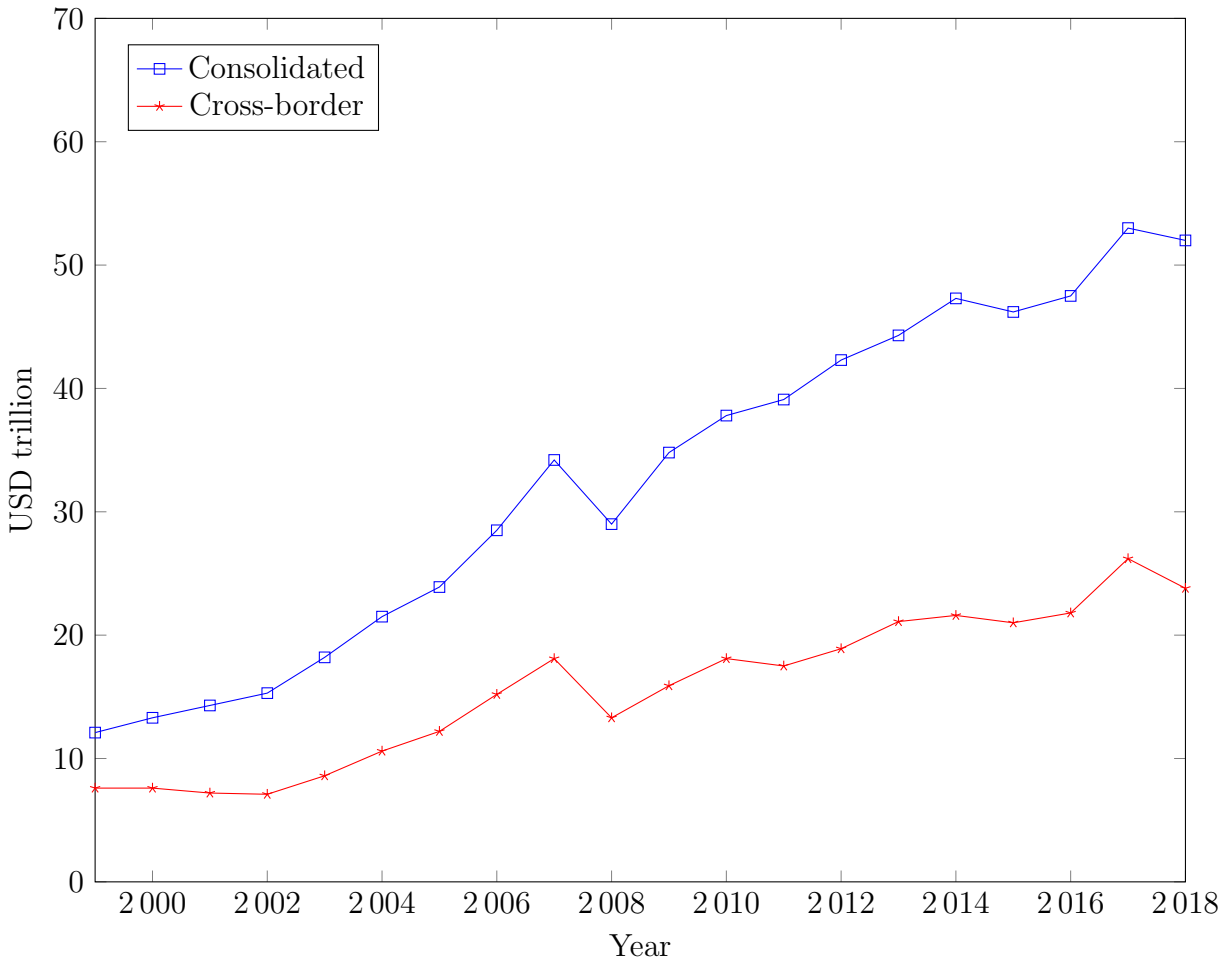
Note: This figure shows the evolution of consolidated-based and cross-border based measures of U.S. International Financial Integration. U.S. IFI is computed as the sum of foreign assets and liabilities divided by GDP. Our calculations do not include financial derivatives given the existing challenges to determine the nationality of their ultimate owners.

Figure 2: U.S. Foreign Assets plus Liabilities



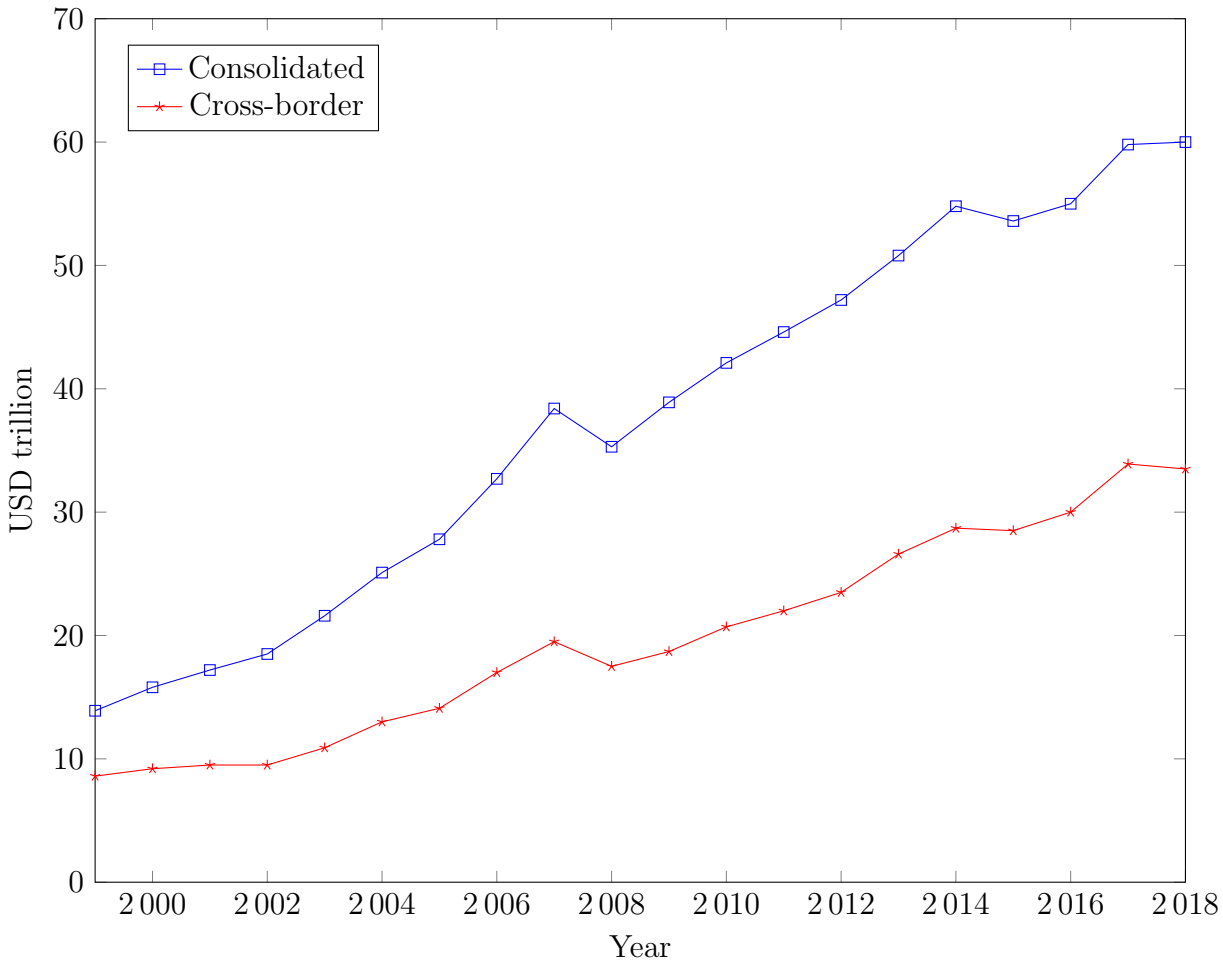
Note: This figure shows the evolution of consolidated-based and cross-border based sum of U.S. assets and liabilities. Our calculations do not include financial derivatives given the existing challenges to determine the nationality of their ultimate owners.

Figure 3: U.S. Assets



Note: This figure shows the evolution of consolidated-based and cross-border based U.S. assets. Our calculations do not include financial derivatives given the existing challenges to determine the nationality of their ultimate owners.

Figure 4: U.S. Liabilities

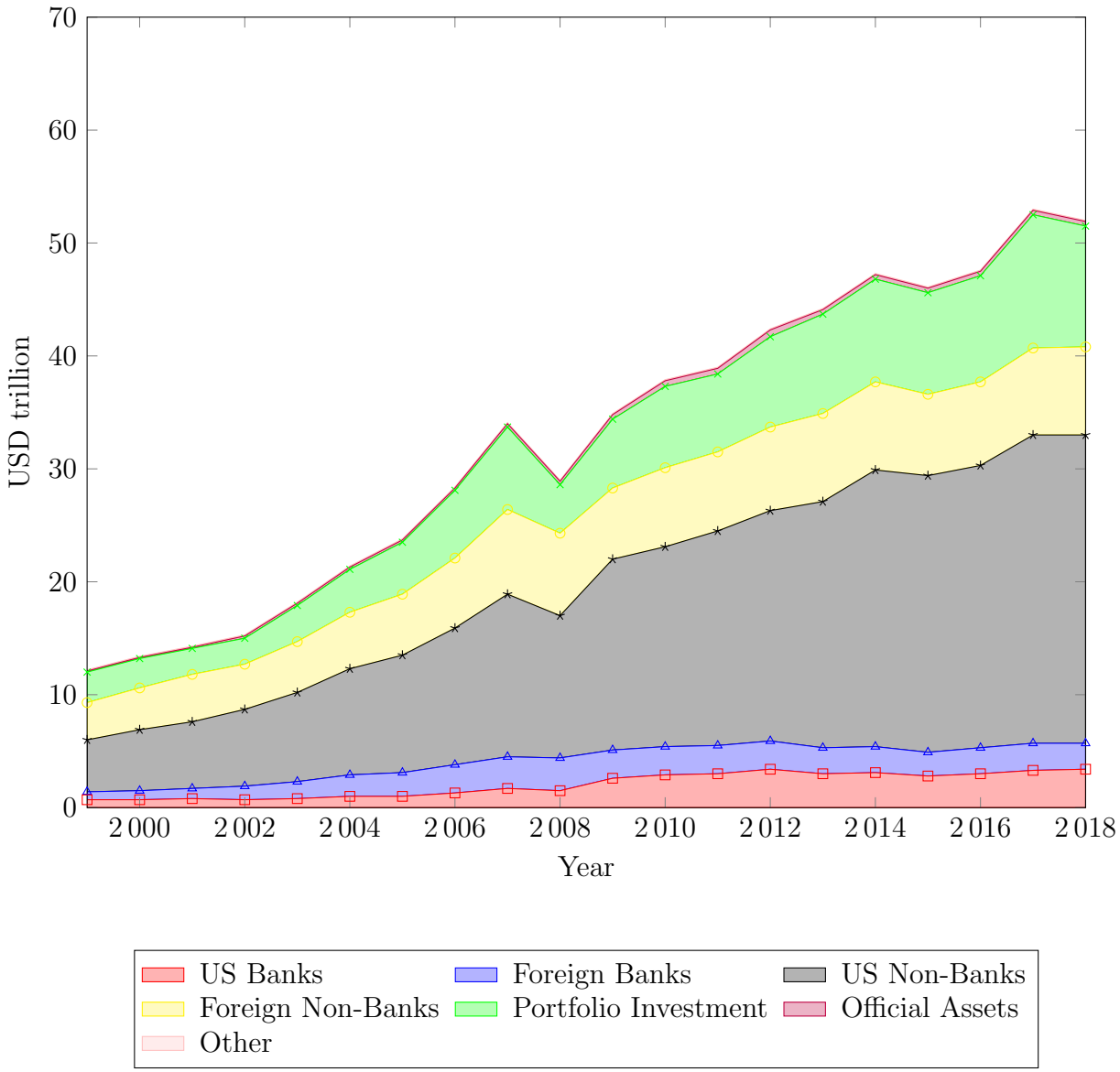


Note: This figure shows the evolution of consolidated-based and cross-border based U.S. liabilities. Our calculations do not include financial derivatives given the existing challenges to determine the nationality of their ultimate owners.

Figure 5: U.S. Net International Investment Position

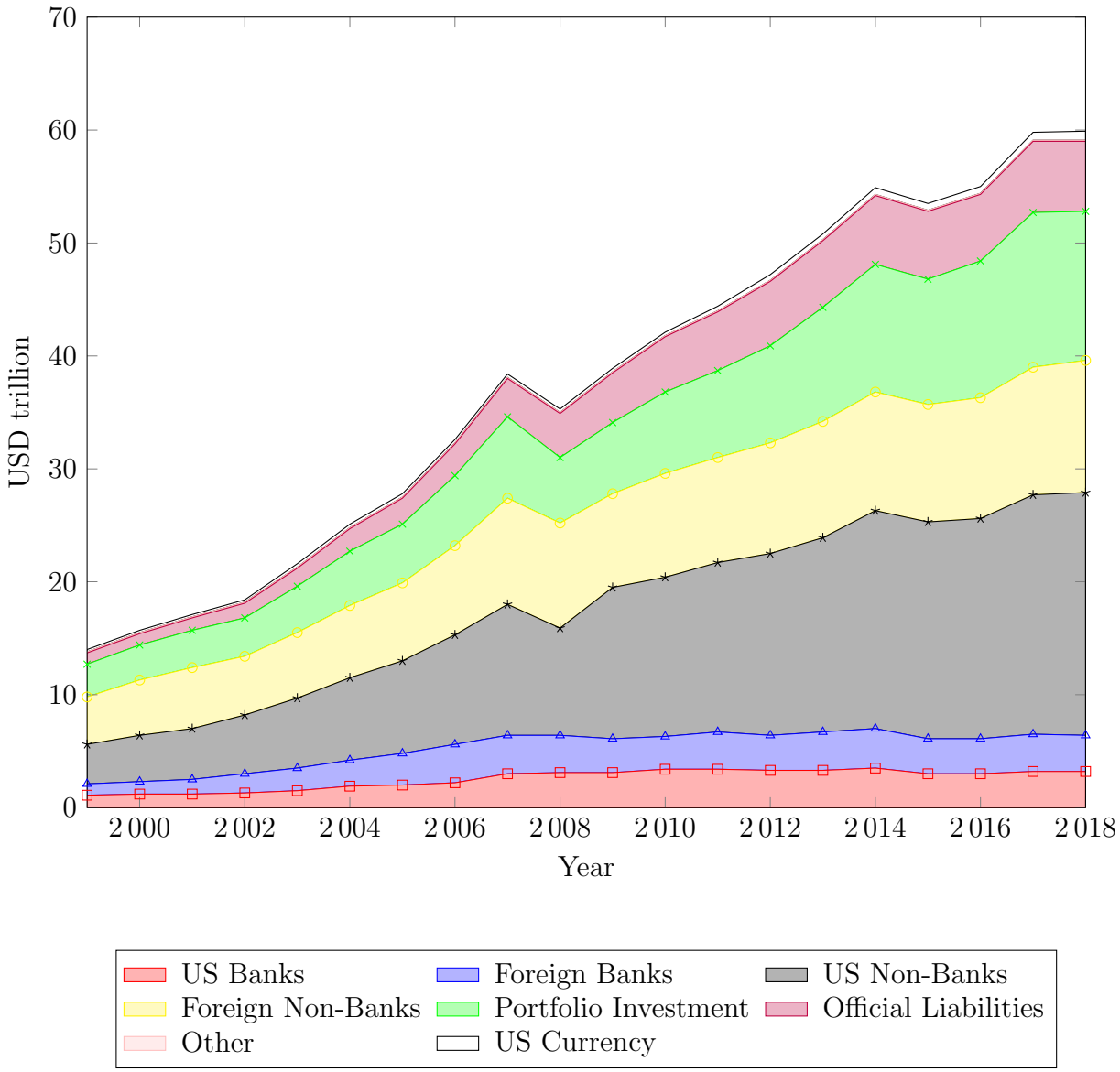
Note: This figure shows the evolution of U.S. Net International Investment Position (NIIP) using both the consolidated and cross-border approach. The NIIP is defined as the difference between U.S. assets and liabilities. Our calculations do not include financial derivatives given the existing challenges to determine the nationality of their ultimate owners.

Figure 6: U.S. Consolidated Foreign Assets



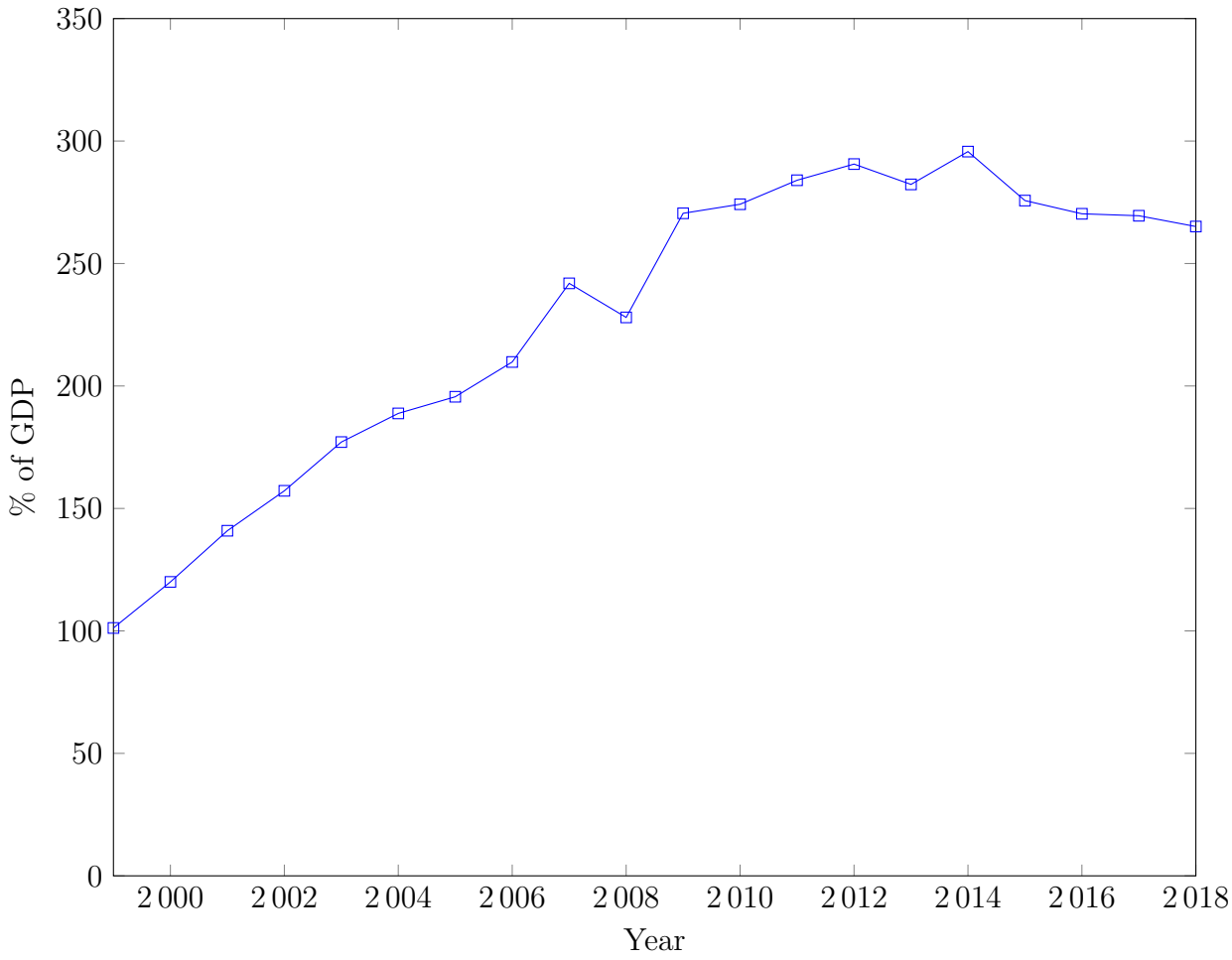
Note: This figure shows the time-varying composition of U.S. consolidated foreign assets over the sample period. The 'other non-financial reported assets' pre-2013 category and the 'other non-bank reported assets' post-2013 category are pooled into a 'other reported assets' subgroup that is quantitatively irrelevant.

Figure 7: U.S. Consolidated Foreign Liabilities



Note: This figure shows the time-varying composition of U.S. consolidated foreign liabilities over the sample period. The 'other non-financial reported liabilities' pre-2013 category and the 'other non-bank reported liabilities' post-2013 category are pooled into a 'other reported liabilities' subgroup that is relatively tiny.

Figure 8: Difference between Consolidated and Cross-Border IFI



Note: This figure the time-varying difference between the consolidated- and cross-border measures of U.S. International Financial Integration.

Table 1: U.S. Consolidated Foreign Balance Sheet - 2018 (USD bn)

Item	**Assets**	**Liabilities**
Bank-reported		
Consolidated US banks	3,419	3,214
Foreign banks	2,296	3,216
Financial non-banks		
U.S. multinationals	7,820	6,860
Affiliates of foreign multinationals	4,089	4,577
Non-financial companies		
U.S. multinationals	19,463	14,622
Affiliates of foreign multinationals	3,687	7,118
Private portfolio investments	10,664	13,250
Official assets and liabilities	449	6,249
Other non-financial reported	71	97
U.S. currency	-	774
Total	**51,958**	**59,977**

Note: This table shows the U.S. consolidated foreign balance sheet for the year of 2018. The consolidated balance sheet is constructed using a methodology similar that used in BIS (2015). It relies on publicly available data from the U.S. Bureau of Economic Analysis (BEA), the U.S. Treasury International Capital System (TIC), the Bank for International Settlements (BIS) and the Federal Reserve Board. The procedure used here to estimate the U.S. consolidated balance sheet is similar to that used in BIS (2015).

Table 2: Consolidated Foreign Balance Sheet Growth

Item	**Assets**	**Liabilities**	**Total**
Bank-reported			
Consolidated US banks	404%	191%	272%
Foreign banks	247%	225%	235%
Non-bank Enterprises			
U.S. multinationals	489%	521%	503%
Affiliates of foreign multinationals	137%	180%	161%
Private portfolio investments	302%	360%	332%
Official assets and liabilities	229%	552%	512%
Other reported	-7.8%	27%	9%
U.S. currency	-	271%	271%
Total	**329%**	**333%**	**331%**

Note: This table shows the cumulative growth rate of each item to the overall growth in U.S. foreign assets, liabilities and the sum of the two components over the sample period. For each item, the cumulative growth rate is calculated by dividing the stock value of each item at the end of our sample by its initial value and subtracting one.

Table 3: Relative Contribution to Consolidated Foreign Balance Sheet Growth

Item	**Assets**	**Liabilities**	**Total**
Bank-reported			
Consolidated US banks	7%	5%	6%
Foreign banks	4%	5%	4%
Non-bank Enterprises			
U.S. multinationals	57%	39%	47%
Affiliates of foreign multinationals	11%	16%	14%
Private portfolio investments	20%	22%	21%
Official assets and liabilities	1%	11%	7%
Other reported	0%	0%	0%
U.S. currency	-	1%	1%
Total	**100%**	**100%**	**100%**

Note: This table shows the relative contribution of each item to the overall growth in U.S. foreign assets, liabilities and the sum of the two components over the sample period. The relative contribution of each item is calculated as its relative weight in 1999 times its cumulative growth rate between 1999 and 2018.

Table 4: Regression results of measures of IFI

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable	$IFIC_t^{XB}$	$IFIC_t^{XB}$	$IFIC_t^{XB}$	$IFIC_t^{XB}$	$IFIC_t^{CO}$	$IFIC_t^{CO}$	$IFIC_t^{CO}$	$IFIC_t^{CO}$
Constant	-59.42	-31.32	-0.65	-98.62**	-161.04**	59.51	1.29	-86.62
	(37.56)	(24.30)	(3.76)	(39.86)	(77.63)	(52.94)	(7.16)	(85.91)
Trade Openness	2.23			2.01	6.04**			3.95
	(1.40)			(1.28)	(2.90)			(2.76)
Stock market capitalisation		0.24		0.34*		-0.46		-0.14
		(0.18)		(0.16)		(0.40)		(0.35)
CorpTax			2.63**	2.81**			7.72***	6.56**
			(1.24)	(1.17)			(2.35)	(2.52)
R^2	0.12	0.09	0.22	0.46	0.19	0.07	0.39	0.47

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

Columns (1) to (4) show the results of linear regressions of $IFIC_t^{XB}$ on control variables and on $CorpTax_t$ defined as the detrended statutory corporate income tax differential between the U.S. and the rest of the world using FDI-based time-varying weights. All regressions estimated using yearly data from 2000 to 2018. $IFIC_t^{XB} = (IFI_t^{XB}) - (\widehat{IFIC_t^{XB}})$ where $(\widehat{IFI_t^{XB}})$ are the fitted values of IFI_t^{XB} on a constant and a time trend. Columns (5) to (8) show the results of linear regressions of $IFIC_t^{CO}$ on the same variables. $IFIC_t^{CO} = (IFI_t^{CO}) - (\widehat{IFIC_t^{CO}})$ where $(\widehat{IFI_t^{CO}})$ are the fitted values of IFI_t^{CO} on a constant and a time trend.

Table 5: Regression results of the difference between consolidated and cross-border

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	$DIFI_t$	$DIFI_t$	$DMNE_t$	$DMNE_t$	$DXME_t$	$DXME_t$
Constant	1.93	12.00	1.71	11.15	0.22	0.85
	(4.77)	(51.34)	(4.08)	(43.12)	(0.91)	(11.07)
Trade Openness		1.94		1.71		0.23
		(1.65)		(1.39)		(0.36)
Stock market cap.		-0.48**		-0.43**		-0.05
		(0.21)		(0.18)		(0.05)
$CorpTax$	5.09***	3.75**	4.22***	3.03**	0.87**	0.71**
	(1.57)	(1.50)	(1.34)	(1.26)	(0.30)	(0.32)
R^2	0.42	0.57	0.37	0.57	0.33	0.40

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

Columns (1) and (2) show the results of linear regressions of $DIFI_t$ on control variables and on $CorpTax_t$ defined as the detrended statutory corporate income tax differential between the U.S. and the rest of the world using FDI-based time-varying weights. All regressions estimated using yearly data from 2000 to 2018. $DIFI_t = (IFI_t^{CO} - IFI_t^{XB}) - (\widehat{IFI_t^{CO} - IFI_t^{XB}})$ where $(\widehat{IFI_t^{CO} - IFI_t^{XB}})$ are the fitted values of the difference on a constant and a time trend. We decompose the difference in IFI into two parts: one that is related to the difference associated with multinational enterprises ($DMNE_t$) and another that is associated with all else but multinational enterprises ($DXME_t$). Columns (3) and (4) show the results of linear regressions of $DMNE_t$ on the control variables and $CorpTax_t$. Columns (5) and (6) show the results of linear regressions of $DXME_t$ on the control variables and $CorpTax_t$.

Table 6: Countries included in the construction of alternative $CorpTax$ measures

	Countries				
FDI-based	Austria	Belgium	Bermuda	Brazil	Canada
	Chile	China	Denmark	France	Germany
	Hong Kong	India	Ireland	Italy	Japan
	Luxembourg	Mexico	Netherlands	Norway	Portugal
	Singapore	South Korea	Spain	Sweden	Switzerland
	United Kingdom				
Trade-based	Brazil	Canada	China	France	Germany
	Hong Kong	India	Italy	Japan	South Korea
	Mexico	Saudi Arabia	Singapore	Taiwan	United Kingdom
Portfolio-based	Australia	Austria	Bermuda	Brazil	Canada
	Cayman Islands	Chile	China	Colombia	Denmark
	France	Germany	Hong Kong	India	Ireland
	Italy	Japan	Mexico	Netherlands	Norway
	Portugal	Saudi Arabia	Singapore	South Africa	South Korea
	Spain	Sweden	Switzerland	Thailand	Turkey
	United Kingdom				

This table shows the counter-party countries included when computing each of the alternative measures of corporate income tax differential. The time-varying weight for country i in a given year is determined as the sum of bilateral positions between the U.S. and country i that year divided by the sum of the bilateral positions with respect to the U.S. for all countries in the group. The average and median-based corporate income tax rate differential are calculated using a list of 107 countries from the OECD database. The portfolio-based corporate income tax weights for the year of 2000 are set equal to those in 2001 due to data availability issues.

Table 7: Regressions using alternative definitions of corporate tax differential

	FDI		Trade		Portfolio		Average		Median	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent Variable: $DIFI_t$										
Constant	1.93	12.00	1.93	13.89	1.93	7.78	1.93	19.00	1.93	15.30
	(4.77)	(51.34)	(4.70)	(51.45)	(5.60)	(56.77)	(4.63)	(50.32)	(5.03)	(54.10)
Trade Openness		1.94		1.79		2.60		1.64		1.97
		(1.65)		(1.67)		(1.78)		(1.64)		(1.75)
Stock market capitalisation		-0.48**		-0.47**		-0.59**		-0.47**		-0.51**
		(0.21)		(0.21)		(0.23)		(0.21)		(0.22)
$CorpTax$	5.09***	3.75**	5.01***	3.66**	3.61	2.72	5.22***	3.94**	4.82**	3.41*
	(1.57)	(1.50)	(1.48)	(1.47)	(2.08)	(1.78)	(1.49)	(1.46)	(1.73)	(1.65)
R^2	0.40	0.57	0.42	0.57	0.17	0.47	0.44	0.59	0.33	0.52

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

This table shows the results of linear regressions of $DIFI_t$ on control variables and on $CorpTax_t$. We use five alternative definitions of $CorpTax_t$. The first three are constructed using FDI-based, trade-based and portfolio-based time-varying weights respectively. The last two alternatives respectively use the average and median statutory corporate tax from the OECD database. Regressions estimated using yearly data from 2000 to 2018. $DIFI_t = (IFI_t^{CO} - IFI_t^{XB}) - (\widehat{IFI_t^{CO} - IFI_t^{XB}})$ where $(\widehat{IFI_t^{CO} - IFI_t^{XB}})$ are the fitted values of the difference on a constant and a time trend. Point estimates are not directly comparable across specifications as each $CorpTax_t$ alternative was constructed using a different set of countries due to data availability. When using the same set of countries in the construction of $CorpTax_t$, the coefficient estimates do not change significantly. The regressions displayed here capture heterogeneity both in the weighting scheme as well as in the set of countries used in the construction of each $CorpTax_t$.

Table 8: Regressions using alternative definitions of corporate tax differential

	FDI	Trade	Portfolio	Average	Median
Dependent Variable: $DIFI_t$					
Constant	-72.19	-61.76	-111.66	-59.82	-72.82
	(71.25)	(72.08)	(78.11)	(71.09)	(76.78)
Trade Openness	1.77	1.58	2.59	1.44	1.81
	(1.90)	(1.90)	(2.11)	(1.89)	(2.02)
ln(Financial Development)	-212.33	-168.74	-350.09	-183.29	-207.04
	(404.86)	(405.95)	(454.27)	(398.44)	(432.84)
$CorpTax$	4.48**	4.45**	2.95	4.66**	4.10**
	(1.71)	(1.66)	(2.12)	(1.67)	(1.92)
R^2	0.43	0.43	0.26	0.45	0.36

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

This table shows the results of linear regressions of $DIFI_t$ on control variables and on $CorpTax_t$. We use five alternative definitions of $CorpTax_t$. The first three are constructed using FDI-based, trade-based and portfolio-based time-varying weights respectively. The last two alternatives respectively use the average and median statutory corporate tax from the OECD database. Regression estimated using yearly data from 2000 to 2018. $DIFI_t = (IFI_t^{CO} - IFI_t^{XB}) - (\widehat{IFI_t^{CO} - IFI_t^{XB}})$ where $(\widehat{IFI_t^{CO} - IFI_t^{XB}})$ are the fitted values of the difference on a constant and a time trend.

Table 9: Regression results including growth-related controls

	(1)	(2)	(3)
Dependent Variable: $DIFI_t$			
Constant	12.00	5.96	5.54
	(51.34)	(52.29)	(54.34)
Trade Openness	1.94	1.91	1.95
	(1.65)	(1.67)	(1.70)
Stock market capitalisation	-0.48**	-0.48*	-0.41
	(0.21)	(0.23)	(0.26)
$CorpTax$	3.75**	3.99**	3.68**
	(1.50)	(1.54)	(1.55)
Growth Differential		4.22	
		(4.94)	
RoW Growth			-1.49
			(3.07)
R^2	0.57	0.59	0.57

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

This table shows the results of linear regressions of $DIFI_t$ on control variables and on $CorpTax_t$ defined as the detrended statutory corporate income tax differential between the U.S. and the rest of the world using FDI-based time-varying weights. Relative to our baseline model, we separately add two explanatory variables. RoW Growth is the annual real GDP growth rate of the counterpart economies using FDI-based weighted. Growth Differential is the difference between the U.S. annual GDP growth rate and RoW Growth. Regression estimated using yearly data from 2000 to 2018. $DIFI_t = (IFI_t^{CO} - IFI_t^{XB}) - \widehat{(IFI_t^{CO} - IFI_t^{XB})}$ where $\widehat{(IFI_t^{CO} - IFI_t^{XB})}$ are the fitted values of the difference on a constant and a time trend.

Table 10: Regression results of cross-border and consolidated-based assets

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable	AC_t^{XB}	$ACMNE_t^{XB}$	$ACXME_t^{XB}$	AC_t^{CO}	$ACMNE_t^{CO}$	$ACXME_t^{CO}$
Constant	-55.22**	-25.11***	-30.11	-45.16	-9.37	-35.79
	(28.08)	(7.31)	(21.07)	(45.62)	(19.02)	(31.06)
Trade Openness	1.22	0.22	1.00	1.91	0.31	1.60
	(0.90)	(0.24)	(0.68)	(1.47)	(0.61)	(1.00)
Stock market capitalisation	0.17	0.15***	0.02	-0.04	-0.01	-0.05
	(0.12)	(0.03)	(0.09)	(0.19)	(0.08)	(0.13)
CorpTax	1.69*	0.69***	1.00	3.29**	1.61**	1.68*
	(0.82)	(0.21)	(0.62)	(1.34)	(0.56)	(0.91)
R^2	0.37	0.67	0.31	0.43	0.41	0.38

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

This table shows the results of detrended consolidated- and cross-border assets on a set of control variables and the FDI-weighted $CorpTax_t$. We split assets into two parts: one that is related to activities by U.S. multinational enterprises ($ACMNE$) and one that is not ($ACXME$) and run the same regression on these two components for the two methodologies. Regressions estimated using yearly data from 2000 to 2018.

A Methodology

We construct estimates of consolidated foreign assets and liabilities using data from the U.S. Bureau of Economic Analysis (BEA), the U.S. Treasury International Capital System (TIC), the Bank for International Settlements (BIS) and the Federal Reserve Board. The procedure used here to estimate the U.S. consolidated balance sheet is similar to that used in BIS (2015). As such, it also does not include financial derivatives due to challenges in determining the ultimate beneficiaries of contracts. Table 11 summarizes the estimation procedure for the components of the consolidated balance sheet for the period between 2013 to 2018. Prior to that, we do not discriminate between financial non-banks and non-financial enterprises due to the available data reporting until then. As such, Table 12 summarizes the estimation procedure for the components of the consolidated external balance sheet for the period between 1999 to 2012.

A.1 U.S. banks and foreign banks

Consolidated U.S. bank assets are equal to the total claims of U.S. banks on all counterparts except U.S. counterparts. This data series is available on the BIS consolidated banking statistics database on a quarterly frequency. Consolidated U.S. bank liabilities are estimated as the local liabilities of U.S. banks abroad plus U.S. banks cross-border liabilities excluding those to related offices and central banks. The BIS banking data can be downloaded from the BIS Statistics Warehouse at https://stats.bis.org/.

The local liabilities of foreign banks operating in the U.S. relative to U.S. counterparts are booked as U.S. foreign assets. Similarly, the total claims of foreign banks on US counterparts are booked as U.S. foreign liabilities. These data series also come from the BIS consolidated banking statistics database and are reported on a quarterly basis.

A.2 Non-bank U.S. Multinational Enterprises

The total assets of U.S.-owned non-bank Multinational Enterprises (MNEs) operating outside the U.S. are booked as U.S. foreign assets.[12] The BEA provides yearly data on the total assets of U.S.-owned MNEs operating abroad on a sectoral basis. From 1999 up to 2012, we make no distinction between financial non-banks and non-financial firms. From 2013 onward, we separate the two groups to reflect the change in TIC reporting that occurred that year as the U.S. Treasury started to be reporting TIC data using

[12]We use total assets as a proxy for local assets owned by these companies in foreign countries due to data availability issues. Similarly, we assume that the total assets of U.S. affiliates of foreign multinationals are all local assets. This also limits the netting out of intra-group positions. As a result, the estimates of foreign assets and liabilities of both U.S. MNEs and U.S. affiliates of foreign MNEs can be seen as upper bounds.

a financial/non-financial firms breakdown as opposed to the previous banks/non-banks breakdown.

The estimated liabilities of these firms are calculated as the difference between their total assets and the U.S. foreign direct investment made in each specific sector. This difference provides an estimate of the portion of their total assets that are funded with resources other than those provided by the U.S. parent company. The FDI data also comes from the BEA and is available on a quarterly frequency.

As these data are available on a sectoral basis, policymakers can use them to assess the risks related to specific sectors and possible policy changes in other countries affecting these sectors. Given the aggregate focus of this paper, we use a bank/non-bank and financial/non-financial breakdown while acknowledging that further research can be done related to specific sectors.

A.3 Non-bank Foreign Multinational Enterprises

The total assets of foreign-owned MNEs operating in the U.S. are booked as U.S. foreign liabilities. We compute the U.S. foreign assets as the difference between the total assets of foreign-owned MNEs operating in the U.S. on a sectoral basis and the FDI received by the U.S. in each sector. This procedure is analogous to that used when booking U.S. external liabilities arising from U.S.-owned MNEs operating abroad. The difference between the total assets of foreign-owned MNEs operating in the U.S. and the FDI received by the U.S. in the same sector represents the amount of assets in that sector that were acquired by foreign-owned MNEs with resources other than those funded by the foreign parent.

As it is also the case for non-bank U.S. multinationals, we make no distinction between financial non-banks and non-financial firms between 1999 and 2012. From 2013 onward, we separate the two groups to reflect the change in TIC reporting that occurred that year. For the sectoral breakdown, where banking/financial firms data were not disclosed for all U.S. affiliates of foreign MNEs, we estimated it by applying the proportion observed for majority-owned U.S. affiliates as they represent more than 90 percent of the universe of all U.S. affiliates of foreign MNEs.[13]

[13]For the year of 2017, the total assets of all U.S. affiliates of foreign MNEs was equal to USD 15.8tn while the total assets of majority-owned U.S. affiliates of foreign MNEs was equal to USD 14.5tn. Of the latter, financial affiliates accounted for USD 8.3tn and non-financial affiliates accounted for USD 6.2tn. As such, we estimate the total assets of all non-financial U.S. affiliates of foreign MNEs as USD 6.8tn ($= 15.8 \cdot \frac{6.2}{14.5}$), which is booked as an U.S. foreign liability.

A.4 Private portfolio investments

U.S. private portfolio assets are equal to the total holdings of foreign securities by U.S. residents. This data series is available on the TIC database on a monthly frequency and starts in September 2011. Prior to that date, we use portfolio investment data from the U.S. International Investment Position database from the BEA on a quarterly frequency.

U.S. private portfolio liabilities are the total holdings of U.S. securities by non-residents, excluding foreign official agencies. This data series is available on the TIC database on a quarterly frequency and starts in December 2011. Prior to that date, U.S. private portfolio liabilities are calculated as the difference between U.S. total portfolio liabilities and the portfolio liabilities to foreign official agencies. Both series come from the BEA International Investment Position database.

A.5 Official assets and liabilities

U.S. official assets are equal to the U.S. reserve assets as reported in the IIP. This data series is available on the BEA International Investment Position database on a quarterly frequency. Similarly, U.S. official liabilities are equal to the U.S. liabilities to foreign official agencies. This includes U.S. equity and, most importantly, debt securities held by foreign official agencies as well as other investments. This data series also comes from the BEA and is available on a yearly frequency.

A.6 Other non-financial reported

Other non-financial reported U.S. foreign assets are claims on unaffiliated foreigners reported by U.S. non-financial companies. Other non-financial reported U.S. foreign liabilities are liabilities to unaffiliated foreigners reported by U.S. non-financial companies. Both data series come from the U.S. TIC and start in 2013. Prior to that year, our balance sheet decomposition does not discriminate between financial non-banks and non-financial companies as U.S. Treasury reported claims and liabilities reported by non-banks instead of by non-financial companies.

A.7 U.S. Currency

U.S. currency held by the rest of the world are booked as an U.S. foreign liability. This data series comes from the Federal Reserve Board Financial Accounts of the United States and is available on a quarterly frequency.

A.8 Cross-Border Estimates

The cross-border estimate of total assets used in this paper is the U.S. total assets excluding financial derivatives that comes from the international investment position database from the BEA. Similarly, the cross-border estimate of total liabilities used is the U.S. total liabilities excluding financial derivatives. These two time series are similar to the estimates produced by Lane and Milesi-Ferretti (2018) when also excluding financial derivative positions.

Table 11: U.S. Consolidated Foreign Balance Sheet (2013-2018)

Item	Assets	Liabilities
Bank-reported		
Consolidated US banks	Total claims of US banks (consolidated) on all counterparts except US counterparts.	Local liabilities of U.S. banks operating abroad plus U.S. banks cross-border liabilities excluding those to related offices and central banks.
Foreign banks	Local liabilities of foreign banks operating in the US relative to US counterparts.	Total claims of Foreign banks (consolidated) on US counterparts.
Financial non-banks		
U.S. multinationals	Total assets of financial non-bank U.S. multinational enterprises operating abroad.	Total assets of financial non-bank U.S. multinationals operating abroad minus the FDI made by the U.S. in the financial non-banking sector.
Affiliates of foreign multinationals	Total assets of financial non-bank U.S. affiliates of foreign multinationals minus the FDI received by the U.S. in the financial non-banking sector.	Total assets of financial non-bank U.S. affiliates of foreign multinationals.
Non-financial Enterprises		
U.S. multinationals	Total assets of non-financial U.S. multinational enterprises operating abroad.	Total assets of non-financial U.S. multinationals operating abroad minus the FDI made by the U.S. in the non-financial sector.
Affiliates of foreign multinationals	Total assets of non-financial U.S. affiliates of foreign multinationals minus the FDI received by the U.S. in the non-financial sector.	Total assets of non-financial U.S. affiliates of foreign multinationals.
Private portfolio investments	Foreign equity and bond securities holdings by U.S. residents.	U.S. equity and bond securities holding by foreigners excluding official agencies.
Official assets and liabilities	U.S. official reserve assets.	U.S. portfolio and other investments holding by foreign official agencies.
Other non-financial reported	Claims on unaffiliated foreigners reported by U.S. non-financial companies.	Liabilities to unaffiliated foreigners reported by non-financial firms.
U.S. currency	-	U.S. currency held by the rest of the world

Table 12: U.S. Consolidated Foreign Balance Sheet (1999-2012)

Item	Assets	Liabilities
Bank-reported		
Consolidated US banks	Total claims of US banks (consolidated) on all counterparts except US counterparts.	Local liabilities of U.S. banks operating abroad plus U.S. banks cross-border liabilities excluding those to related offices and central banks.
Foreign banks	Local liabilities of foreign banks operating in the US relative to US counterparts.	Total claims of Foreign banks (consolidated) on US counterparts.
Non-bank Enterprises		
U.S. multinationals	Total assets of non-bank U.S. multinational enterprises operating abroad.	Total assets of non-bank U.S. multinationals operating abroad minus the FDI made by the U.S. in the non-banking sector.
Affiliates of foreign multinationals	Total assets of non-bank U.S. affiliates of foreign multinationals minus the FDI received by the U.S. in the non-banking sector.	Total assets of non-bank U.S. affiliates of foreign multinationals.
Private portfolio investments	Foreign equity and bond securities holdings by U.S. residents.	U.S. equity and bond securities holding by foreigners excluding official agencies.
Official assets and liabilities	U.S. official reserve assets.	U.S. portfolio and other investments holding by foreign official agencies.
Other non-bank reported	Claims on unaffiliated foreigners reported by U.S. non-bank companies.	Liabilities to unaffiliated foreigners reported by non-bank firms.
U.S. currency	-	U.S. currency held by the rest of the world