CEPII

The Exorbitant Privilege of High Tax Countries

Vincent Vicard

Highlights

▪ The US excess return on its foreign assets is no exception: it is common to high tax countries worldwide.

▪ Tax motivated profit shifting by multinational companies inflates net inflows of FDI income in high tax countries.

▪ French firm level data on dividends, reinvested earnings and capital confirm that returns on foreign subsidiaries are larger in low tax countries and tax havens.

▪ Quantifications show large aggregate impact on the balance of investment income and returns on cross-border investments.

RESEARCH AND EXPERTISE
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▌ Abstract

The well documented US excess returns on its net foreign assets is no exception at the world level. Excess returns on foreign assets owe largely to yield differential within the FDI asset class and are correlated to the corporate tax rate for a large sample of countries, consistently with tax motivated profit shifting by multinational corporations. Using French firm level data on dividends and reinvested earnings from foreign affiliates, I provide evidence and quantify the impact of corporate tax avoidance on international asset returns. Profit shifting inflates the investment income balance and accounts for the average 2 percentage points return differential between French FDI assets and liabilities. Missing profits in France, estimated at €36 billions or 1.6% of GDP in 2015, are mostly shifted to EU countries.

▌ Keywords

Profit Shifting, Multinational Firms, FDI, Investment Income, Tax Avoidance.

▌ JEL

H26, H25, H32, F14, F23.

The exorbitant privilege of high tax countries [1]

Vincent Vicard[*]

1.   Introduction

For almost three decades, the US has received positive net investment incomes from the rest of the world although it is a net international debtor. What has been termed the *income puzzle* in international macroeconomics is generally associated to the *exorbitant privilege* of the dollar. The income puzzle however extends to several other OECD countries: Figure 1 shows that France, the UK and Sweden have experienced at least 10 years of positive investment income balance despite negative international investment positions over 2001-2015. Understanding the source of those discrepancies has important implications for the analysis of global and regional imbalances and the sustainability of current accounts, whose investment income component plays an increasingly important role (Obstfeld, 2012; Forbes et al., 2017).

Put more generally, the *income puzzle* means that US residents get a larger return on their foreign assets than foreign residents do on their US assets. Such positive *return differential* may be explained either by differences in the composition of assets and liabilities − different classes of assets having different yield levels (composition effect) −, or by differences in yields on assets and liabilities within classes of assets (return effect). In the US case, the literature has convincingly shown that the return differential owed primarily to a yield differential within the class of FDI.[2] This pattern is consistent with profit shifting by multinational enterprises (MNEs) to low tax countries or tax havens.

Profit shifting by multinational companies (either through transfer prices on intra-firm international transactions or the location of intra-group debt and intangibles)
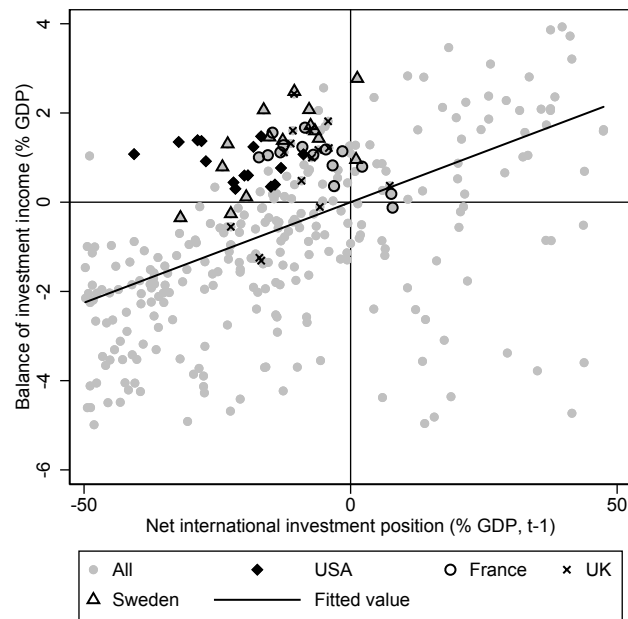
[2]See in particular Gourinchas and Rey (2007), Gourinchas et al. (2010), Lane and Milesi-Ferretti (2009), Obstfeld and Rogoff (2005), Curcuru et al. (2008) and Curcuru et al. (2010).

Figure 1 – International investment position and investment income balance (% of GDP)

inflates profits in low tax countries and reduces them in high tax ones. Depending on the specificities of domestic tax systems, profits booked abroad may be repatriated by the parent company or retained in their foreign subsidiaries. Since both dividends and re-invested earnings are registered as investment income in the balance of payment statistics, profit shifting shall increase the inflows of FDI income in high tax countries for a given level of FDI stock abroad and decrease outflows. Profit shifting therefore distorts balance of payment statistics on returns on cross-border assets generating excess returns on FDI in high tax countries. A measure of the latter at the country level is the differential on yields on FDI assets and liabilities. In this paper, I show that profit shifting by multinational companies can explain the pervasiveness of return differentials on international assets at the global level.

I start by providing evidence consistent with profit shifting by multinationals on a large sample of countries over the 2001-2015 period. Specifically, I show that: (i) return differentials on total assets and liabilities are driven by yields differentials on FDI; and (ii) FDI yield differentials are positively correlated with corporate tax rates, in the cross-section of countries as well as in the within dimension. However, as emphasized by Curcuru et al. (2013), differences across countries and

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over time in the compilation of FDI incomes and stocks in balance of payment statistics prevent robust conclusions from cross-country analysis. I therefore turn to confidential firm level data for France to circumvent the issue of cross-country comparability. Detailed firm level data on the stock of (inward and outward) FDI and FDI income (dividends and re-invested profits) show that returns on affiliates located in low tax jurisdictions and tax havens are significantly larger. This results holds when comparing, within multinational groups, affiliates located in different countries including parent-year fixed effects.

Tax motivated profit shifting is estimated to increase the French income balance by €25 billion in 2015. Such bias is increasing over time, from less than €1 bn in 2001, because of decreasing corporate tax rates worldwide and increasing gross FDI stocks. Correcting for artificially inflated net FDI incomes reduces the average FDI yield differential by 2 percentage points. Tax havens, including Luxembourg and Switzerland, account for one third of profit shifting by MNEs operating in France, and large EU conduit countries - the United Kingdom and Netherlands - account for another third. Finally, profit shifting by multinationals significantly erodes the French corporate tax base - missing profits are estimated at €36 billions or 1.6% of GDP in 2015 -, and reduces corporate tax revenues.

This paper is related to the international macroeconomic literature studying international asset returns. The higher apparent return on US foreign assets than US liabilities has generated a strong debate in relation with the 'exorbitant privilege' of the dollar. The US excess return has been attributed to composition effects – US foreign assets are weighted towards equity and FDI, whose average returns are higher, whereas US liabilities are weighted towards bonds –, and return differentials within the FDI class of assets (Gourinchas and Rey, 2007; Lane and Milesi-Ferretti, 2009; Obstfeld and Rogoff, 2005).[3] Curcuru et al. (2008) discuss the size of the US excess return on methodological ground. Curcuru et al. (2013) and recently Wright and Zucman (2018) attribute a large role to tax motives in explaining the US return differential. The analysis presented here complements the later papers by providing evidence of an exorbitant privilege of high tax countries worldwide due to profit shifting to low-tax countries and tax havens.

Quantifying the impact of profit shifting on foreign asset returns incidentally involves an estimation of the total amount of profit shifted by multinationals located in France. In this respect this paper is related to the literature in international taxation investigating tax avoidance by multinational companies based on firm level

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[3]Habib (2010) investigates returns on net foreign asset positions for a larger sample of countries. Knetsch and Nagengast (2017) focus on Germany and Rogoff and Tashiro (2015) on Japan.

financial data (Huizinga and Laeven, 2008; Johannesen et al., 2016; Dowd et al., 2017). Clausing (2016) criticizes aggregate estimates of income shifting from this line of research on the ground that balance sheet data on affiliates located in tax havens are typically missing in the Orbis data used in most studies.[4] Using data collected for the production of French balance of payment statistics provides me with firm level information on dividends, re-invested earnings and stock value of all affiliates directly held by a French located parent company including those in tax havens.

Finally, this paper contributes to the literature investigating how tax avoidance affects official statistics. At the international level, tariff evasion through mislabelling of products has been shown to explain discrepancies between reported bilateral imports and exports (Fisman and Wei, 2004). Vicard (2015) provides evidence that the manipulation of transfer prices in international intra-group transactions biases the trade balance. And Alcalin and Blanchard (2016) document how corporate taxation may generate simultaneous FDI inflows and outflows. Focusing on individuals instead, Zucman (2013) exploits bias in reported portfolio liabilities to quantify the wealth hiden in tax havens. At the national level, Guvenen et al. (2017) investigates how profit shifting by US MNEs affects the measured productivity growth and Bruner et al. (2018) extend their analysis to other US official statistics. Finally, Torslov et al. (2018) quantify worldwide profits shifted to tax havens exploiting tax generated anomalies in national account statistics. Compared to the last two papers, I propose an alternative estimation methodology for profit shifting based on available official statistics from high tax countries.

The rest of the paper is organized as follows. Section 2 presents *prima facie* evidence of tax generated return differentials on foreign assets for a large sample of countries. Section 3 provides more details on the French case using aggregate balance of payments data. Section 4 uses detailed firm level data on dividends and reinvested earnings from foreign subsidiaries to identify the impact of profit shifting on returns on FDI and section 5 quantify the aggregate implications. Section 6 concludes.

2. Prima facie evidence on aggregate data across countries

Whatever its means, tax avoidance by multinational companies inflates profit reported by their affiliates in low tax countries and reduces it in high tax ones. By

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[4]Johannesen et al. (2016) circumvent this issue by exploiting the availability of ownership data and comparing MNEs operating in the same economy with different networks of foreign affiliates.

doing so, MNEs distort the return on their cross-border investments. At the country level, high tax countries shall therefore exhibit on average higher returns on their foreign assets than on their liabilities. This section uses balance of payment data for a large sample of countries and show that the differential between yields on FDI assets and liabilities at the country level is positively related to the corporate tax rate, consistently with tax motivated profit shifting.

The yields on foreign assets and liabilities can be computed using balance of payment data on investment income credit and debit and international investment positions on stocks of foreign assets and liabilities as:

$$i_{it}^{A,k} = \frac{InvIn_{it}^k}{A_{it-1}^k} \quad \text{and} \quad i_{it}^{L,k} = \frac{InvOut_{it}^k}{L_{it-1}^k} \tag{1}$$

where $InvIn_{it}^k$ are investment income credits for asset class k, $InvOut_{it}^k$ are investment income debits, and A_{it-1}^k and L_{it-1}^k are the stocks of gross foreign assets and liabilities. Note that the analysis focuses here on the income stream generated by foreign asset holding, i.e. interests, dividends or re-invested earnings in the case of FDI. Total returns also include valuation effects related to asset price changes in domestic currency that are not considered here.

The yield differential is then the difference between yields on assets and liabilities, $i_t^{A,k} - i_t^{L,k}$. Table 1 reports the results of the regression of FDI yield differentials on the level of corporate income tax rate and a tax haven dummy. Data on FDI income flows and FDI stocks are from the IMF BOP Statistics. Stock and flow information required to compute yields are available for at least 9 years over the 2001-2015 period for 76 countries (listed in appendix Table 14). Yields are trimmed for outliers exceeding +/-100%. The corporate tax rate is the statutory corporate tax rate and is differentiated with respect to the yearly mean. The tax haven list is taken from Hines and Rice (1994). See Appendix B for the source of the data.

Column (1) of Table 1 presents regressions pooling data across countries and years for the full sample of 76 countries. It shows a positive coefficient, significant at the 1% level, on the corporate tax level, as expected in case of profit shifting strategies inflating net FDI income in high tax countries. The coefficient is twice larger and more precisely estimated when focusing on EU and OECD countries for which the data are arguably more comparable (column (2)).

The insignificant (and either positive or null) coefficient on tax haven status is likely related to the fact that FDI income flows include interests on intra-group debt together with dividends and reinvested earnings from affiliates. Since the former

would increase yields on assets of tax haven and the latter on their liabilities, the relationship between tax haven status and total FDI yield differential is ambiguous.[5] In column (3), I further restrict the sample excluding tax havens; the coefficient on corporate tax differential remain similar but slightly more precisely estimated. Going one step further, columns (4) and (5) make use of more disaggregated data distinguishing direct investment debt and the related interest flows and direct investment equity and associated income flows (dividends and reinvested earnings). Such details of current account statistics is available for a smaller sample and may also be more prone to differences in data collection across countries. When using as dependent variable the return differential computed excluding intra-group debt and related interests (column (4)), the coefficient on tax haven status turns negative, as expected in instances of tax avoidance. The coefficient on the corporate tax rate remains similar to column (2) and (3). Conversely, in column (5) I use only intra-group debt and interest payments when computing the return differential and find a positive coefficient on tax haven status. Such results are again consistent with multinational companies using strategically intra-group debt to shift profit to tax havens.

Composition effects between FDI assets and liabilities may however generate yield differentials at the country level. Such concerns can be attenuated by using the panel dimension of the data. Focusing on the within-country dimension also allows to circumvent issues of cross-country comparability in the level of yields on assets and liabilities related to differences in compilation methods (Curcuru et al., 2013); issues of consistency in the collection of balance of payment data over time however calls for caution when interpreting the results.[6] Including country fixed effects in columns (6) and (7), the coefficient on corporate tax rate remains positive but significant only in the restricted sample of EU and OECD countries. An alternative method for controlling for country specific characteristics is to use as dependent variable the difference in yield differentials on FDI and portfolio equity. Any country specific economic characteristics increasing the yields on liabilities should indeed increase both the yields on FDI and portfolio equity. On the contrary, any inflated net investment income flow related to profit shifting should be specific to the FDI class of assets. Results in column (8) confirm the positive relation between corporate tax rate and FDI yield differentials.

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[5]In addition FDI income does not necessarily incorporate systematically interests on intra-group debt (see Section 3.2 for an illustration in the case of France).

[6]Balance of payment data feature breaks in statistical series that prevent comparisons over time. In columns (6) and (7), the sample is restricted to observations after the last break in statistical series, as indicated by the IMF BOP Statistics.

Table 1 – Return differential on FDI and corporate tax rate

Asset class	(1) DI	(2) DI	(3) DI	(4) DI Interest excl.	(5) DI Interest only	(6) DI	(7) DI	(8) DI minus Portfolio Equity
Sample	All	Restr.	Restr.+	Restr.	Restr.	All	Restr.+	Restr.+
Statutory tax rate	0.13^a	0.29^a	0.29^a	0.33^a	0.02	0.09	0.40^a	0.24^a
	(0.04)	(0.04)	(0.03)	(0.07)	(0.02)	(0.19)	(0.14)	(0.05)
Tax haven dum.	0.02	0.00		-0.04^c	0.014^a			
	(0.03)	(0.03)		(0.02)	(0.00)			
Statutory tax rate*Tax haven dum.	-0.02	-0.45		-0.72^a	-0.11			
	(0.16)	(0.22)		(0.24)	(0.08)			
Constant	-0.03^a	-0.02^a	-0.01^a	-0.02^a	-0.01^a	-0.02^a	-0.02^a	-0.01^a
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	1,020	560	535	497	418	549	342	428
R-squared	0.010	0.072	0.169	0.064	0.057	0.001	0.041	0.089
Number of id						54	31	
Country FE	-	-	-	-	-	Yes	Yes	-

Note: Robust standard errors clustered in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The baseline dependent variable is the return differential, $i_t^{A,FDI} - i_t^{L,FDI}$, on direct investment as defined in Equation 1. In column (4), the return on direct investment is computed excluding intra-group debt and interests; the dependent variable in column (5) is computed on intra-group debt and interest only. In column (8), the dependent variable is the return differential on direct investments minus the return differential on portfolio investment equity for the same country. Statutory tax rates are differentiated with respect to the yearly mean. The sample is restricted to EU and OECD countries in columns (2), (3), (4), (5) (7) and (8). Columns (3), (7) and (8) additionally exclude tax havens. Country fixed effects included in columns (6) and (7) and the sample is restricted to the latest period after the last break in data collection, as reported by the IMF BOP statistics.

Table 2 presents additional specifications. The first two columns use as dependent variable the return differential, $i_t^{A,All} - i_t^{L,All}$, on total investment (foreign direct, portfolio and other investments) instead of direct investment only. It shows that the distortion on FDI returns generated by profit shifting is large enough to generate a positive relationship between the return differentials on total investment and the corporate tax rate. The coefficient are however twice lower than in the baseline specifications in columns (1) and (2) of Table 1. Appendix section A provides further evidence that returns differentials on total investment owes largely to differential in yields wihtin the FDI class, based on the decomposition proposed by Gourinchas and Rey (2007) that distinguishes composition and return effects for each class of assets.

The remaining columns of Table 2 show that the results of Table 1 are robust to controlling for a time trend and its interaction with the corporate tax rate (column (3)), to the use of alternative measures of corporate tax rates (columns (4) and (5)) and to alternative tax haven lists (columns (6) and (7)).

Table 2 − Return differential on FDI and corporate tax rate: robustness

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Asset class	All	All	DI	DI	DI	DI	DI
Sample	All	Restricted	Restricted time trend	Restricted eatr	Restricted emtr	Restricted TH top15	Restricted TH OECD
Statutory tax rate	0.06^a	0.16^a	0.33^a	0.32^a	0.14^a	0.26^a	0.29^a
	(0.01)	(0.01)	(0.12)	(0.05)	(0.03)	(0.05)	(0.03)
Tax haven dum.	0.02^a	0.01^a	0.00	0.02^a	0.01	0.02^a	0.01
	(0.00)	(0.00)	(0.03)	(0.00)	(0.01)	(0.00)	(0.06)
Statutory tax rate*Tax haven dum.	0.00	-0.16^a	-0.45	0.05	0.10	-0.22^c	-0.66^c
	(0.02)	(0.02)	(0.30)	(0.07)	(0.20)	(0.12)	(0.39)
Time trend			0.00				
			(0.00)				
Statutory tax rate * time trend			-0.00				
			(0.01)				
Constant	-0.02^a	-0.01^a	-0.02^b	-0.01^a	-0.01^a	-0.02^a	-0.01^a
	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Observations	1,024	563	560	497	497	560	560
R-squared	0.037	0.280	0.07	0.16	0.04	0.06	0.09

Note: Robust standard errors in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable is the return differential, $i_t^{A,k} - i_t^{L,k}$, on total investment (columns (1)-(2)) and direct investment (columns (3)-(7)) as defined in Equation 1. The sample is restricted to EU and OECD countries in columns (3)-(7). Statutory tax rates are differentiated with respect to the yearly mean. The corporate tax rate is the effective average tax rate in column (4) and the effective marginal tax rate in column (5). In columns (6) and (7), the list of tax haven is respectively the top 15 and the OECD list.

3.   The French case

Curcuru et al. (2013) emphasize that the collection of FDI income data differs across countries and over time. This section illustrates how it matters in the case of France and presents evidence of a French excess return on FDI on consistent data.

### 3.1.   The French income puzzle and corporate taxation

The French pattern of investment income and stocks resembles strongly the well documented US case of *income puzzle*: despite a negative international investment position the balance of investment income has been positive over more than a decade. Figure 2.a shows that France has experienced a steadily positive net inflows of investment incomes since the beginning of the 2000s thanks to large net inflows of FDI income. The balance of investment income has increased over time to more than 1% of GDP in 2015 despite a decreasing net investment position that turns negative from 2004 onwards (-15% of GDP in 2015). The deteriorating net investment position partly reflects the accumulation of current account deficits starting in 2006. The structure of the international asset position is also similar to the US: France holds a surplus in FDI and a negative position on portfolio investment, including in particular significant foreign liabilities on French public debt securities.

France has slipped into a position of excess return on its net foreign asset during a period of intense tax competition especially from its EU partners. Figure 2.b shows that over the last two decades France has progressively moved from an average to a high corporate tax country despite a relatively stable statutory corporate tax rate. The average tax differential with respect to the rest of the world has increased from 5 to 16 percentage points, and from 2 to 18 percentage points with respect to other EU countries.[7] Unlike the US over the period, France has a territorial tax system for corporations which provides for a participation exemption on dividends distributed by foreign affiliates; the territorial tax system generates clear rational for multinational companies to shift their profit to low tax jurisdictions.[8]

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[7]The same pattern holds when using effective average or marginal tax rates.

[8]The USA has applied a residential tax system in which corporations are taxed on their activities worldwide until 2018. The 2017 tax reform shifted the system toward a more territorial taxation but still feature taxes on worldwide profits (Auerbach, 2018).

Figure 2 – Selected balance of payment items and corporate tax rates for France
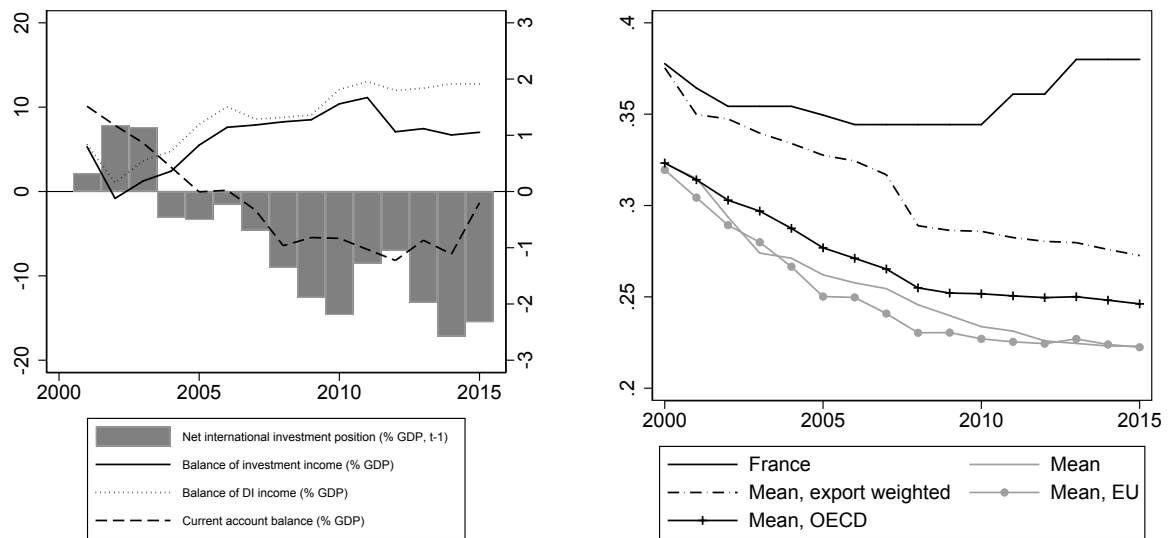
(a) CA, FDI income and stocks

(b) Statutory corporate tax rate

Source: Banque de France, OECD and KPMG.

3.2.   Some specificities of the French balance of payment data

An important statistical issue for the computation of return differentials in the French case is the treatment of intra-group loans: intra-group debt is registered as FDI in the stock data but the related incomes are reported under the "other investment income" item of the "investment income" account until 2012. Such discrepancy in income flows and stocks of FDI biases the denominator of Equation 1 when computed using aggregate FDI stocks as provided but the IMF.[9] I use detailed FDI stock data provided by the Banque de France to correct for this bias using only equity capital stock of FDI in the computation of returns on FDI and allocating the stock of intra-group debt in the 'other investments' category.

Table 3 shows that correcting for intra-group debt increases average yields on FDI from 4.8% (total FDI) to 6.7% (equity capital) for assets on average over the 2002/2012 period and from 3.0% to 4.6% for liabilities. Note that the correction increases not only the level of yields on FDI but also slightly magnifies the differential between assets and liabilities. Columns (2) and (4) show that the yield differential and the correction remain of similar magnitude when applied to stock data in book

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[9] Note that investment flow and stock data are revised accordingly in France (Curcuru et al., 2008).

value instead of market value.

Income on intra-group debt is reported only beginning in 2012. Column (5) of Table 3 shows that the yields on intra-firm debt is indeed lower than on FDI equity and that the differential is negative, i.e. multinational firms located in France pay on average higher interest rates on their intra firm debt than multinational companies located abroad do on their debt held by French resident affiliated firms. Such pattern is consistent with profit shifting by multinationals through intra-firm debt.[10]

Table 3 – Yields on direct investment assets and liabilities: details

Assets Subcategory Valuation Period	FDI tot market	FDI tot book	FDI equity market	FDI equity book	FDI loans
		2002-2012			2012-2014
Assets	4,8%	5,0%	6,7%	7,3%	1,4%
Liabilities	3,0%	3,0%	4,6%	5,0%	1,8%
Differential	1,8%	2,0%	2,1%	2,3%	-0,5%

Source: Banque de France.

3.3. The French excess return on FDI

Table 4 reports the yields on asset and liability by class of asset over the 2001/2014 period. It shows a positive average return differential between assets and liabilities for FDI, especially over 2009/2014, but not for other classes of assets. The return on FDI assets is 6.4% on average, against 4.3% on liabilities, generating a 2.1 percentage point differential. The corresponding differential is -1.0 pp on portfolio equity, 0.4 pp on portfolio debt and -0.1 pp on other investments, confirming that the positive return differential is specific to FDI in the French case. Such pattern of return differentials with asset classes in a high tax country like France is consistent with tax motivated profit shifting by multinational companies.

The middle and bottom panels of Table 4 additionally report returns on French assets and liabilities by sub-period: the yield differential on FDI is larger over the 2009-2014 period than in the beginning of 2000s, as is the yield differential on total investment, a period during which France has increasingly became a high tax country relative to the rest of its partners (see Figure 2.b). Since gross stock positions are much larger than net positions and growing, the 2.5 percentage points

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[10]Flows of interests on intra-firm debt represent 8% of total investment income credit only but 25% of investment income debits in 2014.

Table 4 – Yields on external assets and liabilities (2001-2014)

Assets	Total	FDI (equity)	Portfolio equity	Portfolio debt	Other inv.*
			2001-2014		
Assets	2,8%	6,4%	3,0%	4,3%	1,8%
Liabilities	2,5%	4,3%	4,0%	3,9%	2,0%
Differential	0,3%	2,1%	-1,0%	0,4%	-0,1%
			2001-2008		
Assets	3,1%	6,3%	2,9%	3,3%	1,0%
Liabilities	3,0%	4,5%	3,3%	2,9%	0,9%
Differential	0,1%	1,8%	-0,4%	0,5%	0,1%
			2009-2014		
Assets	2,3%	6,5%	3,2%	3,3%	0,9%
Liabilities	1,9%	4,0%	5,0%	2,9%	0,9%
Differential	0,5%	2,5%	-1,9%	0,5%	0,0%

Source: Banque de France. * including intra-group debt.

differential on FDI also applies to large asset and liability stocks, and explains the gradual appearance of an *income puzzle* in France - despite a negative net international investment position from 2006, the income balance has remained positive.

4. Evidence from firm level data

This section makes use of detailed firm level data on subsidiaries' dividends, reinvested earnings and capital to identify the impact of tax motivated profit shifting on returns on foreign assets. Using individual data allows exploiting variations within a multinational group across affiliates located in different jurisdictions to identify the impact of profit shifting on FDI income flows.

For an affiliate located in country *i* and a French parent *j*, I therefore regress the return on FDI on the corporate tax rate differential between France and country *i* and a tax haven dummy as follows:[11]

$$i_{ijt} = \beta_0 + \beta_1 TaxDiff_{it} + \beta_2 TH_{it} + FE_{jt} + \epsilon_{ijt} \qquad (2)$$

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[11]The inclusion of fixed effect at the parent×year level requires observing several subsidiaries located in different countries per parent. It is the case on the asset side - the data report information on all affiliates of French multinationals abroad -, but not on the liability side since only the French affiliates of foreign parent companies are surveyed; the empirical analysis in this section therefore focuses on the asset side, i.e. foreign affiliates of French parent companies.

where $i_{ijt} = \frac{FDIinc_{ijt}}{FDIstock_{ijt-1}}$.[12] $TaxDiff_{it}$ is the difference between the corporate tax rate in France and in country i and TH_{it} is a dummy variable equal to one when the host country i is a tax haven. FE_{jt} are fixed effects in the parent×year dimension that control for any specificities likely to affect the return on investment at the multinational group level (average productivity, mark-up, intangible assets).

From an international investor perspective, arbitrage opportunities shall equalize after tax returns on investment across locations for a given MNE.[13] In this regard, deviations in *after tax* returns related to the host country's fiscal characteristics, as identified by $\beta_1 > 0$ and $\beta_2 > 0$ in Equation 2, can be interpreted as evidence of tax motivated profit shifting.

Standard errors are clustered at the parent/year level.[14]

4.1. Data sources and descriptive statistics

The main source of data are confidential firm level data on FDI stocks and dividends and reinvested earnings from foreign affiliates collected by the Banque de France in the making of the balance of payment statistics. The dataset used merges information from three sources: the survey of direct investment abroad, which collect information on resident multinational firms and their investment abroad, the FIBEN database ('FIchier Bancaire des ENtreprises') and balance sheet data fom ESANE provided by INSEE, the French statistical institute. Data are supplemented by information from the ACPR on the banking sector. The dataset includes information on foreign affiliates directly held by the parent company located in France. Information on affiliates indirectly held through other foreign affiliates is not reported but the chain of direct investment relationships shall appear in FDI flows and stocks of the first affiliate.[15] Appendix B provides more information on surveys used and data collection.

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[12]i_{ijt} is trimmed for outliers exceeding +/-100% and for negative stocks of assets. Results using alternative trimming procedures are presented in Table 10 in Section 4.3.

[13]Riedel (2018) underlines that such assumption may be violated in case MNEs sort high return projects in low tax countries or if they require higher pre-tax returns to locate in high tax countries. The former argument however only applies to MNEs facing financing or operating constraints, allowing them to implement only a limited set of projects. The latter applies to pre-tax returns but not necessarily to after tax returns as here. From an econometric point of view, if MNEs investing in high tax countries have a positive ij unobserved specific component (because less profitable firms are less likely to enter high tax countries), they should report higher profits on average. Selection would therefore bias downward the coefficient on the tax differential.

[14]Appendix Table 17 shows that the results are robust to different levels of clustering.

[15]Focusing on direct affiliates also prevents any double-counting of income and profits shifted, which include inter-company dividends in the BEA data for instance (Altshuler and Grubert, 2006a).

The dataset includes detailed information on a yearly basis on the stock of FDI assets and liabilities and the associated flows of FDI income for each parent-affiliate pair for all parents and affiliates resident in France. Information is aggregated at the parent-country-year level because no identifier enables matching stock and income flow data of affiliates from the same parent located in the same country. Data are available over the 2001-2015 period. In the balance of payment definition, FDI income is after tax income and includes both dividends distributed to the parent company and reinvested earnings, defined as undistributed after-tax operating income of the foreign subsidiaries and equity interests attributable to the parent company (i.e. depending on the ownership share).

The corporate tax differential is the difference between the French and foreign statutory corporate tax rate. I use the statutory corporate tax rate as my main measure for tax rate differentials and consider the sensitivity of the results to alternative measures of tax rates in the robustness section. Tax havens are from the list of Hines and Rice (1994). The sources of tax data are detailed in Appendix B.

The raw data show that French MNEs have on average 5.2 direct foreign affiliates (median of 3) and that 33% of them have at least one affiliate in a tax haven (according to Hines and Rice (1994)'s list). Gumpert et al. (2016) report tax haven investment by 20% of German multinationals and 59% of US multinationals. Differences in reporting threshold, which is lower in the German MiDi data, likely explain those discrepancies related to the inclusion of small multinational companies.[16]

Figure 8 in Appendix reports the decomposition of FDI income credit/debit and FDI assets/liabilities by regions of the world. On the asset side, EU countries represent almost half of the flows and stocks in 2015. Tax havens account for a disproportionate share of capital and profits of parent companies located in France: 19% of their foreign profit is booked in tax havens, and 12% of their FDI assets. The share of tax havens in both stocks and flows is steadily increasing since 2001 (and especially after 2009), from 11% and 7% in 2001 respectively.

On the liability side, the share of tax havens is even larger: the Big 3 (Ireland, Luxembourg and Switzerland) represent 30% of the stock of French direct investment liabilities (plus another 1% for other tax havens) and 22% of DI income debits in 2015. The rest of the world, including in particular the US and Japan, represents only 19% of the stock of liabilities (against 32% of the stock of assets).

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[16]The average number of foreign affiliates by parent is 2.8 in the German MiDi data in 2002 (Gumpert et al., 2016) and between 7.5 and 7.8 for US parents in the data used by Desai et al. (2006).

The differences in the geographical distribution of FDI stocks and flows underline that profits are booked in tax havens out of proportion to the production factors (capital) located there (and the tax havens' GDP).

The estimation sample includes 43,461 observations pertaining to 9,073 different parent/year groups with on average 7.7 different countries of location of foreign affiliates. Affiliates located in tax havens represent 10.5% of observations in the estimation sample.[17]

4.2. Results

The baseline results are presented in Table 5. The first three columns introduce progressively the variables of interest. They show a positive coefficient on the corporate tax differential, significant at the 1% level. The impact of tax differential remains similar when controlling for tax haven status of the county of location of the affiliate and an interaction terms between the two variables (column (2)).[18] It suggests that profit shifting does not concern affiliates in tax havens only but all partners. Affiliates in tax havens also exhibit higher returns above and beyond any low corporate tax rates (column (3)). The estimated impact is sizeable: tax haven affiliates report a return on investment 1 percentage point larger than affiliates located in regular countries with similar corporate tax rates.

Columns (4) to (6) of Table 5 show that the results are robust to controlling for country specific characteristics likely to affect the return on investment in specific locations. Column (4) includes gravity like variables measuring the similarity or proximity of the host country to France: European Union (EU) or common regional trade agreement (RTA) membership, distance between capitals, dummies for countries sharing a common border or language and time difference. Column (5) controls for all time invariant country characteristics through fixed effects per country of location of the subsidiary. Finally, column (6) additionally includes variables for the economic characteristics of the host country: consumer price inflation (CPI), GDP growth, GDP and GDP per capita. GDP growth is found to increase returns on investment while CPI reduces it. The positive impact of corporate tax differential on returns on FDI is robust to these geographic and economic controls, though the significance level and coefficient is slightly reduced in columns (5) and (6). Since the inclusion of country fixed effects does not allow the estimation of

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[17]14.5% and 0.8% using the top 15 tax havens and OECD lists respectively.

[18]Statutory tax rates may overestimate tax rates in tax havens; column (2) however shows that it does not bias the coefficient on the corporate tax differential.

Table 5 – Returns on affiliates, corporate tax rate and tax havens

	(1)	(2)	(3)	(4)	(5)	(6)
Corporate tax diff.	0.21^a	0.18^a	0.18^a	0.15^a	0.12^c	0.11^c
	(0.03)	(0.03)	(0.03)	(0.04)	(0.07)	(0.07)
Tax haven dum.		0.01	0.01^b	0.01^c		
		(0.01)	(0.01)	(0.01)		
Corporate tax diff x Tax haven dum.		0.04				
		(0.07)				
EU dum.				-0.00		
				(0.01)		
Log dist				0.00		
				(0.01)		
Contiguity dum.				-0.01		
				(0.01)		
Common language dum.				0.01^b		
				(0.01)		
Time diff.				-0.00^b		
				(0.00)		
RTA dum.				-0.00		
				(0.01)		
CPI						-0.00^b
						(0.00)
GDP growth						0.63^a
						(0.09)
Log GDP						-0.00
						(0.04)
Log GDP per capita						0.04
						(0.04)
Observations	43,461	43,461	43,461	43,461	43,452	42,717
R-squared	0.30	0.30	0.30	0.30	0.31	0.32
Nbr of group	9073	9073	9073	9073	9073	9016
FE it	Yes	Yes	Yes	Yes	Yes	Yes
FE j	-	-	-	-	Yes	Yes

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets.

the impact of tax havens on returns on FDI, I focus on the specification of column (3) in the sensitivity analysis.

An interesting feature of my data is that it allows distinguishing profits repatriated in France through dividends from those that are kept abroad as reinvested earnings. Such decision likely depends on the tax legislation applied to repatriated profits, which can be specific to each host country depending on its fiscal characteristics and the existence of double taxation treaties and their provisions. The French territorial tax system does however not provide incentives to MNEs not to repatriate their profits as the 'chech the box' legislation did in the US. It is therefore likely that profit shited to low tax jurisdiction is repatriated to the parent through dividends. Table 6 shows that the composition of FDI income is indeed driven by tax considerations. In column (1), the dependent variable is the share of dividends in total FDI income flows by parent-affiliate-year as in Equation 2. The share of dividends is increasing in the corporate tax differential and when the affiliate is located in a tax haven. The remaining columns of Table 6 reproduce the benchmark specification of column (3) of Table 5 using only dividends (column (2)) or reinvested earnings (column(3)) to compute yields, and show that both returns are increasing in tax differential. The larger return on investment of subsidiaries located in tax havens however originates only from larger flows of dividends.[19]

Table 6 – Returns on affiliates: dividends vs. reinvested earnings

Dependent var.	(1) Share dividends	(2) Yield dividends	(3) Yield reinvested earnings
Corporate tax diff.	0.09^a	0.10^a	0.08^a
	(0.04)	(0.02)	(0.02)
Tax haven dum.	0.02^b	0.02^a	-0.00
	(0.01)	(0.00)	(0.01)
Observations	35,222	46,368	43,919
R-squared	0.34	0.34	0.26
Nbr of group	8004	9415	9104

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable is the share of dividends in total FDI income credit in column (1), and returns i_{ijt} computed from dividend flows only (column (2)) and from reinvested earnings flows only (column (3)). All specifications include parent×year fixed effects.

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[19]Such results may also reflect the fact that tax haven affiliates are used as nodes in chains of direct investment relationships and reinvested earnings from second order affiliates are not reported.

4.3. Robustness

This section presents sensitivity analysis of the baseline results of Table 5 along time, sectoral and firm characteristics, measurement issues and the nature of FDI income.

Time variation: Table 7 explores variations over time in the responsiveness of returns on FDI to tax differentials and affiliate location in tax havens. Column (1) introduces an interaction between the corporate tax differential and a time trend. The coefficient on corporate tax differential drops in magnitude and significance but remain significant at the 10% level and the interaction exhibit a positive coefficient, suggesting that the responsiveness of returns to tax differential within multinational groups is increasing over time. Column (2) divides the sample period into a pre-2008 period, a crisis period (2008 and 2009) and the post 2009 period: it shows that the return on FDI is increasing in corporate tax rate differential over all three periods but the coefficient is larger after the financial crisis. Returns on subsidiaries located in tax havens are similarly larger over the whole period. Finally, in columns (3) and (4) I re-estimate the specification of column (2) on a balanced sample of parent-affiliate pairs over the full period. The corporate tax differential is positive and significant except during the crisis period, while the tax haven dummy turns insignificant, suggesting that the larger responsiveness over time might be related to a different composition of new parent-affiliate pairs over time.

Sectoral characteristics: Firms may have different tax avoidance opportunities depending on the characteristics of the sector they belong to, which would translate into a different responsiveness of returns on FDI to tax differential or tax haven location. The first three columns of Table 8 shows that both variables of interest remain significant when restricting the sample to the manufacturing sector (column (1)), to non-financial sectors (column (2)) or to the financial sector (column (3)).

Firms producing differentiated goods or relying more on intangibles have also more instruments to shift profits to low tax jurisdictions, e.g. through the manipulation of transfer prices in intra-group transactions or the location of intangible assets such as patents or trademark. In columns (4) to (7), I test the sensitivity of the estimated coefficients according to the R&D intensity of the sector of the parent company. Columns (4)-(5) and (6)-(7) use different threshold of R&D intensity, focusing on sectors above the median and 90th percentile respectively. I find no systematic evidence of a larger responsiveness of returns on FDI in more R&D intensive sectors. Such mixed evidence may be related to the French patent

Table 7 – Returns on affiliates: sensitivity over time

	(1)	(2)	(3) balanced	(4) balanced
Corporate tax diff.	0.07^c	0.12^b	0.20^b	0.30^b
	(0.04)	(0.05)	(0.09)	(0.12)
Corporate tax diff. * crisis dum.		-0.12		-0.47^b
		(0.10)		(0.23)
Corporate tax diff. * post 2009 dum.		0.13^b		-0.10
		(0.07)		(0.18)
Tax haven dum.	0.02^a	0.02^b	-0.00	0.03
	(0.01)	(0.01)	(0.02)	(0.03)
Tax haven dum. * crisis dum.		-0.01		-0.04
		(0.02)		(0.05)
Tax haven dum. * post 2009 dum.		-0.01		-0.04
		(0.01)		(0.04)
Corporate tax diff x time trend	0.00^a			
	(0.00)			
Observations	43,461	43,461	3,661	3,661
R-squared	0.30	0.30	0.21	0.22
Nbr of group	9073	9073	630	630

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets. All specifications include parent×year fixed effects.

box legislation, which reduces the corporate tax rate for profits from intellectual property licensing to 15%, and the R&D tax credit system in place in France.

Table 8 – Firm level evidence: robustness on sectoral characteristics

	(1) manuf	(2) no fi	(3) fi	(4) R&D>p50	(5) R&D>p50	(6) R&D>p90	(7) R&D>p90
Corporate tax diff.	0.15^a	0.22^a	0.10^b	0.22^a	0.12^a	0.24^a	0.17^a
	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.06)	(0.03)
Corporate tax diff. * dum.					0.10^c		0.07
					(0.05)		(0.06)
Tax haven dum.	0.02^a	0.01^c	0.02^c	0.02^b	0.01	-0.01	0.02^a
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Tax haven * dum.					0.01		-0.04^a
					(0.01)		(0.01)
Observations	17,615	32,574	10,705	28,075	43,461	9,739	43,461
R-squared	0.32	0.31	0.26	0.31	0.30	0.31	0.30
Nbr of group	3533	6954	2125	5902	9073	1893	9073

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets. All specifications include parent×year fixed effects.

Firm characteristics: Profit shifting within a parent-affiliate pair does not depend on the characteristics of the pairs only but also on tax avoidance strategies at the multinational group level. Differences in returns on investment across subsidiaries are therefore likely to depend on the group characteristics, including the network of affiliates or the company size since tax avoidance entails fixed costs related to e.g. legal expenses or the cost of setting-up administrative documentations (Wier and Reynolds, 2018). Table 9 reports sensitivity analyses on these dimensions.

In columns (1) to (8) I first test whether the estimated coefficients on corporate tax differential and tax haven status vary depending on the overall size of the multinational group, as measured by total FDI (columns (1)-(4)) and the number of affiliates (columns (5)-(8)). I report results on the sample of 'large' multinationals or including interaction terms with a dummy for 'large' MNEs using two different size thresholds, the 75th and 90th percentiles. Note that the size dummies are absorbed by the parent×year fixed effects. The results do not provide strong evidence in favour of a larger tax responsiveness of returns to FDI within large MNEs, measured by either total FDI or the number of affiliates. The fact that the measurement of size is based on data including subsidiaries directly held by resident parents only may however blur results, especially for foreign MNEs or groups with

more complex organisational structures.[20] Moreover, the measurement of size used here is based on foreign activity only, and is not necessarily correlated with the size of domestic activity measured by employment, sales or taxable profits.

The mere fact of having an affiliate in a tax haven may also affect the entire investment strategy of MNEs (Gumpert et al., 2016). In columns (9) to (11), I therefore investigate whether parents having at least one affiliate in a tax haven exhibit different reactions to tax rate differentials. The results confirm that firms having tax haven affiliates shift more profits abroad but show no significant differences in the elasticity of FDI returns in other locations, even after controlling for the size of the multinational group (column (11)).

Finally, columns (12) and (13) report results of the estimation of Equation 2 using weighted OLS, using as weights the FDI income flows in absolute value to account for negative credit flows. Weighted OLS yields slightly larger coefficients on both the corporate tax differential and the tax haven dummy, suggesting that the responsiveness of returns does not depend on firm characteristics but is larger when larger flows are at stake.

Measurement issues: Table 10 begins by testing the sensitivity of the results to the measurement of the return on FDI. In column (1), I trim the dependent variable i_{ijt} for the top and bottom 1% of observations instead of dropping outliers exceeding +/-100% and negative FDI stocks. The results remain similar although quantitatively larger regarding the impact of tax haven location. In column (2), the dependent variable is the return computed using the stock in period t minus FDI flows in t instead of the stock of FDI in $t-1$ as denominator. Column (3) includes observations with negative stock of FDI and column (4) focuses on positive yields only. The results remain quantitatively similar except for the tax haven dummy that turns null and insignificant when restricting the sample to positive yields.

The rest of Table 10 addresses measurement issues related to ownership links. First, in columns (5) and (6), I investigate the robustness of the results regarding the definition of the ownership share required to be included as FDI links. The balance of payment data consider a cross-border investment as an FDI when the parent company owns more than 10% of a foreign company equity shares. The average share held by French parents is however much larger: more than 60% hold a share of more than 99% in their subsidiaries. In column (5), I restrict the sample to observations for which the parent hold more than 99% of the shares. Column (6)

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[20]The fact that larger MNEs have more bargaining power to reduce their domestic tax rate (Egger et al., 2018) could also confound the size results.

Table 9 – Firm level evidence: robustness on firm characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	FDI tot > p75		FDI tot > p90		Aff. nbr > p75		Aff. nbr > p90		Tax haven affiliate dum.			weighted	
Corporate tax diff.	0.20^a (0.03)	0.15^a (0.04)	0.19^a (0.04)	0.18^a (0.04)	0.19^a (0.03)	0.14^b (0.06)	0.21^a (0.04)	0.15^a (0.04)	0.20^a (0.04)	0.15^a (0.04)	0.13^a (0.04)	0.37^a (0.06)	0.27^a (0.08)
Corporate tax diff. * dum.		0.04 (0.05)		0.02 (0.05)		0.05 (0.06)		0.06 (0.04)		0.06 (0.05)	0.04 (0.05)		
Tax haven dum.		0.01 (0.01)	0.01 (0.01)	0.02^a (0.01)	0.01^c (0.01)	0.03^b (0.01)	0.02^a (0.01)	0.02^a (0.01)	0.01^c (0.01)	0.01^c (0.01)	0.01^c (0.01)		
Tax haven * dum.		0.03^a (0.01)	0.02^a (0.01)	0.01 (0.01)	0.03^b (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01^c (0.01)	0.02^b (0.01)			0.05^b (0.02)
Corporate tax diff. * Aff. nbr > p90 dum.											0.04 (0.05)		
Tax haven * dum.											-0.01 (0.01)		
Tax haven * Aff. nbr > p90 dum.		-0.02^c (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02^c (0.01)	-0.02^c (0.01)					0.05^b (0.02)
Observations	25,108	43,461	13,950	43,461	34,943	43,461	21,742	43,461	26,151	43,461	43,461	42,208	42,208
R-squared	0.25	0.30	0.24	0.30	0.26	0.30	0.22	0.30	0.26	0.30	0.30	0.57	0.57
Nbr of group	3595	9073	1562	9073	5465	9073	2159	9073	4021	9073	9073	8858	8858

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, l_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets. All specifications include parent×year fixed effects.

alternatively uses interaction terms and shows that the larger return on FDI in tax havens is related to fully owned subsidiaries while the coefficient on corporate tax differential is slightly lower. The latter likely reflects arbitrage among alternative affiliates. Finally, columns (7) and (8) show that French MNEs do not behave any differently from foreign parents companies located in France and that directly hold foreign subsidiaries.

Table 10 – Firm level evidence: robustness on measurement

	(1) trimmed	(2) alt. stock	(3) incl. stock neg	(4) pos. yields	(5) Ownership > 99%	(6)	(7) French MNE	(8)
Corporate tax diff.	0.19^a	0.15^a	0.16^a	0.19^a	0.18^a	0.22^a	0.20^a	0.13^b
	(0.06)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.05)
Corporate tax diff. * dum.						-0.06^c		0.07
						(0.03)		(0.05)
Tax haven dum.	0.04^a	0.02^a	0.01^b	0.00	0.03^a	-0.01	0.01^b	0.02^c
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Tax haven * dum.						0.03^a		-0.01
						(0.01)		(0.01)
Observations	49,802	52,087	46,178	30,895	26,792	43,461	33,222	43,461
R-squared	0.23	0.30	0.28	0.34	0.34	0.30	0.30	0.30
Nbr of group	9842	10645	9454	7017	6377	9073	6558	9073

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for the top/bottom 1% of observations in column (1), for outliers exceeding +/-100% in column (3) and for outliers exceeding +/-100% and for negative stocks of assets in other columns. The sample is restricted to positive yields in column (4). All specifications include parent×year fixed effects.

A second source of measurement issue relates to the choice of corporate tax rate. The statutory tax rate used as benchmark specifications is a proxy for the marginal tax rate that the firm should face on income shifted across jurisdictions. Effective tax rates could reflect more accurately the tax rate on additional profit but their computation presents methodological challenges and may give rise to endogeneity issues. Columns (2) to (5) of Appendix Table 16 shows that the main results are broadly robust to alternative measures of corporate tax rate differentials using average and effective tax rates computed by the Oxford Center for Business Taxation and Egger and Bosenberg (2017) for different sub-samples of our observations.

Appendix Table 16 also investigates to which extent the functional form of the tax rate differential matters. Column (1) use the difference of log tax rates instead of the tax rate differential in percentage point. Finally, column (6) uses a more flexible approach by including dummies by decile of corporate tax differential. The results presented in Figure 3 confirm that the higher return on affiliates in low tax jurisdictions is not solely driven by specific low tax countries.

Figure 3 – Impact of corporate tax rate on FDI return by decile
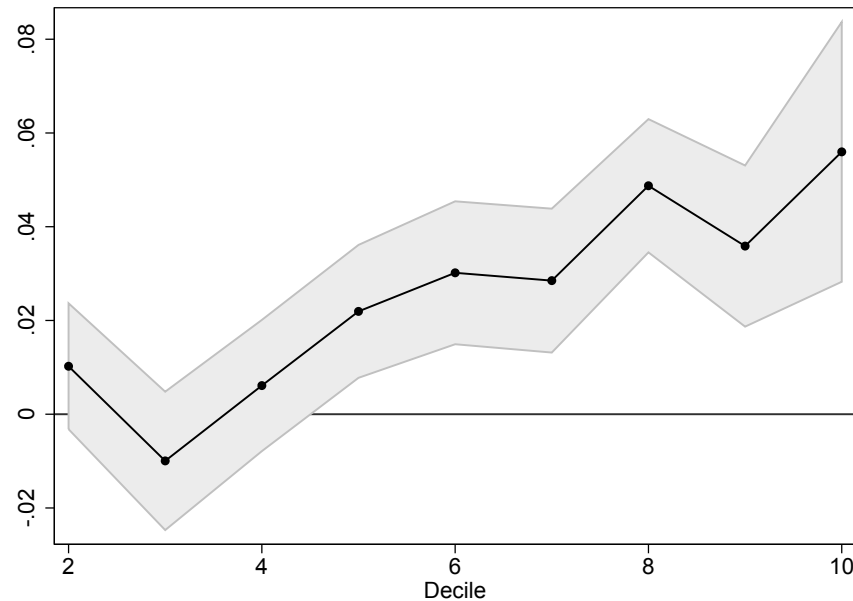
Source: coefficients are reported in column (6) in Appendix Table 16.

A last measurement issue relates to the list of tax havens used. Table 11 assesses the sensitiveness of the results to the use of alternative lists of tax haven. Column (3) considers as tax havens the top 15 countries ranked by Oxfam and column (4) uses the list of uncooperative tax havens defined by OECD (2000) (see Table 15 for country lists). Results remain quantitatively similar to the baseline when using the top 15 list but coefficients are slightly larger when using the OECD list. Note that the latter does not include large tax havens (e.g. Ireland, Luxembourg, Singapore or Switzerland) that are listed on the other two lists.

Table 17 in appendix additionally reports robustness analysis regarding the clustering of data. Appendix Table 18 uses three-year and seven-year non overlapping averages of the data to account for the fact that the adjustment of profit shifting strategies takes time.

5. Quantification and aggregate implications

This section aims at quantifying the aggregate implications of the firm level evidence presented in the preceding section for the balance of investment income, the apparent French excess return on FDI, and the related income puzzle, emphasized

Table 11 – Firm level evidence: robustness on alternative tax haven lists

	(1) Hines and Rice	(2)	(3) top15 Oxfam	(4) OECD
Corporate tax diff.	0.18^a	0.18^a	0.18^a	0.22^a
	(0.03)	(0.03)	(0.03)	(0.03)
Corporate tax diff. * Tax haven dum.		0.04	-0.02	-0.19^c
		(0.07)	(0.06)	(0.11)
Tax haven dum.	0.01^b	0.01	0.02^b	0.05^b
	(0.01)	(0.01)	(0.01)	(0.03)
Observations	43,461	43,461	43,461	43,461
R-squared	0.30	0.30	0.30	0.30
Nbr of group	9073	9073	9073	9073

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets. All specifications include parent×year fixed effects.

in Section 3.1. The quantification is a partial equilibrium exercise assuming that the level and location of FDI are fixed and that profit shifting only distorts their returns.

Inflated net FDI income flows: Profit shifting affects net FDI income through both inflows (credit) and outflows (debit).[21] The quantification however differs slightly on the asset and liability sides. The asset side is directly estimated from Equation 2 by turning off the tax determinants of FDI returns: results reported in Table 5 are used to predict the rate of returns on FDI with profit shifting by multinational companies or without, i.e. when the tax differential and the tax haven dummy are set to zero. Multiplying the predicted rates of return by the FDI stock in $t-1$ yields parent-affiliate-year specific inflows of FDI income which can then be aggregated.[22] The quantification exercise relies on the specification presented in column (3) of Table 5. Figure 9 in appendix shows the goodness of fit of the model prediction: predicted FDI income credits fit closely observed FDI income credits in level and over time.

Since equation 2 can be estimated on FDI assets and income inflows only, the quantification on the liability side cannot draw directly on predicted returns. I

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[21] Note that FDI income flows considered here do not include interests on intra-group debt.

[22] FDI income inflows are adjusted for missing predicted returns (e.g. single affiliate parents) at the country level proportionally to their stock share.

therefore use the observed flow of FDI income debit at the parent-affiliate-year level as benchmark and use the estimated coefficients on the corporate tax differential and the tax haven dummy from column (3) of Table 5 to compute counterfactual flows when profit shifting opportunities are turned off.

Figure 4 – The impact of profit shifting on FDI income flows

(a) FDI Income credit / Asset   (b) FDI Income debit / Liabilities
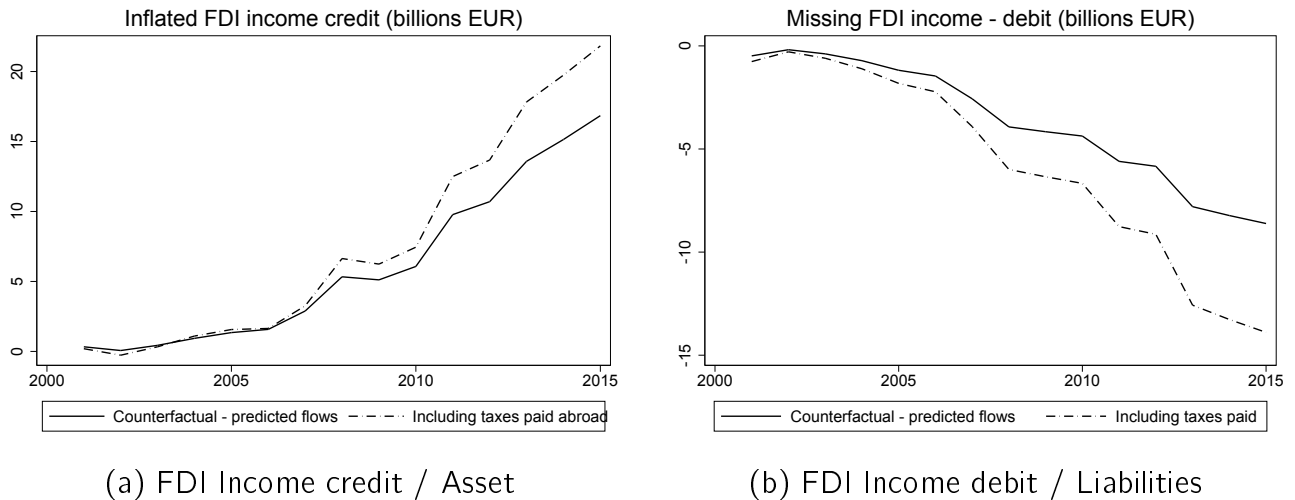
Figure 4 presents the estimated impact of profit shifting on French FDI income credit and debit. On the credit side (left panel), profit shifting inflates reported flows to a significant extent: in 2015, a quarter of FDI income flows (€17 billion out of €65 billion) are artificial flows generated by profit shifting strategies of parent companies operating in France. The orders of magnitude are similar on the debit side (although with opposite sign since profit shifting reduce the profits of subsidiaries in France), but it applies on a much smaller scale: official FDI income debits are worth €20 billion in 2015, to which should be added €9 billion of missing after tax profits from affiliates of foreign MNEs operating in France.

Missing profits: The €25 billions upward bias on the FDI income balance is based on after-tax profits and does not include corporate taxes paid abroad and avoided in France. Reintegrating those tax expenditures provides an estimation of missing profits in France, or equivalently of the erosion of the French corporate tax base due to profit shifting. The dotted lines in Figure 4 report such estimation on the credit and debit sides: in 2015, missing profits are estimated to €36 billions, or 1.6% of GDP.[23] It translates into lost tax revenues of 0.6% of GDP (€14 billions), or 29% of corporate income tax revenues in 2015.

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[23]According to Bruner et al. (2018), at 1.5% of GDP in 2014, the estimated impact for the US is

How does this estimate compare to the existing literature? Torslov et al. (2018) propose an estimation of missing profits worldwide, and their country allocation, based on national account data of tax havens, i.e. countries at the other end of tax avoidance. Interestingly, their estimation for France, €29.5 billion in 2015 (Torslov et al., 2018, Table 2), is very similar to the one above, although based on different methodologies and official statistics. Two other papers provide estimates of corporate income tax revenue losses due to profit shifting for France in previous years. Using data from the Forbes Global 2000 list, Clausing (2016) approximates tax revenues losses at 23% of total CIT in France in 2012, slightly larger than the 15% from the counterfactual exercise above for 2012. And Cobham and Jansky (2017) estimates, from panel data regressions of CIT revenues on a large sample of countries, a tax revenue loss of €16 billion or 0.7% of GDP in 2013 (against €12 billion or 0.55% of GDP in my estimates). All these are partial equilibrium estimates. Using a computable general equilibrium model Alvarez-Martinez et al. (2018) find a loss of 15% of corporate tax revenues for France in 2012, in line with my estimate above. The quantification of missing profits presented in this paper is therefore in the middle-range of those found in literature.

Drivers over time: Figure 4 additionally makes clear that profit shifting inflates net FDI inflows increasingly over time, from less than €1 billion over 2001-2003 to €9 bn in 2008 and €25 bn in 2015. Figure 5 presents estimated FDI income credit under alternative counterfactuals to assess the source of such growing tax related bias. The dotted black line replicates the benchmark counterfactual (grey line) but assuming that tax differentials are fixed at the 2001 level. The estimated bias remains close to null, meaning that the growing corporate tax rate differential between France and its partners is a major contributor. The black line alternatively assumes that FDI stocks are fixed at their 2001 level. The estimated bias on credit flows is again lower than the benchmark, suggesting that growing FDI gross stocks are another major contributor to the growth of profit shifting.

Geographical distribution of missing profits: Figure 6 shows the top 15 countries in terms of total missing net FDI income.[24] Profit shifting occurs mainly with closely related partners: all except 4 countries are European countries. Four countries concentrate the bulk of tax related artificial net income flows: UK, Netherlands, Luxembourg and Switzerland. Multinational companies therefore use mainly

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of similar order of magnitude than for France. Note that the approach for estimating profit shifted proposed here differs from the methodology based on formulary apportionment applied by Guvenen et al. (2017) (which requires data on multinational activities collected only by the US BEA).

[24]Figure 10 in Appendix provides the details for credit and debit separately.

Figure 5 – Predicted inflated FDI income credit under different assumptions
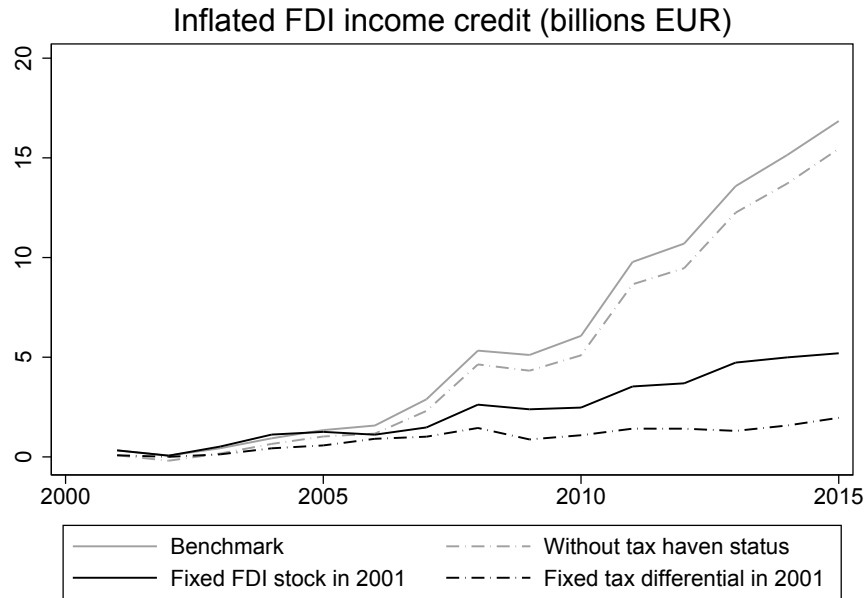
European conduit countries (UK, Netherlands)[25] or tax havens to shift profit out of France. Other notable tax havens representing large flows are Ireland, Hong Kong and Singapore.

The French excess return: Turning to the implications for returns on cross-border investments, the apparent aggregate return on FDI assets and liabilities can be computed from the predicted FDI income flows (with and without profit shifting) and observed FDI gross stocks.[26] Correcting for profit shifting reduces the average yield on FDI assets from 7.1% to 6.2% and increases the average yield on FDI liabilities from 5.5% to 6.7%. The correction is increasing over time (see Figure 7) and reconcile yields on French assets and liabilities. The yield differential therefore drops from 1.5 percentage points on average over the 2001-2015 period (2.2 pp. over 2009-2015) to -0.5 pp.

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[25] These countries are identified as major conduit countries for tax purposes by Van't Riet and Lejour (2018) or Altshuler and Grubert (2006b) because of their network of tax treaties or low withholding taxes.

[26] Aggregate yield differentials estimated from firm level data may differ from the aggregate figures reported in Table 4 because of the computation procedure or some corrections in the production of the balance of payment data from the Survey data.

Figure 6 – Geographical distribution of tax generated net FDI income flows

Bias on FDI income balance (2015, billions EUR)
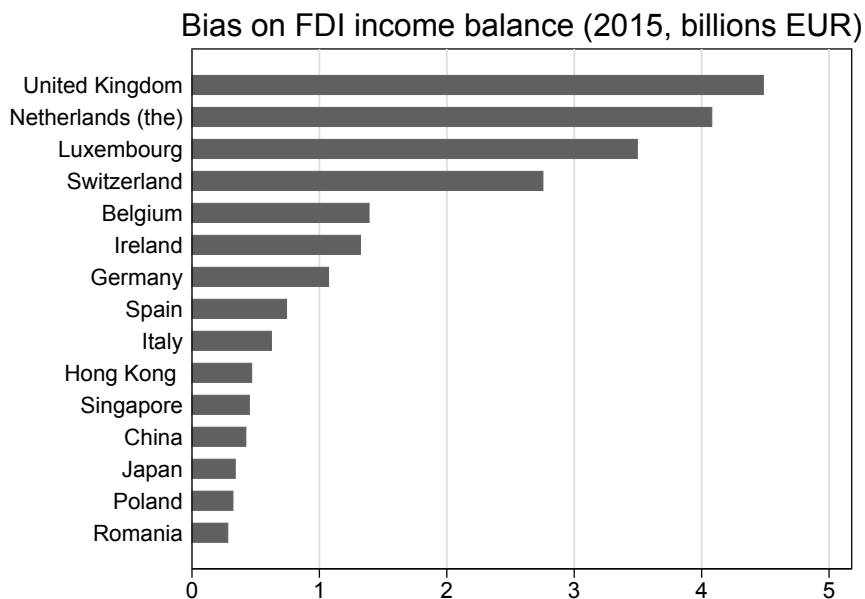
Figure 7 – Aggregate yields on FDI assets and liabilities: observed and counterfactual

Aggregate yields on FDI assets and liabilities
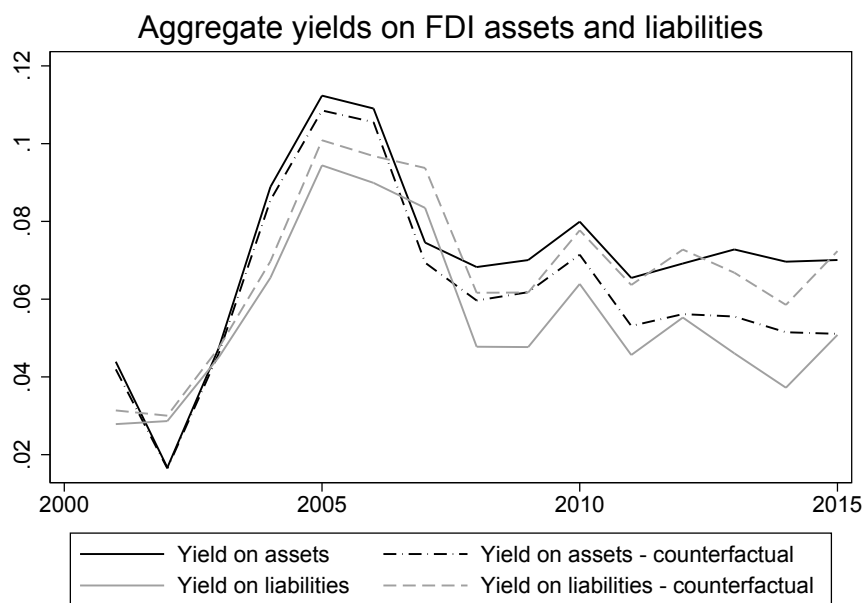
6.   Conclusion

This paper has shown that tax motivated profit shifting by multinational compa-
nies generates an exorbitant privilege for high tax countries. Differences on returns
on foreign assets and liabilities at the country level are correlated to the corpo-
rate income tax level for a large sample of countries and owe primarily to a yield
differential within the class of FDI. Cross-country evidence on aggregate data are
confirmed using confidential firm level data on investment stocks, dividends and
reinvested earnings from affiliates of parents multinationals residing in France. A
quantification exercise shows that profit shifting by MNEs inflates significantly the
net FDI income balance and account for a two percentage points differential in
returns on FDI assets and liabilities for France. Finally, at €36 billion in 2015, esti-
mated missing profits in France are substantial; they are mostly booked in affiliates
located in a few European countries, which underlines the relevance of economic
integration for international tax coordination.

In view of the increasing importance of the investment income item of the current
account, driven by increasing gross international investment positions, a better
understanding of the determinants of returns on cross-border asset holdings appears
crucial to the assessment of current account dynamics and sustainability, especially
in a context of major fiscal reforms in large countries. In addition, profit shifting
is also likely to bias other dimensions of balance of payment and national account
statistics and distort their economic interpretation. Such issues would deserve
further work given the amounts at stake.

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Appendices

A. Composition vs. return effects in total return differentials

The pattern of divergence between net international investment position and returns on investments registered in the current accounts (illustrated in Figure 1) may result either from different compositions of assets and liabilities (composition effect) or yield differentials within classes of assets (return effect). This section provides evidence that the return differentials on total foreign investment owe significantly to a yield differential within FDI.

Gourinchas and Rey (2007) propose to decompose the expected return differential on total investment into two components as follow:

$$E(i_{it}^{A,tot} - i_{it}^{L,tot}) = \sum_k \mu_{it}^k (i_{it}^{A,k} - i_{it}^{L,k}) + \sum_k (\mu_{it}^{A,k} - \mu_{it}^{L,k}) i_{it}^k \tag{3}$$

where $\mu_{it}^k = \frac{\mu_{it}^{A,k} + \mu_{it}^{L,k}}{2}$ et $i_{it}^k = \frac{i_{it}^{A,k} + i_{it}^{L,k}}{2}$.

The first term in Equation 3 reflects the effect of yield differentials within class of assets between assets and liabilities and the second term represents the composition effect. Note that absent differences in the level of average yields across asset-classes, the difference in the composition of assets and liabilities would not affect the return on net foreign investment.

Table 12 reports the average contribution of each component of Equation 3 to total return differentials on net foreign assets for a sample of 37 countries over the period 2001-2015; country details are reported in Table 13. Data are from the IMF Balance of Payment statistics; the sample is restricted to countries reporting at least 10 years of data for all investment income flows and stocks of assets/liabilities by asset class.

Differences in yields on the stock of assets vs. liabilities play a dominant role in return differentials: on average, return effects explain four fifths of the total return differential at the country level. Of those, half is accounted by the yield differential within the direct investment category.[27] The dominant contribution of the return

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[27] Note that for some countries, the contribution of the other investment class to the yield differential may be biased upwards because interests on intra-group debt are not necessarily classified under the direct investment heading in investment income flows, but are in stocks. See Section 3 for an illustration on the French case.

effect is in line with the findings of Gourinchas and Rey (2007) on the US over long period (1952-2004). Composition effects however play a significant role for some countries.

Table 12 – Return and composition effects in total return differentials

| | Return effect | | | | | Composition effect | | | | | Total |
	Total	Direct inv.	Portfolio equity	debt	Other inv.	Total	Direct inv.	Portfolio equity	debt	Other inv.	return diff.
Mean	68%	45%	2%	4%	17%	32%	40%	0%	8%	-16%	-2%
Mean (OECD rich and EU)	74%	48%	4%	6%	16%	26%	37%	-2%	5%	-14%	-1%

Note: data are from the IMF BOP statistics for a sample of 37 countries with non missing data on investment income flows and asset/liability stocks for at least 10 years over the period 2001-2015. Data are trimmed for outlier contributions exceeding +/-500%.

Table 13 – Return and composition effects in total return differentials: country details

| | Return effect | | | | Composition effect | | | | Total return diff. | Obs. |
	Total	Direct inv.	Portfolio equity	Portfolio debt	Other inv.	Total	Direct inv.	Portfolio equity	Portfolio debt	Other inv.		
Australia	79%	84%	17%	-34%	12%	21%	-60%	-25%	126%	-19%	-1%	15
Canada	65%	33%	5%	13%	14%	35%	-35%	-36%	112%	-5%	-1%	15
Chile	61%	45%	6%	6%	3%	39%	61%	-19%	1%	-3%	-6%	14
Cyprus	12%	-32%	1%	16%	26%	88%	120%	-9%	9%	-32%	-1%	11
Czech Republic	60%	48%	4%	5%	4%	40%	70%	-1%	-3%	-27%	-5%	10
Denmark	77%	40%	11%	6%	21%	23%	22%	7%	0%	-7%	0%	15
Estonia	26%	16%	3%	-13%	20%	74%	109%	-2%	-20%	-14%	-2%	15
France	74%	65%	-11%	18%	2%	26%	48%	-7%	-8%	-7%	0%	14
Germany	111%	65%	-15%	61%	1%	-11%	18%	2%	-72%	41%	0%	15
Greece	83%	39%	4%	62%	17%	-2%	5%	77%	-62%	-1%	14	
Hungary	30%	89%	-5%	-62%	8%	70%	-80%	3%	160%	-13%	-1%	11
Iceland	88%	50%	2%	24%	11%	12%	12%	-4%	30%	-26%	1%	13
Ireland	126%	104%	14%	11%	-3%	-26%	-9%	35%	-50%	-2%	-1%	10
Israel	74%	38%	-22%	44%	15%	26%	21%	33%	14%	-41%	-1%	15
Italy	85%	81%	7%	-9%	5%	15%	38%	27%	-52%	1%	0%	10
Japan	80%	-4%	42%	45%	-3%	20%	30%	-37%	28%	-1%	2%	15
Korea (the Republic of)	57%	1%	-8%	25%	39%	43%	86%	17%	-19%	-41%	0%	12
Lithuania	11%	41%	2%	-69%	37%	89%	68%	0%	60%	-39%	-3%	15
Netherlands (the)	56%	88%	-34%	11%	-9%	44%	122%	1%	-74%	-6%	0%	12
New Zealand	96%	108%	48%	-13%	-48%	4%	33%	-63%	48%	-14%	-2%	15
Poland	69%	64%	1%	-4%	8%	31%	34%	1%	22%	-26%	-3%	14
Portugal	121%	8%	10%	34%	69%	-21%	41%	26%	-104%	16%	0%	14
Romania	107%	47%	3%	1%	55%	-7%	25%	1%	8%	-40%	-3%	11
Slovakia	26%	37%	0%	-38%	27%	74%	85%	-1%	5%	-16%	-3%	15
Slovenia	86%	59%	1%	-8%	34%	14%	12%	-9%	5%	6%	-2%	12
Spain	97%	-32%	9%	64%	56%	3%	47%	10%	-52%	-3%	0%	11
Sweden	101%	105%	-14%	22%	-12%	-1%	65%	37%	-106%	3%	1%	15
Switzerland	64%	47%	-1%	5%	13%	36%	35%	-60%	76%	-16%	0%	14
United Kingdom	70%	14%	27%	36%	-7%	30%	64%	-15%	-2%	-17%	0%	13
United States of America (the)	119%	83%	12%	14%	9%	-19%	38%	14%	-77%	6%	1%	15
Argentina	65%	25%	0%	17%	23%	35%	28%	1%	30%	-23%	-6%	12
Brazil	16%	57%	10%	-103%	52%	84%	-4%	11%	116%	-38%	-3%	10
Croatia	84%	34%	0%	16%	33%	16%	36%	-2%	8%	-26%	-2%	10
Hong Kong	24%	40%	-2%	-1%	-12%	76%	122%	2%	-34%	-13%	-1%	15
Kazakhstan	81%	62%	0%	10%	9%	19%	52%	-1%	-17%	-15%	-10%	15
Russian Federation (the)	45%	52%	-41%	0%	35%	55%	18%	54%	10%	-27%	-4%	12
Venezuela	2%	-25%	1%	4%	22%	98%	96%	2%	34%	-35%	-5%	12

Note: data are from the IMF BOP statistics for a sample of 37 countries with non missing data on investment income flows and asset/liability stocks for at least 10 years over the period 2001-2015. Data are trimmed for outlier contributions exceeding +/-500%.

B.   Data

B.1.   Country list with available IMF Balance of payment data

Table 14 – Sample of countries in IMF BOP statistics

Argentina	Japan*
Armenia	Kazakhstan
Australia*	Korea (the Republic of)*
Austria*	Latvia*
Bahrain	Lithuania*
Bangladesh	Luxembourg*
Belarus	Malaysia
Bolivia	Malta*
Bosnia and Herzegovina	Mexico*
Brazil	Moldova (the Republic of)
Bulgaria*	Morocco
Cambodia	Netherlands (the)*
Canada*	New Zealand*
Chile*	Nigeria
Colombia	Norway*
Costa Rica	Pakistan
Croatia	Paraguay
Cyprus*	Philippines (the)
Czech Republic*	Poland*
Denmark*	Portugal*
Egypt	Romania*
El Salvador	Russian Federation (the)
Estonia*	Senegal
Finland*	Slovakia*
France*	Slovenia*
Georgia	Spain*
Germany*	Sweden*
Greece*	Switzerland*
Guatemala	Thailand
Hong Kong	Former Yugoslav Republic of Macedonia
Hungary*	Tunisia
Iceland*	Turkey*
India	Ukraine
Indonesia	United Kingdom*
Ireland*	United States of America (the)*
Israel*	Uruguay
Italy*	Vanuatu
Jamaica	Venezuela

Note: * denote inclusion in the OECD and EU-27 sample.

B.2. French firm level data on direct investment stocks and income flows

The confidential firm level data on FDI stocks and FDI income are compiled by the statistical department of the Banque de France in order to produce the balance of payments statistics. They are collected from several sources. The outward foreign direct investment stocks and income credit come from the *'survey of direct investment abroad'*, a yearly survey of resident parent multinationals (industrial and commercial enterprises, financial intermediaries or insurance corporations) conducted by Banque de France. It collects various information on their investment abroad, including ownership shares, equity capital, current income, exceptional income, other equity capital and dividends. Information on all non-resident subsidiary in which a resident direct investor holds an equity capital stake of more than 5 million euros, or where the acquisition cost was greater than 5 million euros, must be reported in the survey. Major non-financial enterprises (*'Déclarants directs généraux'*, i.e. whose total international transactions in services or incomes exceeding 30 million euros a year) reports on an infra-annual basis their service transactions and their income payments to or from non-residents. The data related to foreign affiliates are therefore reported by the resident MNEs, and do not rely on the availability of financial report in host countries and in particular of corporate registers in tax havens.

Data on inward direct investment stock and income debit are compiled from the FIBEN database ('Fichier bancaire des entreprises'), the firm level dataset produced by Banque de France providing balance sheet information on non-financial resident companies. Those data are supplemented by sources from the ACPR for the banking sector and from INSEE (ESANE data).

Following the 6th manual of the Balance of Payment (BPM6), FDI income is decomposed into dividends, reinvested earnings and interest on intra-group debt.[28] Reinvested earnings are the retained earnings of foreign subsidiaries that are not distributed as dividends; they are attributed to the director investor according to the share of equity they hold. Reinvested earnings are defined as net operating surplus plus primary income (dividends, interest and rents receivable, and share of reinvested earnings of any direct investment enterprises) and current transfers receivable, minus primary income (excluding reinvested earnings payable), taxes and other current transfers payable. Dividends and reinvested earnings are after tax incomes since the corporate tax is payable by the enterprises and not its owner.

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[28]Interests on intra-group debt are recorded separately from other interests beginning in 2012 in the French Balance of Payment statistics. They are no considered here.

Note that since retained earnings include reinvested earnings receivable from any direct investment enterprises, reinvested earnings from indirect holding (affiliates held indirectly through direct affiliates) are indirectly passed on to the direct investor through the chain of direct investment relationships.

The standard valuation of FDI in the balance of payment (BPM6) follows the mixed value which values listed equity stocks at market price and unlisted equity stocks at book value. The book value of unlisted foreign affiliates comes from either the balance sheet of foreign companies (when available) or from information on subsidiaries and interests in the notes to the annual financial statements of resident companies. The value of resident affiliates held by foreign direct investors are taken from their balance sheets.[29] Equity capital is computed as the sum of share capital, reserves, retained earnings, and the current year profit or loss (Banque de France, 2015).

Figure 8 presents the geographic disaggregation of FDI income credit and debit and FDI assets and liabilities into four broad regions: EU-28 (defined using the outlines of EU membership in 2015 throughout the period, excluding tax havens), large tax havens (i.e. Ireland, Luxembourg and Switzerland), other tax havens (as defined by Hines and Rice (1994)), and the rest of the world.

B.3.   Other data

Data on corporate tax rates are from the OECD tax database supplemented by information from KPMG.[30] I use the statutory corporate tax rate as my main measure for tax rate differentials but also consider the sensitivity of the results to alternative measures of tax rates using effective average and marginal tax rates computed by Egger and Bosenberg (2017) and the Oxford Center for Business Taxation. Finally, tax havens are from the list of Hines and Rice (1994); alternative lists from OECD (2000) and using information from Oxfam (Bouvatier et al., 2017) are used for robustness.

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[29]The real-estate investment position is calculated through cumulative flows / valued on the basis of historical cost. and updated yearly using various price indices.
[30]https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html

Table 15 – Lists of tax havens

	Hines and Rice	Top 15 Oxfam	OECD
Andorra			1
Anguilla	1		1
Antigua and Barbuda	1		1
Aruba			1
Bahamas	1	1	1
Bahrain	1		1
Barbados	1	1	1
Belize	1		1
Bermuda	1	1	1
British Virgin Islands		1	1
Cayman Islands (the)	1	1	1
Curacao		1	
Cyprus	1	1	1
Dominica	1		1
Gibraltar			1
Grenada	1		1
Hong Kong	1	1	
Ireland	1	1	
Isle of Man			1
Jersey		1	
Jordan	1		
Lebanon	1		
Liberia	1		1
Liechtenstein	1		1
Luxembourg	1	1	
Macao	1		
Maldives	1		1
Malta	1		1
Mauritius		1	
Monaco	1		1
Netherlands (the)		1	
Netherlands Antilles	1		1
Panama	1		1
Saint Kitts and Nevis	1		1
Saint Lucia	1		1
Saint Vincent and the Grenadines	1		
Samoa			1
Seychelles			1
Singapore	1	1	
Switzerland	1	1	
Turks and Caicos Islands (the)			1
Vanuatu	1		1

Source: Hines and Rice (1994), Bouvatier et al. (2017) and OECD (2000).

Figure 8 – Distribution of French FDI stocks and income flows
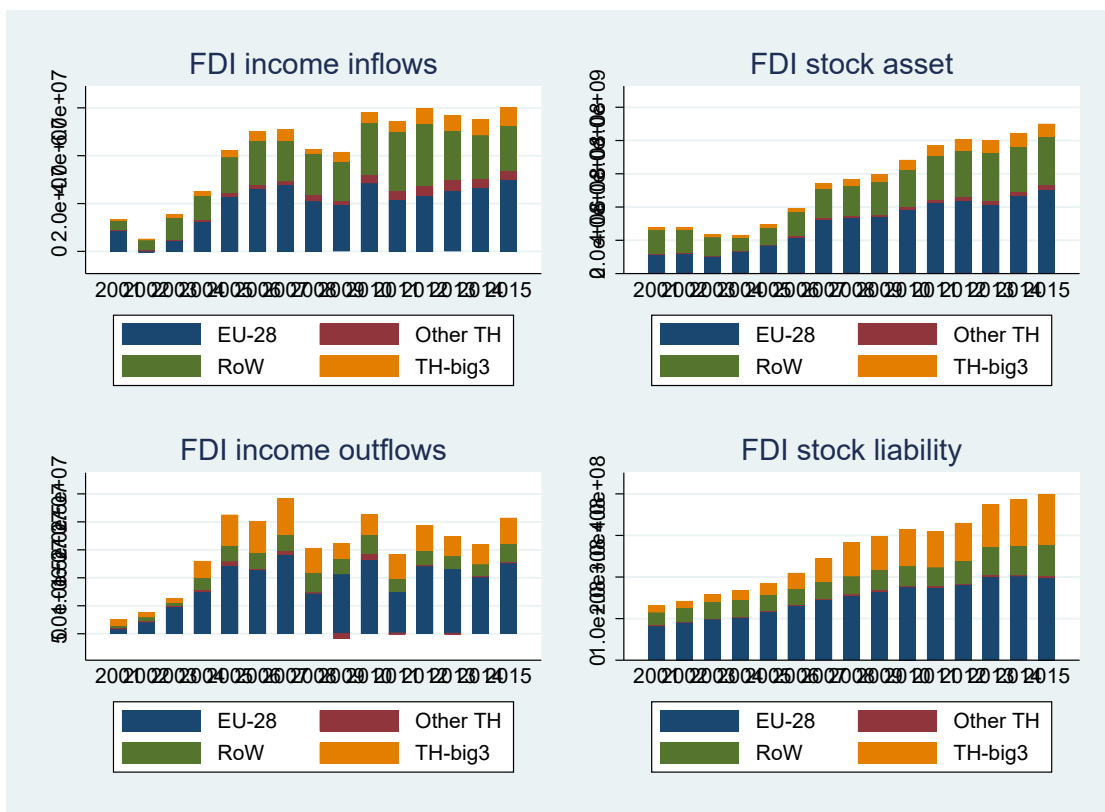
Note: EU-28 includes all EU-28 countries except tax havens countries. TH-Big 3 includes Irland, Luxembourg and Switzerland and Other TH includes all other tax havens from Hines and Rice (1994).

C. Additional robustness

Table 16 – Firm level evidence: robustness on alternative tax rates

	(1) log	(2) EATR	(3) EMTR	(4) EATR 2	(5) EMTR 2	(6)
Corporate tax diff.	0.05^a	0.24^a	0.06	0.22^a	0.17^a	
	(0.01)	(0.04)	(0.05)	(0.04)	(0.03)	
Tax haven dum.	0.01^b	0.01	0.02^b	0.01^c	0.02^b	0.01^c
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Corporate tax diff. Dum. 1						-0.03^a
						(0.01)
Corporate tax diff. Dum. 2						-0.02^b
						(0.01)
Corporate tax diff. Dum. 3						-0.04^a
						(0.01)
Corporate tax diff. Dum. 4						-0.03^a
						(0.01)
Corporate tax diff. Dum. 5						-0.01
						(0.01)
Corporate tax diff. Dum. 6						-
Corporate tax diff. Dum. 7						-0.00
						(0.01)
Corporate tax diff. Dum. 8						0.02^b
						(0.01)
Corporate tax diff. Dum. 9						0.00
						(0.01)
Corporate tax diff. Dum. 10						0.02^b
						(0.01)
Observations	43,291	36,936	36,936	38,186	38,186	44,840
R-squared	0.30	0.31	0.31	0.30	0.30	0.30
Nbr of group	9048	8322	8322	8063	8063	9232

Note: Robust standard errors clustered by parent/year in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets. All specifications include parent×year fixed effects. The corporate tax rate is the effective average and marginal tax rates respectively computed by the Oxford Center for Business Taxation in column (2)-(3) and Egger and Bosenberg (2017) in columns (4)-(5).

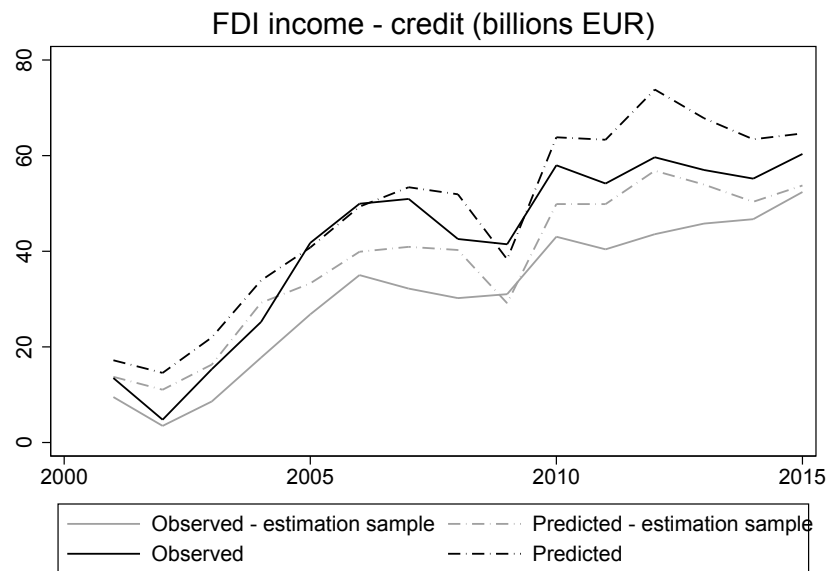**Table 17 – Firm level evidence: robustness on clustering**

	(1) jt	(2) j	(3) i	(4) jt & i
Corporate tax diff.	0.18^a	0.18^a	0.18^a	0.18^a
	(0.03)	(0.06)	(0.04)	(0.04)
Tax haven dum.	0.01^b	0.01	0.01^c	0.01^c
	(0.01)	(0.01)	(0.01)	(0.01)
Observations	43,461	43,461	43,461	43,461
R-squared	0.30	0.30	0.30	0.30
Nbr of group	9073	9073	9073	9073

Note: Robust standard errors clustered by parent/year (colum (1)), parent (column (2), affiliate's country(column(4)), or parent/year and affiliate's country (column (4)) in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets. All specifications include parent×year fixed effects.

Table 18 – Firm level evidence: robustness - averaging

	(1) 7-years	(2)	(3) 3-years	(4)
Corporate tax diff.	0.20^a	0.15^b	0.21^a	0.16^a
	(0.06)	(0.06)	(0.05)	(0.05)
Tax haven dum.		0.02^b		0.02^b
		(0.01)		(0.01)
Observations	12,741	12,741	21,088	21,088
R-squared	0.29	0.29	0.30	0.30
Nbr of group	2397	2397	4171	4171

Note: Robust standard errors clustered by parent/period in parentheses. ^{a}, ^{b} and ^{c} denote significance at the 1%, 5% and 10% level respectively. The dependent variable, i_{ijt}, is trimmed for outliers exceeding +/-100% and for negative stocks of assets. All 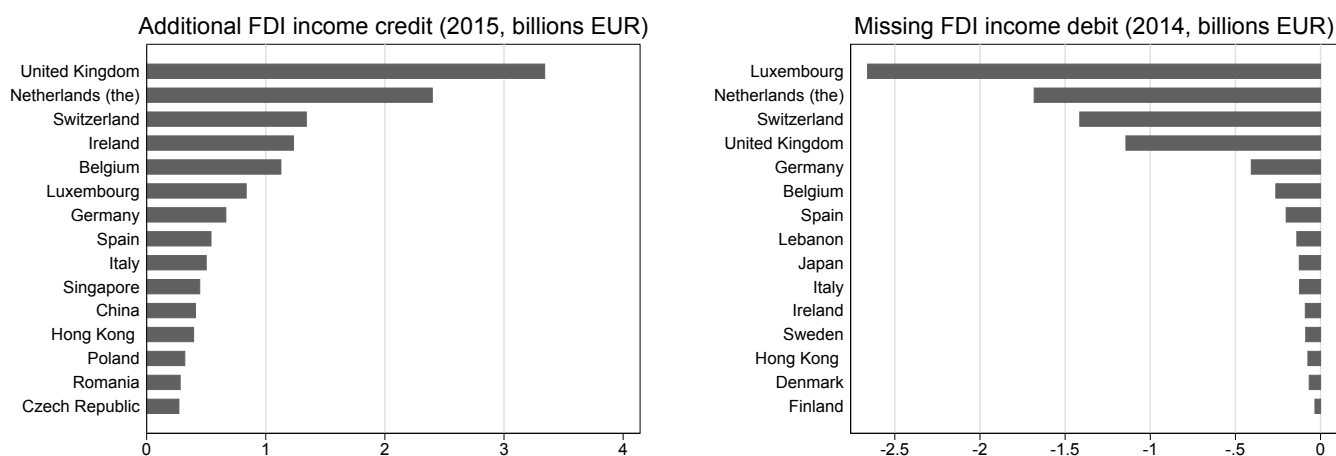specifications include parent×period fixed effects. Data are averaged over non-overlapping 3-years and 7-years periods in columns (1)-(2) and (3)-(4) respectively.

D.   Quantification: additional figures

Figure 9 – Predicted and observed FDI income credit

Figure 10 – Geographical distribution of tax generated FDI income credit and debit

Additional FDI income credit (2015, billions EUR)

United Kingdom	
Netherlands (the)	
Switzerland	
Ireland	
Belgium	
Luxembourg	
Germany	
Spain	
Italy	
Singapore	
China	
Hong Kong	
Poland	
Romania	
Czech Republic	

Missing FDI income debit (2014, billions EUR)

Luxembourg	
Netherlands (the)	
Switzerland	
United Kingdom	
Germany	
Belgium	
Spain	
Lebanon	
Japan	
Italy	
Ireland	
Sweden	
Hong Kong	
Denmark	
Finland	

(a) FDI income credit / Asset   (b) FDI income debit / Liabilities