Profit shifting through transfer pricing: evidence from French firm level trade data[*]

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November 2014

Abstract

This paper provides direct evidence of profit shifting to low tax jurisdictions by multinational companies through transfer prices. Using detailed firm level export and import data by destination and product for France, I show that the price wedge between arm's length trade and related party trade varies systematically with the differential in corporate tax rate between France and the partner country. Profit shifting through transfer prices is estimated to have reduced the French corporate tax base by 8 bn USD in 2008, and its extent is growing over 2000s in France. Though significant, the manipulation of transfer prices on trade in goods accounts for a limited share only of the estimated total profit shifting by multinational companies.

Keywords: Transfer price, Multinational firms, Tax evasion, trade, Investment income, Current account.
JEL Classification: F14, F23, F32, H26

1 Introduction

Anecdotal evidence of very low effective tax rate paid by prominent multinational companies have brought the issue of tax base erosion and profit shifting to the forefront of the public debate and the international policy agenda.[1] By their very nature, multinational companies are indeed able to transfer incomes and profits across jurisdictions with different tax systems, and globalization has increased opportunities for profit shifting to low tax jurisdictions. The importance of multinational groups in economic activity makes these decisions non trivial for national economies, primarily through their impact on the erosion of corporate tax bases and biased competition with domestic firms.

While numerous papers provide empirical evidence of profit shifting to low tax jurisdictions by multinational companies,[2] we know little about the relative importance of the different instruments used by multinationals and the extent of profit shifting in the aggregates.[3] Multinationals may shift profit through three main channels: intra-group loans, the location of intangibles (e.g. brand or patent licenses), or the manipulation of transfer prices. Identifying the relative importance of alternative channels of profit shifting is crucial to understand their impact on national economies and for the design and implementation of anti-avoidance rules.

At the macroeconomic level, profit shifting generates mismeasurement of international flows and imbalances. Transfer pricing and the location of intangibles will bias international trade flows of goods and services directly but also the balance of investment income through profits repatriated from foreign affiliates. The latter implies a direct relation between the level of corporate tax rate and the balance of foreign direct investment (FDI) incomes, for a given level of FDI stocks. Such pattern is illustrated by figure 1, which plots the differential in implicit interest rate on countries' FDI assets and liabilities against the level of corporate tax for a sample of 32 OECD countries in 2007.[4] The positive correlation between the corporate tax rate and the differential in implicit interest rates on FDI shown by figure 1 is consistent with significant profit shifting biasing significantly aggregate international flows. Such discrepancies in international statistics can be used to identify tax avoidance by multinationals.[5]

This paper focuses on transfer pricing in trade in goods, i.e. the prices set in international transactions between a parent and its affiliates or two affiliates of the same group. I provide direct evidence of the strategic use of transfer pricing by multinational companies to shift profit to low tax countries, based on detailed French firm level trade data by product and destination. Linking trade data with consolidated profits then

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[1]In particular, the OECD has launched in 2013 with the support of the G20 an initiative aiming at addressing the issue of Base Erosion and Profit Shifting (BEPS).

[2]See in particular Hines and Rice (1994), Bartelsman and Beetsma (2003), Huizinga and Laeven (2008), Egger et al. (2010) and Dharmapala and Riedel (2013).

[3]Existing (indirect) evidence in the literature provide mixed conclusions regarding the relative importance of different channels in the erosion of tax bases. Based on meta analysis, Heckemeyer and Overesch (2013) attributes 70% of the erosion of tax bases to transfer pricing and licensing by multinationals while Dharmapala and Riedel (2013) argues that most is accounted by the use of debt instruments across affiliates.

[4]Section 2 presents the details of the computation.

[5]See Zucman (2013) for a similar forensic analysis of tax avoidance by individuals from bilateral foreign asset and liability positions.

Figure 1: Corporate income tax, FDI investment income balance and yield differentials
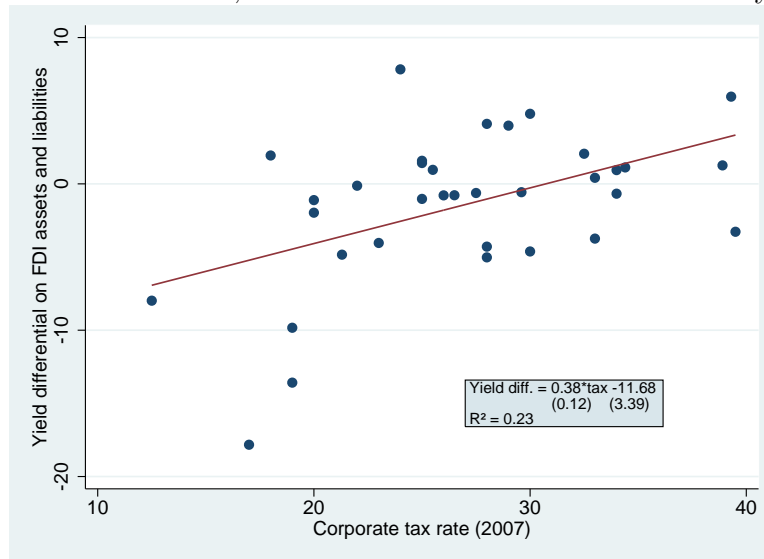
Source: IMF and OECD, author computation. See section 2 for details of the calculation of yield differentials.

enable me to estimate the contribution of transfer pricing on trade in goods to total profit shifting by multinationals. The second objective of this paper is to quantify the aggregate impact on the tax base and international flows and imbalances.

France is a good candidate to study transfer pricing and its impact on aggregate trade and investment income flows. France indeed stands increasingly as a high corporate tax country compared to its main partners throughout the 2000s: its corporate income tax rate ranks third among OECD countries since 2008, but was close to the average tax level of OECD countries in 2000 on a trade weighted basis. In addition, France has a territorial tax system for corporations: it provides for a participation exemption on dividends distributed by foreign affiliates.[6] The French corporate tax system, under the participation exemption, therefore provides a rational for MNEs to shift their profit in low tax jurisdiction. On the contrary, the U.S. applies a residential tax system in which corporations are taxed on their activities worldwide, which is likely to reduce incentives to manipulate transfer prices.[7]

Moreover, France has had increasing investment income inflows despite a deteriorating international investment position over the 2000s, generating an 'excess return' on foreign investments (Gaulier and Vicard, 2014). In this respect, France is similar to the well documented US case (Gourinchas and Rey, 2007; Lane and Milesi-Ferretti, 2009; Obstfeld and Rogoff, 2005; Curcuru et al., 2008). This 'excess return' partly results from a positive return differential within the direct investments category, consistently with transfer pricing explanations.[8]

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[6]More precisely, under the participation exemption, parent companies may exclude up to 95% of the dividends distributed by their affiliates (of which they owns at least 5% of the shares) from their taxable profit. See Ministry of economics and finance, "The French tax system", http://www.impots.gouv.fr/portal/deploiement/p1/fichedescriptive_1006/fichedescriptive_1006.pdf.

[7]Most countries worldwide, and in particular in Europe, apply a territorial system.

[8]Other explanations could also contribute to explaining the joint weak export performance and excess return. The French comparative advantage in services, which are served through FDI rather

The international taxation of the activity of multinational companies draws heavily on the arm's length principle that states that international transactions within multinationals should be treated as if they had taken place between independent firms. Prices in related party transactions should be comparable to those prevailing in "comparable uncontrolled transactions" (CUT), i.e. similar transactions between the same firm and an independent firm or between two similar independent firms. In this paper, I consider as CUT transactions between unrelated parties on the same market (destination country and product) taking place the same year.

The identification strategy makes use of the price wedge between arm's length and related party trade on different markets depending on their corporate income tax levels compared to France. Larger absolute price wedges for exports to or imports from destinations with larger corporate tax differentials would provide evidence of transfer pricing behavior by multinational firms. The comparison of prices between arm's length vs. related party trade is assessed using firm level data at the most detailed level available for France, i.e. within destination country, product (CN8) and year, for exports and imports.

The paper finds evidence of the strategic use of transfer prices by multinational corporations located in France in order to shift income to low tax jurisdictions. The empirical analysis shows that a one percentage point positive differential in corporate tax rate between France and its trade partners reduces intra-firm export prices by 0.22% and increases intra-firm import prices by 0.24% in the preferred specification. A one percentage point increase of the tax differential would decrease the consolidated profit before interest and tax of multinationals companies that export or import goods by 0.1%, which can be compared with an average semi-elasticity of profits to tax differential of 0.8 (Heckemeyer and Overesch, 2013).

A quantification exercise suggests that the manipulation of transfer prices by multinationals in France decreases the value of French exports by 0.7%, increases imports by 0.5% and worsens the trade deficit by 9.2% in 2008. The associated reduction of the surplus of the FDI income balance explains one fifth of the differential in implicit yield between FDI assets and liabilities. These results imply that the underreported taxable revenues due to transfer pricing strategy on both exports and imports amount to 8 billions USD in 2008, and is growing over time.

The existing literature provides mainly indirect evidence of transfer pricing behavior by U.S. multinationals (see e.g. Hines (1997), Swenson (2001) and Clausing (2003)).[9][10] Bernard et al. (2006) is an exception and provides direct evidence that the prices (unit values) of U.S. exporters in arm's-length relationships are substantially larger than those on related-parties trade and that the difference is correlated to corporate tax differentials. They use detailed US export transaction data that allow them to compare prices of

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than exports, could increase investment revenues related to services exports through FDI.

[9]On France, Quantin et al. (2009) provides indirect evidence of transfer pricing using intra-group trade balances of multinational firms for 1999. They find that a one percentage point increase in foreign business tax increases by two percentage points the bilateral normalized intra-group trade balance. Overesch (2006) focuses on German multinationals and subsidiaries and find evidence of transfer pricing using balance sheet items "accounts receivable from affiliated companies" and "accounts receivable from parent company" as proxy for intra-firm trade.

[10]For a theoretical approach to transfer pricing, see e.g. Bauer and Langenmayr (2013).

arm's length vs. related party trade within firm, destination, product month and mode of transport. Two papers, contemporary to this work, also provide direct evidence of transfer pricing strategy by Danish exporters setting affiliates abroad (Cristea et al., 2013) and multinationals located in France in 1999 (**?**). This paper adds to the literature by providing additional direct evidence of transfer pricing on a large country, France, applying a territorial tax system, and by quantifying the aggregate impact of profit shifting through transfer prices. Using information on both exports and imports indeed enables me to fully estimate how transfer prices affect the tax base, the components of the trade and investment income balance and the yield differentials on FDI assets and liabilities.

Transfer pricing is one channel of shifting profit to low tax countries among others: the literature provide evidence of the use of intra-group loans[11], debt shifting, and the location of intangibles (e.g. brand or patent licenses) (Karkinsky and Riedel, 2012) and risks for profit shifting purposes (see Devereux (2007) for a review). While profit shifting systematically affect corporate taxes paid by multinationals, transfer pricing and the location of intangibles are specific in that they will affect directly domestic value added and the corporate tax base as well as the current account. Tax differentials may also impact investment decisions by MNEs (de Mooij and Ederveen, 2008; Devereux and Griffith, 2003); here the impact of tax differentials on price wedges is assessed for given location decisions.[12]

By quantifying the impact of transfer pricing on differentials in foreign asset returns, this paper also contributes to the international macroeconomic literature studying international asset returns. The higher apparent return of the US on its external assets than its external liabilities has generated a strong debate. This US 'exorbitant privilege' has been attributed to composition effects – US foreign assets are weighted towards equity and FDI, whose average returns are higher, whereas foreigners' US assets weighted towards bonds –, and within asset class returns' differentials for FDI (Gourinchas and Rey, 2007; Lane and Milesi-Ferretti, 2009; Obstfeld and Rogoff, 2005).[13] Curcuru et al. (2008) discuss the size of the US excess return on methodological ground. Curcuru et al. (2013) attributes the differential in returns on US FDI assets and liabilities to differences in taxes, risk and the age profile of targeted firms. This paper provides evidence of significant return differentials within the FDI asset class for other countries and show that it is partly accounted by transfer pricing.

The paper is structured as follows. Section 2 provides additional evidence on corporate tax and return differentials on inward and outward stocks of FDI. Section 3 describes the empirical strategy and data. Section 4 presents the empirical results and section 5 a quantification exercise on the tax base and the trade and investment income balances.

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[11]See Nivat and Terrien (2010) for the relevance of intra-group loans in FDI flows and stocks.

[12]On the specific impact of tax havens, see e.g. Gumpert et al. (2011).

[13]Habib (2010) investigates returns on net foreign asset positions for a larger sample of countries.

2 Corporate tax rate and investment income inflows and outflows

2.1 Further evidence on OECD countries

Profit shifting by multinationals through transfer prices inflates profits in low tax countries and reduces them in high tax ones. These profits are likely to be repatriated by the parent company or reinvested abroad, depending on specificities of the domestic tax system. In any case, such operations would increase the inflows of FDI income (repatriated or re-invested) in high tax countries for a given level of FDI stock abroad and decrease outflows, the reverse being true for low tax countries. The level of corporate income tax rate should therefore be positively correlated to the FDI income balance, for a given level of FDI stock.

The returns on each class of foreign assets and liabilities can be computed using balance of payment data on investment income inflows/outflows by class of investment and international investment positions on stocks of foreign assets and liabilities. The yields on assets and liabilities are computed separately as the implicit rates of returns as follows:

$$i_t^A = \frac{InvIn_t}{A_{t-1}} \quad \text{and} \quad i_t^L = \frac{InvOut_t}{L_{t-1}} \tag{1}$$

where $InvIn_t$ are FDI income inflows, $InvOut_t$ are investment income outflows, and A_{t-1} and L_{t-1} are the stocks of gross foreign assets and liabilities.

I use the differentials on returns on FDI assets and liabilities to gauge the difference in returns on inward vs. outward FDI stocks. Data are from the IMF BOPS for the 34 OECD countries over the period 2000-2012.

Composition effects between FDI assets and liabilities may however generate yield differentials. Such concerns can be attenuated by using the panel dimension of the data. Focusing on the within class differentials for a given country 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). Figure 2 plots the residuals of regressions of yield differential and corporate tax rate respectively on a country dummy. It confirms the strong positive correlation between FDI yield differentials and the level of corporate income taxation.

Table 1 present additional specifications of the regression of FDI yield differentials on the level of corporate income tax. Consistent with profit shifting behavior, column (1) shows a positive and significant correlation between the FDI yield differential and corporate tax level on the cross-section in 2007. Column (3) reports similar results on pooled data over 2000-2012. This correlation is robust to controlling for country specific determinants using country fixed effects (column (5)), as illustrated by figure 2. Columns (2), (4) and (6) present similar results on data trimmed for outliers, i.e. dropping yield differential exceeding +10/-10 percentage points.

Figure 2: Corporate income tax and FDI yield differentials
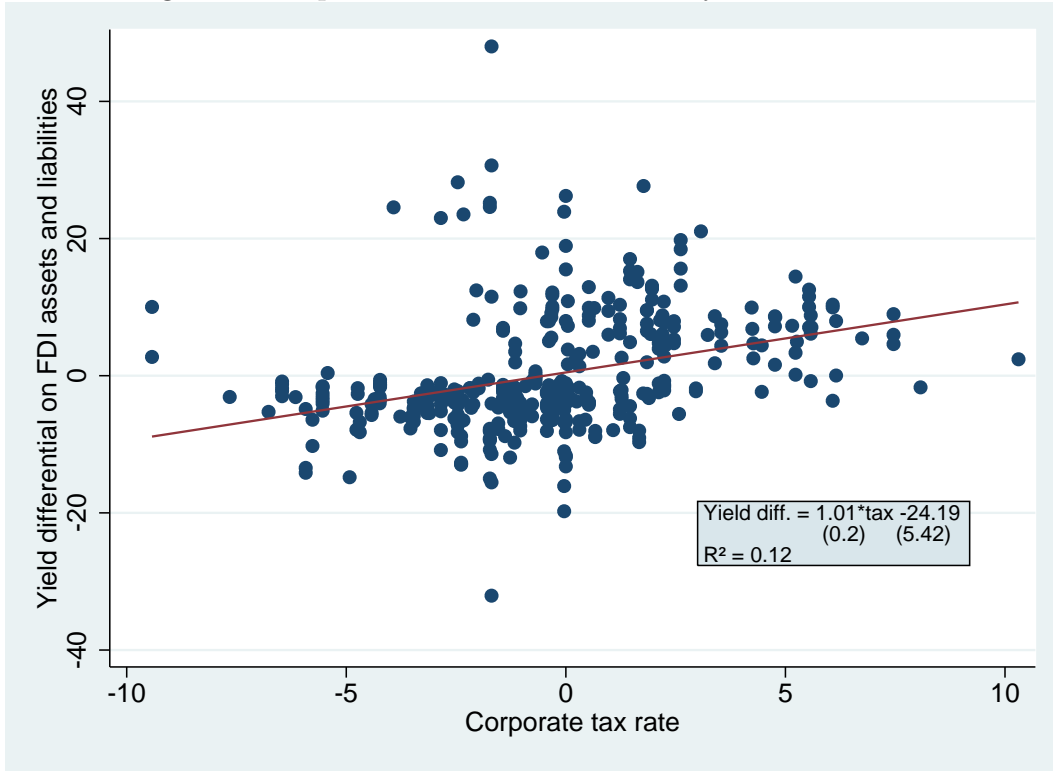
Source: IMF and OECD, author computation.

Table 1: Yield differential and corporate tax rate (2000-2012)

	(1)	(2)	(3)	(4)	(5)	(6)
Time period	2007		2000-2012		2000-2012	
Country FE	No	No	No	No	Yes	Yes
Sample		trimmed		trimmed		trimmed
Tax rate	0.38***	0.22**	0.25***	0.34***	1.01***	0.66***
	(0.122)	(0.102)	(0.082)	(0.053)	(0.196)	(0.112)
Constant	-11.68***	-6.45**	-3.03	-8.95***	-24.19***	-17.79***
	(3.388)	(2.887)	(2.494)	(1.397)	(5.423)	(3.101)
Observations	34	32	399	312	399	312
R-squared	0.233	0.129	0.033	0.270	0.121	0.295
Number of group	-	-	-	-	34	34

2.2 The French case

Figure 3 shows that the French current account has evolved hand in hand with the average corporate income tax differential with other OECD countries over the 2000s. The increasing deficit of goods has been partly offset by increasingly positive balance of investment incomes, at a time of increasing tax differential beginning in 2002. Both trends could be related to transfer pricing behaviors by multinational companies. Besides, France has experienced weak (and largely unexplained) export performance compared to the rest of the euro area, which is partly explained by the weak export growth of multinational groups located in France compared to independent firms over the period

1999/2007 (Bellas et al., 2010).

Figure 3: Components of the French current account (% of GDP)
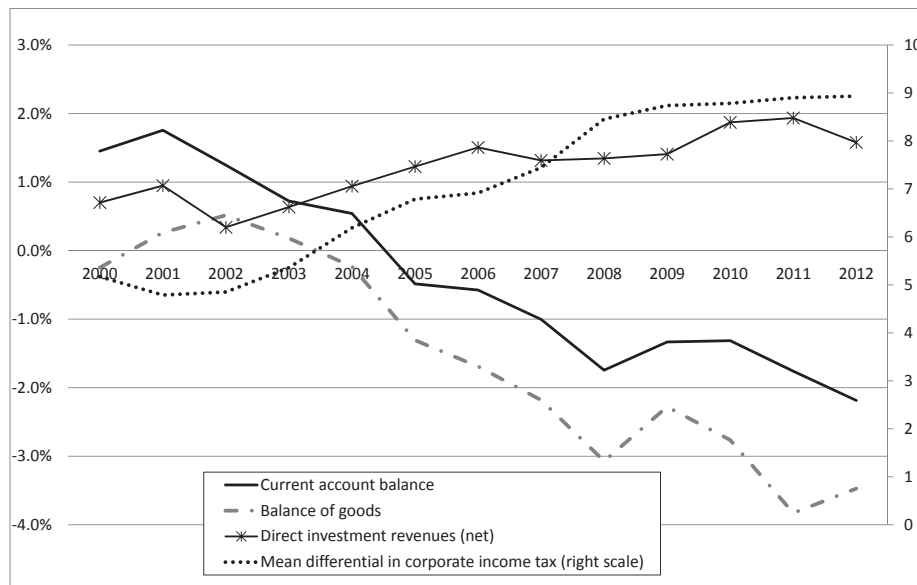
France has had increasing investment income inflows despite a deteriorating international investment position. At end 2000s, France has a negative international investment position and a positive investment income balance exceeding 1% of GDP. In this respect, France is similar over the 2000s to the well documented US case of 'exorbitant privilege' (Gourinchas and Rey, 2007; Lane and Milesi-Ferretti, 2009; Obstfeld and Rogoff, 2005; Curcuru et al., 2008).

The French 'excess return' originates both from a composition effect - France hold a surplus in equity, especially direct investments, and a deficit in debt whose return is lower - , and a return differential within the direct investments category (Gaulier and Vicard, 2014). This section provides additional descriptive evidence on the return differentials within-class of assets for France.[14] One important statistical issue is to correct FDI stocks for intercompany debts because incomes related to intercompany debt are reported under the item "other investments income" of the current account. I therefore use only equity capital stock of FDI and allocate the stock of intercompany debt in the stock of other investments.[15]

Table 2 provides yields decomposition for total foreign assets and liabilities by class of assets/liabilities. It shows a positive average yield differential between assets and liabilities for FDI over 2000/2010, and especially 2004/2010, but not for other class of

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[14]Data are from the Balance of payments and international investment position statistics provided by Banque de France. Note that investment flow as well as stock data are revised accordingly in France, contrary to the US case (Curcuru et al., 2008).

[15]Average yields on FDI increase from 3.5% (total FDI) to 4.7% (equity capital) for FDI assets on average over 2000/2010, respectively 2% to 3% for FDI liabilities.

assets. Yields on FDI assets are 4.7% on average, against 2.9% on liabilities, yielding a 1.8 percentage point differential. The corresponding differential is -0.4pp on portfolio equity, 0.4pp on portfolio debt and 0.0pp on other investments.

Table 2: Yields on external assets and liabilities (2000-2010)

	Total	FDI (equity capital)	Portfolio equity	Portfolio debt	Other inv.*
			Average 2001-2010		
Assets	3.3%	4.7%	1.5%	5.0%	2.4%
Liabilities	2.9%	2.9%	1.9%	4.6%	2.4%
Difference	**0.4%**	**1.8%**	**-0.4%**	**0.4%**	**0.0%**
			Average 2004-2010		
Assets	3.6%	5.9%	1.6%	4.8%	2.3%
Liabilities	3.0%	3.9%	2.1%	4.5%	2.3%
Difference	**0.6%**	**2.1%**	**-0.5%**	**0.4%**	**0.0%**

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

3 Empirical strategy and data

3.1 Arm's length principle and French corporate tax law

The arm's length principle is the international standard agreed by OECD countries that dictate pricing by MNEs in their international transactions with related parties for tax purposes. It is defined in the article 9 of the 2010 OECD Model Tax Convention on Income and Capital:

> [Where] conditions are made or imposed between the two [associated] enterprises in their commercial or financial relations which differ from those which would be made between independent enterprises, then any profits which would, but for those conditions, have accrued to one of the enterprises, but, by reason of those conditions, have not so accrued, may be included in the profits of that enterprise and taxed accordingly.

The arm's length principle states that prices between related parties should be adjusted to reflect conditions which would have prevailed in comparable transactions between independent firms, i.e. should be compared to "comparable uncontrolled transactions". By treating affiliates of MNEs as separate entities, the arm's length principle aims at putting MNEs and independent firms on an equal footing for tax purposes. The "comparability analysis" between controlled and uncontrolled transactions does not focus solely on prices and can make use of mark-up on costs, gross margins or net profit indicators. According to French law, "comparable uncontrolled transactions" can be, for similar market characteristics, similar or identical transactions between the multinational and an independent firm or between two independent firms.[16] The application of the arm's length principle is however more complicated for highly differentiated goods and services and/or using intangibles.

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[16] http://bofip.impots.gouv.fr/bofip/5549-PGP.html.

3.2 Empirical strategy

Transfer pricing behaviors of MNEs are analyzed through a difference-in-difference approach. The identification strategy makes use of the price wedge between arm's length and related party trade on different markets depending on their corporate income tax levels compared to France. Evidence of higher price wedges (between intra-firm and arm's length trade unit values UV_{ijkt}) for a given product in destinations with lower corporate tax rate would provide evidence of transfer pricing behavior by multinational firms. Bernard et al. (2006) derive similar predictions from a partial equilibrium model of transfer pricing incorporating tax and within firm incentives motives for the fixation of transfer prices in international exchanges with related parties.

More specifically, for a firm i exporting a product k in year t to a country j where an affiliate of the same group is located ($net_{ijt} = 1$) or not ($net_{ijt} = 0$), I estimate:

$$\log UV_{ijkt} = \beta_0 + \beta_1 net_{ijt} + \beta_2 tax_{jt} * net_{ijt} + \delta_{ikt} + \gamma_{jkt} + \varepsilon_{ijk} \qquad (2)$$

where tax_{jt} is the difference in corporate income tax rate with France. δ_{ikt} are firm-product-time fixed effects controlling for all characteristics specific to a product made by a given firm, common across markets. γ_{jkt} are country-product-time fixed effects to control for all destination market characteristics likely to affect the price wedge between arm's length and related party trade. Standard errors are clustered at the country-year level.

The coefficient of interest, β_2, is expected to be negative in case of exports and positive when we consider imports. Note that the identification does not rely on the absolute level of price wedge between arm's length and related party trade, but on its correlation with corporate tax differential. The methodology would therefore accommodate arguments implying a systematically lower price in related party trade (see e.g. Bauer and Langenmayr, 2013). Any difference between intra-firm and arm's length products that is common across destinations are picked by the net_{ij} dummy. In the robustness section, we test the sensitivity of our results to controls of characteristics of destination markets (market structure, distance).

The comparison of prices between arm's length vs. related party trade is assessed at the most detailed level of destinations and products available, i.e. within destination country and product (CN8), in order to reduce the likelihood for prices to capture unobservable differences in market structure or product characteristics. It should be acknowledged that several dimensions are not controlled for: the mode of transport is likely correlated to the product quality (Evans and Harrigan, 2005; Hummels and Schaur, 2010), product characteristics may differ even within narrowly defined product categories (CN-8 digit level in our case) or embedded services. Note that the quality of a good produced by a firm is however likely to be correlated across markets as shown by Comite et al. (2013); the firm-product-time fixed effects would therefore picked up the average quality effect on prices.

3.3 Data

Individual export and import data are from the French Customs, which provides firm level trade data (value and quantity) of firms located in France by destination and product. A product is defined by an 8 digit code of the Combined Nomenclature of the EU customs, the most detailed level of information available, which differentiate more than 10,000 different product categories. At this level of disaggregation, for instance in the heading 87 "vehicles other than railway or tramway rolling stock, and parts and accessories thereof", motors cars are differentiated according to their cylinder capacity, the fact that they are new or used, or their use of diesel or gasoline. The data set covers the universe of French exporters, subject to thresholds within the EU, and reports export and import data. Reporting quantity was however not mandatory for trade within EU over our time period, which results in missing values. Export and import prices are measured as unit values at the most disaggregated level, i.e. firm-product-destination.

We merge trade data with data on ownership by multinational groups from the Ownership database of Bureau Van Dick. Bureau Van Dick provides detailed data on ownership of firms worldwide. Direct and indirect links are traced up to the ultimate owner of any affiliate, allowing to identify links between a parent and all its affiliates as well as indirect links between two affiliates belonging to the same group (see Altomonte and Rungi (2013) for details on the methodology). Being able to link any two affiliates of the same group is particularly important since profit shifting occurs between a parent and its affiliates as well as between affiliates (Markle, 2010). We consider intra-firm trade as exports by (French or foreign) multinationals located in France to countries where they own an affiliate. Our measure of intra-firm trade accordingly includes some arm's length trade flows which is likely to lead to an attenuation bias in our results. Bernard et al. (2006) identifies large differences within country/product/month/transport mode in UV between arm's length and related party exports, which implies a downwards bias in our estimations since some firms conduct at the same time intra-firm and arm's length trade to a given destination. Our results should therefore be considered as lower bounds estimates.

Altomonte et al. (2012) provides details on the ownership database and descriptive statistics and show how our measure of intra-firm trade relates to aggregate evidence from other sources. The ownership data are available for 2007-2009. In the final sample, intra-firm transactions represents 53% of exports and 46% of imports.

The data on corporate income tax rates are from the OECD Tax Database. We use the statutory (non-targeted) combined tax rate including central and sub-central corporate income tax rates. The data are annual and cover taxes levied in all 34 OECD countries. Table 3 provides descriptive statistics on corporate tax differentials with respect to France and their evolution between 2000 and 2014. The average tax differential amounts to 8.7 percentage point in 2008, increasing significantly since 2000. A point worth noticing is that on a trade weighted basis, which would be a good benchmark when looking at transfer prices in trade in goods, France was in the average of OECD countries in 2000. The arithmetic average in 2000 is driven by small low tax countries whose share in France exports and imports is very small. The differential with large partners has grown wider since 2000 only, suggesting that the relevance of transfer pricing depends

on the time period and would be more relevant at end 2000s for France.

The final data set covers exports of 9,695 different products to 32 OECD countries by 66,112 firms and imports of 9,799 products from 33 OECD countries by 78,011 firms.

Table 3: Combined corporate income tax rate (central and sub-central (statutory) corporate income tax rate)

| | Tax differential with France | | | Share (2008) in | |
	2000	2008	2014	exports	imports
United States	1.6	4.8	4.7	5.7%	8.2%
Japan	3.1	5.1	2.6	1.9%	1.9%
Belgium	2.4	-0.4	-0.4	14.4%	11.3%
Portugal	-2.6	-7.9	-2.9	1.1%	1.6%
Germany	14.3	-4.3	-4.3	23.4%	18.6%
Australia	-3.8	-4.4	-4.4	0.3%	0.9%
Mexico	-2.8	-6.4	-4.4	0.2%	0.7%
Spain	-2.8	-4.4	-4.4	8.5%	10.6%
Luxembourg	-0.3	-4.8	-5.2	0.4%	0.7%
New Zealand	-4.8	-4.4	-6.4	0.1%	0.1%
Italy	-0.8	-6.9	-6.9	10.9%	10.5%
Norway	-9.8	-6.4	-7.4	3.0%	0.6%
Israel	-1.8	-7.4	-7.9	0.2%	0.5%
Canada	4.7	-3.0	-8.1	0.6%	1.1%
Greece	2.2	-9.4	-8.4	0.2%	1.0%
Austria	-3.8	-9.4	-9.4	1.2%	1.1%
Netherlands	-2.8	-8.9	-9.4	7.3%	5.2%
Denmark	-5.8	-9.4	-9.9	0.8%	0.8%
Korea	-7.0	-6.9	-10.2	0.8%	1.0%
Slovak Republic	-8.8	-15.4	-12.4	0.6%	0.7%
Sweden	-9.8	-6.4	-12.4	1.6%	1.7%
Switzerland	-12.8	-13.3	-13.3	3.1%	3.8%
Estonia	-11.8	-13.4	-13.4	0.0%	0.1%
United Kingdom	-7.8	-6.4	-13.4	6.3%	9.4%
Chile	-22.8	-17.4	-14.4	0.4%	0.2%
Finland	-8.8	-8.4	-14.4	0.6%	0.6%
Iceland	-7.8	-19.4	-14.4	0.0%	0.0%
Turkey	-4.8	-14.4	-14.4	1.3%	1.9%
Czech Republic	-6.8	-13.4	-15.4	1.1%	1.1%
Hungary	-19.8	-14.4	-15.4	0.8%	0.9%
Poland	-7.8	-15.4	-15.4	1.6%	2.1%
Slovenia	-12.8	-12.4	-17.4	0.3%	0.4%
Ireland	-13.8	-21.9	-21.9	1.2%	0.8%
Average	-5.3	-8.7	-9.4		
Avg. weighted by exports	1.0	-5.2	-6.0		
Avg. weighted by imports	0.1	-5.2	-6.1		

Source: OECD Tax Database. Tax differentials in percentage points. Share in French exports to (imports from) OECD countries.

4   Evidence of the strategic use of transfer pricing

4.1   Main results

Table 4 presents the baseline results for export transactions. They provide evidence consistent with tax avoidance through transfer pricing: multinational firms set lower prices in exports to related party than in CUT and these differences are systematically related to the corporate tax differential of the destination country. Without controlling

for country-product-year fixed effects, results reported in column (1) of table 4 show a strong impact of the corporate tax differential on the wedge between related party and arm's length trade. A 1 percentage point lower corporate tax in a destination country compared to France decreases export prices by 0.30%. Controlling for destination market characteristics (country-product-time fixed effects) halves the coefficient and yields a semi elasticities of 0.15, significant at 5% level (column (2)). Column (3) shows that the pricing behavior of multinationals in their related party transactions do not change during the 2008/2009 crisis.

The heterogeneity between independent firms and affiliates of multinational companies may however question the relevance of the comparison group used in columns (1)-(3). In column (4), the sample is restricted to firms belonging to French or foreign groups located in France, in order to control for potential structural differences between independent firms and affiliates of multinationals. The CUT are therefore transactions by multinationals to markets (destination-and-product) where they do not own any affiliate. Restricting the comparison group to multinationals' transactions yields a slightly stronger impact of corporate tax differential: a 1 percentage point lower corporate tax in a destination country compared to France decreases export prices by 0.22%.

Another issue relates to the asymmetry of transfer pricing opportunities: since the French corporate tax ranks third in OECD countries behind Japan and the US, multinationals are likely to use transfer prices to locate profit only in countries where the corporate tax differential is positive compared to France, i.e. where the corporate tax is lower. In column (5), I therefore differentiate the impact of corporate tax on the price wedge depending on the sign of the corporate tax differential. The result confirm that transfer prices are used shift profit toward destination countries with lower corporate tax rates only. The associated semi-elasticity reported in column (5) is -0.26.

Finally, column (6) distinguishes French multinationals from affiliates of foreign multinationals located in France. The results show a significant impact of corporate tax differentials on the price wedge only for French multinationals. A potential explanation would be that foreign groups may have other instruments at their disposal to shift income abroad, because in particular their intangibles are more likely located outside France. Column (7) show a point estimate of -0.44 when focusing on transfer prices of French multinationals to destination countries with positive tax differential.

Results on import transactions provide similar evidence that prices in related party transactions vary systematically with the corporate tax rate of the partner country. Column (1) of table 5 shows that without controlling for country-product-year fixed effects, the coefficient on the interaction term between network and differential in corporate tax rate is as expected positive but not significant. When controlling for market characteristics through country-product-year fixed effects (column (2)), the coefficient however turns significant at the 5% level. A 1 percentage point larger corporate tax differential with a partner increases the import price wedge by 0.19% in the whole sample. As for exports, the estimation on the more comparable sample of multinationals yields a larger semi-elasticity of 0.24.

Contrary to the case of exports, French multinationals do not appear to behave differently than foreign multinationals when setting their prices in import transaction with related parties (column (6)).

Table 4: Export prices and corporate tax differential

	(1)	(2)	(3)	(4) Affiliates	(5) Affiliates	(6) Affiliates	(7) Affiliates
Sample							
Firm-prod-time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-product-time FE	No	Yes	Yes	Yes	Yes	Yes	Yes
Network dum.	-0.036***	-0.035***	-0.037***	-0.026**	-0.023*	-0.029***	-0.026***
	(0.011)	(0.008)	(0.013)	(0.011)	(0.012)	(0.010)	(0.009)
Corporate tax differential	-0.125						
	(0.096)						
Network*corporate tax diff	-0.299***	-0.151**	-0.153**	-0.218**		0.004	
	(0.096)	(0.062)	(0.063)	(0.091)		(0.096)	
Network*crisis			0.004				
			(0.016)				
Network*corporate tax diff - positive					-0.257**		-0.035
					(0.105)		(0.084)
Network*corporate tax diff - negative					0.129		
					(0.444)		
Corporate tax differential*FR						0.043	
						(0.113)	
Network*corporate tax diff*FR						-0.462***	
						(0.158)	
Network*corporate tax diff*FR- positive							-0.444***
							(0.138)
Observations	3,471,689	3,471,689	3,471,689	1,302,545	1,302,545	1,302,545	1,302,545
R-squared	0.917	0.934	0.934	0.930	0.930	0.930	0.930

Note: Robust standard errors clustered by destination-year in parentheses. ***, ** and
* denote respectively significance at the 1% 5% and 10% levels.

Table 5: Import prices and corporate tax differential

	(1)	(2)	(3)	(4) Affiliates	(5) Affiliates	(6) Affiliates
Sample						
Firm-prod-time FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination-product-time FE	No	Yes	Yes	Yes	Yes	Yes
Network dum.	-0.004	-0.008	-0.011	-0.009	-0.006	-0.008
	(0.012)	(0.011)	(0.020)	(0.015)	(0.017)	(0.015)
Corporate tax differential	-0.600**					
	(0.250)					
Network*corporate tax diff	0.050	0.189**	0.188**	0.240*		0.254
	(0.124)	(0.091)	(0.095)	(0.144)		(0.173)
Network*crisis			0.004			
			(0.026)			
Network*corporate tax diff - positive					0.199	
					(0.212)	
Network*corporate tax diff - negative					0.391	
					(0.482)	
Corporate tax differential*FR						-0.156
						(0.241)
Network*corporate tax diff*FR						-0.146
						(0.338)
Observations	4,299,447	4,299,447	4,299,447	1,305,391	1,305,391	1,305,391
R-squared	0.941	0.954	0.954	0.947	0.947	0.947

Note: Robust standard errors clustered by destination-year in parentheses. ***, ** and
* denote respectively significance at the 1% 5% and 10% levels.

The estimates on export transactions presented in table 4 are in the lower bound of
the existing literature. In particular, Bernard et al. (2006) find that a one percentage
point increase in corporate tax rate in destination country increases the price wedge
between arm's length and related party trade by 0.5% to 4.2%, with a preferred point

estimate of 0.65. Our data however do not allow to differentiate simultaneous intra-firm and arm's length trade by a firm to a destination market as Bernard et al. (2006) do. Our group of intra-firm trade therefore includes some arm's length trade, likely to bias downward the estimated coefficients. The results of table 4 should therefore be considered as a lower bound.

Using balance sheet data, I am able to match export and import transactions to profits consolidated by group to estimate the impact of transfer pricing on trade in goods on reported profits of individual multinationals of which a subsidiary located in France export or import goods. I consider earnings before interest and taxes (EBIT) to consider revenues before other forms of profit shifting through interest deductions and intra-group loans. A one percentage point increase in the tax differential with trade partners where affiliates of multinationals operating in France are located would decrease reported profits in France by 0.1%, which can be compared to the average semi-elasticity of profit to tax rate differentials of 0.8 found by Heckemeyer and Overesch (2013).

4.2 Robustness

This section performs a number of robustness exercises to test the sensitivity of the results to the type of products traded, the trade partner and market structure and the functional form of tax differentials.

Types of goods: The ability of multinationals to manipulate transfer prices depends on the availability of comparable uncontrolled transactions, which primarily depends on the nature of the good traded. The price of homogenous goods is readily observable and comparable in international transactions since they do not differ in their attributes. On the contrary, differentiated goods produced by different firms have specific characteristics that make the outright comparison of their price more difficult. The room for fixing transfer prices, and so the impact of corporate tax differentials on price wedges, should therefore be larger for differentiated than homogenous products. I use the Rauch classification (Rauch, 1999) updated in 2007 (liberal classification) that classifies products according to their degree of differentiation into homogenous goods, reference priced products and differentiated products. The results presented in table 6 show, as expected, a stronger impact of corporate tax differentials for differentiated products, and no significant impact on homogenous goods.

Trade partners, market structure and distance: Table 7 presents first results on different sample of trade partners for which the trade costs are likely to be reduced. Within the European Union, trade flows are free of import tariffs so that multinational companies have more incentives to use transfer pricing to shift profit abroad within the EU. In addition, trade costs are also lower within the euro zone: firms do not face any exchange rate costs or risks.[17] For exports, the coefficient on the interaction term between network and tax differential is as expected larger in magnitude than in the benchmark case in both sub-sample of EU and euro zone countries. For imports, we find positive but not significant coefficients on these sub-samples.

Price wedges between arm's length and related party trade may also differ because

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[17]Specifications (2) to (7) in Tables 4 and 5 however control for import tariffs differential by destination and products through country-product-time fixed effects.

Table 6: Robustness by type of goods

	(1)	(2)	(3)	(4)	(5)	(6)
Sample		Exports			Imports	
	differentiated	ref. priced	homogeneous	differentiated	ref. priced	homogeneous
Firm-prod-time FE	Yes	Yes	Yes	Yes	Yes	Yes
Destination-product-time FE	Yes	Yes	Yes	Yes	Yes	Yes
Network dum.	-0.035***	-0.016	0.008	-0.000	-0.024	0.054
	(0.010)	(0.011)	(0.051)	(0.012)	(0.023)	(0.075)
Network*corporate tax diff	-0.166**	-0.190**	0.205	0.219*	0.153	0.142
	(0.076)	(0.089)	(0.455)	(0.120)	(0.183)	(0.851)
Observations	2,106,456	545,543	55,734	2,537,034	724,595	75,501
R-squared	0.916	0.935	0.974	0.945	0.963	0.985

Note: Robust standard errors clustered by destination-year in parentheses. ***, **
and * denote respectively significance at the 1% 5% and 10% levels.

of market structure. Bernard et al. (2006) show that firms with more market power
or exporting to less competitive markets should exhibit larger price wedges. In column
(3) and (7) of table 7, I first control for the distance to the destination/origin market
as an indirect way of accounting for competition effects from French exporters. It is
also a control for the endogenous choice of transport modes: farther destinations are
more likely to be served by airplane and higher quality products are more likely to be
shipped by airplane. The interaction term between distance and the network dummy is
insignificant and leaves the results unchanged. Alternatively, specifications in columns
(4) and (8) control for competition and its potential correlation with corporate tax
through the number of French competitors exporting the same product to the same
destination the same year. It again confirm the robustness of the evidence of the use of
transfer prices by multinationals to transfer profit to low tax jurisdictions.

Table 7: Robustness by destination

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sample		Exports				Imports		
	EU-27	Euro area			EU-27	Euro area		
Firm-prod-time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Destination-product-time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Network dum.	-0.026***	-0.030***	-0.030	-0.045	-0.011	-0.016	-0.008	-0.072
	(0.008)	(0.009)	(0.028)	(0.069)	(0.013)	(0.015)	(0.038)	(0.055)
Network*corporate tax diff	-0.183***	-0.220***	-0.150**	-0.144*	0.122	0.228	0.190**	0.241***
	(0.064)	(0.074)	(0.063)	(0.074)	(0.118)	(0.155)	(0.094)	(0.093)
Network*log distance			-0.001				0.000	
			(0.004)				(0.006)	
Network*log nbr exporters				0.001				0.005
				(0.006)				(0.004)
Observations	2,721,156	2,045,460	3,471,689	3,471,689	3,640,812	3,177,134	4,299,447	4,299,447
R-squared	0.933	0.944	0.934	0.934	0.954	0.963	0.954	0.954

Note: Robust standard errors clustered by destination-year in parentheses. ***, ** and *
denote respectively significance at the 1% 5% and 10% levels.

Non linearity: Finally, table 8 presents robustness on the functional form of the
tax differential. In columns (1) and (3), the differential in corporate tax differential is
introduced by bins instead of linearly. Five bins are distinguished according to the level
of corporate tax of the partner country: lower than 21%, in between 21% and 26%,

26% and 30%, and 30% and 34.3%. The results suggest a stronger impact for partner countries whose corporate tax rate is lower than 30% for export and lower than 26% for imports. Additionally, columns (2) and (4) show the elasticity estimates.

Table 8: Robustness: functional form

	(1)	(2)	(3)	(4)
	Exports		Imports	
	non linear	log/log	non linear	log/log
Firm-prod-time FE	Yes	Yes	Yes	Yes
Destination-product-time FE	Yes	Yes	Yes	Yes
Network dum.	-0.030**	-0.036***	-0.011	-0.008
	(0.012)	(0.008)	(0.012)	(0.011)
Network*corporate tax (< 21)	-0.019		0.032	
	(0.016)		(0.024)	
Network*corporate tax ($>= 21$ and < 26)	-0.023*		0.035**	
	(0.012)		(0.014)	
Network*corporate tax ($>= 26$ and < 30)	-0.024*		0.015	
	(0.012)		(0.016)	
Network*corporate tax ($>= 30$ and < 34.3)	-0.003		0.011	
	(0.011)		(0.013)	
Network*corporate tax diff (log)		-0.038**		0.052*
		(0.016)		(0.027)
Observations	3,471,689	3,471,689	4,299,447	4,299,447
R-squared	0.934	0.934	0.954	0.954

Note: Robust standard errors clustered by destination-year in parentheses. ***, **
and * denote respectively significance at the 1% 5% and 10% levels.

5   Quantification and aggregate implications

One of the motivation of this paper is to understand the aggregate implications of profit shifting by multinationals on the tax base and the different components of the current account. This section quantifies the impact of fiscal optimization through transfer pricing on the corporate tax base, the current account – the trade and FDI income balances – and the implicit yields on foreign assets and liabilities by estimating a counterfactual where the arm's length principle is perfectly enforced and multinationals cannot use their transfer prices to shift profit abroad.

This quantification exercise accounts only for the impact of transfer pricing and do not consider other instruments used by MNEs to shift profit in low tax jurisdictions. It is worth stressing that these calculations rely upon several strong assumptions detailed below. In particular, it assumes that quantity traded are fixed, and considers that only import and export prices respond to changes in corporate tax differentials.

The quantification results presented in Table 9 are based on specifications (7) in table 4 for exports and specification (4) in table 5 for imports. In 2008, the manipulation of transfer prices reduces the value of French exports by 0.7% and increases the value of imports by 0.5%. On net, the French trade deficit would be reduced by 9.2% without profit shifting through transfer prices. These under-reported exports and over-reported imports translate directly into missing domestic value added and tax base of 8 billions USD.[18]

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[18]To estimate the counterfactual in USD, I assume a similar average impact on exports and imports

The extent of profit shifting through transfer pricing is increasing over time in France. The tax differentials between France and its trade partners has clearly increased over time, owing to the decrease in foreign tax rates from 2000 to 2008 – the corporate tax rates in OECD countries have decreased by 6.7 percentage points on average between 2000 and 2007 (and 7.7 percentage points in EU countries), while the French rate has decreased by 3.3 percentage points only –, and the increase of the French corporate tax for large groups between 2008 and 2014.[19] The bottom panel of table 9 show the impact of transfer pricing by multinationals in 2008 when applying the tax differentials of 2000 and 2014. Applying the corporate tax differentials prevailing in 2014 increases the underestimation of exports and the overestimation of imports and deteriorates further the trade balance. At 12 billions USD, the erosion of the French corporate tax base would be larger with corporate taxes of 2014 than of 2008. On the contrary, the impact of transfer pricing with corporate tax rates of 2000 would have amounted to 1.8 billions USD only.

Table 9: Quantification: tax base erosion and the trade balance

| | Export | | Import | | Balance | |
	percent	US$ (mn)	percent	US$ (mn)	percent	US$ (mn)
2008	0.7%	4240	-0.5%	-3749	-9.2%	7989
2000	0.4%	2426	0.1%	600	-2.1%	1825
2014	1.0%	6080	-0.9%	-5982	-13.8%	12062

Note: Estimations from specification (7) in table 4 for exports and specification (4) in table 5 for imports. Estimations in USD and for the trade balance assume a similar average impact on exports and imports to/from non-OECD countries.

In a second step, I estimate the impact of fiscal optimization through transfer prices on the balance of FDI income. I assume that the underreported taxable revenues from domestic activity (through both exports and imports) are profits that are then repatriated by French MNEs, after having been taxed at a lower rate in the foreign country, inflating accordingly the FDI income credit in the balance of payments.[20][21] On the contrary, foreign multinationals are not expected to systematically repatriate their profits shifted abroad in France. I therefore assume that none of the profit shifted abroad is repatriated. Any additional profit of foreign multinationals located in France would however proportionally increase FDI income debit, after having been taxed at the French corporate tax rate.

to/from non-OECD countries than the one estimated on the sample of OECD countries.

[19]In 2014, a 10.7% surtax increases the corporate tax rate of companies whose turnover exceeds EUR 250 millions.

[20]Foreign income repatriation depends on investment opportunities in the domestic market and foreign markets as well as dividend policy. Dharmapala et al. (2011) however shows, in the context of the 2005 US tax break, that almost all repatriated earnings were distributed to shareholders.

[21]I assume that shifted profit are taxed at the statutory tax rate in foreign countries since they are marginal profits and taxed accordingly.

The quantification exercise presented in Table 10 assume a similar average impact on exports/imports to/from non-OECD countries and FDI income inflows/outflows.[22] As for the tax base and the trade balance, corporate tax differentials have a non-trivial impact on the French investment income balance. Table 10 report results for the counterfactual with perfect enforcement of arm's length principle presented above, suppressing profit shifting through transfer pricing. The FDI income inflows are reduced by 5.8% in 2008 and FDI income outflows increased by 4.3% compared to what is actually observed. These estimations imply that the balance of FDI income would deteriorate by 4.8 bn USD, partly compensating the improvement in the trade balance.

Such changes in the balance of FDI income involve a reduction in the implicit yield differential on FDI assets and liabilities highlighted in section 2. Absent profit shifting through transfer prices by MNEs, the implicit yield differential between French FDI assets and liabilities would be 0.4 percentage point lower in 2008, i.e a reduction of the differential by 19%.

Table 10: Quantification on investment income and implicit yield differentials

	FDI income - Credit		FDI income - Debit		Balance		Yield differential	
	percent	US$ (mn)	percent	US$ (mn)	percent	US$ (mn)	Actual	Corrected
2008	-5.8%	-3682	4.3%	1084	-12.6%	-4765	2.2%	1.8%

Note: Estimations from specification (7) in table 4 for exports and specification (4) in table 5 for imports. Estimations assume a similar average impact on exports/imports to/from non-OECD countries and FDI income inflows/outflows.

6 Conclusion

This paper provides direct evidence of the use of transfer prices by multinational firms to shift profit in low tax jurisdictions. The identification strategy makes use of detailed firm level export and import data by destination and product for France to compare prices of arm's length and related party transactions. The empirical analysis shows that the price wedge between arm's length and related party trade varies systematically with the differential in corporate tax rate between France and the partner country.

The goal of this paper was also to quantify the extent to which profit shifting through transfer prices impacts the tax base and international flows and imbalances. The manipulation of transfer prices by multinationals operating in France are estimated to decrease the value of French exports by 0.7% and increases imports by 0.5% in 2008. The underreported taxable revenues due to profit shifting through transfer pricing on both exports and imports are estimated to amount to 8 bn USD in 2008, and are growing over time.

The evidence of strategic use of transfer prices presented here suggest caution in using firm level balance sheet data to compare the performances of multinational companies

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[22]The share of OECD countries in total FDI income flows are computed from Eurostat data on FDI income credit/debit by origin/destination. Missing data are inferred from the share of each country in total FDI stock.

in different jurisdictions with different level of corporate taxation or to compare within country the characteristics of large multinational companies to domestic firms. Beyond the erosion of tax bases, the ability of firms operating in different countries to shift profit in low tax jurisdictions distorts competition between domestic and multinational firms.

In addition, the negative international spillover in corporate taxation highlighted here strengthens the case for international coordination. The scope of base erosion found in this paper raises the question of the appropriate international corporate tax system in an increasingly globalized world in which multinationals play a major role in the emergence of global value chains. The difficulty to enforce transfer pricing rules would give ground to proposals of common consolidated corporate tax base and formulae apportionment that mitigate opportunities for profit shifting, particularly in integrated regions such as the EU.[23]

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[23]See Fuest et al. (2013) and IMF (2014) for discussions of alternative proposals of systems of international corporate taxation and their limits.

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