

MULTINATIONALS' SALES AND PROFIT SHIFTING IN TAX HAVENS. ONLINE APPENDIX

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Contents

A Sales shifting in anecdotal evidences: case studies	2
A.1 Apple	2
A.2 Caterpillar	4
A.3 Google	5
A.4 Kering	5
A.5 The tobacco Industry	6
B Data Description	7
B.1 Empirical Definition(s) of Tax Havens	8
B.2 Foreign Market Access computation	9
C Descriptive statistics	11
D Optimal profit shifting	13
E Additional Tables	14
E.1 Extensions	14
E.2 Robustness tests	16

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A Sales shifting in anecdotal evidences: case studies

To illustrate the novelty of our contributions, we sum up in this section some cases that our framework captures contrary to previous studies. In addition of these less documented methods, it is worth noting that sales shifting also encompass traditional profit shifting methods based on the real (as opposed to the financial) activity of the firm: transfer mispricing of goods and services, location of intangibles in tax havens, etc.

A.1 Apple

The case of Apple is a good example of how an actual foreign sales platform works. The declarations of Apple's representative to the Permanent Subcommittee on Investigations of the U.S. Senate reveal how Apple Inc. organizes its activities to register 64% of its profits in Ireland despite having only 3% of its employees there and 1% of its consumers (in 2011). According to the representative's declarations, this scheme allowed the firm to avoid \$12.5bn of taxes in 2011 and 2012.

Figure A.1 shows a simplified version of the structure used by Apple in Ireland. Apple Operations International (AOI) is owned (100%) by Apple Inc. and is the ultimate owner of most of the offshore affiliates of Apple. It has no employees. Despite being incorporated in Ireland, it has no tax residence. Apple uses loopholes in the Irish and U.S. tax laws that lead to both countries considering Apple resident in the other.¹ Because of the different definitions of residency, AOI is a *stateless* entity (Kleinbard, 2011). AOI owns Apple Operations Europe (AOE) that owns Apple Sales International (ASI). While the first two entities are holding companies, ASI is the affiliate that acts as a sales platform. Just like AOI, it has no tax residency. ASI and AOE have a cost-sharing agreement with Apple Inc. According to the Senate report, Apple applies two main strategies to shift its profits to Ireland. The first is the cost-sharing agreement between ASI and Apple Inc. This agreement, according to which Apple Inc. and ASI share the development of Apple products, helps to locate a large share of Apple's intangible assets in Ireland. The Senate report insists on the fact that this agreement is not economically justified and is only motivated by aggressive tax optimization. Most importantly, ASI acts as a foreign sales platform by concentrating the worldwide sales of the whole group.

The structure chosen by Apple is at the heart of its profit shifting strategy. ASI, the foreign sales platform, engages in contract manufacturing. In practice, it contracts with

¹Irish tax residency is based on where management and control is performed. For ASI this is the U.S. On the contrary, residency in U.S. tax law is the place of incorporation, in this case, Ireland.

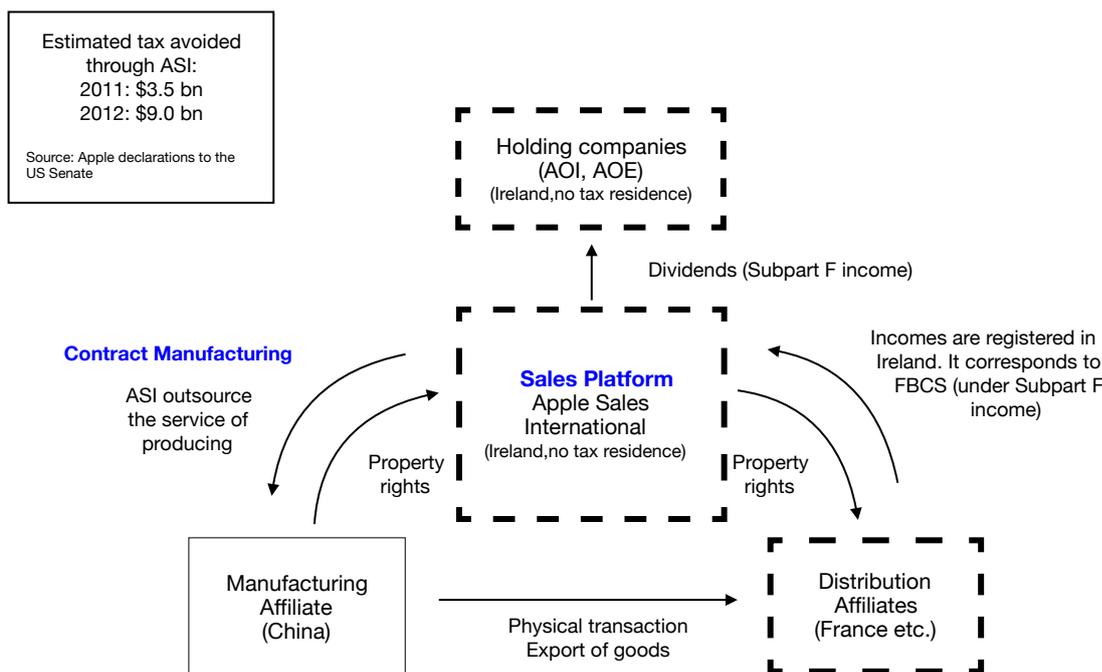


Figure A.1: SIMPLIFIED STRUCTURE OF APPLE IN IRELAND

a manufacturing affiliate in China to outsource production. The goods are produced by the manufacturing affiliate but are always owned by ASI. In terms of trade statistics, these transactions are registered as an import of services by ASI. When a customer buys an Apple product in a store or over the internet, the product is directly sent from China to the customer. Thus, although the owner of these products is ASI in Ireland, the goods generally never cross the Irish border. However, the financial transaction occurs between the owner of the goods and the final customer, in this case, between the retailer and Ireland. Note the discrepancy between the physical transaction and the financial transaction. Usually, it is almost impossible to identify the two types of transactions. However the BEA data allow us to do this for certain transactions. In terms of trade statistics, customs will register an export of goods from China to the retailer's country, while the balance of payments will register an export from Ireland to the retailer's country.² Finally, the revenues from the sales are sent through dividends to the upper-tier subsidiaries AOE and AOI.

To avoid this transfer of revenue to tax havens, the U.S. enacted a law (the Subpart F rules) in 1962 to ensure that passive income (income that results from a passive activity e.g. dividends, interest, royalties, etc.) is always taxed. The objective of this law is to prevent

²The customs register trade based on the crossing of national borders while the balance of payments measures trade based on change of ownership.

income being relocated and conserved in tax havens to avoid paying taxes. Passive income is a common component of firms' tax avoidance strategies. The transactions between the retail affiliate and ASI and the transactions between ASI and the upper-tier affiliates should have been taxed under Subpart F. The first transaction is a Foreign Base Company Sale (FBCS, sales of products that have been produced by an affiliate in an other country) and in the second corresponds to Foreign Personal Holding Company income (FPHC, which includes dividends, interest, rents and royalties).

However, the check-the-box regulations enacted in 1997 can be used to circumvent the Subpart F rules. These regulations allow Apple to make the IRS disregard the lower-tier affiliates (AOE, ASI and the distribution and retail affiliates) for tax purposes. The three entities in dashed boxes in the figure are thus considered a single firm by the IRS. Because the IRS does not look at what happens within a firm, it cannot tax the transactions of passive income.

This tax avoidance scheme may be one of the most tax-saving scheme existing. It helped Apple to save around \$9 billions in taxes in according to Apple's officials declarations. However, it is most likely that this scheme cannot be identified in micro studies using a bilateral identification of transfer pricing.

A.2 Caterpillar

According to [Levin \(2014\)](#), Caterpillar's Swiss affiliate, called Caterpillar SARL (CSARL), plays a major role in the strategy of tax avoidance of the company since it reports more than 85% of non-US profits of the firm whereas no manufacturing facility is present in Switzerland and only 400 employees (among 118500) are working there. In 1999, Caterpillar negotiated a reduced corporate tax rate between 4 and 6 % with the Swiss authorities. To maximize the benefits from this advantageous tax rate, Caterpillar decided to route (following the strategy imagined by PwC) all its non-US sales through its Swiss affiliate's CSARL. CSARL is designated as the *global purchaser* of replacement parts: CSARL buy to third-party manufacturers the replacement parts. All sales of these replacement parts in the world (except in the US) are then registered in Switzerland (it does not enter in the Subpart F regulation because replacement parts are directly bought to third-party manufacturers). This paper operation does not imply that the goods physically transit through Switzerland. The goods are directly shipped from the US to the buyer. On top of this strategy, Caterpillar has also lowered its tax bill by enabling cost-sharing and tolling agreements that allow to shift more profits to the Swiss affiliate. This strategy allowed Caterpillar to avoid about \$2.4 billions between 2000 and 2012 according to the report of the US Senate.

A.3 Google

Google uses several loopholes in the international definition of permanent establishments to shift its taxes to tax havens. We briefly describe here the case of Google France. Google Ireland Limited is a Google affiliate located in Ireland and SARL Google France is Google's French affiliate. The sales of the Google's "Adwords" service to French firms are recorded in the Irish affiliate. These firms either establish directly a contract with Google Ireland Limited or indirectly through SARL Google France. The Paris Administrative Court recognized in 2019 that Google Ireland Limited does not own a French establishment in France (and then its profits from French customers cannot be taxed by France). This decision is based on the fact that the service of "sale assistance" provided by SARL Google France to Google Ireland Limited does not allow SARL Google France to sign contracts in the name of Google Ireland Limited. More specifically SARL Google France cannot negotiate contracts or accept commands to Google Ireland Limited.³

By avoiding the stable establishment status on this activity, Google is able to register its French sales in Ireland and then to shift its tax duty from the French authorities to the Irish authorities (that negotiated a preferential tax rate with Google in Ireland). As this tax avoidance scheme

A.4 Kering

In the general case of contract manufacturing, an affiliate of a MNE located in a tax haven contracts with a manufacturer (either inside or outside of the boundaries of the firm) to produce some goods. This contract takes the form of an import of service from the haven affiliate. The cost of the service corresponds to the cost of inputs plus an underpriced margin (as in the Apple case). Using these types of contracts allows the tax haven entity to hold the property on the goods produced at a price lower than the arm's length price. The good is then directly sent to the distributors at a cost that limits the margin of the distributor. This way, the tax haven affiliate concentrate most of the sales (in value) of the company. The goods do not necessarily physically transit to the tax haven. They are generally exported directly from the manufacturer to the consumption market. Consequently, there is an important distinction between the foreign sale (financial transaction) and the export (physical transaction). Our dataset allows us to distinguish between both flows.

³This service provision is linked to the "Marketing and Services Agreement signed in 2002 between Google Inc. and SARL Google France and transferred from Google Inc. to Google Ireland Limited in 2004. See the decision N.17PA03065 of the Paris Administrative Court accessible here <https://www.legifrance.gouv.fr/affichJuriAdmin.do?idTexte=CETATEXT000038420177>

The case of Kering ([Philippin, Malagutti and Rosenberg \(2018\)](#)), a French group that produces and sell luxury goods, is a variation of this scheme. Here, the goods transit physically to warehouses located in a tax haven. Some goods are produced in Italy, then transit through LGI, the sales platform located in Switzerland, and are finally exported to the rest of Europe.

A.5 The tobacco Industry

In a report on the tobacco industry [Vermeulen et al., 2020](#) discuss alleged cases of tax avoidance strategies used by some tobacco firms. In particular, they point at different strategies that aim at shifting sales from production countries to tax havens. For instance, they describe a sales shifting strategy used by British American Tobacco (BAT): "We found several examples of profit shifting via intra-firm transactions. One is the sale - on paper - of all BAT cigarettes produced by BAT Korea Manufacturing Ltd. (South Korea) to Rothmans Far East BV in the Netherlands. They are immediately re-sold to another South-Korean company, BAT Korea Ltd, at a much higher price. This way, on average each year 98 million in Korean profits are shifted to the Netherlands.". They also describe a strategy used by Phillip Morris (PM) "The Swiss branch of PMI also uses a 'cash pooling system' and a 'tolling system' with subsidiaries in other countries [...]. Under the tolling system, Dutch manufacturing company PM Holland BV buys raw materials from Philip Morris Brands sarl on paper, while revenue from sold products seems to be directed to Switzerland immediately. If the price the Dutch entity pays for these materials to their Swiss counterpart is artificially high, profits in the Netherlands are lowered, resulting in tax avoidance in the Netherlands. The exact importance of this route needs further investigation." These strategies, despite not being proved as tax avoidance practices, underline the role played by the shifting of the origin of sales. In particular they highlight the fact that the transaction only happen "on paper". Besides, it is important to underline that these strategies necessitate the using of contract manufacturing through a tolling system.

B Data Description

The change in the sectoral definition in 1999 and the inclusion of all (rather than just non-bank) foreign affiliates from 2008 onwards led us to define a sample from 1999 to 2013 that excludes the foreign affiliates of banks from the empirical analysis. Our estimation sample covers 56 countries including 9 tax havens, and 11 industries over the period 1999-2013. The list of countries and industries is reported below.

- *Manufacturing*: (1) Mining, (2) Food, (3) Chemicals, (4) Primary and Fabricated Metals, (5) Machinery & Equipment, (6) Computer and Electronic products, (7) Electrical Equipment, Appliance and Components (8) Transportation Equipment. *Services*: (9) Wholesale trade, (10) Information, (11) Professional, Scientific and technical Services.
- Country list (tax havens in bold): Argentina, Australia, Austria, **Barbados**, Belgium, **Bermuda**, Brazil, Canada, Chile, China, Colombia, Costa Rica, the Czech Republic, Denmark, the Dominican Republic, Ecuador, Egypt, Finland, France, Germany, Greece, Honduras, **Hong Kong**, Hungary, India, Indonesia, **Ireland**, Israel, Italy, Japan, the Republic of Korea, **Luxembourg**, Malaysia, Mexico, **the Netherlands**, New Zealand, Norway, **Panama**, Peru, the Philippines, Poland, Portugal, Russia, **Singapore**, South Africa, Spain, Sweden, **Switzerland**, Taiwan, Thailand, Turkey, the United Arab Emirates, the United Kingdom, **British Islands**, **Caribbean**, Venezuela. **British Islands**, **Caribbean** includes the British Virgin Islands, the Cayman Islands, Montserrat and the Turks and Caicos Islands.

We do not use the information from the *Utilities* sector in this study. The utilities industry consists of firms operating in "electric power generation, transmission and distribution," "natural gas distribution," or "water, sewage and other systems." This industry operates locally and represents 0.03% of the total U.S. export share, accounting for 0.75% of the total number of U.S. foreign affiliates. We also exclude the *Other industries* sector since the coverage of our database in terms of foreign sales ratio is relatively low for this sector. The *Other industries* sector includes 3,558 affiliates in 1999 (corresponding to 17% of the MOFAs). It accounts for 18% of total assets, 7% of sales, 31% of net income, and 21% of employees. Inside this composite sector, the "Management of non-bank companies and enterprises" including holding companies accounts for a large share of affiliates (43%), of total assets (74%), and of net income (89%). On the other hand, this sub-sector only accounts for 3% of net property plants and equipment, 1% of sales, and 1% of employees of the *Other industries* sector. This should represent 9,240 observations. However, some of the observations in the dataset are missing either because of insufficient precision in assessing

the value of the activity or because the data are subject to disclosure. In the first case, the BEA indicates that they do not have the exact value of sales and number of employees. This occurs for sales of between $-\$500,000$ and $+\$500,000$, and for a number of employees below 50. Data subject to disclosure are erased. Our sample is reduced to 5,905 observations. It however covers 72.5% of the total sales of foreign U.S. MNE affiliates in 2013.

B.1 Empirical Definition(s) of Tax Havens

There is no commonly accepted definition of what constitutes a tax haven. According to Geoffrey Colin Powell (former economic adviser to Jersey cited in *The Economist*, 2002): "What identifies an area as a tax haven is the existence of a composite tax structure established deliberately to take advantage of, and exploit, a worldwide demand for opportunities to engage in tax avoidance." [Chavagneux and Palan \(2012\)](#) propose a list of criteria that encompass many definitions of tax havens: low or zero taxes, reinforced bank secrecy, extended professional secrecy, easy and fast registration procedure for firms, total free movement of capital, political and economic stability, and a network of bilateral agreements with other countries. We add to this definition the central idea that a tax haven is used as a fictive location for the individuals and firms that use it. An important point is that tax havens are not just low-tax and/or opaque countries.

The OECD ([OECD, 2000](#)) also outlines some of the features that characterize a tax haven. It is a country with no or only nominal taxes, no effective exchange of information⁴ and no substantial activities (meaning that investment and transactions are mainly driven by tax incentives). Ireland, Luxembourg, Hong-Kong and Singapore do not appear in the OECD's list of tax havens.

In the academic literature, the definition of [Hines and Rice \(1994\)](#), based the U.S Internal Revenue Service's (IRS), is close to the OECD's definition: low tax rate, business and banking secrecy, a good communication network and self-promotion as a tax haven. In this paper we use the list compiled by [Dharmapala and Hines \(2009\)](#), which fills in the gaps in the OECD's by including countries considered tax havens by [Hines and Rice \(1994\)](#). This list corresponds to a *de jure* classification and may suffer from a construction bias.

A first argument to justify our list is that the countries included appear in many other lists of tax havens. According to [Chavagneux, Palan and Murphy \(2010\)](#), our tax havens appear in at least 8 other lists (among eleven): Bermuda (11), Panama (11), Barbados (10), the British Virgin Islands (10), Hong-Kong (9), Singapore (9), Switzerland (9), Ireland (8),

⁴There is a growing body of evidence in the literature showing that tax agreements are ineffective at hindering harmful tax practices, see [Bilicka and Fuest \(2014\)](#) or [Johannesen and Zucman \(2014\)](#).

Luxembourg (8).

We can also justify this list empirically by simply looking at the tax bills of US affiliates in foreign countries. As noted by Kleinbard (2011), the ability to generate stateless income affects the US tax bill as well as the local tax bill. This explains why Google only paid 2.9% of its 2009 profits in taxes, which is much lower than the average statutory tax rate that should have applied. In figure B.2, we plot the effective tax rate paid by US MNEs in tax havens and non tax havens and we compare it to the (weighted) statutory tax rate. In countries that are not tax havens, the average effective tax rate is almost equal to the weighted statutory tax rate. There is nonetheless a large dispersion around this average. In tax havens, the effective foreign tax rate line is almost flat and substantially lower than the statutory line, suggesting specific legislative arrangements that allow firms to lower their tax bills. The points are less dispersed and more cluster around the effective tax rate line.

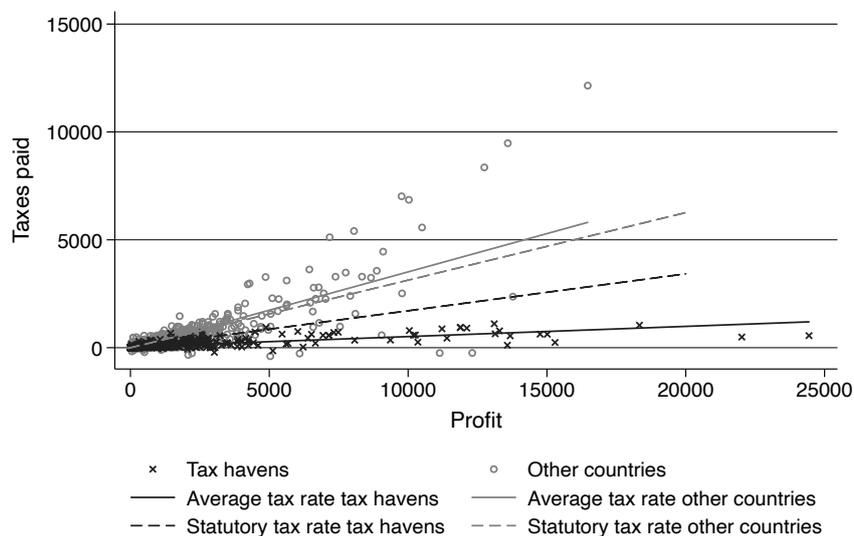


Figure B.2: STATUTORY AND EFFECTIVE TAX RATE.

B.2 Foreign Market Access computation

Our methodology is based on Head and Mayer (2004) and Head and Mayer (2011) approaches. We first calculate the predicted bilateral transport costs between countries using a bilateral gravity equation. These predictions come from a regression analysis of bilateral trade against bilateral distance ($Distance_{ij}$), contiguity ($Contig_{ij}$), former colonial status ($Colony_{ij}$), common language ($ComLang_{ijt}$), regional trade agreements (RTA_{ijt}) and

exporter×year (μ_{it}) and importer×year (μ_{jt}) fixed effects for the period 1999-2013.⁵

$$\begin{aligned} \ln(\text{Trade}_{ijt}) &= \alpha + \beta_1 \ln(\text{Distance}_{ij}) + \beta_2 \text{Contig}_{ij} + \beta_3 \text{Colony}_{ij} \\ &+ \beta_4 \text{ComLang}_{ijt} + \beta_5 \text{RTA}_{ijt} \\ &+ \mu_{it} + \mu_{jt} + \epsilon_{ijt} \end{aligned}$$

where ϵ_{ijt} is the error term. We compute the ease of access to market j for exporters in i at year t :

$$\hat{\phi}_{ijt} = \text{Dist}_{ij}^{\hat{\beta}_1} \times \exp(\hat{\beta}_2 \text{Contig}_{ij} + \hat{\beta}_3 \text{Colony}_{ij} + \hat{\beta}_4 \text{ComLang}_{ijt} + \hat{\beta}_5 \text{RTA}_{ijt})$$

The foreign market access variable can be defined as $FMA_{it} = \sum_j (\exp(\hat{\mu}_{jt}) \times \hat{\phi}_{ijt})$, which does not include the country's internal demand. The FMA is high for countries close to large foreign export markets and low for remote countries.

The foreign market access variable is computed using data for all bilateral pairs of countries in the world. The series on bilateral trade were taken from the BACI database, constructed by the CEPII (Gaulier and Zignago, 2010, 2021) using the UN COMTRADE data on trade flows. The gravity variables are from the CEPII gravity database (Head, Mayer and Ries, 2010, 2019) and the common language data from Melitz and Toubal (2014a,b).

⁵This corresponds to a theoretically-founded gravity equation, with exporter×year (μ_{it}) and importer×year (μ_{jt}) fixed effects accounting for multilateral resistance terms (Head and Mayer, 2011).

C Descriptive statistics

The descriptive statistics of the estimation sample is given in Table C.1 below .

Table C.1: DESCRIPTIVE STATISTICS

	Whole (56 countries, 5,905 obs.)	
	Mean	Std. Dev.
Foreign sales ratio	0.280	0.264
Profit	457.9	1,385
ln(Foreign Market Acc.)	16.34	1.418
Tax rate	0.285	0.0807
Tax Haven	0.161	0.367
Treaty of info. exchange	0.235	0.424
Double tax. agreement	0.698	0.459
ln(GDP)	13.08	1.534
ln(1+ Employment)	1.724	1.243
ln(1 + Productive Assets)	4.946	2.446

We report some statistics on employment, sales, and profit in tax havens and non-tax havens in Table C.2. We show that U.S. foreign affiliates in tax havens report larger average sales per employee and larger profits per employee than foreign affiliates in other countries. Importantly, this table also shows that despite representing 7.2% of the total employment of foreign U.S. affiliates in 2013, total sales and total profits registered in tax havens amount to 30.8% and 35.8%, respectively. It is noteworthy that all these statistics are calculated using the regression sample, i.e. excluding financial affiliates and the *Utilities* sector.

Table C.2: DESCRIPTIVE STATISTICS (56 COUNTRIES)

	Tax Havens	Other countries
<hr/> Employees:		
Total employees in 2013	400500	5183700
Share employees in 2013 (%)	7.2	92.8
Average yearly number of employees	5412	14001
<hr/> Sales (millions of \$):		
Total sales in 2013	1155752	2602569.
Share sales in 2013 (%)	30.8	69.2
Average yearly sales	15618	7034
Average sales per 1000 employees	3523	549
<hr/> Profits (millions of \$):		
Total profits in 2013	98081	175960
Share profits in 2013 (%)	35.8	64.2
Average yearly profit	1325	476
Profits per 1000 employees	227	46

Average values are given at the country level. All years and sectors in the sample are pooled. Profits are shown pre-tax and excluding financial items.

D Optimal profit shifting

This proof is based on [Gumpert, Hines and Schnitzer \(2016\)](#). The maximisation problem at the firm level, given that it has a tax-haven affiliate is

$$\max_{d_i, \Psi_i} \sum_{i=1}^n d_i \left[\Psi_i + (1 - T_i) \left(\rho_i - \Psi_i - \frac{a^{1/\gamma_i} \Psi_i^2}{2 \rho_i} \right) \right]$$

with $d_i \in \{0, 1\}$, s.t

$$\rho_i - \Psi_i - \frac{a^{1/\gamma_i} \Psi_i^2}{2 \rho_i} \geq 0, \forall i = 1, \dots, n$$

Following [Gumpert, Hines and Schnitzer \(2016\)](#) and assuming that the constraint is fulfilled, the first-order condition for Ψ_i is

$$1 - (1 - T_i) - (1 - T_i) \frac{a^{1/\gamma_i} \Psi_i}{\rho_i} = 0$$

It implies

$$\Psi_i^* = \frac{T_i}{1 - T_i} \frac{\rho_i}{a^{1/\gamma_i}}$$

We insert Ψ_i^* into our constraint in order to produce a condition under which the constraint holds

$$\rho_i - \frac{T_i}{1 - T_i} \frac{\rho_i}{a^{1/\gamma_i}} - \frac{T_i^2}{(1 - T_i)^2} \frac{\rho_i}{2a^{1/\gamma_i}} \geq 0 \quad (1)$$

$$\Leftrightarrow T_i \leq 1 - \sqrt{\frac{1}{2a^{1/\gamma_i} + 1}} \quad (2)$$

E Additional Tables

This section contains additional tables. A first subsection is dedicated to extensions and a second one to robustness tests.

E.1 Extensions

In Table E.1, we examine the foreign sales ratio computed from goods and services transaction data separately. This information is yet only available at the country level. The table reveals that tax havens have a disproportionately large foreign sales ratio for both sales of goods and services.

Table E.1: FOREIGN SALES RATIO - GLM (COUNTRY-LEVEL)

Dep. Variable	FS Goods	FS Services
ln(FMA)	0.040 (0.013)	-0.000 (0.014)
Tax Rate	-0.435 (0.207)	-0.104 (0.174)
Tax haven	0.177 (0.043)	0.243 (0.037)
Treaty of info. exchange	0.047 (0.038)	0.019 (0.030)
Double tax. agreement	-0.041 (0.041)	0.043 (0.037)
# DTC	0.079 (0.083)	0.098 (0.064)
ln(GDP)	-0.047 (0.015)	-0.017 (0.011)
Year FE	Yes	Yes
Countries	55	56
Observations	618	648
R2	0.615	0.641

The dependent variable, is the foreign to total sales ratio of goods of country i in year t in column (1), and the foreign to total sales ratio of services in column (2). Panel data (yearly) 1999–2013. GLM estimates with robust standard errors adjusted for clustering by country. Marginal effects at the sample mean are displayed. Standard errors are in parentheses.

Contrary to the conventional wisdom that multinational firms only record the sales of services in tax havens, our findings suggest that both service and goods transactions are concerned. An investigation of the BEA benchmark survey dataset on royalty payments and licence fees shows that both account for a small to moderate share of the total profits reported in European tax havens.⁶ We find that royalty payments and licence fees account

⁶The BEA benchmark survey reports data on intra-firm receipts of royalties and licence fees at the sector level for many countries. The available dataset allows us to get information on intra-firm payments or licence fees for some sectors in European countries. For instance, intra-firm payments in the chemical sector are not disclosed for tax havens. These payments are observed for Europe as a whole and for different European countries. In these cases, we allocate the difference between the intra-firm payments in the chemical sector in Europe and in other non-European tax havens to large tax havens.

for a heterogeneous share of the total profit of large tax havens – from 0.1% in the primary and fabricated metals industry to 34% in professional, scientific, and technical services.

In Table E.2, we run sector-level regressions in order to study the sectoral heterogeneity of foreign sales platforms. We also dichotomize our main variable between large and small tax havens as defined in the paper. Each regression contains year fixed effects. The table reveals both sectoral and geographical heterogeneities both in manufacturing and in services sectors. Interestingly, we find a positive and (slightly) significant coefficient for small tax havens in the mining sector. It suggests that small tax havens may be used to shift sales in the mining sector, more than large tax havens, for which the point estimate is smaller and non-significantly different from zero. Small tax havens are also specialized in the wholesale sector and in the information sector. We obtain large positive and significant estimates for large tax havens in the "Chemicals", "Primary and fabricated metals", "Electrical Equipment", "Wholesale", "Information" and "Professional, scientific and technical services" sectors.

Table E.2: SECTORAL AND GEOGRAPHIC HETEROGENEITY - GLM

Type of haven	Large	Small	Obs.	R^2
<i>Manufacturing sectors:</i>				
Mining	0.104 (0.128)	0.363 (0.188)	394	0.0968
Food	0.087 (0.095)	-2.157 (0.268)	503	0.189
Chemicals	0.285 (0.040)	-0.120 (0.131)	657	0.672
Primary Fabricated Met.	0.139 (0.052)	-0.886 (0.223)	466	0.367
Machinery	0.042 (0.065)	-2.950 (0.220)	554	0.484
Computer	0.020 (0.108)	-3.785 (0.291)	528	0.203
Electricat Eqp.	0.142 (0.082)	-2.818 (0.283)	463	0.489
Transportation eqp.	-0.018 (0.154)	-3.013 (0.293)	499	0.421
<i>Service sectors:</i>				
Wholesale	0.286 (0.039)	0.356 (0.110)	693	0.707
Information	0.200 (0.050)	0.175 (0.100)	543	0.475
Prof. Science and techn. Serv.	0.164 (0.062)	0.128 (0.135)	605	0.277

The dependent variable, FS_{ikt} , is the foreign to total sales ratio in sector k of country i in year t . Panel data (yearly) 1999–2013. GLM estimates with robust standard errors adjusted for clustering by country. Marginal effects at the sample mean are displayed. All regressions include standard control variables and a time fixed effect. Regressions with aggregates includes $sector \times year$ fixed effects. Each line corresponds to a sector-level regression. **Large havens:** Hong Kong, Ireland, Luxembourg, Netherlands, Singapore, and Switzerland. **Small havens:** Barbados, Bermuda, Panama, and the British Virgin Islands. Standard errors are in parentheses.

E.2 Robustness tests

The robustness tests are described in the paper. We provide here more precisions on the placebo tests.

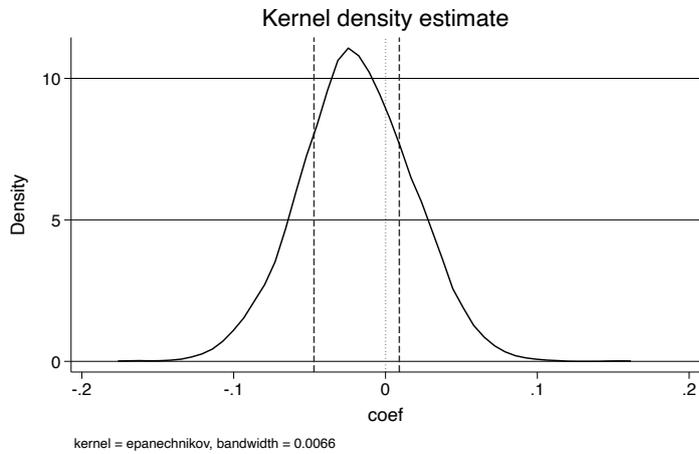
Placebo tests We construct a tax haven dummy variable which takes the value one for 9 randomly selected countries among the set of non-havens and zero otherwise.⁷ We estimate specification (4) of Table 2 using the placebo tax haven variable and repeat the exercise 3,000 times in total. This placebo experiment allows us to confirm the specific impact of tax havens on the share of the foreign sales of U.S. foreign affiliates. We expect the average coefficient of the placebo tax haven variable to be insignificant.

Figure E.3 displays the distribution of the estimated coefficients and the confidence intervals. The marginal effect is $\bar{\beta}_4 = -0.016$ and is insignificant at conventional levels of significance. The effect is slightly negative when the tax havens are kept in the control group. The second placebo experiment concerns the validity of Proposition 2. We again permute the tax havens and 9 randomly chosen countries among the set of non-tax havens. We estimate specification (6) of Table 2 using the placebo tax havens and repeat the exercise 3,000 times in total. We expect the average coefficient of the foreign market access variable to be significant contrary to our earlier finding.

Figure E.4 displays the results. The marginal effect is positive and statistically significant ($\bar{\beta}_1 = 0.046$). This finding suggests that the absence of a significant effect of the market access variable is due to specific characteristics in tax havens.

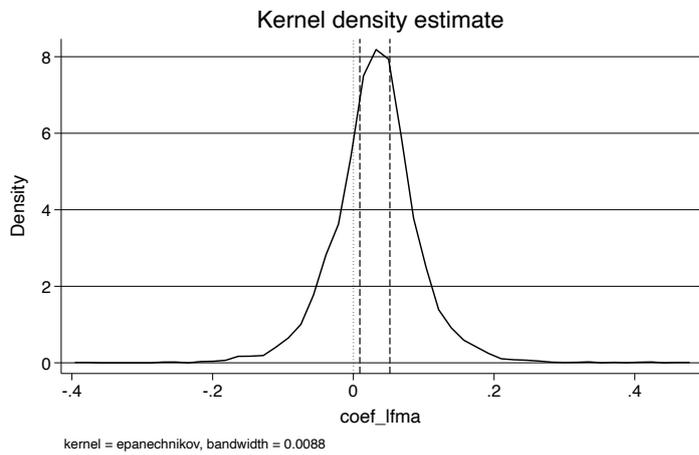
Other tests We propose other tests: we run an exercise with an alternative foreign sales ratio in Table E.3, we replicate columns 5 to 8 of table 2 using the average tax rate in table E.4 and we reproduce the profit regression with different specifications of the tax rate. In table E.5 we replace the statutory tax rate by the average observed tax rate. In table E.6, we allow for a non-linear response to taxes by adding a square term for the statutory tax rate (columns 1 to 3) and the average tax rate (columns 4 and 5).

⁷The (*real*) tax havens are therefore kept in the control group



Note: estimation of specification (4) of Table 2 using the permuted tax haven variable. Dark dashed lines represent 95% confidence intervals around the mean.

Figure E.3: TAX HAVEN DUMMY ESTIMATED COEFFICIENTS WITH 9 RANDOMLY SELECTED COUNTRIES (3,000 PERMUTATIONS)



Note: estimation of specification (6) of Table 2 using the permuted countries. Dark dashed lines represent 95% confidence intervals around the mean.

Figure E.4: MARKET ACCESS COEFFICIENTS IN THE SAMPLE OF PERMUTED TAX HAVENS (3,000 PERMUTATIONS)

Table E.3: FOREIGN SALES RATIO - ALTERNATIVE DEPENDENT VARIABLE

Dep. Variable	FS_{ikt}^{NoUS}		
	(1)	(2)	(3)
ln(Foreign Market Acc.)	0.033 (0.013)	0.037 (0.014)	-0.023 (0.035)
Tax rate	-0.277 (0.177)	-0.025 (0.146)	-0.858 (0.292)
Tax Haven	0.088 (0.034)		
Treaty of info. exchange	-0.061 (0.032)	-0.068 (0.028)	-0.174 (0.112)
Double tax. agreement	-0.028 (0.024)	0.011 (0.023)	0.003 (0.068)
#DTC	0.193 (0.067)	0.171 (0.064)	
ln(GDP)	0.006 (0.012)	-0.014 (0.011)	0.030 (0.020)
Sector \times Year FE	Yes	Yes	Yes
Sample	Full	Non haven	Tax haven
Observations	4,862	4,046	816
R2	0.372	0.415	0.567
Countries	56	46	10
Sectors	11	11	11

Dependent variable, FS_{ikt}^{NoUS} , is a the foreign to total sales ratio that excludes sales to the U.S. from foreign sales in sector k of country i in year t . Panel data at yearly frequencies. GLM estimates with robust standard errors adjusted for clustering by country \times industry. Marginal effects at the sample mean are displayed.

Table E.4: FOREIGN SALES RATIO - GLM AND OLS ESTIMATES

Dep. Variable	Foreign To Total Sales Ratio			
	(1)	(2)	(3)	(4)
ln(Foreign Market Acc.)	0.031 (0.009)	0.019 (0.031)	0.032 (0.010)	0.020 (0.036)
Average Tax rate	-0.008 (0.005)	-0.072 (0.039)	-0.006 (0.005)	-0.067 (0.040)
Treaty of info. exchange	0.041 (0.038)	-0.006 (0.094)	0.036 (0.037)	-0.008 (0.112)
Double tax. agreement	-0.021 (0.023)	-0.000 (0.080)	-0.023 (0.024)	-0.002 (0.093)
#DTC	0.114 (0.053)	0.179 (0.160)	0.117 (0.053)	0.181 (0.189)
ln(GDP)	-0.027 (0.009)	-0.048 (0.011)	-0.027 (0.009)	-0.047 (0.013)
Estimator	GLM	GLM	OLS	OLS
Sector \times Year FE	Yes	Yes	Yes	Yes
Sample	Non tax haven	Tax haven	Non tax haven	Tax haven
# Countries	46	10	46	10
# Sectors	11	11	11	11
Observations	3,690	613	3,690	613
R2	0.378	0.453	0.368	0.448

The dependent variable, FS_{ikt} , is the foreign to total sales ratio in sector k of country i in year t . Panel data (yearly) 1999–2013. GLM estimates in columns 1 and 2, OLS estimates in columns 3 and 4. Robust standard errors adjusted for clustering by country. Marginal effects at the sample mean are displayed. e Standard errors are in parentheses.

Table E.5: PROFIT EQUATION - AVERAGE TAX RATE AS A DETERMINANTS

	(1) OLS	(2) Gamma
Dep. Variable	ln(Profit)	Profits
ln(Foreign Market Acc.)	0.010 (0.039)	0.086 (0.044)
Foreign sales ratio	0.207 (0.181)	0.039 (0.144)
Average Tax rate	-0.206 (0.371)	-1.384 (0.623)
Tax Haven	0.154 (0.350)	-0.500 (0.282)
FS times haven	1.298 (0.577)	2.290 (0.379)
Treaty of info. exchange	0.039 (0.099)	-0.046 (0.129)
Double tax. agreement	-0.055 (0.079)	0.132 (0.109)
#DTC	0.239 (0.224)	-0.648 (0.261)
ln(GDP)	0.049 (0.045)	0.038 (0.049)
ln(1+ Employment)	0.401 (0.066)	0.306 (0.083)
ln(1 + Productive Assets)	0.544 (0.043)	0.576 (0.052)
Sector x Year FE	Yes	Yes
Countries	54	54
Sectors	11	11
Observations	2,761	2,761
R-squared	0.860	0.818

Robust standard errors adjusted for clustering by country level. Standard errors are in parentheses. The sample corresponds to observations with positive profits as the average tax rate is computed on positive profits only.

Table E.6: PROFIT EQUATION: NON-LINEAR TAX SPECIFICATION

	(1) OLS	(2) Gamma	(3) CubeR	(4) OLS	(5) Gamma
Dep. Variable	ln(Profit)	Profit ≥ 0	All profits	ln(Profit)	Profit ≥ 0
ln(Foreign Market Acc.)	-0.027 (0.037)	0.041 (0.048)	-0.024 (0.113)	0.006 (0.038)	0.079 (0.044)
FS times haven	1.493 (0.455)	1.986 (0.469)	5.076 (1.562)	1.273 (0.574)	2.230 (0.384)
Tax Haven	-0.034 (0.241)	-0.704 (0.305)	-0.343 (0.604)	0.173 (0.348)	-0.441 (0.280)
Foreign sales ratio	0.225 (0.162)	0.516 (0.204)	-0.344 (0.585)	0.194 (0.181)	0.016 (0.149)
Tax rate	-10.040 (1.887)	-10.031 (3.200)	-15.218 (3.886)		
Tax ²	18.231 (3.012)	16.636 (4.776)	27.936 (7.405)		
Average Tax rate				-2.389 (1.107)	-5.780 (1.571)
Average Tax ²				6.184 (2.741)	12.417 (3.313)
Treaty of info. exchange	0.062 (0.092)	-0.230 (0.121)	0.055 (0.280)	0.036 (0.097)	-0.062 (0.125)
Double tax. agreement	0.110 (0.086)	0.196 (0.101)	0.173 (0.291)	-0.049 (0.080)	0.172 (0.117)
#DTC	0.353 (0.175)	-0.062 (0.268)	0.039 (0.739)	0.280 (0.217)	-0.554 (0.251)
ln(GDP)	0.000 (0.048)	0.030 (0.091)	-0.041 (0.135)	0.043 (0.043)	0.043 (0.049)
ln(1+ Employment)	0.409 (0.062)	0.191 (0.094)	1.238 (0.171)	0.406 (0.065)	0.330 (0.079)
ln(1 + Productive Assets)	0.564 (0.041)	0.637 (0.056)	0.536 (0.109)	0.539 (0.043)	0.551 (0.052)
Semi-elasticity at t=0	-10.04	-10.03	-10.30	-2.389	-5.780
Semi-elasticity at t=0.5	8.191	6.605	8.609	3.796	6.637
Sector x Year FE	Yes	Yes	Yes	Yes	Yes
Countries	56	56	56	54	54
Sectors	11	11	11	11	11
Observations	4,691	5,284	5,905	2,761	2,761
R-squared	0.795	0.731	0.492	0.861	0.831

Robust standard errors adjusted for clustering by country level.
Standard errors are in parentheses.

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