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Public Procurement and Tax Havens

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Abstract:

To understand public procurement suppliers linked to tax havens, we analyse datasets of tender-level public procurement and firm-level suppliers and provide a series of stylized facts. We estimate that around 5% of tenders by value (145 billion EUR yearly) are supplied by firms with ownership links to tax havens that are black- or grey-listed by the EU. For example, firms linked to the British Virgin Islands and Bermuda supply tenders worth over 900 per cent of their GDP. To address the question of which tenders are more likely to be supplied by firms linked to tax havens, we draw on a theoretical model and a tender-level empirical analysis. We find that tenders co-financed from EU funds and those attracting a larger number of bidders are less likely to be supplied by firms linked to tax havens. Any policy intervention might therefore rely on both an increased government oversight associated with EU funds or an increased firm competition.

JEL: F36, F65, G28, H87, H57

Keywords: public procurement; government expenditures; offshore finance; secrecy jurisdictions; tax havens

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An Online Appendix, including country-level results, code and data is available at <https://osf.io/kh2tm/>.

1 Introduction

Public procurement tenders represent an important form of government expenditure in most EU countries: overall, the public procurement market accounts for 14% of the GDP in the EU, or 1.9 trillion EUR annually (European Commission, 2017). Despite this scale, not much is known about the public tenders' suppliers. In particular, it is not clear how many of them are multinational corporations, how many of them have ownership links to companies from tax havens and what effects they might have on public procurement tenders. The interlinked topics of multinational corporations and tax havens have been drawing more attention from policy makers internationally (e.g. OECD and the EU (including the European Commission's 18 May 2021 proposals) and at country level (e.g. digital services taxes) as well as from researchers (e.g. Tørsløv et al. 2020, Garcia-Bernardo & Janský, 2021). But, so far, there has not been much research that has addressed the role of tax havens in EU public procurement. In this paper, we aim to fill this gap.

We will address the following main question: What is the role played by public procurement supplier firms that are linked to tax havens? As we answer this main research question, we provide a series of stylized facts about the European public procurement market. For example, we show which countries are public procurement supplier firms more likely to have links to. Specifically, we hypothesise that public procurement supplier firms are often linked to tax havens. By tax havens, we mean countries that are on the EU lists of non-cooperative jurisdictions and that often have hardly any real economic activity, but also, more substantively, countries that offer low corporate effective tax rates or low levels of financial transparency. In addition, we analyze which kinds of tenders are more likely to be supplied by firms that do have links to tax havens. We hypothesise that tenders that are co-funded by the EU are less likely to be supplied by firms linked to tax havens and that, the lower the number of bidders in a tender, the more likely the supplier firm is linked to a tax haven.

We build on the best available datasets of European public procurement tenders and companies and we analyse the merged dataset. While existing research on public procurement provides a broad theoretical discussion as well as case studies on individual countries (a comprehensive review of this literature is provided by Thai, 2008), only very rarely do we see studies that explore empirical patterns across a number of countries. One key reason is that comparable data on public procurement and its suppliers across countries has been historically very poor. To fill this gap in research, we identify tax haven- and foreign-linked suppliers of public tenders, including those financed by EU funds, across the EU member states. To that objective we combine two state-of-the-art data sets: tender-level public procurement data from Opentender.eu and the company-level dataset Orbis.

As we answer the main question about the role played by public procurement supplier firms that are linked to tax havens, we provide new findings in three areas. First, we estimate how much money in the EU is distributed through public procurement tenders to companies that are linked to tax havens

via parent companies in their ownership structure. The most important tax havens for procurement suppliers in Europe are the Netherlands, Luxembourg, and Cyprus (within the EU) and Bermuda, the British Virgin Islands and the Cayman Islands (outside the EU). Based on the best available data, we estimate that around 5.5% of tenders by value (in total worth around 150 billion EUR each year) are supplied by firms with ownership links to non-cooperative jurisdictions that have been black- and grey-listed by the EU in 2017 (Table 5 provides the full list of these jurisdictions). Over the time period that we focus on in this paper (2011-2017), the total value of public money that ended up with firms linked to these tax havens amounts to around 1.25 EUR trillion. This estimate is likely to underestimate the actual value of tenders supplied by companies linked to tax havens. There are two reasons for this. First, we only consider vertical ownership links with tax havens – but companies can make use of tax havens even if linked only via their sister companies. Second, by using the EU’s lists, we implicitly do not take into consideration the tax havens that are part of the European Union (such as the Netherlands, Luxembourg and Cyprus, which we mention above).

Second, we put these numbers in context by comparing them to how much money could be expected to be distributed to these companies based on the size of the tax havens’ economies. We show that supplier companies have ownership links with tax havens to a much larger extent than would be in line with the tax havens’ GDP. Every year, firms linked to the British Virgin Islands and Bermuda supply tenders worth over 900 per cent of those countries’ entire GDP, and they are followed by other aggressive tax havens, such as the Cayman Islands, Curacao, Cyprus, Luxembourg or Malta. We report how our findings compare to existing indicators of tax havens and the EU’s current policies to counter tax havens, such as the lists of non-cooperative jurisdictions. We find that corporate income tax rates in particular are very good predictors of the success of tax havens in being present in the ownership structures of supplier firms. Our results indicate that the EU’s blacklist and greylis are not a good reflection of which are the most important tax havens for European tender suppliers, while other widely used lists of tax havens seem to do a better job.

Third, to analyse which tenders are more likely to be supplied by firms linked to tax havens, we draw on both a simple theoretical model and a tender-level empirical analysis. We start by developing a simple model of supplier choice by contracting authorities where one of the bidding firms has links to a tax haven. We show that if the contracting authority uses, as a selection criterion, the cost of the bid net of the corporate tax revenue it would obtain from domestic firms (as compared to tax haven-linked firms), domestic firms will be chosen to a much larger extent than if the cost of the bid is the sole selection criterion (which is most common in public procurement tenders). Supplier firms linked to tax havens will thus be chosen disproportionately often. This prediction is in line with our descriptive results at the country level, which we present in the first stage of our results. We draw several predictions from the model regarding which tenders are more likely to be supplied by firms linked to tax havens. Then, in the tender-level empirical analysis, we assess the validity of these predictions: we

find that tenders that are co-financed from EU funds are less likely to be supplied by firms linked to tax havens and that a larger number of bidders is associated with a lower share of supplier firms linked to tax havens.

In this paper we answer, for the first time, the question of what role is played by public procurement supplier firms that are linked to tax havens. Tax havens, or jurisdictions that provide multinational companies with the opportunity to escape the legislation of the countries in which these companies operate, have become a defining feature of global finance. It is estimated that 8% of global wealth is now held in tax havens, three-quarters of which goes unrecorded (Zucman, 2013); multinational companies shift between 400 and 600 USD billion of corporate profits to tax havens every year (Janský & Palanský, 2019; Tørsløv et al., 2020); and the occasional leaks of confidential documents from offshore legal firms point to the widespread practice of political elites hiding their true identity behind a veil of secrecy. Public procurement is an area that is very vulnerable to harmful practices that involve tax havens and secrecy (Søreide, 2002). We argue that, in the ongoing, so far largely fruitless fight led by governments and international organisations around the world to curb tax havens, the largest single buyer in the global economy – the public sector – is not using its market power to offset the currently significant advantage in public procurement tenders enjoyed by bidders linked to tax havens.

Estimating how large a share of European public procurement tenders are supplied by companies with links to tax havens has not been possible before due to data limitations that we overcome in this paper by merging two state-of-art datasets. The existing research on public procurement supplied by foreign-owned companies is, therefore, scarce. The European Commission (2017) provides basic information about the international openness of public procurement across EU countries. Kutlina-Dimitrova & Lakatos (2016) analyse data published on Tenders Electronic Daily for the period from 2008 until 2012 and find that, among awarding country characteristics, GDP per capita and trade-to-GDP ratio are found to positively impact the probability of a cross-border award. One possible motivation for the government to award tenders to its domestic companies might be to stimulate private investment. Indeed, Hebous & Zimmermann (2016) find that, in the United States, one dollar of federal spending increases firms' capital investment by 7 to 11 cents. Similarly, Hoekman & Sanfilippo (2018) find, for sub-Saharan African countries, that firms that sell a larger share of their output to government entities have perform better in terms of productivity. Using a dataset of World Bank-financed contracts, Kenny & Crisman (2016) find that a minor procurement rule governing advertising on competition appears to have a small, positive impact on bidding levels, suggesting the potential for more significant and strongly enforced transparency initiatives to have a sizeable effect on procurement outcomes.

Recent research has used detailed public procurement data to identify suspicious or corruption-related tenders across Europe (Fazekas et al., 2013, PwC, 2013, The Economist, 2016, Ferwerda, Deleanu, &

Unger (2017), with the Czech Republic being a well-studied example (Chvalkovská & Skuhrovec, 2010, The Economist, 2011, Chvalkovská, Janský, & Skuhrovec 2012, Palguta & Pertold (2017)). In addition, the European Commission itself publishes country-level information for 12 indicators, such as whether there was only a single bidder or missing information, for all EU members (European Commission, 2018). Another area of related literature that has analysed public procurement suppliers owned by companies in other countries is that on EU funds. Government of countries such as Poland (Polish Ministry of Regional Development, 2010) or the Czech Republic (EEIP, 2010) argued that many of the benefits of the EU funds end up with the companies from other EU countries through supplying the EU-funded tenders. Also, there is research on compliance with public procurement directives showing that expected gains of compliance and organisational pressure have a positive impact on compliance (Gelderman et al., 2010). While e-procurement might be a solution to integrating government procurement into the single market (Khorana et al., 2015), we provide new estimates on how much integration there seems to be in the public procurement market by showing the scale of tenders supplied by firms not only with links to tax havens but also, more generally, with foreign ownership links.

The remainder of this paper is organised as follows. In Section 2, we briefly outline the state of knowledge on the beneficial ownership of companies in the EU and their links to tax havens. Next, in Section 3, we detail the methodology, our theoretical model and the data that we use in the analysis. In Section 4, we present the results and we conclude in Section 5 by identifying data improvements that would enable even more reliable results.

2 Methodology, model and data

In this section we first describe our approach to determining which tenders are supplied by companies with ownership links to different countries. Next, we develop a model of a public procurement tender in which one of the bidding companies is linked to a low-tax jurisdiction and describe the predictions of the model, which we then test in the subsequent section.

2.1 Methodology

In our preferred method¹ of determining whether a company is linked to a tax haven, which we call the *risk method*, we follow the ownership structure of each tender supplier that we are able to identify in the Orbis database. We associate a tender supplier with any country to which there is an ownership link of at least 10% in the supplier company's ownership structure, up to 20 levels of ownership structure. We thereby do not take into account sister companies to which profits may also be shifted

¹ In addition, we also considered what we labelled as the *ultimate ownership method* as another possibility in which we assign the value of each tender proportionately (based on ultimate ownership share) to countries from which the supplier is ultimately owned. We do not use this ultimate ownership method in this paper because we argue that any ownership link is a sufficient condition that enables companies to shift profit to tax havens.

and, for this reason, our estimates can be considered lower bound estimates of the actual exposure of EU countries to suppliers linked to tax havens.

We compute the share of the value of all tenders supplied to each EU member state i in year t by firms $f = 1, \dots, F$ with links to country j out of all tenders administered by country i in year t and supplied to it by all identified firms $s = 1, \dots, S$:

$$\text{Share of foreign tenders}_{ijt} = \frac{\sum_{f=1}^F \text{Value of tenders}_{ift}}{\sum_{s=1}^S \text{Value of tenders}_{ist}}$$

Using this definition, we obtain, for each buyer country i , the share of the value of tenders supplied by firms with an ownership link to country j on the total value of tenders administered by country i in year t . Therefore, if a firm F supplies a tender to the government of country A , and firm F is owned by a mother company from country B , which is in turn owned by another mother company in country C , the tender is assigned to both countries B and C . The tender will thus be counted in our data twice – as being linked to country B and also as being linked to country C . For this reason, where we need to determine the share of tenders that are linked to a particular group of countries (such as all foreign countries, other EU countries, tax havens or otherwise defined groups), we avoid double-counting of tenders by calculating these shares separately for each such group.

When absolute values rather than relative shares are needed, it is possible to multiply this by the value of all tenders so that the scales are comparable across countries (to account for various sample sizes across countries due to data availability, as described below), although important caveats apply. For example, it may be the case that the tenders which appear in the national sources in the correct format and which we were able to match to a firm database are more likely to be transparent tenders with no suppliers from tax havens. This would again give our estimates a downward bias and we could thus consider them lower-bound estimates. Similarly, the number of tenders rather than their values can be substituted into the shares outlined above.

In Section 4 below we quantify the role of tax havens in public tenders in the EU. First, we use tools of descriptive statistics to show how much public procurement is supplied by companies linked to tax havens. Second, we hypothesise that firms that are linked to tax havens are chosen as public procurement suppliers more often than would be predicted by the size of the tax havens' economies. Specifically, we test a relationship between (i) the ratio of the value of public procurement supplied by firms linked to a country and its GDP, and (ii) common indicators of tax havens. We thus estimate a model of the following form:

$$\log\left(\frac{PP_i}{GDP_i}\right) = \alpha + \beta * \text{tax haven}_i + \delta * X_i + \epsilon_i \#(1)$$

where PP_i is the value of public procurement supplied to European governments over the studied time period by firms that are linked to country i ; GDP_i is the gross domestic product of country i ;

$tax\ haven_i$ is an indicator of the extent to which country i acts as a tax haven²; X_i is a set of country-specific characteristics (such as GDP, population, or GDP per capita); and ϵ_i is the error term.

The main coefficient of interest, β , is hypothesised to have a positive sign – the more a country acts as a tax haven, the more it is hypothesised to be used by companies that seek to avoid paying corporate tax in the country to whose government they supply public tenders. We are further interested in γ , a coefficient that estimates the effect of financial secrecy on public procurement flows.

2.2 Model

In this subsection, we develop a model of supplier choice by contracting authorities which face bids from firms linked to tax havens. This model helps us highlight some of the crucial issues related to tenders supplied by firms linked to tax havens and the effects of discriminatory procurement.

We build on a simple model of supplier choice as described by McAfee & McMillan (1989) but, without creating ambiguity, we present, a simplified version of it here in which only two firms enter the auction for one unit of a commodity that a contracting authority wishes to acquire. We thus have two bidders, denoted D and TH , which are identical in all aspects except for ownership structure: firm D is owned domestically, while firm TH is owned from abroad and has in its ownership structure a company registered in a tax haven.

It is very important to note here that the same reasoning that we develop here for domestically-owned firms could be applied more generally to all firms that do not shift profit to tax havens to reduce their tax liability. While in our model, we will call such firms domestic, the model can be extended to include all firms that pay all their tax in a country that has not designed its corporate tax system with the aim of attracting a foreign corporate tax base at the expense of other governments losing tax revenue.

Suppose that the two firms submit the following bids:

$$b_D = c + \pi * (1 + \tau_D) \#(2)$$

$$b_{TH} = c + \pi * (1 + \tau_{TH}) + c(u_{TH}) \#(3)$$

where c is the actual cost of supplying the tender and is the same for both companies since they are identical in all relevant aspects; π is the companies' desired profit derived from this tender; τ_D is the domestic corporate tax rate; τ_{TH} is the corporate tax rate faced by firm TH ; and $c(u_{TH})$ is the cost to firm TH of using a tax haven.

² To measure the extent to which a country acts as a tax haven, we use several indicators: statutory and effective corporate income tax rates, haven scores from the Corporate Tax Haven Index (Tax Justice Network, 2019), secrecy scores from the Financial Secrecy Index (Tax Justice Network, 2018) and binary lists of tax havens.

Let us normalise the corporate tax rate τ_{TH} to 0 and assume $\tau_{TH} < \tau_D$. Also, let us assume that $c(uTH) > 0$ as using an ownership structure that includes a tax haven is costly³. It then follows that:

$$b_D > b_{TH} \Leftrightarrow c(uTH) < \pi * \tau_D \#(4)$$

The contracting authority then compares $b_i, i \in \{D, TH\}$ and selects firm i with lowest cost of purchase $C(b_i)$. If the contracting authority uses price (i.e. the value of the bid) as the sole selection criterion, then, since $b_{TH} < b_D$, firm TH is chosen to supply the tender. Indeed, the first prediction of the model is that firms linked to tax havens are selected disproportionately often when price is the contracting authority's sole selection criterion – and we empirically test this prediction using data on European tenders.

However, if the contracting authority's selection criterion is the true cost to the government, i.e. value of the bid net of corporate tax revenue $\pi * \tau_D$, then the cost of purchase of both bids is as follows:

$$C(b_{TH}) = b_{TH} = c + \pi + c(uTH) \#(5)$$

$$C(b_D) = b_D - \pi * \tau_D \#(6)$$

Plugging in for b_D in Equation (5), we obtain $C(b_D) = c + \pi$. The contracting authority then chooses firm D to supply the tender as long as $C(b_D) < C(b_{TH})$, i.e. as long as $c(uTH) > 0$, which we assumed above. This means that, as long as using a tax haven is costly to firm TH , the contracting authority will choose firm D to supply the tender if it uses the true cost to the government as the selection criterion. At the same time, it follows that using the true cost to the government as the selection criterion saves the government the amount $c(uTH)$.

Importantly, this model of supplier selection predicts that, as $c(uTH)$ increases, the probability that a tender will be supplied by a firm linked to a tax haven decreases. Consequently, some tender characteristics that are likely to be associated with a higher cost of using a tax haven are predicted to be associated with a lower probability of being supplied by a firm linked to a tax haven. Below, we analyse two such characteristics: direct co-funding from EU sources and the number of bidders in the tender.

We argue that using a selection criterion of the true cost to the government rather than only price would eliminate the effects that we find in our empirical tests. In fact, the estimates of these effects allow us to derive a discriminatory coefficient by which governments can offset the unfair advantage that firms linked to tax havens have over domestic firms when competing for public procurement tenders.

³ By 'using an ownership structure that includes a tax haven' we mean here that the firm uses its set-up to shift all of its tax base to tax havens, i.e. to territories in which the firm face tax rate τ_{TH} . This is costly because it involves using complicated structures to bypass the current system of international taxation (largely based on the arm's length price principle).

2.3 Data

The primary source of our data on public procurement is the database of Datlab, a Czech private IT company. It is a cleaned up extension of the public portal Opentender.eu, which provides public procurement data from 33 jurisdictions (28 EU member states, the EU institutions, Norway, Iceland, Switzerland and Georgia). The sources of data for Opentender's database are of two kinds – EU-wide Tenders Electronic Daily, which publishes information on public procurement above a given threshold, and other, country-specific, national sources. For Tenders Electronic Daily, we use the time period from 2011 until 2017, while, for national sources, we use data on tenders administered in time periods that vary across countries, as detailed in Table 1. The data contain information on individual public procurement tenders, including those co-financed from the European Union's budget.

For companies that supply tenders, we use data about their ownership from Bureau van Dijk's Orbis database. Orbis is the best available firm-level data set, which contains balance sheet data as well as information on firms' ownership structures. As described in detail by Janský (2018), at the level of individual companies, this is the most extensive and advanced data set in the world. In terms of data, it offers good coverage since the mid-2000s and information for some companies goes back to the 1980s. Orbis aims to contain both consolidated and unconsolidated data. Despite its detail and coverage, which is superior to any other comparable alternative, Orbis has considerable limitations. These limitations are discussed, for example, by Cobham and Loretz (2014) and Clausing (2016). The coverage of individual firms is not universal and differs from country to country: it is, for example, biased against tax havens (implying that any analysis, including ours, is likely to underestimate their presence and provide a lower bound estimate of their effects, as we discuss below) and developing countries. Even when firms are included, how much information is available on them differs and is often limited. Tørsløv, Wier, & Zucman (2018), for example, show that only a weighted average of 17% of multinationals corporations' global profits are included in Orbis.

We use the best available data on tenders and their suppliers in the form of a combination of tender and company information, but it is still imperfect. As Table 1 shows, the data availability on both tenders and company ownership differs substantially from country to country. Importantly, while recognising the limitations of the data, in most of the analysis below we make the important assumption that what we do see in the data is representative of all public procurement tenders administered by the countries in our sample. However, given some countries' low level of data availability, the results presented should be considered illustrative only. Indeed, even though we use the best available data, we are calling for substantial improvement in this regard.

In our analysis in this paper, we do not include countries that have less than 1,000 tenders with identified suppliers (these countries are marked with a star in Table 1). For tenders to be included in our analysis, we require four basic variables to be available: country of the buyer, year of tender, supplier firm's country and value of the tender. Dropping tenders that do not have this information

leaves us with a sample of 1,264,957 tenders, which constitute the sample for our analysis, as detailed in Table 2. In addition to 22 EU member states, our sample covers Norway and Switzerland.

Table 1: Descriptive statistics of public procurement data

Country	Source	Time period	All tenders in database		Sample with identified supplier and basic information	
			Number of tenders	Value of tenders, EUR bn.	Number of tenders (% of all tenders)	Value of tenders, EUR bn. (% of all tenders)
Austria	TED	2011-2017	36,923	31.3	4,997 (13.5%)	8.7 (27.8%)
Belgium	TED	2011-2017	102,480	71.2	6,581 (6.4%)	9.1 (12.8%)
Bulgaria*	TED	2011-2017	169,390	23.4	59 (0%)	0 (0.1%)
Croatia	TED	2011-2017	36,166	13.6	24,030 (66.4%)	8.4 (61.7%)
Cyprus*	TED	2011-2017	11,360	3.9	22 (0.2%)	0 (0.5%)
Czechia	National	2006-2017	257,998	133.4	133,998 (51.9%)	82.8 (62.1%)
Czechia	TED	2011-2017	88,408	109.0	34,428 (38.9%)	35.8 (32.8%)
Denmark	TED	2011-2017	58,254	140.3	8,545 (14.7%)	59.7 (42.6%)
Estonia	National	2007-2017	125,859	30.5	38,932 (30.9%)	11.2 (36.7%)
Estonia	TED	2011-2017	27,925	15.1	7,253 (26%)	7.6 (50.1%)
Finland	TED	2011-2017	61,627	49.8	5,662 (9.2%)	6.7 (13.5%)
France	TED	2011-2017	1,289,907	494.8	56,733 (4.4%)	80.6 (16.3%)
Germany	TED	2011-2017	385,649	149.5	44,363 (11.5%)	43.6 (29.1%)
Greece*	TED	2011-2017	84,083	28.6	97 (0.1%)	0 (0.1%)
Hungary	National	2013-2017	123,291	77.5	30,379 (24.6%)	89 (114.9%)
Hungary	TED	2011-2017	57,759	51.5	2,733 (4.7%)	4.9 (9.5%)
Iceland*	TED	2011-2017	1,809	0.4	9 (0.5%)	0.1 (18.9%)
Ireland*	TED	2011-2017	27,011	29.1	145 (0.5%)	0.3 (0.9%)
Italy	TED	2011-2017	247,821	333.1	17,879 (7.2%)	39.6 (11.9%)
Latvia	TED	2011-2017	91,551	37.4	3,968 (4.3%)	1.1 (3%)
Lithuania	TED	2011-2017	178,100	18.0	18,764 (10.5%)	11.7 (65.1%)
Luxembourg*	TED	2011-2017	9,402	10.4	537 (5.7%)	0.8 (7.4%)
Malta*	TED	2011-2017	5,502	1.5	72 (1.3%)	0.1 (6%)
Netherlands	National	2010-2017	56,217	51.7	2,471 (4.4%)	10.2 (19.8%)
Netherlands	TED	2011-2017	66,687	98.8	8,528 (12.8%)	33 (33.4%)
Norway	National	2003-2017	208,502	96.7	5,821 (2.8%)	16.4 (17%)
Norway	TED	2011-2017	48,344	73.6	4,036 (8.3%)	13.4 (18.2%)
Poland	National	2008-2017	3,310,731	127.0	60,709 (1.8%)	3.3 (2.6%)
Poland	TED	2011-2017	1,089,958	220.8	228,046 (20.9%)	46.6 (21.1%)
Portugal	National	2008-2017	1,246,417	143.9	406,800 (32.6%)	26.7 (18.5%)
Portugal	TED	2011-2017	42,427	29.2	2,111 (5%)	3.1 (10.6%)
Romania	National	2007-2017	2,906,212	122.8	819 (0%)	2.2 (1.8%)
Romania	TED	2011-2017	528,300	74.1	26,304 (5%)	7.2 (9.8%)
Slovakia	National	2009-2017	94,376	47.4	35,163 (37.3%)	31.7 (66.9%)
Slovakia	TED	2011-2017	26,471	35.7	11,805 (44.6%)	22.1 (61.9%)
Slovenia	National	2007-2017	178,775	32.1	269 (0.2%)	0.1 (0.3%)
Slovenia	TED	2011-2017	57,418	11.2	55,595 (96.8%)	6.7 (59.4%)
Spain	National	2008-2017	527,790	220.4	121,678 (23.1%)	44.1 (20%)

Spain	TED	2011-2017	212,399	361.3	14,199 (6.7%)	17.5 (4.8%)
Sweden	TED	2011-2017	97,819	49.9	7,146 (7.3%)	22 (44.1%)
Switzerland	TED	2011-2017	28,622	34.9	8,322 (29.1%)	19.7 (56.4%)
United Kingdom	TED	2011-2017	326,935	1257.5	9,945 (3%)	81.1 (6.4%)

Source: Authors.

Notes: The table shows sources of public procurement data and numbers, values and shares of tenders with basic information about the tender (buyer country, supplier country, year, and value of the tender) and also an identified supplier company (i.e. companies reliably linked to Orbis). The information from EU-wide Tenders Electronic Daily excludes below-threshold tenders, while that from national sources includes below-threshold tenders. Duplicates from both sources are removed (and left in the Tenders Electronic Daily sample). Countries marked with a star have less than 1,000 tenders with identified suppliers, and we exclude these countries from our analysis in this paper.

Table 2: Summary of the cleaned up sample of public procurement data, 2011-2017, by country

Country	Number of tenders	Total value of tenders (EUR billion)	Country	Number of tenders	Total value of tenders (EUR billion)
Austria	4,997	8.7	Lithuania	18,764	11.7
Belgium	6,581	9.1	Netherlands	10,999	43.2
Croatia	24,030	8.4	Norway	9,315	27.5
Czechia	124,171	84.9	Poland	276,538	49.1
Denmark	8,545	59.7	Portugal	321,254	24.7
Estonia	41,810	16.3	Romania	26,835	8.9
Finland	5,662	6.7	Slovakia	42,328	46.5
France	56,733	80.6	Slovenia	55,864	6.8
Germany	44,363	43.6	Spain	124,080	58.4
Hungary	14,828	19.3	Sweden	7,146	22.0
Italy	17,879	39.6	Switzerland	8,322	19.7
Latvia	3,968	1.1	United Kingdom	9,945	81.1

Source: Authors.

Notes: The sample of tenders included in this analysis is created from public procurement data from Opentender.eu with the basic information that was available about the tenders (buyer country, supplier country, year, and value of the tender) and also an identified supplier company (i.e. companies reliably linked to Orbis).

In addition to data on public procurement tenders and its suppliers, we use several auxiliary sources of data. First, to classify tax havens, we use the EU's black and grey lists as the main lists of tax havens because of our focus on EU countries' public procurement. The lists were first published on 5 December 2017 and have since been amended several times. In this analysis, we use the initial lists from 5 December 2017. A list of jurisdictions included on these lists is provided in Table 5. Second, we use three sources of continuous indicators of tax havens: nominal corporate tax rates (which, to achieve the largest possible country coverage, come from OECD, KPMG, the Tax Foundation, TradingEconomics.com, University of Oxford's Centre for Business Taxation, World Bank's Doing Business reports, and individual government agencies (in that order)), effective corporate tax rates (both forward-looking ones, which we source from the Corporate Tax Haven Index (Tax Justice

Network, 2019) and combine with nominal rates where the effective ones are not available, as well as backward-looking ones, which we source from Garcia-Bernardo et al., (2020)), Haven Scores from the Corporate Tax Haven Index (Tax Justice Network, 2019), and Secrecy Scores from the Financial Secrecy Index (Tax Justice Network, 2018). Third, we use data on GDP, GDP per capita, and population from the World Bank, UN, and CIA.

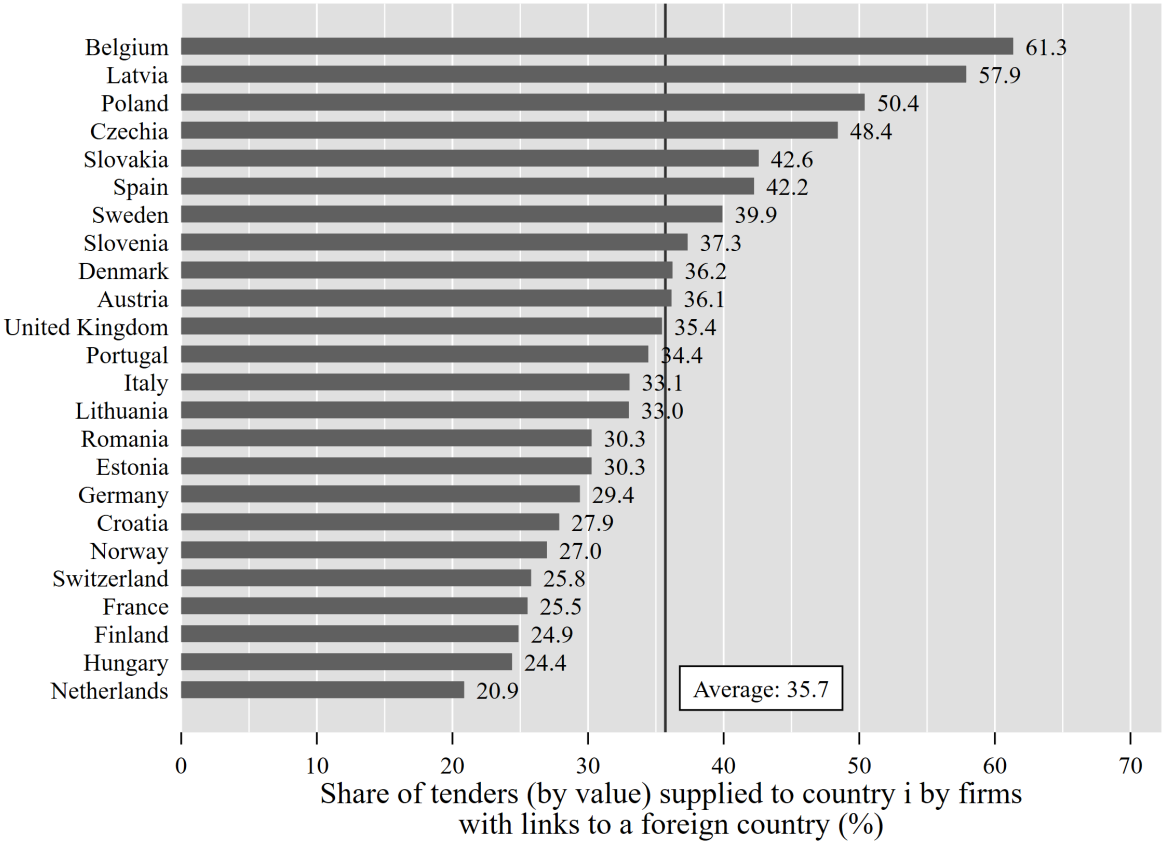
3 Results

In this section we present our empirical results, which answer our main research question about the role that is played by firms linked to tax havens in public procurement tenders administered by European governments. We present the results in four stages. First, we estimate how much public procurement of EU countries is supplied by firms with links to foreign countries. Second, we analyse which specific countries are involved in the ownership chains of the supplier firms and how often these ownership chains involve tax havens. Third, we analyse the relationship between, on the one hand, the ratio of public procurement supplied by firms with links to country i and the GDP of country i , and on the other hand, the extent to which that country acts as a tax haven for multinational corporations. Fourth, we assess whether specific tender characteristics that make it more costly for supplier companies to use tax havens affect the probability that the tender is supplied by a firm linked to a tax haven. In particular, we analyse three tender characteristics: co-funding by the EU, number of bidders entering the auction and the selection procedure used.

3.1 Which countries are supplier firms linked to?

We start by exploring the foreign ownership structures of supplier firms. As we show in Figure 1, on average, 35.7% of tenders (by value) are supplied by firms with an ownership link to at least one foreign country (or are supplied directly by foreign firms). Across EU countries, there is substantial heterogeneity: the share ranges from 21% (Netherlands) to 61% (Belgium).

Figure 1: Percentage share of tenders (by value) supplied by firms with foreign ownership links

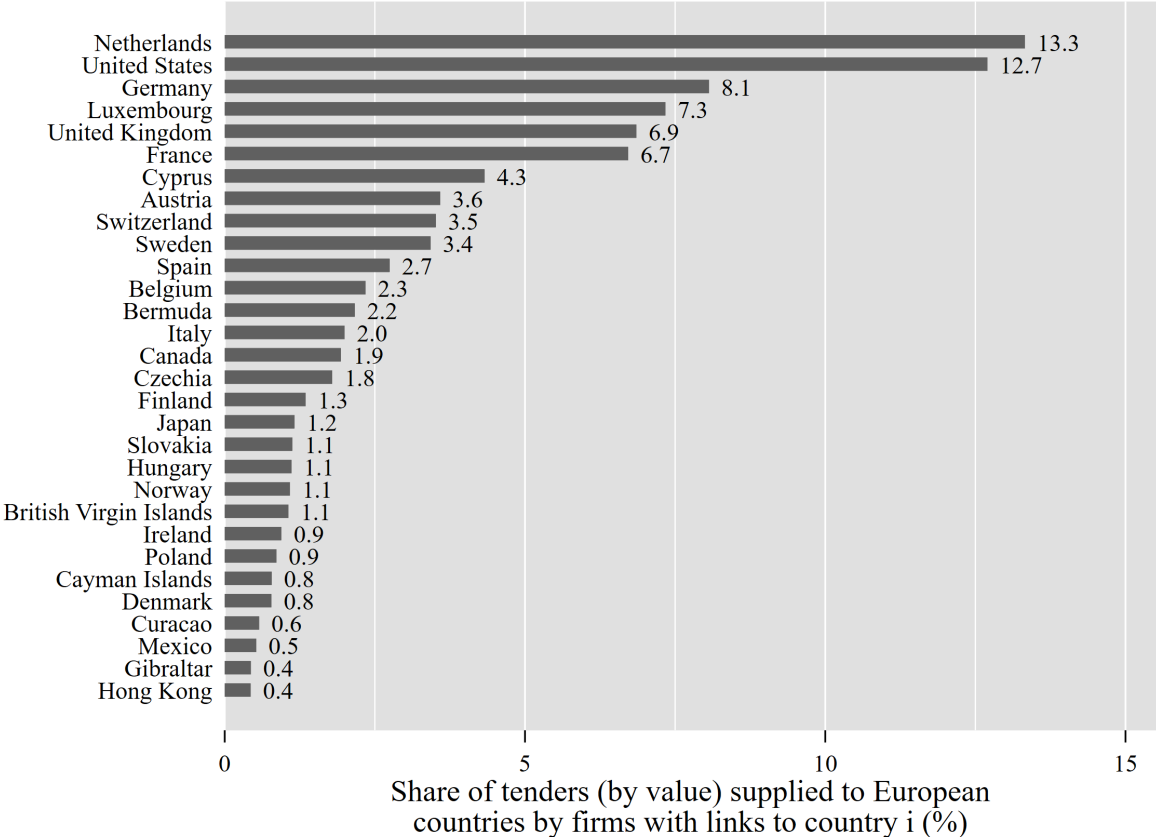


Source: Authors.

Notes: Results are based on the full sample of public procurement data with an identified supplier firm, as summarised in Table 2. A supplier firm is defined to be linked to a foreign country if at least one of the mother companies in the supplier firm’s ownership structure is incorporated in a foreign country; see text for details.

To explore which foreign countries supplier firms are most often linked to, Figure 2 shows the share of all public procurement (by value) which is supplied to European countries by firms linked to individual countries. Some prominent tax havens, such as the Netherlands, Luxembourg or Cyprus, have a high ranking with regard to this metric despite the relatively small size of their economies. Over 13 per cent of all tenders in Europe are supplied by firms that have a company registered in the Netherlands in their ownership structure. Assuming that European countries in the period studied have spent 14% of their GDP on public procurement (as discussed above), this result suggests that tenders worth over three trillion EUR have been supplied by firms with ownership links to the Netherlands between 2011 and 2017. Tenders worth 494, 242 and 178 billion EUR were supplied by firms linked to Bermuda, the British Virgin Islands and the Cayman Islands (respectively), the three countries that topped the Corporate Tax Haven Index in 2019. All of them offer zero corporate tax rates. In total, countries with a zero statutory corporate income tax rate were involved in the ownership structures of firms that supplied tenders worth over 867 billion EUR.

Figure 2: Share of tenders (by value) supplied to European countries by firms with links to individual foreign countries, top 30 linked countries



Source: Authors.

Notes: Results are based on the full sample of public procurement data with an identified supplier firm, as summarised in Table 2. A supplier firm is defined to be linked to a foreign country if at least one of the mother companies in the supplier firm’s ownership structure is incorporated in a foreign country; see text for details.

The results presented in Figure 2 can be disaggregated by buyer country and we do so for each country in the sample in the Online Country-level Appendix. We find that there is relatively significant heterogeneity across countries in the ownership structure of the supplier firms: understandably, countries that are more important trading partners are more often at the top of this statistic, such as the United States for the United Kingdom or Austria for Germany. These patterns can be easily explained by cultural or geographical proximity and trade relations.

We also observe a heterogeneity in terms of which tax havens are most often found in the ownership structures of firms that supply tenders to different countries. The patterns we find there are often roughly in line with previous research on the importance of individual tax havens for individual countries: for example, Cyprus is the most common country to be found in the ownership structures of Czech suppliers (Ledyeva et al., 2015), while Luxembourg takes top places for most of its geographically neighbouring countries.

In Table 3 we provide a country-level breakdown of the share of tenders (both by the value of tenders and by their number) supplied by firms linked to tax havens that are black- or grey-listed by the EU (as of 5 December 2017). These shares range between two and 17 per cent of all tenders by value. In total, in our sample of 1,256,635 tenders, firms linked to tax havens supplied 63,350 tenders worth around 5.5% of the total value of all tenders. Assuming that our sample is representative of the universe of all tenders, the total value of tenders that are supplied by firms linked to tax havens is around 150 EUR billion annually. Over the time period that we focus on in this paper (i.e. 2011-2017), this value is 1.25 EUR trillion.

It is important to note that this ‘back-of-the-envelope’ estimate is illustrative only. It is likely to be an underestimate for two reasons. First, we only consider vertical ownership links with tax havens – but companies can make use of tax havens even if linked only via their sister companies. Second, by using the EU’s lists, we implicitly do not take into consideration the tax havens that are part of the European Union (such as the Netherlands, Luxembourg and Cyprus, which we mention above). One source of uncertainty to this estimate is that, as we explain above, the sample that we observe in the data might not be fully representative of the universe of all tenders. However, it is currently the best estimate we are able to obtain given data limitations.

Table 3: Tenders supplied by firms linked to tax havens, by country.

Country	Total value of tenders in the sample (EUR bn)	Value of tenders supplied by firms linked to tax havens (EUR bn)	Share of value of tenders supplied by firms linked to tax havens	Total number of tenders in the sample	Number of tenders supplied by firms linked to tax havens	Share of number of tenders supplied by firms linked to tax havens
Austria	8.7	0.2	2.7%	4,997	309	6.2%
Belgium	9.1	0.3	2.9%	6,581	226	3.4%
Croatia	8.4	0.2	2.2%	24,030	1,179	4.9%
Czechia	84.9	5.1	6.0%	124,171	4,679	3.8%
Denmark	59.7	2.0	3.3%	8,545	298	3.5%
Estonia	16.3	0.6	3.7%	41,810	912	2.2%
Finland	6.7	0.3	5.1%	5,662	100	1.8%
France	80.6	3.0	3.8%	56,733	1,706	3.0%
Germany	43.6	1.6	3.7%	44,363	1,713	3.9%
Hungary	19.3	0.7	3.5%	14,828	245	1.7%
Italy	39.6	1.3	3.4%	17,879	1,157	6.5%
Latvia	1.1	0.2	17.1%	3,968	146	3.7%
Lithuania	11.7	0.2	1.7%	18,764	1,414	7.5%
Netherlands	43.2	2.5	5.8%	10,999	635	5.8%
Norway	27.5	0.7	2.4%	9,315	252	2.7%
Poland	49.1	2.9	5.8%	276,538	25,901	9.4%
Portugal	24.7	2.1	8.5%	321,254	15,464	4.8%
Romania	8.9	0.2	2.4%	26,835	145	0.5%

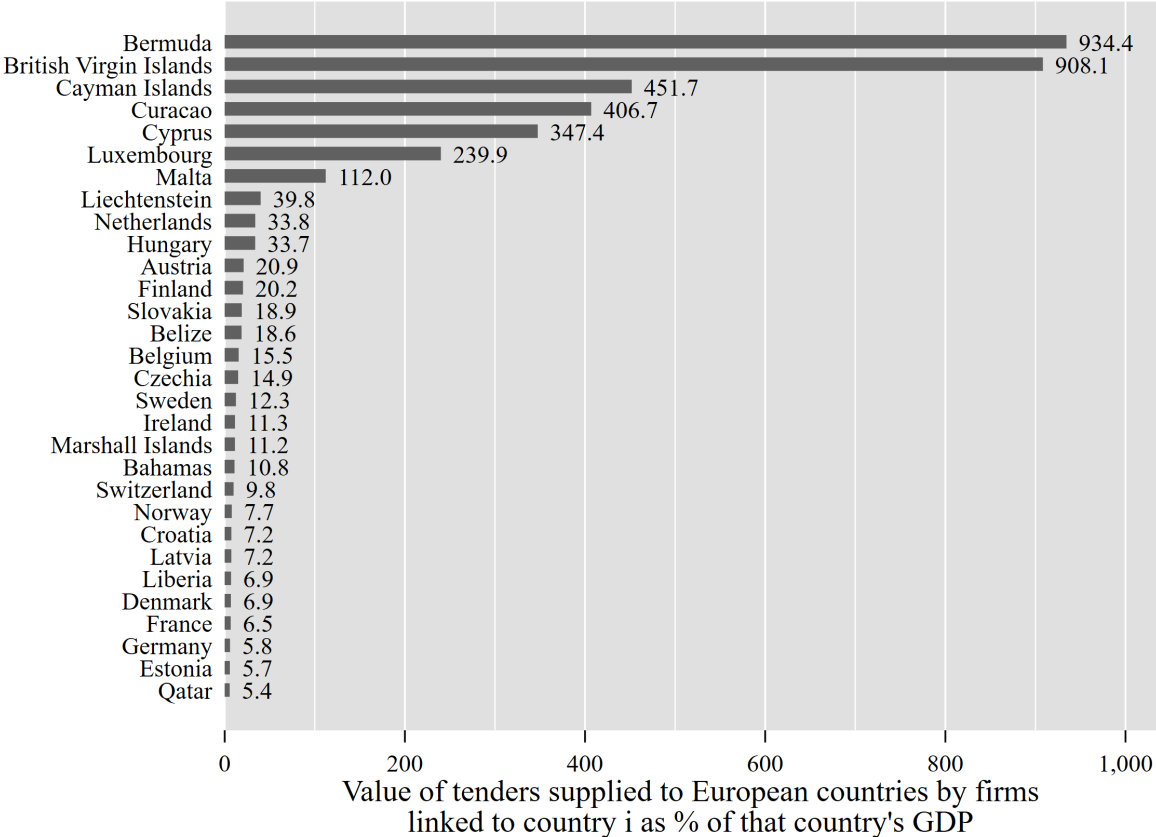
Slovakia	46.5	1.2	2.5%	42,328	605	1.4%
Slovenia	6.8	0.3	5.1%	55,864	1,977	3.5%
Spain	58.4	4.5	7.7%	124,080	3,861	3.1%
Sweden	22.0	0.9	4.0%	7,146	199	2.8%
United Kingdom	81.1	10.7	13.2%	9,945	407	4.1%
Total	758.0	41.6	5.5%	1,256,635	63,530	5.1%

Source: Authors.

Notes: Results are based on the full sample of public procurement data with an identified supplier firm, as summarised in Table 2. A supplier firm is defined to be linked to a tax haven if at least one of the mother companies in the supplier firm's ownership structure is incorporated in that tax haven; see text for details. We define tax havens as countries listed on the EU's black or grey list of non-cooperative jurisdictions as of 5 December 2017.

A comparison of these numbers with the GDP of the respective tax havens offers perspective and makes them comparable across individual tax havens – in Figure 3, we show that some of the most prominent tax havens are often disproportionately present in the ownership structures of firms that supply public procurement in Europe. Indeed, in 2017, firms linked to the British Virgin Islands and Bermuda have supplied tenders worth over 900 per cent of those countries' entire GDP. Other aggressive tax havens, such as the Cayman Islands, Curacao, Cyprus, Luxembourg or Malta, are also found in supplier firms' ownership structures much more often than would be expected based on the size of their economies.

Figure 3: Value of tenders supplied to European countries by firms linked to individual countries, as a share of that country’s GDP, 2017



Source: Authors.

Notes: Results are based on the assumption that European countries spend, on average, 14% of their GDP on public procurement (see text for details). The distribution of supplier firms linked to foreign countries is based on the full sample of public procurement data with an identified supplier firm, as summarised in Table 2.

Similarly, as above, we present the results from Figure 3 at the level of individual countries in the Online Country-level Appendix. The results confirm the importance of Caribbean tax havens as well as Luxembourg in the ownership structure of supplier firms across European countries, while Cyprus and Malta are important mainly in Eastern European countries: for example, in Hungary, we find that the three countries to which suppliers are linked most disproportionately (as compared to the GDP of the tax havens) are Cyprus, Cayman Islands and Malta.

We ran a series of regressions based on Equation (1) and present the results in Table 4 in order to explore more formally which tax havens are the ones that are most disproportionately present in the ownership structures of supplier firms in Europe. We find corporate income tax rates to be good predictors of the success of tax havens in terms of their being present in the ownership structures of a disproportionate amount of firms that supply tenders in Europe. On the limited samples that have Haven Scores and Secrecy Scores available, we again find a strong statistically significant relationship between our dependent variable and the respective indicator of ‘tax havenry’, suggesting that both low

taxation and financial secrecy are attractive for companies as they set up ownership structures in offshore jurisdictions. By contrast, we find that the blacklist and the greylist of tax havens published by the European Commission in December 2017 are not well-aligned with our results in terms of which tax havens are most important for the suppliers of European public procurement. For comparison, in model (7) we include a widely used list of tax havens from UNCTAD (2015) which is strongly correlated with our results on which tax havens are used by supplier firms.

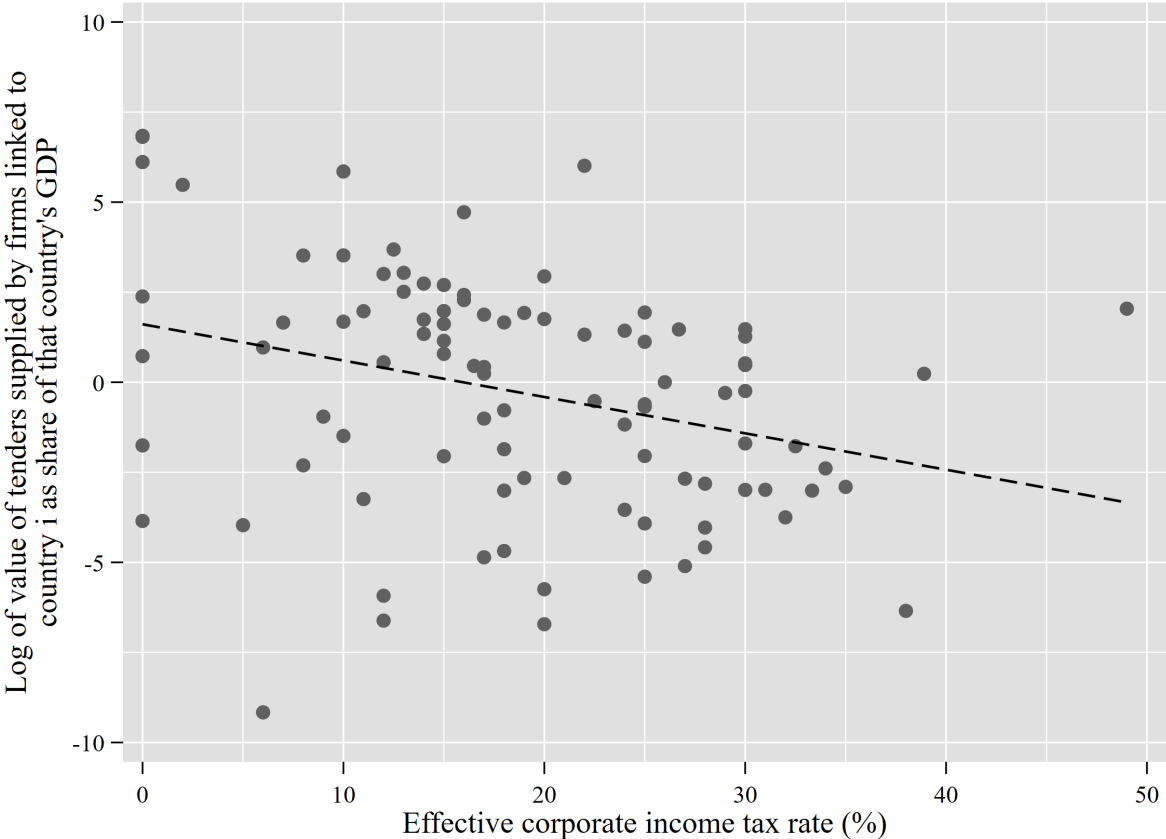
Table 4: Country-level regression results

Dependent variable: log of PP / GDP	(1)	(2)	(3)	(4)	(5)	(6)	(7)
GDP	7.71e-05 (0.00016)	1.06e-05 (0.00016)	8.42e-05 (0.00016)	0.000246 (0.0002)	5.29e-05 (0.00018)	3.28e-05 (0.00017)	9.79e-05 (0.000153)
Population	-0.00037 (0.002)	1.09e-05 (0.002)	-0.00022 (0.002)	-0.0034 (0.003)	-0.00071 (0.0022)	-0.0013 (0.002)	-0.00121 (0.00185)
GDP per capita	0.031*** (0.0110)	0.032*** (0.0108)	0.025** (0.0114)	-8.88e-05 (0.0140)	0.0227* (0.0126)	0.0314*** (0.0111)	0.0207* (0.0106)
Nominal corporate income tax rate	-8.39** (3.81)						
Effective corporate income tax rate (backward-looking)		-8.37** (3.4)					
Effective corporate income tax rate (forward-looking)			-8.63** (3.33)				
Haven Score (CTHI 2019)				0.148*** (0.038)			
Secrecy Score (FSI 2018)					0.104* (0.056)		
Greylist of tax havens (Dec 5, 2017)						0.702 (0.85)	
Blacklist of tax havens (Dec 5, 2017)						-0.445 (1.17)	
List of tax havens (UNCTAD, 2015)							3.201*** (0.865)
Constant	-7.83*** (0.98)	-8.94*** (0.58)	-7.9*** (0.85)	-17.6*** (2.93)	-15.9*** (3.85)	-9.57*** (0.61)	-9.887*** (0.469)
Observations	67	67	67	22	51	71	71
R-squared	0.22	0.24	0.24	0.51	0.17	0.15	0.283

Source: Authors

*Notes: Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.*

Figure 4: Relationship between the value of tenders supplied to European countries by firms linked to individual countries as a share of that country's GDP vs. the country's effective corporate income tax rate, 2017



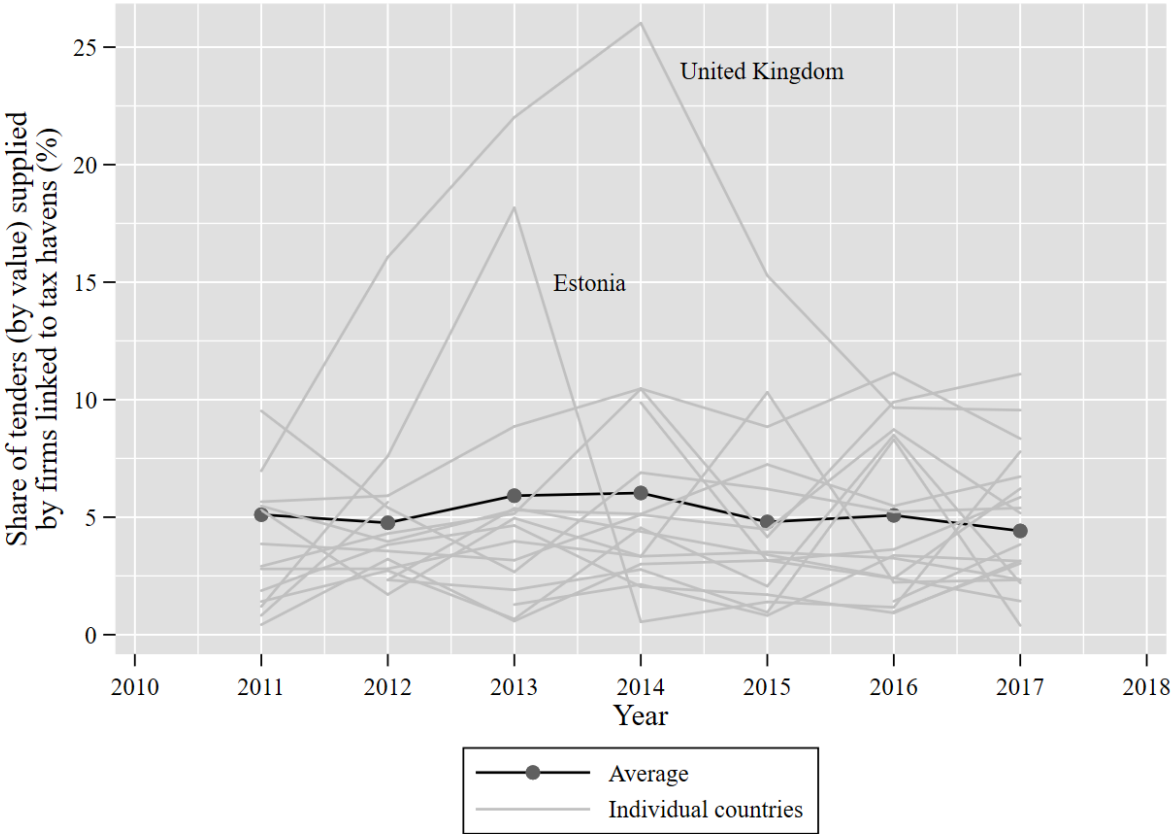
Source: Authors.

Notes: The displayed effective corporate income tax rates are backward-looking rates based on the (Garcia-Bernardo et al., 2021) and, where that is not available, based on nominal rates from various sources (see the Data section for details).

In Figure 4 we display the negative relationship between the logarithm of the value of tenders supplied by firms linked to each non-EU country as a share of that country's GDP and the effective corporate income tax rate. Several jurisdictions are shown to be particularly popular among European public procurement supplier firms and, without exception, they all offer low effective corporate income tax rates, which is consistent with the predictions of our model above.

Next, we turn to analysing the development of the value of tenders supplied by firms linked to tax havens. Figure 5 shows the share of all European tenders in the sample that were supplied by firms linked to one of the countries that appeared on the blacklist or the greylist of the European Commission in the first edition of the lists, which were published in December 2017. We find that around five per cent of European tenders are supplied by companies linked to at least one of these tax havens, which would translate into around 145 billion EUR per year (again assuming that countries spend, on average, 14% of their GDP on public procurement).

Figure 5: Share of tenders (by value) supplied by firms linked to tax havens



Source: Authors.

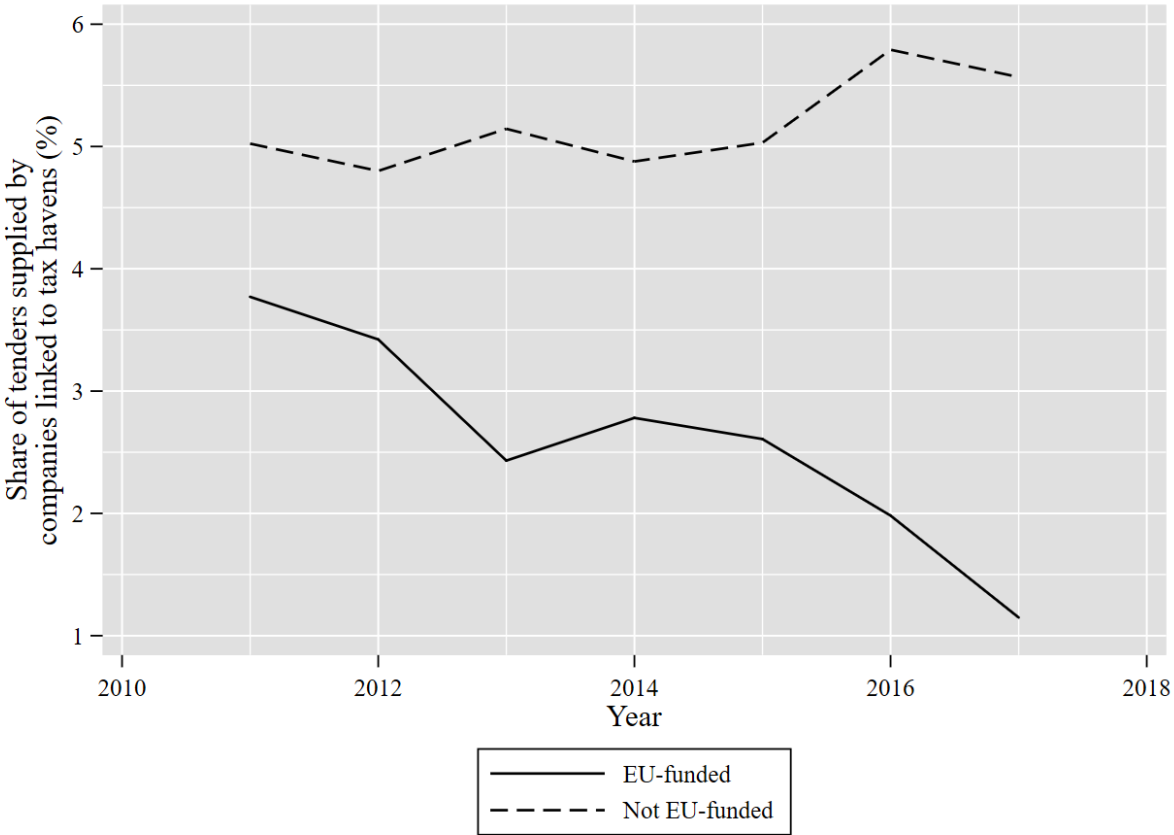
Notes: Tax havens are defined as countries included on the greylist or the blacklist of the European Commission, as published on 5 December 2017. Results are based on the full sample of public procurement data with an identified supplier firm, as summarised in Table 2.

3.2 Which tenders are supplied by firms linked to tax havens?

We now move to the level of individual tenders and ask which tender characteristics are associated with a greater probability that the supplier firm is linked to a tax haven. In particular, we consider two characteristics: whether a tender is co-funded directly by EU funds and the number of bidders.

We find that tenders that are co-funded by the EU are less likely to be supplied by firms linked to tax havens. In Figure 6 we document that the difference between the two groups of tenders is consistent over time. One possible explanation for this finding, which would be in line with the predictions of our model above, is that such tenders are subject to more controls (in the form of reporting requirements, probability of audit, etc.), which increases the cost of using a tax haven.

Figure 6: EU-funded vs. non-EU-funded tenders and the share of these tenders that is supplied by companies linked to tax havens

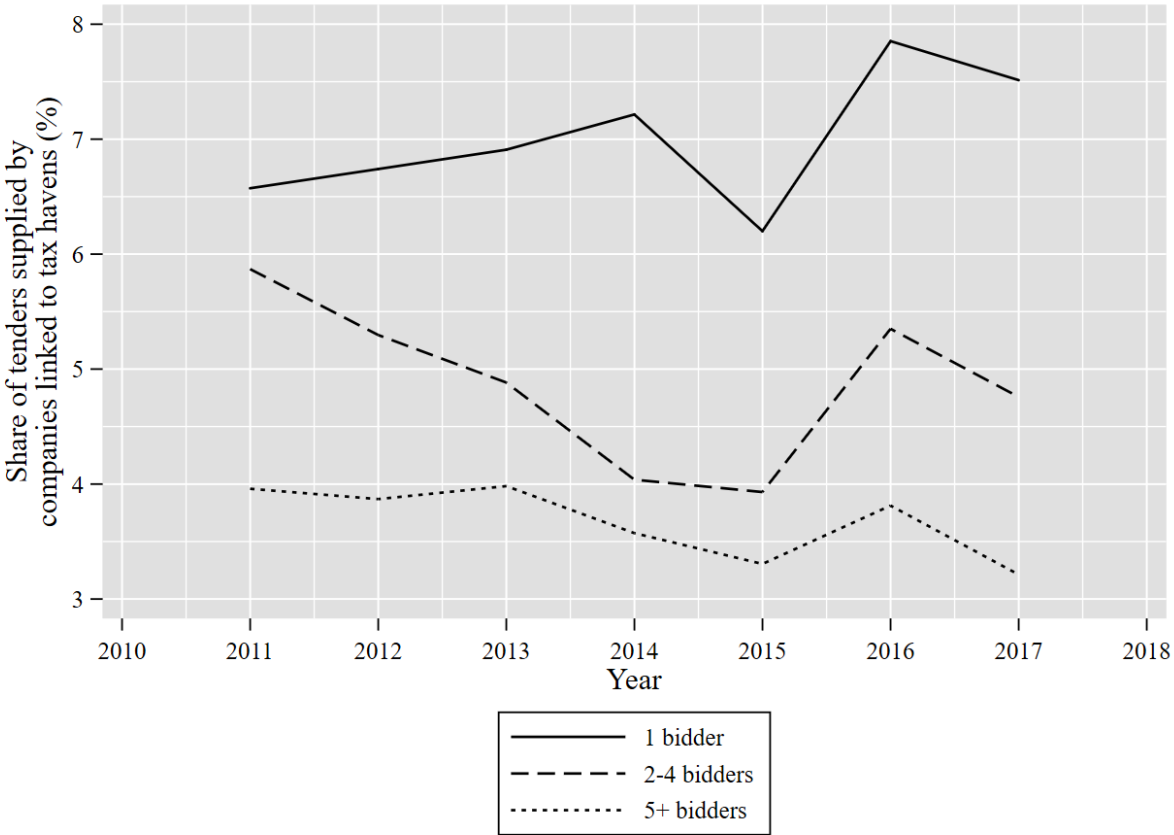


Source: Authors.

Notes: Tax havens are defined as countries included on the greylist or the blacklist of the European Commission, as published on 5 December 2017. Results are based on the full sample of public procurement data with an identified supplier firm, as summarised in Table 2.

Lastly, we assess whether tenders with lower numbers of bidders are more likely to be supplied by firms linked to tax havens. In Figure 7 we split the tenders into three categories according to the number of bidders that competed for the tender (one bidder, two to five bidders and five and more bidders) and we show the development of the share of tenders supplied by companies linked to at least one tax haven listed on the greylist or the blacklist of the European Commission. We observe relatively stable differences between the three groups of tenders over time, with one-bidder tenders being most likely to have a supplier firm linked to a tax haven.

Figure 7: Share of tenders supplied by companies linked to tax havens, tenders divided into three categories by number of bidders



Source: Authors.

Notes: Tax havens are defined as countries included on the greylis t or the blacklis t of the European Commission, as published on 5 December 2017. Results are based on the full sample of public procurement data with an identified supplier firm, as summarised in Table 2.

4 Conclusion

This paper is the first analysis of the role of tax havens in the ownership structures of firms that supply public procurement tenders to European countries and are thus important beneficiaries of EU funds. We use the best available data on European public spending, the OpenTender.eu public procurement dataset, and combine it with the most comprehensive data on firms’ ownership structures, the Orbis database. We are thereby able to track the ownership structures of suppliers of 1,264,957 tenders from 24 European countries in the period from 2011 until 2017, with varying coverage of data across buyer countries.

We estimate that, annually, tenders worth around 150 billion EUR (around 5.5% of all tenders by value) are supplied by firms with ownership links to non-cooperative jurisdictions that are black- and grey-listed by the EU. We find that EU member states exhibit varying levels of exposure to various tax havens and secrecy jurisdictions. Outside the EU, we identified Bermuda, the British Virgin Islands and the Cayman Islands as tax havens with the most disproportionate flows of EU funds to firms

linked to these tax havens via their ownership structures. Within the EU, we report that supplier firms are most disproportionately linked to the Netherlands, Luxembourg and Cyprus, although EU countries are automatically disregarded by the EU lists of tax havens which we use in this paper.

We develop a simple model of supplier choice by contracting authorities where one of the bidding firms is linked to tax havens. We show that, if the contracting authority uses as the selection criterion the cost of the bid net of the corporate tax revenue that it would collect from domestic firms (as compared to tax haven-linked firms), domestic firms would be chosen more often while, with cost of the bid as the sole selection criterion (which is most common in public procurement tenders), suppliers linked to tax havens are chosen disproportionately often. This prediction is in line with our descriptive results at the country level and is confirmed by our analysis at the tender level, in which we find that supplier firms are slightly more likely to be linked to tax havens if the tenders are not directly co-funded from EU funds and that tenders with lower numbers of bidders are more likely to be supplied to tax haven-linked companies.

In terms of policy implications, public procurement is potentially an efficient lever in the fight against tax havens and we highlight two specific policy tools that could improve the situation. First, implementing trustworthy public registers of beneficial ownership: this policy already forms part of the 5th Anti-Money Laundering Directive, but only some of the registers are public for suppliers of public procurement tenders (e.g. Slovakia or Denmark) while other registries are not implemented well, for example, in Poland (Transparent Data, 2020). Second, systematically disadvantaging bids from suppliers linked to tax havens, which has been discussed recently by Tax Haven Free (2014), Ylönen (2016), European Commission (2020) or European Parliament (2021). These two policies aim to mitigate the problem of tax havens by creating a level playing field for all companies that compete for public procurement tenders in the EU. Our third recommendation is to reform the EU lists of non-cooperative jurisdictions, which we view as a potentially useful tool but which currently do not identify the tax havens that are important for firms that receive public money in the EU. Lastly, as we have mentioned in several places in this paper, improved data is crucial in order to gain a better understanding of the role that tax havens play in the ownership structures of beneficiaries of EU funds. Newly available data could be used to more reliably identify the types of EU spending that are more likely to end up as profit shifted to tax havens, which would also allow for more precise policy proposals.

We use, indeed, the best available data, but they are imperfect and so an area for further research would be to check the robustness of our results with respect to the data imperfections (including the data coverage and potential selection bias). A natural and welcome development would be the emergence of even better data than the currently best available data which we use here on both public procurement and company ownership, both ideally in the open data format and with a unique identifier for companies (e.g. the Legal Entity Identifier). Also, the data coverage of our data could be compared

with other, perhaps more aggregate data sources on public procurement (such as European Commission (2017) or OECD (2015)) to determine for what share of all the public procurement there is publicly available information and how much we can actually access. With more reliable information on these shares, we might be able to test the various motivations, if any, of governments to award tenders preferably to domestic companies (e.g. nationalistic, fiscal policy stimulus arguments).

We have so far not exploited the time dimension of the data, but it offers research opportunities for natural experiments, especially for countries with good data coverage. A case in point is the Czech Republic, where, in recent developments, companies bidding for tenders need to disclose their beneficial owners and bearer shares were outlawed (e.g. have the firms previously owned via bearer shares moved to tax havens?). Also, if more public authorities were to provide information on bidders other than the winning ones, it would be possible to ask whether domestic or foreign or tax haven-owned companies are more likely to win tender auctions and whether this probability changes with tender characteristics. Whilst not exploiting the time dimension, our current analysis is also limited by its observational nature and we do not implement any identification strategy that would enable us to proceed with a causal interpretation. However, we believe that our analysis provides first of its kind, albeit indicative, evidence, that can be used for follow-up research in this important area.

A promising area of future applied research would be to develop tools for the public or the government to identify suspicious tenders or suppliers for further audit using detailed open data that is now increasingly available. This could partly build on the so-called zIndex, an indicator published since 2010 for public procurement in the Czech Republic (The Economist, 2011), which could be used by public authorities across countries, but for which no sufficient data are yet available in many other countries. This could also build on the pioneering risk methodology work of Mihaly Fazekas and his co-authors, published in a number of papers such as (Fazekas et al., 2013), which should be critically evaluated and refined if needed and then applied at sectoral, regional and other levels.

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6 Appendix

Table 5: Lists of non-cooperative jurisdictions, as published by the Council of the EU on December 5, 2017.

Blacklist	American Samoa, Bahrain, Barbados, Grenada, Guam, Macao, Marshall Islands, Mongolia, Namibia, Palau, Panama, Samoa, South Korea, St. Lucia, Trinidad and Tobago, Tunisia, United Arab Emirates
Greylist	Albania, Andorra, Armenia, Aruba, Belize, Bermuda, Bosnia and Herzegovina, Botswana, Cape Verde, Cayman Islands, Cook Islands, Curacao, Eswatini, Faroe Islands, Fiji, Greenland, Guernsey, Hong Kong, Isle of Man, Jamaica, Jersey, Jordan, Labuan Island, Liechtenstein, Malaysia, Maldives, Mauritius, Montenegro, Morocco, Nauru, New Caledonia, Niue, North Macedonia, Oman, Peru, Qatar, San Marino, Serbia, Seychelles, St. Vincent and the Grenadines, Switzerland, Taiwan, Thailand, Turkey, Uruguay, Vanuatu, Vietnam

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