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Estimating Bargaining-related Tax Advantages of Multinational Firms*

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Abstract

The effective corporate profit tax rates (ETRs) of multinational enterprises (MNEs) differ from those of national enterprises (NEs). In this paper, we argue that the bargaining power of MNEs is an important factor in explaining these differences beyond profit shifting. First, larger and more profitable firms are more valuable for various reasons (in terms of absolute tax revenues, employment, etc.) for tax authorities. Thus, in threatening to move their operations to other jurisdictions, larger firms may be able to extract greater deductions. This potential bargaining advantage of larger firms may result in a regressive ETR schedule. As MNEs tend to be larger and more profitable than NEs, they may pay lower ETRs for merely size-related reasons. Second, MNEs face arguably lower costs to relocate their business (or profits) to foreign countries with a lower tax rate than NEs. This enhances their bargaining position even further when negotiating tax deductions. To quantify the importance of bargaining in the tax gap between MNEs and NEs, it is elemental to rigorously condition on the determinants of MNE status, profit taxation, as well as possible profit-shifting activities. To that end, we use French firm-level data and entropy balancing of the joint determinants of MNE status (including the possibility of profit shifting) and a firm's ETR. We find that the de-facto regressivity of the French tax schedule reduces French MNEs' ETRs by 2.52 percentage points on average due to their larger size, while the relocation threat of the same firms reduces their ETR by 3.58 percentage points relative to comparable NEs. The former is a tax advantage that any firm (MNE or NE) of the same size could obtain, while the latter is specific to MNEs and beyond the reach of NEs.

Keywords: Profit taxation; Multinational firms; Entropy balancing.

JEL-codes: H25; H26; F23; C21.

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1 Introduction

Multinational enterprises (MNEs) are an integral part of the world economy. They actively engage in innovation, investment, and trade, provide valuable employment and generate extensive profits. This is why many countries run campaigns to lure them into their jurisdictions. However, in the public mind and debate, MNEs are frequently accused of avoiding, if not evading, taxation, thus reducing the tax base of their host countries and causing welfare losses. Individual governments and international organizations – in particular the OECD through its Base Erosion and Profit Shifting (BEPS) initiative – have recently begun to try and limit the undesirable tax avoidance and evasion strategies of firms, primarily of MNEs, in an attempt to limit tax-avoidance-related welfare losses. These internationally coordinated efforts mainly aim at profit shifting activities of MNEs related to transfer pricing, debt shifting, and royalty payments.

The reduction of MNEs' tax bills via profit shifting channels is well documented. However, this paper focuses on a less explored channel: bargaining. In nearly every European country firms are able to bargain with local governments or tax authorities over possible deductions in order to reduce their tax bill. In this bargaining game MNEs are favored relative to firms that only operate domestically, leading to higher tax savings of MNEs. Specifically, we think of the bargaining-related tax gap between MNEs and national enterprises (NEs) as a composite of three ingredients: one non-discriminatory element available to all firms and two discriminatory elements only available to MNEs. The two discriminatory elements relate to MNEs' operations of *foreign* affiliates: (i) foreign affiliates enable profit shifting to low-tax countries (tax avoidance and evasion); and (ii) MNEs are more credibly footloose than NEs which adds to their relative bargaining power for any given firm size and profitability. The non-discriminatory element flows from the de-facto regressivity effective regressiveness of tax schedules due to the greater bargaining power of larger and more profitable firms and leads to increased tax savings for MNEs, solely rooted in their, on average, larger size and greater profitability relative to NEs (see Markusen, 2002; Helpman et al., 2004). These discriminatory and non-discriminatory elements have not been rigorously disentangled in earlier work on the tax gap between MNEs and NEs, which instead largely focused on profit shifting. The goal of the present paper is to fill this gap and, by focusing on bargaining-related aspects of tax savings, disentangle and quantify the discriminatory and non-discriminatory bargaining-related tax savings of MNEs using French firm-level data.

Figure 1 documents the differences in the average ETR (computed as the ratio of annual taxes paid over annual before-tax profits between 2007 and 2012) for three distinct firm types in France as recorded in the Bureau van Dijk's ORBIS data set (see Section 4.1 for details on the firm data): MNEs, multi-entity NEs, and single-entity NEs, where an entity is an independent unit. The figure suggests that MNEs had systematically lower ETRs than both types of NEs on average, and the average ETRs of multi-entity NEs were somewhat lower than those of single-entity NEs. Specifically, the ETR of MNEs is on average 3.42 percentage points lower than that of multi-entity NEs (with a standard error of 0.30). The question is then to which extent this tax gap is an outcome of loopholes in the tax law and accrues to tax avoidance through profit shifting,¹ or is the result of bargaining.

We argue that the tax gap between MNEs and NEs is not primarily based on tax avoidance through profit shifting or (illegal) tax evasion, but on the vast difference in the bargaining power between MNEs and NEs. In this vein, Rego (2003) and Slemrod (2004) provide evidence that tax savings are positively correlated with firms' pre-tax profits, suggesting that the effective tax rate, ETR, declines with pre-tax profits, i.e., the

¹Kopczuk (2006) argues that the complexity of the tax law actually makes tax avoidance more likely.

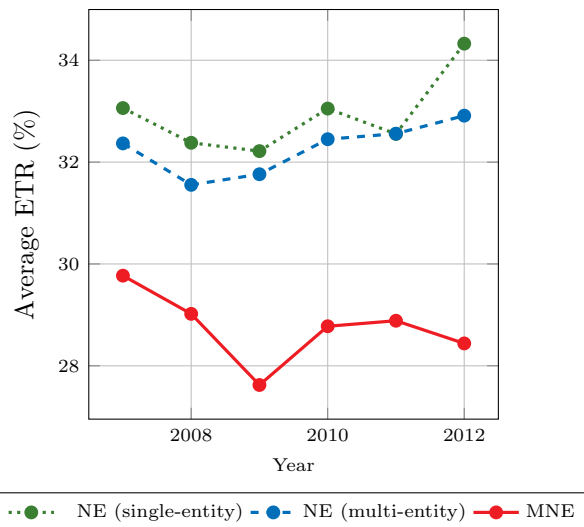


Figure 1: AVERAGE ETR BY FIRM TYPE BETWEEN 2007-2012

ETR schedule of firms is regressive. On the other hand, Egger et al. (2010) show that MNEs have significant tax savings relative to comparable NEs even for a given pre-tax profit level. Consistent with these empirical findings we develop a highly stylized theoretical model that will guide our later estimation. Specifically, the model suggests that firms with higher pre-tax profits are in a better bargaining position and, hence, the observable ETR schedule is regressive. In conjunction with the well-established fact of a greater profitability of MNEs relative to NEs, we are able to identify the non-discriminatory element, which we refer to as the *size effect* on the tax gap between MNEs and NEs. The *footlooseness effect* of MNEs relative to NEs arises from (everything else equal) lower fixed costs to relocate entities into countries with lower tax rates.

The aforementioned decomposition requires comparing MNEs to virtually identical NEs over an array of joint determinants of MNE status and profits. Doing so may be beyond the reach of linear regression and even of unconstrained, nonparametric econometric models, such as simple propensity score matching. This is because such unconstrained models do not ensure that the tax gap is computed from sets of treated (MNE) and control (NE) firms whose characteristics are *distributed* identically. To overcome this problem, we apply entropy balancing, as suggested by Hainmueller (2012) and Hainmueller and Xu (2013), that permits an estimation of the causal effects of MNE status on ETRs through bargaining, conditional on profit-shifting-related tax avoidance and other attributes. To the best of our knowledge, this approach has not been previously applied in the context of self-selection into MNE status. The present paper employs this framework since the array of determinants of MNE status and firms' (including MNEs') tax payments are largely overlapping if not the same and they are observable. Further, as we will see, the distributions of the respective observables vary largely between MNEs and NEs so that conditioning on a compact function of them (e.g., a linear index or a nonlinear index such as the propensity score of MNE status) does not balance these moments as would be required for an identification of the (causal) average treatment effect of MNE status on profit tax payments in such frameworks.

France, despite its recent crackdowns and raids on suspected (most recently on the tax structures of Amazon, Apple, Google, and other well-known MNEs, see Brinded, 2013), tax-avoiding and tax-evading MNEs and notwithstanding its reputation for difficult tax negotiations, is a prime example for such an analysis. Like

a majority of European countries, the French tax authorities offer advance tax rulings, essentially allowing firms to negotiate their tax deductions before the first Euro is earned (see Van de Velde, 2015 for an extensive overview of tax rulings within Europe). Huesecken and Overesch (2015) show that these advanced rulings lead to significantly lower ETRs. While few of these rulings become public knowledge, there are several suspected cases (e.g., Amazon opened distribution centers in France, adding valuable jobs to the economy and revenue to state coffers after prolonged negotiations with the government, see *Le Monde*, 2012; Google opened its Paris office after a big push by the Sarkozy government, see *Le Monde*, 2010) and a handful of disclosed cases (e.g., Vivendi Universal SA, a mass media conglomerate headquartered in France, was permitted to offset the profits from its semi-owned subsidiaries with losses incurred in 2002, significantly reducing Vivendi’s tax bill, see *ITRWeek*, 2004).

The results presented below suggest that, on average and after profit shifting, French MNEs earn 1.53 million more in pre-tax profits than NEs, which, in conjunction with the generally regressive tax schedule, translates into an average reduction of an MNE’s ETR by 2.52 percentage points relative to an NE.² The direct, bargaining-related effect of being an MNE on the ETR due to MNEs’ greater mobility, controlling for pre-tax profits, amounts to a 3.58 percentage-point reduction of the ETR on average. Thus, on average, MNE status reduces the ETR by 6.1 percentage points, conditional on (i.e., after) profit shifting. This effect is mainly driven by firms in the highest quintile of the pre-tax profit distribution. In fact, an MNE’s status significantly increases pre-tax profits and dramatically reduces the ETR relative to NEs in France only for firms in the top quintile.

The remainder of the paper is structured as follows. Section 2 discusses the related literature. Section 3 outlines a stylized model of bargaining over a representative firm’s tax deductions. Section 4 describes the data and the estimation strategy and presents empirical results. Finally, Section 5 concludes with a brief summary of the main findings.

2 Related literature

2.1 Sources of MNEs’ tax savings

The public finance literature largely places the difference in ETRs between MNEs and NEs at the door of profit shifting (see Huizinga and Laeven, 2008; Schindler and Schjelderup, 2013) and its channels through which MNEs reduce their corporate tax payments, namely transfer pricing (see Davies et al., 2014), debt shifting (see Egger et al., 2014), and royalty payments (see Karkinsky and Riedel, 2012; Griffith et al., 2014 among others). We take these profit channels into consideration by controlling for observables that capture these channels, namely cross-border trading, debt, and intangible asset holdings. Konrad and Stolper (2016) show under which conditions the tax havens opposed by the OCED and G20 are able to exist, which makes the aforementioned profits shifting methods possible. However, while interesting in itself, profit shifting is not the focus of the present paper, as it has been for long and still is at the heart of interest in the sizable literature on tax avoidance.

²While the statutory tax rate on corporate profits is not regressive in France, French tax law does provide for numerous deductions and allowances that are related to firm size resulting in a de-facto regressive ETR absent of any bargaining or profit shifting activities.

One strand of earlier work addresses aspects of tax savings that are related to firm size. For instance, Grubert and Slemrod (1998), Rego (2003), Slemrod (2004), and Habu (2017) argue that economies of scale make it more profitable for MNEs to seek out loop holes in the tax code to reduce their ETRs. Alternatively, Richter et al. (2009) find that increased lobbying expenditures lead to lowered ETRs in a panel of U.S. firms. These arguments suggest that the large size of MNEs matters for the affordability of some fixed costs – associated with tax planning or lobbying. Along this line of thinking, there have been analyses of negotiation- and lobbying-related tax savings of MNEs relative to NEs. The results in Boehm et al. (2016) regarding the tax setting in German municipalities suggest that a larger business tax base (i.e., many or large firms present in a particular location) and a high concentration of firms are associated with lower business tax rates at the regional level. A further reason for the profit tax savings of MNEs relates to their greater credibility of threatening footlooseness than is the case with NEs. Vandebussche and Tan (2005) explore the differences in ETRs between Belgian MNEs and NEs. Their findings suggest that MNEs have better outside options than NEs, which leads to more bargaining power and lower taxes relative to NEs. Hueseken and Overesch (2015) show that advanced tax rulings (which are tailor-made for MNEs) significantly decrease the ETRs of MNEs relative to NEs. As such, advanced tax rulings are essentially a non-statutory instrument of tax competition, which itself has been well studied (see Devereux et al., 2002; Hines, 1999 among others), given the importance of MNEs in the global economy. All of these results suggest that larger firms – in particular, larger MNEs – benefit from their size and economic power in terms of reduced ETRs.

Overall, while there is much documentation of the effective tax savings of MNEs, their magnitude is heavily debated and may depend on the setting and respective tax authorities. For instance, the results in Egger et al. (2010) suggest that, among European firms, the absolute tax payments of MNEs are lower than those of comparable NEs, while the results in Dyreng et al. (2017) suggest that U.S. MNEs indeed face a higher ETR than U.S. NEs.

2.2 Econometric approach towards estimating the tax savings effect of being an MNE

In quantifying the effect of the previously noted tax competition on MNE performance, on foreign direct investment, and location choice, previous work such as Hines (1999), Gresik (2001), and Devereux and Maffini (2007) relied on panel data to compare firms or aggregate outcomes just prior to and just after a tax or law change and across locations (e.g. Dharmapala and Riedel, 2013). Alternatively, other work compared the outcomes of MNEs and NEs within a given location (see Jog and Tang, 2001; Buettner et al., 2009; Egger et al., 2010).

In either case, the prevailing framework is based on a selection on (location- and/or firm-level) observables and either a linear (see Becker and Riedel, 2012) or nonlinear and eventually nonparametric (see Egger et al., 2010) index of comparability in regression frameworks. Either econometric approach rests on the idea that, upon conditioning on the (linear or nonlinear) index of observables, any further difference between MNEs and NEs in terms of their (normalized or unnormalized) profit tax payments accrues to a quasi-random assignment of the MNE-versus-NE status. However, for this to hold, either approach requires that the distribution of observables behind the index is the same among MNEs (the treated) and NEs (the controls). Otherwise, some of the differences in profit-tax outcomes that in fact accrue to differences in the distribution of observable joint determinants of MNE status and tax outcome may be misascribed to MNE status only,

which may in turn lead to biased estimates of the average treatment effect of being an MNE on tax outcomes. Econometrically, one would generically refer to such a case as one of a *lack of covariate balancing*.

One approach to overcome this lack of covariate balancing in a selection-on-observables framework has been proposed by Hainmueller (2012) and Hainmueller and Xu (2013). Rather than assuming such balancing (as in regression approaches or propensity score matching) and testing against it ex post, Hainmueller’s entropy balancing enforces covariate balancing in a constrained, nonlinear estimation approach. In a first step, weights are obtained for each targeted moment of the observables when considering treated and control (in our case, MNE and NE, respectively) observations subject to balancing constraints. In a second step, these weights are used in a weighting regression approach, where the outcome is regressed on the treatment indicator (here, MNE status) to estimate the average treatment effect on outcome. Notice that linear regression, propensity score matching, and other approaches based on the idea of selection on observables can be portrayed as special cases of weighting regression approaches towards the estimation of average treatment effects on outcome (see Wooldridge, 2007).

3 A stylized model of tax bargaining

We are interested in isolating the advantages of being an MNE above and beyond the effects of profit shifting. In spite of being at odds with many supranational agreements and the desire for policy transparency, there is evidence and documentation of numerous violations of the principal of an equal treatment of firms by national tax authorities. In this section we develop a stylized theoretical model that will be used to inform our estimation. We assume that firms are able to directly negotiate their possible tax deductions and by this ETRs. For simplicity, we do not differentiate between negotiations over the fraction of profits that is subject to the domestic tax from those over the ETR, as the outcome would be isomorphic.³

Formally, we assume that national tax authorities and a generic firm i bargain over the firm’s deductions from its tax base, D_i , taking the statutory tax rate, τ , as given. Firm i ’s net profits are then determined as

$$\pi_i^n = (1 - \tau)\pi_i + \tau D_i, \quad (1)$$

where π_i are pre-tax profits. The government’s tax revenues per firm, T_i , are then

$$T_i = \tau(\pi_i - D_i). \quad (2)$$

The firm and the government engage in Nash bargaining over the amount of deductions, D_i , where $\alpha \in [0, 1]$ is the bargaining power of the government and $(1 - \alpha)$ is the bargaining power of the firm. Let us denote the outside option of the firm, i.e., the cost of relocating firm i ’s operations to a foreign country with tax rate τ' , by $(1 - \tau')\pi_i - F_i$. For simplicity, we assume that the foreign country is passive; thus, before-tax profits would be the same as at the outset after relocating and τ' will be the firm’s marginal tax rate abroad.⁴ Relocating would come at a fixed cost, F_i , which we assume to depend on the firm’s MNE status. Since MNEs have already established subsidiaries abroad, we assume that MNEs’ fixed costs of relocating their

³In France and elsewhere, MNEs can negotiate the portion of their profits which will be subject to domestic taxes (see Bergin, 2012).

⁴While we do not use a firm index with τ' , we could do so. For simplicity, we assume that the firm cannot simultaneously negotiate with two countries.

operations are significantly lower than those of NEs, $F_{MNE} < F_{NE}$. By this token, the threat point of an MNE is, ceteris paribus, higher than that of an NE, raising its bargaining power.

The solution to the Nash bargaining problem is then

$$D_i^* = \underset{D_i}{\operatorname{argmax}} [(\tau(\pi_i - D_i))^\alpha ((1 - \tau)\pi_i + \tau D_i - (1 - \tau')\pi_i + F_i)^{1-\alpha}], \quad (3)$$

which, under the present assumptions, simplifies to

$$D_i^* = \left(1 - \alpha \frac{\tau'}{\tau}\right) \pi_i - \frac{\alpha}{\tau} F_i. \quad (4)$$

Firm i 's effective tax rate in the domestic country (where it is bargaining with tax authorities) is thus given by

$$\operatorname{ETR}_i = \frac{\tau(\pi_i - D_i^*)}{\pi_i} = \alpha \left(\tau' + \frac{F_i}{\pi_i}\right). \quad (5)$$

Obviously, the ETR increases with the bargaining power of the government, α , and the foreign tax rate, τ' . The ETR decreases with pre-tax profits, π_i , and is therefore regressive. This regressivity arises from the opportunity costs of the government. As pre-tax profits rise, domestic tax revenues increase, while the outside option – no tax revenues from firm i at all – becomes increasingly unattractive. Thus, the government is willing to grant more tax deductions to a highly profitable firm in order to ensure that it does not relocate. On the other hand, the ETR also increases with the fixed costs of relocating, F_i , as higher fixed costs reduce a firm's ability to credibly threaten relocation and the government is able to negotiate lower deductions.

We therefore posit the following:

Proposition: (i) The effective profit tax schedule of firms is downward sloping with their pre-tax profits, i.e., the ETR is regressive. (ii) The ETR increases with the fixed costs of relocating. If $F_{MNE} < F_{NE}$, MNEs face lower ETRs than NEs with the same level of pre-tax profits in equilibrium. (iii) The ETR increases with the foreign (effective) tax rate. (iv) The ETR is less regressive when the fixed costs of relocation are higher. Proof is in Appendix A.

The effect in (iv) can be obtained by taking the cross-derivative of equation (5) with respect to profits, π_i , and fixed costs, F_i . Graphically speaking, the ETR schedules of MNEs and NEs are both downward sloping. However, with $F_{MNE} < F_{NE}$, the ETR schedule of NEs is above the one of MNEs, but NEs' ETR slope is steeper (more negative). While the downward sloping ETR schedule is due to the size effect and is thereby independent of MNE status, the difference in slope and intercept of the ETR schedule can be explained by the greater footlooseness of MNEs.

4 Empirical analysis

This section is devoted to assessing and quantifying some of the core insights from the stylized model above based on firm-level data. We do so in two parts. First, we demonstrate that some of the key model predictions are consistent with simple correlations found in the data. Second, we establish a causal relationship between MNE status and the effects of size and footlooseness on MNEs' ETRs, above and beyond the effects of profit shifting.

The stylized model does not include profit shifting activities or illegal tax evasion (to the extent that pre-tax profits do not depend on statutory tax rates and deductions). Hence, any gap in ETRs between MNEs and NEs is assumed to solely accrue to bargaining between tax authorities and firms. This is not generally the case in the data. Hence, in the empirical framework we must control for profit shifting activities, such as debt shifting, royalty payments, and transfer pricing, in order to not misattribute the difference in ETRs between MNEs and NEs to bargaining. Only the residual or conditional difference in ETRs (above and beyond profit shifting) between MNEs and NEs can and will be attributed to the bargaining of high-profit firms relative to low-profit firms in general and of mobile MNEs relative to less mobile NEs in particular. We will demonstrate later that the remaining difference is not due to evasion but to firm size independent of MNE status and the greater footlooseness of MNEs relative to identical NEs given their declared profits.

In what follows, it is useful to distinguish between an *entity* – i.e., an independent unit of operation within a firm (such as an affiliate or the headquarters) – and a *firm*. The latter is the conglomerate of all affiliates and the headquarters, while the former is an individual component of that very conglomerate.

4.1 Data description

Data that would permit an assessment of bargaining above and beyond profit shifting on MNEs’ relative to NEs’ ETRs must contain information on firms’ MNE status, profits, tax payments, and observable variables that capture profit shifting (such as information on debt levels, trade activities, and intangibles). Large collections of firm- (or, better, entity-) level data such as Bureau van Dijk’s ORBIS database provide these ingredients for a limited set of countries – foremost France, parts of south-eastern Europe, and China. Of those countries, France is a prime candidate: it hosts and headquarters a large number of MNEs and NEs, it levies relatively high profit tax rates, and its economic and political institutions are representative of an industrial economy, including the use of advance tax rulings. We therefore extract the relevant information on French NEs, French MNEs with entities abroad (foreign affiliates), and foreign MNEs with affiliates in France between the years 2007 and 2012. For the sake of better comparability of NEs with MNEs in the sample, we only include NEs with at least two entities. Every firm in the estimation sample is thus a multi-entity enterprise.⁵ We define MNEs as having at least one affiliated entity in a country other than where they are headquartered (France or abroad) in which they hold an ownership share of more than 50%.

We only use firms with unconsolidated accounts, which allows us to calculate firms’ local tax payments and their respective ETRs. We compute the ETR from the ratio of total local tax payments over local pre-tax profits. We clean the data by deleting firms with abnormal returns, negative revenues, and data errors showing excessive ETRs outside the interval of [0%, 100%]. Moreover, we restrict the sample to firms with (i) tax payments of at least €763,000 and (ii) operating revenues that do not exceed €250 million. The first restriction ensures that all firms in the sample are subject to the 3.3% social contribution surtax, while the second restriction ensures that firms in the sample are not subject to the 10.7% surtax added after 2011. The applicable statutory tax rate between 2007 and 2012 is thus 34.43% for all firms in the data.

Imposing these restrictions yields a sample of 2,390 entities (4,661 entity-year observations) located in France. 632 of these entities (1,415, or 30.36% of the entity-year observations) are MNEs. Table 1 reports the composition of the sample and Table 2 summarizes the entities’ observable characteristics. Of the 632 MNE entities in France, 289 are the French subsidiaries of foreign owners, 273 are the French owners of foreign

⁵The results below, however, are insensitive to the inclusion of single-entity NEs.

Table 1: ENTITIES IN FRANCE BY TYPE

	Entities	Obs	Percent
Domestic multi-entity	1,758	3,246	69.64
Multinational	632	1,415	30.36
Total	2,390	4,661	

subsidiaries, and 70 are foreign-owned French subsidiaries which themselves own foreign subsidiaries. For this last category of entities, the host country of the foreign owner of the French entity always charges a higher tax rate than the lowest-tax host country of the foreign subsidiary of the same French entity.

Table 2: SUMMARY STATISTICS

Variable	Firm-year obs.	Mean	Std. dev.	Minimum	Maximum
ETR (%)	4,661	31.29	9.64	1.19	99.97
Profit pre-tax (€mn.)	4,661	8.27	9.13	0.88	102.67
Profit post-tax (€mn.)	4,661	5.73	7.29	0.00	76.13
Tax payments (€mn.)	4,661	2.26	2.37	0.76	26.54
Revenue (€mn.)	4,661	75.53	55.96	0.26	249.52
Productivity	4,661	0.77	1.10	0.04	59.00
Workers	4,661	248.12	711.68	1	43,300
Labor costs (€mn.)	4,661	12.64	13.55	0.03	134.28
Capital (€mn.)	4,661	8.35	27.23	0.00	793.08
Debt (€mn.)	4,661	3.09	16.16	0.00	400.18
Export revenue (€mn.)	4,661	20.23	33.29	0.00	272.40
Intangibles (€mn.)	4,661	4.30	17.61	0.00	395.62
Variable	Country-year obs.	Mean	Std. dev.	Minimum	Maximum
Foreign STR (statutory tax rate, %)	307	25.71	7.59	0.00	42.00
Foreign EATR (%)	307	24.15	7.18	0.00	38.73
Foreign population ('000s)	307	89,300	245,000	311.57	1,350,000
Foreign GDP per capita (constant USD)	307	22,893.48	15,320.27	744.42	74,021.46

Foreign affiliate or owner hosts: Angola, Australia, Austria, Belgium, Bosnia and Herzegovina, Brazil, Bulgaria, Cameroon, Canada, Chile, China, Colombia, Congo, Cote d'Ivoire, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, Gabon, Germany, Ghana, Greece, Guinea, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, Latvia, Lithuania, Luxembourg, Madagascar, Malaysia, Mauritius, Mexico, Morocco, Mozambique, Netherlands, New Zealand, Norway, Panama, Peru, Poland, Portugal, Qatar, Russian Federation, Saudi Arabia, Senegal, Serbia, Singapore, Slovakia, South Africa, South Korea, Spain, Sweden, Switzerland, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Venezuela, and Viet Nam.

The upper part of Table 2 summarizes the entity-level variables pertaining to all sample entities located in France. According to the table, the average ETR is 31.29% for all entities in the sample.

We use the procedure in Levinsohn and Petrin (2003) and Petrin et al. (2004) to estimate firm-level productivity in order to control for the correlation between unobservable productivity shocks and input levels. We estimate a log-linear production function of the following form

$$y_{it} = \varsigma_0 + \varsigma_l l_{it} + \varsigma_k k_{it} + \varsigma_m m_{it} + \chi_{it} + o_{it}, \quad (6)$$

where y_{it} , l_{it} , k_{it} , and m_{it} are the firm's gross revenues, employed labor, capital, and material costs of firm i at time t in logs, respectively. The remainder term consists of a transmitted productivity term $\chi_{it} = \chi_{it}(k_{it}, m_{it})$ that follows a first-order Markov process (known to the firm) and a term that is uncorrelated with the input choice, o_{it} . Using the interaction of capital and material costs as a proxy for the unobservable productivity term allows to identify the productivity level. Note that total revenues and productivity using the procedure

of Levinsohn and Petrin (2003) and Petrin et al. (2004) shown in Table 2 are very dispersed, indicating a large degree of heterogeneity in size as well as productivity across the firms in our sample.⁶

In the lower part of Table 2, we present statistics on the statutory foreign corporate tax rate,⁷ the effective average foreign corporate tax rate (EATR),⁸ and foreign country-size measures of population and real per-capita income from the World Bank’s World Development Indicators for those foreign countries in which the French entities in the sample either have affiliates or owners. Overall, the aforementioned 1,415 entity-year MNE observations are nested in 307 country-year observations involving 72 countries. In the case of multiple foreign affiliates (entities) per firm, we use country-level data for the lowest-taxing foreign location.

4.2 Stylized correlations

The stylized model in Section 3 predicts corporate tax systems to be regressive, whereby firms with higher profits face lower ETRs, irrespective of the entity type. In order to gain preliminary insights into this relationship, we estimate a simple regression of ETR as the dependent variable on log pre-tax profits, $\ln(\pi_{it})$, log pre-tax profits squared, $\ln(\pi_{it})^2$, and cubic log pre-tax profits, $\ln(\pi_{it})^3$, for all 4,661 entity-year observations as well as for observations pertaining to NEs and MNEs separately. Specifically we estimate:

$$\text{ETR}_{it} = \sum_{z=1}^3 \gamma_z \ln(\pi_{it})^z + \kappa + \Xi_{it} + \eta_{it}, \quad (7)$$

where ETR_{it} is the effective tax rate of an entity i located in France at time t , κ is a constant, γ_z are regression parameters of interest, Ξ_{it} is a collection of year and firm fixed effects at time t , and η_{it} is an error term. The parameter estimates can be found in Table 3. Most importantly, the associated predictions are plotted in Figure 2, the inspection of which is key as log before-tax profits enter cubically in the econometric model.

Table 3: ESTIMATION OF THE REGRESSIVITY OF THE FRENCH ETR SCHEDULE

	All obs.	NE obs.	MNE obs.
ln(Pre-tax profits), $\ln(\pi_{it})$ (γ_1)	-62.64*** (3.64)	-65.45*** (4.17)	-63.28*** (7.11)
Squared ln(Pre-tax profits), $\ln(\pi_{it})^2$ (γ_2)	27.34*** (1.96)	30.08*** (2.32)	24.42*** (3.70)
Cubic ln(Pre-tax profits), $\ln(\pi_{it})^3$ (γ_3)	-3.97*** (0.33)	-4.44*** (0.40)	-3.26*** (0.59)
Constant	71.99*** (3.70)	83.27*** (5.28)	76.26*** (5.58)
R^2	0.80	0.85	0.78
Obs.	4,661	3,246	1,415

Pre-tax profits in €mn. Year and firm fixed effects. Standard errors in parentheses. ***, **, and * indicate levels of statistical significance at 1, 5, and 10 percent, respectively.

⁶For robustness, we repeat the analysis using (i) a Solow-residual-type total factor productivity and (ii) estimates based on the procedure of Olley and Pakes (1996). The presentation of these results is relegated to Appendices B and C. However, the main findings are not sensitive to the choice of productivity estimation.

⁷The data are collected from publications by Ernst&Young, PricewaterhouseCoopers, and country-specific sources.

⁸In contrast to statutory rates, EATRs account for deductions, etc. The respective data are taken from Boesenberg and Egger (2016) and Boesenberg et al. (2017).

According to Table 3 and Figure 2, the estimation results suggest the following insights. First, entities with lower log pre-tax profits face a higher ETR than entities with higher pre-tax profits – i.e., the applied ETR is generally regressive for both types of firms. Second, the MNEs’ ETR schedule is situated below the one for NEs. Third, the ETR schedule of NEs has a steeper slope, i.e., is more regressive.⁹ The (unconditional) results from this simple empirical exercise are in line with the hypotheses of the stylized model summarized by the proposition in Section 3.

Moreover, we can use Figure 2 to visualize the two bargaining effects of being an MNE on the ETR. A movement along the NEs’ ETR schedule (from point A to B) corresponds to the size effect, higher profits due to the MNE status translate to a lower ETR given the regressivity of the ETR schedule. Switching from the NEs’ ETR schedule to the MNEs’ ETR schedule (from point B to C) gives us the footlooseness effect of being an MNE. The move from point A to C is the overall effect, which can be decomposed into the size and footlooseness effect.

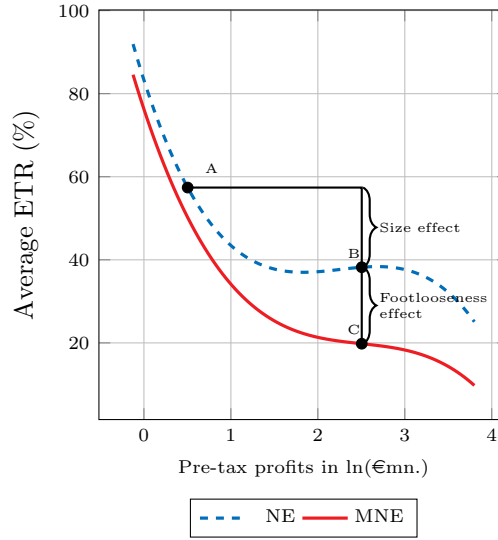


Figure 2: PREDICTED ETR

Next, we focus on a theory-guided estimation of the determinants of the ETR based on equation (5). Specifically we emphasize the role of fixed costs, F_i . In doing so, we focus entirely on MNEs – either ones whose parent firms are located in France or ones whose parent firms are located abroad with at least one affiliate in France. Following the aforementioned proposition, the ETR of a French entity should increase with the foreign (effective) tax rate, according to equation (5), at any level of fixed costs of relocating. In addressing the role of foreign (effective) profit tax rates on the ETR, we amend the specification in equation (7) by including the foreign statutory and, alternatively, effective average tax rates of affiliates of French entities abroad. For these tax rates we use the lowest tax rate within the network of each MNE and we

⁹The slope of the NE’s ETR schedule is always steeper (more negative) than for MNEs at a given pre-tax income, i.e.,

$$-65.45 \frac{1}{\pi} + 60.16 \ln(\pi) \frac{1}{\pi} - 13.32 \ln(\pi)^2 \frac{1}{\pi} < -63.28 \frac{1}{\pi} + 48.84 \ln(\pi) \frac{1}{\pi} - 9.78 \ln(\pi)^2 \frac{1}{\pi} \quad \forall \pi \in [-0.12, 4.6].$$

estimate the following equation:

$$ETR_{it} = \sum_{z=1}^3 \beta_z \ln(\pi_{it})^z + \varphi \tau'_{it} + \Gamma_{it} + \epsilon_{it}, \quad (8)$$

where ETR_{it} is the effective tax rate of a French entity i at time t , and π_{it} are the log pre-tax profits of this entity. τ'_{it} is, depending on the specification, the statutory tax rate (STR) or the effective average tax rate (EATR) of the lowest-tax country in i 's network at time t , Γ_{it} contains a collection of fixed effects in the dimension of years, foreign-lowest-tax-country in i 's MNE network at time t , and the main sector affiliation of i at time t , and ϵ_{it} is an error term.

In the estimation, we restrict our sample to MNEs, where the foreign (effective) tax rate is observable. We also distinguish between foreign-owned entities (designated foreign parents), which includes all foreign-owned entities in France, irrespective of whether they themselves hold foreign entities or not, and foreign-affiliate-owning French entities (designated French parents), which includes all French entities that own affiliates abroad, irrespective of whether the French entities are headquarters or are themselves foreign-owned. Hence, there is some small overlap in the samples.¹⁰ Overall, we suspect that the relocation costs of a headquarters are higher than those of an affiliated firm with the headquarters abroad. Thus, the ETR schedule should be more regressive for the former, while for both subgroups, a higher foreign statutory or effective tax rate would increase an MNE entity's ETR in France.

Table 4: REGRESSION RESULTS: EFFECT OF FOREIGN TAXES ON FIRM'S ETR BY OWNERSHIP STRUCTURE

	All MNEs		Foreign parents		French parents	
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(\text{Pre-tax profits}), \ln(\pi_{it})$ (β_1)	-53.44*** (7.82)	-54.87*** (7.86)	-57.62*** (11.10)	-57.59*** (11.08)	-40.66*** (7.84)	-42.57*** (7.99)
$\ln(\text{Pre-tax profits}), \ln(\pi_{it})^2$ (β_2)	20.97*** (3.66)	21.77*** (3.70)	23.09*** (5.33)	23.07*** (5.32)	14.64*** (3.78)	15.64*** (3.87)
$\ln(\text{Pre-tax profits}), \ln(\pi_{it})^3$ (β_3)	-2.68*** (0.53)	-2.81*** (0.54)	-2.96*** (0.80)	-2.96*** (0.80)	-1.78*** (0.56)	-1.93*** (0.57)
Foreign STR' (φ)	0.23 (0.17)		0.30* (0.16)		0.08 (0.23)	
Foreign EATR' (φ)		0.32** (0.16)		0.30** (0.15)		0.14 (0.22)
R^2	0.30	0.32	0.31	0.31	0.30	0.32
Obs.	1,415	1,415	612	612	985	985

Only those foreign markets with an affiliate with the lowest STR' or EATR' considered. The sample for foreign headquarters uses French MNE units which are headquartered abroad, irrespective of whether they hold foreign affiliates themselves or not. The sample for French parents uses French MNE units which hold affiliates abroad, irrespective of whether they themselves are headquartered in France or abroad. Hence, there is some overlap between these samples. Standard errors in parentheses clustered at firm level. We suppress estimates of the lowest-tax-country-in- i 's-network, time-, and sector-fixed effects. ***, **, and * indicate levels of statistical significance at 1, 5, and 10 percent, respectively.

Table 4 summarizes the key regression results corresponding to equation (8). Columns (1) and (2) present the results for all MNE entities located in France in our sample. Considering the distribution of $\ln(\pi_{it})$ in conjunction with the coefficient estimates ($\hat{\beta}_z$), higher pre-tax profits reduce a firm's ETR as before, which squares with the insights of the theoretical model discussed above. Notice that the estimates $\hat{\beta}_z$ are not statistically different from their counterparts $\hat{\gamma}_z$ in Table 3. A higher foreign tax rate is expected to raise

¹⁰For that reason, the observation numbers in Columns (3) and (5) add to slightly more than the one in Column (1) of Table 4, and the same is true for Columns (4) and (6) relative to Column (2).

a firm’s French ETR. While not contradicted by the results, the corresponding effects are not statistically significant for all MNEs when using the foreign statutory tax rate in Column (1) or French parent firms in Column (5). On the other hand, the foreign EATR, which is a better measure of effective taxation, clearly increases the ETR of French entities with foreign parents, see Column (4). In general the effect of foreign tax rates – STR or EATR – in Columns (3) and (4) is stronger for French entities that are owned by foreign MNEs than for French parent entities, where the effect is not significant, see Columns (5) and (6). Implicitly, this means that foreign-owned affiliates in France are gaining more from bargaining and, in the context of the theoretical model, appear to be viewed as having even lower relocation costs than French parent firms. This is consistent both with the stylized model and the proposition in Section 3.

4.3 Entropy balancing to establish causal relationships

Even though we can measure firms’ profits in France and estimate the shape of the nexus of profits and the ETR, we cannot straightforwardly compare MNEs and NEs in terms of profits and the associated ETR to gauge the bargaining component in ETRs, since MNEs can manipulate their profits in a way that is beyond the reach of NEs. This leads to endogeneity in the above estimations. We address this by using entropy balancing, which is a generalized weighting procedure. In doing so, we allow profits and MNE status to be simultaneously determined by the firm.

Being an MNE affects the tax rate in two ways. (i) All else equal (meaning in the absence of or beyond profit shifting), MNEs have higher profits on average (see Helpman et al., 2004), which mechanically reduces their effective tax rate if the ETR schedule is regressive. (ii) MNEs are in a better bargaining position relative to NEs and can thus reduce their tax burden even further. The first, the *size effect*, is related to the better bargaining position of larger firms, while the latter, the *footlooseness effect*, arises from the reduced costs of MNEs to relocate. Thus, we first need to estimate profits that are free of profit shifting aspects to arrive at comparable units between NEs and MNEs. For this, we use a procedure capable of retrieving the average difference between NEs and MNEs in terms of their (log) profits which weights the joint determinants of (revealed) profitability – including the different channels of profit shifting – and MNE status such that the obtained conditional mean is characterized by the same targeted moments of the distribution of each and every such joint determinant.

We apply entropy balancing as proposed by Hainmueller (2012) and Hainmueller and Xu (2013). Akin to other approaches invoking a selection (into treatment; here, MNE status) on observables which jointly determine treatment status as well as outcome (in this case, (log) pre-tax profits or the French ETR), entropy balancing lends itself to a weighting regression framework. With traditional approaches (such as linear regression or propensity score matching), the weights are obtained in a way that is unconditional of the distribution of the observables between the treated and the untreated. This is true for linear regression, where all weights are identical, as well as for propensity score matching, which can be considered an inverse propensity-score-weighting regression (see Wooldridge, 2007). Differences in the covariate distributions between the treated and the untreated observations may confound any identification of the parametric or nonparametric link between treatment status and outcome. Entropy balancing avoids this problem by determining the weights subject to constraints which enforce the balancing of targeted moments of the distribution of observables – captured by the respective entropy – between the samples of MNE and NE data points.

Specifically, we are interested in the average treatment effect on the treated (ATT) – the effect of being an

MNE on the MNEs in the data. After subsuming all observables into the vector X_{it} , we can drop entity-time indices it and write the ATT as

$$ATT = E[ETR|MNE = 1] - \int E[ETR|X = x, MNE = 1] f_{X|MNE=1}(x) dx, \quad (9)$$

wherein ETR denotes the ETR outcome associated with MNE status, MNE , and X are the observable joint determinants of MNE status and the ETR. The ATT is identified by selecting on a range of observables, such that the ETR of the untreated is independent of the treatment status given the observables. This holds as long as there is some overlap between the treated and the untreated in the values that the observables (x) may take within the support of the observables among the treated, $f_{X|MNE=1}$. In order to estimate this last term, the covariate distribution of the control group's observables must be adjusted to match the covariate distribution of the treatment group. This enforces the orthogonality of the treatment indicator, MNE , and the observables which is required for a causal inference of the treatment effect (see Hainmueller and Xu, 2013). Moreover, this procedure automatically closes the gap between the ATT and the average treatment effect (ATE), which is not the case when the balancing of the distribution of observables is not enforced. In drawing a random entity from among the data of MNEs and NEs, the predicted effect of being an MNE relative to being an NE on either outcome (profits or the ETR) is the same under entropy balancing regression but not under a simple weighting regression, which does not constrain the distribution of the observables to be the same between treated and untreated units. Accordingly, entropy balancing generalizes the unconstrained weighting approaches of treatment effects under a selection on observables, including propensity score matching. Relative to unconstrained weighting approaches, entropy balancing gives greater weight to observations in the control group that are similar to observations in the treatment group in terms of the observables.

In the subsequent analysis, we denote the weight (of an observation i in year t) generated by the entropy balancing procedure by λ_{it} . Table 5 summarizes the targeted (balanced) moments of the observables in the determination of the balancing weights λ_{it} .

Table 5: TARGETED MOMENTS OF OBSERVABLE VARIABLES IN THE ENTROPY BALANCING OF MNEs (λ_{it})

Control	Targeted moment		
	Mean	Variance	Skewness
ln(Revenues)	YES	YES	YES
ln(Productivity)	YES	YES	YES
ln(Employees)	YES	YES	NO
ln(Capital)	YES	YES	NO
ln(Labor costs)	YES	YES	NO
ln($\frac{\text{Exports}}{\text{Revenues}}$)	YES	YES	NO
ln($\frac{\text{Debt}}{\text{Revenues}}$)	YES	YES	NO
ln($\frac{\text{Intangibles}}{\text{Revenues}}$)	YES	YES	NO
ln(Revenues) × ln(Productivity)	YES	YES	NO
ln(Revenues) × ln(Employees)	YES	YES	NO
ln(Revenues) × ln(Capital)	YES	YES	NO
Time-fixed effects	YES	NO	NO

4.4 Determining the ETR effect of being an MNE

To apply entropy balancing as described in the previous subsection, we target the firm fundamentals and moments listed in Table 5 and obtain the balancing statistics presented in Table 6. The latter table reports the moments of interest of the main observables and is organized in three horizontal blocks: the first one focuses on the control units (i.e., NEs) before balancing the observables; the second block reports the same moments among the treated units (i.e., MNEs); and the third block summarizes the moments of the control units after balancing. In comparing the first with the second and third horizontal block in the table, we see that some of the moments of the main variables differ significantly between MNEs and NEs prior to balancing; however, this difference vanishes after balancing.¹¹ In particular, covariate balancing vastly improves the comparability of the higher moments in the data.

Table 6: PRE-TAX PROFIT BALANCING: FRENCH MNEs AND DOMESTIC MULTI-ENTITY FIRMS

	Control			Treatment			Control balanced		
	Mean	Variance	Skewness	Mean	Variance	Skewness	Mean	Variance	Skewness
ln(Revenues)	17.81	0.679	-0.4084	17.93	0.639	-0.9671	17.93	0.639	-0.9671
ln(Productivity)	6.490	0.151	1.136	6.563	0.256	2.109	6.564	0.256	2.109
ln(Employees)	4.85	1.37		4.99	1.38		4.99	1.38	
ln(Capital)	14.42	3.03		14.97	2.76		14.97	2.76	
ln(Labor costs)	16	1.153		16	1.072		16	1.072	
ln($\frac{\text{Exports}}{\text{Revenues}}$)	0.225	0.082		0.359	0.087		0.359	0.087	
ln($\frac{\text{Debt}}{\text{Revenues}}$)	0.03263	0.029		0.07544	0.199		0.07544	0.199	
ln($\frac{\text{Intangibles}}{\text{Revenues}}$)	0.05729	0.056		0.07284	0.091		0.07284	0.091	

Given the balancing summarized above, we use the balancing weights, λ_{it} , to obtain an estimate of the ETR schedule considering the endogeneity of (log) pre-tax profits, $\ln(\pi_{it})$, and the binary MNE status, MNE_{it} . For this, we weight the outcome variable of interest, ETR_{it} , the (log) pre-tax profits, and the binary MNE indicator by λ_{it} to obtain $\widetilde{\text{ETR}}_{it}$, $\ln(\widetilde{\pi}_{it})$, and $\widetilde{\text{MNE}}_{it}$, respectively, and estimate the following

$$\widetilde{\text{ETR}}_{it} = \alpha + \sum_{z=1}^3 \omega_z \ln(\widetilde{\pi}_{it})^z + \mu \widetilde{\text{MNE}}_{it} + \sum_{z=1}^3 \vartheta_z \widetilde{\text{MNE}}_{it} \ln(\widetilde{\pi}_{it})^z + \rho_{it}, \quad (10)$$

where ω_z gives the coefficients of the ETR schedule for NEs and where μ and ϑ_z are the conditional ATT and ATE of MNE status on the ETR beyond profit shifting, i.e., the change of the ETR intersection and slope due to being a MNE, respectively. α is a constant and ρ_{it} is an error term. Since we condition on domestic-versus-foreign average tax- and profit-shifting-related differences in the pre-tax profits when estimating ω_z in equation (10), any remaining ATT (and ATE) of being an MNE on the ETR is attributable to the footlooseness effect of being an MNE. Otherwise identical firms will only differ in their MNE status. Table 7 shows the estimated coefficients when using the balancing weights, λ_{it} . The coefficients of this estimation will next be used to quantify the size and footlooseness effect.

¹¹We are able to balance on different moments with varying degrees of precision. The degree of precision used is indicated by the number of digits reported in Table 6.

Table 7: PRE-TAX PROFIT BALANCING: FRENCH MNEs AND DOMESTIC MULTI-ENTITY FIRMS

Variable	Coef.
Const. (α)	66.25*** (3.40)
$\ln(\tilde{\pi})$ (ω_1)	-48.65*** (6.00)
$\ln(\tilde{\pi})^2$ (ω_2)	20.52*** (3.29)
$\ln(\tilde{\pi})^3$ (ω_3)	-2.76*** (0.56)
$\widetilde{\text{MNE}}$ (μ)	-9.31** (4.51)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})$ (ϑ_1)	15.75** (7.62)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})^2$ (ϑ_2)	-8.45** (3.98)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})^3$ (ϑ_3)	1.23* (0.64)

Standard errors in parentheses obtained through bootstrapping. ***, **, and * indicate levels of statistical significance at 1, 5, and 10 percent, respectively. F-value for joint significance of all MNE effects is 20.43.

To determine the size effect, we need to know the additional profits an MNE is able to generate relative to an NE. We do so by estimating

$$\ln(\tilde{\pi}_{it}) = \delta \widetilde{\text{MNE}}_{it} + \alpha + \nu_{it}, \quad (11)$$

where δ gives the additional profits of an MNE. Table 8 shows the estimated additional profits using the balancing weights, λ_{it} . Unconditionally, the pre-tax profits of MNEs are 38% higher than those of NEs, while conditioning on firm fundamentals reduces this unconditional difference from 38% to 18%. The average firm in our sample has about €8.27 million in pre-tax profits, random assignment of the MNE status under balancing would therefore imply a pre-tax profit increase of about €1.53 million.

Table 8: THE ATE OF MNE STATUS ON PROFITS

Variable	unconditional	balanced
MNE (δ)	0.38*** (0.03)	0.18*** (0.03)

The ATE of MNE status in the balanced regression is the effect beyond profit shifting activities. Standard errors in parentheses obtained through bootstrapping. ***, **, and * indicate levels of statistical significance at 1, 5, and 10 percent, respectively.

We can then translate these additional pre-tax profits into changes of the ETR (size effect) by using the estimated additional (log) pre-tax profits, $\hat{\delta}$, in conjunction with the estimated parameters from equation

(10). The change of the ETR for a given level of pre-tax profits, π , can be written as

$$\Delta\text{ETR}(\pi) = \sum_{z=1}^3 \hat{\omega}_z \ln(\pi)^z - \left(\sum_{z=1}^3 \hat{\omega}_z (\ln(\pi) + \hat{\delta})^z \right), \quad (12)$$

where $\hat{\omega}_z$ are the estimated coefficients from equation (10) and $\hat{\delta}$ are the estimated (log) additional profits from equation (11). Note that we use the ETR schedule for NEs, i.e., $\text{MNE} = 0$.¹² In our sample, the €1.53 million in average, additional profits reduce the ETR over the support of pre-tax profits by around 2.52 percentage points. Similarly, we can compute the distance between the ETR schedules of MNEs and NEs (the distance between points B and C in Figure 2), which gives us the footlooseness effect and is about 3.58 percentage points on average. Adding both effects produces an average overall effect of 6.10 percentage points, where the footlooseness effect contributes more than 58%.

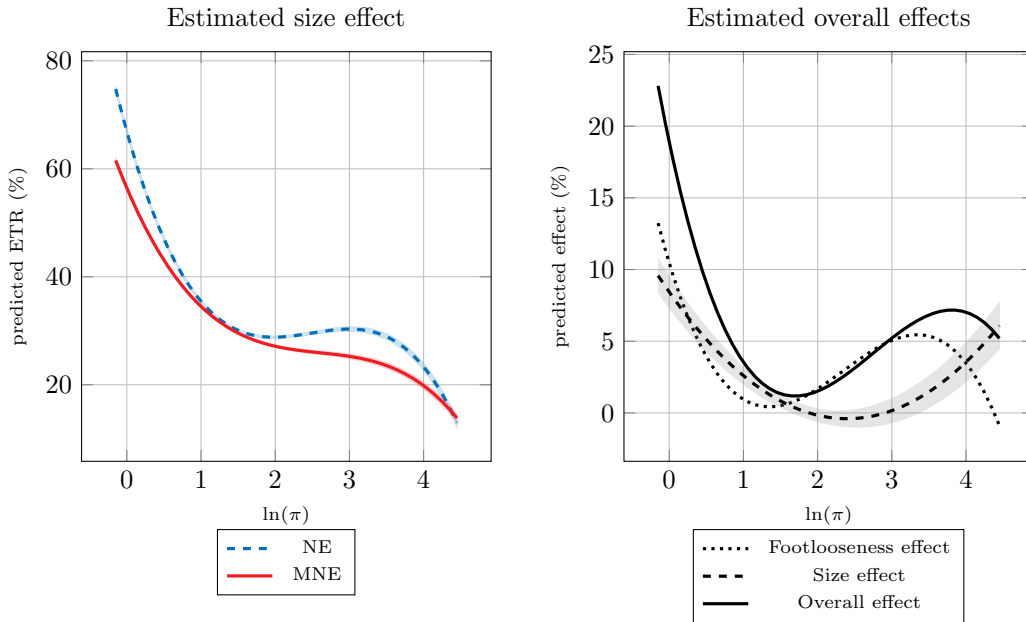


Figure 3: RESULTS COMPUTATION

The left panel of Figure 3 plots the ETR schedules for MNEs and NEs using the estimated coefficients from Table 7 with 95-percent confidence bounds.¹³ The right panel of the figure, in addition to the footlooseness effect (dotted line, the difference in the MNEs' and NEs' ETR schedules from the left-hand plot), plots the estimated size effect (dashed line) with 95-percent confidence bounds and the overall effect. Clearly, the footlooseness effect is dominant in the right tail of the pre-tax profit distribution, indicating that bigger firms are gaining more from threatening to relocate. Due to differences in the slope of the ETR schedule, the size effect is most prominent in the left tail.

¹²The results are qualitatively similar when using the MNE ETR schedule instead.

¹³This left-hand panel of Figure 3 is similar to Figure 2 but relies on the balanced sample to estimate the ETR schedule, which explains the minor deviations.

4.5 Quintile regressions

In equation (10), we estimate a cubic relationship between ETRs and pre-tax profits, while establishing a linear relationship between the MNE status and pre-tax profits in equation (11). However, this omits an array of possible nonlinearities in δ , which we account for by applying quintile regressions for the size effect. Thus, we constrain our sample and balance individual quintiles of the (log) pre-tax profit distribution.

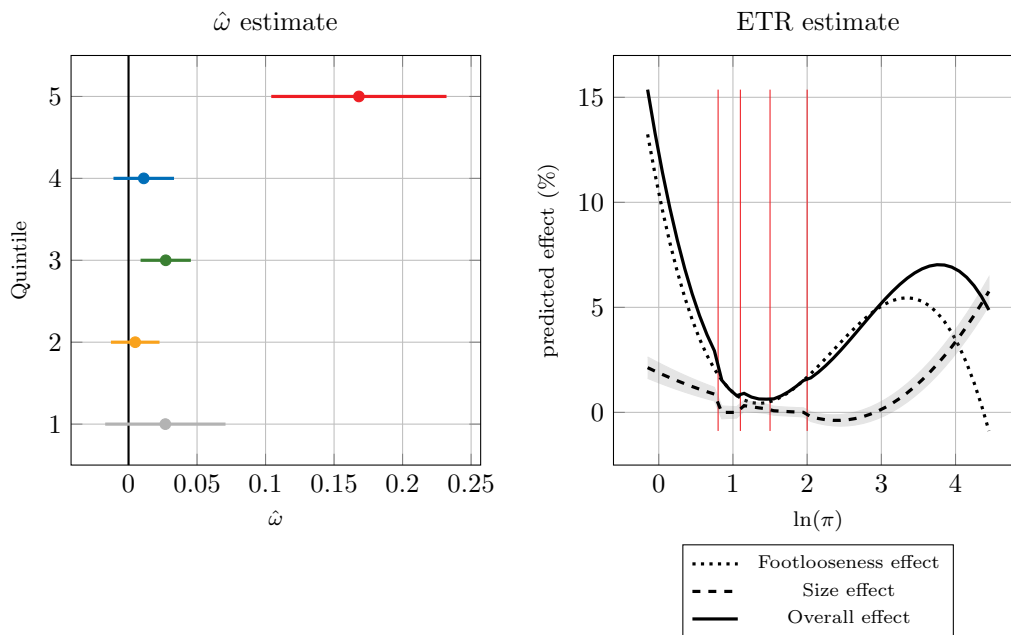


Figure 4: ETR & (LOG) PRE-TAX PROFIT ESTIMATE AFTER BALANCING PRE-TAX PROFIT QUINTILES

Figure 4 presents quintile-specific results, estimated and balanced along pre-tax profit quintiles, and is comparable to the right-hand panel in Figure 3. Quintiles are visually separated by thin, red, vertical bars. In terms of pre-tax profits, the overall effect seems to be driven by the lowest and highest quintiles. MNEs in the top quintile have over 16.8 percent higher profits on average, which corresponds to €3.52 million in additional profits relative to NEs in the same quintile.¹⁴ In Figure 4, we derive the size effect (dashed line) using the additional profits specific to the respective quintile. In contrast to the size effect based on the whole sample, the quintile-specific size effect is now much smaller for firms in the left tail of the pre-tax profit distribution. While the slope of the ETR schedule in the left tail is very steep, small firms do not gain sufficient additional profits from being an MNE. The greater pre-tax profit gains in the right tail of the pre-tax profit distribution significantly decrease the ETR, although the slope is much smaller than in the left tail. MNEs in the highest quintile are able to decrease their ETR by 5.06 percentage points on average relative to NEs. In the top quintile, the average size effect contributes about 1.43 percentage points (or 28% percent) towards the average overall effect.

Table 9 gives a detailed overview of the decomposition by quintile. Our main results are robust to the use of alternative productivity measures, as we document in the appendix.

Habu (2017) argues that unconditional tax differentials of English MNEs and NEs arise from the incomplete consideration of MNE with negative profits. Including firms with negative profits with an ETR of zero

¹⁴The average firm in the highest quintile has about €21 million in pre-tax profits.

Table 9: DECOMPOSE THE EFFECTS BY QUINTILE

Quintile	ω	Size effect	Footlooseness	Overall
1	0.04	1.46	6.71	8.17
2	0.00	0.00	1.15	1.15
3	0.03	0.24	0.48	0.72
4	0.02	0.04	1.00	1.04
5	0.17	1.43	3.63	5.06

Decomposition of the overall effect into the size and footlooseness effects. Point estimates of ω are the average for each quintile.

(instead of excluding them) leads to a different ETR schedule. The great mass of firms with an ETR of zero will lead to an upward sloping ETR schedule in the left tail with the data at hand. Nevertheless, even when including MNEs with negative pre-tax profits, MNEs are (on average) still more profitable than similar NEs and their additional pre-tax profits are about €300,000. This is once again driven by firms in the top quintile which have €0.5 million in additional profits relative to comparable NEs.

5 Conclusions

This paper investigates the differences in the ETRs of French MNEs vis-à-vis French domestic-only firms. MNEs are in a better bargaining position in their negotiations with tax authorities due to both their size and their reduced relocation costs relative to NEs. We formalize this idea in a simple stylized model, where firms and tax authorities negotiate over tax deductions. Higher pre-tax profits increase the bargaining power of firms and, hence, the ETR decreases mechanically along the tax schedule. In conjunction with a regressive corporate tax schedule, this size effect straightforwardly decreases the effective tax rate for MNEs, given their generally larger pre-tax profits. The second, the footlooseness effect, accounts for how much the effective tax rate decreases given the better bargaining position of MNEs, which is rooted in their lower relocation fixed costs and, thus, their higher credibility in threatening to move their operations abroad. Even after controlling for possible debt shifting, patent trading, and transfer pricing, the ETRs of MNEs appear to be systemically lower than the ETRs of NEs.

Empirically, we find that an average (French or foreign) MNE in France faces a 3.42 percentage point lower (unconditional) effective tax rate than a French firm with purely domestic operations. We then decompose the overall effect into its footlooseness- and size-related components. This is chiefly derived by comparing MNEs and domestic-only firms that are otherwise identical. While the footlooseness effect accounts for about 3.58 percentage points, the size effect corresponds to a 2.52 percentage point reduction of the ETR of MNEs. In total, the conditional difference in the ETR between MNEs and NEs amounts to 6.1 percentage points. Moreover, we find that the total bargaining effect of being an MNE on the ETR is mainly driven by high-productivity (high-profit) firms, even among MNEs.

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Appendix

A Proof of proposition

The proof of the proposition is straightforward.

(i) the ETR is downward sloping:

$$\frac{\partial \text{ETR}_i}{\partial \pi_i} = -\alpha \frac{F_i}{\pi_i^2} < 0$$

(ii) the ETR schedule of MNEs lies below the one of NEs:

$$\frac{\partial \text{ETR}_i}{\partial F_i} = \frac{\alpha}{\pi_i} > 0 \quad \forall \pi_i$$

(iii) the ETR increases with the foreign tax rate:

$$\frac{\partial \text{ETR}_i}{\partial \tau'} = \alpha > 0$$

(iv) the ETR schedule of NEs is more regressive than of MNEs:

$$\frac{\partial \text{ETR}_i^2}{\partial \pi_i \partial F_i} = -\frac{\alpha}{\pi_i^2} < 0,$$

where the cross-derivative in (iv) implies that the slope of the ETR schedule is more negative, if F_i is lower, which we assume to be the case for MNEs.

B Measuring productivity by the Solow-type TFP residual

One alternative approach is to estimate productivity via the total factor productivity residual, ϵ_{it} , in a regression of log firm output, $\ln(y_{it})$, on log employment, $\ln(l_{it})$, and log total capital, $\ln(k_{it})$, of the form:

$$\ln(y_{it}) = \alpha \ln(l_{it}) + \beta \ln(k_{it}) + \epsilon_{it}. \quad (13)$$

When using the estimated TFP residual in the entropy balancing of Subsection 4.4 and repeating the estimation underlying Table 7 on all entities, we obtain the estimation results summarized in Table 10.

Table 10: PRE-TAX PROFIT BALANCING USING SOLOW-TYPE TFP RESIDUALS: FRENCH MNEs AND DOMESTIC MULTI-ENTITY FIRMS

Variable	Coef.
Const. (α)	59.69*** (7.84)
$\ln(\tilde{\pi})$ (ω_1)	-33.16*** (12.08)
$\ln(\tilde{\pi})^2$ (ω_2)	12.21** (5.75)
$\ln(\tilde{\pi})^3$ (ω_3)	-1.50* (0.85)
$\widetilde{\text{MNE}}$ (μ)	-7.13 (10.71)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})$ (ϑ_1)	9.77 (15.62)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})^2$ (ϑ_2)	-4.73 (7.10)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})^3$ (ϑ_3)	0.57 (1.01)

Standard errors in parentheses obtained through bootstrapping. ***, **, and * indicate levels of statistical significance at 1, 5, and 10 percent, respectively. F-value for joint significance of all MNE effects is 19.78.

Profits of MNEs are about 4.78 percentage points (with a standard error of 0.35) higher than those of comparable NEs using the balancing procedure with the Solow-type TFP residual as a productivity measure. The average size and footlooseness effect amount to 0.49 and 4.14 percentage points, respectively. The results are shown graphically in Figure 5. The ETR schedule using the TFP residual is very similar to the one using productivity based on Levinsohn and Petrin (2003). The overall effect of 4.63 percentage points is again mainly driven by the credible footlooseness of MNEs. This is due to the relatively small additional profits, $\widehat{\delta}$, of about 8.91 percentage points (with a standard error of 2.86).

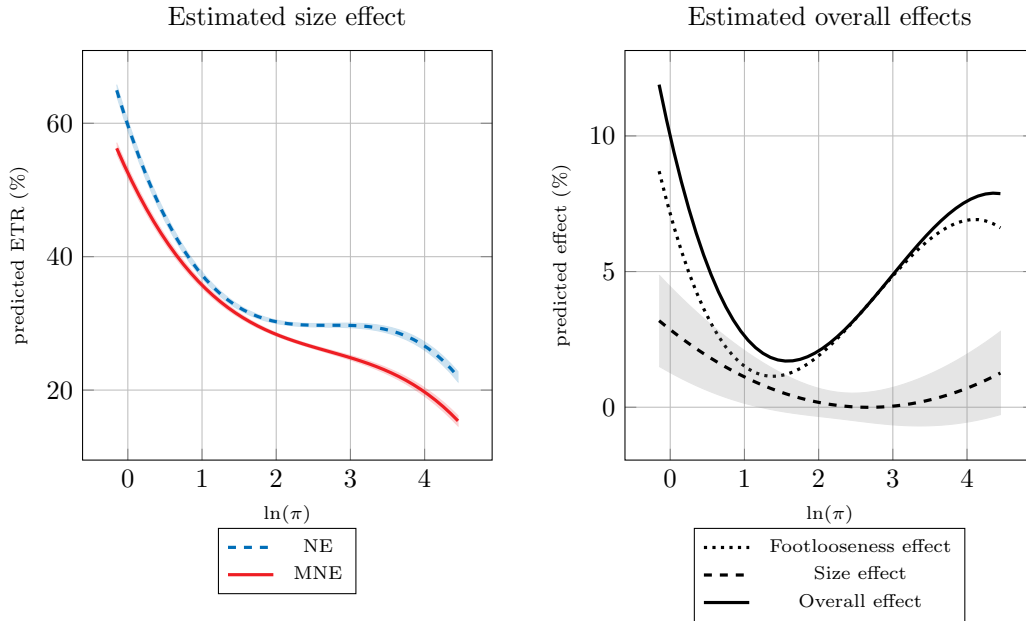


Figure 5: PRE-TAX PROFIT BALANCING USING SOLOW-TYPE TFP RESIDUALS FOR PRODUCTIVITY: RESULTS COMPUTATION

Analogously, we split the sample into quintiles to allow for non-linearities in δ . The associated results are shown in Figure 6. Once again quintiles are visually separated by thin, red, vertical bars. Only firms in the left tail of the size distribution derive significant additional profits from being a MNE, as with the benchmark results. The footlooseness effect is most pronounced in the right tail of the distribution as before, but the size effect remains important, especially for very large firms.

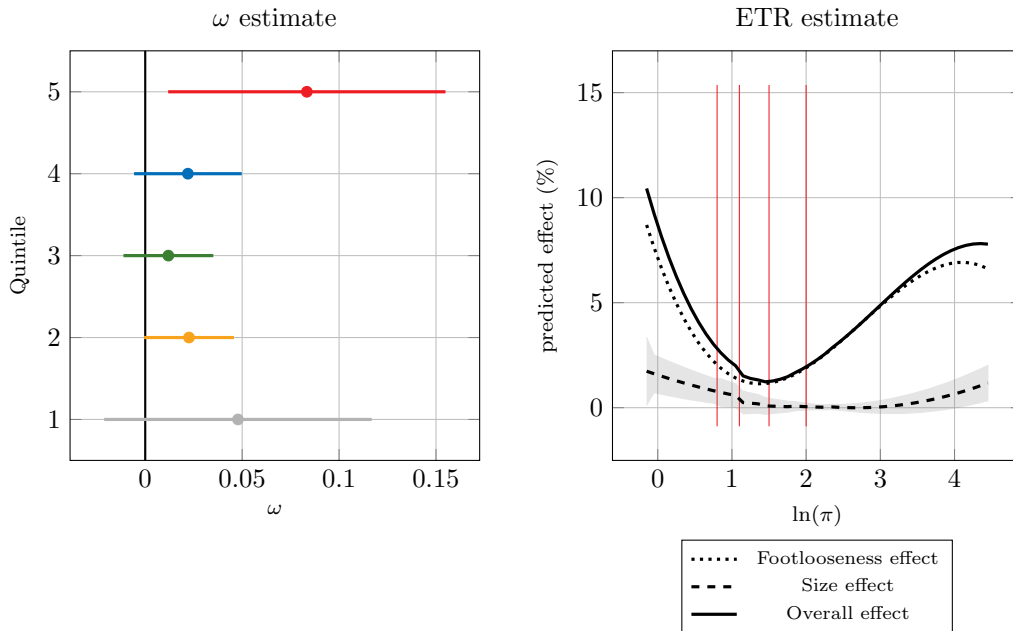


Figure 6: PRE-TAX PROFIT BALANCING USING SOLOW-TYPE TFP RESIDUALS: ETR & (LOG) PRE-TAX PROFIT ESTIMATE AFTER BALANCING PRE-TAX PROFIT QUINTILES

C Productivity estimation following Olley and Pakes (1996)

Another approach to estimating productivity is to follow Olley and Pakes (1996). Instead of using material costs as a proxy as in Levinsohn and Petrin (2003), Olley and Pakes (1996) use investment and consider entry and exits. The implied log-linear production function has the following form:

$$y_{it} = \varphi_0 + \varphi_l l_{it} + \varphi_k k_{it} + \varphi_{it} + \zeta_{it}, \quad (14)$$

where y_{it} , l_{it} , and k_{it} are the gross revenue, labor, and capital of firm i at time t , respectively, in logs. Again the error term consists of a transmitted productivity term $\chi_{it} = \chi_{it}(k_{it}, m_{it})$ that follows a first-order Markov process (known to the firm) and an error term that is uncorrelated with the input choice, ζ_{it} . Using the interaction of capital and investment (the first difference of capital) as a proxy for the unobservable productivity term allows the identification of firm-level productivity. Additionally, Olley and Pakes (1996) include a probit estimation to control for entry and exit.

Applying the corresponding productivity estimates in the entropy balancing exercise, we can repeat the estimation underlying Table 7 on all entities. Table 11 presents the estimation regarding the ETR schedule.

Table 11: PRE-TAX PROFIT BALANCING USING PRODUCTIVITY BASED ON OLLEY AND PAKES (1996) PRODUCTIVITY: FRENCH MNEs AND DOMESTIC MULTI-ENTITY FIRMS

Variable	Coef.
Const. (α)	64.04*** (3.67)
$\ln(\tilde{\pi})$ (ω_1)	-44.05*** (6.56)
$\ln(\tilde{\pi})^2$ (ω_2)	18.03*** (3.62)
$\ln(\tilde{\pi})^3$ (ω_3)	-2.38*** (0.61)
$\widetilde{\text{MNE}}$ (μ)	-7.17 (4.89)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})$ (ϑ_1)	11.30 (8.14)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})^2$ (ϑ_2)	-6.05 (4.22)
$\widetilde{\text{MNE}} \ln(\tilde{\pi})^3$ (ϑ_3)	0.85 (0.68)

Standard errors in parentheses obtained through bootstrapping. ***, **, and * indicate levels of statistical significance at 1, 5, and 10 percent, respectively. F-value for joint significance of all MNE effects is 20.99.

With the Olley-Pakes productivity estimates, the average French MNE has profits that are 5.11 (standard error of 1.75) percentage points higher ($\hat{\delta}$) than those of NEs. This leads to a very small size effect of 0.56 percentage points. The footlooseness effect in turn amounts to 3.31 percentage points and is the main driver of the overall effect of 3.87 percentage points, as shown in Figure 7.

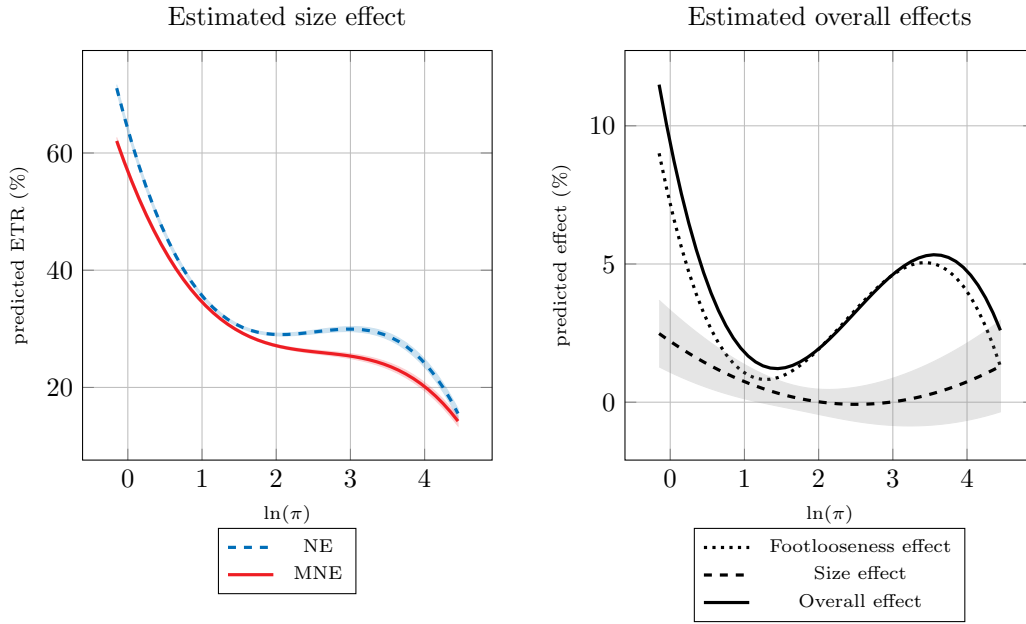


Figure 7: PRE-TAX PROFIT BALANCING USING OLLEY AND PAKES (1996): RESULTS COMPUTATION

Using quintiles estimates of δ to allow for non-linearities yields similar results as before. We present the quintile results using Olley and Pakes (1996) productivity in Figure 8, where the quintiles are visually separated by thin, red bars. Only for firms in the highest quintile does the size effect significantly contribute to the overall effect.

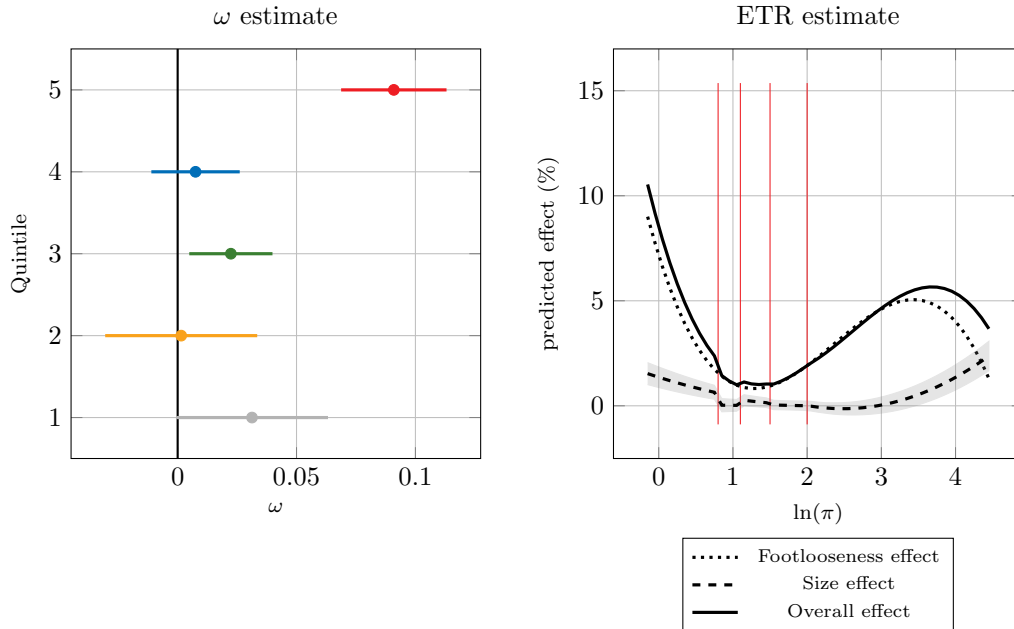


Figure 8: PRE-TAX PROFIT BALANCING USING OLLEY AND PAKES (1996): ETR & (LOG) PRE-TAX PROFIT ESTIMATE AFTER BALANCING PRE-TAX PROFIT QUINTILES