Profit Shifting and Firm Growth

Katarzyna Bilicka*

Khalil Esmkhani[†]

Sepideh Raei[‡]

September 2023

Abstract

In this paper we analyze the consequences of profit shifting for firm growth. Using firm-level balance sheet data, we show that multi-establishment domestic firms in high-tax countries tend to be larger than comparable multinational firms with subsidiaries in tax heavens. We attribute this to the fact that some firms may prioritize tax saving and locate their new establishments in low-tax countries at the expense of expanding at home. We build a novel firm dynamic model with multi-establishment firms to explain the mechanism driving this empirical observation. In our model, firms choose to expand their operations by either growing the size of each of their establishments or by opening a new establishment. They can open a new establishment either in a domestic, high-tax location or in a foreign, low-tax location. We use our model to show that tax planning incentives result in firms opting to be multinationals and having fewer and smaller establishments. This results in lower levels of output and employment. Our findings suggest that when firms put minimizing their tax bill as their objective, they may forgo a higher level of output and employment.¹

JEL: H25, H26, E23, O40 Keywords: Profit Shifting, Firm Growth

^{*}Utah State University, NBER, CEPR, CESifo and Oxford University Centre for Business Taxation, John Huntsman Business School, United States; corresponding author: kat.bilicka@usu.edu.

[†]Simon Fraser University, Beedie School of Business, Canada.

[‡]Utah State University, John Huntsman Business School, United States.

¹We thank participants at NTA, ifo Conference on Macroeconomics and Survey Data, Midwest Macro Meeting, ASU reunion conference, Western Economic Associations International conference, and IIPF 2023 annual conference audiences for their helpful suggestions.

1 Introduction

The revelations from Panama and Paradise papers in 2015 exposed a sizable amount of international tax avoidance by firms, and in particular multinational enterprises (MNCs). Despite a multilateral effort to curb such practices, the extent of profit shifting has been increasing over time. While recent evidence suggests that the size of profit shifting is substantial, we still have much to understand about the consequences of such tax minimization practices on real firm level outcomes. If a consequence of tax minimization is simply a movement of paper profits around the globe, then the real consequences are small. However, if movement of paper profits comes with inefficient allocation of labor, assets and investment and as a consequence slower firm growth, this affects our economies more severely in the long run. Not only could governments lose revenues, but slower firm growth could contribute to slower GDP growth through unemployment and lower capital accumulation due to reduced investment.

In this paper we analyze the consequences of profit shifting for firm growth. Using firm level balance sheet data, we show two sets of empirical facts that serve as a basis for our theoretical model. First, we find that multi-establishment domestic firms in high-tax countries tend to be larger than comparable multinational firms, especially those that have subsidiaries in tax havens. Second, domestic firms that add a subsidiary in a tax haven to their ownership structure have lower growth rate of assets, employment, and turnover than domestic firms that add a domestic or non-haven subsidiary to their ownership structure. Smaller size of MNCs from the first observation can be a direct consequence of the slower growth of MNCs from the second observation. We attribute these findings to the fact that some firms may prioritize tax saving and locate their new establishments in low tax countries. On one hand, profit shifting enables firms to move profits from high tax locations to low tax locations to minimize the overall tax bill. This may result in more capital and an increase in the overall investment. On the other hand, it may have two potential negative consequences. First, those firms that move their profits to low tax jurisdictions may pass up on profitable investment opportunities in higher tax countries, if their objective becomes tax minimization. Second, firms may choose to move real business operations away from high tax jurisdictions, thereby slowing down growth of particular business affiliates in particular locations. This might distort the allocation of capital.

We propose a model to investigate potential mechanism through which tax planning affects firm production and consequently firm growth. We develop a firm dynamic model with multi-establishment firms. In this model, firms grow on both intensive margin, by expanding the size of an establishment, and extensive margin, by opening new establishments. The presence of the extensive margin is especially important for our purpose since most big firms that get involved in tax planning do that by opening establishments in locations that are subject to low corporate tax rates (Dowd et al., 2017a; Egger et al., 2010; Grubert and Slemrod, 1998; Gumpert et al., 2016; Hines and Rice, 1994; Huizinga and Laeven, 2008). Our model of multi-establishment firms is based on the classic models of firm dynamics proposed by Hopenhayn (1992), Hopenhayn and Rogerson (1993), and Veracierto (2001). following Xi (2023), we augment this framework by adding technology capital and multi-establishment firms. Furthermore, we add two new features: the choice of the type of establishment (in our case, the location of the establishment) and the possibility of tax planning.

In our model, the firm is the decision-making unit with establishments being the production units. Establishments use labor and technology capital as inputs for production. Technology capital can be divided into firm-specific intangible capital, e.g. blue-prints, patents, which is non-rival, and establishment-specific intangible capital, e.g. the local network, knowledge of the local market, which is rival. The decision to have multiple establishments is driven by the non-rivalry feature of the firm-specific intangible capital.

Firms can choose to expand their operations by either growing the size of each of their establishments or by opening a new establishment. When they open a new establishment, they have to decide on its type. The type of a establishment is determined by the location it is created in. A firm starts by creating its first establishment on the mainland and for all other establishments, it can choose between a domestic and a foreign establishment. A domestic establishment is located on the mainland and has a tax regime with a higher corporate tax rate. A foreign establishment is located outside of the mainland, where the corporate tax rate is lower compared to the mainland. To capture the profit shifting practice of a multinational firm, we assume that, if a firm decides to have foreign establishments, all of its profits generated in both domestic and foreign establishments can be taxed at the lower rate of the foreign location. This provides the incentive for firms to choose to be multinational, despite the higher cost of running a foreign establishment.

We use our model to conduct a number of policy relevant experiments. First, we consider the effects of tax planning incentives on firm production level and employment. To do so, we equalize the corporate tax rates between domestic and foreign locations and compare these results to the baseline case. We find that tax planning incentives result in firms opting to be multinationals and having fewer and smaller establishments. When reducing the tax burden plays a significant role in firms' decisions, it may lead them to forgo opportunities for greater output and employment. This is consistent with the evidence from the data, where we find small multinational firms to be smaller, in terms of their employment, assets and turnover than comparable domestic firms.

Second, we use our model to compare two different incentives to be a multinational firm; the effect of tax planning and that of lower labor cost. We find that lower labor cost is a relatively more powerful incentive for firms to go multinational. However, unlike tax planning incentive, it makes firms produce more due to a lower cost of production.

We then use our model to quantify the adverse real effect of profit shifting on firm output and growth. We calibrate the model to the French firm level data for the panel of 2010 -2019. We use information on French multi-establishment domestic and multinational firms, but limit our study to smaller multinational firms. This is because the mechanisms we present in this paper applies to firms making a decision to go multinational and not to large conglomerates with multiple foreign establishments. We use our estimates of the real cost of profit shifting to evaluate the policy proposals designed to curb profit shifting, but which may be costly.

This paper is related to a growing literature on the real effects of profit shifting. The two papers closest to ours are Serrato (2018) and Bilicka et al. (2020). Serrato (2018) shows that the repeal of a tax code that allowed US MNCs to exclude income from Puerto Rico from US corporate taxes led them to shift investment and employment away from the US. Bilicka et al. (2020) show that the anti-tax avoidance measure targeted at debt shifting introduced by the UK reduced real operations of affected multinationals in the UK and increased their operations abroad, especially in high tax countries. In contrast to those two studies, we do not analyze the effects of a reform that targeted profit shifting activities of firms. Our model shows the consequences of firms choosing to take advantage of tax planning opportunities on real outcomes. Hence, it has the ability to show how distorted the allocation of capital was before any profit shifting reforms take place.

This paper contributes to several broader strands of literature. First, an empirical literature that examines how MNCs allocate their real operations in response to economic and policy shocks and how this allocation can affect the global economy (Almedia et al., 2015; Boutin et al., 2013; Desai et al., 2007; Giroud and Mueller, 2015, 2016; Huber, 2018; Kalemli-Ozcan et al., 2016; Santioni et al., 2017). Second, the vast literature on the economic implications of corporate income tax. Much of the early research focuses on tax incidence issues, especially the welfare implications of the corporate income tax (Feldstein, 1978; Feldstein and Slemrod, 1980; Gravelle and Kotlikoff, 1989). Another strand of this literature focuses on the effects of the corporate income tax on firm financing decisions. Bradford (1981) analyzes the effect of tax on corporate distributions to equity owners. Auerbach and Hines (2002) and Jensen (1986) examine the implications of corporate tax distortions on investment efficiency. More recent contributions model the effects of corporate tax on the structure of the firm and its decisions. Chen et al. (2017) evaluate how a corporate income tax reduction affects employment thorough affecting the firm's choice of legal form of organization. Bilicka and Raei (2023) studies the aggregate outcomes and efficiency consequences of the differential tax treatment of business incomes, and its impact on firm dynamics, focusing on the roles of legal forms of organization. Dyrda and Pugsley (2019) investigate the effects of change in dynamic of legal forms of businesses affected by the corporate tax structure on the increase in the income inequality. In this paper we are studying the real effect of tax planning on firm growth and its implications on employment and output.

Third, there is a large related trade literature that studies multinational firms and foreign direct investment (FDI). Markusen (1984) builds an equilibrium model of multinational firms based on knowledge capital, i.e., intangible assets that have a joint-input feature, which gives rise to the economies of multi-plant operations. McGrattan and Prescott (2009) incorporate technology capital into neoclassic growth model and use it to quantify the gains from opening to FDI. Ramondo (2014) builds a multinational firm model that combines Lucas (1978) with Eaton and Kortum (2002), and use it to quantify the gains from opening to FDI. Our paper proposes a multi-establishment firm model to study the real effects of tax planning on firms' decisions on location of the operation and the consequences of that on total employment and output of the economy

In what follows, section 2 describes the stylized facts, section 3 sets up the model, section 4 discusses the policy experiments, and section 5 concludes.

2 Empirical analysis

We start by presenting a set of facts which we use to motivate our theoretical model. We use Bureau van Dijk Orbis dataset to compile these facts. Orbis provides balance sheet information for firms' financial and real variables such as total assets, operating revenue (turnover), number of employees, profits, etc. First, we use Orbis to show differences in firm size between multinational and domestic firms for high and low tax countries and second, we demonstrate what happens to firms' growth when they add a foreign subsidiary in a low tax country.

2.1 Descriptive statistics

To showcase differences between firm size in high and low tax countries, we choose France and Poland during the period 2010 - 2019. We chose these countries for 2 reasons. First, they have large coverage in Orbis. Second, France is among the countries with the highest corporate tax rate in Europe, 34%, and Poland is an example of a low tax country with a corporate tax rate of 19%.²

We classify firms into two categories: multinational and domestic firms. To do that we use information from Orbis on the location of Global Ultimate Owner (GUO) and on firm majority-owned foreign subsidiaries. We define a multinational as a firm that has a French or a Polish GUO and at least one foreign subsidiary.³ Domestic firms are those that do not have any foreign subsidiaries. To make domestic and multinational firms comparable, we limit the sample to firms with more than 2, but fewer than 13 establishments. This is to ensure that we are comparing firms of roughly similar scope, for which the incentives discussed in our theoretical model matter.⁴ Further, we use consolidated firm level data, which means that firm financial and fundamentals are aggregated at the firm level.

In Panel A of Table 1, we compare French domestic firms to multinational corporations. We further categorize MNCs into those with and those without tax haven subsidiaries. The literature on profit shifting shows that multinational firms that have subsidiaries in tax havens tend to be more 'aggressive' in minimizing their tax liabilities by moving profits from high to low tax jurisdictions (Dowd et al., 2017b; Gumpert et al., 2016; Hines and Rice, 1994).⁵

We show that, on average, domestic French firms are larger than MNCs with similar number of subsidiaries. Specifically, domestic French firms have average total assets of

²Neither France nor Poland had any substantial corporate tax reforms during the period we are examining.

 $^{^{3}}$ From the 400,000 French firms we have in our sample 25,000 are multinationals and the remaining are domestic firms. Hence, multinationals constitute 6% of firms in our sample. This number is consistent with studies that use corporate tax returns data in Europe and categorize firms into MNCs and domestic firms (Bilicka (2019)).

⁴Amongst the domestic firms, the vast majority – almost 94% – are single establishment. Amongst domestic firms with multiple establishments, 53% have 1 subsidiary, 17% have 2 subsidiaries, and 95% of firms have fewer than 13 subsidiaries. Of MNCs with multiple establishments, 30% have 1 subsidiary, 14.5% have 2 and 20% of the sample have more than 13 subsidiaries with a maximum of 1,404.

⁵Many papers use the presence of tax haven in the ownership structure of a multinational to proxy for their ability to shift profits to low tax jurisdictions (Bilicka et al., 2023; Bilicka and Scur, 2021) and presence of tax haven subsidiaries further allows these firms to directly move profits to those tax haven subsidiaries.

	Panel A: French firms			
	domestic	MNC	MNC without havens	MNC with havens
total assets	82281	64046	66498	57637
employment	287	164	173	139
turnover	87446	48360	51142	41106
ROA	0.027	-0.124	-0.141	-0.079
Effective tax rate	0.173	0.079	0.082	0.071
$\ln(\text{sales per employee})$	5.825	5.186	5.186 5.064	
age	29.392	26.372	26.422	26.226
No of subsidiaries	3.22	3.55	3.40	4.00
Observations	3600	1452	1080	372
			Panel B: Polish firms	3
total assets	12436	13965	14224	11908
employment	104	117	121	82
turnover	14255	15730	16092	12868
ROA	0.008	0.033	0.034	0.019
Effective tax rate	0.142	2 0.140 0.145		0.108
ln(sales per employee)	4.857	4.980	4.978	4.993
age	28.137	26.613	27.782	17.429
No of subsidiaries	2.589	3.210	3.182	3.429
Observations	3852	744	660	84

Table 1: Average firm size - domestic vs multinational firms.

Note: Total assets and turnover numbers are averages in thousands of \$USD. Employment is a simple average. No of subsidiaries is the average number of subsidiaries that a firm reports. We only include firms which report consolidated financial accounts. Source: Orbis data.



Note: Total assets and turnover numbers are averages in thousands of \$USD. Employment is a simple average. We only include firms which report consolidated financial accounts. Source: Orbis data. approximately \$82.3 million USD, employ an average of 287 people, and generate around \$87.41 million USD in turnover. In contrast, MNCs with comparable operations have total assets of \$64 million USD, employ an average of 164 people, and have a turnover of \$48.4 million USD. These disparities are further illustrated in Figure 1, where we compare the size distributions of domestic and multinational French firms across the three size dimensions. Note that these patterns are consistent across most sectors, except for agriculture, retail trade, and mining (see Figure A1).

Focusing on the last two columns of Panel A in Table 1, we observe a more pronounced size difference between MNCs that have tax haven subsidiaries and those that do not. Specifically, MNCs with tax haven subsidiaries are smaller in terms of total assets, employment and turnover, than those without tax haven subsidiaries in their ownership structure. When comparing the Effective Tax Rate (ETR) – the ratio of tax liability to pre-tax profit and loss – we find a higher ETR for domestic firms relative to MNCs and an even lower ETR for MNCs with tax haven subsidiaries. This is consistent with a notion that the MNCs in our sample are able to minimize their tax liabilities more effectively, especially when they have tax havens in their ownership structure.

In Panel B of Table 1, we examine Polish firms to draw parallels with our analysis on French firms. Contrary to what we observe in France, the size dynamics in Poland are inverted; domestic firms are generally smaller than MNCs with a comparable number of subsidiaries. However, Polish MNCs with tax haven subsidiaries exhibit the same patterns we identified among French firms. This aligns with our theoretical framework, suggesting that firms in low-tax jurisdictions do not move operations to other low-tax countries (tax havens in this case) to shift profits.

We then compare profitability (ROA) and effective tax rates (ETRs) of French (Panel A) and Polish (Panel B) subsidiaries that belong to domestic and multinational firms. In Panel A in Table 2, we show that French subsidiaries of multinationals report lower ETRs and ROAs in France than domestic firms. This is consistent with a large literature that argues that sensitivity of profits to statutory corporate tax rates is evidence of profit shifting and shows that subsidiaries of MNCs report lower profits in countries with high statutory tax rates relative to countries with low statutory tax rates (Beer et al., 2020; Dharmapala and Riedel, 2013; Hines and Rice, 1994; Huizinga and Laeven, 2008). In our case, subsidiaries of French MNCs report profits that are lower than those of subsidiaries of French domestic firms which supports a notion that they shift profits away from France, which is a high-tax country. In turn, subsidiaries of Polish MNCs (Panel B) tend to report higher ROAs and

ETRs than subsidiaries of Polish domestic firms, consistent with a notion that MNCs shift profits towards Poland, which is a low tax country. Within the MNC sample, subsidiaries with tax haven affiliates report lower ROA and ETRs, both in France and in Poland. Taken together, these results are consistent with the presence of profit-shifting activities amongst the firms that we analyze.

	Panel B: French firms			
	domestic	MNC	MNC without havens	MNC with havens
ROA	0.051	0.034	0.034	0.031
ETR	0.110	0.107	0.107	0.106
No of subsidiaries	1.827	2.285	2.195	2.737
Observations	117780	19488	16248	3240
			ranei D: ronsn nrm	8
ROA	0.047	0.070	0.073	0.008
ETR	0.128	0.157	0.158	0.138
No of subsidiaries	1.572	1.914	1.902	2.182
Observations	93420	3084	2952	132

Table 2: Comparison of Domestic Subsidiaries.

Note: This table compares average profitability and effective tax rates for domestic subsidiaries of both domestic firms and MNCs in our sample. Profitability is ROA - returns on assets - defined as the ratio of profit and loss before taxes and total assets. ETR is effective tax rate, defined as the ratio of tax liability and profit and loss before taxes. Source: Orbis data.

2.2 Impact of adding a subsidiary on firm growth

While evidence from section 2.1 suggests that firms in high-tax countries that have foreign subsidiaries are smaller than those that only have domestic subsidiaries, we present this evidence using a snapshot of ownership information from 2019. As such, the size differences could be driven by differences in the growth path that these firms are on. In this section, we specifically consider the historical ownership from Orbis database to answer a question of what happens to firm *growth* when a firm expands abroad, especially towards tax havens. For the purpose of the analysis in this section, we consider the universe of firms available in Orbis, limiting the sample to firms that have fewer than 13 subsidiaries, similar to section 2.1. Note that the empirical evidence in this section is still preliminary.

To examine the potential effect of profit shifting on growth, we pick a set of firms that added a subsidiary, either domestic or foreign, between 2007 and 2019. We distinguish between adding a foreign subsidiary in a non-tax haven country and a foreign subsidiary in a tax haven country to understand the profit shifting motives directly. As such, in our empirical model we compare growth rates of firms that added a domestic subsidiary to those that added a foreign subsidiary in a non-haven country and a foreign subsidiary in a tax haven country in a framework akin to triple difference-in-differences model. Since the decision to open a subsidiary domestically or abroad is not exogenous, we do not treat these estimates as causal, but as evidence supporting the mechanisms our theoretical model outlines. As such, we estimate the following:

$$Growth_{it} = \alpha + \beta post_t \times new fsub_i + \gamma post_t \times new haven sub_i + \eta_i + \delta_t + \epsilon_{it}$$
(1)

where $Growth_{it}$ is a measure of firm growth, using one of the total assets, employment and turnover. $post_t$ is a dummy equal to 1 in the years after a firm opens up a new subsidiary, zero before. $newfsub_i$ is a dummy equal to 1 if a firm opens up a foreign subsidiary during a sample period, $newhavensub_i$ is 1 when that foreign subsidiary is in tax haven. η_i are firm fixed effects and δ_t are year fixed effects and ϵ_{it} is an error term. We cluster standard errors at the firm level in each estimation. The coefficient of interest, γ , shows the differential effect of opening a foreign subsidiary in a tax haven location on firm growth relative to opening a foreign subsidiary in a non tax haven location.

We present results in Table 3, distinguishing between MNCs headquartered in high tax and low tax countries in odd and even columns, respectively. We find that adding a new nontax haven subsidiary has no effect on firm growth relative to adding a domestic subsidiary. However, adding a tax haven subsidiary reduces growth rate of firms that are headquartered in high-tax countries. We do not see a significant effect of adding a tax haven subsidiary on growth on firms that are headquartered in low-tax countries. Specifically, firms that added a tax haven subsidiary had 4.4% lower growth rate in terms of assets, 3.6% lower growth rate in terms of employment and 6.1% lower growth rate in terms of turnover than firms that added a foreign non-haven subsidiary. In Figure 2 we show the dynamic evolution of firm growth after a new subsidiary is added to firm ownership structure. To do so, we estimate an event study, where an event is a year before the new subsidiary is opened. In the figure we plot the differential effect of the subsidiary opening on firms growth, comparing growth of firms that opened a foreign non-tax haven subsidiary relative to those that opened a tax haven subsidiary. In blue, we plot the effects for firms headquartered in low tax countries in and black firms headquartered in high tax countries. We observe that growth rates fall one year after a tax haven subsidiary is opened, suggesting that this fall is related to this opening of the new subsidiary. For firms headquartered in low tax countries growth rates are not significantly different for firms that opened up a non-haven subsidiary versus those that opened a tax haven subsidiary before the subsidiary is opened. However, the pre-trends do suggest a relative slowing down in growth rates for the latter firms.

	(1) total a	(2) ssets	(3) (4) employment		(5) (6) turnover	
	high tax	low tax	high tax	low tax	high tax	low tax
post $\times newfsub_i$	0.010	0.005	0.004	0.002	0.007	0.017
	(0.006)	(0.007)	(0.006)	(0.006)	(0.012)	(0.011)
post \times newhavensub _i	-0.044***	-0.009	-0.036*	0.005	-0.061*	-0.006
	(0.017)	(0.014)	(0.016)	(0.012)	(0.029)	(0.022)
Observations	60 502	41 204	22 771	<u> </u>	51 979	11 991
Observations	00,002	41,604	22,771	23,314	51,575	41,334
number of firms	22,467	$24,\!589$	$57,\!5716$	10,922	$18,\!876$	22,216
Dep. var mean	0.054	0.043	0.047	0.036	0.055	0.043

Table 3: Impact of adding a subsidiary on the firm growth

Note: This table shows the effect of adding a new foreign subsidiary on firm growth. In columns 1 and 2, we show the effect on growth rate of total assets, in columns 3 and 4 on growth rate of employment, in columns 5 and 6 on growth rate of turnover. In odd columns, we use a sub-sample of firms that are located in high-tax countries, defined as those with above median statutory corporate tax rate across all years 2007 - 2018. In even columns, we use a sub-sample of firms located in low-tax countries, defined as those with below median statutory corporate tax rate across all years 2007 - 2018. In even columns, we use a sub-sample of firms located in low-tax countries, defined as those with below median statutory corporate tax rate across all years 2007 - 2018. *post* is equal to 1 in the year a firm acquires a foreign subsidiary, *newfsub* is 1 if that subsidiary is in a non-haven location and *newhavensub* is 1 if that subsidiary is in a tax haven location. Each specification includes year and firm fixed effects. Standard errors are clustered at the firm level. Source: Orbis data.

Summary These observations serve as the foundation for our theoretical model, in which we outline a mechanism by which tax considerations can impact firm's growth prospects and, consequently, its size. This has broader implications for aggregate employment and could potentially influence the allocation of resources within the economy.



Figure 2: Impact of adding a subsidiary on the firm growth: dynamics.

Note: This figure shows the dynamic effect of adding a new foreign subsidiary on firm growth. In panel a, we show effects for total assets growth, in panel b for employment growth and in in panel c, for turnover growth. We separately show effects for adding a non-haven subsidiary in grey, marked as tirangles and adding a tax haven subsidiary in blue marked with diamonds. Standard errors are clustered at the firm level. Source: Orbis data.

3 Model

In this section, we introduce a model of multi-establishment firm dynamics that extends the foundational work of Hopenhayn (1992), Hopenhayn and Rogerson (1993), and Atkeson and Burstein (2010). Incorporating insights from Xi (2023), our model enriches the framework by adding multi-establishment operations and technology capital as key components. Echoing the ideas in McGrattan and Prescott (2009), we define technology capital as a firm's proprietary expertise, which could include patents, blueprints, brands, or knowledge of local supply chains. Importantly, some aspects of this technology capital can be non-rivalrous, allowing multiple establishments within the same firm to utilize them concurrently. This provides a natural mechanism for firms with substantial technology capital to expand along the extensive margin, thereby adopting a multi-establishment organizational structure. Building on this general framework, our model further delineates the strategic choices firms face when considering expansion. Firms have the option to either expand production by establishing additional units in their primary location—referred to hereafter as "domestic" establishments—or by maintaining the main unit in the primary location while situating all subsequent establishments outside of it, which we term as "foreign" establishments. In essence, a firm can opt for a structure composed entirely of domestic establishments, which we call *domestic firms*, or one that combines a single domestic establishment with multiple foreign ones and we call *multinational firms*. We employ this modeling framework to investigate the impact of tax planning motivations on a firm's establishment choices and the subsequent consequences for the distribution of firm sizes.

3.1 Model Environment

There is a continuum of firms with measure normalized to 1. Each firm is defined with a stock of technology capital x which is drawn from a probability density function $\phi(x)$. A firm decides on how to divide the technology capital x between the non-rival firm-specific intangible capital x_f , and the rival establishment-specific intangible capital, x_e , using a linear technology:

$$x_f + x_e \le x \tag{2}$$

For firm-specific intangible capital, examples include elements such as patents, blueprints, and brand names. On the other hand, establishment-specific intangible capital could encompass managerial skills and expertise in local production processes, along with other conditions that affect production. It's important to note that in our model, the establishment serves as the basic unit of production. Firms have the flexibility to operate multiple establishments (more than one in our setup) and can make choices regarding the number and locations of these establishments.

3.1.1 Domestic firms

Domestic firms are those that have all their establishments located in the mainland. In simpler terms, all their establishments are domestic and fall under the main location's corporate tax rate.

For production, the domestic establishment utilizes three key inputs: firm-specific intangible capital x_f , establishment-specific intangible capital x_e , and labor h. These inputs are combined to generate output y based on the following production technology:

$$y = f^{D}(x_{f}, x_{e}, h) = (x_{f}^{\alpha} x_{e}^{1-\alpha})^{1-\gamma} h^{\gamma}$$
(3)

where α determines the importance of technology capital in the establishment's production, and $1 - \gamma$ measures the importance of intangible capital ($\alpha, \gamma \in (0, 1)$). A firm needs to hire at least c^D units of labor to create and operate a domestic establishment which we interpret at the fixed cost of creating/running an establishment.

3.1.2 Multinational firms

Multinational firms are those that include both domestic and foreign units in their organizational structure, and their profits are taxed according to the foreign location's tax rate. This is an abstract way to model profit shifting practice.

Similar to a domestic establishment, a foreign establishment uses firm-specific intangible capital x_f , establishment-specific intangible capital x_e , and labor h as inputs in the following production technology:

$$y = f^F(x_f, x_e, h) = (x_f^{\alpha}((1-\mu)x_e)^{1-\alpha})^{1-\gamma}h^{\gamma}$$
(4)

where $\mu < 1$ is the depreciation of establishment-specific intangible capital that occurs due to moving the production outside the mainland. We can think of this depreciation as a lack of knowledge about the market or the supply chain in the new location compared to the mainland. This concept aligns with what Alviarez et al. (2020) term as technology transfer costs. They contend that a firm's productivity depends on country's infrastructure, regulations, and the quality of the supply chain. Therefore, multinational enterprises (MNEs) can only leverage a portion of their productivity when operating in foreign locations.⁶ Also, a firm needs to pay fixed cost, c_F , measured in units of labor to create and operate a foreign establishment.

3.2 Firms decisions

As we mention earlier, a firm with the technology capital x, can choose to be a domestic or a multinational organization and that depends on the after-tax profit of either options. we define variable $\tau \in \{D, M\}$ to reflect this choice.

3.2.1 Domestic firms' problem, $\tau = D$

We model the firm's decision-making as a two-stage process. In the first stage, the domestic firm decides the number of establishments $n_D > 1$ it want to create and its labor demand h_D given the wage rate w and its stock of technology capital x, to maximize the after-tax profit. In the second stage, given $\{x, n_D, h_D\}$, the firm determines how to distribute its technology capital and labor across its establishments to maximize output. We'll outline the decisions made in the second stage first, followed by those in the first stage.

The second stage; the output maximization problem that a firm solves at the second stage can be described in the following way. Taking $\{x, h_D, n_D\}$ as given, the firm chooses

⁶This is also the concept that has been established in the management literature in depth. Studies have emphasized the crucial role of knowledge transfer in the performance of foreign subsidiaries within multinational enterprises (MNEs) (Sammarra and Biggiero, 2008; Van Wijk et al., 2008). Fang et al. (2007) shows that the success of international corporate diversification depends on a firm's capability to transfer knowledge to its subsidiaries. As knowledge resources are imperfectly mobile, a firm may find it difficult to transfer knowledge to its subsidiaries. Further, it has been increasingly acknowledged that a firm's embeddedness in its business network is an important explanatory factor for its performance (Dyer and Singh, 1998; Håkansson and Snehota, 1989; McEvily and Zaheer, 1999; Uzzi, 1996). The importance of embeddedness in relationships with local customers, suppliers and other partners has also been demonstrated in the context of the multinational corporation (MNC) (Andersson et al., 2005). For instance, local network embeddedness has been shown to positively impact a subsidiary's sales growth, market share, and profitability (Andersson et al., 2002a,b). All of these are consistent with our modeling choice of μ here.

 ${x_f, x_{e,j}, h_j}_{j=1}^{n_D}$ to solve this problem:

$$F^{D}(x, h_{D}, n_{D}) = \max_{x_{e,j}, h_{j}} \sum_{j=1}^{n_{D}} f^{D}(x_{f}, x_{e,j}, h_{j})$$

$$s.t.$$

$$\sum_{j=1}^{n_{D}} h_{j} \le h_{D} \quad , \quad \sum_{j=1}^{n_{D}} x_{e,j} \le x_{e}$$

$$x_{e} + x_{f} \le x$$

$$(5)$$

where $x_{e,j}$ and h_j are the establishment specific intangible capital and the labor demand for establishment j. Given that all establishments have the same production technology, the solution to the firm maximization problem is:

$$h_j = \frac{h_D}{n_D}$$
, $x_{e,j} = \frac{x_e}{n_D}$, $x_e = (1 - \alpha)x$, $x_f = \alpha x$

Substituting this solution into (5), the production function for the firm will be

$$F^{D}(x, h_{D}, n_{D}) = \Psi_{D}(n_{D}^{\alpha}x)^{1-\gamma}h_{D}^{\gamma}$$
(6)

where $\Psi_D = (\alpha^{\alpha}(1-\alpha)^{1-\alpha})^{1-\gamma}$. Notice that as the firm has n_L establishments, the level of output depends on n_L as well as technology capital x.

The first stage; given the wage rate w, the firm with intangible capital x chooses $\{n_D, h_D\}$ to maximize the after-tax profit:

$$\pi^{D}(x) = \max_{n,h} \left(F^{D}(x, h_{D}, n_{D}) - wh_{D} - wn_{D}cD \right) (1 - t_{D})$$
(7)

where t_D is the domestic corporate tax rate. Here, we are assuming that the mainland has a linear tax structure levied on the net profit of the firms. In other words, firms pay a proportional tax rate t_D on each unit of their profit.

3.2.2 Multinational firms' problem, $\tau = M$

In this case, we are assuming that the firm can have one domestic establishment, and $n_F \geq 1$ foreign establishments. We can think of the domestic establishment as the headquarter where in addition to production. We can describe the profit function of the firm in the

following way:

$$\pi^{M}(x) = \max_{\substack{x_{f}, x_{eD}, h_{D}, \\ x_{eF}, h_{F}}} \left\{ \left(f^{D}(x_{f}, x_{eD}, h_{D}) - wh_{D} - wc^{D} + F^{F}(h_{F}, n_{F}, x_{f}, x_{eF}) - wh_{F} - wn_{F}c^{F} \right) (1 - t_{F}) \right\}$$

$$s.t.$$

$$x_{f} + x_{eF} + x_{eD} \leq x$$
(8)

where h_D is the labor demand for the domestic establishment, h_D is the aggregate labor demand for foreign establishments, n_F is the number of foreign establishments, x_f is the firmspecific intangible capital, x_{eD} is the establishment-specific intangible capital for the domestic establishment, x_{eF} is the sum of establishment-specific intangible capital used in foreign establishments, and t_F is the corporate tax rate in the location of foreign establishments. Note that we are assuming that, if a firm decides to create and run foreign establishments, then all the profit generated in both domestic and foreign establishments will be taxed according to the tax regime of the foreign location. This setup is meant to model the tax planning that happens in multi-establishment firms with subsidiaries in low-tax areas. Hence, we allow the firm to shift *all* of the profit it makes in a high tax domestic location to the low tax foreign location.

In (8), $F^F(h_F, n_F, x_f, x_{eF})$ is defined as

$$F^{F}(h_{F}, n_{F}, x_{f}, x_{eF}) = \max_{z_{e,j}, h_{j}} \sum_{j=1}^{n_{F}} f^{F}(x_{f}, x_{e,j}, h_{j})$$

$$s.t.$$
(9)

$$\sum_{j=1}^{n_F} h_j \le h_F$$
$$\sum_{j=1}^{n_F} x_{e,j} \le x_{eF}$$

in which, similar to (5), as all foreign establishments have the same production technology, the firm will distribute labor h_F , and intangible capital x_{eF} equally among all n_F establishments.

Choosing the firm structure, a firm with the technology capital x, chooses between a domestic and multinational structure by comparing the after-tax profits of each option

$$\pi(x) = \max\{\pi^{D}(x), \pi^{M}(x)\}$$
(10)

Choosing the structure of firm, i.e. being domestic or multinational hings on how the two types of establishments compare with each other that affects the after tax profit of each structure. The first difference between a domestic and a foreign establishment is with respect to the fixed cost of creating/running an establishment. Domestic ones are facing a lower fixed cost compared to foreign establishments, $(c^D < c^F)$, which is a common assumption in the literature. The second difference between the two is with respect to depreciation of establishment-specific intangible capital, which we show with parameter μ in the model. For foreign establishment, $\mu > 0$, indicating that part of the establishment-specific intangible capital is lost due to depreciation, while the value of μ for the domestic establishments is 0. Finally, tax implications differ between the two structures. If a firm chooses to be domestic, meaning to have only domestic establishments, the profit is subject to corporate tax at rate t_D , whereas a multinational firm, meaning the one with both domestic and foreign establishments, the profit is taxed at t_F which we assume to be lower than t_D . this is basically the way our model captures the profit shifting practice aimed at reducing the firm's overall tax liability.

4 Parametrization

The French economy is assumed to be the high tax jurisdiction benchmark and the model parameters are chosen to match the key aspects of French firms that we have in the empirical part - taken from ORBIS database -. We assume the intangible capital x, has a Pareto distribution with tail parameter ξ and scale parameter x_m .

One set of parameters are picked from the literature. The parameters that governs return to scale, i.e. span of control, at the establishment level, γ is chosen to be 0.8 (Guner et al. (2008)). Tax rate for mainland, t_D set to 34% and tax rate that imposed on multinational firms, $t_F = 15\%$, which corresponds to the corporate tax rate in lower tax counties in Europe. The rest of parameters are determined jointly.

Parameter	Value	Description
α	0.34	importance of technology capital
γ	0.8	span of control parameter
μ	0.9	depreciation of x_e for foreign est.
c^D	5.5	cost of operating domestic establishment
c^F	6	cost of operating foreign establishment
ξ	1.3	tail parameter for intangible capital distribution
x_m	0	scale parameter for intangible capital distribution
t_D	0.34	tax rate for mainland
t_F	0.15	tax rate for abroad

 Table 4: Parameter Values

Note: This table summarizes values of parameters with brief descriptions.

5 Findings

In this section, we explain the outcome of the model, which is plotted in the following figure. Subsequently, in the discussion section, we conduct three experiments to assess the model's predictions under different circumstances.

In executing the model, we set the wage rate to a normalized value of 1, assuming wage rates are the same in both the mainland and foreign locations. This choice is intentional; our primary objective is to isolate and assess the impact of tax planning on the decision to establish a foreign unit. By doing so, we aim to abstract from other incentives like reduced production costs through lower wages or cheaper capital, topics that have already been extensively covered in existing literature.

The initial graph in Figure 3 provides a comparative analysis of after-tax profits for firms opting for either a domestic or multinational structure, plotted against various levels of technology capital (x). For firms with smaller amounts of x, the model suggests that a domestic structure is more profitable. This is primarily because domestic firms experience zero depreciation of their establishment-specific intangible capital x_e , incur lower fixed and operational costs, but are subject to a higher tax rate on their profits. These factors tend to offset the negative impact of the higher tax rate, making it advantageous for smaller firms to remain domestic.

As x increases, the scenario changes. Firms with higher levels of technology capital find it



Figure 3: Output of the model with baseline parameters

Note: for all figures, the horizontal axis is the technology capital x.

more beneficial to transition to a multinational structure. Despite facing higher operational costs and some depreciation of x_e , the lower foreign tax rate becomes a significant factor, making the multinational option more profitable as x grows.

Further insights can be gleaned from the second and third plots in Figure 3. These plots reveal that for the same level of intangible capital x, firms operating as multinationals typically opt for fewer establishments and employ fewer workers. The fourth plot underscores a noteworthy consequence: opting for a multinational structure results in a decline in overall production levels for firms with higher x.

Overall, our model suggests that although tax planning benefits make the multinational structure attractive for firms with high levels of technology capital, this choice comes with trade-offs in terms of reduced production and employment levels in the economy.

6 Discussion

To better understand the significance of the various mechanisms highlighted in our model, we conducted three experiments and contrasted their outcomes with the baseline scenario.

6.1 Uniform tax structure in domestic and foreign locations

The primary motivation for firms to opt for a multinational structure is the tax benefits it offers. In this experiment, we neutralize this incentive by setting equal tax rates in both domestic and foreign locations and then rerun the model. Our goal is to evaluate the cost of tax planning in terms of aggregate output and employment for the economy.

As anticipated, in this scenario, no firms opt for a multinational structure, as shown in Figure 4. Firms with higher levels of technology capital consequently grow larger than their benchmark counterparts, both in terms of overall size and the number of establishments. With uniform tax rates in both locations, total output increases compared to the baseline case. This experiment validates that tax planning incentives lead to smaller firms and, subsequently, reduced economic output.

6.2 Equalized fixed cost for domestic and foreign establishments

Tax rates aren't the only difference between a domestic and a foreign establishment; the running costs are also lower for domestic establishments. Consequently, the lower cost of creating and operating domestic establishments is one of its advantages. In this exercise, we



Figure 4: Output of the model with uniform tax structure in domestic and foreign locations



compare the importance of this advantage on firms' choice by equalizing the cost of running for both types of establishments. Therefore, we are taking away one of the advantages of being a domestic firm. As shown in Figure 5, the level of technology capital at which firms choose to become multinational over domestic is lower than in the benchmark case. Further, when compared to the benchmark case, the total output of firms is smaller because firms with lower levels of x opt to be multinational.

6.3 Assessing the trade-off between tax incentive and labor cost advantage

Besides the advantages of tax planning, the opportunity for cheaper labor costs is another compelling reason for a firm to go multinational. In this exercise, we measure the influence of tax planning against the allure of lower labor costs. To do so, we standardize tax rates across both locations while modestly increasing the labor costs for domestic establishments. Essentially, we substitute the tax incentive with an incentive for lower labor costs. Figure 6 presents the model's outcomes. When compared to tax planning, we find that the appeal of lower labor costs is a stronger driver for firms to opt for a multinational structure.

As observed in the final plot of the figure, only firms with lower levels of technology capital opt for a domestic structure. The technology capital threshold for preferring a multinational setup is significantly lower in this scenario compared to when tax planning incentives are in play. However, this does not entail the downsides commonly associated with tax planning. As depicted in the second and fourth plots in Figure 6, opting for a multinational structure in this case leads to higher labor hiring and increased output. This is because the cost of production is more favorable in foreign establishments. Therefore, when a firm's intent for establishing foreign subsidiaries is to benefit from lower labor costs, a multinational structure actually boosts aggregate output compared to a solely domestic operation.

7 Conclusion

In this paper, we analyzed the consequences of profit shifting for firm growth. Using firmlevel balance sheet data we find that multi-establishment domestic firms tend to be larger than comparable multinational firms with subsidiaries in tax havens. Our results support the notion that some firms prioritize tax savings over domestic expansion, which can result in reduced output and employment.



Figure 5: Output of the model when the cost of creating an running an establishment is equalized in both locations





Figure 6: Output of the model with cheaper labor in foreign location and uniform tax rates

Note: for all figures, the x axis is the technology capital x.

We developed a novel firm dynamic model with multi-establishment firms to explain the mechanism driving this empirical observation. In our model, firms choose to expand their operations by either growing the size of each of their establishments or by opening a new establishment. They can open a new establishment either in a domestic, high-tax location or in a foreign, low-tax location. We use this model to study the real effects of tax planning incentive on firm's size and total output of the economy. We consider the total output to be GNP to take into account the output generated by MNCs abroad. We find that the consequence of firms setting tax bill minimization as their objective is a lower production and employment level for the economy.

Our results have important implications for policymakers who are concerned about the effects of profit shifting on the economy. By showing that profit shifting can result in reduced output and employment, our findings clarifies the real costs of firms engaging in tax planning activities. Our study and the model we developed here is useful from a policy perspective, especially when evaluating costly policy proposals that are targeting tax avoidance practices. This model can provide a measure of the potential benefit of those policies for the economy in terms of real output and employment which can be compared with the costs of implementing those policies.

References

- Heitor Almedia, Chang-Soo Kim, and Hwanki Brian Kim. Internal capital markets in business groups: Evidence from the asian financial crisis. *The Journal of Finance*, 70(6): 2539–2586, 2015.
- Vanessa I Alviarez, Javier Cravino, and Natalia Ramondo. Firm-embedded productivity and cross-country income differences. Working Paper 27915, National Bureau of Economic Research, October 2020. URL http://www.nber.org/papers/w27915.
- Ulf Andersson, Mats Forsgren, and Ulf Holm. The strategic impact of external networks: Subsidiary performance and competence development in the multinational corporation. *Strategic Management Journal*, 23(11):979–996, 2002a. ISSN 01432095, 10970266. URL http://www.jstor.org/stable/3094344.
- Ulf Andersson, Mats Forsgren, and Ulf Holm. The strategic impact of external networks: subsidiary performance and competence development in the multinational corporation. *Strategic Management Journal*, 23(11):979–996, 2002b. doi: https://doi.org/10.1002/smj.267. URL https://onlinelibrary.wiley.com/doi/abs/10.1002/smj.267.
- Ulf Andersson, Ingmar Björkman, and Mats Forsgren. Managing subsidiary knowledge creation: The effect of control mechanisms on subsidiary local embeddedness. International Business Review. 14(5):521-538,2005.ISSN 0969-5931. doi: https://doi.org/10.1016/j.ibusrev.2005.07.001. URL https://www.sciencedirect.com/science/article/pii/S0969593105000727.
- Andrew Atkeson and Ariel Tomás Burstein. Innovation, firm dynamics, and international trade. Journal of Political Economy, 118(3):433-484, 2010. doi: 10.1086/653690. URL https://doi.org/10.1086/653690.
- Alan J. Auerbach and James R. Hines. Chapter 21 taxation and economic efficiency. volume 3 of *Handbook of Public Economics*, pages 1347 – 1421. Elsevier, 2002. doi: https://doi.org/10.1016/S1573-4420(02)80025-8.
- Sebastian Beer, Ruud De Mooij, and Li Liu. International corporate tax avoidance: A review of the channels, magnitudes, and blind spots. *Journal of Economic Surveys*, 34(3): 660–688, 2020. doi: 10.1111/joes.12305.

- Katarzyna Bilicka and Sepideh Raei. Output distortions and the choice of legal form of organization. *Economic Modelling*, 119:106159, 2023. ISSN 0264-9993. doi: https://doi.org/10.1016/j.econmod.2022.106159. URL https://www.sciencedirect.com/science/article/pii/S0264999322003960.
- Katarzyna Bilicka, Yaxuan Qi, and Jing Xing. Real responses to anti-tax avoidance policies: Evidence from the uk worldwide debt cap. *Working Paper*, 2020.
- Katarzyna Bilicka, Michael Devereux, and Irem Guçeri. Tax policy, investment and profitshifting. Technical report, Working Papers, 2023.
- Katarzyna A Bilicka and Daniela Scur. Organizational capacity and profit shifting. Working Paper 29225, National Bureau of Economic Research, September 2021.
- Katarzyna Anna Bilicka. Comparing uk tax returns of foreign multinationals to matched domestic firms. *American Economic Review*, 109(8):2921–53, August 2019.
- Xavier Boutin, Giacinta Cestone, Chiara Fumagalli, Giovanni Pica, and Nicolas Serrano-Velarde. The deep-pocket effect of internal capital markets. *Journal of Financial Eco*nomics, 109(1):122 – 145, 2013.
- David F. Bradford. The incidence and allocation effects of a tax on corporate distributions. Journal of Public Economics, 15(1):1–22, 1981. ISSN 0047-2727.
- Daphne Chen, Shi Qi, and Don E. Schlagenhauf. Corporate income tax, legal form of organization, and employment. *AEJ: Macroeconomics*, 2017.
- Mihir A. Desai, C. Fritz Foley, and Kristin J. Forbes. Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Depreciations. *The Review of Fi*nancial Studies, 21(6):2857–2888, 03 2007.
- Dhammika Dharmapala and Nadine Riedel. Earnings shocks and tax-motivated incomeshifting: Evidence from European multinationals. *Journal of Public Economics*, 97:95–107, 2013. doi: 10.1016/j.jpubeco.2012.08.004.
- Tim Dowd, Paul Landefeld, and Anne Moore. Profit shifting of u.s. multinationals. *Journal of Public Economics*, 148:1 13, 2017a. ISSN 0047-2727.

- Tim Dowd, Paul Landefeld, and Anne Moore. Profit shifting of U.S. multinationals. Journal of Public Economics, 148:1–13, 2017b. ISSN 0047-2727. doi: 10.1016/j.jpubeco.2017.02.005.
- Jeffrey H. Dyer and Harbir Singh. The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *The Academy of Management Review*, 23(4): 660–679, 1998. ISSN 03637425. URL http://www.jstor.org/stable/259056.
- Sebastien Dyrda and Benjamin Pugsley. Taxes, private equity, and evolution of income inequality in the us. *Working paper*, 2019.
- Jonathan Eaton and Samuel Kortum. Technology, geography, and trade. *Econometrica*, 70 (5):1741–1779, 2002. doi: 10.1111/1468-0262.00352.
- Peter Egger, Wolfgang Eggert, and Hannes Winner. Saving taxes through foreign plant ownership. *Journal of International Economics*, 81(1):99 108, 2010.
- Yulin Fang, Michael Wade, Andrew Delios, and Paul W. Beamish. International diversification, subsidiary performance, and the mobility of knowledge resources. *Strategic Management Journal*, 28(10):1053-1064, 2007. doi: https://doi.org/10.1002/smj.619. URL https://onlinelibrary.wiley.com/doi/abs/10.1002/smj.619.
- Martin S Feldstein. The Welfare Cost of Capital Income Taxation. *Journal of Political Economy*, 86(2):29–51, April 1978.
- Martin S Feldstein and Joel Slemrod. Personal Taxation, Portfolio Choice, and the Effect of the Corporation Income Tax. *Journal of Political Economy*, 88(5):854–866, October 1980.
- Xavier Giroud and Holger M. Mueller. Capital and Labor Reallocation within Firms. *Journal* of Finance, 70(4):1767–1804, August 2015.
- Xavier Giroud and Holger M. Mueller. Firm Leverage, Consumer Demand, and Employment Losses During the Great Recession. The Quarterly Journal of Economics, 132(1):271–316, 10 2016.
- Jane G Gravelle and Laurence J Kotlikoff. The Incidence and Efficiency Costs of Corporate Taxation When Corporate and Noncorporate Firms Produce the Same Good. *Journal of Political Economy*, 97(4):749–780, August 1989.

- Harry Grubert and Joel Slemrod. The Effect Of Taxes On Investment And Income Shifting To Puerto Rico. *The Review of Economics and Statistics*, 80(3):365–373, August 1998.
- Anna Gumpert, James R. Hines Jr., and Monika Schnitzer. Multinational firms and tax havens. The Review of Economics and Statistics, 98(4):713–727, 2016.
- Nezih Guner, Gustavo Ventura, and Xu Yi. Macroeconomic Implications of Size-Dependent Policies. *Review of Economic Dynamics*, 11(4):721-744, October 2008. doi: 10.1016/j.red.2008.01.005. URL https://ideas.repec.org/a/red/issued/07-73.html.
- James R. Hines and Eric M. Rice. Fiscal Paradise: Foreign Tax Havens and American Business. The Quarterly Journal of Economics, 109(1):149–182, 1994.
- Hugo Hopenhayn and Richard Rogerson. Job Turnover and Policy Evaluation: A General Equilibrium Analysis. *Journal of Political Economy*, 101(5):915–938, October 1993.
- Hugo A Hopenhayn. Entry, Exit, and Firm Dynamics in Long Run Equilibrium. *Economet*rica, 60(5):1127–1150, September 1992.
- Kilian Huber. Disentangling the effects of a banking crisis: Evidence from german firms and counties. *American Economic Review*, 108(3):868–98, March 2018.
- Harry Huizinga and Luc Laeven. International profit shifting within multinationals: A multi-country perspective. *Journal of Public Economics*, 92(5-6):1164–1182, June 2008.
- Håkan Håkansson and Ivan Snehota. No business is an island: The network concept of business strategy. Scandinavian Journal of Management, 5(3):187-200, 1989. ISSN 0956-5221. doi: https://doi.org/10.1016/0956-5221(89)90026-2. URL https://www.sciencedirect.com/science/article/pii/0956522189900262.
- Michael C Jensen. Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. American Economic Review, 76(2):323–329, May 1986.
- Sebnem Kalemli-Ozcan, Herman Kamil, and Carolina Villegas-Sanchez. What Hinders Investment in the Aftermath of Financial Crises: Insolvent Firms or Illiquid Banks? The Review of Economics and Statistics, 98(4):756–769, October 2016.
- Robert Lucas. On the size distribution of business firms. *Bell Journal of Economics*, 9(2): 508–523, 1978.

- James Markusen. Multinationals, multi-plant economies, and the gains from trade. *Journal* of International Economics, 16(3-4):205–226, 1984.
- Bill McEvily and Akbar Zaheer. Bridging ties: A source of firm heterogeneity in competitive capabilities. *Strategic Management Journal*, 20(12):1133–1156, 1999. ISSN 01432095, 10970266. URL http://www.jstor.org/stable/3094082.
- Ellen McGrattan and Edward Prescott. Openness, technology capital, and development. Journal of Economic Theory, 144(6):2454–2476, 2009.
- Natalia Ramondo. A quantitative approach to multinational production. Journal of International Economics, 93(1):108–122, 2014. doi: 10.1016/j.jinteco.2014.01.
- Alessia Sammarra and Lucio Biggiero. Heterogeneity and specificity of inter-firm knowledge flows in innovation networks. *Journal of Management Studies*, 45 (4):800-829, 2008. doi: https://doi.org/10.1111/j.1467-6486.2008.00770.x. URL https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-6486.2008.00770.x.
- Raffaele Santioni, Fabio Schiantarelli, and Philip E Strahan. Internal capital markets in times of crisis: The benefit of group affiliation in italy. Working Paper 23541, National Bureau of Economic Research, June 2017.
- Juan Carlos Suárez Serrato. Unintended Consequences of Eliminating Tax Havens. NBER Working Papers 24850, National Bureau of Economic Research, Inc, July 2018.
- Brian Uzzi. The sources and consequences of embeddedness for the economic performance of organizations: The network effect. American Sociological Review, 61(4):674–698, 1996. ISSN 00031224. URL http://www.jstor.org/stable/2096399.
- Raymond Van Wijk, Justin J. P. Jansen, and Marjorie A. Lyles. Inter- and intra-organizational knowledge transfer: A meta-analytic review and assessment of its antecedents and consequences. *Journal of Management Studies*, 45(4): 830-853, 2008. doi: https://doi.org/10.1111/j.1467-6486.2008.00771.x. URL https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-6486.2008.00771.x.
- Marcelo Veracierto. Employment flows, capital mobility, and policy analysis. *International Economic Review*, 42(3):571–596, 2001.

Xican Xi. Multi-establishmentfirms, misallocation, and productivity. Journalof Economic Dynamics and Control, 2023. 154:104705, ISSN 0165-1889. https://doi.org/10.1016/j.jedc.2023.104705. doi: URL https://www.sciencedirect.com/science/article/pii/S0165188923001112.

Appendices

A Additional empirical evidence



Figure A1: Industry heterogeneity - differences between domestic and multinational firms.

c Turnover

Note: Total assets and turnover numbers are averages in thousands of \$USD. Employment is a simple average. Only firms which report consolidated financial accounts for all their establishments. Source: Orbis data.