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The Impact of Profit Shifting on Economic Activity
and Tax Competition

By Alexander Klemm and Li Liu

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The Impact of Profit Shifting on Economic Activity and Tax Competition

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Abstract

A growing empirical literature has documented significant profit shifting activities by multinationals. This paper looks at the impact of such profit shifting on real activity and tax competition. Real activity can be affected as profit shifting changes—and theoretically most likely reduces—the cost of capital. Tax competition, even over real capital, is affected, because a permissive attitude toward profit shifting can be seen as a selective tax reduction for multinationals. Tightening profit shifting rules in turn can affect tax competition through the main rate. This paper discusses these issues theoretically and with the help of a simulation to assess the impact of profit-shifting on investment, revenues, and government behavior. Using the theoretical framework, it also provides a brief overview of the related empirical literature.

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I. INTRODUCTION

Under the current international taxation system, multinational corporations (MNCs) can often reduce their global tax liabilities through profit shifting activities. Typical examples include transfer price manipulation, intra-company debt, and the strategic location of intangible assets, such as intellectual property (IP). There is plenty of empirical evidence that reported profits by multinationals indeed respond to international tax differentials. A recent survey article (Beer, de Mooij, and Liu, 2018) estimates the consensus value of the semi-elasticity of reported profits with respect to international tax differential to be 1.5. That is, a 1 percentage-point reduction in the statutory CIT tax rate in a certain location is expected to raise reported profits by multinationals in that location by 1.5 percent, *ceteris paribus*.

The size of tax revenue at stake is also substantial. For the United States alone tax avoidance costs about between one quarter and one third of total corporate tax revenue in 2012 (Clausing, 2016). Losses elsewhere could be much larger and possibly amount to several points of GDP, especially in lower income countries with weak enforcement capacity. Revenue losses are of particular concern for developing countries, which derive a higher share of their total revenue from corporate taxes and have fewer alternative revenue sources to fall back on (Keen, 2017).

During the last few decades, many countries have adopted a variety of anti-avoidance regulations to mitigate international corporate tax avoidance. These include, for example, the adoption of increasingly detailed transfer pricing regulations, thin capitalization rules, controlled foreign corporations (CFC) rules or a general anti-avoidance rule (GAAR). In recent years, these efforts have been elevated to supranational levels in light of the initiative of the G20-OECD on base erosion and profit shifting (BEPS). The project aims to address major tax avoidance opportunities arising under the current international tax framework in a coordinated manner (OECD, 2015). For instance, countries participating under what is now called the inclusive framework on BEPS, commit to four minimum standards (e.g., on treaty abuse) and adhere to the common approaches to adopt anti-avoidance legislation.

The focus of this paper is on the impact of profit shifting and its countermeasures on real investment and tax competition. Our analysis shows that:

- Real investment can be affected by profit shifting in various ways, most obviously, investment in high-tax countries may be higher, if investors know that they are able to avoid some of the tax through profit shifting. More subtly, investors may also invest more in low-tax jurisdictions, because having capital there may facilitate shifting profits into those jurisdictions.
- Tax competition is the process of lowering taxes to attract capital investment. A permissible attitude toward profit shifting could be a component of such competition, as governments can reduce effective tax levels by tolerating such behavior. In turn, if profit shifting is limited through international coordination, governments may face stronger pressure to reduce tax levels directly, for example by cutting statutory tax rates.

This paper discusses these two channels and their policy implications. It is structured as follows. Section II discusses the theoretical impact of profit shifting on investment and tax competition,

when there is only one type of capital. This capital is internationally mobile—or more precisely—allows profit shifting at some cost. Further interesting issues arise, when capital is heterogenous, with only some capital internationally mobile. The implications of this, and the similarities of profit shifting with preferential tax regimes are discussed in Section III. Section IV discusses related empirical evidence. Section V draws overall conclusions.

II. THE EFFECTS OF PROFIT SHIFTING WHEN CAPITAL IS MOBILE

A. Conceptual Framework

Tax-motivated profit shifting changes the effective tax rates paid by MNCs. For example, in the extreme case of costless profit shifting, MNCs could entirely avoid corporate income tax (CIT) by shifting all profits into a country with no (or minimal) CIT. Then its effective CIT rate for investment becomes zero—even in the high-tax country. Its cost of capital—or using the expression coined by Grubert and Slemrod (1998), its ‘income shifting adjusted cost of capital’—is reduced to the normal rate of return. This reduction in the cost of capital would boost investment compared to the case of no profit shifting.

More realistically, profit shifting is not without limits. Legal profit shifting is restricted by a range of laws and regulations. As these laws are not very precise—for example determining the transfer prices of intangibles is not an exact science—shifting small amounts of profits is relatively inexpensive. Shifting larger amounts, will however require setting up complicated structures (e.g., companies that hold IP assets) or relocation of at least some real activity. Any profit shifting through tax avoidance additionally carries a risk of detection and penalties, which is likely to rise with the amount of tax avoided.

In a simple model below, we illustrate the exact role of profit shifting in affecting the cost of capital, where profit shifting is costly. The model is based on the frameworks described in Hines and Rice (1994) and Grubert and Slemrod (1998). A similar approach is also described in Suárez Serrato (2018) and Desai, Foley, and Hines (2006), who allow firms to invest in low-tax jurisdictions so as to obtain access to profit-shifting opportunities. A somewhat different model, which also leads to a tradeoff between profit shifting controls and tax cuts is described in Peralta, Wauthy, and van Ypersele (2006). Specifically, they assume a monopolist can locate production in either of two countries, from which both will then be served, and between which profits can be shifted. Governments set tax rate and decide on whether to allow profit shifting. Lenient transfer price control can be used as a substitute for tax cuts and can reduce competition over rates.²

Consider a MNC locating in n countries. Assuming a territorial system of taxation,³ after-tax profits for the MNC are given by:

² Another related paper is Johannesen (2012), which considers the implications of withholding taxes on international interest payments as a means of limiting profit shifting through thin capitalization.

³ If we wish to distinguish between the county of the parent p and other countries, this can be rewritten as: $(1 - t_p)f_p(K_p) + \sum_{j \neq p} (1 - t_j)f_j(K_j) - r(\sum_j K_j)$. A complication arises in case of countries with worldwide taxation: the tax rate in countries other than p will reflect both source and residence-based taxation (in case of

$$\sum_j (1 - t_j) f_j(K_j) - r \sum_j K_j, \quad (1)$$

where: $f_i(\cdot)$ is a firm's production function in country i , which is assumed to be increasing in capital ($f_i'(K_i) > 0$) and exhibits decreasing returns to investment ($f_i''(K_i) < 0$); and r is the required rate of return.

The firm undertakes two sequential decisions.⁴ First, it decides how much capital to invest in each country. In the second period, it chooses the optimal profit-shifting strategy. Specifically, a firm engages in profit shifting by reporting some profitability π_i instead of its true profitability ($f_i(K_i)/K_i$). The cost of reporting a profit that is different from true profit is modelled as proportional to local investment and rising quadratically in the degree of profit shifting:

$$c(\pi_i, K_i) = \frac{K_i}{2a} \left(\pi_i - \frac{f_i(K_i)}{K_i} \right)^2. \quad (2)$$

The parameter a measures the extent of costs from reporting local profits different from true profits, with high values of a implying lower profit shifting costs. In particular, stricter anti-avoidance regulations (or stronger administrative capacity) increase the cost of profit shifting or lower the value of a . The shape of the cost function is crucial. If profit shifting were independent of capital stocks, for example, if it depended only on the absolute amount of profit shifted, very different results would be obtained, and certainly real investment would not be linked to profit shifting. For many profit-shifting scenarios a link to capital is likely though: the more actual activity there is in a country, the more profit can be shifted by a small transfer price change. Moreover, profits that are very out of line with the size of operations would likely attract the attention of tax authorities.

The firm's optimization problem can be solved starting from the second period. Given a capital allocation $\{K_j\}$, the firm solves the following tax-planning problem:

$$\max_{\{\pi_j\}} \sum_j K_j \left[(1 - t_j) \pi_j - r - \frac{\left(\pi_j - \frac{f_j(K_j)}{K_j} \right)^2}{2a} \right], \text{ s. t. } \sum_j f_j(K_j) = \sum_j \pi_j K_j. \quad (3)$$

The constraint implies that the firm must report total profits truthfully but may shift the location of its profits to minimize taxes. Optimal reported profitability, by solving the first-order conditions of Equation (3), is:

full worldwide taxation on an accruals bases, t_i would equal t_p for all countries with rates below the parent country and there would be no incentives to shift profits out of country p).

⁴ In an alternative model in Harper and Liu (2019), the firm decides jointly on the of investment and the scale of profit shifting, whereas the cost function is modeled as increasing in the proportion of profit shifted. The key conclusions remain the same.

$$\pi_i = \frac{f_i(K_i)}{K_i} + a(\tilde{t} - t_i), \quad (4)$$

where \tilde{t} is the capital-weighted-average tax rate ($\sum_j t_j K_j / \sum_j K_j$).

The relationship in Equation (4) summarizes three simple and intuitive results. First, the direction of profit shifting depends on the relative statutory tax rates, i.e., the difference between the host country statutory tax rate and the capital-weighted average tax rates. The firm under-reports profits in countries where the corporate tax rate is above the capital-weighted average tax rate, and over-reports in countries with a lower corporate tax. This result reproduces the Hines and Rice (1994) prediction that a firm's reported profitability is negatively correlated with the country's tax rate. Second, the magnitude of reported profitability is positively correlated with economic profitability. Third, optimal reported profitability is inversely related to profit shifting costs, i.e., increasing concealments costs dampen the extent of profit reallocation.

In the first period, the firm foresees its profit-shifting strategies and invests across countries to maximize a combination of economic and profit-shifting incentives. Substituting the optimal reported profitability into the objective function, and rearranging, we get:

$$\max_{\{K_j\}} \sum_j [(1 - t_j)f_j(K_j) - rK_j] + a \sum_j K_j \left[(1 - t_j)(\tilde{t} - t_j) - \frac{(\tilde{t} - t_j)^2}{2} \right]. \quad (5)$$

Maximizing with respect to K_i gives the user cost of capital:

$$f'_i(K_i) = \frac{1}{1 - t_i} \left[r - \frac{a}{2} (\tilde{t} - t_i)^2 \right]. \quad (6)$$

B. Impact on Real Investment

The reduction in the cost of capital can be expected to raise real investment. As shown in Equation (6), the income-shifting-adjusted user cost of capital is reduced by the net marginal benefit from profit shifting. One particularly interesting aspect is that profit shifting opportunities reduce the cost of capital both in countries whose tax rates exceed and undercut the weighted average. The reduction in the cost of capital thanks to profit shifting is largest in countries with (i) tax rates that are most different from the average, (ii) in countries with higher tax rates, and (iii) in countries with less stringent anti-avoidance rules (which is reflected in a higher value of a).

C. Impact on Government Behavior

Governments that engage in strategic tax setting, such as tax competition, have more than instrument at their disposal. Most importantly, they can (1) reduce the statutory corporate tax rate, (2) introduce preferential tax regimes, (3) loosen anti-avoidance regulations, or (4) signal lax enforcement. In terms of Equation (6), the first two instruments are reflected in a lower value of t_i , while the latter are reflected in a higher value of a . In this model, lower corporate tax rates and

lax anti-avoidance measures are substitutes in reducing the profit-shifting-adjusted user cost of capital.

To understand the choice between two instruments better, we consider the revenue implications of adjusting either.⁵ Assuming that firms choose the optimal capital stock K^* determined by equation (6), revenue (R) in each country is given by:

$$R_i = t_i f(K_i^*) + at_i(\bar{t}^* - t_i)K_i^* = t_i f(K_i^*) + at_i \left(\frac{\sum_j K_j^* (t_j - t_i)}{\sum_j K_j^*} \right) K_i^*. \quad (7)$$

The difficulty in assessing equation (7) is that the optimal capital stock is a function of the tax rate and the cost of profit shifting. However, the impact can be gauged by imposing some simplifying assumptions. Specifically, if we focus on a two-country case (labelled 1 and 2) and impose a specific production function of $f(K) = K^\alpha$, we can illustrate the trade-offs. In this case we obtain:

$$K_1 = \left(\frac{\alpha(1 - t_1)}{r - \frac{\alpha(K_2(t_2 - t_1))^2}{2(K_1 + K_2)^2}} \right)^{\frac{1}{1-\alpha}}. \quad (8)$$

By symmetry the same applies to the other country. While this is still difficult to solve analytically, a solution can be computed iteratively.

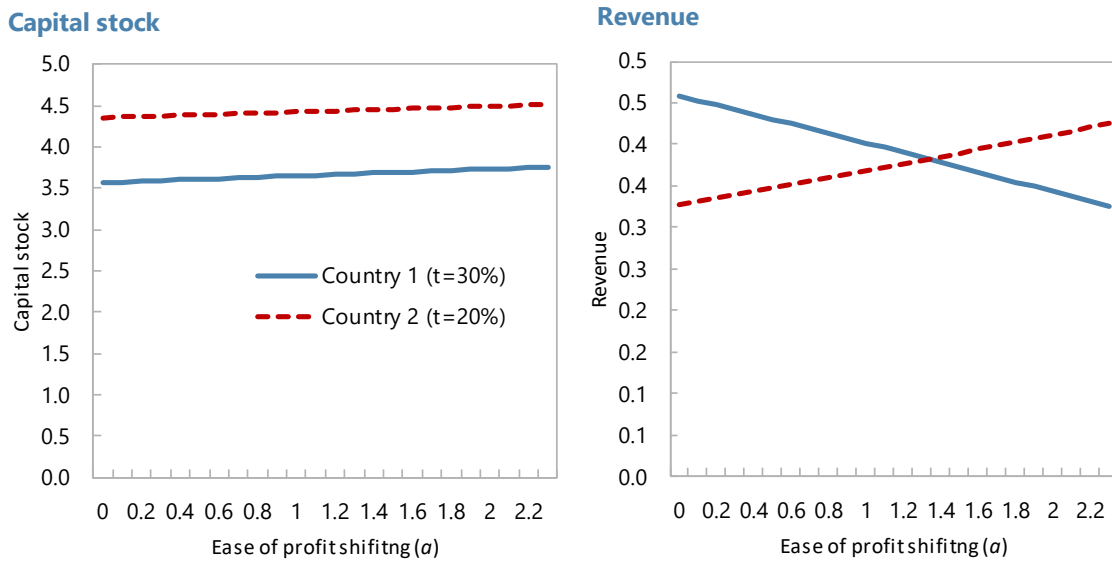
Costs of Profit Shifting

Consider first the cost of profit shifting. Assume that country 1 is in relative terms a high-tax country with a tax rate of 30 percent, while country 2 has lower tax rate of 20 percent. The calculations assume a world required rate of return of 10 percent and a production function with $\alpha = 1/3$. Qualitatively similar results are obtained with any other reasonable assumptions (i.e., both figures not above zero and below 1). The left panel of

Figure 1 shows how the capital stock in each country changes as a function of the ease of profit shifting (i.e., parameter a). As expected, the low-tax country has a higher capital stock, and in both countries the stock rises as profit shifting becomes less costly. The right panel shows that revenues rise in the low tax country and fall in the high tax country, the easier it is to shift profits. This means that—at least in this simple model—taxes on the additional real capital that is drawn in as a result of profit shifting is not enough to undo the lost reported tax base. For high-tax countries there is therefore a tradeoff: implementing measures to protect tax bases from profit shifting reduces the capital stock but raises revenue. For low-tax countries, there is no tradeoff, and relaxing profit-shifting rules boosts both capital stocks and revenues.

⁵ An analytically more demanding approach, left for future research, would involve defining a government objective function, capturing revenue in addition to other objectives, such as output.

Figure 1. Capital Stock and Tax Revenue in 2-Country Case, $r=10\%$, $\alpha=1/3$

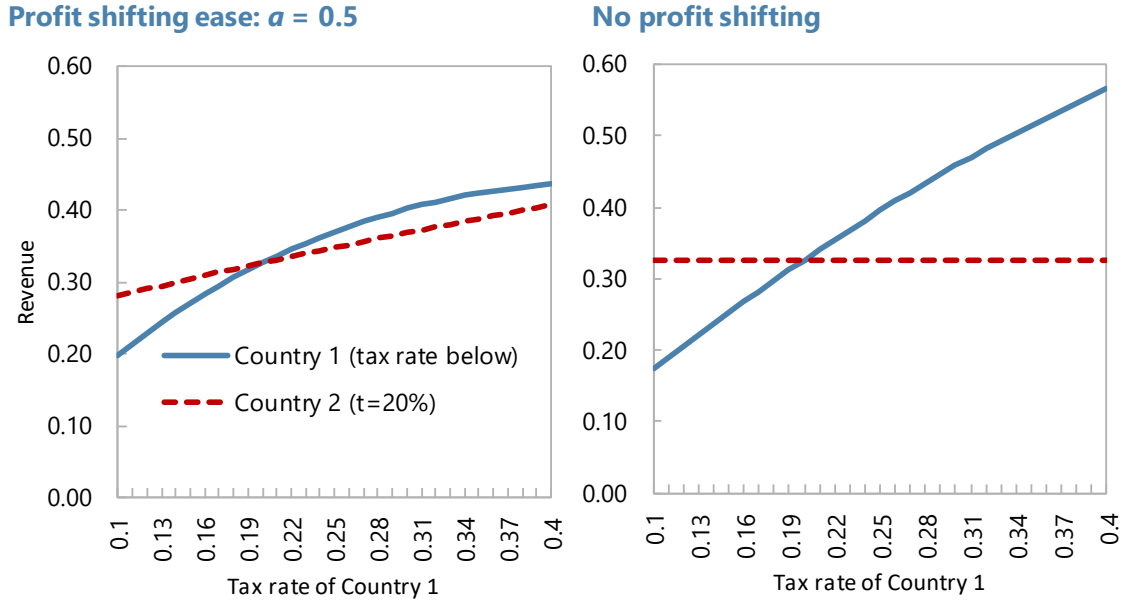


Source: Authors' Simulation.

The Tax Rate

To illustrate the impact of the tax rate, we fix the cost parameter of profit shifting ($a = 0.2$), keeping the same required rate of return production function parameter as above. Country 2 is assumed to maintain a tax rate of 20 percent as before. Country 1, however, is now allowed to vary its tax rate. **Figure 2** shows the impact of the choice of Country 1's tax rate on revenues. The right panel shows, for comparison, the results if there is no profit shifting. The left panel reveals very clearly, how raising the tax rate is much less effective in increasing revenues. The spillovers on the other country are, as expected, positive for any tax rate above 20 percent, and negative otherwise. The presence of profit shifting opportunities therefore has an ambiguous impact on tax competition: it reduces the benefit in terms of revenues when raising rates, but it reduces the costs in terms of lost investment. To the extent that raising revenues is weighed highly in a the government's objective function, the assumption would be that profit shifting leads to downward pressure on tax rates, at least based on this simple model.

Figure 2. Tax Revenues as Function of the Tax Rate in 2-Country Case, $r= 10\%$, $\alpha=1/3$



Source: Authors' Simulation.

A different argument for why tightening profit-shifting rules may intensify tax competition is made in Becker and Fuest (2012). In their model, allowing profit shifting to low-tax jurisdictions, encourages them to levy a higher tax rate. If rules are tightened low-tax jurisdictions may react by cutting rates to save some of their tax base.

III. PROFIT SHIFTING WITH HETEROGENEOUS CAPITAL

Even though the simple model described above already led to ambiguous effects on of profit shifting on welfare, it still overlooks a very important aspect in practice. Notably, not all capital is equally mobile.

A few theoretical papers analyze the interaction between profit shifting, the tax rate, and investment allowing for such heterogeneous capital. Hong and Smart (2010), for example, find that profit shifting within certain limits can benefit even the countries that lose tax bases, because of an increase in investment (as above), but also because this allows countries to raise the statutory tax rate without driving away mobile capital. The result is ambiguous, however, and depends on tax rates not being too high, and tax avoidance activities not being excessive. Haufler and Runkel (2012) consider the choice between profit shifting through thin capitalization and the tax rate. They find—in line with the tax competition literature—that in an uncoordinated equilibrium, countries choose tax rates that are inefficiently low. Moreover, they also choose inefficiently lenient thin capitalization rules. If countries coordinate on tightening thin capitalization, this benefits both countries, despite resulting in more intense competition over tax rates. As the global capital stock is fixed in their model, it is not clear whether this result holds more generally.

A related literature on preferential tax regimes (Keen, 2001; Janeba and Smart, 2003) has shown that offering a lower tax rate to the more mobile capital can be welfare enhancing. The intuitive explanation is that offering a special regime allows countries to restrict competition to the mobile base (K^M), without giving up as much of the revenues from the immobile base (K^I).

If the mobile tax base is also the base that has access to profit shifting, then there is a clear link between this literature and the issue considered here. Specifically, if only mobile firms have access to profit shifting (or face a naturally much lower cost), then profit-shifting permits a differentiation in effective tax levels between such firms. Hence the discussion of the usefulness of global measures to make it harder to shift profits is very similar to the benefits and harms of preferential tax regimes. Table 1 summarizes the comparison between both issues. The last row shows the likely policies of countries that act without coordination: because of the greater elasticity of mobile capital, the maximizing tax rate is lower, which can be achieved either by tolerating some profit shifting or by offering a special regime.

Table 1. Duality between Profit Shifting and Preferential Tax Regimes

	Differentiation by Tax Regime	Differentiation by Profit-Shifting Opportunities
Immobile Capital, K^I	Standard Regime	No profit shifting
Mobile capital, K^M ($\varepsilon^M > \varepsilon^I$)	Preferential Regime	Profit Shifting
Uncoordinated tax policy	t determined by ε^I Special regime by ε^M	t determined by ε^I BEPS measures by ε^M
Possible coordination	Restrict rate differential	Agree measures to curb profit shifting

Source: Authors' Assessment

Janeba and Smart (2003) discuss the conditions under which international coordination to restrict special regimes can be beneficial. Their approach considers two tax bases with different elasticities. The innovative aspect of their analysis is to consider both the elasticity of a tax base in response to a tax rate change by one country only ($\varepsilon_i^a = -\frac{t_i}{x_i(t_i, T_i)} \frac{\partial x_i(t_i, T_i)}{\partial t_i}$),⁶ and the elasticity in response to a change by both countries ($\varepsilon_i^b = -\frac{t_i}{x_i(t_i, T_i)} \left(\frac{\partial x_i(t_i, T_i)}{\partial t_i} + \frac{\partial x_i(t_i, T_i)}{\partial T_i} \right)$). As the latter elasticity keeps relative tax rates constant, it abstracts from any impact on capital mobility, and instead reveals the closed-economy equivalent relationship between the tax rate and the capital stock, or equivalently the responsiveness of the global capital stock to a global change in the tax rate (in Keen (2001), this is assumed 0, i.e., the global capital stock is fixed). They then label a tax base as mobile if the difference ($\varepsilon_i^c = \varepsilon_i^a - \varepsilon_i^b$) is large, i.e., if most of the change in the tax base is the result of capital mobility. They conclude that restricting rate differences is generally revenue raising, if the mobile base is also the more elastic one, but is revenue losing if the mobile base is less elastic.

⁶ Notation: x is the tax base, of which there are two indicated by i , t is own tax rate T is the other country's tax rate.

Based on the duality with the profit-shifting channel, this suggests that international agreements to curb profit shifting, such as the OECD-G20 BEPS initiative may or may not increase revenues—even abstracting from possibilities of uneven implementation.

The duality is not perfect, however. One advantage of profit shifting over preferential regimes, is that it allows self-selection of firms. Preferential regimes imply a lot of costs and risks, including for compliance and administration and the scope for corruption.⁷ To the extent that the link between mobility and access to profit shifting is indeed strong, a method based on self-selection can reduce these costs and risks. A disadvantage of profit shifting is that it incurs a deadweight cost, both in the model described above, and most likely also in practice as firms have to bear the costs of setting up structures with no productive use (e.g., subsidiaries in low-tax jurisdictions with no actual activity).

IV. EMPIRICAL EVIDENCE

The existing empirical literature has paid relatively little attention to the interaction between profit shifting and the allocation of real activities by MNCs. Most existing research has focused largely on either quantifying the scale of profit shifting and its revenue impact at national or global level, or instead on quantifying the impact of taxes on the location of FDI. There are, however, a number of recent papers that come closer to the interaction of interest here.

In terms of the simple model above, the link between real investment and profit shifting operates both through the tax differential and the cost of profit shifting (Equation (6)). While we are not aware of any paper analyzing both channels simultaneously, the literature has considered both of them separately. **Table 2** classifies the literature by the channel studied and the following two subsections discuss selected papers and their findings.

Table 2. Empirical Literature Related to Profit Shifting and Real Investment

Channel	Papers
Changes in $(\tilde{t} - t_i)$	Desai, Foley and Hines (2006)
	Overesch (2009)
Changes in α	Firm-specific proxies Grubert and Slemrod (1998)
	Transfer pricing regulations De Mooij and Liu (2018a) Buettner and others (2018)
	Thin capitalization rules Buettner and others (2018) De Mooij and Liu (2018b) Weichenrieder and Windischbauer (2008)
	Controlled Foreign Company (CFC) rules Egger and Wamser (2015) Albertus (2018)

Source: Authors' compilation

⁷ For an overview of the benefits, costs, and risks of tax incentives see for example Klemm (2010).

A. Evidence on the Investment Effect of Tax Differences

Overesch (2009) uses panel data on German inbound investment and shows that real investment increases by 0.971 percent with each percentage point increase in the tax rate difference between Germany and the investor's country. This can be interpreted as indirect evidence of real investment being responsive to the profit-shifting opportunities. Goldbach and others (2019), also using German data, find that multinationals increase their investment in Germany following investment abroad. They find that this effect is stronger the greater the tax differential, suggesting that profit-shifting opportunities indeed raise investment even in the high tax country. Desai, Foley, and Hines (2006) consider regional investment of multinationals and find that a positive relationship between the use of a low-tax jurisdictions and real investment in the same region. Specifically, if the likelihood of establishing a low-tax jurisdictions affiliate rises by 1 percent, then sales and investment in the region, but outside the low-tax jurisdictions, grow by 0.5-0.7 percent.

Becker and Riedel (2012) consider a somewhat different model, where investment in a host country depends on parent country taxes not only through profit shifting, but also because investment in both locations is interdependent. They find a semi-elasticity of host-country investment with respect to the home country tax rate of -0.56, which they argue is due to negative investment spillovers. This finding is not directly comparable, though, because an increase in parent country tax rate could increase or reduce the difference with host country.

B. Evidence on the Investment Effect of Profit Shifting Costs

Grubert and Slemrod (1998) show that investment by Puerto Rican affiliates of U.S. MNCs responds significantly to firm-level proxies for cost of shifting. Moreover, simulation results suggest that nearly half of all U.S. firms in PR are there solely for the profit shifting benefits. A later paper by Suárez Serrato (2018) further shows that limiting profit shifting for US multinationals, by removing the tax advantage of shifting profits to Puerto Rican, reduced the domestic investment of US multinationals by 38 percent, and their domestic employment by 1.0 million jobs.

Another related paper is Mintz and Smart (2004), which is mostly dedicated to estimating income shifting elasticities, but also presents one result of the impact of profit shifting opportunities on real investment choices. Specifically, the paper uses Canadian data to split firms into those that have limited and those that have ample possibilities for intra-provincial profit shifting. They find that that firms with access to shifting are more sensitive to tax rates—which is not in line with their model or our expectations.

A small, but growing, literature analyzes the effect of anti-avoidance rules on investment. If anti-avoidance rules reduce the scope for profit shifting, then there should be a negative impact on real investment, based on the considerations discussed above.

Transfer Pricing Regulation. De Mooij and Liu (2018a) study the impact of introducing or tightening transfer pricing regulations using European data. They find that such regulations have a negative and significant effect on MNC investment in fixed assets, with the introduction of such

regulations reducing MNC fixed investment by 15 percent, compared to investment by domestic companies. Buettner and others (2018) also consider transfer pricing regulations using data for German MNC affiliates, but they find no significant impact.

Thin Capitalization Rules. In addition to transfer pricing regulations, Buettner and others (2018) also analyze thin capitalization rules. They find a negative effect of thin capitalization rules on investment and employment. De Mooij and Liu (2018b) confirm the result of a negative impact of thin capitalization on investment using a panel dataset of multinational affiliates in 32 countries. Moreover, they show that the negative investment effect of thin-capitalization rules is more pronounced for highly-leveraged affiliates and with tighter safe-haven ratios. Weichenrieder and Windischbauer (2008) on the other hand find no impact of thin capitalization rules on real investment using German data, which they argue can be explained by firms being able to use a loophole to avoid the rules (a preference to holding companies). Ruf and Schindler (2015) discuss the experience of thin capitalization rules in Germany and the related literature.

Controlled Foreign Corporation (CFC) rules. Egger and Wamser (2015) study the impact of CFC rules and find that the German CFC rule decreased foreign subsidiaries' real investments by about €7 million per subsidiary in a regression discontinuity design. Albertus (2018) study foreign MNCs in the United States and that when a U.S. subsidiary is subject to a CFC law, the subsidiary's U.S. investment decreases by around 12 percent.

Another related paper is Nicolay, Nusser and Pfeiffer (2017), which studies the interaction between different measures to restrict profit shifting. Analyzing a French reform, the paper finds that tightening transfer pricing rules does not only reduce profit shifting, but also causes substitution toward more debt shifting and vice versa. Moreover, the substitution is stronger for firms with high shares of intangible profits, and hence presumably more opportunities to shift profits.

V. CONCLUSIONS

This paper has considered the link between profit shifting and real investment. One of the strong insights from the analysis is that profit-shifting opportunities unambiguously reduce the cost of capital in all countries—irrespective of whether they charge higher or lower taxes than the global average (for countries charging exactly the global average rate, there is no impact). Hence profit-shifting raises global capital stocks. That does not necessarily imply that it is also efficient, as it creates a distortion between the purely domestic and international parts of the economy, leading to a shift of capital from purely domestic to multinational firms.⁸ The impact on welfare and optimal behavior by governments is ambiguous, however. While jurisdictions with relatively low taxes are likely to gain revenues and capital, high-tax countries are likely to gain capital but lose revenue.

Considering that tax bases may differ in the degree of mobility—or their access to profit-shifting opportunities—reveals a mechanism through which curbing profit shifting will have an

⁸ This could be mitigated by positive spillovers from the multinational to domestic investment.

ambiguous impact on tax revenues and welfare, similar to the ambiguous results about the benefits of permitting special regimes for mobile capital.

Given the ambiguity of many of the findings, the recent strength of international efforts at curbing profit shifting may appear surprising. Of course, there are many important aspects that are beyond simple models. For example, allowing effectively lower taxation of mobile activities may put local businesses at a competitive disadvantage, creating incentives for mergers with firms that have global activities, even without a business reason. Politically it could also be costly to charge lower effective taxes to mobile businesses that often are particularly profitable.

The illustrative use of the simple model also revealed the difficulty in assessing separately the impact of changes to tax rates or the ease of profit shifting on investment and revenues. If this is complicated already in a very simple model, it must be much more so in practice, where many further channels and interactions exist. So, while countries may indeed have more than one instrument at their hand to react to competitive pressures, it is not easy for them to determine the optimal strategy.

The December 2017 U.S. tax reform, for example, includes various—in some case counter-acting—measures. Like many reforms there is a somewhat offsetting element, with a rate cut combined with measures to restrict profit shifting. Specifically, the U.S. tax rate is reduced by 14 percentage points (and even more strongly for those with high returns on tangible assets through the FDII provision).⁹ Measures to limit profit shifting included GILTI and BEAT. At same time, however, profit shifting was made easier for some firms (those not caught by GILTI or BEAT), through the move to territoriality. A particularly interesting aspect is the GILTI, because it discourages profit shifting only for profits that imply high returns on tangible assets. This may therefore encourage real investment abroad, which in turn allows profit shifting without being caught by GILTI. In terms of the model above, this means that the cost of profit shifting (a), becomes a function of the capital stock (K).

⁹ The acronyms stand for Foreign Derived Intangible Income (FDII), Global Intangible Low-Taxed Income (GILTI), and Base Erosion Anti-Abuse Tax (BEAT). For details of the international spillovers from the U.S. reform see Beer, Klemm, and Matheson (2018).

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