Double Tax Avoidance and Tax Competition for Mobile Capital

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1. Introduction

Tax competition for mobile tax bases, capital in particular, has received increasing attention in recent years not least because *de jure* and *de facto* capital mobility has risen. It is frequently argued that the attraction of mobile capital *ceteris paribus* creates welfare gains for a country as additional tax revenues accrue and/or the domestic capital and technology stocks increase. Thus, it is not surprising that countries strive to increase capital stock within their borders.

There are two largely distinct bodies of literature and corresponding research areas in international taxation. On the one hand, there is the big and continuously growing body of theoretical and empirical literature on tax competition,² mainly in the field of economics; on the other, there is a large body of mostly legal literature dealing with international double tax avoidance.³ The fact is, however, that there are only very few contributions which address both issues at the same time.⁴ This article tries to narrow this gap. Specifically, this chapter addresses the issue of why measures of double tax avoidance, even though they comprise measures of bilateral tax coordination, may actually act as instruments of tax competition.⁵

The rules of double tax avoidance (henceforth DTAV) are contained in bilateral double tax treaties (DTTs), in domestic tax rules and, in the European Union (EU), in supranational tax laws. All these different levels of rules are influenced by conventions promoted by international organizations. This set of rules is designed to ensure that international investments are not over-taxed in comparison with national investments. The goal is to achieve “single taxation” by coordinating different countries’ taxing rights so as to avoid jurisdictional overlap. However, one consequence of the way DTAV rules are constructed and the way the various

¹ The part on hybrid instruments in Section 2.2 was drafted by Martin Six. We are grateful to Julia Braun who helped in the collection and the analysis of empirical papers.

² See *inter alia* Wilson and Wildasin (2004) and Hochgatterer and Leibrecht (2009).

³ See *inter alia* Lang (2003).

⁴ See *inter alia* Roin (2008).

⁵ *Nota bene*: We emphasize tax avoidance by multinational firms and tax competition for investments by firms.

elements interact may be “double non-taxation”: sophisticated taxpayers can use the rules in a way that helps them to minimize their tax payments. They engage in so-called tax arbitrage across different jurisdictions and DTAV rules.

However, the fact that taxpayers exploit differences in the rules in order to minimize their tax payments is by itself not sufficient reason to diagnose tax competition. An additional condition is that governments which have the power to tax use taxpayers’ arbitrage activities to attract capital investments.⁶ This becomes clear, if one considers that horizontal tax competition is defined as non-cooperative tax setting by independent governments, where each government’s respective policy choices influences the allocation of mobile tax bases among the regions or jurisdictions represented by these governments.⁷ This means that independent jurisdictions interact strategically in setting taxes. Moreover, it implies that at least three conditions must be met in order for tax competition to exist. First, governments use tax rules intentionally to attract or to keep capital in the country. This condition can be met in various ways such as a discretionary reduction in tax rates, fashioning preferential tax regimes for foreign investors or creating (or not closing) tax loopholes. Second, capital tax bases must be sensitive with respect to tax law differences, so that there is a real effect of governmental actions on the allocation of mobile tax bases. Third, capital mobility must be *de jure* possible and it must *de facto* occur.⁸

As already noted an extensive body of empirical literature exploring the presence of tax competition has emerged⁹ but this literature focuses upon just one tax policy instrument to attract mobile capital, namely, statutory or effective tax rates on corporate income. Yet tax competition might occur via more subtle channels.¹⁰ In particular we argue that there is a direct link between DTAV and tax competition. The most obvious link is that if double taxation is curbed the net rate of return of, say, a foreign direct investment (FDI) is increased. This phenomenon is expected to be particularly pronounced in the case of tax sparing rules which are contained in some treaties between developed and developing countries as these rules ensure the advantages granted by specific tax provisions. Hence, with DTAV rules in force there is an increased propensity among firms to undertake foreign investments and thus cross-border capital flows are induced.

⁶ Note here that vis-à-vis capital the behaviour of the home country as well as that of the host country has to be considered. Thus there are three actors in the tax competition game, namely, firms, the home country government and the host country government (see also Altshuler and Grubert 2005).

⁷ Wilson and Wildasin (2004).

⁸ Also see Bellak and Leibrecht (2008).

⁹ Among the seminal papers in this respect is Devereux et al. (2004).

¹⁰ Also see Altshuler and Grubert (2005).

A more interesting link is based on the fact that DTAV rules generally rely on legal form rather than economic substance. Thus these rules may leave open or create opportunities (“loopholes”) for tax arbitrage enabling businesses to shift paper profits. Although it is likely that some of these loopholes are unintended, it is also conceivable that governments actively use DTAV rules to tailor specific offers to taxpayers’ needs in order to attract a tax base. For example governments can offer corporations the possibility to set up brass plate (“letterbox”) companies or other artificial legal entities; this encourages these enterprises to thus engage in tax residence “shopping”. Or, governments may be reluctant to include thin capitalization measures in their DTAV rules in order to make their country more attractive for real capital investments.¹¹ Thus, in addition to statutory and effective tax rates, governments may also use DTAV rules as instruments for competing over mobile tax bases.

This article is structured as follows: In section two, we outline the principles and rules of international double tax avoidance and explain how they can be used for purposes of tax arbitrage. Moreover we outline why DTAV rules can provide an important institutional foundation for tax competition. After that we review the empirical literature suggestive of the role of DTAV rules in tax competition (section three). Finally, we summarize our analysis and draw some preliminary policy conclusions.

2. Double Tax Avoidance as the Institutional Foundation of Tax Competition

In this section, we show how DTAV rules provide an institutional foundation for tax competition. We first describe the principles and rules of DTAV which operate on the domestic, bilateral and multilateral levels (section 2.1). We then move on to show how the complex set of DTAV rules can be used for purposes of tax arbitrage by taxpayers (section 2.2). Section 2.3 will then illustrate how governments react to taxpayers’ arbitrage activities and position themselves in the resulting tax competition. This description also provides a stylized historic account of the development of the international tax system.

2.1. Principles and Rules of Double Tax Avoidance

Double taxation is defined as the imposition of comparable taxes in at least two countries on the same taxpayer with respect to the same subject matter and for identical periods.¹² It results from an overlap of jurisdiction to tax between a *residence state*, where the recipient of

¹¹ See e.g. Haufler and Runkel (2008).

¹² Baker (2001).

income lives, and a *source state*, where the income was generated. If both states exert their power to tax to the full extent, the total burden on trans-border economic activities is prohibitively high. In order to obtain the benefits of international liberalization, governments have a common interest in avoiding double taxation. The basic conflict is: Which country has the right to tax the income, and which country must restrict its tax claims.¹³

While there were some domestic provisions and a few DTTs in continental Europe prior to World War I, after the war the problem became more pressing when many countries put taxation on a broader basis including general income taxes. In the 1920s the International Chamber of Commerce put the issue of double taxation on the international agenda. In response to this the League of Nations commissioned reports by experts and convened several conferences of technical experts and government officials. During the League years the basic principles and rules were developed that have guided the avoidance of double taxation up to today. In the 1950s and 1960s the OECD took over the position of the League of Nations (and briefly the United Nations) as the main multilateral policy forum for discussions of international tax issues.¹⁴

Initially, the objective of these activities was to draft a multilateral tax treaty. But governments persistently rejected the idea of a binding multilateral treaty. They were nonetheless supportive of developing a model convention (MC) that could be employed as a template for bilateral DTTs. They insisted on keeping the MC non-binding to allow the necessary flexibility to make nationally differing tax systems compatible to one another.¹⁵

The development of the MC was marked by a conflict over the allocation of taxing rights. Should the MC be based on the residence or the source principle? Both principles can be normatively justified. Those emphasizing the principle of *ability to pay* will favour residence taxation because the residence country is in a better position to assess the taxpayer's worldwide income. Conversely, if one regards the *benefit principle* as the more appropriate standard this would suggest source taxation because the source country provides infrastructure that allows the generation of income in the first place. Both of these arguments are simple and intuitive. None of the scholars that have discussed the issue of a desirable allocation of taxing rights have come out in favour of one or the other principle, but rather for some solution that accords different weights to these considerations.¹⁶ This normative indeterminacy was further aggravated by a *distributive conflict* between net capital importers and net capital exporters. Exporting countries favour the residence principle, whereas importers favour

¹³ See e.g. Li (2003).

¹⁴ Rixen (2008, 86-99) and Picciotto (1992, 14-35).

¹⁵ Rixen (2008).

¹⁶ See e.g. Musgrave (2006) and Li (2003).

source taxation. In each case the respective principle would result in the allocation of a bigger share of the international tax base to one or the other country.¹⁷

Accordingly, no general consensus on either principle could be achieved. Instead the solutions embodied in the various MCs that were developed since the 1920s (which have remained fundamentally unchanged from that time right up to today) represent a compromise. Broadly speaking, the primary (or exclusive) right to tax active business income is granted to the source country (Article 7, OECD MC), if there is at least a “permanent establishment” (Article 5, OECD MC), i.e. a fixed place of business in that country. The residence country, by contrast, has the primary right to tax passive income, i.e. income from financial investment such as interest, dividends or royalties, with the source country having the right to levy withholding taxes (Articles 10-12, OECD MC).¹⁸ Overall the MC differentiates between various kinds of income and assigns each to either the source country or the residence country. In general the OECD MC places greater emphasis on residence taxation.¹⁹ For passive investment income the rates for royalties are different from those for dividends or income. The OECD MC is thus based on a *schedular* system of taxation. The residence country is obliged to provide relief from double taxation in cases of full or limited source taxation. This can either be done by granting a *foreign tax credit* for the tax paid at source on the tax due in the home country or by a full *exemption* of that income from home tax. In addition bilateral treaties contain provisions on information exchange between tax administrations (Article 26 MC). This is the only provision of DTTs that is not primarily concerned with the avoidance of double taxation but focuses instead on the problem of potential tax evasion and avoidance.

In parallel to the drafting of the non-binding multilateral MC (and in some cases even prior to it) governments have developed domestic tax rules to avoid double taxation.²⁰ Basically all countries provide for relief of double taxation unilaterally. Their respective national tax codes contain provisions for exempting foreign income from taxation, crediting the taxpayer or granting a deduction (partial relief) for taxes paid on such income in the source country. In addition governments conclude bilateral DTTs on the basis of the MC. Basically, all of the

¹⁷ See e.g. Dagan (2000) and Davies (2004). In addition to concerns about fairness, there are also important concerns about efficiency. The basic question is whether the residence or source principle is better suited to achieve tax neutrality. On the pros and cons of capital export neutrality (CEN), capital import neutrality (CIN), national neutrality (NN) and the concept of capital ownership neutrality (CON) see Frisch (1990) and Desai (2003).

¹⁸ While this describes the general pattern, there are many exceptions to this division of the tax base. The precise sharing rules are laid down in the so-called source rules of the typical bilateral tax treaty and/or the MC (see OECD, 2005, Article 6-22).

¹⁹ This is the main reason why developing countries – generally net capital importers – are supporters of the UN MC which was first developed in the 1970s and emphasizes the source principle (see Rixen, 2008).

²⁰ Rixen (2008).

more than 3,000 bilateral tax treaties adopt the basic structure and the provisions of the MC.²¹ Thus most DTTs are similar in terms of the topics covered, their structure and even the language used. Seventy-five percent of the wording in any given DTT will be identical to that of any other one.²² Often technical innovations that come up in bilateral treaties or in domestic provisions are integrated into the multilateral MC so that experiences made at the national and bilateral levels can be disseminated multilaterally to all parties. Other innovations are initiated by the OECD which constantly strives to modernize and adapt the MC. Through this interaction of domestic, bilateral and multilateral activities a common understanding of double tax avoidance is developed.²³ In other words, the complex of rules to which we summarily refer as DTAV rules consists of domestic rules of international taxation and of binding bilateral DTTs, both of which are informed by the principles developed within multilateral policy forums, most importantly the OECD.²⁴

In line with the interests of governments, the particular solution embodied in the MC is *sovereignty-preserving*, that is, it ensures that countries are as free as possible to apply their own national tax laws. The MC defines a series of legal constructs intended to allocate the right to tax among the jurisdictions involved.²⁵ For example, the concept of a permanent establishment (PE) codifies what is taxable as a separate entity of a multinational enterprise (MNE) in the country of source. This and other constructs are chosen in such a way as to interfere as little as possible with national tax laws. They merely allocate the right to tax to governments, without prescribing whether or how they ought to exercise this right. Governments retain full authority over designing all elements of their respective tax regimes – namely the tax base, rate and system – independently from other governments. The idea is that of *territorial disentanglement* of different tax systems. There is *no harmonization* of national tax systems but only *coordination* of different regimes. In this sense, the term “international tax” is a misnomer, since there is no overriding international law of taxation, but only rules of allocation that operate at the *interfaces* of different national tax systems.²⁶ Emblematic for the sovereignty-preserving setup of international taxation are the rules for allocating the profits of MNEs to the various countries in which the MNE operates. Under the “separate entity approach” the allocation should be the same one as would result if the different entities of a

²¹ Owens (2008).

²² Avi-Yonah (2007).

²³ According to Avi-Yonah (2006) the standard of single taxation has become part of customary international law.

²⁴ Rixen (2008).

²⁵ See e.g. Bird (2000).

²⁶ Li (2003).

multinational group were independent actors transacting on a market. This so-called arm's-length standard (ALS) makes it unnecessary to agree on a common tax base.

Thus, while the interfaces of different tax systems in the form of DTAV rules have been harmonized to a considerable extent – even though important differences remain among bilateral tax treaties – national tax rules remain dissimilar.

2.2. How Double Tax Avoidance Enables Tax Arbitrage

Although rules of double tax avoidance explicitly address only governments and tell them how to structure their international tax relations, the same rules (implicitly) pre-structure taxpayers' avoidance or planning strategies. There are several techniques of tax arbitrage which is defined as "tak[ing] advantage of inconsistencies between different countries' tax rules to achieve a more favourable result than that which would have resulted from investing in a single jurisdiction."²⁷

First, the manipulation of arm's-length transfer prices is a method of avoidance that builds on an important aspect of the DTT regime. According to Article 7 (2) of the OECD MC the profits of an MNE have to be attributed to the different affiliates as if their transactions with each other were those of independent enterprises exchanging their products and services at regular market prices. However it is often difficult to determine the "correct" market prices, since there is no regular market on which the goods in question are traded.²⁸ Accordingly, taxpayers enjoy legal manoeuvring room to set transfer prices in a way that leads to allocating larger shares of profit to low-tax countries.

A second tax planning technique is treaty shopping, that is, the "accessing of treaty benefits by persons who are not resident of either treaty state through the use of an entity that qualifies as a resident of one of the states".²⁹ For example, if a company wishes to get access to cheap capital from residents of a country with which there is no tax treaty, it may be advisable to let a financial subsidiary in a treaty partner country issue the bonds.³⁰

Third, the schedular structure of DTTs allows taxpayers to reclassify their financial flows in a tax optimal way. Most importantly they can substitute debt for equity. Very often, this reclassification is facilitated by the possibility of hybrid financing and hybrid entities which we

²⁷ Shaviro (2002, 319).

²⁸ Graetz (2003, 402) has observed that the "irony and ... essential difficulty" is that MNEs exist because of the absence of, or imperfections in, an arm's-length market, although the arm's-length standard is used to determine transfer prices for tax purposes.

²⁹ Li (2003, 106).

³⁰ See e.g. Papke (2000).

discuss here in more detail for three reasons: First, the use of hybrid financial instruments provides a vivid illustration of how the structure of DTTs can be utilized to reclassify financial flows tax optimally. Second, hybrid financing can be interpreted as a sophisticated way to substitute debt for equity with the intention to circumvent thin capitalization rules (see the following section 2.3) – in many cases, without actually increasing the debt to equity ratio. Third, although hybrid instruments may be issued for a variety of non-tax reasons,³¹ taxation issues do have considerable impact on management's financing decisions.

What makes hybrid instruments such a potent tool in tax planning is the simple fact that in the majority of countries financial instruments must be treated either wholly as equity or wholly as debt for fiscal purposes.³² In other words, income is treated either as a distribution of profit (or dividends, in a broad sense), or as interest. This in turn is crucial for two reasons: first, the classification generally determines whether or not the issuer can treat the payments as tax deductible; second, in many cases it determines whether the income from the instruments is tax exempt in the hands of the recipients.³³ Only in rare cases is the fiscal treatment of an instrument split.

De facto a wide variety of financial instruments incorporate elements of both equity and debt.³⁴ Because these financial tools usually cannot be classified clearly as either one or the other, they are referred to as "hybrid instruments" or collectively as "mezzanine financing". The spectrum of hybrid instruments ranges from corporate shares with features typical of loans (such as certain preference shares) to loans with features usually associated with equity investments (such as participation in profits and losses). Such equity-type loans include, among other things, jouissance rights, silent partnerships, participation bonds, convertible bonds, warrant bonds, profit participating loans and preference shares. For fiscal authorities, the wide variety of hybrid instruments in use and their rapid evolution makes an unambiguous classification of any given hybrid instrument all but impossible. The need to apply general criteria in the classification of hybrid instruments opens up significant opportunities and risks for tax planning.

Evidently this is even more important for cross-border transactions. Hybrid instruments are used effectively as flexible, tailor-made forms of finance because in cross-border situations both countries involved must decide on the classification of the instruments and could,

³¹ Duncan (2000).

³² See e.g. Six (2007) for an analysis of the relevant provisions of national tax law in eight Central and Eastern European countries; see Wiedermann-Ondrej (2007) for an analysis of the relevant provisions of US tax law.

³³ Eberhartinger (2005), Helminen (2004), Six (2007), Wittendorff and Banner-Voigt (2000).

³⁴ For the features of hybrid instruments that can blur the distinction between equity and debt, see Duncan (2000).

in some cases, decide differently. Thus, if a payment is deductible as interest in the source state and exempt as remuneration of equity (dividend) in the parent company's state of residence, the result will be double non-taxation. In the opposite case where the hybrid instrument is treated as equity in the source state and as debt in the state where the parent company resides, the difference in classification may result in double taxation, with the payment subject to withholding tax in the source state and to income tax in the parent company's state of residence. This is where the DTTs should step in to prevent double taxation.

The relevant distributive rules in DTTs for the treatment of income derived from hybrid financial instruments are Articles 10 (on dividends) and 11 (on interest). Articles 10 and 11 of the OECD MC give the residence state an unlimited right to tax the income received; at the same time, these rules do not deny the source state a right to tax that same income by levying a withholding tax. To avoid double taxation, the OECD MC therefore obliges the state of residence to credit the taxpayer with the tax withheld by the source state against the corporate tax that the former desires to levy. Articles 23A and 23B of the OECD MC provide for the use of the standard credit method with a per country limitation in these cases.

The OECD MC curtails the rights of the source state by limiting the amount of withholding tax it may levy: Article 10 limits it to five percent in the case of associated companies³⁵ and to 15 percent in all other cases, Article 11 limits the permitted withholding tax to 10 percent. These limits are the subject of serious discussion in treaty negotiations, and individual conventions may differ considerably from the OECD MC.³⁶ Similarly, it is also possible for a specific DTT to deny the source state the right to levy withholding tax; this is more frequently the case with interest payments than with dividends.³⁷ Whereas the actual levels of withholding tax provided for in a specific DTT are relevant in practice, here, it is important to point out that DTTs may give the source state the right to levy withholding tax on *both* dividends and interest, on *neither* of them or – most importantly – on *only one* of them. This last case is clearly important for hybrid finance because the classification of the return as dividend or interest then determines whether withholding tax can be levied or not.³⁸

In the standard case where both countries apply the same classification criteria to decide whether the return on a certain hybrid instrument falls under Article 10 or Article 11, it is

³⁵ A minimum 25% interest in capital is required. On the question as to whether hybrid instruments have to be included in the calculation of the minimum holding requirement, see Six (2007).

³⁶ Rixen (2008) provides empirical evidence that these rates depend on the degree of asymmetry of capital flows between treaty partners. The more asymmetric the capital flows the higher the withholding rates.

³⁷ In the case of interest payments, some DTTs even grant the source state no right to tax at all. See e.g. the DTT between Austria and Switzerland in force since 4 December 1974.

³⁸ The same is of course true for cases where different levels of withholding tax are allowed for dividends and interest.

merely a matter of tax planning to choose hybrid instruments whose returns fall under the more favourable of the two articles. More difficult to resolve is the situation where a DTT provides for a withholding tax in accordance with only one of the articles but the countries concerned do not apply the same article to the return of a particular hybrid instrument. In one particularly problematic case, the source state (country X) applies the article that provides for withholding tax (say, the dividend article) and levies the appropriate tax. The recipient's state of residence (country Y), on the other hand, applies the article that does not provide for withholding tax. Must Y then credit the taxpayer with the tax withheld in X, even if according to Y's interpretation of the treaty no such withholding tax is permitted?³⁹ Although the prevailing German legal opinion⁴⁰ in part seems to suggest that the state of residence is not obliged to credit the taxpayer in this case, which would result in double taxation of the return despite the DTT, the issue remains unresolved. It seems reasonable to assume that some countries will credit the withholding tax while other countries will decline to do so in these circumstances. In any event, this problem makes it clear why the application of the two relevant articles is important when hybrid instruments are used, particularly if the accepted view is that the DTT must be interpreted autonomously.⁴¹

The essential criterion for distinguishing between these two distributive rules is the existence of a corporate right. The yield of a hybrid instrument qualified as a corporate right under Article 10 is defined as a dividend in accordance with the purposes outlined in that article. In all other cases, the yield constitutes interest under Article 11. In order for an investment to qualify as a corporate right under the OECD MC, the investor must accept the risk of possible loss of the investment in a way comparable to the risk assumed by a regular shareholder. According to the prevailing German doctrine, this is the case if the investment involves participation in both the profits *and* liquidation proceeds of the issuing company. Only if these two conditions are satisfied is the investor's risk of loss comparable to that of a regular shareholder.⁴²

The OECD MC, however, does not explicitly mention these conditions or indicate how they can be satisfied for purposes of qualifying a financial instrument as equity. Hybrid financial instruments have numerous possible characteristics regarding participation in entrepreneurial risk, which makes it difficult to determine whether these conditions are satisfied in a particular case. This in turn will inevitably lead to situations where two contracting states dis-

³⁹ Similar problems clearly arise as well where the relevant articles permit different maximum levels of withholding tax.

⁴⁰ See e.g. Wassermeyer (2004).

⁴¹ Lang (1993, 1998) and 1999).

⁴² For the legal reasoning behind this line of argument, see Six (2009) who also provides further references.

agree on whether the characteristics of a hybrid instrument are such as to qualify that instrument as a corporate right and thus as generating dividends. It is therefore possible that, in the situation of a particular taxpayer and a given form of hybrid finance, one state applies the dividend article (Article 10) while the other applies the interest article (Article 11). Depending on the relevant tax treaty this might result in double taxation or double non-taxation of the taxpayer's income.⁴³ From the perspective of tax planning this situation holds considerable potential because it implies that a group in a given set of countries may be able to choose an appropriate hybrid instrument that allows for double non-taxation thus creating in fact tax-free income. An enterprise or business group with particular financial needs would be able to choose appropriate countries for its subsidiaries in order to optimize or even eliminate the tax burden on payments received (treaty shopping).

With these and other similar techniques taxpayers make sure that profits are taxable in low-tax countries, while losses occur in high-tax states. What these methods have in common is that none of them rely on the relocation of real business activities but rather on the mere shifting of paper profits and losses. This form of tax arbitrage is possible because the DTT regime gives states the freedom to design their own national tax laws. The sovereignty-preserving approach to double tax cooperation creates an opportunity structure for taxpayers to engage in tax arbitrage.

2.3. DTAV Rules as Instruments of Tax Competition

The sovereignty-preserving character of DTAV rules not only creates an opportunity structure for taxpayers but also one for governments to engage in tax competition. This manifests itself in different ways. To begin, since DTTs may reduce the overall tax burden on international investment but at the same time contain provisions that increase investors' legal certainty, governments may want to conclude such treaties in order to signal the attractiveness of their respective countries as a location for international investment.⁴⁴ Whereas this would make DTTs important instruments in the competition for mobile capital, they might also reduce the possibilities for tax avoidance which, contrary to intent, could hamper FDI.

But there are other ways to use DTAV rules in tax competition. Most importantly tax haven governments make special offers to satisfy taxpayer demand for tax minimization. This is possible because DTAV rules set no limits on how governments can design their national tax legislation and because, in general, legal form and not economic substance is sufficient for

⁴³ For an analysis of the possible cases of such classification conflicts, see Eberhartinger and Six (2009). For specific examples of such situations see Six (2008).

⁴⁴ See e.g. Dagan (2000).

establishing tax residence. Also, governments actively design solutions that can help taxpayers to play out the differences among different DTTs or different domestic laws and DTTs. This is most easily visible if one considers the role tax havens play in the tax competition game. Tax haven governments offer very low or zero tax rates in combination with tailored solutions making it easy for businesses to establish legal tax residence under their jurisdiction. One way of doing this is to allow the incorporation of brass plate businesses which serve no substantive economic purpose but the tax privileged holding of assets for a multinational group. Tax havens actively search for market niches and try to specialize in different tax planning activities.⁴⁵ This illustrates that tax havens are in competition with each other and with high tax countries for the assignment of so-called “paper” profits. This also implies that high-tax countries come under competitive pressure; they must take the threat of the erosion of their tax base into consideration in the design of their tax systems.⁴⁶

Many high-tax countries reacted to tax arbitrage with a combination of trying to curb it and efforts to remain competitive vis-à-vis other countries. With respect to curbing tax arbitrage, governments have developed unilateral measures against tax avoidance. One example is the so-called controlled foreign companies (CFC) legislation which targets the use of foreign subsidiaries as base or conduit companies in tax havens. In the 1960s the United States was the first country to introduce unilateral anti-avoidance legislation. Resident shareholders, for example the parents of an MNE, controlling a subsidiary in a tax haven are taxable on the passive income (e.g. interest incurred from the lending of liquid funds) of the subsidiary in the current period, regardless of whether that income is actually distributed to them or not. Thus CFC rules stretch the original DTAV principle of treating all parts of an MNE as separate na-

⁴⁵ Tax havens have been subdivided into “production havens”, “headquarter havens” (offer the incorporation in their territory regardless of where the shareholders reside), “sham havens” (host financial intermediaries that are little more than an address for investment activity) and “secrecy havens” (specialize in allowing personal income tax evasion by reinvesting funds that have been provided without the knowledge of authorities at home), depending on the particular features of their financial and tax systems. Most real world tax havens provide some mix of these functions. See Eden (2005).

⁴⁶ It should be noted that in the economics literature two distinct views on the role of tax havens have emerged. The “pessimistic” or “negative” view stresses that tax havens erode the tax base of high-tax countries. They also lead to other types of welfare-reducing costs. The “positive” view makes the point that – if one starts with the assumption that the first-best world of curbing tax competition entirely is not achievable, and the available choices are thus only between different kinds of tax competition – the presence of tax havens enables high-tax countries to actually impose higher taxes on immobile (domestic) firms coupled with lighter taxation of multinational firms. This, in turn, can make tax competition for *real* capital less fierce and could actually increase the general welfare. See the example given by Dharmapala (2008, 14 ff.).

tional entities⁴⁷ and in so doing pierce the “corporate veil” of the tax haven entity. In the meantime such rules have diffused via the OECD to all major capital exporting nations.⁴⁸

Another example of an attempt to curb tax arbitrage are so-called thin capitalization rules. These rules identify a threshold of excessive debt on the basis of the debt-equity ratio. The rules only apply to non-resident lenders holding a significant percentage of the shares of the resident corporation.⁴⁹ If the criteria are met then the debt is treated as “hidden equity” and the interest payment is not deductible.⁵⁰

A final example of an area in which efforts at curbing abuse have been made is transfer pricing. Again the US was the first country to push for changes. In the 1990s it adopted new transfer pricing guidelines; OECD recommendations were subsequently also reformed. Since then the guidelines have been in a state of almost perpetual adaptation. Overall, the new guidelines move the actual rules closer to considering the consolidated profits of the MNE but take great care to formally reinforce the principle of separate entity accounting on a transactional basis. With the introduction of advanced pricing agreements (APAs) in many countries and their promotion by the OECD, this trend has become even more pronounced.⁵¹

However, the effectiveness of these measures is questionable. In the case of transfer prices, for instance, the manoeuvring room for taxpayers remains high because the range of permissible prices is large. At the same time the procedure imposes serious administrative costs on the taxpayer. As for the unilateral anti-avoidance measures, what can be observed is that they generally target certain circumscribed tax arbitrage schemes which taxpayers can simply circumvent by designing more sophisticated schemes. For example, CFC rules are often sidestepped by creating hybrid entities.⁵²

⁴⁷ There has been dispute among tax lawyers about the extent to which CFC rules violate international tax principles. The dominant view – and government practices reflect this – is that CFC rules are legitimate tools for fighting tax shelters. Cf. Rixen (2008, 122-126).

⁴⁸ See e.g. Arnold (2000).

⁴⁹ There are surprisingly few theoretical tax competition models which consider thin capitalization rules as a device for governments to attract (or retain) capital. A notable example is contained in Haufler and Runkel (2008). The authors present a model with countries competing for MNEs via statutory tax rates on corporate income and applying thin capitalization rules. They find that, in a state of equilibrium, countries opt for inefficient and lax thin capitalization rules.

⁵⁰ Some thin capitalization rules have been ruled by the European Court of Justice (ECJ) to be in violation of European law. In the Lankhorst-Hohorst decision of 12 December 2002 (C-324/00) the ECJ ruled that the German law treating some interest payments as hidden dividend payments, which would not reduce taxable profit in Germany, violated the freedom-of-establishment clause under the Treaty of Maastricht of the EU.

⁵¹ APAs are mechanisms under which MNEs and tax administrations can bargain over the appropriate method for determining reasonable transfer prices. Thus the bargaining parties basically commit themselves to certain prices before the transactions actually occur. For a more detailed description of these policies, see Rixen (2008).

⁵² See section three in this article on the “check-the-box” regulation in US CFC law.

What is observed in practice is a kind of proliferation spiral. Taxpayers react to anti-avoidance rules by devising more sophisticated techniques of tax arbitrage; these in turn are then targeted by new anti-avoidance rules by governments, and so on. In effect governments continue to react to taxpayers' arbitrage activities. A likely reason why governments do not design broad and effective rules against tax arbitrage is that they are under competitive pressure vis-à-vis other high-tax countries which are willing to leave loopholes open for their taxpayers.⁵³ One recent example of this is the introduction of a so-called "Zinsschranke" (i.e. a unilaterally binding boundary on debt financing of affiliates) in German corporation tax law. Originally, the finance minister planned to introduce a thin capitalization rule that foresaw the non-deductibility of fifty percent of interest expenses. However, this proposal met with opposition from business interests and parliamentarians of the CDU, one of the parties making up the coalition government. Eventually, the "Zinsschranke" passed by the government only foresees the non-deductibility of thirty percent of net interest expenses (those expenses above interest receipts) and this only if none of three exceptions (small company clause, group clause and escape clause⁵⁴) is applicable.⁵⁵ Very recently, following continuous lobbying of business interests against the rule, the small company clause has been extended as part of the governments' stimulus package against the global recession: instead of applying the rule to interest expenses above one million Euro the threshold has been increased to three million Euro.

Summarizing, it is not implausible that DTAV rules not only achieve the avoidance of double taxation, but that they also provide an institutional foundation of tax arbitrage (for taxpayers) and, further, that DTAV rules thus become instruments of tax competition (for home and host country governments).⁵⁶ Some suggestive evidence for an active role of DTAV rules in the tax competition process is presented in the next section.

⁵³ For a discussion of the underlying political rationale, see e.g. Roin (2008, 18-20). Engel (2001) illustrates this in his discussion of CFC rules in the USA. The empirical evidence for governments' reluctant attempts to curb under-taxation suggests that such considerations are prevalent in all countries. Compare e.g. Rixen (2008, 117-151).

⁵⁴ See Homburg (2007; p. 605).

⁵⁵ Jarass (2007).

⁵⁶ DTTs usually include a section on information sharing (see the article by Aigner et al. in this volume). These agreements are predominantly aimed at threatening individuals who evade taxes illegally (Dharmapala 2008). We do not further elaborate on this aspect here as we are concerned with tax avoidance by MNEs. Moreover, empirical evidence on the effects of advanced information sharing is very scarce; see Dharmapala (2008) for two examples.

3. Surveying Empirical Evidence Suggestive of the Role of DTAV in Tax Competition

In section two we outline several channels through which DTAV rules can result in tax minimization by MNEs and thus can be used for tax competition by governments. This section tries to assess the empirical relevance of these channels. Unfortunately no direct evidence is available, underscoring the role of DTAV rules in tax competition for mobile capital, so we must rely on indirect evidence here. Following Griffith and Klemm⁵⁷ direct evidence for tax competition is based on empirical models relating a country's tax rate on corporate income to the weighted tax rate of competitor countries (i.e. on reaction-function approaches). The seminal paper in this respect is Devereux, Lockwood and Redoano.⁵⁸ A direct study would, thus, relate rules of DTAV by one country to that of competitor countries.⁵⁹ However, the papers surveyed can provide indirect evidence for the role of DTAV rules in tax competition as they focus on a precondition for tax competition to set in, namely, the sensitivity of mobile capital (esp. FDI and paper profits) with respect to tax conditions.

Specifically, we survey (i) empirical papers about the effect of DTTs on FDI, (ii) papers on the relevance of tax sparing rules for FDI to developing countries, and (iii) studies dealing with the empirical relevance of profit shifting, whereby a particular focus is put on transfer pricing and the impact of thin capitalization rules on debt financing of foreign affiliates. Finally, we present (iv) the main results of a study dealing explicitly with the role of "hybrid entities".

3.1 Preliminary Remarks

The papers surveyed are structured along several dimensions (main outcomes, data bases used, estimators applied etc.).⁶⁰ A particular focus is put on the derivation of the implied semi-elasticities. Semi-elasticities represent the percentage change in the endogenous variable (FDI, pre-tax profit, etc.) when the exogenous variable of main interest (statutory tax rate on corporate income, dummy variable for DTT in force or not, etc.) changes by one unit (e.g. a change in one-percentage-point in the tax rate or the change of a dummy variable

⁵⁷ Griffith and Klemm (2005).

⁵⁸ Devereux et al. (2004).

⁵⁹ For thin capitalization rules compare the analysis in Haufler and Runkel (2008, section four).

⁶⁰ See Tables A1 to A6 in the appendix.

from zero to one). The derivation of semi-elasticities intends to make the results of the heterogeneous studies surveyed somewhat more comparable.⁶¹

The empirical models used in the papers do not usually lead directly to semi-elasticities. Thus, the regression coefficients shown in the papers need to be suitably transformed in a first step. The empirical models applied in the various papers are usually based on “level-level” or on “log-level” specifications. Level-level specifications relate the endogenous variable in levels (e.g. FDI in millions of Euro) to the independent variable of main interest also measured in levels (e.g. the statutory tax rate on corporate income measured in percent or a dummy variable indicating the presence of a DTT). In contrast, Log-level specifications have the dependent variables in logarithmic form (e.g. $\log(\text{FDI})$). The advantage of the latter specification is that the implied semi-elasticity is made directly visible by multiplying the regression coefficient by 100.⁶²

In the case of level-level specifications the implied semi-elasticity can be deduced by:

$$\varepsilon(s) = \hat{a}/(y_mean)*100 \quad (1)$$

with $\hat{a}$ being the regression coefficient and y_mean the sample mean value of the endogenous variable

Moreover, some empirical models are based on elasticities (ε) as regression coefficients (“log-log specifications”). In these cases the implied semi-elasticities are derived as:

$$\varepsilon(s) = \varepsilon/(x_mean)*100 \quad (2)$$

with ε = elasticity = regression coefficient and x_mean being the sample mean value of the independent variable of main interest

Note, that not all papers provide the information necessary (e.g. the mean values of y and x) to derive the semi-elasticities from the regression coefficients. Therefore, only papers providing this information are included in the survey.

3.2 A Brief Summary of Empirical Studies

a. Double Taxation Treaties and Foreign Direct Investment

Empirical papers dealing with the impact of DTTs on FDI are quite scarce. This is even more so for studies analyzing the impact of tax sparing rules contained in DTTs on FDI to

⁶¹ See also De Mooij (2005).

⁶² If the independent variable of main interest is a dummy variable, then the semi-elasticity can be represented by $100*(\exp(\hat{a}) - 1)$, where $\hat{a}$ is the regression coefficient.

developing countries. Basically, signing a DTT might on the one hand lead to more FDI because double taxation of income is avoided and uncertainty is reduced. On the other hand, however, DTTs might also reduce the possibilities for tax evasion and avoidance.⁶³ Thus, empirically speaking, the effect of DTTs on FDI is ambiguous *a priori*.

Concerning studies dealing with FDI and DTT,⁶⁴ the early paper of Bloningen and Davies⁶⁵ concludes that the signing of DTTs does not have relevant effects on the volume of FDI because most regression coefficients lack statistical significance. Thus a semi-elasticity of zero is plausible. In a follow-up study⁶⁶ the same authors find that FDI is lower if a new treaty is signed, this suggests that the possibilities to evade taxes via FDI are fewer if a viable tax treaty is in force.⁶⁷ The analyses of Bloningen and Davies are based on level-level specifications. In a more recent work⁶⁸ the same authors argue in favour of using a “log-level” specification. Applying the latter leads the authors to conclude that new treaties do not seem to impact positively or negatively on FDI because the regression coefficients are not statistically different from zero. To sum up, the papers of Bloningen and Davies imply that DTTs do not impact on the level of FDI.

However, two aspects of the Bloningen and Davies studies are worth mentioning. First, they rely largely on data for developed economies and, second, they consider the signing of a DTT to be an exogenous event. Concerning the first aspect, Neumayer⁶⁹ provides evidence that the presence of a DTT increases FDI in middle-income developing countries; thus he finds a positive impact of DTT on FDI. Egger, Larch, Pfaffermayr and Winner allow the signing of a DTT to be an endogenous event.⁷⁰ Specifically, it is more likely that countries will sign a DTT in cases where bilateral FDI is already present. Using a rather sophisticated two-step approach they find that the signing of a new DTT reduces FDI significantly. This result is consistent with the view that DTTs effectively reduce the possibilities to avoid taxes via FDI.

Turning to recent studies on the topic, Barthels, Busse and Neumayer conclude that DTTs lead to substantial and significantly higher FDI-stocks.⁷¹ The distinguishing feature of this

⁶³ Egger et al. (2006).

⁶⁴ See table A1 in the appendix for details.

⁶⁵ Bloningen and Davies (2000).

⁶⁶ Bloningen and Davies (2002).

⁶⁷ A new treaty is a treaty which was signed after the starting year of their data sample. Old treaties are treaties which were already in force at the beginning of the sample period. For old treaties Bloningen and Davies (2002) find a positive effect on FDI. Yet, this coefficient suffers from severe endogeneity bias according to the authors. It should therefore not be considered as valid evidence for a DTT's effect on FDI.

⁶⁸ Bloningen and Davies (2004b).

⁶⁹ Neumayer (2007).

⁷⁰ Egger et al. (2006).

⁷¹ Barthels et al. (2008).

study is the usage of a large dataset containing both developed and developing countries. Finally, Davies, Norbäck and Tekin-Koru again find little evidence for an effect of DTT on the level of total sales acting as proxy for foreign investment.⁷² However, they do find evidence supporting the contention that treaty formation has a positive impact on the probability of new investment in a country. Thus, tax treaties seem to have no effect on the volume of investment (given that a firm has already invested in a country) but they do seem to have an impact on the location of the investment.⁷³

So what can we conclude from these papers with respect to our assertion that DTAV rules create an institutional foundation for tax competition? Since the more recent studies find evidence that DTTs positively impact FDI (especially to developing countries) and new investments, then one precondition for tax competition to set in – viz. the sensitivity of FDI with respect to changes in the taxation environment – seems to be fulfilled. Put differently, without DTTs less capital would move across borders and tax competition for FDI between countries would be of less importance.⁷⁴ However, one must bear in mind that the results of Egger, Larch, Pfaffermayr and Winner are evidence against our assertion. Their results imply that DTTs are effective in reducing the possibilities for MNEs to avoid taxes and that DTTs are not instruments of tax competition for governments. To sum up, the available literature supports our assertion if developing countries are included in the sample and if the impact of DTTs on new investments is considered.

b. Tax Sparing Clauses and Foreign Direct Investment

Tax sparing clauses are sometimes included in DTTs signed by developed countries, in particular if applying the credit system in international taxation (e.g. Japan or the UK), and developing countries. These rules have the aim of allowing foreign investors to partake of the special tax advantages provided by the host countries of FDI. Put differently, if a tax sparing clause is included in a DTT then the home country of FDI calculates the residual tax liability of the investor as if the special tax advantage were not provided by the host country.⁷⁵

⁷² Davies et al. (2009).

⁷³ Two further papers are Millimet and Kumas (2007) and Coupe et al. (2008). The former finds that the impact of a DTT on FDI is positive for initially low FDI levels and negative for initially higher levels. The latter finds no significant effect (also see Davies et al., 2009 and Barthels et al., 2008).

⁷⁴ As FDI is frequently seen as motor for economic growth, DTTs might be welfare improving in this respect. However, if DTTs induce welfare decreasing (inefficient) tax competition, then they lead to a situation in which all countries are worse off because the capital stock may remain unaltered although tax revenues decline.

⁷⁵ See Hines (1998) for details.

Only two empirical papers on this issue are available so far. Both are based on Japanese FDI data and both find a huge impact of tax sparing rules on FDI (see the semi-elasticities contained in Table A2). This evidence is consistent with the results of Neumayer presented above, which show a significant impact of DTTs on FDI to developing countries. Thus, the studies surveyed provide fairly solid evidence for the positive impact of DTTs on FDI to developing countries, especially if they include tax sparing clauses. Hence, overall the evidence is in favour of DTTs making capital mobile across borders. Thus, DTAV rules are capable to spur tax competition which supports our assertion that these rules are an institutional foundation of tax competition.

c. *Tax Motivated Profit Shifting*

As outlined above, various means to shift profits from high- to low-tax countries exist. These include transfer pricing, debt financing of affiliated companies or the location of intangible assets. Profit shifting incentives are exerted by differences in statutory tax rates on corporate income across countries.⁷⁶ These differences lead to tax-motivated changes in the location of pre-tax profits via the various means to shift profits.

The papers surveyed here are separated into three categories: (i) papers dealing with profit shifting in general; (ii) papers dealing with profit shifting via transfer pricing or the location of intangible assets and (iii) papers dealing with the effect of thin capitalization rules on debt financing of firms.

The papers summarized in Table A3 relate a proxy for a firm's declared profits (pre-tax or net-of-tax, depending on the study) to the relevant (home or host country) statutory tax rate on corporate income.⁷⁷ De Mooij's paper also includes a survey of empirical studies.⁷⁸ The author calculates a semi-elasticity of -2, meaning that a one-percentage-point shift in the relevant tax rate changes declared profits by about two percent. More recent studies by Weichenrieder and Huizinga and Laeven⁷⁹ broadly confirm this evidence even if the implied semi-elasticities are somewhat lower (about +1 and -1.30).⁸⁰

Concerning our assertion these results imply that profit shifting is an empirically relevant phenomenon and that DTAV measures are not effective in curbing it. However, not curbing

⁷⁶ See e.g. Weichenrieder (2009).

⁷⁷ Additional surveys, also including early papers on the topic, are Hines (1997) and Devereux (2007).

⁷⁸ De Mooij (2005).

⁷⁹ Weichenrieder (2009); Huizinga and Laeven (2007).

⁸⁰ *Nota bene*: If the coefficient has a positive sign, this implies an increase in net-of-tax profit of a host-country affiliate, if the home country's statutory tax rate increases. This is evidence for profit shifting (see Table A3).

profit shifting might be in the interest of governments because this could lead to an inflow of tax revenues (low tax country) or because profit shifting opportunities probably make real capital less sensitive to differences in statutory tax rates across countries.⁸¹

The papers contained in Tables A4 and A5 shed more light on the various channels of profit shifting (transfer pricing, location of intangibles and thin capitalization of foreign affiliates). Clausing's article is among the first to directly address the transfer pricing issue.⁸² Clausing relates the export and import prices of US multinational firms to the statutory tax rate on corporate income of the host country of a foreign affiliate. She finds substantial evidence for tax motivated transfer pricing in US intra-firm trade prices. Specifically, the lower a host country's tax rate, the lower are US intra-firm export prices and the higher are US intra-firm import prices relative to corresponding arm's-length prices. Based on Clausing's results semi-elasticities of about +4 for export prices and -4.7 for import prices are derived (cf. Table A4).

Bernard, Jensen and Schott also give direct evidence for the importance of tax motivated transfer pricing.⁸³ Their paper shows that the wedge between the arm's-length export price and the intra-firm export price of US-based multinationals is negatively related to the taxation of corporate income in the foreign import country. This response indicates that tax motivated transfer pricing is present in the intra-firm export prices of US-based multinational companies. The mean semi-elasticity derived is -1.25. This value implies that a one-percentage-point increase in the host country's tax rate on corporate income leads to a decrease in the wedge between arm's-length export prices and intra-firm export prices by 1.25 percent.

Dischinger and Riedel analyze the tax sensitivity of the location of intangible assets with respect to the statutory tax rate on corporate income.⁸⁴ They show that the location of holdings and investments in intangible assets is indeed inversely related to the statutory tax rate on corporate income. This relationship can be considered as indirect evidence in favour of tax motivated transfer pricing in intra-firm trade of intangibles. The derived semi-elasticity is -1.20.⁸⁵

Concerning our assertion these results collectively imply that profit shifting via transfer pricing is an empirically relevant phenomenon and that stipulations concerning transfer pricing contained in DTAV rules are by no means effective in curbing it. However, as in the case

⁸¹ For the latter point, see also Desai et al. (2006a) and section 2.3 above on the "positive view" of tax havens..

⁸² Clausing (2003).

⁸³ Bernard et al. (2008).

⁸⁴ Dischinger and Riedel (2008).

⁸⁵ Moreover, the study of Desai et al. (2006b) finds that US MNEs with a focus on R&D are more likely to establish affiliates in low-tax countries (tax havens).

of profit shifting in general, it might be in the interest of governments not to inhibit profit shifting through transfer pricing.

Turning to papers dealing with the impact that thin capitalization rules exert on the financing structure of affiliated companies we see that such rules indeed have a significant effect on the level of debt financing (cf. Table A5). The results indicate that the introduction of thin capitalization rules has a pronounced effect on the debt-to-asset ratio of an affiliated company. This means that governments could reduce the amount of profit shifting via debt financing with relative ease.⁸⁶ But even in the EU, as of 2007, seven member states had not applied thin capitalization regimes. Worthy of note here is that of those countries who have not applied such rules are many smaller nations that are known to be among the more aggressive tax competitors.⁸⁷ Furthermore, the rules in operation in the other EU member countries vary according to the method adopted, the scope of application and their effects.⁸⁸ Not applying thin capitalization rules might be considered as effort by governments to attract foreign *real* capital,⁸⁹ likely coupled with a positive effect on the domestic capital stock and with positive technology spill-over effects.⁹⁰ Again, these results favour our conjecture.

d. The Role of Hybrid Entities

As suggested above (section two), tax minimization using hybrid entities or hybrid securities is likely. But empirical evidence on the role of hybrid instruments is scarce. One notable exception is the paper of Altshuler and Grubert who analyze the effects of a specific amendment to CFC rules in the US in 1997.⁹¹ In particular, new regulation in 1997 introduced “hybrid entities”. Altshuler and Grubert describe these as “business operations that are regarded as corporations by one country while being an unincorporated branch to another.”⁹² Hybrid entities allow US companies to avoid the current tax under the CFC rules on intercompany payments (e.g. interest and royalties) made from an affiliate in a high tax country (*H*) to another affiliate in a low tax country (*L*). At the same time country *H* also allows such payments to be deductible. The new regulations are usually referred to as “check-the-box” rules because they give firms the possibility to simply check a box on a tax form to either identify an

⁸⁶ Note that there is extensive literature showing that the degree of debt financing is closely related to differences in the statutory tax rates on corporate income across countries (see e.g. Weichenrieder (2007) for a survey). Thus profit shifting via debt financing is a highly relevant phenomenon.

⁸⁷ See Haufler and Runkel (2008) and Dourado and De La Faria (2008).

⁸⁸ See Dourado and De La Faria (2008).

⁸⁹ See also Altshuler and Grubert (2005) and Haufler and Runkel (2008).

⁹⁰ See Barba-Navaretti and Venables (2004, chapter 7) on the effects of FDI on the host country.

⁹¹ Altshuler and Grubert (2005).

⁹² Altshuler and Grubert (2005, 5).

entity as a separate corporation or to classify it as the branch of another corporation.⁹³ The introduction of these rules in 1997 provides sufficiently relevant variation to distil the empirical importance of hybrid entities. Based on this change in US national tax law, Altshuler and Grubert provide evidence that MNEs could save huge amounts of taxes by using hybrid entities.

One piece of evidence in this respect is based on the comparison of the tax-rate sensitivity of declared pre-tax profits by US foreign affiliates with respect to the statutory tax rate on corporate income in the host country before and after the introduction of check-the-box. Altshuler and Grubert show that the tax-rate sensitivity in 2000 (i.e. after the introduction of check-the-box) is higher in absolute value than it is in 1996 (the year before the introduction). The corresponding semi-elasticities given in Table A6 are -1.48 for 1996 and -2.07 for 2000, respectively. This difference in the magnitudes of the two mean values is suggestive evidence in favour of an increase in tax motivated profit shifting via hybrid entities after the 1997 rule change. Specifically, according to Altshuler and Grubert, it is possible that highly profitable subsidiaries in high tax countries became part of a consolidated hybrid entity based in a tax haven or that “high-tax host countries may have reacted to the increasing tax sensitivity of investment by easing up on their transfer pricing and thin capitalization rules in order to attract mobile corporations.”⁹⁴

Another piece of evidence contained in Altshuler and Grubert, which is consistent with the increasing importance of hybrid entities, is that “there are less CFCs in the 2000 sample than in 1996.”⁹⁵ Moreover, the authors find that the total tangible capital in all locations grew by 28 percent from 1996 to 2000. But in five low-tax countries tangible capital grew by almost 200 percent. According to the Altshuler and Grubert most of this growth “reflects the consolidation of the low-tax CFC with the operations of a high-tax affiliate.”⁹⁶

Concerning our assertion that DTAV rules provides an institutional foundation for tax competition, the example of the 1997 check-the-box change in US CFC rules suggests that unilaterally applied measures (in this case by the home country of FDI) make it easier for MNEs to avoid taxes. The introduction of check-the-box can also be considered as a home country instrument to attract – or at least not to lose – firms because the ability to hide profits makes it more likely that a company will not opt to relocate its headquarters.

To sum up, the indirect evidence provided in this section suggests that DTAV rules do indeed serve as an institutional foundation of tax competition: DTTs seem to increase the pro-

⁹³ See Altshuler and Grubert (2005) for details.

⁹⁴ Altshuler and Grubert (2005, 17).

⁹⁵ Altshuler and Gruber (2005, 16, footnote 3).

⁹⁶ Altshuler and Grubert (2005, 18).

pensity of firms to become multinational via FDI. DTAV without thin capitalization rules, despite their effectiveness in curbing profit shifting, can be seen as an example for host countries using not only statutory tax rates to compete for mobile capital but also more subtle channels. The presence of tax motivated transfer pricing via intra-firm trade or through the location of intangibles, despite the existence of DTTs and transfer pricing regulations, is another example in this respect. The check-the-box regulation represents an example for the role of unilateral DTAV rules introduced by a home country as instrument of tax competition.⁹⁷

4. Summary and Conclusions

This article explores the role DTAV rules play in tax competition for mobile capital. We first sketched various channels introduced by DTAV rules, through which taxpayers can minimize tax payments and which also constitute channels for governments to compete for mobile capital. Second, the overview of existing empirical research provides indirect evidence for our assertion that tax competition via subtle DTAV-related channels exists. We may conclude that DTAV rules play a prominent role in the tax competition game. The deeper reason for this lies in the patchwork structure of DTAV rules. The fact that there are differences among the various domestic and bilateral rules creates possibilities for tax arbitrage which in turn creates tax competition among countries and thus reinforces the differences among the tax rules.

What policy conclusions follow from these findings? Specifically, since DTAV rules also comprise measures of tax coordination (e.g. DTTs), what conclusions can then be derived concerning the discussion on the virtues and pitfalls of tax coordination and tax harmonization?

The answer depends on the welfare effects of tax competition. If one sees tax competition as a process to restrain selfish governments or to induce policy innovations, then the answer would probably be “do nothing because there are no virtues of tax coordination”. However, if one sees tax competition as a process leading to welfare decreases, then it is clear that the current sovereignty-preserving approach to tax coordination is insufficient to address the issue of tax competition effectively. As long as governments remain free to determine central aspects of their respective tax systems independently, they will always have an incentive to tailor their tax regimes to the specific needs of taxpayers wishing to optimize their international tax payments. Neither unilateral measures (which governments will often also use as

⁹⁷ For the latter also see Altshuler and Grubert (2005).

strategic instruments in tax competition) nor bilateral tax treaties can be effective instruments to address the inherently multilateral problems of tax arbitrage and tax competition.

What would be needed instead is *tax coordination by delegation*,⁹⁸ i.e. central parameters of tax systems would have to be determined and administered by an organization equipped with supranational taxation authority. Specifically in the European context tax laws could be coordinated at the EU level.

The focus of such a supranational tax policy should be on curbing tax competition for paper profits, since these are more mobile than real capital. Further, profit shifting is a more obvious violation of minimal fairness norms than real tax competition⁹⁹. Under real tax competition a taxpayer would have to pay the actual “price” demanded by the respective government, even though that price may also be under harmful competitive pressure.¹⁰⁰ This would not be the case, however, if paper profits can be shifted. In that case taxpayers become partial free riders: they enjoy the services offered, but avoid paying the price for them by shifting their profits out of the country.

Although the supranationalization of tax policy sounds utopian, in Europe discussions about just such a solution are already underway. Indeed, the Treaty of Nice has made the implementation of such measures easier. Specifically, some of the proposals for a Common Consolidated Corporate Tax Base (CCCTB) foresee *inter alia* a solution to the problems linked to tax competition for paper profits:¹⁰¹ the tax base would be defined and administered by the EU, whereas individual member states would remain free to set their own respective tax rates. Thus, a central part of national tax sovereignty would be supranationalized.

Alternative measures which could reduce tax competition for capital – paper profits in particular– include, for instance, the introduction of an “EU CIT”, that is an EU-wide corporate income tax law and tax administration with the tax and fiscal sovereignty based at EU level.¹⁰² Another measure would be the introduction of a minimum level for the statutory tax rate on corporate income as suggested in the Ruding Report.¹⁰³ But, as the current debate on the implementation of the CCCTB shows, the political will among the EU member countries to delegate even a part of their taxation rights to a higher level authority is low. Thus, given the

⁹⁸ DTTs are an example of *tax coordination by explicit agreement* (see Wildasin 2002).

⁹⁹ Real tax competition is defined here as tax competition for real capital without profit shifting opportunities.

¹⁰⁰ See e.g. Sinn (1997).

¹⁰¹ See European Commission (2001) on the CCCTB. For good overviews of many issues concerning the choice between unitary taxation and separate accounting, see Sørensen (2004) and McLure and Weiner (2000).

¹⁰² See the article of Lang and Zagler in this volume.

¹⁰³ See Ruding Report (1992).

current political environment in the EU, supranational measures, in order that they have any realistic chance of being adopted, will need to preserve member countries' national sovereignty in taxation matters as far as possible. This, however, implies that tax competition will not be curbed effectively in the near future.

Moreover, to increase the likelihood of adoption, supranational measures should be considered that target primarily tax-induced distortions which, though not directly related to horizontal tax competition for mobile capital, nevertheless have side-effects on it. The incentive to introduce measures of this type might be larger for governments.

A notable example in this respect is the reduction of the distorting effects the accrual based classic corporate income tax system exerts *inter alia* on financing and investment decisions of firms. Several changes in the traditional corporate income tax system were suggested, discussed and in some cases even implemented.¹⁰⁴ The focus of those measures has been on eliminating the different tax treatment of equity and debt finance, for instance, by introducing an allowance for the remuneration of equity finance (ACE, allowance for corporate equity) or by abolishing the deductibility of the remuneration for debt finance (CBIT, comprehensive business income tax). These measures result in increased efficiency in corporate income taxation because they achieve neutrality vis-à-vis investment and/or financing decisions. One side effect of this is that tax planning and governmental tax competition aiming to exploit the differential treatment of debt and equity financing (e.g. the use of hybrid instruments) would become less effective under such systems. Providing members states with information concerning possible welfare impacts resulting from the coordinated introduction of a more neutral corporate income tax system by the European Commission is an important first step in this direction.¹⁰⁵

In any case, the sorts of far-reaching measures mentioned – in particular, a minimum statutory tax rate on corporate income, a more neutral corporate income tax system or an EU-wide corporate income tax law and tax administration with tax and fiscal sovereignty at EU level – must be seen at present, in light of the current political environment, as long-term options only.

To conclude, the given patchwork structure of DTAV rules is a good example of how tax coordination can lead to tax-induced distortions instead of eliminating them. This is an example of a pitfall of tax coordination. The solution to such problems requires appropriate international and supranational coordination measures of central tax parameters. Unfortunately, however, these are currently unlikely given present political constraints.

¹⁰⁴ See OECD 2007 for an overview.

¹⁰⁵ See De Mooij and Devereux (2009) for a simulation exercise in this respect.

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Appendix

Table A1 DTTs and Foreign Direct Investment

Bloningen and Davies (2000):

Outcome(s): Bilateral double taxation treaties seem to exert a positive impact on FDI-stock and affiliate sales with a time lag; US inbound and outbound FDI significantly increase with a treaty's age;

Years and Countries included: 1966-1992; U.S. and (up to) 65 partner countries;

Specification and Estimator applied: Level-level specification, Pooled OLS and country-pair Fixed effects estimator;

Dependent variable: Affiliate sales in the host country, FDI-stock, FDI-flows;

Tax variable of main interest: Dummy variable equal to 1 if a treaty is in effect for the country pair in a given year (Treaty dummy), Length of time a treaty has existed between the U.S. and a partner country in a given year (Treaty age);

Control variables: Gravity model and knowledge-capital model type variables like real GDP of home and host country of FDI, real GDP per capita in home and host country of FDI, bilateral distance between countries, openness to FDI and trade, sum of home and host countries' real GDPs, squared difference between the home and host countries' real GDP, dummy variable for the level of a home country's skill endowment, difference in relative skilled-labour abundance between home and host country of FDI;

Semi-elasticities:

Tax variable of interest	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
Treaty dummy	27.90*	-29.18	132.64	55.69
Treaty age	2.44**	-12.55	11.62	5.51

Notes: * The positive sign implies that signing a treaty increases FDI; yet most coefficients (especially that derived based on the gravity model) are not statistically significant; only results contained in Tables 3 and 4 are used; ** The positive sign implies that FDI increases with the treaty age; using only Tables 5 and 6 of the paper results in semi-elasticities between 1.40 and 8.61 which correspond to the information given in the abstract of the paper by Bloningen and Davies (2000); In Bloningen and Davies (2004) the authors argue against the validity of these results as they pick up the effect of old tax treaties on FDI which suffers from endogeneity problems;

Bloningen and Davies (2002):

Outcome(s): Recent treaty formation does not promote FDI; It may even reduce investment as possibilities to evade taxes are reduced;

Years and Countries included: 1982-1992; 24 OECD countries (not included: Mexico, the Central and Eastern European OECD Countries, South Korea);

Specification and Estimator applied: Level-Level specification, Pooled OLS and country-pair fixed effects estimator;

Dependent variable: FDI outbound stock and FDI outflows;

Tax variable of main interest: Dummy variable which takes the value of one when a bilateral tax treaty is in place between two countries, Dummy variables for "old" and "new" treaties (e.g. new treaty dummy has value 1 if it comes into force after the starting year of the sample used and zero otherwise);

Control variables: Knowledge-capital model type variables, openness to FDI and trade, bilateral distance between countries, various interaction terms;

Semi-elasticities:

Tax variable of interest	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
Treaty dummy (including old treaty dummy)	82.01*	72.43	90.84	6.52
New Treaty dummy	-56.21**	-123.61	-7.25	44.27

Notes: * A positive sign implies that FDI is higher if a treaty is in force; yet this estimate probably suffers from endogeneity problems; ** The negative sign implies that FDI is lower if a new treaty is signed pointing towards reduced possibilities to evade taxes via FDI in case of a tax treaty in force;

Bloningen and Davies (2004):

Outcome(s): No systematic evidence is found that bilateral tax treaties increase FDI activity if a preferred Log-level specification is applied;

Years and Countries included: 1980-1999; U.S. inbound and outbound FDI from/to 88 partner countries;

Specification and Estimator applied: Level-Level and Log-Level specifications with preference for the Log-Level specification; Pooled OLS and country-pair specific fixed effects estimator;

Dependent variable: FDI stock and affiliate sales data in non-financial sectors;

Tax variable of main interest: Dummy variable which takes the value of one when a bilateral tax treaty is in place between two countries, Dummy variables for "old" and "new" treaties (e.g. new treaty dummy has value 1 if it comes into force after the starting year of the sample used and zero otherwise);

Control variables: Knowledge-capital model type variables, openness to FDI and trade, bilateral distance between countries, various interaction terms, trade costs of both home and host country, costs of investing in the host country), log (exchange rate), log(country average tax rate on corporate income);

Semi-elasticities:

Tax variable of interest	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
Level-Level specification: Treaty dummy	-23.93*	-36.86	-10.99	12.94
Level-Level specification: Old treaty dummy	90.16**	58.72	121.61	31.45
Level-Level specification: New treaty dummy	-107.49***	-167.50	-46.90	50.23
Log-Level specification: New treaty dummy	19.45****	2.02	47.70	16.68

Notes: * The negative sign implies that FDI is lower if a treaty is in force; ** The positive sign implies that FDI is higher if a treaty is already in force at the beginning of the sample period; yet the estimates are likely to suffer from endogeneity problems; *** The negative sign implies that FDI is lower if a new treaty is signed pointing towards reduced possibilities to evade taxes via FDI in case of a tax treaty in force; **** The positive sign implies that FDI is higher if a new treaty is signed; yet no underlying coefficient is statistically significant; therefore new treaties seem not to impact positively / negatively on FDI; This is the preferred specification of Bloningen and Davies (2004);

Neumayer (2007):

Outcome(s): Developing countries (DC) that have signed a tax treaty with the US or with important capital exporters actually do receive more FDI from the US and in total; however, tax treaties are only effective in the group of middle-income but not in low-income DCs;

Years and Countries included: 1970-2001 (bilateral US case and unilateral FDI flow case) and 1980-2001 (unilateral FDI stock case), respectively; US outbound FDI stocks in 114 host countries and FDI stocks and inflows to 120 DCs;

Specification and Estimator applied: Log-Level specification; Random and fixed-effects estimation (country and country-pair effects);

Dependent variable: US outbound FDI stocks in less developed countries; total inbound FDI stocks in and FDI inflows to less developed countries ; a country's share in the total FDI stock (-inflow) in (t)o all less developed countries considered;

Tax variable of main interest: Dummy variable for the existence of a tax treaty with the US; FDI flow weighted cumulative number of tax treaties a DC has signed with OECD countries, where the weight is the OECD countries share of FDI outflows in total world FDI-outflows;

Control variables: Dummy variable for the existence of a Bilateral Investment Treaty (BIT) with the US, FDI flows weighted cumulative number of BITS a DC has signed with OECD countries, log(GDP per-capita), log(population), economic growth rate, dummy variable indicating whether a country is member of the WTO, number of bilateral trade agreements a DC has concluded with the US, the EU or Japan, weighted by their respective shares of world trade, inflation rate, measure of natural resource intensity, political constraints index;

Semi-elasticities:

Dependent variable used	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
US outbound stock	29.43*	22.26	40.92	8.21
Inward FDI stock and FDI inflows in DC	0.54**	0.20	0.90	0.31
US outbound stock in low-income DCs	-17.51***	-18.21	-16.81	0.70
Inward FDI stock and FDI inflows in low-income DC	0.43****	0.00	0.90	0.43
US outbound stock in middle-income DCs	24.22'	16.65	31.78	7.57
Inward FDI stock and FDI inflows in middle-income DC	0.68"	0.50	0.80	0.13

Notes: * The positive sign implies that the US outbound FDI stock is higher if a tax treaty exists; ** The positive sign implies that the inward FDI stock and FDI inflows to DC is the higher the bigger the number of tax treaty signed is; *** The negative sign implies that the US outbound FDI stock in a low-income DC is lower if a tax treaty exists; yet none of the underlying coefficients is statistically significant; **** The positive sign implies that the inward FDI stock and FDI inflows to low-income DC is the higher the bigger the number of tax treaty signed is; however none of the underlying coefficients is statistically significant; ' The positive sign implies that the US outbound FDI stock in a middle-income DC is higher if a tax treaty exists; " The positive sign implies that the inward FDI stock and FDI inflows to middle-income DC is the higher the bigger the number of tax treaty signed is;

Egger et al. (2006):

Outcome(s): Significant negative impact of newly implemented tax treaties on outward FDI stocks once the endogeneity of tax treaties is accounted for;

Years and Countries included: 1985-2000; OECD countries;

Specification and Estimator applied: Log-Level specification, Two-step approach with a Difference-in-difference approach in the second step;

Dependent variable: In the second step of the estimation the difference between bilateral outward FDI stock two years before and after a treaty is signed is used as dependent variable;

Tax variable of main interest: Tax treaty dummy with entry one in the years after two countries have implemented a treaty;

Control variables: log(sum of GDPs), log(similarity index), absolute value of difference in log(capital to labour ratios), interaction terms, home and host countries' government expenditures to GDP ratios;

Semi-elasticities:

Tax variable of interest	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
Exogenous tax treaty	-10.16*	-0.16	-0.62	6.78
Endogenous tax treaty	-19.97**	-39.41	-9.90	5.91

Notes: * The negative sign implies that new tax treaties reduce outward FDI stocks; yet none of the underlying coefficients is statistically significant; ** The negative sign implies that new tax treaties reduce outward FDI stocks;

Barthels et al. (2008):

Outcome(s): Tax treaties lead to substantial and significantly higher FDI stocks;

Years and Countries included: 1978-2004 Large dyadic panel data set from various sources (e.g. UNCTAD) with 30 FDI source countries (of which are 10 DCs), 105 FDI host countries (of which are 84 DCs);

Specification and Estimator applied: Log-Level specification; Country-pair specific Fixed effects estimator;

Dependent variable: Bilateral FDI stock;

Tax variable of main interest: Dummy variable with entry one if a bilateral tax treaty is in force and zero otherwise (Treaty dummy); number of years since a tax treaty has been effective (Treaty age);

Control variables: log(GDP of host country), log(GDP per-capita of host country), log(Inflation rate), openness to trade, Dummy variable taking the value of one if the home and the host country have signed a common regional trade agreement, Dummy with entry one if a bilateral investment treaty is in force and zero otherwise;

Semi-elasticities:

Tax variable of interest	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
Treaty dummy	25.33*	5.34	66.53	18.80
Treaty age	4.43**	2.00	9.00	2.24

Notes: * The positive sign implies that tax treaties increase FDI; ** The positive sign implies that FDI increases with the treaty age;

Davies et al. (2009):

Outcome(s): Little evidence for an effect of treaties on the level of total sales, which act as proxy for foreign investment; However, a positive impact of treaty formation on the probability of newly investing in a country is found; that is a tax treaty has no impact on the volume of investment but on the location of the investment;

Years and Countries included: 1965, 1970, 1974, 1978, 1986, 1990, 1994, 1998; Sweden as home country and 25 developing countries as well as Australia and Luxembourg as partner countries;

Specification and Estimator applied: Level-Level and Log-Level specifications, Panel Probit estimator with various fixed effects (country, region, time and firm fixed effects) and Fixed effects estimator;

Dependent variable: Micro-data from the Research Institute of Industrial Economics is used for total affiliate sales in a host country; dummy variable indicating whether a Swedish multinational has an affiliate in a host country or not;

Tax variable of main interest: Dummy variable equal to 1 if a treaty is in effect for the country pair in a given year (Treaty dummy);

Control variables: Statutory tax rate on corporate income, GDP, GDP per capita, Openness to trade, R&D-intensity, Dummy variable indicating the participation in a trade agreement, indicator of the size of the Swedish MNE and its experience abroad, fixed costs in terms of plant scale, age of the affiliate under, dummy variable to proxy the purpose of the establishment (sales company or production unit);

Semi-elasticities:

Dependent variable used	Semi-elasticity
Level of sales	-11.75*
Probability of investment	16.70**

Notes: * Information only for one specification is available to derive semi-elasticities; the negative sign implies that the existence of a tax treaty reduces affiliate sales; yet the coefficient is not statistically significant; ** Only for one specification the implied marginal effects are given in the paper; the positive sign implies that having established a tax treaty increases the probability of having an affiliate in the partner country;

Table A2 Tax Sparring Rules and Foreign Direct Investment

Hines (1998):

Outcome(s): Tax sparring rules have a substantial and significant positive influence on the level of Japanese FDI;

Years and Countries included: 1989 and 1990; Japan and the US with 67 partner countries;

Specification and Estimator applied: Level-Level specification; OLS, 2SLS;

Dependent variable: Japanese share of FDI (equity investment) in developing countries to total Japanese FDI (equity investment) minus the corresponding US FDI (equity investment) share;

Tax variable of main interest: Dummy variable for tax sparring rule in force (Yes / No);

Control variables: log(GDP);

Semi-elasticities:

Dependent variable used	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
FDI share	304.76*	138.23	479.01	127.33
Equity share:	196.69**	159.4	266.51	37.890

Notes: * Substantially higher values arise if the 2SLS estimator is used; the positive sign means that Japanese FDI is higher in countries with which Japan has tax sparring agreements than with countries no such rules are in force; ** Substantially higher values arise if the 2SLS estimator is used; the positive sign means that Japanese equity investment is higher in countries with which Japan has tax sparring agreements than with countries no such rules are in force;

Azémar et al. (2007):

Outcome(s): Tax sparing provisions have a substantial and significant positive impact on the level of Japanese FDI;

Years and Countries included: 1989-2000; Japan and 26 developing countries;

Specification and Estimator applied: Log-Level specification; Random effects estimator;

Dependent variable: Total Japanese FDI flows into host country i;

Tax variable of main interest: Dummy variable for tax sparing rule in force (Yes / No);

Control variables: GDP, labour costs, exchange rates, country risk, quality of infrastructures, natural resources, trade openness, geographical distance, regional dummy for East Asia and Pacific countries, proxy for agglomeration effects;

Semi-elasticity: 180.11*

Notes: * Only column 2 of Table 4 is used to isolate the impact of Tax sparing rules on FDI;

Table A3 Profit-Shifting: General Evidence

De Mooij (2005):

Outcome(s): Includes survey of earlier papers; a mean semi-elasticity of -2 is derived;

Weichenrieder (2009):

Outcome(s): Empirical evidence is found for the net of taxes profitability of foreign affiliates in Germany being positively correlated with the home country statutory tax rate on corporate income; Moreover, some evidence (i.e. in case leverage is not considered as regressor) is found for wholly-owned German foreign affiliates being more sensitive to host country statutory tax rates on corporate income than non-wholly owned affiliates abroad;

Years and Countries included: 1996 to 2003; Germany and a not specified range of host countries of German affiliates and foreign parent companies of inbound FDI in Germany;

Specification and Estimator applied: Level-Level specification; Two-way fixed effects estimator (time and firm specific effects) in inbound case; Firm specific effects estimator in outbound case;

Dependent variable: Yearly data on the net of tax profit of an affiliate in percent of the affiliate's total assets is used; items taken from the Midi database of the Deutsche Bundesbank; affiliates in the banking and insurance industries, holding companies as well as indirect participations are excluded (inbound case);

Tax variable of main interest: Statutory tax rate on corporate income in host country of German affiliate; statutory tax rate on corporate income in home country of foreign affiliate in Germany;

Control variables: log(employment), log(sales), log(fixed assets), debt ratio, GDP growth of host country of German affiliates, domestic private credit to GDP ratio of the host country, Dummy variable for ownership structure;

Semi-elasticity:

Case	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
inbound case	0.91*	0.72	1.23	0.17
outbound case:	-0.55**	-0.67	-0.42	0.12

Notes: * The positive sign means that the higher the tax rate in the country of location of the foreign parent company, the higher is the reported net of taxes profitability of the foreign affiliate in Germany; ** The negative sign means that the tax rate respon-

siveness of net of taxes profitability for wholly-owned German foreign affiliates is higher (in absolute value) than that for non-wholly owned German affiliates;

Huizinga and Laeven (2007):

Outcome(s): For various European countries empirical evidence on a substantial tax-rate sensitivity of pre-tax profits is found;

Years and Countries included: Cross-section of firms for 1999; EU-27 less Cyprus, Malta, Latvia, Lithuania, Slovenia, Greece and Ireland but plus Norway;

Specification and Estimator applied: Log-Level specification; 2SLS estimator with the statutory tax rate on corporate income of a country being instrumented by the difference between log(population host country of affiliate) and log(population of home country of parent); industry fixed effects included; simulation of aggregated country-specific semi-elasticities;

Dependent variable: The dependent variable is the log(earnings before interest and taxes); data are taken from the Amadeus database of the Bureau Van Dijk; manufacturing sector firms included only;

Tax variable of main interest: Composite tax variable which summarizes all information about the tax rates and profits in all the countries a multinational enterprise is present;

Control variables: log(fixed assets) of the affiliate, log(GDP per-capita) of the country the affiliate is based;

Semi-elasticity:

Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
-1.31	-0.28	-2.92	0.81

Note: Mean value is mean over the 21 country-specific semi-elasticities; the negative sign means that the tax base (i.e. earnings before interest and taxes) is reduced if the statutory tax rate is increased;

Table A4 Profit-Shifting: Transfer Pricing Evidence

Clausing (2003):

Outcome(s): Substantial evidence for tax-motivated transfer pricing in US intra-firm trade prices is present; Specifically, the lower a host country's tax rate the lower are US intra-firm export prices and the higher are US intra-firm import prices;

Years and Countries included: 1997 to 1999; The US and 54 partner countries;

Specification and Estimator applied: Log-Log specification; Pooled OLS with industry dummies, robustness checks with time fixed effects, country Fixed effects and country Random effects;

Dependent variable: Monthly data on US international export and import prices (intra-firm and non-intra-firm) at the product level from the Bureau of Labor Statistics is used;

Tax variable of main interest: log(1-average tax rate on corporate income), log(1-statutory tax rate on corporate income);

Control variables: log(GDP), log(GDP per-capita), log(US-Dollar exchange rate), various dummy variables (e.g. intra-firm dummy, dummy for dollar denomination of transactions, dummy for price imputation);

Semi-elasticities:

Dependent variable	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
Export prices	4.08*	2.54	5.51	1.35
Import prices	-4.73**	-7.91	-1.99	2.38

Notes: * The positive sign means that lower prices (relative to non-intra-firm prices) are charged on intra-firm exports to affiliates companies located in countries with lower tax rates; ** The negative sign means that higher prices (relative to non-intra-firm prices) are charged for intra-firm imports from an affiliated company located in countries with lower tax rates;

Clausing (2006):

Outcome(s): A substantial and significant impact of tax avoidance incentives on the pattern of US international intra-firm trade is found which is consistent with tax-motivated transfer pricing;

Years and Countries included: 1982 to 2000; The US and 51 partner countries;

Specification and Estimator applied: Level-Level specification; Pooled OLS with industry dummies, robustness checks with time fixed effects;

Dependent variable: Yearly intra-firm trade data of US multinational firms; data from the US Bureau of Economic Analysis is used; for evidence on the "price effect" the intra-firm trade balance between the US and the country hosting US affiliates is used as endogenous variable;

Tax variable of main interest: Difference in statutory tax rate on corporate income in host country of US affiliate and statutory tax rate on corporate income in the US, Difference in average tax rate on corporate income in host country of US affiliates and average tax rate on corporate income in the US;

Control variables: Share of sales, unaffiliated trade balance, dummy variables for Europe and Japan;

Semi-elasticities:

Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
4.81	1.81	7.32	1.82

Notes: Only Tables 3 and A2 on the price effect are explored; the positive sign implies that the intra-firm trade balance, measured as exports to foreign affiliates minus imports from foreign affiliates increases with an increase in the foreign tax rate on corporate income in the host country;

Overesch (2006):

Outcome(s): If an affiliate does not have loss carry forwards intra-firm then sales decrease with an increase in the host countries statutory tax rate on corporate income; This is consistent with tax-motivated transfer pricing in German intra-firm sales;

Years and Countries included: 1996 to 2003; Germany and 31 partner countries (EU-27 without Bulgaria, Cyprus, Germany and Romania, the US, Canada, Mexico, New Zealand, Australia, Japan, Norway, Switzerland);

Specification and Estimator applied: Log-Level specification; 2SLS with parent, industry and time fixed effects;

Dependent variable: Yearly balance sheet data of German foreign affiliates is applied; variables "accounts receivable from affiliated companies" and "accounts receivable from the parent company" made available by the Midi database of the Deutsche

Bundesbank is used; majority-owned direct participations outside the financial sector and without holding companies are included in the sample;

Tax variable of main interest: Statutory tax rate on corporate income in host country of German affiliate in case of "accounts receivable from affiliated companies", Difference in Statutory tax rate on corporate income in Germany and that of the host country in case of "accounts receivable from parent company";

Control variables: log(total capital of the affiliate) instrumented by log(GDP of the host country), log(lending rate of the host country), various dummy variables (e.g. for ownership structure, loss carry forward), log(turnover of the affiliate), log(bilateral distance between Germany and the host country of the affiliate);

Semi-elasticities:

Dependent variable	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
Trade with parent	0.51	-3.22*	2.84	1.70
Trade with affiliates	-1.00	-3.38**	1.80	1.31

Notes: * Negative values are found in cases loss carry forwards are available to the affiliate; ** Positive values are found in cases loss carry forwards are available to the affiliate;

Bernard et al. (2008):

Outcome(s): The paper shows that the wedge between the arm's length export price and the intra-firm export price of US based multinationals is negatively related to the taxation of corporate income in the foreign import country. This response indicates that tax-motivated transfer pricing is present in intra-firm export prices of US based multinational companies;

Years and Countries included: 1993 to 2000; The US and 140 partner countries;

Specification and Estimator applied: Log-Level specification; Pooled OLS with product fixed effects;

Dependent variable: The dependent variable is the wedge between the arm's length export price and the intra-firm export price of US based multinationals; data from the Linked/Longitudinal Firm Trade Transaction Database (LFTTD) , which is based on data from the US Census Bureau and the US Customs Bureau, is used;

Tax variable of main interest: Statutory tax rate on corporate income and average tax rate on corporate income in the host country of US based multinationals' affiliates;

Control variables: tariff rate, log(employment of the affiliate), firm export share, log(real exchange rate with US Dollar), log(GDP per-capita);

Semi-elasticities:

Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
-1.25	-4.18	-0.39	1.18

Notes: The negative sign implies that an increase in the host country tax rate on corporate income leads to a decrease in the wedge between arm's length export prices and intra-firm export prices;

Dischinger and Riedel (2008):

Outcome(s): The paper shows that the location of holdings and investments in intangible assets is inversely related to the statutory tax rate on corporate income; this relationship can be considered as indirect evidence in favour of tax-motivated transfer pricing in intra-firm trade of intangibles;

Years and Countries included: 1995-2005; EU-27 less Cyprus and Malta;

Specification and Estimator applied: Log-Level specification; Fixed effects estimator, First difference estimator, Anderson-Hsiao estimator, Arellano-Bond estimator, Fixed effects Logit and Linear Probability model estimator;

Dependent variable: Balance sheet item "intangible assets" plus 1 taken from the Amadeus database; Dummy variable with entry one if an affiliate owns intangible assets and zero otherwise;

Tax variable of main interest: Mean difference between the statutory tax rate on corporate income of an affiliate and the statutory tax rate on corporate income of all other affiliates of a common parent company;

Control variables: log(GDP per-capita of host country), log(population of host country), log(unemployment rate in host country), log(total assets of affiliate);

Semi-elasticities:

Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
-1.17*	-2.04	-0.36	0.45

Notes: * The negative sign implies that an affiliate's holdings of intangibles decrease ceteris paribus with an increase of the statutory tax rate on corporate income in the host country;

Table A5 Profit-Shifting: Thin capitalization rules

Büttner et al (2006):

Outcome(s): Thin capitalization rules are found to be effective in restricting debt finance;

Years and Countries included: 1996-2004; Germany as home country of FDI and 24 partner countries;

Specification and Estimator applied: Level-level specification; Fixed effects estimator;

Dependent variable: Debt to asset ratio of German foreign subsidiaries (leverage); data are taken from the Midi database of the Deutsche Bundesbank;

Tax variable of main interest: Dummy for the presence of a Thin capitalization rule, Dummy variable for the presence of a Thin capitalization rule interacted with the statutory tax rate on corporate income;

Control variables: log(lending rate for the private sector), log(turnover), statutory tax rate on corporate income, dummy variable indicating whether loss carry-forward is reported by the affiliate;

Semi-elasticities:

Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
-8.27*	-8.34	-8.20	0.06

Notes:* The negative sign implies that the debt to equity ratio is reduced when a thin capitalization rule is in force;

Overesch and Wamser (2006):

Outcome(s): German thin capitalization rule induces significantly lower intra-firm debt-levels of inbound investments; hence, tax planning via intra-firm finance is effectively limited;

Years and Countries included: 1996-2004; Germany as host country of FDI and 31 investor countries;

Specification and Estimator applied: Level-level specification; Difference-in-differences approach with affiliate fixed effects and time dummies;

Dependent variable: Intercompany loans as share of total affiliate capital; data is taken from the Midi database of the Deutsche Bundesbank;

Tax variable of main interest: Interaction term between "Treatment group dummy" and "Post tax reform dummy";

Control variables: log(turnover), dummy for loss carry-forward of affiliate available or not, Difference in statutory tax rate on corporate income of Germany and the home country of FDI, Treatment group dummy;

Semi-elasticities:

Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
-24.72*	-31.86	-31.00	6.49

Notes: * The negative sign implies that the debt to equity ratio is reduced when a thin capitalization rule is in force; only results from Tables 4 and 5 could be used due to lacking information on the mean of the endogenous variable;

Weichenrieder and Windischbauer (2008):

Outcome(s): The change in German thin capitalization rules in 2001 induces significantly lower intra-firm debt-levels of inbound investments (especially for affiliates which are very highly leveraged prior to the 2001);

Years and Countries included: 2000-2002; Germany as host country of FDI and several investor countries;

Specification and Estimator applied: Level-Level specification; Two-way fixed effects estimator (affiliate and time fixed effects);

Dependent variable: Intra-firm debt as share of total affiliate assets one year lagged; data is taken from the Midi database of the Deutsche Bundesbank;

Tax variable of main interest: Interaction term capturing highly leveraged corporations in 2000 and interaction term capturing highly leveraged branches in 2000;

Control variables: log(sales of the affiliate);

Semi-elasticity: -22.99*

Notes: * The negative sign implies that the debt to equity ratio is reduced when a thin capitalization rule is in force; only results from Table 2, column 1 could be used due to lacking information; semi-elasticity is calculated as $((1.624-0.417)*100)/525*100*(-1)$;

Table A6 The role of hybrid entities

Altshuler and Grubert (2005):

Outcome(s): The introduction of hybrid entities into US CFC rules ("check the box") substantially alters the tax planning opportunities of multinational enterprises which result in a looser relationship between average tax rates of US foreign affiliates and the host countries' statutory tax rate on corporate income, a looser relationship between the parent company's R&D expenditures and the average tax rates of foreign affiliates and a stronger negative impact of the statutory tax rate on corporate income on the pre-tax profit declared in a host country;

Years and Countries included: 1996 and 2000; The US plus 60 partner countries;

Specification and Estimator applied: Level-Level specification; Cross-sectional OLS;

Dependent variable: Pre-tax profits as a share of sales; data from the US Treasury tax files for US multinational corporations is used;

Tax variable of main interest: Statutory tax rate on corporate income;

Control variables: Age of the affiliate, Parent company R&D expenditures as share of sales, Parent company advertising expenditures as share of sales;

Semi-elasticities:

Year	Semi-elasticity mean	Semi-elasticity min	Semi-elasticity max	Standard deviation
1996	-1.48	-1.61	-1.31	0.13
2000	-2.07	-2.3	-1.81	0.2

Notes: The negative signs imply that the higher the statutory tax rate on corporate income is the lower are the reported pre-tax profits of the foreign affiliate; As the "check the box" possibility is introduced into US CFC rules in 1997 the difference in the magnitudes of the two mean values is suggestive evidence in favour of an increase in tax-motivated profit shifting via hybrid entities after the 1997 CFC rule change; Specifically, it is likely that highly profitable subsidiaries in high tax countries became part of a consolidated hybrid entity based in a tax haven;