Unilateral Introduction of Destination-Based Corporate Income Taxation

by

Johannes Becker† and Markos Jung‡

Abstract

We consider source-based and destination-based corporate income taxation in a symmetric two-country model with heterogeneous firms. Whereas source-based taxation yields (fiscal) externalities and is thus inefficient, bilateral destination-based taxation is efficient, as proposed by Auerbach & Devereux (2013). This paper shows that the unilateral introduction of a destination-based tax may, first, increase tax revenue in both countries and, second, be Pareto improving if certain conditions are met. Thus, even if a multilateral reform is not feasible, a unilateral reform may be desirable both from the individual and the global point of view.

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†Corresponding author, Institute of Public Economics, University of Münster, Wilmingasse 6-8, 48143 Münster, Germany, johannes.becker@wiwi.uni-muenster.de.

‡Institute of Public Economics, University of Münster, Germany, markos.jung@wiwi.uni-muenster.de. The author gratefully acknowledges support from the Heinrich Böll Foundation.
1 Introduction

Throughout the world, corporate profits are taxed at source. Decentralized tax policies yield tax rate differentials which distort the allocation of productive assets. Public finance scholars have long thought about this and come up with a range of propositions to mitigate the welfare loss due to these distortions. Most recently, Auerbach & Devereux (2013) proposed the introduction of a destination-based tax on corporate income. If properly implemented and if all countries adopt such a system, the allocation of capital and firms could be efficient. However, it may be deemed unrealistic that all countries simultaneously adopt such a system – as there will likely be winners and losers. Therefore, this paper considers the unilateral introduction of a destination-based corporate income tax (DT).

We extend the work by Auerbach & Devereux (2013, A&D henceforth) in two ways. First, we consider DT in a framework with imperfect competition – which seems especially suitable in the context of multinational firms. Whereas A&D assume that the firm is a price-taker (since this simplifies the analysis of allocative efficiency), we consider Melitz-type heterogeneous firms that supply to their home market and the foreign market via exports and FDI (as in Helpman et al. 2004). Second, we describe the equilibrium after a unilateral introduction of DT. A&D consider the marginal incentive to introduce a system with DT, starting from an equilibrium under the source-based taxation. This allows ignoring the impact on equilibrium tax rates. It remains unclear whether a full introduction leaves the country better-off or not.

We show that, under imperfect competition, a multilateral introduction of DT yields constrained efficiency in the sense that a distortion due to imperfect competition persists. The DT system implies that the export-FDI margin remains unaffected by tax differences. Since, with cash-flow type taxation, this is the only source of tax distortion in a system with source-based taxation, the DT system is constrainedly efficient. However, there is a tendency towards overtaxation which equally occurs under perfect competition (but has been neglected by A&D). Under plausible assumptions, the unilateral introduction of a DT system increases tax revenues in both countries and may, under certain circumstances, imply a Pareto improvement. That is, even if a coordinated switch from the current system to the DT is (politically) not

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1 A small number of countries, including the US, complements source-based taxation within its territorial borders with taxation of worldwide income. However, as it is often argued, deferral of repatriation and other tax avoidance strategies make foreign income of corporations effectively tax exempt.
feasible, some countries may consider the introduction unilaterally.

As mentioned above, the literature provides a range of reform proposals directed at improving the efficiency (and, sometimes, the fairness) of the international tax system. Obviously, the proposed cure is a function of the underlying diagnosis. The latter has changed over time, and it may be helpful to quickly recapture the main steps. Peggy Musgrave (née Richman 1963) and, later on, Roger Gordon (1986) stressed the inefficiency of source-based capital income taxation and pointed out that pure residence based taxation is superior. These first studies (as well as the first treatments of tax competition in Zodrow & Mieszkowski 1986 and Wilson 1986) share the assumption that capital is homogeneous and perfectly mobile across borders, whereas e.g. labor and firms are immobile. Since markets equate the after-tax return to capital across borders and allocative efficiency requires equal pre-tax returns in each country, decentralized tax rate setting almost necessarily leads to distortions. Pure residence based taxation may solve this problem, but may be impractical due to high enforcement cost and quickly changing ownership structures. As a consequence, efficient capital taxation may be infeasible and, thus, the optimal tax on the normal return to capital is presumed to be zero. This does, however, not prevent government to tax economic rents. One straightforward mechanism to achieve this is to grant full tax deductibility of the normal return to capital under the standard source-based tax system. This reduces the effective marginal tax rate on capital to zero. An alternative way of achieving this is a system of cash-flow taxation (see e.g. Bond & Devereux 2002).

In the 1990s, after observing the surge of foreign direct investment throughout the world, especially of US FDI in Ireland, and the rise of multinational firms, the discussion shifted towards the mobility of firms or whole production units, instead of marginal units of capital. As pointed out by Devereux & Griffith (1998), taxes do distort the allocation of production even if the normal return to capital remains untaxed. A crucial insight of these considerations is that full deductibility of capital expenses does not abolish all distortions. Finally in the 2000s, the focus of the academic as well as the political debate shifted again and centered on the tax-induced shifting of book profits via transfer pricing and financial policy. With profit shifting alone, formula apportionment (see, e.g., Gordon & Wilson 1986) or CFC regulation may be suitable

\footnote{Since the cost of debt finance is already deductible, such a policy reform would require an allowance for corporate equity (ACE).}

\footnote{Sinn (1990) supposed that granting full deductibility of capital expenses would immunize a country from the pressures of globalized capital markets.}
solutions, but with cross-border investment in multinational firms, such institutions may give rise to additional distortions. In general, the opportunity of profit shifting may exacerbate the tax elasticity of investment (because firms invest in low-tax countries in order to shift profits) or mitigate it (because firms anticipate that they will not have to tax profits in high-tax countries). The latter assumption seems to be shared by most observers, as investment distortions seems to have somehow lost political (and academic) attention.

Auerbach & Devereux (2013) propose a system that tackles the distortion drivers from all three past decades: mobile capital, mobile firms and mobile profits. Since the location of firms and profits (or, more generally, value added) has tax consequences as long as taxation depends on the location of production, they propose to make the tax liability depending on the location of the consumer. Since firms cannot (easily) move consumers, such a system could get rid of all three potential distortions. Such a system would be similar to a destination based system of value added taxation.

In the version of A&D, under a destination based system of corporate taxation, tax revenue is collected by the country where the consumer resides. For allocative efficiency, it is irrelevant which government collects the revenue as long as firms pay the same amount of tax. However, if tax rates are endogenized (as in our framework), the destination country has the incentive to export some of its tax burden to foreign producers. This may give rise to overtaxation as we show below. Another difficulty arises when the DT system is unilaterally introduced. Then, waiving the right to tax to the destination country would create untaxed income (exporters in the country that has introduced DT) and double taxed income of imports from foreign producers. We therefore modify the setting and assume that the DT country still taxes its exporters, but at the rate of the destination country. In allocative terms, this system is equivalent to the one proposed by A&D.

The remainder of the paper is organized as follows. Section 2 presents the model setup. Section 3 discusses the benchmark scenario under source-based taxation (ST) with underprovision of public goods. In Section 4, we analyze tax policy under destination-based taxation if multilaterally or unilaterally introduced. Section 5 discusses several extensions. Section 6 concludes.

2 Model setup

Before we describe the details of the model, it may be useful to justify some of our modelling choices. Our model is a standard Helpman et al. (2004)
framework with Melitz (2003)-type heterogeneous firms augmented by an export-FDI decision. We add to this framework profit taxes which finance a public good. All other ingredients of the model stay the same, which is why we reduce the model description to the necessary. In the baseline version of the model, we do not consider mobile capital and profit shifting. Given the above discussed focus of the existing literature on these two aspects, this may seem surprising, but it can be made plausible as follows. First, since all considered tax system here are cash-flow systems, the investment decision is always non-distorted and can therefore be neglected. Thus, integrating capital as a productive input does not provide any new insights, but comes at the cost of more complexity (as, for instance, a world capital market would have to be modelled etc.). Second, profit shifting opportunities have a similar effect as choosing between exports and FDI; the main driver is the statutory tax rate. Moreover, since we consider a symmetric model with equal tax rates in equilibrium, profit shifting in the symmetric equilibrium is zero. Therefore, we abstract from profit shifting in the baseline version of the model, will however discuss its implication in Section 5.

Consider a world with two countries, home \((h)\) and foreign \((f)\), indexed by \(i = h, f\). In each country \(i\), the representative consumer derives utility from a public good and consumption of private goods. The latter consist of a numeraire good \(y\) and a CES-aggregate of differentiated goods indexed \(\omega\). Subutility function \(U\) captures the utility from private consumption and is given by

\[
U = y + \frac{1}{\gamma} \left[ \int_{\omega \in \Omega} q(\omega)^\rho d\omega \right]^{\frac{\gamma}{\rho}} \tag{1}
\]

where \(\sigma = \frac{1}{1-\rho}\) is the elasticity of substitution between the differentiated goods, \(\frac{\sigma}{\rho-\gamma}\) is the elasticity of substitution between both sectors, \(q(\omega)\) denotes the quantity of variety \(\omega\), and \(\Omega\) is the set of available goods, the mass of which is given by \(M\).\(^4\) In order to have positive elasticities of substitution, we assume \(0 < \gamma < \rho < 1\).\(^5\) With \(p(\omega)\) the price of variety \(\omega\) and \(I\) the household’s income, the household’s budget constraint is given by

\[
I = y + \int_{\omega \in \Omega} p(\omega) q(\omega) d\omega. \tag{2}
\]

Income \(I\) consists of wage income \(w\) and dividend income (i.e. effectively the

\(^4\)Explicit expressions of \(q(\omega)\) as well as the price index \(P\) are derived in the Appendix.

\(^5\)See Chor (2009) for a similar assumption.
sum of after-tax profits of domestic firms). Due to the quasi-linearity of the utility function, all income effects are absorbed by the numeraire sector.\(^6\)

There are two sectors of production. The numeraire good sector is assumed to produce under constant returns to scale technology with a marginal labor productivity of unity. Moreover, competition is perfect and trade is costless, which pins down the wage to unity in both countries. Profits in the numeraire sector are zero.

In the CES sector, there is a continuum of heterogeneous firms, as in Melitz (2003) and Helpman et al. (2004). Prior to market entry, an exogenous number of firms, \(N\), draws a random productivity \(\phi\) from a distribution \(G(\phi)\). Firms have the option to serve the domestic market (\(D\)), to serve the other market via exports (\(E\)) or FDI (\(F\)), or to not enter the market. For each of these activities, there are fixed costs \(F_X\) involved with \(X \in \{D, E, F\}\) denoting the activity. Similarly, there are iceberg shipping cost, \(\tau_X \geq 1\), i.e. if a quantity \(q\) is to be sold, a quantity \(\tau_X q\) has to be shipped. We assume \(\tau_E = \tau > 1\) as well as \(\tau_D = \tau_F = 1\) for all \(i\).

Each firm pays a proportional tax \(t_{iX}\) on its net profits. After-tax profits of a firm with productivity \(\phi\) are, dependent on the activity \(X\), given by

\[
\pi_{iX}(\phi) = \left[ \left( p_{iX}(\phi) - \frac{\tau_X}{\phi} \right) q_{iX}(\phi) - F_X \right] (1 - t_{iX}) \tag{3}
\]

Under source based corporate profit taxation, we have \(t_{iX} = t_i\) for domestic production and exports and \(t_{iX} = t_{-i}\) for FDI. As in Melitz (2003), all firms charge the same markups \(\frac{1}{\rho}\) which implies a price \(p_{iX}(\phi) = \tau_X(\phi)\).

The productivity cutoff for domestic production is denoted by \(\phi_{iD}\) and defined by \(\pi_{iD}(\phi_{iD}) = 0\). With productivity increasing, the firm may consider exporting its goods. The associated cutoff is \(\phi_{iE}\) and defined by \(\pi_{iE}(\phi_{iE}) = 0\). Highly productive firms may consider FDI instead of exporting. The cutoff is \(\phi_{iF}\) and defined by \(\pi_{iE}(\phi_{iF}) = \pi_{iF}(\phi_{iF})\). The parameters of the model are chosen such that \(\phi_{iD} < \phi_{iE} < \phi_{iF}\) which, among others, requires \(F_D < \tau^{\sigma-1}F_E < F_F\). Thus, firms with a productivity below \(\phi_{iD}\) do not produce, between \(\phi_{iD}\) and \(\phi_{iE}\) only serve the domestic market, between \(\phi_{iE}\) and \(\phi_{iF}\) export, and above \(\phi_{iF}\) invest abroad instead of exporting.

Governments are assumed to maximize a welfare function \(W_i = W(T_i, U_i)\) where \(T_i\) denotes country \(i\)'s corporate income tax revenue. This includes

\(^6\)We assume that the income is high enough such that the household consumes both the numeraire and the CES goods.
the case of revenue maximization, if $W_U = 0$, and the case of a benevolent government that maximizes its citizens’ utility which depends on $T_i$ because it finances the public good.

We will continue by outlining the benchmark, i.e. taxation under a system of source-based corporate income taxation. Then, we quickly outline a system with destination-based corporate income taxation as proposed by Auerbach & Devereux (2013). After that, we analyze the effects of a unilateral introduction of a DT system.

3 Benchmark: Tax policy under source-based taxation (ST)

Under a pure (and stylized) source-based corporate income tax system, the government in $i$ taxes all profits that accrue within their jurisdiction at source. Country $i$’s household has income of $I_{ST}^i = (1 - t_i) (B_{iD} + B_{iE}) + (1 - t_{-i}) B_{iF} + w$. Tax revenue is given by $T_{ST}^i = t_i (B_{iD} + B_{iE} + B_{-iF})$ where $B_{iD}$, $B_{iE}$ and $B_{-iF}$ refer to the tax bases from domestic production, exports and inbound FDI, respectively. These can be expressed as $B_{iX} = \int_{\omega \in \Omega_{iX}} \pi_{iX}(\omega) \frac{\partial B_{iX}}{\partial P_{iX}} d\omega$ where $\Omega_{iX}$ denotes the set of firms involved in activity $X$. The government in $i$ sets $t_i$ such that

$$\frac{dW_i}{dt_i} = W_T \frac{dT_i}{dt_i} + W_U \frac{dU_i}{dt_i} = 0$$

with $\frac{dW_i}{dt_i}$ given by

$$\frac{dW_i}{dt_i} = \left( W_T - W_U \right) (B_{iD} + B_{iE}) + W_T B_{-iF}$$

$$+ W_{ST} \left( \frac{dB_{iD}}{dt_i} + \frac{dB_{iE}}{dt_i} + \frac{dB_{-iF}}{dt_i} \right) + W_U \left( \frac{dU_i}{dP_i} \frac{dP_i}{dt_i} + \frac{dU_i}{dP_{-i}} \frac{dP_{-i}}{dt_i} \right)$$

The first term on the right hand side captures the mechanical reallocation of funds from the domestic household to the government. If the marginal social value of tax revenue is larger than the marginal social value of private consumption, this effect is positive. The second term represents the social gain from taxing foreigners ($B_{-iF}$). The third term captures the behavioral effects on the tax base, with $\frac{dB_{iD}}{dt_i} = \frac{\partial B_{iD}}{\partial P_{iD}} \frac{dP_{iD}}{dt_i} > 0$, $\frac{dB_{iE}}{dt_i} = \frac{\partial B_{iE}}{\partial P_{iE}} \frac{dP_{iE}}{dt_i}$ and $\frac{dB_{iE}}{dt_i} > 0$ always reduces the tax base – under ST as well as in the unilateral DT system.8

7A more explicit expression of the tax base as well as the first derivatives of all cutoffs, prices, and tax bases are given in the Appendix.

8Hence, we assume $\frac{dB_{iD}}{dt_i} + \frac{dB_{-iF}}{dt_i} < 0$, which is the case if the inter-sectoral elasticity of
Note that the tax $t_i$ does not directly affect the domestic production cutoff and the export cutoff, $\partial B_{iD} / \partial \phi_i = 0$ and $\partial B_{iE} / \partial \phi_i = 0$. Finally, private utility is negatively affected by changes in the price level, both via consumption and dividend income.\(^9\)

Now, consider a symmetric Nash equilibrium, starting from which both countries marginally increase their tax rates by an equal amount. Then, all cutoffs remain unaffected, as do the price levels. The resulting welfare effect is given by

$$\frac{dW_i}{dt_i} = (W_T - W_U) (B_{iD} + B_{iE}) + W_T (B_{-iF}) - W_U (B_{iF})$$

which is positive as long as $W_T > W_U$.

**Proposition 1** [Zodrow & Mieszkowski 1986] In the symmetric equilibrium, competition with source-based corporate taxes yields inefficient low tax rates provided that the tax base from inbound investment activity, $B_{-iF}$, is sufficiently small. Thus, tax competition yields underprovision of public goods.

**Proof.** With $B_{-iF}$ sufficiently small, $W_T > W_U$ is a necessary condition for $\frac{dW_i}{dt_i} = 0$ to hold. Then, a coordinated tax increase raises welfare which proves the above Proposition. \(\blacksquare\)

A foreign owned tax base (due to cross-border ownership links), $B_{-iF}$, may give rise to tax exporting and – potentially – overtaxation (see Bucovetsky 1995 and Huizinga & Nielsen 1997 for the first formal treatments of the 'foreign firm ownership effect'). This effect makes the classical result of underprovided public goods (Zodrow & Mieszkowski 1986) vanish. In what follows, we will suppose that this effect will not be too strong, i.e. that the classical dilemma as described by the classical tax competition models still exists.

\(^9\)Note that the envelope theorem implies that marginal changes in cutoffs do not affect $U$. However, since the single firm takes the price level as given, a change in price level has a first order effect on private utility. With $U_i = I_i + \frac{1-t_i}{1-\gamma} P_i^{1-\gamma}$ and $(1-t_i) \frac{dB_{iD}}{dP_i} < P_i^{1-\gamma}$ as well as $\frac{dB_{iE}}{dP_i} > 0$ (see the Appendix), these effects are given by

$$\frac{dU_i}{dP_i} = \frac{dI_i}{dP_i} - P_i^{1-\gamma} = (1-t_i) \frac{dB_{iD}}{dP_i} - P_i^{1-\gamma} < 0$$

$$\frac{dU_i}{dP_{-i}} = \frac{dI_i}{dP_{-i}} - (1-t_i) \frac{dB_{iE}}{dP_{-i}} + (1-t_{-i}) \frac{dB_{iF}}{dP_{-i}} > 0.$$
Given that tax competition yields inefficient outcomes (be it in terms of public good provision or capital allocation), the question arises why source-based taxes still prevail. The answer may be that the alternatives are equally unattractive. Country heterogeneity may prevent tax harmonization (Bucovetsky 1991) and a switch to pure residence taxation may either be impractical or distortive as well (see e.g. Becker & Fuest 2011). A novel approach is taken by Auerbach & Devereux (2013) who propose a switch to a destination-based corporate tax system which follows the principle used in value-added taxation. Before we describe this approach, we need to prepare the analysis as follows.

For later use, it is helpful to distinguish the tax base generated by selling product to domestic consumers, $B_{iD} + B_{-iF}$, and the tax base due to selling product to foreign consumers, $B_{iE}$. Assume, for a moment, that these two subsets could be taxed at different rates (see Keen 2001 for a broader discussion on differential or preferential treatment of distinct tax bases). Let $t_{iE}^E$ denote the tax rate on exporting firms and $t_{iD}^F$ the tax rate on $B_{iD} + B_{-iF}$. Optimal tax rates, $t_{iD}^{DF*}$ and $t_{iE}^{E*}$, are implied by

$$\frac{dW_i}{dt_{iD}^{DF}} = (W_T - W_U) B_{iD} + W_T B_{-iF} + W_T t_{iD}^{DF} \left( \frac{dB_{iD}}{dt_i} + \frac{dB_{-iF}}{dt_i} \right) + W_U \frac{dU_i}{dP} \frac{dP}{dt_i}$$

$$\frac{dW_i}{dt_{iE}^{E}} = (W_T - W_U) B_{iE} + W_T t_{iE}^{E} \frac{dB_{iE}}{dt_i} + W_U \frac{dU_i}{dP} \frac{dP_{-i}}{dt_i}$$ (6)

In general, we cannot determine whether $t_{iD}^{DF*}$ or $t_{iE}^{E*}$ is higher than the other. We can, however, state the following lemma.

**Lemma 1** $t_{iD}^{DF*} > t_{iE}^{E*}$ if

(i) $W_U = 0$ or $W_T$ is sufficiently larger than $W_U$ or

(ii) price level effects, $\frac{dP}{dt_i}$ and $\frac{dP_{-i}}{dt_i}$, are sufficiently small.

**Proof.** See the Appendix. ■

The optimal tax rate under ST is a weighted average of $t_{iD}^{DF*}$ and $t_{iE}^{E*}$.

### 4 Tax policy under destination-based taxation (DT)

Auerbach & Devereux (2013) propose the introduction of destination-based corporate profit taxation. In short, taxes are levied by the country in which the consumers are. If consumers are sufficiently immobile, such a system leaves the allocation of capital undistorted and provides a level playing field for domestic and foreign competitors on a given market.
4.1 Multilateral introduction

If all countries adopt the DT system, the government in \( i \) taxes all profits that are associated with goods that remain in or are shipped into its country. Private income is now

\[
I^\text{DT}_i = (1 - t_i) B_{iD} + (1 - t_{-i}) (B_{iE} + B_{iF}) + w \tag{7}
\]

and tax revenue

\[
T^\text{DT}_i = t_i (B_{iD} + B_{-iF} + B_{-iE}). \tag{8}
\]

Proposition 2. Destination-based corporate income taxation leaves the export-FDI margin unaffected.

Proof. By construction of the model, taxes only distort the decision between exporting and FDI. Since, under DT, profits from exports and FDI are taxed at the same rate, this margin will not be distorted. ■

Given this, taxation has no efficiency cost and could, in principle, be efficient – given the instruments available.\(^\text{10}\) However, since each government effectively taxes foreigners’ income, the incentive remains to export the tax burden.

Corollary 1 (i) If there is no lump-sum transfer to the household, the tax rate is inefficiently high. (ii) If there is a lump-sum transfer available, the optimal tax is efficient but close to 100 per cent.

Proof. (i) Inserting \( \frac{dT_i}{dt_i} = B_{iD} + B_{-iF} + B_{-iE} \) and \( \frac{dU_i}{dt_i} = -B_{iD} \) into (4) yields \( W_T < W_U \). A coordinated decrease of tax rates increases welfare. (ii) With a lump-sum transfer to domestic households, optimal policy implies \( W_T = W_U \). Firms are taxed as high as possible, i.e. close to full expropriation, since taxes do not have any behavioral effects. The resulting revenue is distributed among households and public goods provision such that \( W_T = W_U \). A coordinated decrease of taxes does not increase welfare. ■

Even despite of the overtaxation result, the DT system seems attractive due to its allocative and competitive neutrality. However, it seems equally plausible that a coordinated switch from ST to DT seems unrealistic. Therefore, the question arises whether a unilateral introduction of DT is desirable both from the individual and the global point of view.

\(^\text{10}\)Note that efficiency could be further enhanced by subsidizing FDI, as the inter-sectoral allocation of labor is not efficient due to different markups in both sectors (see, for example, Dixit & Stiglitz 1977).
4.2 Unilateral introduction

We will now assume that one country unilaterally introduces destination-based taxation (UDT) whereas the other country keeps the source-based tax system (UST). A unilateral introduction requires some adjustments vis-a-vis a multilateral introduction. First, since the DT-country cannot tax profits from imports (at least not without double taxing the importing firm), it will voluntarily forego the tax on these firms. Second, it will continue taxing the exporting firms within its own borders, but will adopt the tax rate of the country of destination. Thus, firms headquartered in the DT-country have the same incentive environment as under a full-fledged DT system, but the revenue is collected by the source country instead of the destination country.

Let country $i$ be the DT country. Its household has thus income of (7) and tax revenue is given by

$$T_{iUDT} = t_i (B_{iD} + B_{-iF}) + t_{-i} (B_{iE})$$

(9)

A small increase in $t_i$ affects welfare as follows.

$$(W_T - W_U) B_{iD} + W_T \left( B_{-iF} + t_i \left( \frac{dB_{iD}}{dt_i} + \frac{dB_{-iF}}{dt_i} \right) \right) + W_U \left( \frac{dU_i}{dP_i} \frac{dP_i}{dt_i} \right)$$

(10)

with $\frac{dB_{iD}}{dt_i}$ and $\frac{dB_{-iF}}{dt_i}$ defined above. By effectively letting country $-i$ decide on the tax rate on exporting firms, the domestic tax rate does no longer affect this tax base or the outbound export-FDI margin. Accordingly, it has no impact on the price level $P_{-i}$.

Effectively, the DT country makes the same choice as if it had to choose the optimal tax $t_i^{DF*}$ on $B_{iD} + B_{-iF}$. Evaluated at $(t_i^{ST}, t_{-i}^{ST})$, we can conclude that, if $t_i^{DF*} > t_i^{E*}$, the DT country has a marginal incentive to increase its tax rate above $t_i^{ST*}$.

Now, let country $i$ tax according to ST and country $-i$ having a DT system. Country $i$’s household has income of $I_{iUST}^{UST} = (1 - t_i) (B_{iD} + B_{iE}) + (1 - t_{-i}) B_{iF} + w$, i.e. the same as under a multilateral ST system. Tax revenue is still given by $T_{iUST} = t_i (B_{iD} + B_{-iF} + B_{iE})$.

$^{11} t_i^{DF*} > t_i^{E*}$ implies that, at $(t_i^{ST}, t_{-i}^{ST})$, $(W_T - W_U) B_{iE} + W_T t_i \frac{dB_{-iF}}{dt_i} + W_U \left( \frac{dU_i}{dP_i} \frac{dP_i}{dt_i} \right) < 0.$

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A small increase in $t_i$ affects welfare according to

$$(W_T - W_U)(B_{iD} + B_{iE}) + W_T \left( B_{-iF} + t_i \frac{dB_{iE}}{dt_i} \right) + W_U \left( \frac{dU_i}{dP_i} \frac{dP_{-i}}{dt_i} \right) \tag{11}$$

with $\frac{dB_{iE}}{dt_i}$ defined above. Now, $t_i$ does not directly affect the inbound export-FDI cutoff which is why the domestic price level remains constant.

Evaluated at $(t_i^{ST}, t_{-i}^{ST})$, an increase in $t_i$ increases welfare if

$$W_T t_i \left( \frac{dB_{iD}}{dt_i} + \frac{dB_{-iF}}{dt_i} \right) + W_U \left( \frac{dU_i}{dP_i} \frac{dP_{-i}}{dt_i} \right) < 0 \tag{12}$$

which is the case due to $\frac{dU_i}{dt_i} \frac{dP_{-i}}{dt_i} < 0$ and the assumption of $\frac{dB_{iD}}{dt_i} + \frac{dB_{-iF}}{dt_i} < 0$.

We can now state the following proposition.

**Proposition 3** If the desired tax on exporting firms is lower than $t_i^{ST*}$, a unilateral introduction of DT provides both countries with a marginal incentive to increase their tax rate.

**Proof.** At $(t_i^{ST}, t_{-i}^{ST})$, the ST country has an incentive to increase its tax rate, as shown above. The DT country does so too if (10) is positive. At $(t_i^{ST*}, t_{-i}^{ST*})$, this is the case if the desired tax on exporting firms is lower than $t_i^{ST*}$.

In other words, by foregoing the right to determine the tax rate on exporting firms, the DT country sets its tax rate only on domestic firms and profits from inbound investment. That is, it actually chooses its $t_i^{DF*}$ (see Section 3). Since the optimal tax rate under a pure ST system is a weighted average of $t_i^{E*}$ and $t_i^{DF*}$, it follows that this tax rate is higher if the desired tax on exporters, $t_i^{E*}$, is lower.

**Proposition 4** Suppose that tax rates are strategic complements (i.e. reaction functions are upward-sloping), and the desired tax on exporting firms is lower than $t_i^{ST*}$. Then, a unilateral introduction of DT unambiguously increases tax revenue.

**Proof.** With upward-sloping reaction functions, a marginal incentive to increase taxes for both countries implies that equilibrium tax rates increase.

How does this affect welfare?
Corollary 2 If the social value of tax revenue is large enough (e.g. when governments are revenue maximizers or firms are foreign owned), the unilateral introduction implies a Pareto improvement.

Proof. This follows from the above proposition and lemma 1.

5 Extensions

5.1 Integrating profit shifting opportunities

In the above model, there is no intra-firm trade in any way. When a firm switches from exporting to FDI, the whole production unit is shifted to the foreign country. This makes profit shifting hard. However, intra-firm trade (and, thus, profit shifting) is an important aspect of multinational firm activity, and a reform proposal must deal with it. Auerbach & Devereux (2013) who use a richer model than the one presented above allow for intra-firm imports of the 'basic' product which serves as an input good for final good production at the destination location. These imports need to be priced, and the price can be manipulated for profit shifting purposes.

The perhaps easiest way of integrating profit shifting into the above model is to assume that the foreign plant uses a patent located at the headquarters. A price \( z \) for using the patent is paid from the foreign subsidiary to the headquarters. We assume that a fair price is given by \( \bar{z} \), but the firm may deviate from this price in order to save taxes. Transfer price manipulation, however, comes at a convex cost \( c(z - \bar{z}) \) with \( c' = \text{sgn}(z) \) and \( c'' > 0 \) and \( c'(0) = c''(0) = 0 \).

Profit shifting is only possible if the firm has a foreign plant, i.e. if it is in the FDI mode. Its profits are then

\[
\tilde{\pi}_{iF} = \pi_{iF}(\phi) + z(t_i - t) - c(z - \bar{z})
\]

By manipulating \( z \), the firm may shift profits from one location to the other. The profit-maximizing choice of \( z \) requires \( c' = t_i - t_i \), i.e. transfer price manipulation only takes place with non-zero tax differentials. That is, in the symmetric equilibrium, the incentive to shift profits is zero.

The payment of \( z \) reduces the tax base of the foreign subsidiary and increases it at the domestic headquarters. In the symmetric equilibrium, these two cancel out. However, when setting the tax rate, the government accounts for the elasticity of \( z \) with regard to the tax rate. In other words, profit shifting makes increasing tax rates more costly in terms of tax revenue, which
implies that equilibrium tax rates are lower.

How does profit shifting affect the efficiency properties of the DT system? The answer to this question depends on how exactly profit shifting is modelled. If the patent is used only from production directed at consumers in the foreign market, a DT system abolishes all profit shifting incentives since the proceeds of supplying to this market are taxed at the destination country’s rate independent of the transfer price. In this case, the welfare-enhancing effect of a DT system is reinforced both for multilateral and unilateral introduction.

Things get more complicated if the patent is used for both, production for domestic and foreign markets. This is the case of firm-specific assets, also covered by Auerbach & Devereux (2013), which we deal with in the next subsection.

5.2 Firm-specific assets

The most productive firms in the above model supply both to the domestic and the foreign market. Now, consider the case in which there is a firm-specific asset, e.g. a patent, that is used for production directed at both markets. In order to implement the DT system, income accruing to the use of the patent has to be assigned to either the domestic market or the foreign market, in order to attribute the cost for developing the patent. To see this, consider the following example.

Assume that a firm is active in a low-tax country and a high-tax country. Both activities require the use of a patent which has been developed by the firm itself at considerable cost. Under DT system, the firm has to indicate which part of the profit is due to activity in each country. It has now a strong incentive to underreport the use of the patent for its low-tax country activity and to overreport it for the high-tax country. Then, it may assign a larger part of the patent development cost to high tax country activity, thus decreasing the profit from this activity. Similarly, its profit from low-tax country activity are increased. Overall, its tax liability is reduced.

In other words, the necessity to assign the use of the firm-specific asset gives rise to the same problems discussed in the context of transfer pricing under standard source-based tax systems. Whether manipulation of this kind increases or decreases the attractiveness of the DT system is hard to tell; it will depend on whether shifting between locations is easier than shifting between assigned activities or vice versa.
5.3 Diversified ownership

“Broad ownership” (Auerbach & Devereux 2013), i.e. diverse shareholders from (many) different countries, is considered a defining feature of multinational firms. In the above model, cross-border ownership links occur endogenously when a firm switches from exporting to FDI. As an alternative, domestic households could buy shares from foreign households and vice versa. As Bucovetsky (1995) and Huizinga & Nielsen (1997) have pointed out, an increase in foreign firm ownership reduces the cost of taxation as perceived by a national government, due to the assumption that foreigners’ income is not part of the government’s objective function. Thus, an increase in foreign firm ownership is likely to increase equilibrium tax rates, potentially up to a point where inefficient overtaxation occurs. To the degree that broad ownership reduces the size of the fiscal externality and thus the underprovision of public goods, it reduces the value of switching to a DT system (although it should be kept in mind that a system with multilateral DT is prone to overtaxation, too). This is also true for a unilateral switch to a DT system.

5.4 One (unilateral) step further: Treatment of foreign investors

In the above symmetric two-country model with unilateral introduction of DT, the remaining distortion concerns the foreign investors’ decision between exporting and FDI. There is, however, an easy way of fixing this distortion. The reform country (i.e. the DT country) could tax the foreign investors at the foreign rate, i.e. $B_{-1F}$ at a rate of $t_{-i}$, thus unilaterally transforming the two-country world into an effective DT system. One potential caveat here is that the tax system would have to condition on ownership structures (and not, as in the current version, on the destination of product). Since ownership structures vary frequently and can easily be manipulated, such a tax system would be prone to inefficient avoidance activities.

5.5 One (multilateral) step further: Mitigating overtaxation

The incentive to overtax in a multilateral DT system is due to the fact that foreigners’ income is part of the destination country’s tax base. For the allocative efficiency, though, it does not matter which government actually receives the revenue. Therefore, it might be a solution if the revenue is redistributed according to the national ownership. This would in any case eliminate the incentive to overtax since both the gain (in terms of public goods) and the cost
(in terms of net income) are born by domestic agents (which, by assumption, are part of the government’s objective function.

As in the previous subsection, there is the caveat that such a system would require the tax system to condition upon ownership. However, this time ownership only affects who receives the revenue and not how much the firm pays. This implies that there is no incentive to manipulate ownership for tax saving purposes. With diverse ownership, e.g. in publicly listed firms, and quickly changing ownership structures, conditioning on ownership may be difficult, though. One should keep in mind, however, that it is not the exact ownership structure at a given point in time which affects the efficiency of tax rate setting, but the government’s perception that it only affects domestic agents. Therefore, measurement problems may not be as severe as one could think.

6 Conclusion

In this paper, we reconsider destination based corporate income taxation as proposed by Auerbach & Devereux (2013) in a framework with heterogeneous firms and imperfect competition. Our analysis provides support for such a reform proposal in two ways. First, we show that a DT system performs well under imperfect competition although it cannot correct for the distortions induced by imperfect competition. Second, we show that a multilateral introduction is not a necessary prerequisite for such a system to enhance welfare. Instead, we show that a unilateral introduction may not only enhance welfare in the reform country, but also globally (at least if certain conditions are met).

There are three caveats with regard to the robustness of our results. First, real world tax competition is characterized by large asymmetries. The large, economically powerful countries levy relatively high tax rates whereas small peripheral countries usually have low tax rates. Under these circumstances, a unilateral switch to DT will not necessarily be desirable. The results derived in this paper should be understood as showing that, if asymmetries are not excessively large, destination based taxation makes sense even if not all countries participate. It should be noted, though, that the same caveat is there for a multilateral introduction. Even if the allocation of capital, firms and profits is restored, such a policy may still be unappealing for countries with strong exporters and small markets, as they will lose a large part of their revenue.

Second, firms make a large number of decisions, many of which are tax
relevant. As every model, we have abstracted from this complexity and, of course, we cannot exclude that there are decisions which are not only unaffected by a switch to DT but also aggravated. A case in point is the attribution of income to cost discussed in Section 5.4. Again, this caveat concerns more DT introduction in general than a unilateral switch.

Third, an introduction of DT – be it multilateral or unilateral – may strongly affect a country’s incentive to enforce taxation. Auerbach & Devereux (2013) propose that the destination country receives all tax revenue from activity related to supplying to its inhabitants. This would require that the source based countries enforce taxes that they do not get. The abundant experience with e.g. information exchange in capital income taxation does not warrant an overly optimistic view on this.

References


