Strategic Trade Policy through the Tax System

Johannes Becker

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Abstract

If conventional instruments of strategic trade policy are unavailable, the system of foreign profit taxation and transfer price guidelines may serve as surrogate policy instruments. In this paper, I consider a model where firms from two countries compete with each other on a third market. I analyze optimal policy choices of the firms' residence countries aiming at strategically manipulating the competitivity of their firms on the third market. I show that, as has recently been claimed, countries prefer the tax exemption system over the tax credit system if transfer prices for headquarter services to the affiliate are close to the headquarter's variable cost and if the third country's tax rate is low (i.e., if there is a large tax differential between both locations within the firm). However, if transfer prices are high and the tax rate in the third market country is sufficiently close to the residence country's tax rate, I show that the tax credit system is an optimal tax policy choice for both countries. From a policy perspective, the view that the tax exemption system is generally the best policy response if domestic firms' competitiveness is a policy goal has to be qualified.

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1 Introduction

In recent decades, international trade agreements like GATT and supranational institutions like the WTO and the EU have successfully reduced the level of tariffs and production subsidies. Today, if countries want to strategically manipulate the terms of trade of their trade-oriented firms, they have to choose different and subtler means than outright subsidies or tariffs. One potential means to do so is the tax system, especially the set of taxes on multinational firms.

In this paper, I analyze the tax system's scope and potential for strategic trade purposes. I concentrate on two features of the tax system, the regime of foreign profit taxation and transfer price guidelines. The OECD recommends to its members to choose between two regimes of foreign business income taxation, the tax credit system where foreign income is taxed and foreign taxes are credited against the domestic tax liability, and the tax exemption system where foreign income is not taxed by the residence country. As the regime choice is likely to affect the cost of production, it is relevant as a means of indirect strategic trade policy. The same may be true for transfer price guidelines which are required to determine locational income for tax purposes. The choice of transfer price guidelines may serve the goal of efficiency[1] (not distort production choices) and fairness (ensure a fair share of taxable income in all locations), but it may also be used as an instrument for indirect strategic trade policy. If the two jurisdictions under consideration differ in tax rates, changing the transfer price affects the firm's variable cost and, thus, its competitiveness. Of course, by choosing its set of transfer price guidelines, a country will have to account for the multinational trying to manipulate transfer prices for purpose of tax minimization.[2]

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[1] The efficiency related objective implies that transfer prices among related parties should not be different from market prices in transactions between unrelated parties. This arm's length principle is, however, often hard to apply, e.g. if such market transactions do not exist, and its efficiency properties crucially depend on the assumption of competitive markets. Moreover, even if an arm's length benchmark exists, its use may lead to distorted incentives within the firm, as Devereux & Keuschnigg (2009) point out.

[2] Profit shifting by strategic use of transfer prices has been a major research topic in the public finance literature, see e.g. Huizinga & Laeven (2008) and, for a survey, Devereux (2007). Direct evidence for strategic transfer pricing is given in Bernard and Weiner (1990), Clausing (2003), Overesch (2006). Bernard, Jensen and Schott (2006) document that export prices of U.S. multinationals for intrafirm transactions are significantly lower than prices for the same good sent to an arm's length customer.

The implications of the tax regime choice for the domestic firms' competitiveness has recently been in the focus of a lively debate.[3] Several countries, among them the United States and the United Kingdom, have reviewed their system of foreign income taxation. The UK has already switched from the tax credit system to the exemption system. The main argument in favour of exemption has been - both in the UK and the US - that a tax on foreign income reduces the competitiveness of domestic firms on foreign markets. For instance, the Office of Tax Policy at the U.S. Treasury Department (2007) states that *"U.S. companies increasingly suffer a competitive disadvantage. The U.S. business tax system imposes a burden on on U.S. companies and U.S. workers by (...) burdening U.S. firms as they compete with other firms in foreign markets."* (p. i) As a consequence, the Office recommends a switch to the exemption system.[4] Similarly, the Coalition Agreement (2009) between the three governing parties in Germany states that the government will stick to the exemption system in order to support the competitiveness of German firms.[5]

Transfer price guidelines have been to a lesser extent considered as a means to affect the competitiveness of domestic firms.[6] However, as this paper argues, the actual level of transfer prices is crucial for the properties of the tax credit

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[3]Recent contributions include Desai & Hines (2003, 2004), Devereux (2008), Desai (2009), Hines (2009), Becker & Fuest (2010). There is an extensive literature on the optimal taxation of foreign profits building on the seminal work by Peggy Musgrave (née Richman, 1963, 1969). For a short overview and discussion, the reader may refer to Mintz & Tulkens (1996) or Becker (2009).

[4]Before switching to the exemption system, the British Treasury argued: *"Business increasingly operates in a global marketplace, where many of the UK's competitors already operate forms of an exemption regime, (...). The Government therefore believes it is now time to consider again the case for exemption."* (HM Treasury and HM Revenue and Customs, 2007, p. 13) And Devereux (2008) adds that *"imposing a tax on worldwide income will, in general, raise the required pre-tax rate of return, possibly giving the company a competitive disadvantage in foreign markets, and hence reducing the attractiveness of the residence country as a headquarters location."* (p. 710)

[5]The Coalition Agreement (2009) says: *"We will ensure our companies can remain competitive internationally with our double taxation policies and thus, in principle, adhere to the exemption method on foreign income."* (p. 15)

[6]Even when, in 2002, the WTO ruled against the U.S. and forced the country to abolish legal provisions that allowed U.S. multinationals to shift foreign income through tax havens, transfer prices got only little scholarly attention from the competition perspective (see Rosenbaum & Olson: U.S. Loses Trade Case to Europeans on Offshore Tax Havens, New York Times, January 15, 2002).

system and exemption system in terms of efficiency and competitiveness.[7] Thus, the arguments put forward in favor of exemption require some assumptions on the level of transfer prices.

This paper considers the interaction of transfer price policies and the choice of the regime of foreign profit taxation in a strategic setting. It builds on a model in the tradition of Brander & Spencer (1985) where firms from two countries compete with each other on a third market.[8] As a crucial difference to Brander & Spencer (1985), I assume that both firms have production facilities in the third market country which give rise to intra-firm trade. For tax purposes, transfer prices for input goods received from the headquarter are required.[9] The governments of the residence countries (where the headquarters are) choose a tax on foreign income and - eventually - a transfer price guideline, given the choices of the other country. Then, firms may choose to deviate from the guideline by setting their own, tax minimizing transfer price.

The main results are the following. Firstly, if transfer prices are close to variable costs at the headquarter, the optimal system of foreign income taxation is the exemption system. This result confirms the claims of the exemption proponents, but it has to be qualified because it depends on the actual level of transfer prices. Secondly, if transfer prices for headquarter services to the affiliate are sufficiently high (e.g., to shift a fair amount of taxable income to the headquarter location), the optimal system of foreign profit taxation is the tax credit system. Thirdly, if both countries autonomously choose the transfer price guidelines (and, thus, use them as a means to strategically subsidize production), the exemption system is optimal for low tax rates in the third market and the tax credit system for tax rates close to the residence country's tax rate. Fourthly, if the third country is allowed to choose its tax rate, it will choose a tax rate low enough to trigger an equilibrium where both residence countries choose the exemption system.

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[7]Becker & Fuest (2009) provide an example how transfer price guidelines may be used strategically in tax competition. Becker & Loomer (2009) analyze a country's incentive to use transfer pricing via tax havens in order to improve the country's terms of trade.

[8]Note that this setting differs substantially from the one in Bond & Samuelson (1989) who also analyse strategic competition in systems of foreign profit taxation.

[9]Note that I do not consider incentive effects of transfer pricing within the firm, as in Holmstrom and Tirole (1991), Elitzur & Mintz (1996) or Koethenbuerger (2010). I assume that headquarters can perfectly control affiliates.

It is important to note that these results crucially depend on the assumption of an effective lack of suitable policy instruments: the availability of direct subsidies or tariffs is ruled out. As a consequence, each policy choice is subject to a trade-off between different government goals. The choice of the system of foreign profit taxation has to account for the revenue implications and the tax effects on the competitiveness of domestic firms (and its market shares). Transfer price guidelines are chosen weighing off the loss in taxable income at the headquarter location and their effect on the variable cost of production. If the restriction on the number of available policy instruments is relaxed, e.g. if a direct production subsidy is allowed for, the picture changes substantially. It is straightforward to show that the tax exemption system would not be an optimal policy choice independent of the level of transfer prices. Of course, the question may arise whether a situation in which tax policy choices are the result of a trade-off between revenue and strategic trade goals is necessarily better than a situation in which direct subsidies are allowed for. Moreover, one might ask, if the world's trade organization banned direct subsidies, how should indirect subsidies (such as the tax exemption system) be evaluated. These questions are beyond the scope of the paper, though.

The remainder of the paper is organized as follows. In the following section, the model setup is described and the market equilibrium is derived. In section 3, tax policy with given and endogenous transfer prices is analyzed. Section 4 discusses the results and section 5 concludes.

2   The model

Assume a world with three countries, labelled a, b and c. There are two multinational firms (MNFs) with their headquarters in countries a and b, respectively. Each of the two MNFs has an affiliate in country c and produces a homogeneous good x which is sold to consumers in country c. Demand in c is denoted by X and given by $X = A - p$ where p is the price and A is a constant parameter.

Consider firstly the production decisions of the multinational firm headquartered in country i. Production of one unit of x_i requires one unit labor and one unit

of capital. The unit cost of labor is given by w in all locations[10] and capital is rented at the world capital market at a constant rate of r. Production takes place at both locations within the firm, the headquarter in country i and the affiliate in country c. I assume that a fraction θ of production is located at the headquarter and the complement, $1-\theta$, at the affiliate in country c. This can be interpreted as the headquarter producing some input good necessary for production in country c, or as the firm allocating different "tasks" across locations (like in Grossman & Rossi-Hansberg, 2008). For accounting and tax purposes, the foreign affiliate has to "buy" the headquarter part of the production at a transfer price of δ_i. Thus, the before-tax variable cost at the affiliate is given by $(1-\theta)(w+r) + \theta\delta_i$ and at the headquarter by $\theta(w+r) - \theta\delta_i$.

How are transfer prices determined? I assume that countries a and b - either cooperatively or uncoordinatedly - choose transfer price guidelines, denoted by $\bar{\delta}_i$. Firms may choose to deviate from the guideline by setting $\tilde{\delta}_i$. Deviating from the "official" transfer price fixed by the guideline is costly, though, since this deviation has to be concealed from detection. The concealment cost is assumed to equal $k_i\left(\tilde{\delta}_i - \bar{\delta}_i\right)$ with $k_i' = \text{sign}\left(\tilde{\delta}_i - \bar{\delta}_i\right)$ and $k_i'' > 0$.

After-tax profits are then given by

$$
\begin{aligned}
\pi_i &= \left[\left(p(x_i, x_j) - w(1-\theta) - \theta\tilde{\delta}_i\right)x_i - F_i\right](1 - t_i^e) \\
&\quad + \left[\tilde{\delta}_i - w - k_i\left(\tilde{\delta}_i - \bar{\delta}_i\right)\right]\theta x_i (1 - t_i) - rx_i
\end{aligned}
\tag{1}
$$

where t_i is the corporate tax in country i, $t_i^e = t_c + t_i^r(1 - t_c)$ the effective tax rate on foreign profits, t_i^r is the repatriation tax and t_c the corporate tax in country c. Under the tax exemption system, t_i^r equals zero, and under the tax credit system, t_i^r is equal to $\frac{t_i - t_c}{1 - t_c}$ yielding an effective tax rate on foreign profits of $t_i^e = t_i$. Note that, in the absence of taxes or under the tax credit system, with $t_i^e = t_i$, the transfer price does not affect firm profits. Throughout the paper, I assume that $t_c < t_i$.

The firm in i maximizes its profits by strategically setting x_i and $\tilde{\delta}_i$. Consider firstly the profit-maximizing choice of the transfer price $\tilde{\delta}_i$. The first order

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[10]The equality of wages is not crucial for the model results, but simplifies notation.

condition is given by

$$t_i - t_i^e = -k_i' (1 - t_i) \tag{2}$$

Under the tax credit system, $t_i^e = t_i$, the firm does not deviate from the transfer price guideline, $\tilde{\delta}_i = \bar{\delta}_i$. However, under the exemption system, $t_i > t_i^e = t_c$, k_i' has to be negative to satisfy the above condition which implies $\tilde{\delta}_i < \bar{\delta}_i$. The firm sets a lower transfer price than officially proposed in order to shift income from the high-tax headquarter location to the low-tax affiliate location.

Now consider the profit-maximizing quantity given by

$$x_i = \frac{A - \kappa_i - (\kappa_i - \kappa_j)}{3} \tag{3}$$

where $\kappa_i = w + \theta \left(\bar{\delta}_i - w \right) \left(\frac{t_i - t_i^e}{1 - t_i^e} \right) - \frac{\Omega_i^f}{1 - t_i^e} + \frac{r}{1 - t_i^e}$ and $\kappa_j = w + \theta \left(\bar{\delta}_j - w \right) \left(\frac{t_j - t_j^e}{1 - t_j^e} \right) - \frac{\Omega_j^f}{1 - t_j^e} + \frac{r}{1 - t_j^e}$ are the variable costs of firms headquartered in i and j, and $\Omega_i^f = -\theta \left(\tilde{\delta}_i - \bar{\delta}_i \right) (t_i - t_i^e) - k_i \theta (1 - t_i) > 0$ and $\Omega_j^f = -\theta \left(\tilde{\delta}_j - \bar{\delta}_j \right) (t_j - t_j^e) - k_j \theta (1 - t_j)$ are the firms' total gains from profit shifting (i.e., deviating from $\bar{\delta}$). Note that Ω_i^f and Ω_j^f do not depend on the level of $\bar{\delta}_i$ or $\bar{\delta}_j$, see also (2).

The equilibrium price is

$$p = \frac{A + \kappa_a + \kappa_b}{3} \tag{4}$$

It follows that the equilibrium quantity can be expressed as $x_i = p - \kappa_i$ and profits as $\pi_i = \left((x_i)^2 - F_i \right) (1 - t_i^e)$.

It is useful to have a look at how policy choices affect the equilibrium quantities. A small increase in t_i^r has the following impact on x_i:

$$\frac{\partial x_i}{\partial t_i^r} = -\frac{2}{3} \frac{\partial \kappa_i}{\partial t_i^r} = \frac{2}{3} \left[-\frac{r}{1 - t_i} + \theta \left(\bar{\delta}_i - w \right) + \theta \left(\tilde{\delta}_i - \bar{\delta}_i - k_i \right) \right] \frac{(1 - t_i)(1 - t_c)}{(1 - t_i^e)^2} \tag{5}$$

An increase in t_i^r has three effects. Firstly, it increases the capital cost since capital costs cannot be deducted from the corporate tax base (first term in square brackets). Secondly, it increases the tax deductions for the transfer price that the affiliate has to pay to the headquarter. This reduces *ceteris paribus* the variable cost and increases the equilibrium quantity. Thirdly, an increase in t_i^r reduces the tax gap between the two locations and, thus, reduces the opportunities for profit

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shifting. The net effect on quantities is positive if the the official transfer price is large enough, i.e. if $\theta \left(\delta_i - w \right) > \frac{r}{1-t_i} - \theta \left(\tilde{\delta}_i - \bar{\delta}_i - k_i \right)$. Similarly, the impact of t_j^r on x_i is $\frac{\partial x_i}{\partial t_j^r} = \frac{1}{3} \frac{\partial \kappa_j}{\partial t_j^r} = \frac{2}{3} \left[-\frac{r}{1-t_j} + \theta \left(\bar{\delta}_j - w \right) + \theta \left(\tilde{\delta}_j - \bar{\delta}_j - k_j \right) \right] \frac{(1-t_c)(1-t_j)}{\left(1 - t_j^e \right)^2}$.

The effect of a small increase in the transfer price δ_i is given by

$$\frac{\partial x_i}{\partial \delta_i} - \frac{2}{3} \frac{\partial k_i}{\partial \bar{\delta}_i} = \frac{2}{3} k_i' \theta \left(\frac{1-t_i}{1-t_i^e} \right) = -\frac{2}{3} \theta \left(\frac{t_i - t_i^e}{1-t_i^e} \right) \leq 0 \tag{6}$$

If the effective tax rates on income in both locations are equal, as under the credit system, the transfer price guideline (which then is the effective transfer price) is irrelevant for quantity and prices. However, if there is a difference in effective taxation between the headquarter and the affiliate in c, an increase in the transfer price leads to an increase in variable cost and, thus, decreases equilibrium quantity. The reason is that an increase in δ_i increases heavily taxed headquarter income and reduces lightly taxed affiliate income (without changing the sum of pre-tax income). Similarly, an increase in the transfer price of country j increases the profit-maximizing quantity of the firm in i, $\frac{\partial x_i}{\partial \delta_j} = \frac{1}{3} \theta \left(\frac{t_j - t_j^e}{1-t_j^e} \right) \geq 0$, if it increases the variable cost of the firm in j.

3 Welfare and optimal policy choices

The literature on optimal foreign income taxation usually assumes that the government's objective is to maximize national income. Its focus is on the optimal tax on foreign income given the corporate tax rates at home and abroad. Thus, taxation in this literature is neither about redistribution nor about public good provision[11] but rather about correcting for allocative distortions due to corporate tax rate differences. Here, I adopt these assumptions. Accordingly, national welfare is assumed to be the sum of firm profits and tax revenue where the former is

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[11] Note that if national income maximization is the government's objective the case for raising tax revenue is rather low compared to the cases in which funds are to be redistributed or used for public goods provision. Thus, the assumption makes exemption as an optimal policy outcome more likely.

given in (1) and the latter by

$$T_i = t_i^r (1 - t_c) \left[\left(p - w (1 - \theta) - \theta \tilde{\delta}_i \right) x_i - F_i \right] + t_i \theta \left(\tilde{\delta}_i - w - k_i \right) x_i \qquad (7)$$

Thus, welfare in country i equals

$$W_i = \left[\left(p - w + \frac{t_c}{1 - t_c} \theta \left(\bar{\delta}_i - w \right) - \frac{\Omega_i^g}{1 - t_c} - \frac{r}{1 - t_c} \right) x_i - F_i \right] (1 - t_c) \qquad (8)$$

where $\Omega_i^g = -\theta \left(\tilde{\delta}_i - \bar{\delta}_i \right) t_c + k_i \theta \geq 0$ denotes the social cost due to profit shifting. Taxes levied by country i do not occur since they just redistribute funds from the private to the public sector which has no welfare implication, by assumption. The transfer price guideline $\bar{\delta}_i$ only plays a role if there is a non-zero corporate tax in the third market c (recall that Ω_i^g is independent of the level of $\bar{\delta}_i$, see equation (2)).

Before I analyze optimal policy choices, it is worthwhile to consider how the benevolent government would like the firm to set its choices in comparison to how it actually sets it. The answer to this question is straightforward with regard to profit shifting. As $\Omega_i^g > 0$, the government wants the firm to shift no profits at all. In terms of quantity, the picture is more complex. For purpose of illustration, assume that the government can force the firm to marginally increase its quantity. The effect on welfare is given by

$$\frac{\partial W_i}{\partial x_i} = \left[\underbrace{-\frac{\partial x_j}{\partial x_i} x_i}_{\text{Brander\&Spencer(1985)}} + \underbrace{\theta \left(\bar{\delta}_i - w \right) \left(\frac{t_i - t_i^r}{1 - t_i^e} \right) + \frac{t_i^r r}{1 - t_i^e}}_{\text{Taxation effect}} - \underbrace{\left(\Omega_i^f + \Omega_i^g \right)}_{\text{Profit shifting effect}} \right] (1 - t_c)$$

$$(9)$$

By increasing x_i, the government acts as a Stackelberg leader and forces the firm in j to reduce its quantity. This leads to an increase in p as $\frac{\partial p}{\partial x_j} = -1$. This effect has been analyzed in a three country model by Brander & Spencer (1985). In their framework, this effect provides the rationale for subsidizing production (via an export subsidy). The second effect is due to taxation. In the presence of taxes, firm choices have an effect on the government budget which is not accounted for by

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firms. Production is therefore inefficiently low. Therefore an increase of production increases welfare. The third effect is due to profit shifting opportunities. If profit shifting decreases variable cost, the firm *ceteris paribus* produces too much which *ceteris paribus* implies negative welfare effects of production increases.[12]

In the presence of a sufficient number of instruments, the government could suppress profit shifting and subsidize production in order to maximize national welfare. However, as outlined in the introduction, production subsidies may not be available due to international trade agreements. Moreover, the government may simply lack adequate instruments allowing for suppressing profit shifting at an acceptable cost. I assume that the only instruments available are the choice of the system of foreign profit taxation and eventually the choice of transfer price guidelines.

Depending on the extent of the profit shifting opportunities, i.e. the level of Ω_i^f and Ω_i^g, production is either too high or too low. In the absence of profit shifting, production is inefficiently low. The question is therefore which of the two systems of taxation pushes the firm closer to the welfare-maximizing behavior. This is to be examined in the following. The analysis has two parts. In the first part, I assume that transfer prices are exogenously given, e.g. by some supranational transfer price guideline. In the second part, transfer prices can be set non-cooperatively and coordinatedly by countries i and j.

3.1 Tax policy with given transfer prices

To start with, assume that transfer prices δ_a and δ_b are exogenously given, e.g. due to some earlier agreement or some supranational institution. Both governments in a and b simultaneously choose between the two standard systems of foreign taxation: exemption system and tax credit system. The governments' purpose is to maximize national welfare given by (8). Corporate tax rates t_a and t_b are assumed to be given, and the government in c is passive. In the following, I will analyze country i's choice depending on given transfer prices and the choices of

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[12]This effect has been analyzed in Grubert & Slemrod (1998) and Slemrod (2003).

country j with $i, j = a, b$ and $i \neq j$. Its optimization problem is given by

$$\max_{t_i^e} W_i \quad \text{with } t_i^e \in \{t_i, t_c\} \tag{10}$$

With $\pi_i = \left((x_i)^2 - F_i\right)(1 - t_i^e)$, welfare under the exemption system (ex) can be expressed as

$$W^{ex} = \pi_i^{ex} + t_i \theta \left(\tilde{\delta}_i^{ex} - w - k_i^{ex}\right) x_i^{ex} \tag{11}$$

where π_i^{ex} and x_i^{ex} are profits and the profit-maximizing quantity, respectively, if country i chooses the exemption system, see (3) with $t_i^e = t_c$. In contrast, welfare under the tax credit system is equal to

$$W^{cr} = \pi_i^{cr} + t_i^r (1 - t_c) \left[\left(p^{cr} - w (1 - \theta) - \theta \bar{\delta}_i\right) x_i^{cr} - F_i\right] + t_i \theta \left(\bar{\delta}_i - w\right) x_i^{cr} \tag{12}$$

where π_i^{cr} and x_i^{cr} are profits and the profit-maximizing quantity, respectively, if country i chooses the tax credit system, see (3) with $t_i^e = t_i$.

Country i chooses the exemption system if $W^{ex} > W^{cr}$. The welfare difference can be expressed as

$$W_i^{ex} - W_i^{cr} = \left[\Psi - \frac{\kappa_i^{cr} - \kappa_i^{ex}}{3} (1 - t_c)\right] \frac{2}{3} \left(\frac{\kappa_i^{cr} - \kappa_i^{ex}}{3}\right) - \Omega_i^{g,ex} \tag{13}$$

where Ψ is defined as $\Psi = t_c w (1 - \theta) + t_c \theta \bar{\delta}_i + \frac{t_i - t_c}{1 - t_i} r + \frac{x_i^{cr}}{2} > 0$. Thus, the welfare difference is a quadratic function of the difference in variable cost, $\kappa_i^{cr} - \kappa_i^{ex}$. If the social cost of profit shifting, $\Omega_i^{g,ex}$, is sufficiently small, this function has two nulls, N_1 and N_2 (derived in the appendix), both larger than zero. However, if $\Omega_i^{g,ex}$ is high, the tax credit system is always preferred over the tax exemption system.

For $\kappa_j^{cr} > \kappa_j^{ex}$, Ψ is larger if country j chooses the exemption system, $t_j^e = t_j$. This implies that $W_i^{ex} - W_i^{cr}$ is larger of all positive cost differences $\kappa_i^{cr} - \kappa_i^{ex}$ under $t_j^e = t_j$ than under $t_j^e = t_c$.

The difference in marginal cost can be expressed as

$$\kappa_i^{cr} - \kappa_i^{ex} = \frac{t_i - t_c}{1 - t_c} \left[\frac{r}{1 - t_i} - \theta \left(\bar{\delta}_i - w\right)\right] + \Omega_i^{f,ex} \tag{14}$$

If $\bar{\delta}_i$ equals the variable cost at the headquarter, w, the variable cost under the tax credit system is always higher than the variable cost under exemption. Only for sufficiently large transfer price guidelines, the variable cost difference can become negative. Note that the firm's gain from profit shifting does not depend on the transfer price guideline $\bar{\delta}_i$.

Diagram 1 summarizes the results. Suppose that country j applies the exemption system and that $\Omega_i^{g,ex}$ is sufficiently small. Then, if the variable cost under the credit system is lower or only little larger than the variable cost under the exemption system, country i prefers the tax credit system (parameter range left of N_1). If the cost difference becomes larger, country i switches to the exemption system (parameter range between N_1 and N_2). At $\kappa_i^{cr} - \kappa_i^{ex} = N_2$, it switches back to the tax credit system (parameter range right of N_2). If country j applies the tax credit system, the nulls are at $\tilde{N}_1$ and $\tilde{N}_2$ which implies a larger parameter range at which the exemption system is the optimal tax policy choice.
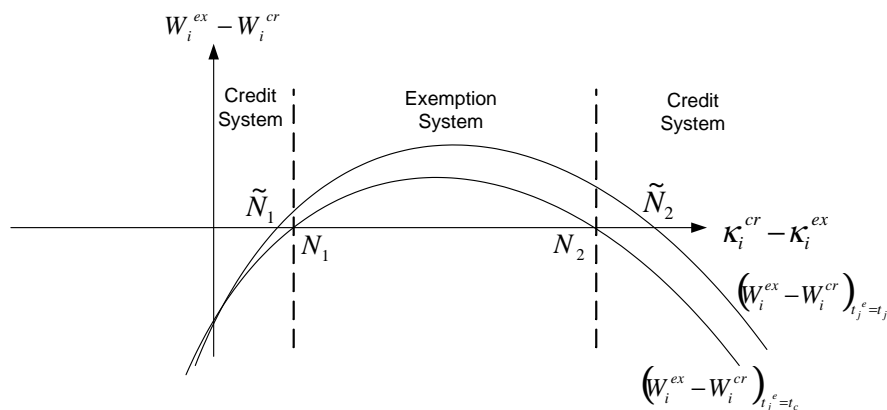
Diagram 1: Welfare difference as a function of variable cost difference.

I can thus state

Proposition 1 *Assume that transfer price guidelines are exogenously given and equal in both countries, $\bar{\delta}_a = \bar{\delta}_b = \bar{\delta}$. Then, a Nash equilibrium exists with both countries choosing the tax credit system if the social loss due to profit shifting opportunities under the exemption system $\Omega_i^{g,ex}$ is large. If $\Omega_i^{g,ex}$ is sufficiently small,*

i) a Nash equilibrium exists with both countries choosing the tax credit system if $\kappa_i^{cr} - \kappa_i^{ex} < \tilde{N}_1$ and $\kappa_i^{cr} - \kappa_i^{ex} > \tilde{N}_2$.

ii) a Nash equilibrium exists with both countries choosing the tax exemption system if $N_1 < \kappa_i^{cr} - \kappa_i^{ex} < N_2$.

iii) no equilibrium in pure strategies exists if $\tilde{N}_1 < \kappa_i^{cr} - \kappa_i^{ex} < N_1$ and $N_2 < \kappa_i^{cr} - \kappa_i^{ex} < \tilde{N}_2$.

One may summarize the above proposition as follows. In the absence of intra-firm trade, $\theta = 0$, the exemption system is optimal. In the presence of intra-firm trade and if transfer price guidelines are close to actual costs at the headquarter location, see equation (14), the exemption system is an optimal policy choice and the equilibrium strategy as long as profit shifting opportunities are not too large. If transfer price guidelines are used to shift a fair amount of taxable income to the headquarter location (i.e. if transfer prices are sufficiently large), it is likely that the tax credit system is an optimal policy choice in both countries.

3.2 Tax policy with endogenous transfer prices

So far, I have assumed that transfer price guidelines are given. This may be a plausible assumption since countries agree on international transfer price guidelines which may have quasi-legal status in trade frameworks like the WTO. However, countries may have some discretion in setting the transfer price guidelines whether due to incomplete international arrangements or discretionary ranges allowed for in these arrangements. For this purpose, I assume that countries a and b can set the transfer price guidelines. Country c is supposed to have no means to dispute the guidelines[13] as long as there is a non-negative tax base in country c, i.e. as long as $\bar{\delta}_i \le \bar{\delta}_i^{\max} \equiv \frac{1}{\theta} \left(p - w(1 - \theta) - \frac{F_i}{x_i} \right)$. The optimization problem of country i becomes

$$\max_{t_i^e, \delta_i} W_i \quad \text{with } t_i^e \in \{t_i, t_c\} \text{ and } \bar{\delta}_i \in \left[-\infty, \bar{\delta}_i^{\max} \right] \tag{15}$$

Given t_i^e and the policy choices of country j, the first-order condition for δ_i is

$$\frac{\partial W_i}{\partial \bar{\delta}_i} = t_c \theta x_i + \left[\frac{1}{2} x_i + \theta \left(\bar{\delta}_i - w \right) \left(\frac{t_i - t_i^r}{1 - t_i^e} \right) + \frac{t_i^r r}{1 - t_i^e} - \frac{\Omega_i^f}{1 - t_i^e} - \frac{\Omega_i^g}{1 - t_c} \right] (1 - t_c) \frac{\partial x_i}{\partial \bar{\delta}_i} = 0 \tag{16}$$

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[13] This assumption is further discussed in section 4.

with $\frac{\partial x_i}{\partial \delta_i} = -\frac{2}{3}\theta\left(\frac{t_i - t_i^e}{1 - t_i^e}\right)$. Thus, the optimal transfer price guideline results from a trade-off between shifting taxable income to the domestic jurisdiction (and, thus, save foreign tax payments, see the first term) and distorting the cost of production (second term). This trade-off differs according to the system of foreign profit taxation.

Under the tax credit system, the quantity does not depend on the transfer price, $\frac{\partial x_i}{\partial \delta_i} = 0$. Thus, the government in country i shifts all profits out of country c by charging the highest possible transfer price, $\bar{\delta}_i^{\max}$, which implies profits of $\pi_i = \left[\left(p - w - \frac{r}{1 - t_i}\right)x_i - F_i\right](1 - t_i)$ and tax revenue of $T_i = t_i\left((p - w)x_i - F_i\right)$ where x_i and p are given in (3) and (4), respectively.

Under the exemption system, country i's optimal transfer price depends on country j's choice of the tax system. The appendix shows that, if country j chooses the tax credit system, the optimal $\bar{\delta}_i$ equals

$$\bar{\delta}_i\Big|_{t_j^e = t_j} = w + \frac{3}{2}\frac{\left(\Omega_i^f + \Omega_i^g\right)}{(2t_c + t_i)\theta} + \left(\frac{1 - t_c}{t_i - t_c}\right)\frac{(4t_c - t_i)\left(A - w + \frac{r}{1 - t_j} + 2\frac{\Omega_i^f}{1 - t_c} - 2\frac{r}{1 - t_c}\right)}{4(2t_c + t_i)\theta}$$

(17)

If country j chooses the tax credit system, the optimal transfer price guideline reads

$$\bar{\delta}_i\Big|_{t_j^e = t_c} = w + \frac{2(12t_c + 3t_i)}{\theta\left(5t_i^2 + 24t_it_c + 16t_c^2\right)}\left(\Omega^f + \Omega^g\right)$$

$$+ (4t_c - t_i)\left(\frac{1 - t_c}{t_i - t_c}\right)\frac{(4t_c + t_i)}{\theta\left(5t_i^2 + 24t_it_c + 16t_c^2\right)}\left(A - w - \frac{r}{1 - t_c} + \frac{\Omega^f}{1 - t_c}\right)$$

(18)

Thus, the choice of $\bar{\delta}_i$ depends on the tax systems choice in both countries and the tax rate in country c, $\bar{\delta}_i = \bar{\delta}_i\left(t_i^e, t_j^e, t_c\right)$, of which the latter is of crucial importance. It follows directly from the two above equations that $t_c > t_i/4$ is a sufficient condition for the optimal transfer price guideline to exceed the variable cost at the headquarter: $\bar{\delta}_i > w$. The larger the firm's gain and the social loss due to profit shifting, the higher the optimal $\bar{\delta}_i$. To understand the relationship between t_c and the optimal transfer price, recall that the transfer price has two main effects. Firstly, the transfer price can be used to manipulate the variable cost

which is similar to a production subsidy. This effect becomes the more important the higher the tax gap $t_i - t_c$, i.e. the lower the foreign tax rate t_c. Secondly, the transfer price shifts income from the foreign tax base to the domestic tax base. From the domestic perspective, this is the more important the higher the foreign tax rate t_c. In other words, if the tax rate in country c is low, transfer pricing is aggressive and competition oriented; if the tax rate in country c is high, transfer pricing is tax revenue oriented.

Now, consider the choice between the exemption and the tax credit system. This choice is different from the choice analyzed in the preceding section: The firm either chooses exemption and the transfer price in (17) or (18), or the tax credit system and the maximum transfer price given by $\bar{\delta}_i^{\max} = \theta^{-1}\left(p - w(1-\theta) - \frac{F_i}{x_i}\right)$. Under exemption, national welfare is given by (11). In contrast, under the tax credit system, national welfare is given by $W_i^{cr} = (p - w - r)x_i - F_i$. Welfare does not depend on the tax rate in country c, since all taxable income is shifted out of country c. The country has no opportunity to use transfer prices to subsidize production, however it can shift all income out of country c without deteriorating the terms of trade of its firm.

Proposition 2 *Assume that transfer prices and tax regimes are simultaneously and uncoordinatedly chosen by both countries a and b. Then,*

i) if t_c approaches zero, both countries choose the exemption system;

ii) if the foreign tax rate approaches t_i, both countries prefer the tax credit system.

Proof. Assume $t_c = 0$. Then, under the tax credit system, the transfer price has no impact on welfare. Under an exemption system, country i can replicate the welfare level of the tax credit system by setting an adequate transfer price (at N_1 or $\tilde{N}_1$, respectively, in diagram 1). However, changing the transfer price may increase welfare even higher. Thus, the welfare under the exemption system can be increased by setting lower transfer prices (and, thus, increase $\kappa_i^{cr} - \kappa_i^{ex}$). If t_c increases, the first term in (17) and (18) decrease whereas the second terms increase. If t_c approaches t_i, δ_i will at some point reach its maximum level given by $\delta_i^{\max}$ (due to the term $t_i - t_c$ in the denominator). As shown in the preceding section, a sufficient condition for a country to prefer the credit system is $\kappa_i^{cr} - \kappa_i^{ex} < 0$

which implies $\bar{\delta}_i > w + \frac{r}{\theta(1-t_i)} - \left(\tilde{\delta}_i - \bar{\delta}_i\right)(1-t_c) - \left(\frac{1-t_c}{t_i-t_c}\right)k_i(1-t_i)$. Thus, it suffices to show that $\delta_i^{\max} > w + \frac{r}{\theta(1-t_i)} - \left(\tilde{\delta}_i - \bar{\delta}_i\right)(1-t_c) - \left(\frac{1-t_c}{t_i-t_c}\right)k_i(1-t_i)$ in order to prove that, for high levels of t_c, the preferred tax system is the tax credit system. It is straightforward to show that it actually is higher if $\left(\frac{p-w-\frac{F_i}{x_i}-\frac{r}{(1-t_i)}}{\theta}\right) > \left[-\left(\tilde{\delta}_i - \bar{\delta}_i\right) - k_i\left(\frac{1-t_i}{t_i-t_c}\right)\right](1-t_c)$ which is necessarily true for high levels of t_c approaching t_i. ∎

Thus, countries choose the credit system if income shifting to the domestic tax base is more important (i.e. if t_c is large) and the exemption system if subsidization is more effective (i.e. if t_c is low).

3.3 Extension: Tax rate choice of country c

So far, I have assumed that country c is passive and does not respond to the policy choices of countries a and b. However, the model results have shown that optimal policy choices with endogenous transfer prices crucially depend on the tax policy choice of c, the tax rate t_c. For reasons discussed above, I have assumed that countries a and b consider their corporate tax rates as given, and it is natural to apply the same assumption to country c. In fact, tax competition over corporate tax rates has been extensively analyzed in the literature, in symmetric settings (countries a and b) and asymmetric settings (countries c and a/b). Replicating this kind of analysis is not likely to yield new insights. It is, however, tempting to ask whether country c has an incentive to trigger certain policy responses by country a and b by setting its tax rate before a and b choose their system of foreign profit taxation and the transfer price guidelines.

Therefore assume that country c acts as a Stackelberg leader and determines its tax rate t_c anticipating the other countries' policy choices on t_a^e, t_b^e, $\bar{\delta}_a$, $\bar{\delta}_b$. As indicated above, both countries a and b choose their system of foreign profit taxation according to a trade-off between production subsidization and income shifting out of country c. Whereas production subsidies benefit the economy in c because consumer surplus increases, income shifting reduces the country's tax revenue. In other words, subsidizing production by country i harms country j and benefits country c, whereas income shifting under the tax credit system does

not affect country j but harms country c. Therefore, country c clearly prefers the other two countries to implement the exemption system.

Proposition 3 *If country c is allowed to adjust its tax rate t_c, the resulting equilibrium implies both countries a and b choosing the exemption system.*

Proof.   If t_c is large, both countries a and b choose the tax credit system and country c has zero tax revenue and consumer prices of $p\left(t_i^e = t_i\right)$. If t_c is low, countries a and b choose the exemption system and country c has zero or positive tax revenue and consumer prices of $p\left(t_i^e = t_c\right)$. Since tax revenue cannot become negative and because $p\left(t_i^e = t_c\right) < p\left(t_i^e = t_i\right)$, it follows that country c always chooses a tax rate which ensures a tax exemption equilibrium.   ∎

This result stands in contrast to the standard literature where the low-tax country may profit from tax credit system employed by the high-tax country. The reason is that the low-tax country may then increase its tax rate without distorting the incentives for the foreign owned capital.

4   Discussion

As every model, the above presented model is based on a number of simplifying assumptions. In the following, I will discuss three of these simplifications and their implications for the model results.

Firstly, I assumed for most of the model analysis that country c remains passive, especially in terms of transfer pricing policies. In the real world, transfer prices are negotiated between the two parties which are directly concerned: the residence country and the host country. Other residence countries (like country j in the model) are affected by the outcome of these negotiations but do not participate. Assuming that the host country is passive is equivalent to assuming that it has no negotiation power. This greatly simplifies the analysis but, as I will argue here, does not substantially restrict the results in their generality. On the one hand, in many cases the residence country has incentives to allow for profit shifting to the low tax host country in order to subsidize production. On the other hand, if the host country has negotiation power this would simply imply that the highest

possible transfer price is reduced. This does not affect the results derived in section 3.2, though.

Secondly, I assumed that the firm's headquarter and affiliate act as one player. There are not principle-agent or management control problems involved. As pointed out by Elitzur & Mintz (1996) and Koethenbuerger (2010), transfer pricing may be used by the headquarter to incentivize managers at the affiliate location. For instance, in order to reduce the risk of empire-building behavior, transfer prices may be chosen artificially high. In the cases described above, such a transfer pricing policy gets in conflict with the firm's tax saving purposes. Again, if countries anticipate this transfer pricing behavior, they may choose official transfer prices accordingly and end up at the transfer price levels as in the current version of the model. However, additional complexities arise as the affiliate part of the firm is not committed to profit-maximization.

Thirdly, the model considers perfect tax credit systems and perfect exemption systems. It has often been argued that real world versions of both tax systems actually are somewhere between the polar cases considered here. Deferral of profit repatriations undermine the tax credit system, and legislation for controlled foreign companies (CFC rules) introduce elements of residence taxation into real world exemption systems. Insofar, the model is not intended to reflect all complexities of existing tax systems, but rather focus on a major trade-off between revenue policy and trade policy which so far has mostly been neglected.

5   Conclusion

This paper started from the observation that explicit subsidies and tariffs are decreasing in importance due to international trade agreements. However, the tax system offers subtle means to manipulate the terms of trade for multinational firms, especially if intra-firm trade occurs. I built a model in the tradition of Brander & Spencer (1985) where two firms from different countries compete on a third market. In contrast to the Brander & Spencer (1985) framework, the firms have production facilities in the third market, but nevertheless import a fraction of their production from the headquarters. This gives rise to intra-firm trade which requires transfer price guidelines for tax reasons. The governments

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of the countries hosting the headquarters have two instruments at their disposal, the choice of the system of foreign profit taxation and transfer price guidelines. The paper demonstrates how the two instruments interdepend and what are the optimal choices under competition.

Firstly, it turns out that, in the absence of intra-firm trade both countries choose the exemption system. This is not a novel result, as it has often been mentioned in the literature and recent policy documents. As each residence country would like to subsidize production of its multinational firm, it certainly will not impose an extra cost on production via the repatriation tax.

Secondly, the picture changes in the presence of intra-firm trade, if transfer prices are exogenously given (e.g. by some international agreement) and ensure that there is positive taxable income in both locations, the headquarter and the affiliate. If intra-firm trade becomes more important, the residence country may have an incentive to switch to the tax credit system. The reason is that a transfer price that shifts taxable profits to the high-tax country increases the variable cost of the firm if there is a difference in effective taxation between the two locations. The tax credit system closes this tax gap and, thus, *ceteris paribus* reduces the variable cost.

Thirdly, if transfer prices are autonomously chosen by the residence countries a trade-off occurs between extracting income from the source country or implicitly subsidizing production. If the welfare objective is assumed to be national income, there is only an incentive to shift income out of the source country if it applies a positive corporate tax rate. It turns out that optimal transfer prices are below the variable headquarter cost of production if the source country's corporate tax rate is low and above if it approaches the corporate tax rate level of the residence country. The paper shows that, as a consequence, the residence countries prefer the exemption system for low corporate tax levels in the third country and the tax credit system otherwise.

Fourthly and finally, if the source country is allowed to adjust its tax rate, it can be shown that it will choose a corporate tax rate which is sufficiently low to ensure that both residence countries choose the exemption system.

What follows for tax policy? The most important message from the above analysis is probably that the competitive effects of the tax credit and the exemption

system crucially depend on quantity and price of intra-firm trade. Moreover, as also pointed out by Becker & Loomer (2009), transfer pricing may have a substantial effect on competition and should be treated accordingly by supranational competition institutions.

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Appendix

Appendix 1: Welfare difference

This appendix derives the two nulls of the welfare difference function in equation (13).

The welfare level is given by

$$W_i^{ex} - W_i^{cr} = \left[\Psi - \frac{\kappa_i^{cr} - \kappa_i^{ex}}{3} (1 - t_c) \right] \frac{2}{3} \left(\frac{\kappa_i^{cr} - \kappa_i^{ex}}{3} \right) - \Omega_i^{g,ex}$$

Thus, $W_i^{ex} - W_i^{cr}$ is a quadratic function of the cost difference $\kappa_i^{cr} - \kappa_i^{ex}$:

$$W_i^{ex} - W_i^{cr} = - (1 - t_c) \frac{2}{27} \left[(\kappa_i^{cr} - \kappa_i^{ex})^2 - \frac{3Y}{(1 - t_c)} (\kappa_i^{cr} - \kappa_i^{ex}) + \frac{27}{2 (1 - t_c)} \Omega_i^{g,ex} \right]$$

which has two nulls at

$$\kappa_i^{cr} - \kappa_i^{ex} = \frac{3Y}{2 (1 - t_c)} \pm \sqrt{\frac{1}{4} \left(\frac{3Y}{(1 - t_c)} \right)^2 - \frac{27}{2 (1 - t_c)} \Omega_i^{g,ex}}$$

If $\Omega_i^{g,ex}$ is sufficiently small, the two nulls N_1 and N_2 have positive signs:

$$N_1 = \frac{3Y}{2 (1 - t_c)} - \sqrt{\frac{\left(\frac{3Y}{(1 - t_c)} \right)^2}{4} - \frac{27}{2 (1 - t_c)} \Omega_i^{g,ex}} \geq 0$$

$$N_2 = \frac{3Y}{2 (1 - t_c)} + \sqrt{\frac{\left(\frac{3Y}{(1 - t_c)} \right)^2}{4} - \frac{27}{2 (1 - t_c)} \Omega_i^{g,ex}} > 0$$

Appendix 2: Optimal transfer pricing guidelines

This appendix derives the expressions in equations (17) and (18).

The first order condition is given by

$$\frac{\partial W_i}{\partial \bar{\delta}_i} = \left(\frac{1}{2}x_i + \theta\left(\bar{\delta}_i - w\right)\left(\frac{t_i - t_i^r}{1 - t_i^e}\right) + \frac{t_i^r r}{1 - t_i^e} - \frac{\Omega_i^f}{1 - t_i^e} - \frac{\Omega_i^g}{1 - t_c}\right)(1 - t_c)\frac{\partial x_i}{\partial \bar{\delta}_i}$$
$$+ t_c \theta x_i$$

Using

$$x_i = \frac{A - w - \frac{\Omega_j^f}{1 - t_j^e} + \theta\left(\bar{\delta}_j - w\right)\left(\frac{t_j - t_j^e}{1 - t_j^e}\right) + \frac{r}{1 - t_j^e} - 2\theta\left(\bar{\delta}_i - w\right)\left(\frac{t_i - t_i^e}{1 - t_i^e}\right) + 2\frac{\Omega_i^f}{1 - t_i^e} - 2\frac{r}{1 - t_i^e}}{3}$$

and solving for $\bar{\delta}_i$ yields

$$\bar{\delta}_i = w + \frac{3}{2}\frac{\left(\Omega_i^f + \Omega_i^g\right)}{(2t_c + t_i)\theta}$$
$$+ \left(\frac{1 - t_c}{t_i - t_c}\right)\frac{(4t_c - t_i)\left(A - w - \frac{\Omega_j^f}{1 - t_j^e} + \theta\left(\bar{\delta}_j - w\right)\left(\frac{t_j - t_j^e}{1 - t_j^e}\right) + \frac{r}{1 - t_j^e} + 2\frac{\Omega_i^f}{1 - t_c} - 2\frac{r}{1 - t_c}\right)}{4(2t_c + t_i)\theta}$$

where I used $t_i^e = t_c$.

If j chooses credits, the above equation reads

$$\bar{\delta}_i = w + \frac{3}{2}\frac{\left(\Omega_i^f + \Omega_i^g\right)}{(2t_c + t_i)\theta} + \left(\frac{1 - t_c}{t_i - t_c}\right)\frac{(4t_c - t_i)\left(A - w + \frac{r}{1 - t_j} + 2\frac{\Omega_i^f}{1 - t_c} - 2\frac{r}{1 - t_c}\right)}{4(2t_c + t_i)\theta}$$

If j chooses exemption, the above equation reads

$$\bar{\delta}_i = w + \frac{3}{2}\frac{\left(\Omega_i^f + \Omega_i^g\right)}{(2t_c + t_i)\theta}$$
$$+ \left(\frac{1 - t_c}{t_i - t_c}\right)\frac{(4t_c - t_i)\left(A - w - \frac{r}{1 - t_c} - \frac{\Omega_j^f}{1 - t_c} + \theta\left(\bar{\delta}_j - w\right)\left(\frac{t_j - t_c}{1 - t_c}\right) + 2\frac{\Omega_i^f}{1 - t_c}\right)}{4(2t_c + t_i)\theta}$$

Accordingly, j chooses

$$\bar{\delta}_j = w + \frac{3}{2}\frac{\left(\Omega_j^f + \Omega_j^g\right)}{(2t_c + t_j)\,\theta}$$

$$+ \left(\frac{1-t_c}{t_j - t_c}\right)\frac{(4t_c - t_j)\left(A - w - \frac{r}{1-t_c} - \frac{\Omega_i^f}{1-t_c} + \theta\left(\bar{\delta}_i - w\right)\left(\frac{t_i - t_c}{1-t_c}\right) + 2\frac{\Omega_j^f}{1-t_c}\right)}{4\,(2t_c + t_j)\,\theta}$$

Plugging the above expression for $\bar{\delta}_j$ in the expression for $\bar{\delta}_i$ yields

$$\left(\bar{\delta}_i - w\right)\theta = \frac{6\left[4\,(2t_c + t_j)\left(\Omega_i^f + \Omega_i^g\right) + (4t_c - t_i)\left(\Omega_j^f + \Omega_j^g\right)\left(\frac{t_j - t_c}{t_i - t_c}\right)\right]}{16\,(2t_c + t_i)\,(2t_c + t_j) - (4t_c - t_i)\,(4t_c - t_j)}$$

$$+ \left(\frac{1-t_c}{t_i - t_c}\right)\frac{4\,(4t_c - t_i)\,(2t_c + t_j)\left(A - w - \frac{r}{1-t_c} - \frac{\Omega_j^f}{1-t_c} + 2\frac{\Omega_i^f}{1-t_c}\right)}{16\,(2t_c + t_i)\,(2t_c + t_j) - (4t_c - t_i)\,(4t_c - t_j)}$$

$$+ \frac{1-t_c}{t_i - t_c}\frac{(4t_c - t_i)\,(4t_c - t_j)\left(A - w - \frac{r}{1-t_c} - \frac{\Omega_i^f}{1-t_c} + 2\frac{\Omega_j^f}{1-t_c}\right)}{16\,(2t_c + t_i)\,(2t_c + t_j) - (4t_c - t_i)\,(4t_c - t_j)}$$

which, under symmetry, reads

$$\bar{\delta}_i = w + \frac{2\,(12t_c + 3t_i)}{\theta\left(5t_i^2 + 24t_i t_c + 16t_c^2\right)}\left(\Omega^f + \Omega^g\right)$$

$$+ (4t_c - t_i)\left(\frac{1-t_c}{t_i - t_c}\right)\frac{(4t_c + t_i)}{\theta\left(5t_i^2 + 24t_i t_c + 16t_c^2\right)}\left(A - w - \frac{r}{1-t_c} + \frac{\Omega^f}{1-t_c}\right)$$

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