Partial Tax Coordination and Profit Shifting of Multinational Firms

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Abstract

This paper analyzes how transfer pricing regulations affect the stability of tax agreements. We use a three-country model of asymmetric tax competition and show that there may exist cases where as increasing regulation of transfer pricing raise the costs of profit shifting, countries are less likely to cooperate on corporate income taxes and thus tax harmonization agreements may become less sustainable.

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1 Introduction

Tax competition gained rising attention over the last 40 years. Starting from tax competition with symmetric countries as analyzed by (Wilson, 1986) and Zodrow and Mieszkowski (1986) the focus changed to asymmetric countries such as analyzed by Bucovetsky (1991) where population differences cause different taxes. Wilson (1991) reviews the results that small countries gain from tax competition if the tax differences are caused by population differences and shows that this may also be true for more general models. Bucovetsky and Wilson (1991) show that countries tax capital and labor if they are sufficiently powerful to change the capital market equilibrium.

The problem commonly described is that countries can have an incentive not to coordinate taxes as – especially the small – countries gain from non-cooperative behavior. Nevertheless, this leads to tax rates which are not welfare maximizing. This problem can be solved if countries decide to harmonize their tax rates. However, harmonization requires that countries do not have an incentive to deviate from the tax agreement. Hence, possibilities of cooperation can be realized in repeated interaction models. Repeated games allow the countries to generate wealth levels under harmonized tax rates which exceed the wealth level of a deviation from the tax agreement. This reasoning follows Coates (1993) who shows that under a system of property tax competition where head taxes are available the collusion of local governments increases welfare. Although nowadays there is a grand branch focusing on tax competition between two countries three country models are considered much less. An exception is Eggert and Itaya (2014) who reason that the existence of a third country involves more heterogeneity between the countries and thus reduces the probability of sustainable tax agreements.

We use a three country model to analyze the affect of transfer pricing regulations on the stability of tax agreements. We show that decreasing tax induced profit shifting between the countries can lead to instability of tax unions which apply harmonized tax rates. Additionally, a union of states with a common tax harmonization agreement can exist as long as the overall capital stock in this union is sufficiently large. However, once the capital stock decreases due to an economic or financial crisis, it can burst a critical threshold and incentivize the countries to leave the union.

2 The model

The model consists of three asymmetric countries $i = 1, 2, 3$ which differ in their production technologies and tax rates τ_i. Each of the countries is home to an affiliate of a multinational enterprise (MNE) which uses transfer prices to maximize global profits. It uses the possibility of tax arbitrage to move proceeds to the low tax country while it shifts costs to the high tax country. The multinational firm chooses a calculation method of the transfer price such that it maximizes profits. This does not necessarily mean that the transfer price is not on arm's length as different methods (CUP, RP, C+, CPM, PS)[1] can lead to different transfer prices and thus provide a range of legal transfer prices.

[1] CUP: Comparable Uncontrolled Price, RP: Resale Price, C+: Cost Plus, CPM: Comparable Profits Method, PS: Profit Split

2.1 Affiliates

Following Haufler (1997), Peralta and van Ypersele (2005), Itaya (2008), and Eggert and Itaya (2014) affiliates have the constant-returns-to-scale production function $f_i(k_i) = (A_i - k_i)k_i$ where A_i describes the country specific technology parameter and k_i is the capital invested in region i. Let the affiliates in the different countries choose their production level and thus their capital demand to maximize local after-tax profits $(1 - \tau_i)\pi_i$ where

$$\begin{aligned}
\pi_1 &= f_1(k_1) - rk_1 - (s_1 - 1) - (s_3 - 1), \\
\pi_2 &= f_2(k_2) - rk_2 + (s_1 - 1) - (s_2 - 1), \\
\pi_3 &= f_3(k_3) - rk_3 + (s_3 - 1) + (s_2 - 1).
\end{aligned} \tag{1}$$

Hence, the firms' demand capital is

$$k_i^{CapD} = \arg\max_{k_i}(1 - \tau_i)\pi_i = 1/2(A_i - r). \tag{2}$$

Thus, the affiliates' capital demand depends only on their country specific production technology and on the capital market interest rate.

2.2 Capital Market

In this subsection we calculate the capital market interest rate and find the equilibrium capital demands of the affiliates. The capital market equilibrium requires that the sum of capital demands is equal to the total capital endowment $\sum_{i=1}^{3} k_i = 3K$ and all agents maximize their objective function. We use this condition together with equation 2 to solve for the capital market interest rate

$$r^m = \frac{1}{3}\sum_{i=1}^{3} A_i - 2K. \tag{3}$$

Substituting the capital market interest rate 3 in the affiliates' capital demand function 2 gives the equilibrium capital demands

$$k_i^m = \frac{1}{6}(2A_i - \sum A_{-i}) + K. \tag{4}$$

2.3 Multinational Enterprise

The MNE chooses a transfer price s_i to shift the affiliates' profits with the aim of maximizing global income. Thus, the transfer price can differ from the "real" transfer price which for the sake of simplicity is normalized to 1. Let the costs of deviating from the true transfer price be a convex function. Following Eggert and Itaya (2014) we assume the cost function for shifting profits to be $q_i = \beta/2(s_i - 1)^2$. This accounts for the following: If the MNE chooses the "real" transfer price of 1, it is confronted with costs of $q_i = 0$ which can be thought of as the additional costs for the financial department (which, since the transfer price equals the "real" price are zero). In case it chooses a transfer price close to one as it can be calculated with one of the above mentioned methods, the costs are slightly higher since the accountants need to choose the method which maximizes profits but still is at arm's length. However, we do also allow for illegal manipulations of the transfer price. This leads to larger costs due to concealment costs and possible fines. Let the MNE's global profit consist of the affiliates' profit decreased by the costs of transfer pricing.

$$\Pi = \sum_{i=1}^{3} \left[(1-\tau_i)\pi_i - q_i\right]. \tag{5}$$

Substituting 3 and 4 into 5 and solving for s_i we find the set of profit maximizing transfer prices $s_i = \arg\max_{s_i} \Pi$:

$$s_1 = \frac{\beta + \tau_1 - \tau_2}{\beta}, \quad s_2 = \frac{\beta + \tau_2 - \tau_3}{\beta}, \quad s_3 = \frac{\beta + \tau_1 - \tau_3}{\beta}. \tag{6}$$

One can see that as long as countries choose equal tax rates $\tau_1 = \tau_2 = \tau_3$ the MNE sets the transfer price as the true transfer price and no tax induced profit shifting occurs. If country i levies higher tax rates than country $-i$, the MNE shifts profits to the low tax countries $-i \quad \forall -i \neq i$.

2.4 Nash Taxes

Let the governments maximize tax revenues. This simplifying assumption can be rationalized by a government which gains little attention to consumer and producer or wants to counteract wage decreases due to globalization (Kanbur and Keen, 1993 as well as Elitzur and Mintz, 1996 or Eggert and Itaya, 2014). Thus, we allow the governments to maximize tax revenues which are

$$R_i(\tau_i) = \tau_i \pi_i. \tag{7}$$

The countries choose tax rates τ_i which lead to higher revenues at any tax rates of the other countries, i.e. $R_i(\tau_i, \tau_{-i}) > R_i(\tau_i', \tau_{-i})$. We find that the best response functions $\tau_i(\tau_{-i})$ satisfy the condition of the existence of an unique one-shot Nash equilibrium $\frac{\partial \tau_i(\tau_{-i})}{\partial \tau_{-i}} < 1, i \neq -i$. Thus, the countries levy tax rates

$$\tau_i^N = \tau_i^N(A_1, A_2, A_3, K, \beta), \quad i = 1, 2, 3. \tag{8}$$

Substituting 8 in the countries' tax revenue 7 gives the one-shot Nash tax revenue

$$R_i(\tau_i^N) = R_i^N(A_1, A_2, A_3, K, \beta), \quad i = 1, 2, 3. \tag{9}$$

2.5 Tax Harmonization

Building a union (i.e. cooperation) can potentially lead to a higher sum of discounted tax rates than in the sub-game perfect equilibrium. Since there are three countries, there are four possibilities of cooperation. The case we are interested in is if a country i has an incentive to stay in the union of all three countries. Let the tax rates under coordination τ^C maximize the sum of tax revenues $\sum_{i=1}^{3} R_i^C$. The optimal use of capital and the cooperative tax rates are determined by the first order conditions

$$r^C = \frac{1}{3}\sum_{i=1}^{3} A_i - 2K \tag{10}$$

$$\tau_i^C = \tau_{-i}^C = \tau^C \quad \forall i = 1, 2, 3. \tag{11}$$

We substitute 10 and 11 in 7 to calculate the tax revenues under cooperation:

$$R_i^C(\tau^C) = \frac{\tau^C}{36}\left(\sum A_{-i} - 2A_i - 6K\right)^2. \tag{12}$$

The participation in tax harmonization requires agreements and political processes which potentially are costly. Hence, a country will only agree on tax harmonization if this results in higher tax revenues than under Nash tax rates, i.e. $R_i^C(\tau^C) - R_i^N(\tau_i^N) \geq 0, i = 1, 2, 3$.

We use 12 and 9 to solve above inequality for τ_C. This leads to the participation constraint PC_i at which the countries still agree on tax harmonization.

2.6 Best Deviation Tax Rates

In case of cooperation, a country might consider to leave the union and levy taxes τ_i^D while the other two countries still levy cooperative tax rates τ^C. The deviating country then obtains higher tax revenues $R_i^D(\tau_i^D, \tau_{-i}^C)$, which are

$$R_i^D(\tau_i^D, \tau_{-i}^C) = \frac{(72\tau^C + \beta(\sum A_{-i} - 2A_i - 6K)^2)^2}{10368\beta}. \tag{13}$$

2.7 Repeated Game

We analyzed the tax rates in the different scenarios: uncooperative tax rates, cooperative tax rates and best deviation tax rates. Comparing equations 9,12 and 13, one can see that the tax revenues under cooperation are higher than those under non-cooperation. However, since a country can achieve the highest tax revenue under deviation, the tax agreement could fail and countries face a tradeoff: The gain in tax revenue due to deviation against the loss in tax revenue as a result of the Nash tax rates which follow the deviation. This gives the following condition for cooperation: The countries cooperate as long as the discounted tax revenue under infinite cooperation exceeds the one-shot deviation tax revenue followed by the non-cooperative Nash tax revenue. With equations 12,13 and 9, we can solve the conditions for countries $i = 1, 2, 3$

$$\frac{1}{1-\delta_i} R_i^C \geq R_i^D + \frac{\delta_i}{1-\delta_i} R_i^N \tag{14}$$

for the minimum discount factor $\hat{\delta}_i$ for a country to agree on tax harmonization. Solving 14 gives

$$\hat{\delta}_i = \frac{R_i^D - R_i^C}{R_i^D - R_i^N} \quad \forall i = 1, 2, 3. \tag{15}$$

The participation constraints and discount factors for countries $i = 1, 2, 3$ do only match as long as the capital stock in the union is sufficiently large, i.e

$$K \geq \frac{1}{12}(2A_1 - A_2 - A_3). \tag{16}$$

If the capital stock in the union decreases under this threshold due to a financial crisis, at least one of the countries has an incentive to leave the union.

2.8 Regulation of Transfer Pricing Rules

What if the countries decide to tighten the regulations on transfer pricing? First, from equation 12 we know that $\frac{\partial R_i^C(\tau^C)}{\partial \beta} = 0$ which means that the tax revenues in a system of tax rate harmonization is not dependent on the costs of tax induced transfer pricing. This result is intuitive. Since the tax rates are harmonized, i.e. $\tau_i^C = \tau_{-i}^C = \tau^C$, there is no reason for tax induced profit shifting. Thus, the left hand side of the cooperation condition 14 is not affected by regulations on transfer pricing. Second, we find that the Nash tax revenues always increase with higher costs of transfer pricing, i.e. $\frac{\partial R_i^N}{\partial \beta} > 0 \quad \forall i = 1, 2, 3$. Third, from equation 13, we can derive that

$$\frac{\partial R_i^D}{\partial \beta} = \frac{\left[\beta \left(\sum A_{-i} - 2A_i - 6K\right)^2 + 72\tau^C\right] \left[\beta \left(\sum A_{-i} - 2A_i - 6K\right)^2 - 72\tau^C\right]}{10368\beta^2}. \tag{17}$$

Therefore, one can conclude that an increase in the costs of transfer pricing increases the best deviation payoff as long as the harmonized tax rate is low, i.e. $\tau^C < \frac{\beta}{72} \left(\sum A_{-i} - 2A_i - 6K\right)^2$.

Hence, as long as the countries levy a low tax rate in an economy with tax harmonization, additional regulation on transfer pricing which increases the costs of tax induced profit shifting leads to an increase in the right hand side of equation 14. This can be interpreted as a rise in the opportunity costs of staying in the tax union. Since the benefits of staying in the union are not affected, due to $\partial R_i^C(\tau^C)/\partial \beta = 0$, regulation of transfer pricing decreases the sustainability of the harmonization agreements.

3 Conclusion

We aimed to analyze how transfer pricing regulations affect the stability of tax agreements. For this purpose, we model an economy which is home to a multinational enterprise. The MNE has affiliates in each country. Each of the affiliates chooses its production level and demand to maximize profits. Given the production decisions of the affiliate the MNE sets a transfer price that maximizes global after-tax profits. Each home country to any affiliate can choose tax rates such that it maximizes tax revenues. We show that in a one-shot game no cooperation will occur, whereas repeated interaction between the countries can lead to tax harmonization agreements.

Our analysis focuses on two topics. First, the tax harmonization agreement is only sustainable as long as the total capital stock of the tax union is sufficiently high. In the event of a financial or economical crises, countries might consider to leave the union. Second, given low tax rates under coordination, additional regulation of transfer pricing undermines the sustainability of the harmonization agreements.

References

Bucovetsky, S. (1991): Asymmetric Tax Competition. In: *Journal of Urban Economics* 30, S. 167–181.

Coates, Dennis (1993): Property tax competition in a repeated game. In: *Regional Science and Urban Economics* 23 (1), S. 111–119.

Eggert, W.; Itaya, J. (2014): Tax Rate Harmonization, Renegotiation, and

Asymmetric Tax Competition for Profits with Repeated Interaction. In: *Journal of Public Economic Theory* 16 (5), S. 796–823.

Elitzur, R.; Mintz, J. (1996): Transfer pricing rules and corporate tax competition. In: *ISPE Conference on Tax Reforms and Tax Harmonization: Public choice versus public finance* 60 (3), S. 401–422.

Haufler, A. (1997): Factor Taxation, Income Distribution and Capital Market Integration. In: *The Scandinavian Journal of Economics* 99 (3), S. 425–446.

Itaya, J.; Okamura, M.; Yamaguchi, C. (2008): Are regional asymmetries detrimental to tax coordination in a repeated game setting? In: *New Directions in Fiscal Federalism* 92 (12), S. 2403–2411.

Kanbur, R.; Keen, M. (2007): Jeux Sans Frontieres: Tax Competition and Tax Coordination When Countries Differ in Size', *American Economic Review* 83 (4), September, 877–892.

Peralta, S.; van Ypersele, T. (2005): Factor endowments and welfare levels in an asymmetric tax competition game. In: *Journal of Urban Economics* 57 (2), S. 258–274.

Wilson, John D. (1986): A theory of interregional tax competition. In: *Journal of Urban Economics* 19 (3), S. 296–315.

Wilson, J. D. (1991): Tax competition with interregional differences in factor endowments. In: *Special Issue Theoretical Issues in Local Public Economics* 21 (3), S. 423–451.

Zodrow, G. R.; Mieszkowski, P. (1986): Pigou, Tiebout, property taxation, and the underprovision of local public goods. In: *Journal of Urban Economics* 19 (3), S. 356–370.