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Tax Principles of Pillar One in the BEPS Project**

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Still under-taxing the digital MNE? Assessing the tax principles of Pillar One in the BEPS Project

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Abstract

A new principle of international taxation that gives taxing rights on the profits of digital multinational firms (MNEs) has been proposed in Pillar One of the OECD/G20 Base Erosion and Profit Shifting (BEPS) Project. This note delineates this tax principle in a simple model and points out that while the new framework allows taxation of MNEs profits that could not be taxed before, it includes incentives for excessive reductions in the corporate tax rate.

Keywords. Corporate tax; International taxation; BEPS project; Digital MNE
JEL classification. F23; H25

1 Introduction

The Base Erosion and Profit Shifting (BEPS) project, a collaboration between the OECD and the G20, has been exploring a new international taxation framework to address BEPS. In particular, the focus of the debate has been a new framework for taxing the profits of digital MNEs that do not have a permanent establishment (PE) in the country where they provide services. After a long discussion, a blueprint for a new taxation rights framework was published by the OECD in October 2020 (OECD, 2020a), and a new taxation scheme was proposed in Pillar One of the BEPS reports that shifts the taxation authority from the principle of taxing corporate entities based on their place of residence to the place of consumption of services (*market jurisdiction* in the terms of the report).¹

The purpose of this note is to delineate this new taxation principle in a simple model and to show the potential challenges that might arise. Our model builds on the specific example of the new taxation nexus given by the OECD (2020a, pp. 221-224). This note points out that while market jurisdictions will now be able to tax MNE profits, which previously could not be taxed by the market state, the government's incentives for excessive tax rate reductions still remain within the framework of Pillar One proposed in the BEPS project. This is because when there is room for the country to have the discretion to tax against the tax base allocated to each country in the new tax framework, the MNE changes the target countries for increasing sales from high-tax to low-tax countries, consequently creating fiscal externalities in corporate tax decisions.

2 Model

Consider a multinational firm (MNE) that exclusively supplies services to two independent countries ($i = 1, 2$). To focus on efficiency, let us assume that the two countries are symmetric. The inverse demand function of the services in each country is:

$$p_i = a + \beta q_j - q_i, \tag{1}$$

where p_i is the price of services in country i , and q_i is the amount of services consumed, for example, the number of service users. a and β are both positive parameters. Without losing generality, we assume that $a = 1$ in the following analysis and that β is between 0 and 1. To assume digital services, following Adachi (2002), the second term on the right side of (1) contains a term representing network externalities. Digital services such as movie and music delivery, online cloud storage, matching service, and online games are characterized by the fact that the benefits of using these services are enhanced as the number of users in other countries increases. Transactions through platforms are also expected to benefit consumers in the home country when there are more participants in the transaction in the other country.

Services to both countries are supplied by monopolistic MNE with physical locations outside the two target countries. Under conventional international taxation principles, the governments of the two countries cannot impose a corporate tax on firms with physical equipment (PE) outside the country. However, Pillar One of the BEPS projects proposes a rule that would allow the government of the country where the services are consumed to impose its own tax on *residual* profits (in terms of the report) that exceed the firm's *routine* profits. In the proposal, although

¹The BEPS project has made proposals on a variety of issues related to international taxation, and although they are few in number, they have been the subject of several economic analyses. For example, Merrill (2016) studies whether the intellectual property box proposed in OECD (2015) could be considered a harmful preferential tax regime. Hanappi and González Cabral (2020) estimate the impacts of Pillar One and Pillar Two of BEPS project on the investment costs through changes in the effective marginal and average tax rates.

the level is yet to be determined, a certain percentage of sales is recognized as residual profits (OECD, 2020a, p. 222).

Let π_i be the gross profits of the MNE in country i and assume that the variable cost of supply is zero, $C(q_1, q_2) = 0$, for simplicity. We do not exclude the existence of fixed costs, but because they do not affect the results, they are omitted. Because the production cost is assumed to be zero, $\pi_i = R_i$, where

$$R_i = p_i q_i. \quad (2)$$

The total gross profits of the MNE are $R = R_1 + R_2$. Let $z \in (0, 1)$ be the fraction of the firm's total profits that qualifies as residual profits and $1 - z$ the fraction that qualifies as routine profits.² Then, the residual profits that may be subject to taxation are zR .

Of the residual profits subject to tax by the market jurisdictions, an agreed level of $x \in (0, 1)$ is allocated as the tax base of the two countries. The example in OECD (2020a, p. 223) is set at $x = 0.2$. The tax base allocated to both countries is further allocated as the tax base for each country based on sales in each country. Then, the tax base allocated to country i , A_i , is

$$A_i = \left(\frac{R_i}{R_i + R_j} \right) xzR, \quad (3)$$

where $R_i/(R_i + R_j)$ is the proportion of the residual profits subject to tax allocated to country i . Suppose that each country imposes an arbitrary tax on this tax base. If the tax rate for each country is t_i , then the tax revenue for country i , G_i , is

$$G_i = t_i A_i. \quad (4)$$

The total net profits of firm after taxation are $\Pi = \pi_1 + \pi_2 - G_1 - G_2$, where the first two terms are the gross profits and the last two terms are the corporate tax payments to the market jurisdictions. Substituting (2)-(4) into the net profit function, the MNE chooses q_1 and q_2 to maximize its total net profit, which is given by

$$\Pi = R_1 + R_2 - \chi(t_1 R_1 + t_2 R_2), \quad (5)$$

where $\chi \equiv x(1 - z) \in (0, 1)$ and $R_i = (1 + \beta q_j - q_i)q_i$. (5) shows that the tax rate is equivalent to the *price* at which the MNE decides which country to earn its revenues from. If $t_1 > t_2$, then the MNE will try to obtain more revenue from Country 2, where the tax rate is relatively low, and vice versa.

The timing of the decision making is as follows: Assuming that z and x are predetermined at the agreed levels in the framework of the BEPS project, the governments decide t_i in the first stage. We assume that the government in each country maximizes the tax revenues given by (4).³ After observing the tax rates in each country, in the second stage, the MNE decides q_i to maximize the total net profits, which is given by (5). We solve the problem of obtaining the sub-game perfect Nash equilibrium (SPNE) by backward induction.

3 Equilibrium

In the second stage, by maximizing the MNE's profits, services in each country can be obtained as a function of each country's tax rate: $q_i = q_i(t_1, t_2)$.⁴ Reading the actions of MNEs in the

²In the terms of the report, z defines the share of residual profits (actual profits minus the profitability threshold) and is set at a level at which the firm's profits fall below an agreed level of profitability. In estimating the tax base generated in market jurisdictions in the report, five values of the profitability threshold, ranging from 8% to 25%, were used.

³The result holds even when governments are assumed to maximize their domestic surpluses, which consist of consumer surpluses and tax revenues.

⁴Specific solutions are shown in Appendix A.

second stage, governments determine the tax rate in the first stage. Solving the problem, we find that the tax rate in the symmetric SPNE, t_E , is given by⁵

$$t_E = \frac{(1 - \beta)(1 + \beta)}{\chi}. \quad (6)$$

From (6), the greater the network effect, the lower the tax rate in the equilibrium: $\partial t_E / \partial \beta = -2\beta / \chi < 0$. Using (6), we have $p_E = 1/2$ and $q_E = 2/(1 - \beta)$ in the SPNE.

Let us suppose that the two countries coordinate to determine the corporate tax rate to maximize the sum of the two countries' tax revenues, $G_1 + G_2$. When we define the cooperative solution in this way, we obtain the following result.

Proposition 1. Under the tax principles of Pillar One proposed by the BEPS Project, the corporate tax rate in the symmetric SPNE would be lower than the coordinated tax rate.

Proof. Country i chooses t_i to maximize G_i , but the raising (lowering) of t_i is accompanied by a positive (negative) externality for other countries (see Appendix C):

$$\frac{\partial G_j}{\partial t_i} = \frac{t\beta^2\chi}{4(1 + \beta)(1 - \beta)^2(1 - t\chi)} > 0. \quad (7)$$

The externalities associated with tax decisions appear as typical fiscal externalities (Wildasin, 1989; Keen and Konrad, 2013). If a country i raises the corporate tax rate, the MNE will try to increase sales in country j rather than sales in country i : $\partial R_j / \partial t_i = -\partial R_i / \partial t_i = \chi\beta^2 / 4(1 + \beta)(1 - \beta)^2(1 - t\chi) > 0$. The key to the mechanism that leads to the change in the target countries for sales is the network effect, represented by β : When country i raises its corporate tax rate, the MNE shifts the target country for increased sales to country j if $\beta > 0$. In country i , where taxes have been raised, the MNE stops trying to make sales and seeks to expand the number of users, even at lower prices. This, through the network effect, increases the value of the service to consumers in low-tax country j , where sales are targeted, and thus generates more sales. With this change in the countries that the MNE targets for these sales, an increase in the tax rate in country i increases the tax base in country j because the tax base for each country is allocated according to the proportion of the MNE sales in each country. When country i changes its tax rate, it does not take into account the impact on country j 's tax base, so a non-cooperative tax decision on the tax base allocated under Pillar One will result in an under-taxed level.

One way to increase the equilibrium tax rate is to incorporate tax adjustments into the Pillar One whereby the MNE pays taxes to each country according to the tax rate after adjusting for tax rates across countries. Specifically, suppose that each country's tax revenue is given by $G_i = [t_i + \lambda(\Gamma_i(t_1, t_2) - t_i)] A_i$. The second term in the bracket is the new adjustment term, where λ is the intensity of the tax adjustment between the two countries. Suppose $\Gamma_i = t_{avg} - t_i$, where t_{avg} is the average tax rate of member countries, and that the effective tax rate is adjusted for the difference between the average tax rate of member countries and the tax rate set by the home country. In this case, the symmetric equilibrium tax rate will be as follows:

$$t_E = \frac{(2 - \lambda)(1 - \beta)(1 + \beta)}{(2 - \lambda - \lambda\beta^2)\chi}. \quad (8)$$

Since $\partial t_E / \partial \lambda = 2\beta^2(1 - \beta)(1 + \beta) / (2 - \lambda - \lambda\beta^2)^2\chi > 0$, it suggests the stronger the strength of the adjustment term, the higher the equilibrium tax rate will be. This indicates that cooperation among countries on tax rates to be set after the introduction of the new framework will contribute to increased tax revenues.

⁵See Appendix B.

4 Conclusion

The difficulty of taxing digital services companies with physical equipment (PE) outside the market jurisdiction has led to lower tax revenues for countries. A new framework to overcome this is being developed in the form set out in Pillar One of the BEPS Project in cooperation between the OECD and the G20. This note attempts to evaluate the proposed scheme. Digital services are characterized by the presence of network effects in service use. If we accept the existence of these effects, it is shown that taxing each country freely on its allocated tax base under the proposed framework may be insufficient compared to setting tax rates that cooperate to maximize the total tax revenues of each country. There needs to be a mechanism to avoid competition to lower corporate taxes on the newly allocated tax base through the BEPS Project.

Finally, two remarks should be noted. First, the focus on symmetric equilibrium in this note provides an explicit solution, but introducing some asymmetry into the model makes it difficult to obtain equilibrium tax rates analytically. Even then, however, the conclusions here would qualitatively hold, since fiscal externalities would arise as long as MNEs act to change the target country for sales when a country raises its corporate tax rate. Second, although this note focuses only on the Pillar One of the BEPS project, the BEPS project also proposes countermeasures against profit shifting as the Pillar Two (OECD, 2020b). The Pillar One is largely intended to correct the inequity of digital MNEs evading taxation, and it may be the Pillar Two that requires more pursuit of tax efficiency. An analysis on the Pillar Two and integrated analysis of the two Pillars would validate the results more generally, especially since the estimation by Hanappi and González Cabral (2020, pp. 32-34) show that the impacts of the Pillar Two on effective marginal and average tax rates are greater than those of the Pillar One.

Appendices

Appendix A. The first-order condition for the MNE's profit maximization yields

$$q_i = \frac{\beta}{2} \cdot \frac{2 - \chi(t_1 + t_2)}{1 - t_i \chi} q_j + \frac{1}{2}.$$

Solving this equation for $i = 1, 2$, we have

$$q_i = \frac{2(1 + \beta) - \chi(2 + \beta)t_i - \chi(2 + 3\beta)t_j + \chi^2 \beta t_j^2 + \chi^2(2 + \beta)t_i t_j}{4(1 - \beta)(1 + \beta) - \chi^2 \beta^2 (t_1 + t_2)^2 + 4\chi^2 t_1 t_2 - 4\chi(1 - \beta)(1 + \beta)(t_1 + t_2)}.$$

Appendix B. The first-order derivative of G_i with respect to t_i gives

$$\frac{\partial G_i}{\partial t_i} = \chi \left[p_i q_i + t_i \left(q_i \frac{\partial p_i}{\partial t_i} + p_i \frac{\partial q_i}{\partial t_i} \right) \right] = 0. \quad (A1)$$

In the two symmetric countries, we have

$$\frac{\partial q_i}{\partial t_i} = -\frac{\beta \chi}{4(1 - \beta)(1 + \beta)(1 - t \chi)} \quad \text{and} \quad \frac{\partial p_i}{\partial t_i} = \frac{\beta \chi}{4(1 - \beta)(1 - t \chi)}. \quad (A2)$$

Inserting (A2) into (A1), we obtain (6) for the symmetric SPNE.

Appendix C. The first-order derivative of G_j with respect to t_i gives

$$\frac{\partial G_j}{\partial t_i} = \chi t_j \left(q_j \frac{\partial p_j}{\partial t_i} + p_j \frac{\partial q_j}{\partial t_i} \right). \quad (A3)$$

In the symmetric countries, we have $\partial q_i / \partial t_i = -\partial q_j / \partial t_i$ and $\partial p_i / \partial t_i = -\partial p_j / \partial t_i$. Using these properties with (A3), we obtain (7).

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