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Taxing Multinational Enterprises: A Theory-Based Approach to Reform

Abstract

Almost 140 countries have agreed to reallocate the rights to tax international corporate profits and to introduce minimum tax rates. The agreed plan is the product of pragmatism and a search for consensus, but ambitious. It includes steps towards unitary taxation to be established by a multilateral convention that the world has not yet seen in comparable format. This paper argues for a reform that retains separate entity accounting and addresses the flaws in the current system of corporate taxation at their root rather than merely fixing symptoms. To this end, a reform aimed specifically at the rules governing the taxation of intangible assets is recommended.

JEL-Codes: H250, F230, M480.

Keywords: OECD/G20 BEPS Project, formula apportionment, separate entity accounting, Shapley assignment of taxing rights, residual profit allocation/splitting.

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1. Introduction

The origins of the current system of international corporate income taxation date back to the 1920s, when the League of Nations recognized the need to regulate the taxation of cross-border transactions in order to avoid the detrimental effects of double taxation. It is widely held that these now century-old regulations take insufficient account of today's increasing globalization and rapidly progressing digitalization, a view which prompted the G20 countries to invite other interested governments to join them in working out a two-pillar reform under the guidance of the OECD. In November 2021, 137 countries eventually agreed on a reallocation of the rights to tax international corporate profits (Pillar One) and the introduction of minimum tax rates (Pillar Two) (OECD, 2021). The plan is the product of pragmatism and a search for consensus, but ambitious. It is a plan, which still needs to be agreed upon in detail. It requires far-reaching system changes such as a move towards unitary profit taxation, better known as formula apportionment (FA). The formulary apportionment of profit earned by a multinational enterprise (MNE) assumes international agreement on common rules for the determination of taxable profit. This is a critical departure from the well-established tradition of separate entity accounting (SEA) and may still turn out to be a severe obstacle on the way to implementation.

This paper therefore puts forward for discussion an alternative reform that retains SEA, is firmly grounded in economic theory, and is essentially limited to a revision of the rules on the taxation and pricing of rights and services, which are non-rival in use.

Two cases of non-rival use are differentiated. The first concerns the remote supply of items such as automated digital services (ADS) with which profit is earned in an importing "market jurisdiction" without relying on physical nexus. This is the case for which Pillar One proposes a reassignment of taxing rights in favor of market jurisdictions. An alternative and appealing provision retaining SEA has recently been included in the United Nations Model Tax Convention (UN MTC). The Convention's new Article 12B assigns market jurisdictions the right to levy a withholding tax on outflowing payments for ADS. In the present paper, the withholding tax is interpreted as a profit split and recommended as a model for a more general reform termed 'residual profit splitting' (RPS) by the present author in a companion paper (Richter, 2022).

The second case of non-rival use is one where a simple move towards withholding taxation would not fix the problems that Pillar Two addresses. Commonly known as base erosion and profit shifting (BEPS), these drawbacks to the current system are closely related to the financing of investments and the internal pricing of intangible assets. A core element of the RPS proposal

is that intragroup payments for intangible assets are no longer recognized for tax purposes. Rather, the jurisdictions directly involved would be allowed to tax a company-independent share of the profit earned from the non-rival use of rights and services. Most notably, the formula used for apportioning taxable profit would not depend endogenously on costs or sales, as recommended by various prominent reform proposals and planned by the OECD for Pillar One.[1] The simple formula defining RPS is justified in Section 4 by reinterpreting the OECD's guideline on aligning profit taxation with value creation and by applying Shapley's solution concept from cooperative game theory (Shapley, 1953). It represents a theory-based generalization of the withholding tax solution of Article 12B UN MTC to cases where an MNE maintains a physical presence in a source country or intra-group supplies of goods and services entail allocable costs.

Such departures from more common reform ideas are derived from a thorough analysis of the deficiencies of the current system of corporate taxation. Constituent elements of the current system are (i) SEA, (ii) the requirement of physical nexus for the right of taxation, and (iii) payment-based taxation. This last means that tax obligations are tied to payments and not to such values as imputed costs, on which rational decision makers base their decisions. The clear advantage of payment-based taxation is that it confers legal certainty in assessment while the drawback is that it lends itself to the design of financial structures whose sole purpose is to save taxes. The insistence on physical nexus has both pros and cons, too. The advantages are related to the monitoring of tax liability: with a physical nexus, the tax authority can more easily enforce its claims. On the other hand, requiring physical nexus is increasingly considered producing inter-jurisdictionally unfair results, as the example of ADS illustrates. By contrast, SEA is an element of the current system, which has an indisputable advantage in a world of sovereign states. The need for consensus on common rules is minimized. Unitary taxation, by contrast, requires inter-jurisdictional agreement on detailed regulations, which, once established, are politically difficult to change. As the experience of the European Union demonstrates, there are always some countries, which benefit from the existing rules and oppose any reforms. Unitary taxation is a system that is doomed to fail in a world of sovereign states.

It is therefore surprising that the OECD plans to reform international corporate taxation by moving towards FA. In moving away from SEA, the OECD is calling into question the one element of the current tax system that least deserves to be abandoned. The apparent motive for this is to render unprofitable the profit shifting to which payment-based taxation is such an open

[1] For references to the literature, see section 6.

invitation. However, profit shifting is only the symptom that FA is supposed to cure. In contrast, RPS is designed to close the loophole for profit shifting that is opened by the payment-based taxation of intangibles.

The present article provides a theory-based derivation of RPS. Apart from own articles (Richter, 2021a and 2022), the relevant literature consists mainly of alternative reform proposals and will therefore be discussed in my conclusion, where, having been clearly laid out, the concept of RPS can be compared with the competing ideas for reform.

The paper is structured as follows. Section 2 identifies excludable knowhow as the driver of multinationalization in production. Section 3 answers the question of why and how MNEs should be taxed, with section 3.1 clarifying the advantage of taxing profit at the corporate level and section 3.2 arguing that digital taxes should be interpreted as effective taxes on profits. Section 4 elaborates the content of the OECD guideline to align profit taxation with value creation. While section 4.1 clarifies the concept of value creation, section 4.2 is devoted to Shapley's axiomatic theory and its application to the problem of assigning the right to tax MNEs. Section 4.3 then identifies the theoretical determinants of the splitting parameter before section 4.4 discusses the role of profit splitting in the current tax system. That the widely proposed switch from SEA to unitary taxation and FA is not compatible with the OECD guideline is pointed out in section 4.5. Section 5 develops the concept of RPS in detail. After section 5.1 has argued that only supernormal profits should be subject to profit splitting, section 5.2 illustrates the allocation of taxing rights under RPS by means of an example. Finally, section 5.3 discusses the practical problem of setting the splitting parameter and section 5.4 the presumed impact of RPS on corporate behavior and tax policy. The concluding section 6 compares RPS with the most prominent alternative proposals for reforming the international taxation of corporate profit.

2. The model of an MNE

The focus is on an MNE facing demand for its product, $X(P,Q)$, which depends not only on price P but also on quality Q. The cost, $C(X,Q)$, of producing quantity X is therefore dependent on quality, too. In the simplest conceivable case, the function is quasi-linear, $C = C(Q) + cX$. The marginal cost of quantity is constant, $MC_X = c$, and the marginal cost of quality, MC_Q, increasing. The case of zero marginal cost of quantity is not ruled out and, indeed, the case of $MC_X = 0$ is of particular relevance to the new economy. Here, Google Ads is an instructive example. The platform traffic from non-paying users determines the quality of the service and

the volume of advertisements placed the quantity. As with other automated digital services, the marginal cost of serving paying customers is so low that it can be ignored (Commission Expert Group, 2014). By contrast, the marginal cost of enhancing platform features suitable to increase the number of non-paying users will be positive.

The provision of quality is a matter of knowhow, which needs to be developed and can take the form of a computer program. The term $C(Q)$ captures the cost incurred by developing the knowhow needed to ensure quality Q. Knowhow is non-rival in use, meaning it can be reused without causing any additional cost and it becomes tradable if the right of use is excludable. Patents, trademarks, copyrights and so forth are legal means to enforce excludability. Tradable knowhow is also known as intellectual property and is an intangible asset. However, since there are intangible assets which are rival in use, such as the right to use a car or an airplane, tradable knowhow is more precisely defined as a *non-rival* intangible asset.[2]

Lack of rivalry in use is causing the primary difficulty encountered when pricing intangibles. In its ideal form, arm's length pricing requires the existence of perfect markets and price-taking behaviour. Under such conditions, prices can be assumed to reflect the marginal cost of supply. If the use of a right or a service is non-rival, the marginal cost of serving a marginal user is zero so that its perfect market price would have to be zero, too. However, the user value would clearly be positive. This inconsistency explains why ideal arm's length prices can at most be determined for goods and services whose marginal cost of supply is positive. Such positivity does not apply to broad areas of the digital economy.

The wish to reuse expensive knowhow can be considered one - if not the - key driver of multinationalization in production. As Dunning (1977, 1979 et al.) points out in his eclectic paradigm of international business, the lack of rivalry in use promises cost savings, which provides an "ownership advantage" over potential competitors in foreign markets. Although, as the OLI abbreviation used by Dunning makes clear, the ownership advantage must be joined by advantages of location and internalization to explain the emergence of MNEs, the conclusion can only be that the taxation of non-rival intangibles rather than capital should be the focus of any theory-based approach to the taxation of MNEs.

[2] Markusen (1995) speaks of 'knowledge-based assets', which is also prone to misunderstanding. A smartphone might equally well be considered knowledge-based, although very obviously tangible.

3. Why tax MNEs?

3.1 Why tax corporate profit?

To ask why and how MNEs should be taxed on their profit presupposes that good reasons can be found for taxing companies instead of individuals.[3] After all, one could argue that taxes are always borne by individuals, who should therefore be taxed directly and not indirectly via companies with their inhomogeneous shareholders. From this perspective, corporate taxation can only be justified by significant cost savings. These could, in principle, be of an administrative nature. If it is to be taxed, income from entrepreneurial activity must be determined, and the determination of taxable corporate income makes use of information that is only available in the company. This provides an argument in favor of taxing profit income at source. However, taxation at source conflicts with the wish to tax individuals in line with their ability to pay. According to the conventional view going back to Schanz, Haig and Simons, the ability-to-pay principle requires the taxation of consumption plus change in net worth, which can only be determined at the individual level taking into account all forms of domestic and foreign income. Taxation at source could therefore not be final. Full credit would have to be granted in the taxpayer's country of residence, which is not without own well-known problems. Therefore, the argument that corporate taxation saves administrative costs is far from conclusive.

Nor is the opposite idea convincing that only the taxation at the corporate level enables the effective taxation of entrepreneurial income in line with ability to pay. In principle, there might be concern that without an explicit tax at the corporate level, shareholders might prefer dividends to be retained by the company solely for the purpose of saving personal taxes. This concern, however, could be addressed by a tax on capital gains.

A third reason given for the taxation of companies at the corporate level is based on the benefit principle, according to which companies, like individuals, should contribute to the costs of public goods and services. However, to the extent that such goods are non-rival in use, the assessment of their utilization defies a reliable arm's length valuation.

A more convincing justification of corporate taxation is based on the production efficiency theorem (Diamond and Mirrlees, 1971), which suggests that, since the social cost of taxing economic rent is zero while that of distortionary taxes is positive, the latter should be imposed only after any rent income has already been taxed away. Thus, the wish to minimize the social

[3] For a detailed discussion of this issue, see Devereux et al. 2021, Chap. 2.

cost of taxation provides a normative rationale for taxing pure profit. Although corporate profit is not identical with pure profit, the social cost of taxing corporate profit tends to be small if only the tax rate is small.

In the international sphere, however, a positive-theoretic rationale is gaining in importance. As has been argued above, the wish to exploit knowhow drives multinationalization in production. Yet the development of knowhow causes fixed costs in the production of quantities sold which cannot be covered without exercising a certain market power. According to Brander and Spencer (1984), such circumstances are conducive to non-cooperative attacks by foreign countries. They are incentivized to tax imports, if these are priced above the marginal cost of supply and if the price elasticity of demand increases in quantity. This incentive is even strengthened if the import concerned is of digital services, where fixed costs are high and marginal costs close to zero. This is how Richter (2021b) explains the policy of a growing number of countries to introduce taxes on digital services.

3.2 Digital services taxes

Digital services taxes (DSTs) take a variety of forms. In the narrower sense, they are taxes on payments for a specific set of digital goods and services. However, they can also take the form of gross-based withholding taxes on revenues derived from digital businesses. A number of countries use diluted requirements for permanence and physical presence to establish nexus for net-basis taxation (Bunn et al., 2020) and so on. The term DST is used here for all such provisions designed to expand source taxation of online business activities.

If marginal costs of supply are zero, marginal revenues are marginal profit contributions. Because of this identity, DSTs can be classified as taxes on specific goods and services even though they are designed to extract rent income earned by companies exercising market power. This conceptual ambiguity allowed the European Commission (2018) to present its proposed DST as a tax levied on the “revenues” resulting from the supply of certain digital services while justifying the proposal with the concern that “profits” earned in the digital economy would not fairly be taxed.

In the relevant case, digital services are imported and revenues are generated through remote supply. Here, the physical nexus without which the source country is not entitled to tax profit under current law is missing. The lack of clarity on how to classify DSTs legally has encouraged their spread around the world, prompting G20 countries to take countermeasures. The OECD

was tasked with inviting other countries to jointly work out a consensual solution within the Inclusive Framework on BEPS. In November 2021, 137 countries eventually agreed on a two-pillar plan, the first of which proposed a reassignment of taxing rights in favour of market jurisdictions. The proposal is linked to the expectation that beneficiary states will forego any additional taxation of digital services (OECD, 2021).

The OECD and G20 countries had previously adopted a 15-point Action Plan with which they sought to address BEPS in the taxation of MNEs. Of the fifteen actions this contained, three were designed to "align transfer pricing outcomes with value creation" (OECD, 2015). However, the OECD failed to provide a definition of "value creation" (Olbert and Spengel, 2017), thus spurring a debate about whether the demand for digital services also creates value by making private information available. Since there was no agreement on a precise meaning, the concept of value creation was eventually "thrown overboard as a guiding light" (Schön, 2021). The following section will demonstrate that the concept of value creation can indeed serve as a 'guiding light' if only applied to jurisdictions instead of companies and consumers.

4. Aligning profit taxation with value creation

4.1 Value creation

According to the prevailing view, value is primarily created by business activity. This view may help to justify the taxation of corporations, but is not helpful for the allocation of taxing rights between jurisdictions (Schön, 2021). If, for example, an MNE that is resident in jurisdiction H holds a permanent establishment (PE) in a foreign jurisdiction S, it is clear that the PE is value creating but not which jurisdiction should be entitled to the right of taxation. For this, additional arguments are required. For instance, taking allocational efficiency as an objective would speak for implementing the residence principle and assigning the right to H. As is well known, taxation at source impedes allocational efficiency. By contrast, were the aim to minimize the administrative cost of tax assessment, this could be achieved by implementing the source principle and assigning the taxing right to S. Physical nexus makes it easier for a jurisdiction to collect tax-relevant information and monitor compliance with tax obligations.

If the objective is to allocate the right to tax corporate profit in line with value creation, it makes sense to assume that the relevant entities are the jurisdictions involved. They create value by establishing the legal framework necessary for generating taxable profit. In the international sphere, this relates in particular to the right to do business abroad. An MNE earns taxable profit abroad only if the jurisdictions involved cooperate on such legal issues as market access,

commercial law, the rules of taxation, and so forth. If this view of value creation through the legal cooperation of jurisdictions is accepted and if profit taxation is to be aligned with value creation, then taxing rights should ideally be allocated to these jurisdictions according to standards generally accepted as fair and equitable when dividing the gains from cooperation (Richter, 2021a). The "Shapley value" is a concept developed by game theory with the aim of equitably dividing the gains from cooperation between the cooperating partners. However, since the use of the term 'value' by game theorists differs from that of tax experts, we should perhaps rather speak of the Shapley 'solution' or the Shapley 'assignment of taxing rights' to avoid potential misunderstanding. Just as the "Shapley value" represents an equitable division of the gains from cooperation in game theory, so the Shapley solution promises an assignment of taxing rights which achieves inter-jurisdictional tax equity. The solution is uniquely determined by a set of four axioms which have the character of desiderata that could plausibly guide the search for agreement in international negotiations. However, this unique determination is far from self-evident, which is why it is also referred to as Shapley's theorem.[4]

4.2 Shapley's theorem

For Shapley's (1953) theorem to be applied to taxation, its game-theory terms must be substantiated with tax-theory contents. Thus, "players" are interpreted as jurisdictions and "games" to be "played" as MNEs to be taxed according to jointly agreed rules. The agreement on rules is the object of cooperation. The "characteristic function" of a particular game is set equal with the function obtained when mapping any particular subset of jurisdictions to the group profit the associated MNE would earn if its business activities were restricted to this subset. In what follows, this function is called the MNE's profit pattern. Profit is defined as the surplus of revenues over costs and thus as the quantity economic theory assumes to be maximized by a rational entrepreneur.

Plausibility suggests that the legal cooperation of two sets of jurisdictions promises an amount of profit, which weakly exceeds the sum of the profits obtained when the two sets do not cooperate. In game-theoretic terminology, this means that the profit pattern is super-additive. Cooperation promises additional profit and the question to be answered is how the right to tax the surplus is to be allocated to the cooperating jurisdictions. The unambiguous answer

[4] Sections 4.2 - 4.3 draw on Richter (2021a). See also this article for references to earlier applications of Shapley value theory to the transfer-pricing problem in MNEs. Hines (1990) deserves special mention, although he rejects the Shapley approach and develops his own solution.

suggested by Shapley's theorem is that each jurisdiction should be allocated the share of profit that it contributes on average when joining the cooperation of all jurisdictions in a randomly chosen sequence. Although the practical implementation of this solution is likely to pose intractable problems of information-acquisition, it has a far-reaching implication.

As the expansion of jurisdictional cooperation promises additional profit, it is clear that each individual jurisdiction J should be given the right to tax more profit than the profit earned when J stands alone. It is worth noting that this should hold irrespective of whether the MNE under consideration has physical nexus with J or not. The allocation of taxable profit is best illustrated by looking at a simple scenario with only two jurisdictions, Home (H) and a foreign market (M), and an MNE servicing both jurisdictions from H. The MNE has no physical nexus with M and the profit earned from M is nil if H and M do not cooperate. In sharp contrast with current tax rules, the Shapley assignment of taxing rights suggests that M should be granted the right to tax some share $s \in (0, \frac{1}{2}]$ of the additional profit earned when cooperation between H and M allows the MNE to expand business to M. The exact value of the splitting parameter s is case dependent. However, residence taxation ($s = 0$) and source taxation ($s = 1$) are ruled out. A system of taxation requiring s between zero and one is called profit splitting.

It should not go unmentioned that the Shapley solution is not the only concept developed by game theorists to justify a particular division of the surplus generated by cooperation. Of these alternatives, the Nash bargaining solution is the best-known. The splitting parameter s may change if another solution concept is applied. However, residence and source taxation are not supported. Following Richter (2021a), the Shapley solution is applied here, because its axiomatics can be interpreted particularly well in terms of the OECD guideline to align profit taxation with value creation.

Shapley's axiomatics consists of four individual axioms,[5] two of which can be perfectly interpreted in line with the OECD guideline. Thus, one requires that a jurisdiction should only be assigned the right to tax a particular MNE if this MNE is able to increase profit by expanding business to that jurisdiction. One might rightly speak of *no taxation without value creation*. The other axiom requires *additivity* in the assignment of taxing rights. It is best explained by an example in which an MNE based in H acquires a company based in S. Before the acquisition, both firms only earn profit in their home jurisdictions. The acquisition is assumed not to change the incidence of profit contributions and, from the MNE's perspective, additional profit is therefore solely attributable to S. Aligning profit taxation with value creation suggests that the

[5] The game-theoretic terms are, in the order of discussion: null player, additivity, efficiency, and anonymity.

MNE's increase in profit be taxed in S only, an outcome ensured by additivity. The remaining two axioms are not directly related to the OCED guideline, but speak for themselves and do not require any special justification. One states that there should be *no double taxation* and that no profit should remain untaxed (*no white income*). In other words, the jurisdictional tax bases should add up to the (group) profit the MNE earns worldwide. The final axiom requires that the rules by which taxable profit is allocated treat jurisdictions non-discriminatorily (*no discrimination*).

In summary, the axiomatics of Shapley can be interpreted particularly well in terms of the OECD guideline to align profit taxation with value creation. The conclusion to be drawn from the application of Shapley's theorem is that profit splitting should be considered the only fair assignment of taxing rights, to the exclusion of source and residence taxation. Before addressing reasons for qualifying this conclusion, the determinants of the splitting parameter will be reviewed in more detail.

4.3 The determinants of the splitting parameter

The Shapley assignment of taxing rights does not require that a source country S be generally allowed to tax exactly fifty percent of the profit a foreign-based MNE earns in S. There are two major reasons why the share s may well be smaller than fifty percent. The first is that profit in H is affected by the expansion of business activity to S. Technically speaking, the profit pattern might not be additively separable because of an externality which business activity in S exerts on the profitability in other jurisdictions. For example, the amount of resources that an MNE regards as optimal to spend on research and development (R&D) in its home jurisdiction H might increase when S is to be served additionally. In this case, Shapley's theorem would imply that S should ideally tax a share s of the profit earned in S, which is positive but less than fifty percent. The gap to one half, $\frac{1}{2}-s$, would reflect the strength of the externality which business activity in S exerts on the profitability in H.

The second reason for the splitting parameter s to be smaller than fifty percent assumes that positive profit can be earned in S only if more jurisdictions than one cooperate with S. Thus, supply-relevant knowhow might consist of several pieces that are all essential and excludable inputs to serving S and developed independently by affiliates hosted in n independent jurisdictions $H_1, .., H_n$. In this case, the Shapley solution suggests that S is allowed to tax not more than a share $\frac{1}{n+1}$ of the profit the MNE in question earns in S. Intuitively speaking, the

reason is that n home jurisdictions plus one source jurisdiction S – i.e., $n + 1$ jurisdictions in total – must cooperate if positive profit is to be earned in S.

In summary, Shapley's theorem suggests that the taxable profit earned in a source jurisdiction S should be allocated to those jurisdictions whose cooperation is essential for generating this profit. Cooperation must encompass the source jurisdiction S and all jurisdictions hosting affiliated companies that develop knowhow which is essential for serving demand in S. The ideal splitting parameter s may vary with the profit pattern of the MNE under consideration. However, s is positive and does not exceed a certain case-dependent percentage.

4.4 Profit splitting in the current system of taxation

If inter-jurisdictional tax equity seems to require profit splitting, it is reasonable to ask why it does not play a major role in the current system of international profit taxation. As things stand, the OECD accepts profit splitting only as a method of transfer pricing in controlled transactions between firms when each one makes a "unique and valuable contribution" (OECD, 2018). It is only recently that governments have agreed to examine profit splitting as one of competing proposals designed to address the tax challenges arising from digitalization (OECD, 2019). Notwithstanding this recent development, it remains puzzling why profit splitting does not play a more established role in the current tax system.

It might be argued that the current system aims at maximizing global production efficiency rather than inter-jurisdictional tax equity and that the achievement of this goal speaks against profit splitting and for residence taxation. However, this argument fails to convince. Firstly, it would require the applicability of the production efficiency theorem, which assumes that no taxpayer is left earning pure profit. Obviously, it is difficult to consider this assumption as empirically satisfied. Second, the significant role played by source taxation in the current system of taxation speaks against efficiency being a guiding policy objective.

Alternatively, one could object that the argument in favor of profit splitting is based on the assumption that inter-jurisdictional tax equity is to be achieved at the firm level. However, costs of administration and the harm to global production efficiency would be prohibitive. This concern finds particular support when considering the taxation of profit from international trade. In the current system, profit earned on exports is only taxable in the exporting jurisdiction. However, this regulation can only look like a violation of inter-jurisdictional tax equity if imports are ignored. In fact, tax base gains from exports and losses from imports should be seen

together. After all, trade has to be balanced in the long run and one may doubt that the gains of inter-jurisdictional tax equity achieved by profit splitting are worth the costs incurred by increases of administration and global production inefficiency. Conversely, one could conclude that profit splitting is only justifiable to the extent that trade is unable to ensure inter-jurisdictional tax equity. This insight is behind the proposal of *residual* profit splitting (RPS) discussed in section 5.

4.5 Formula apportionment

One of the prominent alternatives to the Shapley assignment of taxing rights is FA. It came to the fore with the European Commission's (2011) proposal to replace SEA with unitary taxation for European MNEs and allocate group profit to jurisdictions based on costs and sales. However, regardless of whether costs or sales are chosen as endogenous factors of apportionment, FA conflicts with the goal of bringing profit taxation in line with value creation. To show this for sales, it is useful to introduce some further notation.

Let R_J, C_J denote revenues and costs in jurisdiction J and $\Pi \equiv \sum_J (R_J - C_J)$ group profit. B_J is the tax base allocated to J. For the sake of simplicity, let there be only two jurisdictions, $J = H, S$. The focus is on an MNE, which is able to increase sales to R_H while keeping R_S and costs constant. In this case, a sales-based apportionment has the effect of increasing the tax base allocated to S, because

$$B_S \equiv \frac{R_S}{R_H + R_S}\Pi = R_S\left(1 - \frac{C_H + C_S}{R_H + R_S}\right) \text{ is increasing in } R_H.$$

This fails to align profit taxation with value creation because marginal value is exclusively created in H and yet the tax base of S increases.

A similar objection can be made to cost-based FA, in which case the tax base allocated to S is given by

$$B_S \equiv \frac{C_S}{C_H + C_S}\Pi = C_S\left(\frac{R_H + R_S}{C_H + C_S} - 1\right).$$

If C_H decreases while C_S and revenues remain constant, B_S increases. As before, this cannot be reconciled with the objective of aligning profit taxation with value creation. Marginal value is exclusively created in H and yet the tax base of S increases.

5. Residual profit splitting

By reference to Shapley's theorem, I have argued above that, if interpreted as a guideline for the achievement of inter-jurisdictional tax equity, the objective of aligning profit taxation with value creation requires profit splitting. It was also pointed out that administrative costs would be disproportionately high and global production efficiency would suffer unduly if inter-jurisdictional tax equity were sought for each individual MNE. In wide areas, trade is able to ensure inter-jurisdictional tax equity even when such equity is violated at the firm level. As exports have to be matched by imports, the taxation of profits from exports does not necessarily have to be subject to splitting. Inter-jurisdictional tax equity is harmed at most when trade is qualitatively unbalanced in the long run as is the case when goods and services imported by a country promise unusually high profits, while the goods and services it exports do not. This is precisely the allegation traditionally levelled at industrialized countries by their developing counterparts and it finds topical nourishment in the ill-balanced trade in ADS. There is no doubt that the digital economy is characterized by economies of scale and scope. In addition, spill-over effects in R&D bring about regional concentration (Paunov et al., 2019). The emergence of regionally concentrated natural monopolies might even foster growth from which the whole world benefits. However, balanced trade in digital services would be neither competitively sustainable nor production efficient and therefore cannot and should not be expected. The world will thus have to live with an ill-balanced distribution of supernormal profits earned from digitalization. Indeed, this was the expectation behind the OECD plan to restrict the scope of Pillar One to MNEs with an extraordinary high profitability, and it also suggests that profit splitting should be limited to such cases.[6]

5.1 Allocating taxing rights

Supernormal profits are earned when firms exercise market power over the supply of goods and services. Natural resources and excludable knowhow are both typical sources of such profits, but the OECD (2021) plan provides for different treatment. The call for re-assigning taxing rights is primarily aimed at profits from knowledge-based business, whereas extractives are

[6] In its Statement on a Two-Pillar Solution of November 2021, the OECD/G20 Inclusive Framework on BEPS provides that MNEs are "in scope" when their global turnover is above 20 bn. euros and profitability above 10% (i.e. profit before tax/revenue) (OECD, 2021). Beer et al. (2020) find residual profits to be substantial, but concentrated in a relatively few MNEs headquartered in a small number of countries.

explicitly excluded from scope under Pillar One. [7] There is no need to challenge this differential treatment. After all, it can be argued that natural resources such as gas and oil are commonly already subject to effective profit splitting, with profits from extraction taxed in source countries, and consumption taxed additionally and specifically in importing countries, even where there is already a broad-based consumption tax. It therefore makes much sense to restrict the call for profit splitting to the taxation of supernormal profits earned from knowhow. In a system of RPS taxing rights would be allocated as follows.

One would start with the conventional determination of a firm's profit by SEA with one notable change. Payments made between affiliated companies for the non-rival use of excludable rights and services would no longer be recognized for tax purposes. The residual part of profit is what remains after deducting any accounting profit resulting from differences between arm's length prices and payments for those inputs, which are rival in use. The logic of this approach should be clear. The determination of ideal arm's length prices assumes that the marginal cost of supply is positive. However, positivity can only be expected to hold if the good is rival in use. If it is non-rival, as is typically the case with knowhow, its marginal cost price is zero. It is then appropriate not to recognize payments so made and instead to apply profit splitting.[8]

Economic rationality suggests assigning the right to tax the accounting profit earned on the supply of rival goods to the jurisdiction incurring the opportunity cost. This is much in line with current practice. Land is taxed at source, labor is taxed in the supplier's country of residence, and interest paid on debt is taxed in the lender's country of residence. A major discrepancy exists only in the case of equity. Under current law, the return on equity is taxed where business is carried out and not necessarily where the supplier of capital is resident. The differential assignment of taxing rights over income from debt and equity is a well-known source of tax-saving schemes for investment financing. The criticism of this is old, so a reference to the literature will suffice (Boadway and Bruce, 1984; and a.o., de Mooij and Devereux, 2011).[9]

The determination of transfer prices would ideally follow the same logic. If goods and services are traded on perfect markets, observed prices can be used; if not, prices need to be assessed. Ideal transfer prices would only provide compensation for the imputed costs of those inputs which are rival in use. If the transferred goods and services fetch higher prices when resold to

[7] Cui and Hashimzade (2019) elaborate on the parallel between DSTs and royalties on rent income earned from extracting natural resources.
[8] This does not preclude royalties from being paid and recognized under commercial law.
[9] The European Commission (2022) sees the need to overcome the different taxation of debt and equity and has therefore recently proposed to the EU member states to introduce a debt-equity bias reduction allowance (DEBRA). The challenge in recognizing the cost of equity for tax purposes is rooted in the difficulty of pricing differences of risk.

third parties in the importing jurisdiction, the difference would have to be interpreted as return on knowhow, which adds to profit and would be subject to splitting when exceeding an agreed threshold.

5.2 An example

Consider the example of an MNE developing knowhow in jurisdiction H, producing goods and services in a S-based subsidiary, and selling them in H, S, and the market jurisdiction M at an equal price. Total revenues are 3,000 units of which one half is earned in H, one third in S, and one sixth in M. Expenses are incurred by production (1,500 units) and the development of knowhow (R&D; 600 units). Production also entails costs of land, which, however, is owned by the subsidiary in S, so that there is no expense. The imputed cost of land is 300 units. All costs of quantity are allocable and rival. For the purpose of taxation, they are allocated to the jurisdictions in proportion to sales. By contrast, the cost of developing knowhow remains allocated to H where the expense is born. The example is such that the affiliate in H breaks even if profit is assessed according to SEA. H benefits from the development of knowhow by sharing in the residual profits earned in S and M. Residual profit is split by assuming a splitting parameter of $s = 40\%$. The affiliate in S earns an accounting profit of 300 units from the use of land. The implications are shown in Table 1. Taxable profits are 360 units in H, 460 units in S, and 80 units in M.

Table 1: Accounting, residual, and taxable profit

	Affiliate in			Total
	H	S	M	
Revenues	1,500	1,000	500	3,000
Expenses				
- production of quantity		1,500		1,500
- R&D	600			600
Imputed cost of land used in production and owned by affiliate in S		300		300
Allocable rival costs of quantity				
- external procurement	750	500	250	1,500
- internal, imputed cost of land	150	100	50	300

Gross income	600	700	200	1,500
Non-allocable costs of knowhow	600			600
Profit (SEA)	0	700	200	900
Accounting profit		300		300
Residual profit	0	400	200	600
Taxable profit if $s = 40\%$	360	460	80	900

5.3 Setting the splitting parameter

When setting the splitting parameter, it is necessary to distinguish between theory and practice. In theoretical terms, Shapley's theorem assigns to each jurisdiction the right to tax the share of profit that it contributes on average when joining the cooperation of all jurisdictions in a randomly chosen sequence. If strictly applied, this means that the share of taxable profit differs from company to company, making the splitting parameter company-dependent. Here, it is important to understand the determinants of potential company dependency, from which we can exclude three factors. The first is costs, which do not provide any determining information as they lack any firm connection with profit. Secondly, whether an MNE maintains physical nexus or not should be considered irrelevant. Finally, the spatial incidence of revenues is only relevant if they can be equated with profit contributions - which would require the marginal variable costs of supply to be negligible. The sole remaining determinant of company dependency is thus the profit contribution that can be earned through cross-border business expansion.

Any *relative* weighting of costs and revenues, as known from FA, would imply that all jurisdictions are treated equally in the allocation of taxable profit. This is incompatible with the Shapley approach, which, on the contrary, suggests that jurisdictions in which knowhow is developed should receive preferential treatment. More precisely, if an MNE develops all knowhow in jurisdiction H, the profit earned in H should not be subject to profit splitting. Things would be different if essential knowhow was developed in different jurisdictions. Still, such home jurisdictions should receive preferential treatment, since they bear the cost of developing knowhow and positive profit can only be earned if they cooperate. Market jurisdictions are in a weaker position, since they contribute profit but their cooperation is not needed for generating profit in home jurisdictions.

In practice, it would suffice to grant a market jurisdiction M the legal right to tax a limited share of the profit an MNE earns in M. The exact share, the splitting parameter, can and should be left to negotiations between the jurisdictions directly involved. A company-independent splitting parameter would have great advantages in practice. At most, one might consider making the splitting parameter dependent on whether essential knowhow has been developed in one or more home jurisdictions.

5.4 The impact of RPS on corporate behavior and tax policy

The RPS system has been justified by normative-theoretical reasoning. What has not been taken into account so far are possible behavioral effects that the introduction may cause, both on the part of the taxpaying MNEs and on the part of the tax rate-setting jurisdictions. These effects deserve brief discussion.

The most important corporate decision that is likely to be changed by the RPS system concerns the choice between exploiting knowhow in an affiliate and selling the right of use to an unaffiliated company in return for a market-determined fee. Since the sale to an unaffiliated company means that the MNE loses Dunning's internalization advantage, the tax savings would have to be large if internal use were to be replaced by marketed use. Under the ideal RPS system, however, large tax savings are less likely than under the current tax system. The explanation is as follows.

Large tax savings are only conceivable if the source jurisdiction S sets a profit tax rate that is significantly lower than that of the home jurisdiction H. However, in the RPS system the incentive to undercut H's tax rate is limited to the attraction of companies that wish to locate and to set up. Unlike in the current system, the incentive to undercut disappears in those cases where an existing MNE merely wants to expand business into S. After all, residual profit is supernormal profit that S will want to tax as high as possible (Richter, 2021b). This incentive is curbed only to the extent that S's tax reduces the MNE's incentive to develop the knowhow of which the residual profit is the return (Richter, 2022). Thus, S has to solve a trade-off when choosing its profit tax rate, which is why one can expect more convergence of tax rates in the RPS system than in the current one. If tax rates differ little internationally, an MNE will prefer to exploit own knowhow internally instead of selling the right of use to an unaffiliated company. The internalization advantage makes internal use appear more profitable.

The RPS system does not change the taxation of land, labor, and debt. If the introduction of RPS were used to equalize the taxation of equity and debt, this would obviously have an impact on financing decisions. In this case, however, the effects are politically intended and cannot be attributed to RPS as such. In sum, the allocational effects of the RPS system are likely to be more positive than negative compared to the current one.

6. Comparison with competing reform proposals and conclusions

RPS should be seen as an alternative to the OECD reform plan that allows the restructuring of international taxing rights (Pillar One) to be combined with the containment of BEPS (Pillar Two). RPS does so because the proposed splitting of taxable residual profits prevents MNEs from exploiting their current leeway in pricing non-rival intangibles with the intention of saving taxes. As estimated by Grubert (2003), income derived from R&D-based intangibles accounts for about half of the income shifted from high-tax to low-tax countries (see also Karkinsky and Riedel, 2012; Bilicka et al., 2022). The differential taxation of debt and equity is another source of BEPS activity. This loophole, too, would be closed if the introduction of the RPS system were combined with the equalization of taxing equity and debt. However, the risk-adequate determination of the cost of equity is a particular challenge in practice and it is not imperative to link the restructuring of taxation rights for intangible assets with those for capital.

In comparison with the OECD reform plan, RPS has some noteworthy advantages. RPS retains SEA whereas the OECD plan requires moves towards unitary taxation implemented through a multilateral convention. A unitary tax system may well be the right solution for a federal state, which has a joint government that can establish the system and change it as needed. However, nothing comparable exists in the international sphere. Policymakers should take seriously the difficulty of handling a system of unitary taxation in a world with nearly two hundred sovereign states all seeking their own advantage. The system requires a level of willingness to cooperate that is unrealistic. The path the OECD is taking with Pillar One is also problematic for other reasons. Pillar One assumes sales-based FA of an MNE's total profit, which, as shown, does not really meet the objective of aligning profit taxation with value creation. Furthermore, it has unclear efficiency effects (Richter, 2022).

The same criticisms apply to a number of other prominent reform proposals, all of which build on unitary taxation and FA. The European Commission's proposal of 2011 to introduce the Common Consolidated Corporate Tax Base (CCCTB) in the EU has achieved the greatest

prominence.[10] The proposal was relatively open with regard to various details and has also been amended slightly over the years to assuage its critics. However, the core of the proposal has remained the move from SEA to unitary taxation and the allocation of an MNE's total profit according to a formula based on costs and/or sales. The proposal to use only sales for apportioning profit was made by Avi-Yonah et al. (2009) before being adopted by the OECD's Pillar One. Devereux et al. (2021, Chap. 6) have recently proposed using an income-based formula where income means residual gross income defined as third-party revenues less allocable costs.

It is worth noting that Avi-Yonah et al. and Devereux et al. combine their proposals with a recommendation to restrict FA to the apportionment of residual profit. Their proposals thus belong to a family of schemes called residual profit allocation (RPA), which propose to divide an MNE's total profit into routine and residual parts and to tax MNEs by allocating routine profits to the jurisdictions in which routine functions and activities take place and only dividing residual profit across jurisdictions on some formulaic basis.[11]

The idea of separating routine/normal and residual/supernormal profit is shared by RPA and RPS. Still, there are important differences, not only in the formulae used for apportioning residual profit, but also in the determination of the two parts of profit. The proposals subsumed under RPA are payment-related tax systems, while RPS seeks to overcome the drawbacks of such systems. Differences in the determination of normal profit make this clear. Avi-Yonah et al. and Devereux et al. determine routine profit by common transfer pricing techniques, e.g. as a markup on (certain) expenses. In contrast, RPS equates normal profit with accounting profit determined as the difference between imputed costs and payments for the inputs that are rival in use. The difference in the determination reflects different goals. RPA stands for an attempt to improve the current tax system in a pragmatic way with changes suggested by plausibility considerations. In contrast, RPS results from the attempt to identify the ideal system behind the current tax system. The attempt is motivated by the (academic) view that tax reforms should be guided by a normative-theoretical ideal and that this ideal should be known and accepted before propagating deviations justified by practical necessities. Assuming that RPS can be regarded as the ideal underlying the current tax system, further research will need to clarify what deviations

[10] The promotion of the CCCTB dates back to 2001, when the European Commission stressed the need to provide "multinational companies with a consolidated corporate tax base for their EU-wide activities" (European Commission, 2001, p. 15). An early analysis of the advantages and deficiencies of FA was provided by J. Mintz and J.M. Weiner (2003). A recent analysis of the worldwide introduction of FA is provided in de Mooij et al. (2021).

[11] Devereux et al. (2021, p. 191) define routine profit as what "a third party would expect to earn for performing a particular set of functions and activities on an outsourcing basis".

should be tolerated in practice when trading off cost savings in tax assessment against losses in inter-jurisdictional tax equity and global production efficiency. Clarification would also be needed on whether regulated financial services should be included in the RPS system. Those services are excluded from scope under Pillar One.

Compromises will certainly be necessary in all those cases where RPS ideally requires the determination of imputed costs as in the case of equity capital and entrepreneurial labor. However, compromises will also be necessary when it comes to identifying group entities that develop knowhow, which can be considered an essential and excludable input for the MNE's international expansion of business. The jurisdictions in which such knowhow is developed have been called home jurisdictions in Section 4. A home jurisdiction H would have to pass the test that the MNE in question would not be able to serve markets if a group entity hosted in H had not developed specific rights and services, which are non-rival in use.[12] Hence, the focus would have to be on the production and development of non-rival intangibles, which are essential for serving markets. RPS allocates an equal share of the MNE's residual profit to all home jurisdictions. A non-home jurisdiction S is allocated a smaller share of that profit that is contributed by the expansion of the MNE's business into S (Richter, 2021a).

RPS stands for a theory-based tax reform and as such can be compared with the proposal made by Auerbach and Devereux (2018) to replace the current corporate tax system by a destination-based cash flow tax (DBCFT). However, RPS and the DBCFT serve different goals. While RPS aims at inter-jurisdictional tax equity, the DBCFT has been designed to sustain global production efficiency. Taxing rights are exclusively assigned to the destination country. The DBCFT is allocationally equivalent to a destination-based value-added tax (VAT) coupled with a wage subsidy of equal rate. In this sense, it is closer to VAT than to the current system of international corporate taxation. In short, the DBCFT is not a model that stands out as a solution to the current reform debate with its focus on inter-jurisdictional tax equity.

This article aims to show that RPS has the potential to serve as a serious option in the reform debate. The proposed system limits the application of the arm's length principle to the pricing of those goods and services for which perfect market conditions are conceivable because of rivalry in their use. In contrast, profit earned on rights and services whose use is non-rival is split and allocated to the jurisdictions involved. The splitting parameter should best be fixed company-independently as part of negotiations on double tax treaties. Such a tax system can be

[12] The test is the analogue to the OECD's DEMPE rule. The OECD has developed the DEMPE concept to provide guidance for pricing functions performed, assets used, and risks assumed by the entities of an MNE group in the development, enhancement, maintenance, protection, and exploitation of intangibles.

interpreted as a theory-based generalization of the withholding tax solution of Article 12B UN MTC to cases where an MNE maintains a physical presence in the source country or intra-group supplies of goods and services entail allocable costs. Unlike the OECD's 2-Pillars reform, RPS adheres to SEA and seeks to combat BEPS by reforming the taxation of intangibles.

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