

# Formulary Apportionment in Theory and Practice

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## INTRODUCTION

The current international tax system, which is based on separate accounting for corporate affiliates trading at arm's length prices, is increasingly viewed as prone to abuse, as noted in Chapters 5 and 6. Multinational enterprises have become adept at manipulating the rules of the current system to shift profits from high-tax to low-tax (or no-tax) jurisdictions. Several recent studies of worldwide revenue losses due to profit shifting suggest that short-term losses range from 5 to 10 percent of total corporate income tax revenues (Cobham and Janský 2018; Crivelli, De Mooij, and Keen 2016; OECD 2015; Tørsløv, Wier, and Zucman 2018; UNCTAD 2015).<sup>1</sup> On average, revenue losses in OECD countries are found to be about twice as high as those in developing countries; however, revenue losses as a share of GDP are about one-third higher for developing countries (Crivelli, De Mooij, and Keen 2016).

In addition to being porous, the prevailing corporate tax system is also extremely complex. Each country's law sets corporate income tax rates as well as bases, which may be eroded by tax incentives provided via legislation or ministerial discretion. These laws are further overlaid by a network of bilateral tax treaties, which alter the tax treatment of investment depending on the particular source and residence countries involved. This makes administration and enforcement of the corporate income tax costly, especially for developing country governments. Corporate compliance costs also increase with complexity, although sophisticated multinationals are often able to turn complexity to their advantage by practices such as treaty shopping and the use of hybrid entities.

One fundamental reform proposal is to replace the current system of separate accounting by formulary apportionment.<sup>2</sup> In contrast to separate accounting,

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<sup>1</sup> Crivelli, De Mooij, and Keen (2016) further estimate long-term losses from profit shifting to be as much as 25 percent of corporate income tax revenues.

<sup>2</sup> This has been proposed by some experts and civil society organizations. See, for example, Avi-Yonah and Clausing (2007); ICRICT (2018); OECD (2019b); and Picciotto (2016).

formulary apportionment would consolidate corporate profits at the regional or global level and then allocate them among jurisdictions according to a formula, leaving the decision on the tax rate to individual jurisdictions. Typically, the allocation formula is some combination of real resources used (employment, payroll, or fixed assets) and sales (usually destination-based sales). This method has been used successfully by federal states including Canada, Germany, Japan, and the United States to allocate corporate income tax revenues among subnational governments. The current EU initiative for adoption of the Common Consolidated Corporate Tax Base (CCCTB) would constitute the first application of formulary apportionment at a supranational level.

This chapter considers a range of questions, including the following:

- Would formulary apportionment in fact be simpler than the current system? This depends on the trade-off between eliminating the complexity inherent in the current international tax system, notably in the need to determine transfer prices, and new complexities that may be created (regarding, for example, decisions as to what entities or activities are to be consolidated; separation of activities subject to different sectoral regimes, such as finance or extractive industries; and, in a regional system, determination of income within the so-called water's edge).
- How would formulary apportionment affect the distribution of tax revenues? This depends on the system's design and notably the factors of apportionment: Some countries are more likely to gain from factors mimicking source, such as capital and employment, while others would benefit from destination-based factors, notably destination-based sales.
- How would formulary apportionment affect economic efficiency? This again depends on the factors of apportionment. If productive factors such as assets and employment are used, formulary apportionment would retain the incentive to locate such factors in low-tax jurisdictions, perpetuating tax competition. Apportionment on the basis of destination-based sales would avoid these distortive pressures (see Chapter 13).
- Is formulary apportionment politically feasible? This depends not only on who loses and gains from such a reform, but also on international trust and the willingness to cooperate, including among low-income and high-income economies in the case of global adoption.

The remainder of this chapter explores these questions in greater depth, drawing inferences from recent studies as well as historical experience. The next section considers the various design options for a formulary apportionment system and how they affect corporate and government incentives. The chapter then looks at how formulary apportionment has performed in practice at the subnational level (in the United States, Canada, and China), and its prospects for implementation in the European Union. The following section discusses economic sectors, in particular finance and the extractive industry, that require special treatment under formulary apportionment due to their specific features. Finally, the chapter discusses residual profit allocation and then concludes.

## THEORETICAL AND PRACTICAL DESIGN ISSUES

### Design Considerations

Implementation of formulary apportionment requires several important design considerations that affect potential efficiency and equity gains relative to separate accounting. In particular, the definition of the consolidated tax base and the allocation formula used to apportion consolidated profits are key features determining the impact of any formulary apportionment system.

#### *Defining the Consolidated Tax Base*

The first step in the design of formulary apportionment is determination of the tax base (that is, taxable profits), which should be commonly defined across participating jurisdictions. This includes determining depreciation allowances, deductible expenses, and deductibility limits implemented as anti-avoidance measures. More substantially, participating jurisdictions need to decide whether to consolidate taxable income at the corporate group level or on a business activity basis.

One option consists of a corporate group's total earnings, where the group is defined according to some choice of ownership threshold. Consolidating a group's total earnings likely implies a reduction in administrative and compliance costs relative to a more granular approach: most jurisdictions already have a working definition of an affiliated group that relates multiple corporations through some threshold of common ownership, such as share of equity ownership or voting rights. Moreover, publicly listed firms are already required to prepare consolidated financial accounts for majority-owned affiliates. Therefore, a consolidated tax base at the corporate group level would be relatively straightforward to define and implement in domestic law, given the current legal and regulatory background. However, consolidation based on ownership structure can introduce incentives for increased vertical integration for tax purposes (for example, if the combined structure offsets intragroup losses, as described in the next section). Furthermore, differences in production functions, business models, and risk exposure across industries imply that consolidation of income for tax purposes could distort the allocation of resources and impair tax burden neutrality across sectors, as the same regulation could favor one sector over another.

Another option is consolidation on an activity-by-activity, business, or product-line basis. This may be easier to align with the current international tax architecture. Double tax treaties allow countries to tax nonresidents, on either a gross or net basis, if they are sufficiently economically connected with the country or if there is taxable income whose source is in the taxing country. Under the current system of bilateral tax treaties, taxation on a gross basis is usually imposed by withholding taxation on payments that are considered to have a domestic source, such as interest or service payments. Taxation on a net basis, on the other hand, requires the identification of a permanent establishment. The digitalization of the economy has raised significant challenges with respect to both approaches, and new proxies for what constitutes sufficient economic presence are actively

being discussed (see Chapter 10). Significant ties of a nonresident to a country are easier to establish for a nonresident establishment providing intermediate inputs to the production of a good or service that is sold domestically than for another nonresident arm of the same corporate group that is not directly involved in the production of the domestically sold good. Consolidation of a group's income along business lines is thus likely simpler to align with the current international tax framework, as it would align tax bases more closely with the activities performed within a given jurisdiction. However, many functions within multinational enterprises, such as support and service activities, serve multiple business lines, complicating the delineation of a unitary business (see Picciotto 2017).

Finally, consolidation of a group's income can either be restricted to the participating jurisdictions (often referred to as "water's edge") or done on a worldwide basis. For instance, the EU Common Consolidated Corporate Tax Base proposal foresees a formulary apportionment system that applies only to income generated within the European Union, while traditional transfer pricing methods and the network of double tax treaties would continue to determine the allocation of profits between the European Union and third countries. Conversely, by eliminating the ambiguity over geographical reach, global income consolidation should be less affected by profit shifting. However, if not all countries participate or apply the same apportionment formula, global consolidation could easily lead to double taxation (or nontaxation), in which case multiple uncoordinated formulary apportionment and separate accounting systems might be applied to the same base by different countries.

### *Distribution Mechanism*

Formulary apportionment allocates the consolidated tax base of a multinational using proxy weights for economic activity. Historically, countries with subnational formulary apportionment systems have relied on a combination of (proxies for) production factors—such as payroll, headcount employment, or tangible assets—and on third-party sales. Similarly, the European Union's Common Consolidated Corporate Tax Base proposal suggests using three equally weighted factors: fixed assets, sales by destination, and labor (comprising an equal weighting of payroll and employees).

The use of production factors as an allocation base reflects the idea of taxing the underlying factors that generate profits. The market value of a firm's tangible assets is sometimes not readily available, but corporate accounting generally tracks acquisition costs, depreciation expenses, and depreciated book valuations for both financial and income tax purposes. As a consequence, the value of tangible assets is straightforward to compute. It is, however, subject to some manipulation, particularly in accounting systems that give some leeway on depreciation amounts. Payroll usually involves third-party transactions, increasing this factor's robustness to manipulation. In contrast, headcount employment is independent of wage levels but may be easier to manipulate for tax reporting purposes, since nominal positions can be created without significant associated labor costs.

Third-party sales, an increasingly prevalent factor in policy choice, can be measured either on an origin basis (where the seller resides) or on a destination basis (where the purchaser resides). Using sales by destination as an apportionment factor has the advantage that consumers are relatively immobile, so the tax base should be fairly inelastic with respect to such a factor. However, profit taxation based on the destination of the final consumers requires adjustments to the nexus definition in existing tax treaties.

For certain lines of business, the inclusion of industry-specific factors in the allocation formula may be justified. For example, as elaborated later in the chapter, natural resource assets could be used as a key allocation factor for the extractives sector. This would likely benefit commodity-exporting developing countries in particular. Although intangible assets are an important production input for several industries, such as pharmaceuticals and information technology, their manipulability (due to ease of “relocation” and current lack of accounting measurability in the case of self-developed intellectual property) has thus far excluded intangible assets from consideration as an apportionment factor. Nonetheless, to the extent that the value of intangible assets is derived from employment (research and development workers) or tangible investments (such as laboratories), they are arguably at least partially captured by those other factors.

### Efficiency Implications

Moving from separate accounting to formulary apportionment would change the nature of tax avoidance and the potential for real factor distortions and thus impact the efficiency of the global tax system. Moreover, by eliminating the need to document and verify group-internal price setting, formulary apportionment would reduce administrative and compliance costs substantially. However, other administrative and compliance costs under formulary apportionment would depend on the specifics of the system and are hard to quantify.

### Factor Distortions

Production efficiency requires that the marginal pretax return of production factors be equalized across sectors and jurisdictions. Taxes generally drive a wedge between pre- and posttax returns, thus distorting this optimal allocation and leading to production inefficiencies. Under formulary apportionment, the corporate income tax effectively becomes a tax levied on the factors of the formula (McLure 1981). Hence, tax rate differences between countries may distort the allocation of mobile factors as multinationals relocate workers and physical assets to low-tax jurisdictions that are otherwise not the most productive. In addition, definition of the tax base on a consolidated corporate group basis may compromise tax neutrality across sectors of economic activity, where the group’s activities span structurally different industries that are asymmetrically affected by the unitary tax formula.

Several studies try to quantify the distortive impact on real factors of production, with most, but not all, showing nontrivial misallocation. For instance, some studies using US state data from the 1980s and 1990s find that employment and investment are sensitive to the use of payroll and asset weights, respectively, in the state-level allocation formula (Goolsbee and Maydew 2000; Gupta and Hofmann 2003). Riedel (2010) likewise finds a very elastic response of the payroll-to-capital ratio of German affiliates in response to tax rate differentials under Germany's local business tax, which uses payroll as a single apportionment factor. In contrast, Clausing (2016b) examines the effects of US tax rates on employment, investment, and sales, depending on state-level formula weights, and finds that these variables have not been particularly sensitive to tax rates, suggesting that distortions might in fact be modest.

### *Tax Avoidance*

Tax avoidance can reduce the distortive effects of tax systems on the allocation of real productive factors, for example under the current system. However, spending time and resources unproductively to avoid taxes increases the deadweight loss of the tax system, in addition to direct tax revenue erosion. Under separate accounting, multinationals use tax planning techniques to shift reported taxable income between entities in the group in order to minimize their overall corporate income tax liability. By contrast, when taxing multinationals on a consolidated basis for formulary apportionment, the arm's length principle and the availability—or absence—of comparable prices are immaterial to the determination of taxable profits. Formulary apportionment thus eliminates tax avoidance through the manipulation of intragroup payments or through the abuse of a country's double tax treaty network (at least if income is consolidated globally). However, this does not mean that profit shifting will disappear altogether.

Under formulary apportionment, related and unrelated companies are treated differently for tax purposes, engendering arbitrage or avoidance in organizational form and ownership. Combining two independent firms would generally change their combined tax liability under formulary apportionment, while such a group would be treated the same under separate accounting if transfer prices were set at arm's length. Gordon and Wilson (1986) show that companies have an incentive to spread excess returns to low-tax jurisdictions under formulary apportionment by merging with companies in low-tax states. Hines (2010) also finds that even a distortion-minimizing formula can create large incentives for inefficient ownership reallocation due to the variation in profitability that is unexplained by formulary factors. Nielsen, Raimondos, and Schjelderup (2003) posit that such incentives might be especially large under conditions of imperfect competition.

Tax avoidance opportunities also depend on the apportionment formula and the simplicity of manipulating apportionment factors. For example, Eichfelder, Hechtner, and Hundsdorfer (2017) study the German context of local business taxes that use payroll as a single apportionment factor. The authors conclude that payroll expenses are driven by both reallocation of real labor and tax-planning strategies that affect the payroll expense at the establishment level without implying

changes in the production process or the allocation of input factors. In addition, while the location of final consumers is inelastic and hence a theoretically appealing factor for apportioning profits, the recorded location of third-party sales is open to abuse. If, for example, origin-based sales are used as a factor, corporate groups may have an incentive to establish sales subsidiaries in low-tax jurisdictions and serve the markets in high-tax countries through independent distributors. Thus, if destination-based sales were used, multinationals would have an incentive to sell to independent distributors located in low-tax jurisdictions.

Moreover, if formulary apportionment were restricted to the water's edge of participating jurisdictions, all currently available profit-shifting strategies would remain for transactions with affiliates outside the water's edge.

Despite these potential distortions, formulary apportionment is generally thought to be less vulnerable to manipulation than separate accounting. This was stressed, for example, by Musgrave (1973) and is confirmed by Mintz and Smart (2004), where firms are taxed either by formulary apportionment or separate accounting, depending on their ownership structure across provinces. The latter find that the elasticity of taxable income for firms subject to separate accounting is more than double that for firms under formulary apportionment.

## Revenue Implications

Formulary apportionment would impact both the aggregate level of global corporate income tax revenues and their distribution, with modest but mostly positive effects for emerging market economies. Directly, global revenues would decrease due to intragroup loss consolidation and increase due to a redistribution of the tax base from low-tax to high-tax countries. In the long run, revenues would also change indirectly due to evolving tax competition incentives among governments.

In addition, IMF (2019) indicates that the global distribution of taxable income is highly sensitive to apportionment factors. For example, a heavy weight on headcount employment would tilt the taxable income base in favor of developing countries, which have a relatively large concentration of workers; but these countries would lose from a system based on payroll, due to their relatively lower wages. In turn, advanced economies are more likely to gain revenue if apportionment is by value added, payroll, or sales.

### *Direct Revenue Implications*

Corporate income tax systems typically allow companies the opportunity to carry forward losses, offsetting future profits with current losses incurred. Under separate accounting, this opportunity to offset losses applies separately to each subsidiary or, if there is domestic group taxation, to the group of subsidiaries within the borders of a country. Under formulary apportionment, however, the global consolidation of entity-level earnings would imply an immediate loss offset for all globally profitable multinationals, leading to a reduction in their overall tax base. Fuest, Hemmelgarn, and Ramb (2007) assess the base effect of loss consolidation

in the European Union using data for German multinationals and find a reduction in the EU-wide corporate income tax base of more than 20 percent. Using a larger set of unconsolidated firm-level data from ORBIS, Cobham and Loretz (2014) report a potential revenue loss of about 10 percent under global formulary apportionment due to similar drivers. Computable general equilibrium simulations for Europe by Bettendorf and others (2010), however, find a smaller reduction in the tax base from loss consolidation of close to 7.5 percent in the long term, that is, once the stock of losses carried forward from past years has stabilized.

The second effect on corporate income tax revenue is due to the reallocation of the tax base among countries. In particular, as the base is shifted from low-tax to high-tax countries, the previously described narrowing of the tax base is largely offset, boosting aggregate tax revenue. For the European Union, Devereux and Loretz (2008) find that this reallocation effect would more than offset the effect of loss consolidation and that EU-wide tax revenues would therefore rise by 2 percent under regional water's edge formulary apportionment. For global formulary apportionment, Cobham and Loretz (2014) also report a net increase in total potential tax revenue in the order of between 2 and 4 percent.

Inter-nation equity goals concerning the allocation of taxable income across jurisdictions (Musgrave and Musgrave 1972) are also affected by apportionment factors, but by and large formulary apportionment is estimated to distribute potential tax revenues more uniformly across jurisdictions than the existing system does. Using various data sets and allocation factors, De Mooij, Liu, and Prihardini (2019) confirm that the distributional consequences of global formulary apportionment on potential revenue are highly sensitive to the system design choices and data used. Notwithstanding, investment hubs are consistently estimated to experience large revenue losses of up to 80 percent of multinational enterprise tax payments. In contrast, many large economies are estimated to benefit from higher revenues. Developing countries gain mostly if employment receives a large weight in the formula, yet also tend to benefit on average from formulae based on sales by destination, as shown in Figure 14.1.<sup>3</sup>

### *Indirect Revenue Implications*

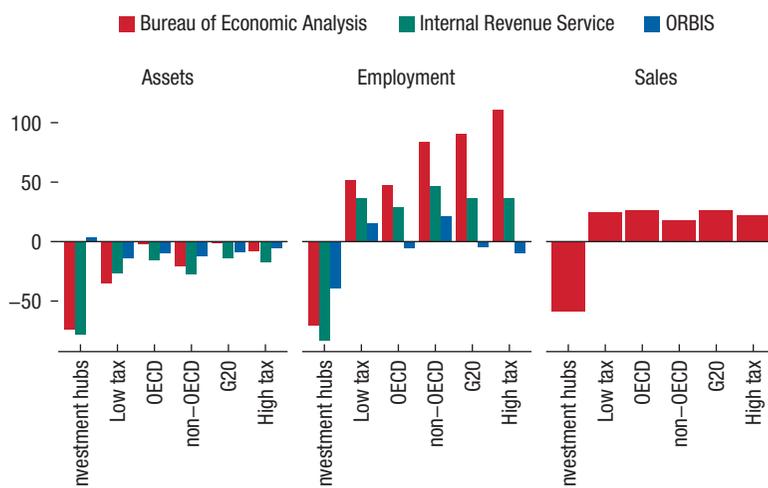
Under the current separate accounting framework, governments have an incentive to attract investment by reducing corporate taxation. Tax competition is seen as the major driver behind the decline in corporate tax rates worldwide over the past decades. Under formulary apportionment, tax competition does not disappear, as countries can continue to compete with their tax rates to attract whatever factors are given high weight in the formula. The incentive may be even stronger

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<sup>3</sup> Figure 14.1 shows the median impact per region. Due to the large aggregate impact of the United States, the median impact for other countries is highly dependent on what happens in the United States, which is markedly different between the asset and employment share. For another analysis, see also Cobham, Faccio, and Fitzgerald (2019).

### Figure 14.1. Revenue Effect from Implementing Formulary Apportionment for Different Allocation Factors

(Percent of corporate income tax revenue)



Source: De Mooij, Liu, and Prihardini (2019).

than under separate accounting, since the revenue gain from attracting such factors is not merely from a marginal increase in some local tax base, but from the greater share of the group's overall profit that is brought into tax (Nielsen and others 2010). This effect on tax competition, however, will depend on the choice of apportionment factors and their weights.

Namely, under a formulary system built on relatively immobile factors, such as destination-based sales, the pressure for a race to the bottom on rates might soften, and the trend could even reverse. Empirically, Pethig and Wagener (2007) find that tax competition under formulary apportionment results in lower equilibrium tax rates if the formulary share of a particular factor is more elastic. Thus, tax competition is most intense when apportionment is based on assets, followed by payroll and then sales, which are the least elastic. More promisingly, Eichner and Runkel (2008) show that formulary apportionment with a sales factor may mitigate or even eliminate fiscal externalities associated with tax competition. Calibrating the model for the European Union, they show that formulary apportionment with a sales-only formula raises average steady-state corporate income tax rates by 2 percentage points and generates positive welfare effects. Some studies have also explored tax competition through the choice of formula factors, which applies only if jurisdictions are granted full fiscal autonomy with respect to formula design—as is the case in the United States. US states have increasingly converged toward a greater weight of the sales factor. Anand and Sansing (2000) find that states with a current account deficit generally have incentives to increase

the sales factor, whereas states with a current account surplus tend to increase input factors. (This aligns well with the discussion about the revenue implication of destination-based corporate income taxes in Chapter 13).

Lastly, sharing a common tax base across countries could produce novel fiscal externalities. Deductible expenses, such as social security contributions or non-corporate income tax state-specific taxes, could translate into *de facto* cross-subsidization if they continued to be deductible from a cross-country consolidated income base before apportionment (Schreiber 2008). Under international formulary apportionment, concerns have surfaced over the moral hazard associated with governments increasing taxes on relatively immobile domestic bases (such as payroll), provided those taxes are deductible from the consolidated international corporate tax base. In doing so, they would capture the full marginal increase in state-specific taxes, while sharing the reduction of corporate income tax revenue with other countries in the consolidated tax base. In general equilibrium, however, this would be constrained by the fact that as firms will not keep investing in countries where profitability is lower due to higher payroll costs.

## SUBNATIONAL AND SUPRANATIONAL EXPERIENCES

A number of countries, including the United States, Canada, and China, use formulary apportionment to tax the income of multijurisdictional enterprises at the subnational level. This section summarizes the experiences in these countries, focusing on the prospective benefits and costs of introducing formulary apportionment at a supranational level. It then discusses the main features of the European Commission's Common Consolidated Corporate Tax Base, which introduces an apportionment formula for distributing the consolidated corporate tax base among EU member states.

### The United States

The United States has used formulary apportionment to distribute multistate companies' taxable income among its states since the early twentieth century. In determining state-level tax liabilities, states first need to determine whether they have the authority to tax a business, that is, whether a company has economic nexus in a state. Loosely speaking, if a firm has physical presence in the state—specifically, property or employees—then the state has the power to tax it.<sup>4</sup> If a firm does not have physical presence in the state, and its activities are limited to “mere solicitation of orders,” then it does not have nexus in the state. Many states use “throwback” rules that attribute taxable income back to the source state if a company has no nexus in the state where its goods are sold.

However, the nexus rule has also been evolving, in particularly with regard to the sales tax. On June 21, 2018, the US Supreme Court ruled granted South

<sup>4</sup> The term “nexus” is thus closely linked to the concept of a permanent establishment.

Dakota authority to impose sales tax on sales into South Dakota of companies with no physical presence in the state (*South Dakota v. Wayfair*). Since the ruling, several states have responded by implementing legislation to adopt economic nexus provisions requiring remote sellers to collect and remit sales tax without having a physical presence in the state.<sup>5</sup> Expanding the nexus rules to cover international transactions by remote sellers without a permanent establishment could be the next step. For new international formulary apportionment proposals, some of which consider taxing residual profits in “market countries”—that is, countries where final sales are located—nexus can be defined more broadly from the start to include the presence of (nontrivial) sales.

In the early days of formulary apportionment, virtually all US states apportioned taxable income on the basis of the Massachusetts three-factor formula, which gives equal weight to property, payroll, and destination-based sales within a state. Over the past twenty years, however, many states have reduced the weights of property and payroll factors. As of 2017, only six of the 47 states that tax corporate income<sup>6</sup> use the traditional evenly weighted three-factor formula. Fifteen states use double- or triple-weighted sales formulae, in which a company’s in-state sales are at least twice as important as each of the other factors. Some 23 states and the District of Columbia use a single sales factor formula (that is, a 100 percent weight on destination-based sales).

Evidence from empirical research suggests that local investment and employment tend to increase following reduction in the weight on the property and payroll factors (Goolsbee and Maydew 2000; Gupta and Mills 2002; Weiner 1994). Under a pure single-sales factor, the only variable that matters in apportioning income to the state (assuming that the firm has nexus) is the share of within-state sales. The effective tax rate on property and payroll is thus zero, regardless of the level of the statutory corporate income tax rate.

Other aspects of state policies also vary substantially. Most states use federal taxable income as the baseline, making subsequent adjustments to determine the state tax base. Some 26 states require combined reporting by multistate firms, including profits of all US subsidiaries regardless of their location. Some states offer options among formula types or reporting requirements, and as noted, many states also have throwback rules. Further, states have frequently changed tax rates, although on average these rates have been fairly stable over time, declining from 7.2 percent in 1986 to 6 percent in 2017 (Clausing 2016a).

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<sup>5</sup> Hawaii, Kentucky, and Vermont, for example, have adopted South Dakota style economic nexus laws that went into effect on July 1, 2018. Each state’s threshold is \$100,000 or 200 individual sales in any preceding 12-month period (Vermont) or in current or previous calendar year (Kentucky and Hawaii). Several other 18 states already have economic nexus rules similar to South Dakota, each with different statutory start dates and sales/transactions requirement that trigger nexus.

<sup>6</sup> Nevada, South Dakota, and Wyoming do not tax corporate income. Ohio and Texas use a gross receipts tax instead of corporate income tax.

## Canada

As in the United States, Canadian provinces typically use the federal tax base, while each province imposes its own tax rate. The federal government, by entering tax collection agreements with 8 of 10 provinces, plays a strong role in the legislation and administration of the common tax base. The two non-acceding provinces (Quebec and Alberta) have independent corporate income taxes, but they coordinate closely with the federal government and rely largely on federal audit and enforcement. Tax rates range from 7 percent in Quebec to 16 percent in New Brunswick, Newfoundland, Manitoba, and Saskatchewan.

Canadian formulary apportionment applies to corporations that have permanent establishments in more than one province on the basis of a formula that equally weights payroll and destination-based sales.<sup>7</sup> However, as Canada does not allow group consolidation, formulary apportionment is in effect elective for taxpayers, as it only applies to those operating by permanent establishment (branches or other unincorporated entities) in different provinces. Companies operating through separate affiliates can shift tax losses and profits across provinces, often through leasing, financing, and transfer pricing. These tax avoidance behaviors increase the elasticity of taxable income and reduce the sensitivity of investment decisions based on differences in tax rates. Indeed, Mintz and Smart (2004) show that the reported taxable income of single-province subsidiaries is twice as responsive to provincial tax rates (with an estimated elasticity of 4.6) as that of large firms that are subject to formulary apportionment (with an estimated elasticity of 2.3). The findings thus suggest that tax avoidance is likely to be larger under separate accounting than formulary apportionment in Canada.

The federal equalization program, a system of transfers designed to reduce fiscal disparities across provinces, plays a key role in limiting provincial tax competition. The equalization formula is based on each province's revenue-raising capacity (using commonly defined tax bases at national average tax rates) compared to a representative standard. Increases in own-source tax revenue reduce equalization grants almost dollar for dollar (Smart and Vaillancourt 2019). Currently, seven provinces receive equalization payments.<sup>8</sup>

Canada's equalization system essentially removes incentives for provinces to engage in horizontal and vertical tax competition (since revenues are shared with the federal government). While federal corporate income tax rates in Canada have significantly declined, provincial rates have been relatively stable. As shown in Smart (2007), tax rates are typically higher in grant-receiving provinces, where they would be 38 percent lower if grants were abolished. Provinces respond to expansions of equalization transfers by increasing their own corporate tax rates.

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<sup>7</sup> Special types of formulary apportionment are used for insurance companies, banks, lending companies, railways, crop companies, freight transportation, shipping, and pipelines (Weiner 2005).

<sup>8</sup> These include Manitoba, New Brunswick, Newfoundland, Nova Scotia, Prince Edward Island, Quebec, and Saskatchewan. These seven provinces have a combined population of approximately 12 million, or 39 percent of the national population.

## China

Though its use of formulary apportionment is less well known, China also applies it to companies that have permanent establishments, including branches or other unincorporated entities, in more than one region.<sup>9</sup> Similar to the system in Canada, formulary apportionment only applies to those operating by permanent establishment but not by separately incorporated entities in different regions.

The apportionment formula has two tiers. First, the headquarters is responsible for 50 percent of total corporate income tax. Second, all other unincorporated businesses are liable for the remaining 50 percent. The liability for each establishment is determined by a three-factor formula that includes origin-based sales, payroll, and total assets, with respective weights of 35, 35, and 30 percent. Effectively, the formulary apportionment in China uses a mix of source and residence principles, with equal weights for the residence and source locations.

## European Union

The European Commission introduced its supranational formulary apportionment proposal, the Common Consolidated Corporate Tax Base, in 2011 and relaunched it in 2016. The Common Consolidated Corporate Tax Base is a water's edge system that applies only to the EU-source income of multinationals operating in more than one EU state. It is mandatory for multinationals with global sales of at least EUR 750 million and optional below this threshold. Where optional, the Common Consolidated Corporate Tax Base system applies on an all-in-or-all-out basis: in other words, a company belonging to a covered group cannot individually opt for the Common Consolidated Corporate Tax Base, but only jointly with all other members of the corporate group. Further, intergroup shareholding must exceed 50 percent, and more than 75 percent of the capital must be owned by the parent.

Under the current proposal, each multinational enterprise calculates its consolidated taxable profits under the rules for a common tax base, with losses of one affiliate automatically offsetting profits of others in the same group. The principal taxpayer of the group—generally the regional headquarters—consolidates all individual tax bases in a single return to the tax authority of the regional headquarters' country. A formulary apportionment system is then used to distribute the tax base among the member states in which the group is active. The Common Consolidated Corporate Tax Base formula consists of three equally weighted factors of assets, labor, and destination-based sales. The labor factor is a 50-50 weighting of payroll and employees to compensate for labor productivity and wage differentials across the European Union. Member states are free to set their own tax rates. There are sector-specific formulae for several industries: For financial institutions and insurance companies, financial assets and sales are included

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<sup>9</sup> With exceptions for 15 large state-owned enterprises, whose revenue goes entirely to the central government. Formulary apportionment is also not applicable for the transportation sector in China.

in the common tax base. For the oil and gas industry, sales are attributed to the jurisdiction of extraction or production. There are also specific provisions for shipping, inland waterways transport, and air transport.

The consideration of adopting the Common Consolidated Corporate Tax Base has been progressing very slowly since its relaunch, highlighting the political challenges in reforming the corporate tax regime in the European Union, which requires unanimity among members. An EU-wide Common Consolidated Corporate Tax Base also implies that corporate groups in Europe would have to deal with different income tax systems within and outside the EU single market. Nevertheless, the recent OECD (2019a) report on the digital economy could accelerate work on the Common Consolidated Corporate Tax Base and formulary apportionment in general. The OECD's Inclusive Framework has launched a new initiative to explore changes to the international tax system, with the aim of reaching consensus by mid-2021. One of the pillars under consideration would allocate at least some part of the residual profits of multinationals by means of a formula, that includes a sales factor (see Chapter 10).

## SECTOR-SPECIFIC FORMULAE

For both technical and political reasons, any introduction of formulary apportionment on a global or regional basis would likely require special provisions to reflect the inherent characteristics of certain industries. This section examines some of the specific characteristics in the financial sector and extractive industry that highlight the design issues in allocation factors warranting special consideration.<sup>10</sup>

### Financial Sector

Two distinct features of the financial sector call for special consideration in the choice of apportionment factors. First, compared to other capital-intensive sectors, fixed assets comprise only a small fraction of the total assets of financial companies, as most of their assets consist of loans, deposits and other financial obligations. For example, fixed assets typically account for one-third of total assets among the world's largest 10,000 nonfinancial, nonutility multinationals, but less than 5 percent of total assets among the top 500 financial companies. Thus, fixed assets are likely to be a weak indicator of the overall economic activities of financial companies.

Moreover, sales conducted by financial companies are of a different nature than those of other companies, whose activities typically involve exchange of goods and services for money. For financial companies, only some receipts come in the form of explicit fees for service, which is a straightforward sale. Instead,

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<sup>10</sup> Special apportionment formulae also apply to other sectors, including construction contractors, transportation, television and radio broadcasting, and publishing.

much financial intermediation is compensated by a financial margin such as an interest markup or bid-ask spread.

Given these considerations, the formula applied to the financial sector is generally different. Canada uses an allocation formula based on both payroll (one-third) and loans and deposits (two-thirds, as a proxy for sales). In the United States, the sales factor for financial companies is replaced by a gross receipts factor. In the European Common Consolidated Corporate Tax Base proposal, 10 percent of the value of financial assets is added to the asset factor.

## Extractive Industries

Extractive industries, such as mining and petroleum, have distinct features that set them apart from other sectors of the economy—most saliently, immobile and exhaustible natural resource assets that can generate substantial rents (Daniel, Keen, and McPherson 2010). Applying the standard allocation formulae with (an often heavy) destination-based sales weighting would thus omit the principal factor involved in their value generation. It would also fail to address international equity concerns, whereby low-income source countries would receive little of the extractive industry revenue, since projects typically generate scant local employment and the bulk of production is sold abroad. Moreover, extractive industry projects tend to inflict considerable environmental damage while depleting a nonrenewable local resource. All these concerns suggest that a destination-based sales factor would not be appropriate for the extractive industries (see also Chapter 13).

The experience of formulary apportionment applied to extractive industries at the subnational level illustrates various design options:

- In the United States, several states have special formulary apportionment provisions for the sector, but only Alaska explicitly includes natural resources in the allocation formula. Alaska allocates income for petroleum and pipeline companies on the basis of sales and tariffs, property, and an extraction factor consisting of total production of barrels of oil plus one sixth of thousand cubic feet of natural gas.
- In Canada, although some sectors benefit from special formula rules, extractive industries are subject to the general formula based on payroll and destination-based sales. This reduces revenue for resource-rich provinces, where the capital-intensive extractive industry sector generates comparatively few jobs (Siu and others 2017). Nevertheless, some of the distortions are leveled off through the federal capacity equalization grants system.
- Under the Common Consolidated Corporate Tax Base, the petroleum sector (but not the mining sector) has a sector-specific formula, according to which sales are attributed to the jurisdiction of extraction and production and not to the jurisdiction of consumption.

For a broader regional implementation, many complexities need to be addressed, including clarification of the definition of extractive industry activities

subject to the tax, composition of extractive industry income, interaction with other domestic taxes and levies, and the formula for apportionment.

- *Definition of extractive industry activities:* International accounting and disclosure requirements for the sector—such as those laid out in the US Dodd–Frank Act,<sup>11</sup> in the EU Accounting and Transparency Directive,<sup>12</sup> and in the Extractive Industries Transparency Initiative—point to a broad definition in which extractive industries include all upstream activities within the mining or petroleum value chain (that is, exploration and extraction activities), but generally exclude downstream activities (such as processing). If formulary apportionment were to reflect the inherent characteristics of the industry and its underlying economic activities, the industry definition should arguably include entities from both upstream and downstream activities (Phionesso 2015). Such consolidation has the additional advantage of removing incentives for transfer pricing between upstream and downstream operations; however, it is likely distortionary as upstream activities have very different risk profiles compared to the downstream.
- *Extractive industry income subject to taxation:* In defining the base at an international level, a critical element will be the treatment of other domestic extractive industry taxes, which in many countries yield more revenue than the corporate income tax in this sector. These include bonuses (upfront payments on the acquisition of mineral exploitation rights), royalties (production-based taxes), additional profit taxes, resource rent taxes, and “profit oil or gas” in production-sharing contracts. The host government may also have an equity stake in resource projects, either paid or unpaid. The consolidation approach would have to account for the interaction between such payments and corporate income taxation (IMF 2012). In particular, it will be important to specify whether royalties and rent taxes are deductible from the unitary tax base, and whether project-specific economic rents are determined before or after netting out corporate income tax liabilities. The existing literature does not discuss such interactions but acknowledges that formulary apportionment could considerably improve project-level tax accounting through improved top-down reporting (Siu and others 2017).
- *Apportionment formula:* The literature is split on the design of the apportionment formula, and the US and Canadian experiences indicate that it is

<sup>11</sup> The Dodd–Frank Act, Section 1504, Rule 13(q), mandated that the Securities and Exchange Commission issue a rule requiring issuers engaged in the “commercial development of oil, gas, or minerals, or the license for any such activity” disclose annually the amount of expenses by type, project, and government. The scope of the Dodd–Frank Act excludes marketing, transportation, refining or smelting activities, and logging activities (US Securities and Exchange Commission 2012).

<sup>12</sup> The EU Accounting and Transparency Directive, Article 41, defines extractive industry activities as undertakings involving “exploration, prospection, discovery, development, and extraction of minerals, oil, natural gas deposits or other materials within the economic activities.”

possible to operate both with and without incorporating a sector-specific weight. Phionesso (2015) argues that the traditional formula of equally weighted sales, assets, and labor factors provides a reasonable apportionment that removes the need for a sector-specific formula (except perhaps for an adjustment in the labor factor to strike a balance between remuneration and headcount employment, as under the Common Consolidated Corporate Tax Base). However, for developing countries to strengthen their source taxation, the asset factor could be replaced or supplemented by an extraction factor tied to the production level. Siu and others (2017) argue in favor of using source-based factors for extractive industries to satisfy source entitlement concerns, such as special extraction factors (following the Alaskan formula) or origin-based sales factors (following the Common Consolidated Corporate Tax Base proposal).

## RESIDUAL PROFIT ALLOCATION<sup>13</sup>

### What Is Residual Profit Allocation?

Residual profit allocation has been widely discussed in recent proposals as a potential solution to the tax challenges arising from the digitalization of the economy, and more fundamentally as a future alternative to the current international tax regime (IMF 2019). As a hybrid system that combines elements of formulary apportionment and separate accounting under the arm's length principle, residual profit allocation takes the entire profit of a multinational corporate group and divides it into routine and residual components on a unitary basis.

- Routine profit refers to an acceptable return to some activity or function—broadly equivalent to a normal return (that is, the minimum after-tax return required by shareholders). As the name suggests, in transfer pricing analysis routine profit is usually assumed to be the return on routine activities, such as assembling a product's subcomponents or providing warehousing services.<sup>14</sup> Calculation of routine profit is in practice context specific, the general aim being to identify the return earned by an entity undertaking that activity on an outsourced basis.
- Residual profit refers to the difference between aggregate profit and routine profit, which may be negative. If routine profit can be identified with a normal return on investment, residual profit can be identified with economic rent. It will include that part of profit that—due to intangibles or risk bearing, for instance—is hardest to allocate across jurisdictions by standard transfer pricing methods.

<sup>13</sup> This section draws heavily on IMF (2019) and Beer and others (2020).

<sup>14</sup> Auerbach, Devereux, Keen, Oosterhuis, Schön and Vella (2019) argue that the two coincide when, as in the simplest capital asset pricing models without taxation, the required return on an investment is the same for all firms undertaking it.

In most proposals under discussion, routine profits are typically allocated where the associated costs (purchases from third parties) are incurred, while residual profits are generally allocated on a formulaic basis. Countries may then choose to tax these two types of income allocated to their jurisdictions at different rates. The OECD's Inclusive Framework proposes using variants of residual profit allocation to tax digital consumer-facing companies, or more generally, the return to selected intangibles. A common feature of these schemes is that they envisage taxing rights being established in the destination country, even in the absence of a traditional permanent establishment. Examples of such proposals include the following:

- Avi-Yonah, Clausing, and Durst (2009) propose calculating routine profit by applying an agreed markup on third-party costs and apportioning residual profit on the basis of destination-based sales.
- Auerbach, Devereux, Keen, Oosterhuis, Schön and Vella (2019) propose allocating residual profit in proportion to destination-based sales less third-party costs that can be attributed to sales in particular markets.<sup>15</sup>

Other proposals seek to distinguish among different types of residual profit or to address the income tax challenges introduced by the digital economy:

- The United States has proposed allocating part of residual profit attributable to “marketing intangibles”<sup>16</sup>—trademarks, brand recognition, and the like—to the market country with which they are associated.<sup>17</sup>
- A proposal put forth in the United Kingdom envisages allocating residual profit in part by some indicator of the value created by user participation, such as revenue or the number of active users (HM Treasury 2018).

The implementation issues raised by these proposals differ, but they share the fundamental principle of extending taxing rights to destination or ‘user’ countries. The UK proposal, for instance, raises the practical issue of how to quantify user value and leaves open the allocation of other sources of residual profit. Schemes that allocate in part by destination face the possibility, as under standard formulary apportionment, of avoidance by multinationals selling final products to third-party distributors in low-tax jurisdictions. Schemes that operate on a product or product line basis can add their own complexities and opportunities for manipulation by strategic choice of product groupings.

A common feature of destination-based apportionment schemes is that they envisage taxing rights being established even in the absence of a traditional permanent establishment. This is a fundamental shift of principle that is likely to

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<sup>15</sup> The merit of this approach, relative to fully sales-based allocation, is that it allocates less residual profit to jurisdictions that are demonstrably costlier to serve. This scheme also has the feature—which may make it more familiar to practitioners—that the final allocation can be reached not only by apportionment but by intuitive hypothetical transfer pricing adjustments.

<sup>16</sup> As opposed in particular to product or trade intangibles reflecting, for example, research and development and product design.

<sup>17</sup> See, for example, reported comments made by US Treasury officials at the 31st Annual Institute on Current Issues in International Taxation, held December 13–14, 2018, in Washington, DC.

require amendment of existing tax treaties—either to create a “virtual permanent establishment” as discussed earlier, or to establish a generalized right to tax in the destination country. Essentially the same issues as for formulary apportionment arise in the sharing of residual profit.

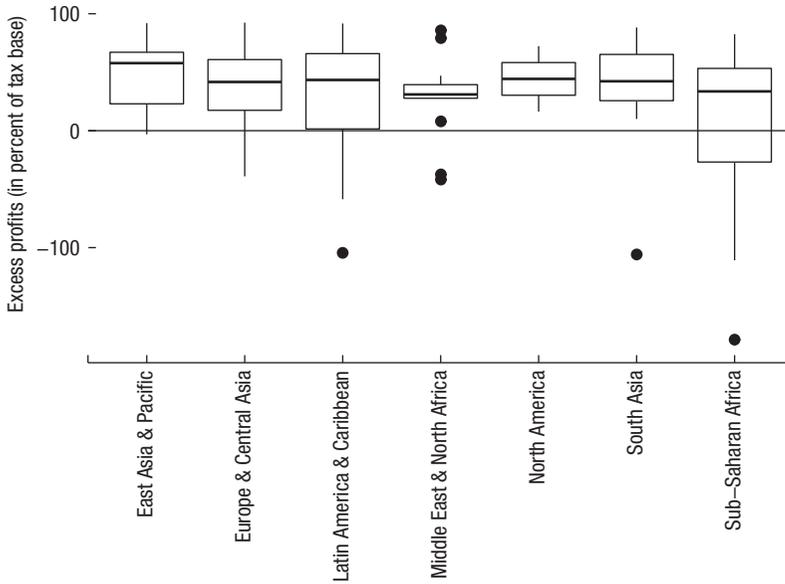
The interest in residual profit allocation signals a recognition that although the arm’s length principle has proved capable of dealing with relatively straightforward operations, it is not capable of addressing the full complexities of transactions within modern multinational enterprises. While preserving a significant element of source taxation, the residual profit allocation approach thus provides a framework within which progress might be made while retaining familiar elements of current arrangements. The taxation of normal returns retains a distortion inherent in most current corporate income taxes and creates an incentive for countries to attract mobile routine activities. Incentives to compete for residual profit depend on an apportionment formula: using formulary apportionment to allocate residual profits means that the same forces potentially encouraging tax competition between governments (and game playing by firms) identified earlier remain. They are lessened, however, if apportionment is by destination-based sales.

### **What Is the Potential Revenue Impact of Residual Profit Allocation?**

There is little analysis of the revenue implications of residual profit allocation. Avi-Yonah and others (2009) and Auerbach and others (2019) describe how their proposals would work, how they can be implemented, and what the benefits are of such reforms, but not their revenue implications. Conjecturally, the revenue impact of residual profit allocation would be proportional to the size of the residual profit, as only the allocation of that share of income would be modified—the routine return would continue to be taxed according to the current system. If so, then the economic implications (for example, on investment, profit shifting, and tax competition) would also be proportionally adjusted. However, there can be profound nonlinearities in the system that can create disproportional effects. For example, profit shifting might currently be disproportionately associated with residual profit allocation, rather than with routine profits. Residual profit allocation would then, like formulary apportionment, virtually eliminate profit shifting.

The impact of residual profit allocation will depend critically on two aspects: (1) how routine profit is determined, and (2) how residual profit is subsequently apportioned across countries. On the first, some initial empirical analysis is reported in Beer, de Mooij, Hebous, Keen, and Liu (2020), based on consolidated income statements of the 10,000 largest global companies. The analysis shows, for instance, that for a routine return on tangible assets of 7.5 percent, the average residual profit of a multinational enterprise would be about 60 percent of total income. Assuming this routine rate of return, between 20 and 30 percent of the multinationals would report a negative residual. This may be an artifact of assumptions underlying the calculations, but it highlights the practical issue of how to apportion residual losses. There would also be significant variation across sectors and countries. Most global residual profits are earned by US-based

**Figure 14.2. Excess of Current Corporate Income Tax Bases over Routine Return**



Source: IMF staff calculations.

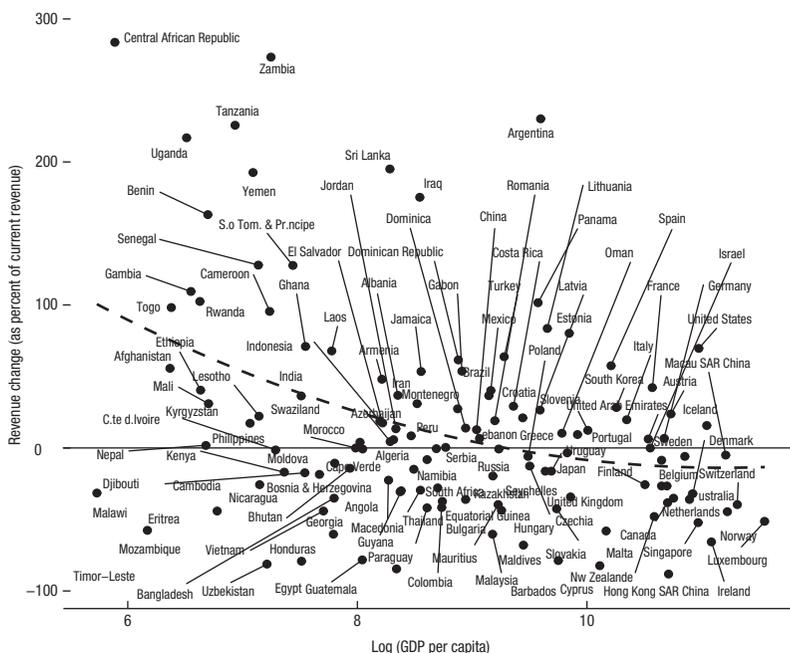
Note: Figure shows boxplots by country groups. The lower and upper hinges correspond to the first and third quartile of the region-specific distributions. The middle line depicts the median of the distribution, and points represent outliers.

multinational enterprises, and one third of global residual profits are earned by the largest 1 percent of multinationals in terms of revenue.

On the second issue, the focus in Beer, de Mooij, Hebous, Keen, and Liu (2020) is on apportionment to the destination country using a sales factor and, alternatively, a fixed assets factor. Two complementary assessments shed light on the potential revenue implications of residual profit allocation proposals, including (1) the scale of revenue from taxing only the routine return component, and how the revenue under this approach compares to current tax revenue; and (2) the full revenue effect from taxing both the routine return and the residual profit. The main data set used for these assessments is a sample of 114 countries and their corporate income tax rates, revenue, capital stock, and a proxy for sales by destination.<sup>18</sup> One insight from this assessment is that many countries, particularly in sub-Saharan Africa, may currently collect less revenue than they would by fully taxing routine returns (computed as 7.5 percent of tangible assets) (Figure 14.2).

<sup>18</sup> Data set developed from the IMF's WEO and WoRLD databases, available at: <https://data.imf.org/?sk=77413F1D-1525-450A-A23A-47AEED40FE78>.

**Figure 14.3. Effect of Sales-Based Residual Profit Allocation on Corporate Income Tax Revenue**



Source: Beer, de Mooij, Hebous, Keen, and Liu (2020).

Reducing profit shifting under residual profit allocation could benefit many countries, but its impact on the distribution of tax revenues depends on how residual profit is allocated. Analysis of wholly sales-based residual profit allocation suggests that the effects of reduced profit shifting may be modest relative to those from reallocation of residual profits. Figure 14.3 summarizes the results from this simulation, showing the revenue change from sales-based residual profit allocation as a percentage of current corporate income tax revenue. Interestingly, lower-income countries stand to gain more from sales-based residual profit allocation, as illustrated by the downward slope of the regression line. Reallocation of residual profits also implies that high-tax countries gain at the expense of low-tax countries, so that global revenue is likely to increase as a result of the reallocation.

One important qualification of the assessment is that it does not capture the reduction in taxable profits inherent in moving to the taxation of enterprises on a consolidated basis (through the cross-border jurisdiction offsetting of losses). Previous work suggests that this effect can be substantial, perhaps in the order of 10 percent of aggregate corporate tax revenues.<sup>19</sup> Indeed, far more research is

<sup>19</sup> See, in particular, Cobham and Loretz (2014); and De Mooij, Liu, and Prihardini (2019).

needed on routine and residual profit patterns and the potential impact of alternative residual profit allocation schemes.

### Efficiency Aspects of Residual Profit Allocation

A primary concern with the adoption of a residual profit allocation scheme, as with any major reform of the corporate tax system, is its impact on investment. This matters for revenue as well as for the efficiency of the tax system. Again, the specific impact would depend on the rates at which the routine and residual profits were taxed. Analysis in Beer, de Mooij, Hebous, Keen, and Liu (2020) shows that if the tax rate on routine profits was equal to current statutory tax rate, the marginal effective tax rate—defined as the amount by which the marginal value product of capital in a country exceeds the required pretax return, as a proportion of the latter—would rise significantly (from an average of 0.13 under the current system to 0.28 under residual profit allocation) and efficiency would decline. However, if the tax on routine profits is set in a way as to leave the effective tax on capital unchanged, the marginal effective tax rate will hardly change; that is, the weighted average will increase by 0.01—reflecting the elimination of profit shifting.

## CONCLUSION

The weaknesses of the global corporate tax system—particularly its complexity and manipulability, which along with tax competition have contributed to revenue erosion—have spurred debate on how to amend or replace it. Apportioning multinational enterprise revenues among their countries of operation according to a formula, rather than the separate accounts of their affiliates, may offer greater simplicity and fewer opportunities for manipulation. Both of these aspects are particularly important for developing countries.

In terms of revenue implications, the effect of formulary apportionment on the international allocation of corporate income tax revenues depends on the system's design. Developing countries gain mostly when headcount employment receives a large weight in the formula, yet also tend to benefit on average from a formula based on sales by destination. While *low-income* jurisdictions may gain or lose, depending on the formula, *low-tax* jurisdictions would lose tax base under all formulae under consideration.

In terms of efficiency, to the extent that the formula contains production factors, such as assets and employment, the corporate income tax effectively turns into a tax on those factors and distorts productive efficiency. Moreover, the incentive to locate such factors in low-tax jurisdiction remains, also perpetuating tax competition. Experience from federal states confirms that such distortions arise in the allocation of formula factors. Apportionment on the basis of destination-based sales would reduce these distortive pressures (see Chapter 13), although it could encourage turning low-tax investment hub jurisdictions into marketing hubs. While classic profit shifting would become impossible, new opportunities for tax planning will arise, related to manipulation of factors.

In terms of simplicity, the elimination of the need for transfer price estimation and enforcement would be a major advantage. Clearly this is maximized in the case of global adoption, while regional adoption would still require transfer pricing at the water's edge. In any case, while possibly simpler, the system would still feature some new complexities, such as which entities and activities are to be consolidated and how to distinguish between different sectoral regimes (such as the finance or extractive industries). In the case of residual profit allocation, the additional difficulties of distinguishing between types of profits and using two allocation mechanisms arise.

Given that formulary apportionment represents a significant departure from the current system, its adoption faces substantial political obstacles. These would likely stem less from opposition by corporations than from national governments. Global loss offsetting would be an attractive feature for many multinational enterprises, while national governments may not find a smaller tax base appealing, nor would they wish to cede control over that base, which is a valuable fiscal tool. Developing countries might be especially reluctant to join a formulary apportionment union with developed countries for fear that they would have relatively little bargaining power in central decision-making. Formulary apportionment adoption may therefore be more feasible—at least in the medium term—regionally among countries with similar income levels.

Nonetheless, continued integration of global markets and rapid growth of the digital economy create increasing pressure to reform the current system, and the dialogue among the more than 130 member countries of the Inclusive Framework on Base Erosion and Profit Shifting (BEPS) continues to deepen: the OECD's (2019b) *Programme of Work* discusses several formulary options, one of which (“fractional apportionment”) is supported by the G24 group of developing economies. Overall, the policy relevance of the discussions goes beyond formulary apportionment. For instance, the analysis makes transparent how profit would be allocated if it were to closely resemble the allocation of production factors or sales (either by origin or destination). This informs debates on the desirable allocation of taxing rights and profit attribution. Moreover, the analysis sheds light on the revenue implications of more incremental reforms that would only partly use formulary elements. For example, proposals for so-called residual profit allocation use formulary apportionment for a fraction of the total profit.

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