

Tax Policies in a Transition to a Knowledge-Based Economy: The Effective Tax Burden of Companies and Highly Skilled Labour

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*Globalization and the fast-approaching digitalization increase capital and labour mobility which fosters tax competition among countries worldwide. Based on a unique dataset, the authors have analysed the development of effective tax burdens on corporations and highly skilled labour for 26 countries of the Organisation for Economic Co-operation and Development (OECD) over the last decade. The synthesis of both indicators allows to identify tax strategies of the considered countries and further elaborate on the scope of future tax competition in the context of current developments. Overall, the authors ascertain a declining trend in effective tax burdens on corporate investments whereas increases in the top statutory tax rates for high-income earners and a rather constant average effective tax burden on labour for a disposable income of EUR 100,000 are observed. Current developments such as the agreement on a global minimum tax or the transition to a knowledge-based economy can establish a new lower bound to tax competition on corporate investments and might shift its focus.******

Keywords: Effective tax rates, tax competition, location attractiveness, corporate location decision, devereux/Griffith methodology, human resource tax analyser.

I INTRODUCTION

Globalization has reduced trade barriers and increased capital mobility. Hence, corporations decide where to locate their capital investments in a globally integrated market. Besides several non-tax factors such as production costs or market potential, it is well established that taxation can play a pivotal role in the location decision of multinational enterprises (MNE).¹ Since governments can most visibly influence the impact of taxation with this decision, countries worldwide participated in the ‘race to the bottom’ by continually lowering statutory corporate income tax rates over the last decades.² However, the agreement on a global minimum taxation can set a new lower bound to this race.

At the same time, due to the ongoing transition to a knowledge-based economy and the fast-approaching digitalization of it, the transmission of ideas and meanings through labour mobility is increasing. This transition not only leads to an enhanced shift of economic activity from the manufacturing to the service sector but also changes the characteristics of the labour force. In particular, the shift towards globally operating service sectors and an increasing demand for internationally mobile, highly educated employees is intensifying the competition for these actors.³ The rising digital transformation of corporations and working conditions, such as remote working, further exacerbates this process.⁴ Thus, increasing mobility and intensifying international competition for highly skilled employees may enable them to shift greater portions of

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¹ See e.g., M. Hanlon & S. Heitzman, *A Review of Tax Research*, 50(2–3) *J. Accounting & Econ.* 147–151 (2010), and M. Jacob, *Real Effects of Corporate Taxation: A Review*, Forthcoming in the *European Accounting Review* 12–16 (2021), <https://doi.org/10.1080/09638180.2021.1934055>.

² For decreasing statutory tax rates over the last decades in the EU, see e.g., R. Bräutigam, K. Stutzenberger & C. Spengel, *The Development of Corporate Tax Systems in the European Union from 1998 to 2017: Qualitative and Quantitative Analysis*, 47(6/7) *Intertax* 357 (2019).

³ See D. Hope & J. Limberg, *The Knowledge Economy and Taxes on the Rich*, Accepted/In press, *J. Eur. Pub. Pol’y* 4f. (2021), <https://doi.org/10.1080/13501763.2021.1992483> [https://kclpure.kcl.ac.uk/portal/en/publications/the-knowledge-economy-and-taxes-on-the-rich\(da2952fd-201f-4b87-b9e6-6f23df6cbf3a\).html](https://kclpure.kcl.ac.uk/portal/en/publications/the-knowledge-economy-and-taxes-on-the-rich(da2952fd-201f-4b87-b9e6-6f23df6cbf3a).html).

⁴ See R. de la Feria & G. Maffini, *The Impact of Digitalisation on Personal Income Taxes*, 2 *Brit. Tax Rev.* 156 (2021).

non-wage labour costs – at least to some extent – to the employing MNEs. Consequently, the latter are not only confronted with the direct costs of corporate taxation but also with the economic consequences of the shifted incidence of labour taxation.⁵ Hence, the synthesis of corporate and labour taxation will be increasingly important for corporations' location decisions in the near future and thus for the location attractiveness of countries.

Thus far, studies analysing the developments in tax competition focus on only one of two indicators – either corporate or labour taxation.⁶ This article contributes to this literature and sheds further light to ongoing discussions by evaluating both levels of taxation. First, a comprehensive, cross-country analysis will be provided of the evolution of tax location attractiveness in terms of corporate and labour taxation over the past decade (2009–2019). Second, the synthesis of both indicators contributes to a more comprehensive understanding of the current challenges policy-makers face in creating an optimal tax environment for business investments and the strategies chosen to address the transition to a knowledge-based economy.⁷ Examining effective tax rates over time provides an intuition about tax competition, especially within the European Union (EU), as well as common trends and possible interdependences between countries' national tax systems. More precisely, estimates are presented on the effective tax burden on corporate investments and highly skilled labour for 26 OECD countries that have been important foreign direct investment (FDI) locations over the last decade. Specifically, eighteen EU Member States,⁸ Japan (JP), Norway (NO), Switzerland (CH), and the United States (US) are covered along with four key transition economies, specifically, Brazil (BR), China (CN), India (IN), and Russia (RU).

To analyse the development of the tax burden on corporations and labour, the authors rely on well-established effective tax measures as they go beyond the statutory tax rate and are directly comparable due to their aggregated level in relation to different locations. The estimates on the effective tax burden on corporations are based on Devereux and Griffith's (1999, 2003) methodology whereas, for the

effective tax burden on highly skilled labour, the intertemporal simulation model developed by Elschner and Schwager (2005) is utilized.

The authors continue to ascertain wide dispersion in effective tax levels on both corporate and labour investments across countries. These substantial differences over time and region have the potential to significantly affect the geographical allocation of (innovative) businesses and highly skilled labour, especially in an integrated region like the European Union. Hence, it is increasingly important that governments pay attention to mobility responses when designing tax policy. In the context of the current developments such as corporate minimum taxes and the transition to a knowledge-based economy, labour taxes might be an even more powerful instrument to increase a countries' location attractiveness from a tax perspective.

The remainder of this article proceeds as follows. In section 2, the authors present the empirical evidence on the impact of taxation on corporate location decisions and the mobility of highly skilled employees. In section 3, a brief overview is provided of the methodology that is used to measure the effective tax burden before discussing the main results of the evolution of national tax burdens over the last decade. Estimates on company taxation and the taxation of highly skilled employees are first offered separately before considering them collectively in a synthesis. In section 4, the findings of current tax policy developments and challenges are discussed. Section 5 concludes.

2 INFLUENCE OF TAXATION ON LOCATION DECISIONS AND THE ROLE OF TAX COMPETITION

2.1 Literature on the Impact of Corporate Taxation on the Location Decision of Firms

Over the last decades, increasing globalization reduced trade barriers and fostered economic integration

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⁵ Throughout the study, 'labour taxation' and 'labour taxes' are used when discussing the tax burden on labour income through personal income taxation.

⁶ For the development of corporate tax rates, see for instance, C. Spengel, K. Nicolay, A.-C. Werner, M. Olbert, D. Steinbrenner, F. Schmidt & T. Wolf, *Steuerliche Standortattraktivität digitaler Geschäftsmodelle* (2018), <https://www.zew.de/PU80680-1>; Bräutigam et al., *supra* n. 2; E. Steinmüller, G. U. Thuncke & G. Wamser, *Corporate Income Taxes Around the World: A Survey on Forward-Looking Tax Measures and Two Applications*, 26 *Int'l Tax & Pub. Fin.* 418–456 (2019). For an overview of theoretical and empirical studies on corporate tax competition, see M. P. Devereux & S. Loretz, *What do we Know About Corporate Tax Competition?*, 66(3) *Nat'l Tax J.* 745–774 (2013). P. Egger, D. Radulescu & N. Strecker, *Effective Labor Taxation and the International Location of Headquarters*, 20(4) *Int'l Tax & Pub. Fin.* 631–652 (2013) show the impact of personal income taxation of labour for the international location decisions of headquarters, while C. Elschner & R. Schwager, *A Simulation Method to Measure the Effective Tax Rate on Highly Skilled Labor*, 63(4) *FinanzArchiv/Public Finance Analysis* 563–582 (2007) provide an overview of effective tax rates on highly skilled labour for selected countries. In contrast, C. Elschner, L. Lammensen, M. Overesch & R. Schwager, *The Effective Tax Burden of Companies and of Highly Skilled Manpower: Tax Policy Strategies in a Globalised Economy*, 27(4) *Fiscal Stud.* 513–534 (2006) is the only study that provides a combined analysis of both aspects of taxation and finds a strong correlation between both indicators for the majority of the countries considered for the early 2000s, i.e., 2003.

⁷ For the synthesis of the two indicators, the authors mainly rely on the estimates of effective tax rates that they produce annually at the firm level for the European Commission (see C. Spengel, F. Schmidt, J. H. Heckemeyer, K. Nicolay, A. Bartholmeß, C. Ludwig, D. Steinbrenner, P. Buchmann, A. T. Bührle, V. Dutt, L. Fischer, J. Spix & B. Stage, *Effective Tax Levels using the Devereux/Griffith Methodology – Final Report 2020*. Project for the EU Commission, TAXUD/2020/DE/308 (2021)) and on estimates of the effective employee tax burden in the context of the BAK Taxation Index (see BAK Economics and ZEW, *BAK Taxation Index für Arbeitnehmer 2019/2020* (2020), <https://baktaxation.bak-economics.com/bak-taxation-index-hochqualifizierte> (accessed 5 Aug. 2021)).

⁸ Precisely, Austria (AT), Belgium (BE), Czech Republic (CZ), Denmark (DK), Finland (FI), France (FR), Germany (DE), Hungary (HU), Ireland (IE), Italy (IT), Luxembourg (LU), the Netherlands (NL), Poland (PL), Slovakia (SK), Slovenia (SL), Spain (ES), Sweden (SE), and the United Kingdom (UK) are covered.

worldwide. Thus, several firms are no longer operating in country-specific local markets but rather in a global marketplace. Considering this, numerous companies have significantly enhanced their international activities.⁹ In this context, they must also decide how to serve the foreign market – either by establishing a foreign affiliate or exporting goods from their home country.¹⁰ Several factors can determine the decision to establish an affiliated company abroad. On the one hand, non-tax reasons such as lower factor prices, market potential and access, or the size of the host market may be taken into account in the location decision of multinational firms.¹¹ On the other hand, corporate taxation can impact this decision. Due to non-harmonized tax regulations, firms can benefit from differences in the corporate tax systems across countries. An ample amount of literature addresses the genuine effects of important tax aspects that can impact investment location decisions of firms, e.g., tax transparency,¹² tax uncertainty,¹³ tax enforcement,¹⁴ repatriation taxes¹⁵ or investment incentives^{16,17}. This study focuses on the impact of effective average tax rates on a country's tax location attractiveness for corporate investments.

Governments can directly influence their corporate tax systems to improve their location attractiveness for FDI. For governments, this is particularly relevant since several empirical studies confirm that FDI is linked to

organizational expertise and new technologies that can increase productivity at an aggregated level in the host country.¹⁸ Furthermore, FDI and particularly greenfield investments are associated with net job creation. Hence, to enhance productivity and competitiveness, governments globally attempt to attract FDI using corporate taxation to improve their location attractiveness from a tax perspective.¹⁹

Economists have long explored how tax policy impacts investment.²⁰ A vast amount of theoretical public finance literature demonstrates the sensitivity of capital location in general and particularly of multinational firms on the benefits of profit tax policy.²¹ Extensive works of empirical literature has confirmed this result. Using data on different levels of aggregation (aggregated bilateral activity, industry, firm), these studies show that national tax policy on corporate profit taxation impacts the location decision of MNEs' investments across countries. One strand of literature relies on data of bilateral FDI flows.²² For example, Devereux and Freeman (1995) analyse the effect of the effective marginal tax rate on bilateral FDI flows between seven countries and can confirm the impact of their measure in explaining the size of FDI flows relative to gross domestic product (GDP). Several more recent papers rely also on bilateral FDI flow data in their studies but explore alternative specifications of the tax rate, e.g., effective average and marginal tax rate and forward-looking versus backward-looking measures.²³

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- ⁹ See D. Schanz, A. Dinkel & S. Keller, *Tax Attractiveness and the Location of German-Controlled Subsidiaries*, 11(1) Rev. Managerial Sci. 252 (2017).
- ¹⁰ See S. Barrios, H. Huizinga, L. Laeven & G. Nicodème, *International Taxation and Multinational Firm Location Decisions*, 96(11–12) J. Pub. Econ. 946 (2012); M. Lawless, D. McCoy, E. L. W. Morgenroth & C. M. O'Toole, *Corporate Tax and Location Choice for Multinational Firms*, 50(26) Applied Econ. 2920 (2018).
- ¹¹ For the theoretical perspective, see E. Helpman, *A Simple Theory of International Trade with Multinational Corporations*, 92 J. Pol. Econ. 451–471 (1984); E. Helpman, *Multinational Corporations and Trade Structure*, 52 Rev. Econ. Stud. 443–457 (1985) (vertical model) or J. R. Markusen, *Multinationals, Multi-plant Economies, and the Gains from Trade*, 16 J. Int'l Econ. 205–226 (1984); J. R. Markusen, *Multinational Firms and the Theory of International Trade* (MIT Press, Cambridge 2002) (horizontal model) and, for reviews on the determinants of the location choice of foreign affiliates, e.g., L. Fontagné & T. Mayer, *Determinants of Location Choices by Multinational Firms: A review of the current state of knowledge*, 51 Applied Econ. Q. 9–34 (2005), M. Lawless, D. McCoy, E. Morgenroth & C. M. O'Toole, *The Importance of Corporation Tax Policy in the Location Choice of Multinational Firms*, Department of Finance, Dublin (2014) or R. B. Davies, I. Siedschlag & Z. Studnicka, *Corporate Taxation and the Location Choice of Foreign Direct Investment in EU Countries*. ESRI Working Paper, 591 (2018).
- ¹² See e.g., L. De Simone & M. Olbert, *Real Effects of Private Country-by-Country Disclosure*, Forthcoming in Accounting Rev. (2021), <https://doi.org/10.2308/TAR-2020-0714>.
- ¹³ See for instance, M. Jacob, K. Wentland & S. A. Wentland, *Real Effects of Tax Uncertainty: Evidence from Firm Capital Investments*, Forthcoming in Management Science (2021), <https://doi.org/10.1287/mnsc.2021.4072>.
- ¹⁴ See e.g., J. Gallemore & M. Jacob, *Corporate Tax Enforcement Externalities and the Banking Sector*, 58(5) J. Accounting Research 1117–1159 (2020).
- ¹⁵ See for instance, H. Amberger, K. S. Markle & D. M. P. Samuel, *Repatriation Taxes, Internal Agency Conflicts, and Subsidiary-Level Investment Efficiency*, 96(4) Accounting Rev. 1–25 (2021).
- ¹⁶ For innovation box tax incentives, see e.g., S. Chen, L. De Simone, M. Hanlon & R. Lester, *The Effect of Innovation Box Regimes on Investment and Employment Activity*, SSRN Electronic J. (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3864574; for tax incentives on domestic manufacturing activity, see e.g., R. Lester, *Made in the USA? A Study of Firm Responses to Domestic Production Incentives*, 57(4) J. Accounting Res. 1059–1114 (2019).
- ¹⁷ For an overview of additional literature, see also Hanlon & Heintzman, *supra* n. 1; Jacob, *supra* n. 1.
- ¹⁸ For a discussion of the literature, see M. Schiffbauer, I. Siedschlag & F. Ruane, *Do Foreign Mergers and Acquisitions Boost Firm Productivity?*, 26(6) Int'l Bus. Rev. 1124–1140 (2017).
- ¹⁹ See Davies et al., *supra* n. 11, at 2.
- ²⁰ See e.g., R. E. Hall & D. W. Jorgenson, *Tax Policy and Investment Behavior*, 57(3) Am. Econ. Rev. 391–414 (1967); J. G. Cummins, K. A. Hassett & R. G. Hubbard, *Have Tax Reforms Affected Investment?*, Tax Policy & Econ. 9, 131–149 (1995); A. Goolsbee, *Investment Tax Incentives, Prices, and the Supply of Capital Goods*, 113(1) Q. J. Econ. 121–148 (1998); C. L. House & M. D. Shapiro, *Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation*, 98(3) Am. Econ. Rev. 737–768 (2008).
- ²¹ See for instance, J. D. Wilson, *Trade, Capital Mobility, and Tax Competition*, 95(4) J. Pol. Econ. 835–856 (1987); E. Janeba, *Corporate Income Tax Competition, Double Taxation Treaties, and Foreign Direct Investment*, 56(2) J. Pub. Econ. 311–325 (1995) or M. P. Devereux & R. G. Hubbard, *Taxing Multinationals*, 10(4) Int'l Tax & Pub. Fin. 469–487 (2003).
- ²² For an overview of earlier work, see J. Slemrod, *Tax effects on Foreign Direct Investment in the United States: Evidence from a Cross-Country Comparison*, in *Taxation in the Global Economy* 79–117 (A. Razin & J. Slemrod eds, Chicago, University of Chicago Press 1990).
- ²³ See e.g., T. Buettner, *The Impact of Taxes and Public Spending on the Location of FDI: Evidence from FDI-flows Within Europe*, SSRN Electronic J. (2002), <http://www.ssrn.com/abstract=335724>; J. Gorter, & A. Parikh, *How Sensitive is FDI to Differences in Corporate Income Taxation Within the EU?*, 151 *De Economist* 193–204 (2003); A. Bénassy-Quéré, L. Fontagné & A. Lahrèche-Révil, *How Does FDI React to Corporate Taxation?*, 12(5) Int'l Tax & Pub. Finance 583–603 (2005); Steinmüller et al., *supra* n. 6.

Considering the effective average tax rate as a linear combination of the (forward-looking) effective marginal and the statutory tax rate, Buettner (2002) finds that both measures significantly impact FDI flows. However, due to the aggregation level, the relevance of FDI flows with regard to MNEs' investment location decision is limited.²⁴

Therefore, the second strand of literature uses aggregated data on MNEs' affiliates, including their activities in foreign countries. Several studies focus on the United States, like Grubert and Mutti (1991, 2000) and Hines and Rice (1994). Concerning the results, for example, Grubert and Mutti (1991) and Hines and Rice (1994) show that the average tax rate negatively influences the aggregated capital stock of affiliated companies. However, data on a firm-level is necessary to more precisely explore the differences in MNEs' location decisions and to study differences between corporations. This strand of literature has been rapidly increasing over the last two decades.²⁵ For example, Stöwhase (2002) uses a dataset on German MNEs and analyses the number of affiliates of German MNEs in eight host countries. The results show that the average tax rate has a significant impact on companies in production industries while the statutory tax rate plays a relevant role for companies in the service, finance, and research and development (R&D) industries. More recently, Schanz et al. (2017) confirm – using not only corporate tax rates but several other tax variables – that German MNEs locate their affiliates in countries that offer favourable statutory tax rates, withholding taxes, double tax treaty networks, and holding incentives. To further elucidate the question of the tax rate used by firms for their investment decisions, Graham et al. (2017) surveyed executives of public and private US firms. The results show that firms use an average rather than a marginal tax rate to evaluate incremental decisions. Overall, these studies indicate that taxation and particularly effective average tax rates impact the location decision of multinational

firms – whereby the magnitude differs. In the overall allocation of capital, effective average tax rates tend to play a pivotal role while effective marginal tax rates are less relevant.²⁶

Due to the extensive quantities of empirical literature studying the impact of taxation on the location decision of corporations, meta-studies shed further light on this question.²⁷ For example, Feld and Heckemeyer (2011) estimate a semi-elasticity with respect to the corporate tax rate of 2.49, indicating that a one percentage point increase in the corporate tax rate of one country decreases its' FDI by 2.49%. Hence, besides several non-tax factors that are not included in this analysis, it is widely established that corporate taxation influences the location decision of corporate investments.

2.2 Literature on the Impact of Taxation on Highly Skilled Labour

In contrast to what was indicated regarding literature in the previous section, there is very little empirical work on the effect of taxation on the spatial mobility of individuals.²⁸ However, it is essential to consider income taxation not only as a potential distortion for corporate investments but also for the market of highly skilled human resources. Besides anecdotal evidence of the negative impact of taxation on top earners,²⁹ there is growing evidence that taxes can affect the migration of employees both within and across countries, especially among high-skilled employees. The following studies have shown that labour taxes can be used to attract highly skilled individuals and can also exert an effect on the wage-setting process of top earners.

With respect to attracting highly skilled labour, the small but increasing number of literary works on within and cross-border country migration shows that especially highly skilled employees and top earners significantly react to tax differentials through mobility across regions. Liebig et al. (2007) and Schmidheiny and Slotwinski (2018) find evidence for this subgroup of

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²⁴ See M. P. Devereux & G. Maffini, *The Impact of Taxation on the Location of Capital, Firms and Profit: A Survey of Empirical Evidence*, Working Paper (2006), https://www.researchgate.net/publication/4799414_The_Impact_of_Taxation_on_the_Location_of_Capital_Firms_and_Profit_A_Survey_of_Empirical_Evidence.

²⁵ See e.g., M. P. Devereux & R. Griffith, *Taxes and the Location of Production: Evidence from a Panel of US Multinationals*, 68(3) J. Pub. Econ. 335–367 (1998); S. Stöwhase, *Profit Shifting opportunities, Multinationals, and the Determinants of FDI*, Working Paper (2002), <https://pub.ub.uni-muenchen.de/id/eprint/29>; R. Altshuler & H. Grubert, *Repatriation Taxes, Repatriation Strategies and Multinational Financial Policy*, 87 J. Pub. Econ. 73–107 (2002); M. A. Desai, C. F. Foley & J. R. Hines, *Foreign Direct Investment in a World of Multiple Taxes*, 88(12) J. Pub. Econ. 2727–2744 (2004); Schanz et al., *supra* n. 9; Lawless et al., *supra* n. 10. For an overview and the development of empirical tax research in accounting, see D. Shackelford & T. Shevlin, *Empirical Research in Accounting*, 31 J. Accounting & Econ. 321–387 (2001), T. Shevlin, *The Future of Tax Research: From an Accounting Professor's Perspective*, 29(2) J. Am. Tax. Association 87–93 (2007); Hanlon & Heitzman, *supra* n. 1 and Jacob, *supra* n. 1.

²⁶ See Devereux & Maffini, *supra* n. 24, at 41.

²⁷ See for instance, de R. A. de Mooij and S. Ederveen, *Taxation and Foreign Direct Investment: A Synthesis of Empirical Research*, 10 Int'l Tax & Pub. Fin. 673–693 (2003); L. P. Feld & J. H. Heckemeyer, *FDI and Taxation: A Meta-study*, 25(2) J. Econ. Surveys 233–272 (2011).

²⁸ In the context of this analysis, the authors do not focus on the impact of taxation on other types of personal income, i.e., capital or business income, which comprises a majority of the income of superrich individuals. For more details on the impact of taxation on this type of top income earner, see F. Scheuer & J. Slemrod, *Taxation and the Superrich*, 12 Annual Rev. Econ. 189–211 (2020).

²⁹ Some anecdotal evidence on the French wealth tax (a marginal tax rate of 75% for incomes above EUR 1 million) indicates that this tax was abandoned in 2015 not only due to its low incidence but also due to difficulties of French companies to attract top international staff; see Hopkins (23 Dec. 2014, <https://www.dailymail.co.uk/news/article-2885197/France-waves-discreet-goodbye-75-percent-super-tax.html>).

employees of within-country migration by exploiting discontinuities in Swiss cantons' personal income tax rates. Recent analyses confirm this pattern of within-country variations for other countries.³⁰ Furthermore, these studies commonly stress that specific segments of the population (e.g., highly skilled employees, young and/or unmarried individuals (without family), and chief executive officers (CEOs)) are more sensitive to taxes either because they are less attached to specific firms or their skills are less likely to be location-specific. Besides population characteristics, Agrawal and Foremny (2019) accentuate the relevance of particular industries, i.e., scientific, health, finance, real estate, and information industries, in driving the largest effects of migration. Concentrating on an even more specific subgroup of top earners, i.e., highly paid star scientists, Moretti and Wilson (2017) confirm the findings of interstate mobility within the United States. In contrast, Young and Varner (2011) and Young et al. (2016) find only very limited effects of tax differentials at the US federal personal income tax level on millionaires' migration.

In the context of cross-border migration, the existing literature is even more focused on the impact of taxation on specific occupations, i.e., football players,³¹ highly paid foreigners,³² and inventors.³³ These studies show that tax-induced migration of (foreign) top income earners can be important for local governments, especially in a large mobility area like the European Union.³⁴ Participation in beggar-thy-neighbour strategies allows countries to take advantage of top earners' tax-driven mobility. Kleven et al. (2013) provided the first evidence on the positive (upper bound) effect of foreigner-specific tax breaks on immigration by analysing the European football market.³⁵ Based on panel data from the United States and European Patent Offices, Akcigit et al. (2016) can monitor inventors over time and across countries and exploit the differential impact of top rates on

inventors at different productivity and, consequently, income levels. The authors confirm the results of Moretti and Wilson (2017) in an international setting. Further evidence in this regard is provided by Akcigit et al. (2018) by showing a strong impact of corporate and personal taxes on the mobility of foreign inventors across US states over the twentieth century. Exploiting a preferential flat tax rate granted in Denmark for a maximum of 36 months after the immigration of highly skilled foreign employees, Kleven et al. (2014) not only ascertain a significant increase of highly paid foreigners eligible for this preferential tax scheme (i.e., the scheme almost doubled the number of highly paid foreigners in Denmark relative to slightly lesser paid ineligible foreigners), but they also provide evidence of the wage bargaining power of these top earners. Even when they find evidence on a larger group of top earners, the migration effects are quite heterogeneous between sectors, i.e., sports and entertainment as well as all other industries.³⁶ Muñoz (2019) demonstrates that countries included in a large mobility area such as the European Union have increasing interests to participate in beggar-thy-neighbour strategies in order to take advantage of top earner's tax-driven mobility.

Besides the suggestive evidence on tax-induced migration effects within and across certain regions, the analysis rests on the assumption that highly skilled employees exert sufficient bargaining power for shifting at least part of their labour tax burden to the employer. Existing literature on the incidence of labour taxes finds very different results ranging from full incidence among employers³⁷ to full incidence among employees.³⁸ However, in accordance with Ruf and Schmider (2018), Kleven et al. (2014) point out in the context of highly skilled employees and CEOs that they seem to be able to shift part of their labour tax burden to employers. Guillot (2021) confirms these findings by analysing the impact of the

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³⁰ See D. R. Agrawal & D. Foremny, *Relocation of the Rich: Migration in Response to Top Tax Rate Changes from Spanish Reforms*, 101(2) Rev. Econ. & Statistics 214–232 (2019) for Spain and E. Rubolino, *Tax-Induced Transfer of Residence: Evidence From Tax Decentralization in Italy*, SSRN Electronic J. (2020), <https://www.ssrn.com/abstract=3710932> for Italy.

³¹ See H. J. Kleven, C. Landais & E. Saez, *Taxation and International Migration of Superstars: Evidence from the European Football Market*, 103(5) Am. Econ. Rev. 1892–1924 (2013).

³² See H. J. Kleven, C. Landais, E. Saez, & E. Schultz, *Migration and Wage Effects of Taxing Top Earners: Evidence from the Foreigners' Tax Scheme in Denmark*, 129(1) Q. J. Econ. 333–378 (2014).

³³ See U. Akcigit, S. Baslandze & S. Stantcheva, *Taxation and the International Mobility of Inventors*, 106(10) Am. Econ. Rev. 2930–2981 (2016).

³⁴ See M. Muñoz, *Do European Top Earners React to Labour Taxation Through Migration?*, Working Paper (2019), <https://halshs.archives-ouvertes.fr/halshs-03252899>.

³⁵ Usually, football players can make their clubs pay the full cost of the tax due to their unique contracts; see M. Guillot, *Tax Incidence Among the Working Superrich. Evidence From the French 75% Tax on Millionaires*, SSRN Electronic J. (2021), <https://ssrn.com/abstract=3412261>.

³⁶ See H. Kleven, C. Landais, M. Muñoz & S. Stantcheva, *Taxation and Migration: Evidence and Policy Implications*, 34(2) J. Econ. Persps 129 (2020).

³⁷ See E. Saez, M. Matsaganis & P. Tsakloglou, *Earnings Determination and Taxes: Evidence From a Cohort-Based Payroll Tax Reform in Greece*, 127(1) Q. J. Econ. 493–533 (2012), E. Saez, B. Schoefer & D. Seim, *Payroll Taxes, Firm Behavior, and Rent Sharing: Evidence from a Young Workers' Tax Cut in Sweden*, 109(5) Am. Econ. Rev. 1717–1763 (2019), and Y. Benzarti & J. Harju, *Using Payroll Tax Variation to Unpack the Black Box of Firm-Level Production*, NBER Working Paper No. 26640 (2020). Recent literature shows that these effects depend on the business cycle; see Y. Benzarti & J. Harju, *Can Payroll Tax Cuts Help Firms During Recessions?*, 200 J. Public Econ. 15 (2021).

³⁸ See J. Gruber, *The incidence of payroll taxation: Evidence from Chile*, 15(S3) J. Lab. Econ. S72–S101 (1997). However, the full pass-through to employees strongly depends on the relationship of the contributions and expected benefits; see A. Bozio, T. Breda & J. Grenet, *Does Tax-Benefit Linkage Matter for the Incidence of Social Security Contributions?*, IZA Discussion Paper No. 12502 23 (2019).

French 75% tax on millionaires. However, she stresses that the bargaining power and thus the incidence is highly driven by the employees' occupations both upon the introduction and the removal of the tax. Especially, CEOs as well as administration and business managers to a lesser extent, exert a higher share of bargaining power. Engineers and technical managers bear half of the incidence and do not benefit as much as the others from the removal of the wealth tax. The finding by Fuest et al. (2018) that low-skilled, female, and young employees bear a larger share of the corporate tax burden (i.e., have the largest decreases in wages) indicates that high-skilled employees seem to have sufficient bargaining power to also escape the corporate tax incidence.³⁹

Based on the presented empirical evidence, any increase in the taxation of highly skilled employees could result in a (partly) offsetting increase in the remuneration and thus increase companies' labour costs. As multinationals are especially quite sensitive to costs, higher employer-borne taxes and social security contributions could exert negative investment distortions. Feld and Kirchgässner (2002) exploit the regional distribution of companies and focus on cantonal employment using a panel dataset of the 26 Swiss cantons from 1985 to 1997. They show that higher corporate and personal income taxes deter companies from locating in a canton and subsequently reducing employment there. Additional evidence of the sensitivity of firms to variation in top personal income tax rates is provided by Egger and Radulescu (2011) and Egger et al. (2013) in their studies in which they show that firms tend to locate their headquarters where top tax rates and tax progression are lower. In detail, Egger et al. (2013) find that a one percentage point increase in payroll taxes (i.e., personal income taxes and social security contributions) reduces the probability of a country attracting headquarters by 6.1%. Further indirect empirical evidence on the negative impact of labour costs is provided by Buettner and Ruf (2007), Buettner and Wamser (2009), and Montout and Sami (2016). These studies find a significant negative effect of labour taxes on cross-border location and investment decisions

by implicitly controlling for labour taxes by including labour costs in their analyses.

Overall, there is evidence that, first, highly skilled employees react to tax incentives through within and cross-border country migration. Second, the literature has shown that these employees use their bargaining power to shift – at least some parts – of their labour tax burden to the employer.

3 TRENDS IN EFFECTIVE TAX BURDENS OF CORPORATIONS AND HIGHLY SKILLED LABOUR

To identify trends in countries' location attractiveness from a tax perspective for corporations and highly skilled employees over the last decade, the authors rely on well-established measures of the effective tax burden at the corporate level and on labour, specifically, the models developed by Devereux and Griffith (1999; 2003) and Elschner and Schwager (2005).⁴⁰ These effective tax rates should be preferred over statutory tax rates as they incorporate the most significant features of the underlying corporate and personal income tax system, e.g., tax allowances, local profit tax rates, surcharges, non-income tax charges and social security contributions and could therefore point out distortions of taxes for investment decisions.

To analyse the attractiveness of different locations from a tax perspective, the authors compare effective tax burdens on corporations and labour internationally. In particular, 18 EU Member States and four major industrialized non-EU countries (i.e., CH, JP, NO, and the US) and four transition economies (i.e., BR, CN, IN, and RU) are compared. In the majority of countries, corporate and personal income tax rates are only established at the federal level. However, certain countries are also covered that levy income taxes on the national and sub-national levels (i.e., BE, CH, DE, DK, ES, FI, IT, JP, NO, SE, and the US). Further, regional differences in social security contributions drive variations in the Chinese tax burden. In the context of the analysis, the authors therefore focus on the regulation applicable in the capital cities if there are local differences within a country.⁴¹

Notes

³⁹ In addition, the authors find that wage effects due to corporate tax incidence on employees are near zero for large companies, foreign-owned firms, and multinational enterprises. Higher profit-shifting opportunities of these companies seem to be the main driver for the low corporate tax incidence on employees; see C. Fuest, A. Peichl, & S. Sieglösch, *Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany*, 108(2) *Am. Econ. Rev.* 413 (2018). For further information on corporate tax incidence, see C. Suárez Serrato & O. Zidar, *Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogeneous Firms*, 106(9) *Am. Econ. Rev.* 2582–2624 (2016); N. Dwenger, P. Rattenhuber & V. Steiner, *Sharing the Burden? Empirical Evidence on Corporate Tax Incidence*, 20(4) *German Econ. Rev.* e107-e140 (2019).

⁴⁰ The authors' focus on the taxation of corporations and highly skilled employees is not meant to imply denial of the importance of other location factors such as infrastructure or environmental amenities. Rather, there is a concentration on taxation in order to clearly isolate the impact of one specific location factor.

⁴¹ In CH, we refer to the canton and city of Zurich and, in the United States, to the state of California.

3.1 Development of Effective Tax Burden on Corporations

3.1.1 The Devereux/Griffith Methodology

The Devereux/Griffith methodology (1999, 2003) builds on the work of Jorgenson (1963), Hall and Jorgensen (1967), and King and Fullerton (1984) and is based on the neoclassical investment theory. It assumes a perfect capital market under certainty and considers a hypothetical domestic incremental investment by a corporation in the manufacturing sector.⁴² This investment occurs in one period and generates a return in the subsequent period.⁴³ Further, it assumes that firms undertake the hypothetical domestic investment as long as its marginal return covers its marginal costs. Stated differently, investment takes place until the return is equal to the cost of capital – the minimum pre-tax real rate of return required by an investor given a post-tax real rate of return on an alternative (financial) investment.⁴⁴

The Devereux/Griffith methodology allows the computation of effective tax burdens on marginal investments that only yield a minimum required return (relevant measure: cost of capital, effective marginal tax rate (EMTR_C)) and on highly profitable investments with a pre-tax rate of return of 20% (relevant measure: effective average tax rate (EATR_C)). For this study, only the EATR_C at the corporate level is considered with the objective to analyse the impact of taxes on the location attractiveness of countries for corporate investments over time.⁴⁵

The EATR_C measures the change in the net present value (NPV) of a highly profitable investment caused by taxation. This is especially relevant when companies must decide on the geographical allocation of economic returns in the course of investment location decisions.⁴⁶ From a set of discrete, mutually exclusive investments with an identical pre-tax real rate of return, the investor will choose the location for which the NPV is least reduced by taxation, that is, where the EATR_C is lowest.⁴⁷

The EATR_C is computed as the difference of the NPV before and after taxes ($R^* - R$) divided by the discounted pre-tax rate of return p .

$$EATR_C = (R^* - R) / \left(\frac{p}{1+r} \right) \quad (1)$$

Alternatively, the EATR_C can be written as⁴⁸:

$$EATR_C = \frac{\tilde{p}}{p} * EMTR_C + \frac{p - \tilde{p}}{p} * \tau \quad (2)$$

Hence, the EATR_C equals the EMTR_C if the pre-tax rate of return (p) is identical to the cost of capital (\tilde{p}). Further, the EATR_C approaches the statutory tax rate τ if profits increase (i.e., an increasing pre-tax rate of return). Therefore, the corporate income tax rate can be considered as the main driver of the EATR_C for highly profitable investments whereas the relevance of tax base elements considerably decrease for such investments.⁴⁹

To calculate the effective average tax burden, the model considers country-specific information on the type of the tax system, applicable profit and non-profit taxes (e.g., corporate income tax, real estate tax, etc.) as well as tax base and tax rate regulations.⁵⁰ Besides this country-specific tax information, the model depends on several important economic assumptions displayed in Table 1. All economic parameters are held constant across all investments in order to isolate the effect of different international tax regimes irrespective of their location.

Table 1 Parameters of Devereux Griffith Methodology

Economic Parameters	
True economic depreciation rate (%)	
intangibles	15.35
industrial building	3.1
machinery	17.5
real interest rate (%)	5
inflation rate (%)	2
pre-tax rate of return for EATR _C (%)	20

Notes

⁴² See L. Evers, H. Miller & C. Spengel, *Intellectual Property Box Regimes: Effective Tax Rates and Tax Policy Considerations*, 22(3) Int'l Tax & Pub. Fin. 510 (2015); O. Pfeiffer & C. Spengel, *Tax Incentives for Research and Development and Their Use in Tax Planning*, ZEW Discussion Paper No. 17-046, Mannheim 21 (2017).

⁴³ See e.g., C. Spengel, L. Fischer & K. Stutzenberger, *Breaking Borders? The European Court of Justice and Internal Market*, ZEW Discussion Paper No. 20-059, Mannheim (2020).

⁴⁴ See for instance, Evers et al., *supra* n. 42, at 510.

⁴⁵ It is appropriate to disregard taxes at the shareholder level if managers do not know the tax position of their marginal shareholder. For a discussion of these issues, see M. P. Devereux, R. Griffith & A. Klemm, *Corporate Income Tax Reforms and International Tax Competition*, 17(35) Econ. Pol'y 449-495 (2002).

⁴⁶ See for instance, M. P. Devereux & R. Griffith, *Evaluating Tax Policy for Location Decisions*, 10 Int'l Tax & Pub. Fin. 107-126 (2003) and A. J. Auerbach, *Who Bears the Corporate Tax? A Review of What We Know*, 20 Tax Pol'y & Econ. 1-40 (2006).

⁴⁷ For an illustrative example and interpretation, see Spengel et al., *supra* n. 6, at 62.

⁴⁸ Personal taxes are neglected. For the derivation, see M. P. Devereux & R. Griffith, *The Taxation of Discrete Investment Choices*. Institute for Fiscal Studies Working Paper, 98/16 (Revision 3) 21 ff. (1999), <http://www.ifs.org.uk/wps/wp9816.pdf>.

⁴⁹ See Devereux & Griffith, *supra* n. 46, at 112 f.; C. Spengel, *Internationale Unternehmensbesteuerung in der Europäischen Union: Steuerwirkungsanalyse, empirische Befunde, Reformüberlegungen* 75 ff. (2003).

⁵⁰ For further details of the annual update on effective tax levels in the EU, see Spengel et al., *supra* n. 21.

Composition of investment	
Weighting of investment (%)	
Intangibles, buildings, machinery, inventory, financial assets	each 20
Weighting of financing (%)	
Retained earnings	55
New equity	10
Debt	35

Note: Assumptions based on Spengel et al. (2021).

3.1.2 Tax Burden on Profitable Investment Projects – Country Comparison 2009-2019

3.1.2.1 Statutory Corporate Income Tax Rates

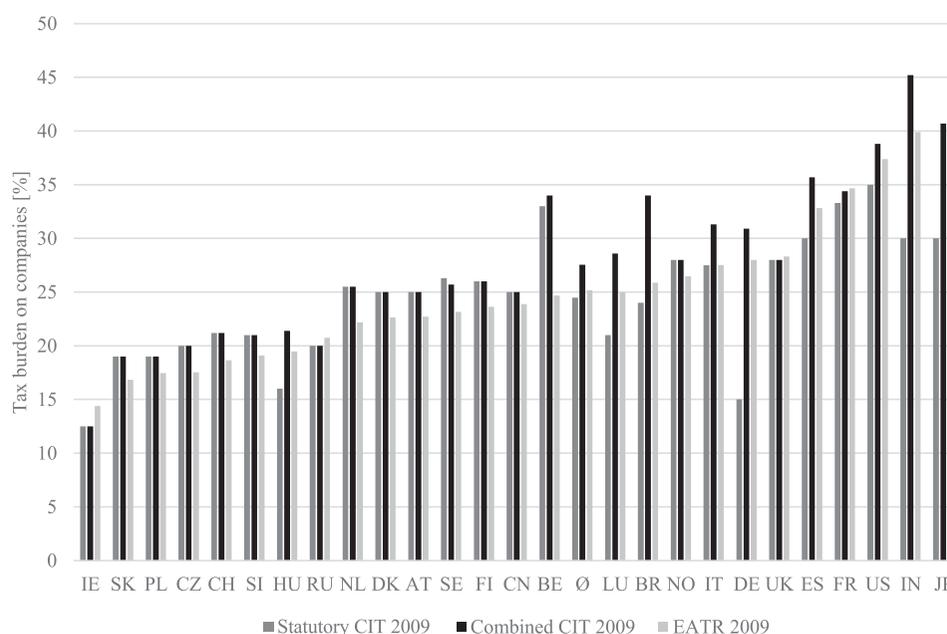
All of the countries considered in this study's sample apply a flat statutory rate to tax corporate profits. In addition, some countries such as Germany, India, or Italy levy additional surcharges or business taxes that increase the statutory corporate income tax rate. Therefore, the combined corporate income tax rate (statutory tax rate including surcharges/business taxes) can deviate from the statutory

rate. Before evaluating the trends of effective average tax rates over the last decade, the authors focus on the development and distribution of statutory and combined profit tax rates as these are often used as a first indicator of the effective tax burden on corporate investments.

Figures 1 and 2 graphically illustrate the statutory, combined, and effective average tax rates for all of the considered countries for the years 2009 and 2019 (see also Table 3 in the Appendix). A glance at the timeline of the different averages shows a significant trend downwards across all tax rate measures. Overall, average statutory corporate income tax rates (combined tax rates) decreased from 24.5% (27.5%) in 2009 to 21.6% (24.7%) ten years later. The modest reduction in the standard deviation of statutory tax rates (combined tax rates) indicates that the difference in national tax levels persists over the observation period (5.7 (7.5) in 2009 to 5.0 (7.3) in 2019).

Within this study's sample, the average combined profit tax rate on distributed profits is 24.7%, and the remarkable spread between the highest and the lowest profit tax rate amounts to 35.2 % points (pp) in 2019. In this regard, Hungary and Ireland levy the lowest combined corporate income tax rate at 11.1% and 12.5%, respectively, and India the highest at 46.3%. In India, companies face an above-average statutory corporate income tax rate of 30% that is further increased by an additional dividend distribution tax (15%), surcharge, and educational tax levy.⁵¹ In comparison,

Figure 1 Statutory, Combined and Effective Average Tax Rates for Corporations, 2009

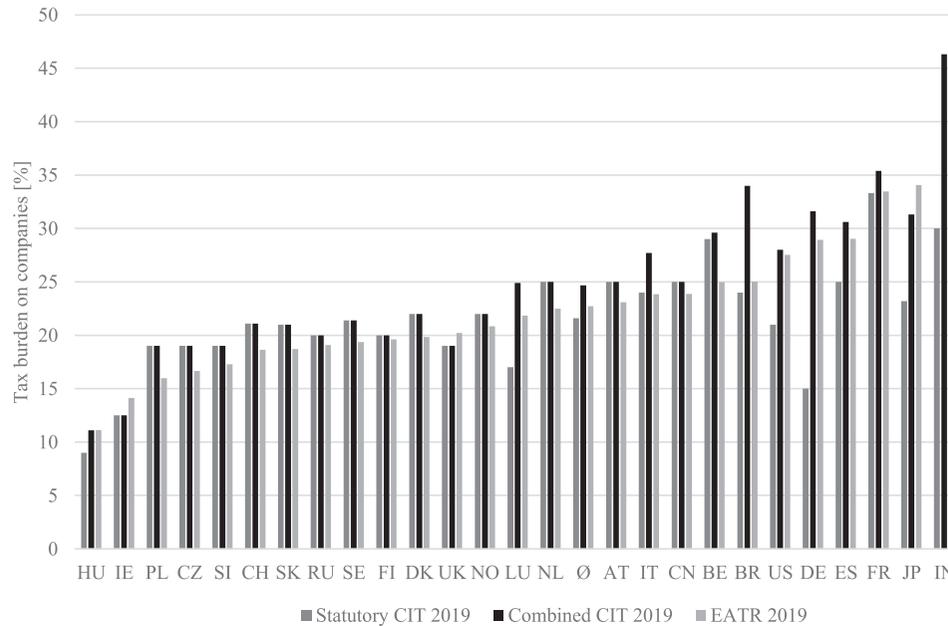


Source: Spengel et al. (2021), own calculation for transition economies.

Notes

⁵¹ The effective tax burden of an Indian company is determined by the product of the sum of the corporate income tax rate, the distribution tax, and the surcharge as well as the educational tax levy ((30%+15%)*1.12*1.04).

Figure 2 Statutory, Combined and Effective Average Tax Rates for Corporations, 2019



Source: Spengel et al. (2021), own calculation for transition economies.

the average combined corporate income tax rate in the EU is 23%.

The dispersion of statutory and combined profit tax rates indicates significant regional variation that partly reflects the underlying tax systems. Most large economies complement corporate income taxes with surcharges and local business taxes (e.g., DE, ES, FR, IT) or state taxes (e.g., CH, US). In contrast, the majority of the considered Eastern EU countries and Russia not only apply slightly below average corporate income tax rates but also use relatively simple tax regimes without any additional surcharges on profit, revenue, or other business assets.

3.1.2.2 Effective Average Tax Rates

Concerning effective average tax rates, the figures mentioned above show that the $EATR_C$ in the majority of countries is lower than the combined statutory tax rate due to the tax-reducing impact of tax base regulations and the deductibility of interest payments on debt financing.

Table 4 in the Appendix presents the respective $EATR_C$ for 26 countries every two years beginning from 2009 to 2019. In accordance with the developments of statutory and combined corporate income tax rates, the results show, on average, a decline in the $EATR_C$ (25.2% in 2009 *v.* 22.7% in 2019) and a remarkable dispersion across

countries that persists over the observation period. In 2009, the $EATR_C$ ranged from 14.4% in Ireland to 41.7% in Japan while, in 2019, Hungary has the lowest $EATR_C$ with 11.1% and India the highest with 40.8%. However, these trends might differ between regions, especially between EU and non-EU countries.⁵²

Although the average level of effective tax burdens is slightly lower compared to the overall sample, the trends mentioned above – on average – can also be observed for the considered EU Member States with a decreasing unweighted average $EATR_C$ of 23.3% in 2009 and 21.1% in 2019. Furthermore, the nearly constant standard deviation suggests that a comparatively high cross-country spread in the $EATR_C$ persists over time (5.3 in 2009 *v.* 5.4 in 2019). The slightly lower level of the $EATR_C$ compared to the overall sample is primarily driven by the tax burdens of the five Eastern EU countries, specifically, the Czech Republic, Hungary, Poland, Slovakia, and Slovenia. Compared to the other considered Member States, the unweighted average $EATR_C$ of the Eastern EU countries is approximately 7 percentage points lower at 18.1% in 2009 and 16.0% in 2019. With a standard deviation of 1.0, the levels of effective tax burdens for corporate taxpayers in these five countries were very much aligned in 2009. However, due to contrary developments in Hungary and Slovakia, the spread in the $EATR_C$ across these Eastern EU countries increased significantly and resulted in a standard deviation of 2.6 in 2019.

Notes

⁵² For the analysis, the authors rely on the following country-clusters: Eastern EU countries: CZ, HU, PL, SK, SL; Central and Western EU countries: AT, BE, DE, ES, FR, IT, LU, NL; Northern EU countries: DK, FI, IE, SE, UK; and Non-EU countries: BR, CN, CH, IN, JP, NO, RU, US.

As these findings already imply, the location attractiveness from a tax perspective differs significantly within the European Union. Already in 2009, France, Spain, and Germany showed the highest $EATR_C$ among the considered EU Member States with 34.7%, 32.8%, and 28.0%, respectively, and are still the top three high-tax countries in 2019. Whereas the German effective tax burden increased slightly due to, on average, increasing local scaling factors of the business tax and the lack of a major corporate tax reform, the $EATR_C$ in France and Spain decreased to 33.5% and 29.0% in 2019, respectively. Especially a rather strong $EATR_C$ decline of 3.8 percentage points can be observed in Spain due to several cuts in the statutory corporate income tax rate (2009: 30%, 2015: 28%, 2016: 25%). From a tax perspective, the most attractive investment condition was offered by Ireland in 2009 with an $EATR_C$ of 14.4%. While Ireland's effective corporate tax burden has been relatively constant over the observation period (2019: 14.1%), Hungary significantly reduced the statutory corporate income tax rate by 7% points from 16% to 9% with major tax reform in 2017. As a result, Hungarian corporations faced the lowest average effective tax burden in 2019 among the EU Member States under consideration.

Besides the most noticeable $EATR_C$ reduction in Hungary (-8.4 pp), the effective average tax burden for corporations in the United Kingdom decreased by 8.1 percentage points from 28.3% in 2009 to 20.2% in 2019. This substantial decline was also due to continuous reductions in the statutory corporate tax rate (from 28% in 2009 to 19% from 2017 onwards).⁵³ Another seven out of the eighteen considered EU Member States show a decline in the $EATR_C$ of slightly above or around 3% points. Most of these countries reduced their statutory corporate income tax rate (e.g., ES, FI, LU, SE) while Italy introduced a notional interest deduction in 2011 that led to a lower corporate income tax base. In contrast to the strong decreases in the $EATR_C$ among the considered Member States, only Austria, Belgium, Germany, and the Netherlands faced slight increases in the effective tax burdens of their corporate taxpayers ranging from 0.3% points (BE) to 0.9 percentage points (DE). These increases were mainly caused by local profit as well as real estate taxes. By contrast, the increases in the effective tax burden of Belgian corporations until 2017 were due to significant reductions in the eligible rate for the notional interest deduction (approximately 4.5% in 2009 to 0.2% in 2017). Hence, it broadened the corporate tax base and therefore increased the $EATR_C$. This increase was not fully offset by the Belgian tax reform in 2018 that reduced the statutory corporate income tax rate from 33% to 29%. The most substantial increase of 1.9% points between 2009 and 2019 in effective average tax burdens among the considered EU Member States can be observed in Slovakia. This

country significantly increased its corporate income tax rate by 4 percentage points in 2013. Collectively, the considered Northern and Eastern EU countries show a stronger trend towards declining effective average tax burdens on corporate investment in comparison to Central and Western EU Member States.

The four industrialized non-EU countries – Japan, Norway, Switzerland, and the United States – show, on average, a significantly higher level of the $EATR_C$ compared to the eighteen EU Member States during the last decade. Nevertheless, a declining trend of the $EATR_C$ can also be observed in these countries. The average $EATR_C$ of 31.0% in 2009 decreased to 25.3% in 2019. While, the $EATR_C$ remained almost constant in Switzerland over the observation period, the $EATR_C$ reductions in Japan, Norway, and the United States drove the aforementioned $EATR_C$ decline.

Due to the 'Tax Cuts and Jobs Act' of 2017, the United States – besides introducing several other tax law changes – reduced the federal statutory corporate income tax rate from 35% to 21% as of 2018. Compared to all of the other considered countries, this reform is the main driver for the most substantial decrease in the $EATR_C$ – specifically, 9.9% points – over the entire observation period.

Between 2009 and 2019, Japan also steadily reduced the statutory corporate income tax rate with a major decrease of 4.5% points from 30% to 25.5% in 2012. From 2014 onwards, the statutory tax rate was even further decreased; however, the respective changes were rather minimal (2015: 23.9%, 2016: 23.4%, 2018: 23.2%). The observed declines in the $EATR_C$ over the last decade have led to a 7.6% points reduction of the $EATR_C$ in Japan and thus to the most vital improvement of location attractiveness from a tax perspective after the United States (-9.9 pp), Hungary (-8.4 pp), and the United Kingdom (-8.1 pp). In accordance with the observations in Japan and the United States, the declining trend in the $EATR_C$ can also be observed in Norway. Similarly, it is primarily driven by reductions in the statutory corporate income tax rate. However, in contrast to the other two countries, there has not been one major reduction but rather several continuous steps with similar magnitudes. While the statutory corporate tax rate amounted to 28% for the years 2009 to 2013, Norway began to reduce it by 1% point in (nearly) each subsequent year, resulting in a statutory corporate tax rate of 22% in 2019.⁵⁴ Besides the cuts mentioned previously in the statutory tax rates, other temporary tax law changes could counteract (e.g., special reconstruction tax in JP from 2012–2015) or even amplify the effect (e.g., accelerated depreciation for machinery and equipment in NO from 2014–2016).

Notes

⁵³ The planned decrease of the corporate income tax rate to 16% in 2020 was abolished due to the Covid-19 pandemic.

⁵⁴ The statutory corporate tax rates for the years 2014 to 2019 are the following: 2014–2015: 27%, 2016: 25%, 2017: 24%, 2018: 23% and 22% in 2019.

Overall, the significant decrease of the effective corporate tax rate in Japan led to an alignment with the European high-tax countries. Whereas corporate taxpayers in Japan faced a nearly 7% points higher tax burden than their counterparts in France in 2009 (41.7% *v.* 34.7%), this difference in effective tax levels narrowed to 0.6% points ten years later. Hence, Japan was – from a tax perspective – as equally attractive for corporate investments as France in 2019. Similar improvements in location attractiveness can be observed for the United States. While the tax burden for corporations in the United States in 2009 was higher than in every other EU Member State under consideration, this has changed significantly due to their major tax reform in 2017 and no or rather moderate reforms in the EU high-tax countries, *i.e.*, France, Germany, and Spain. Hence, in 2019 the situation is reversed – with the EATR_C of 33.5%, 29.0%, and 28.9%, taxpayers in France, Spain, and Germany, respectively, faced higher tax burdens than US corporations with an effective average tax rate of 27.5%. Finally, with an almost constant EATR_C of approximately 18.6% over the last decade, Switzerland provides rather attractive investment conditions compared to the considered EU Member States. A lower EATR_C can only be observed in the European low-tax countries, specifically, the five Eastern Member States and Ireland.

In contrast to the observations mentioned previously, the overall trend of declining EATR_C over the last decade cannot be observed for the four key transition economies Brazil, China, India, and Russia. While the effective corporate tax burdens in Brazil, China, and India remained (almost) constant over the last decade, only a minor EATR_C decrease from 20.7% to 19.1% can be observed in Russia. Since the statutory corporate income tax rate is unchanged over the observation period, the EATR_C reduction is due to an exemption of fixed assets from the corporate property tax as of 2013. Compared to the overall sample, India offered the least attractive investment conditions in 2019 due to the absence of tax reforms during the last decade. The EATR_C of 40.8% in 2019 far exceeds the tax burden of every other high-tax country in the sample. The effective corporate tax burdens in Brazil and China are slightly above average compared to the considered Central and Western EU Member States while Russia's EATR_C is comparable with that of the Northern EU Member States, Denmark, Finland, and Sweden.

Overall, the authors demonstrate that, on average, there is a declining trend in the EATR_C over the last decade and

a remarkable dispersion of it across countries that persists over the observation period. As shown above, these developments depend on the national tax reforms of the countries under consideration. In general, the level of the effective corporate tax burden depends on the statutory corporate tax rate, tax base regulations, and the imposition of additional income and non-income taxes on corporations by the respective country. Hence, a comparison of the statutory corporate income tax rate with the corresponding EATR_C allows a conclusion on changes in the tax base and on other corporate taxes considered in the model.⁵⁵ It is evident that the EATR_C correlates strongly with the statutory corporate tax rate of the respective country. Hence, a high statutory tax rate is associated with a high EATR_C. This traces back to the assumption of a highly profitable investment. As profits increase, *i.e.*, an increasing pre-tax rate of return, the EATR_C approaches the statutory tax rate which becomes the decisive factor with regard to the corporate tax burden. Consequently, a higher profit level is associated with a declining impact of tax base elements, *e.g.*, depreciation allowances, relative to the absolute value of the profits.⁵⁶ Therefore, in the vast majority of the considered countries, the EATR_C is not significantly lower than the statutory and combined tax rate. This is valid for the years 2009 and 2019.

In ten out of the 26 OECD countries, the combined corporate income tax rate exceeds the statutory tax rate in 2009 and 2019.⁵⁷ This originates from additional (local) business taxes levied in these countries that can account for up to 50% of the combined corporate income tax rate, such as in Germany. Further, some local business taxes take the form of taxes on gross profits without a deduction allowance for financing and/or labour costs. Such taxes are levied, for example, in France (CVAE), Hungary (*iparu zési adó*), and Italy (IRAP).⁵⁸ In contrast to the vast majority of the considered countries, the effective average tax rate is higher than the statutory and combined tax rate in France, Ireland, Japan, Russia, and the United Kingdom in 2009. The reasons are generally twofold. First, in Japan, Russia, and the United Kingdom, the depreciation regulations according to the countries' tax law are less favourable than the economic depreciation assumed in the model for some of the considered assets. For example, in the United Kingdom in 2009, industrial buildings could be depreciated over 50 years under the straight-line method resulting in an annual depreciation rate of 2%. However, the underlying economic

Notes

⁵⁵ See D. Endres, K. Finke, J. H. Heckemeyer & C. Spengel, *Corporate Taxation Trends in Europe*, 41(10) Intertax 499–506 (2013).

⁵⁶ See S.-E. Bärsch, C. Spengel & F. Streif, *Chinese Direct Investments in the EU: New Tax Treaties and Effective Corporate Tax Burdens*, 20(6) Asia-Pacific Tax Bull. 430 (2014); C. Spengel, J. H. Heckemeyer, K. Nicolay, R. Bräutigam, O. Klar & K. Stutzenberger, *The Effects of Tax Reforms to Address the Debt-Equity Bias on the Cost of Capital and on Effective Tax Rates*, European Commission Taxation Papers, Working Paper N. 65–2016, Luxembourg 16 (2016).

⁵⁷ The combined corporate income tax rate exceeds the statutory tax rate in BE, BR, DE, ES, HU, IN, IT, JP, LU, and the US in 2009 and 2019.

⁵⁸ The tax on the added value of business was introduced in 2010 under the name of *cotisation sur la valeur ajoutée des entreprises*.

depreciation rate assumed in the model is significantly higher at 3.1%. Thus, these national tax regulations of the respective countries increase the net present value after taxes and lead to a higher $EATR_C$. Second, France, Japan, and Russia levied a wealth tax in general or only with regard to specific assets considered in the model in 2009. This tax increased the effective tax burden of corporations but is neither considered in the statutory nor in the combined corporate income tax rate. However, France and Russia abolished this tax or excluded the considered assets from the tax base during the observation period. Therefore, the $EATR_C$ was lower or equal to the statutory and combined tax rate in 2019.

Regarding Ireland, the explanation differs. Trading income is taxed at a statutory tax rate of 12.5% whereas non-trading income, such as interest income, is taxed at a much higher rate of 25%. Since the model also considers an investment in financial assets, the authors adjust for this issue which results in a higher effective average tax burden for corporations compared to the statutory and combined income tax rate on trading income.

Overall, in accordance with previous studies, the authors find a declining trend in statutory and effective corporate tax burdens in the EU. However, comparing this study's results to previous work,⁵⁹ it is observed that the downward trend of the effective average tax burden slowed down in the last decade. With regard to the transition economies of Brazil, China, India, and Russia, the authors cannot confirm this trend since the effective corporate tax burdens remained (almost) constant over the last decade.

3.2 Development of Effective Tax Burden on Highly Skilled Labour

3.2.1 The Human Resource Tax Analyser Model

To analyse the effective tax burden on highly skilled labour, the authors rely on the effective tax measure developed by Elschner and Schwager (2005), referred to as the Human Resource Tax Analyser.⁶⁰ This approach rests on the assumption that highly skilled employees are perfectly mobile across countries which allows them to demand a specific disposable income after taxes when

selecting among job offers. Based on the empirical evidence summarized in section 2.2, it is assumed that especially highly skilled employees in a competitive labour market can shift their respective personal income tax burden and tax-like social security contributions on labour income to the employer. Thus, differences in these country-specific non-wage labour costs lead to distortions in the cost employing a highly skilled employee. In particular, employers are required to compensate their employees for these higher charges on labour income in order to remain competitive in an international comparison. Otherwise stated, the higher the perceived labour costs are of companies due to taxes and social security contributions payable by the employer, the less attractive a country is for companies employing highly skilled employees there.⁶¹

To measure and analyse the differences in national tax regulations concerning labour costs, the methodology by Elschner und Schwager (2005) allows calculating the effective average tax burden for a fixed disposable income after taxes and social security contributions. The $EATR_L$ represents the tax wedge reflecting the share of the remuneration that does not benefit the highly skilled employee. Thus, the $EATR_L$ expresses how much the employer must expend in addition to the predetermined disposable income due to taxation. This is especially relevant when companies have to decide on the geographical location of highly skilled employees. High effective average tax rates indicate that the employer has to spend significantly more to compensate an internationally mobile employee. Alternatively, to express it in the context of this study, the higher the $EATR_L$, the less attractive a country is for companies employing highly skilled employees.

The $EATR_L$ is computed as the difference between the total remuneration of the employee (pre-tax value (E^*)) and the required fixed income after taxes and social security contributions (after-tax value (E)) divided by the total remuneration (pre-tax value (E^*)).

$$EATR_L = \frac{E^* - E}{E^*} \quad (3)$$

In accordance with the Devereux/Griffith methodology that is used to calculate effective corporate tax burdens, the Human Resource Tax Analyser incorporates

Notes

⁵⁹ See e.g., Bräutigam et al., *supra* n. 2.

⁶⁰ For a detailed explanation of the methodology, see C. Elschner & R. Schwager, *The Effective Tax Burden on Highly Qualified Employees – An International Comparison (1st ed.)*, Physica-Verlag (2005), Elschner & Schwager, *supra* n. 6. The Human Resource Tax Analyser is closest to the OECD publication series on 'taxing wages', however, there are two significant deviations. First, this approach suggests that social security contributions should not be entirely treated as tax-like contributions. Second, it takes into account the tax impacts on old-age contributions (Elschner & Schwager, *supra* n. 60).

⁶¹ In addition to the increase in labour costs of highly qualified employees due to shifted tax incidence on the employer, MNEs face an increasing number of countries that restrict the tax deductibility of very high salaries (e.g., of over USD 1 million in the United States and EUR 500,000 in Austria). These measures generally aim to dampen CEO compensation. Due to their high thresholds, the authors do not consider them in the context of this study in which a disposable annual income of EUR 100,000 is assumed.

information on current and future tax payments as well as charges that occur by both the employee and the employer in the context of the total remuneration in one period. In detail, the authors consider all personal income taxes, including surcharges, state, and municipality taxes, at the level of the employee. On the employer's side, payroll taxes applicable to the total wage costs are taken into account. Furthermore, both employees' and employers' social security contributions are considered as part of the tax burden as long as employees do not earn a specific individual benefit by participating in these schemes. Hence, the contributions to unemployment insurance and accident insurance are explicitly treated as tax-like contributions. On the other hand, due to the unavailability of the precise tax component in healthcare premiums, these contributions are not regarded as tax-like.⁶² Concerning mandatory public pension schemes, the benefits provided by such schemes are carefully accounted for according to the regulations currently in force in each country. Following Elschner and Schwager (2007), the fact that payments into a public pension scheme can at least partially be considered as insurance premiums even if the benefits provided are typically not actuarially fair is also considered.⁶³ In addition, the tax treatment of the respective social security contribution at the employee level affects the effective tax burden. If these contributions are tax-deductible, they reduce the taxable earned income and thus result in a lower tax payment.⁶⁴

Different types of compensation determine the total remuneration of employees. This study's analysis is restricted to cash compensations (75%) and contributions to old-age provisions (25%). The former is taxable in the year of payment whereas the treatment of the latter is not straightforward. If the contributions are paid out of taxed income, the resulting benefits are non-taxable whereas their initial exclusion from taxable income results in taxable old-age benefits. The intertemporal approach of Elschner and Schwager (2005) explicitly addresses the different timing of income payments and their consequences on taxes and social security contributions by considering personal characteristics of the highly qualified employee - like contribution years and life expectancy (see Table 2).

The disposable income for all locations is expressed in euros in order to obtain internationally comparable effective tax rates. Thus, the disposable income must be converted into the national currency of a country unless the local currency is the euro. To isolate fiscal changes and abstain from fluctuations in currency exchange rates, fixed nominal exchange rates are used as displayed in Table 7 in the Appendix.⁶⁵

Table 2 Parameters for Human Resource Tax Analyser

<i>Personal Characteristics of Highly Qualified Employee</i>	
Current age	40 years
Age at start of work	25 years
Age at retirement	65 years
Life expectancy	85 years
Status	Single, without children
<i>Economic parameters</i>	
Real interest rate (%)	5
Disposable income (baseline)	EUR 100,000
<i>Composition of remuneration</i>	
Cash components (%)	75
Old age contributions (%)	25

Note: Assumptions based on Elschner and Schwager (2005).

3.2.2 Tax Burden on Highly Qualified Employees – Country Comparison 2009-2019:

3.2.2.1 Statutory Personal Income Tax Rates

Although average effective tax rates should be the decisive factor for location choices, statutory top personal income tax rates are often highly relevant for individuals and can thus have an important signalling effect for many employees. Consequently, it is very likely that these tax rates

Notes

⁶² For simplicity, the authors follow the existing literature and assume that these contributions are insurance-equivalent. In this case, the employer's contributions are now part of the disposable income and increase it one for one; it results in tax-free income. Hence, the total tax burden decreases as the employer's contribution increases. DK, IE, ES, NO, and the UK, e.g., finance their social security system and thus health care largely by taxes. In these cases, the model does not allow explicitly taking into account the share of the tax burden i.e., allocated to health care financing. This, in combination with the simplifying assumption for existing health insurance schemes in other countries, might lead to a slight overestimation of the effective tax burden. For further details on the model assumptions, see Elschner et al., *supra* n. 6, at 523.

⁶³ See Elschner & Schwager, *supra* n. 6, at 566.

⁶⁴ The EATR_L in this study is thus appropriate for reflecting the complex interaction of national tax and social security regulations in an objective benchmark. It is not possible to break down the tax burden exactly into taxes and social security contributions, but this is also not the intention of the methodology used.

⁶⁵ Moreover, the authors do not adjust the assumed disposable income for inflation over time. In any case, the effect of inflation adjustments on the country rankings is moderate. Since the focus is on isolating changes in tax effects from other determinants of an employee's location choice, such as the cost of living, the authors do not convert the disposable income and other tax regulations (expressed in national tax currencies) into purchasing power parities. Further, this would also require converting disposable income within the euro region, thus preventing comparability of purely tax-driven changes.

could have an impact on international labour tax competition.⁶⁶ Therefore, a brief overview is first provided of the evolution of statutory top personal income tax rates over the last decade.

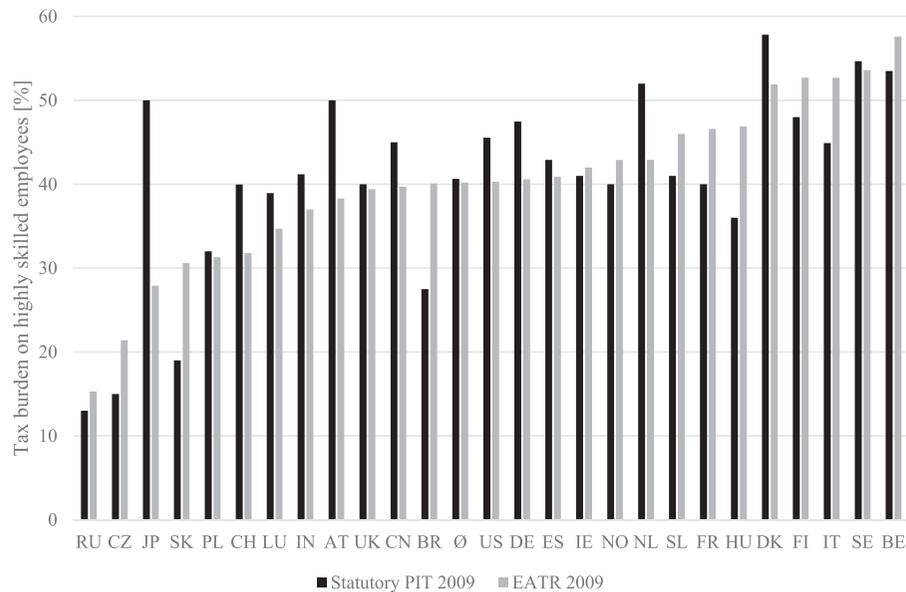
While corporate income is taxed at flat tax rates, the vast majority of the considered countries apply a progressive tax schedule for personal income taxation. Within this study's observation period, only a small number of countries, i.e., the Czech Republic, Hungary, Slovakia, and Russia, use a flat statutory tax rate – at least temporarily. In this case, the tax burden is primarily driven by the statutory tax rate of the respective country. In contrast, if a country applies a progressive tax schedule, the tax burden depends not only on the statutory tax rate but also on the size and distribution of the income brackets. Within the group of countries levying progressive tax rates on labour income, an incremental progression tariff is used, with the exception of Germany that applies a linear progression schedule. Both progression types have an income-dependent increase in the average tax rate. However, while the linear progression increases steadily, the increase in the incremental progression has a ripple effect depending on the size of the income brackets. The number of income brackets with a flat marginal tax rate is at least two (e.g., CZ, DK, IE, PL, SK) and can be

subdivided indefinitely (e.g., LU with up to 23 brackets). With an increasing number of income brackets, it approaches the linear progression. Figures 3 and 4 display the evolution of the top statutory personal income tax rates including local surcharges over the last decade (see Table 5 in the Appendix).⁶⁷

In contrast to the declining trend in statutory corporate income tax rates, a slight increase is observed in the unweighted average top personal income tax rate from 40.6% (2009) to 42.1% (2019). In addition, the simultaneous increase in the standard deviation (11.5% in 2009 to 12.4% in 2019) demonstrates a further divergence in statutory tax rates within this study's group of countries. In contrast, the overall spread of statutory personal income tax rates stagnated over the last decade resulting in a constant, substantial dispersion. In this regard, Russia levies the lowest personal income tax rate at 13% and Belgium (DK) the highest at approximately 58% in 2019 (2009). Still, significant differences in the level and development of top personal income tax rates can be observed between individual countries and regions.

Employees in the EU face an average statutory tax rate of 43.3% in 2019 which is slightly higher than the overall average in this study's country comparison. This results in above-average wage costs for employing a highly qualified

Figure 3 Statutory Tax Rates and Effective Tax Burdens on Highly Skilled Labour, 2009



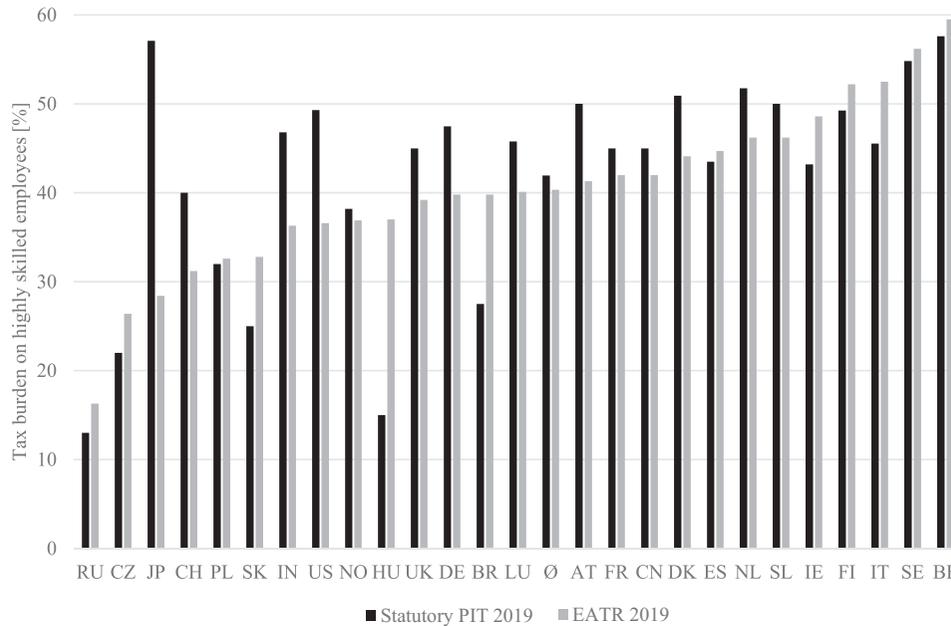
Source: BAK Economics and ZEW (2020), own calculation for BR, IN, JP, RU for the year 2009.

Notes

⁶⁶ See de la Feria & Maffini, *supra* n. 4, at 165.

⁶⁷ Several countries levy taxes also at the regional level (i.e., BE, CH, DK, FI, IT, JP, NO, SE, and the US) whereas a general surcharge is levied in seven countries (i.e., BE, CZ, DE, IE, LU, IN, and JP). For more details on the respective income brackets, see Table 5 in Appendix.

Figure 4 Statutory Tax Rates and Effective Tax Burdens on Highly Skilled Labour, 2019



Source: BAK Economics and ZEW (2020).

employee in this region. In addition, this region adheres to the general trend of slightly increasing income tax rates (41.9% in 2009 *v.* 43.3% in 2019), except for Denmark, Hungary, and the Netherlands. Among these three countries, Hungarian employees experienced the most drastic personal income tax reform. In 2011, Hungary not only reduced its top personal income tax rate by 20 percentage points but also abolished the progressive tax schedule. In doing so, it followed the trend of other Eastern EU countries (i.e., CZ in 2008, SK in 2009).

In general, there are significant differences at the regional level within the EU. The Central and Western Member States as well as the United Kingdom and Ireland have comparatively high statutory top tax rates with an average of 48%. The Eastern Member States stand out in the comparison group with low to moderate top tax rates ranging from below 25% in Hungary and the Czech Republic to 50% in Slovenia. In comparison, the four industrialized non-EU and the four transition economies indicate a stronger increase in personal income tax rates. Although this increase is strongly driven by increasing tax rates of individual countries, i.e., Japan (+7.1 pp), India (+5.2 pp), and the United States (+3.7 pp). Whereas most of these countries face relatively high tax rates of over 40%, Russia and Brazil have comparatively low statutory personal income tax rates.

In addition to the absolute level of the top statutory tax rates, however, the absence or length of the progression is also decisive for the effective tax burden. Within the considered countries, Austria, Germany, Switzerland, and the

United States are particularly distinct as the top personal income tax rate takes effect relatively late (e.g., DE: EUR 265,326, JP: EUR 271,089, CH: EUR 512,211, the US: EUR 608,259 and AT: EUR 1,000,000). In Austria, Switzerland, and the United States in particular, the top marginal tax rate is more comparable to a wealth surcharge as it only becomes effective at a very late stage.

3.2.2.2 Effective Average Tax Rates

In the second set of estimations, the $EATR_L$ is presented for an employee who is unmarried, without children, and demanding a disposable income of EUR 100,000 after taxes and charges (see Table 6 in the Appendix). In contrast to the evolution of the average statutory top personal income tax rate, an overall increase is not observed in the average effective tax burden over the last decade (40.2% in 2009 *vs.* 40.3% in 2019). Still, the results indicate a wide dispersion of effective tax levels on highly skilled employees across countries with a total spread exceeding 40 percentage points in both periods. In 2009, the $EATR_L$ ranged from 15.3% in Russia to 57.6% in Belgium while, in 2019, the lowest $EATR_L$ in Russia slightly increased to 16.3% whereas the highest $EATR_L$ increased to 59.5% for Belgium. To better illustrate these differences, the $EATR_L$ is translated back into total remuneration costs that an employer faces in each location.⁶⁸ Thus, in 2019, employers incurred expenses of EUR 119,474 in Russia to compensate their highly skilled employees for a disposable income of EUR 100,000

Notes

⁶⁸ To obtain the total amount of remuneration, transformation of equation (3) derives the following formula: $E^* = E/(1-EATR)$, with the disposable income $E=100,000$.

after taxes. In contrast, Belgium employers were required to pay EUR 246,914, more than twice that amount, to grant the same disposable income.

Among the considered countries, the EU Member States show, on average, an above-average level of the effective tax burden and an increase in the unweighted average $EATR_L$ of 42.8% in 2009 to 43.4% in 2019. This higher level of effective tax burdens is driven by the Central and Western EU Member States, Ireland, and the United Kingdom as their average tax burden is 45.7% in 2009 and 46.6% in 2019 which is significantly higher than the overall average. Except for the Eastern EU Member States, Germany, and the United Kingdom, all other Member States show effective tax rates above the unweighted average of 40.3% in 2019. With a tax burden of less than 40%, the two largest EU economies in terms of GDP, i.e., Germany and the United Kingdom, are similar to other major industrialized non-EU countries, such as the United States, and can also compete with emerging economies like India and Brazil. However, other large EU countries like Italy and France, even with France catching up since its major pension system reform in 2019⁶⁹ (-4.6 pp), lag behind. Luxembourg had a rather moderate effective tax burden of labour at 34.7% in 2009 but approached the overall average $EATR_L$ with 40.1% in 2019. Ireland, another rather small EU economy, showed one of the most significant increases in the effective tax burden (+6.6 pp) over the last ten years which is due to several cuts in personal tax credits, allowances, and the abolition of the employee's income ceiling from global social insurance.

Not surprisingly, the authors find that the Scandinavian countries levied relatively high tax levels – topped, however, by Belgium. Already in 2009, Belgium, Denmark, Finland, Italy, and Sweden raised the highest $EATR_L$ among the considered EU Member States with more than 50% and are still the top high-tax countries in 2019 with the exception of Denmark. Among these high-tax countries, a relatively strong $EATR_L$ decrease of 7.8 percentage points to 44.1% can be observed in Denmark in 2019 due to several reductions in the top statutory tax rate and adjustments in the progression schedule and personal allowances.

In comparison, Eastern EU countries face significantly lower effective tax burdens than their Central and Western counterparts, averaging 11 percentage points. As an exception, Slovenia is the only Eastern EU country with a tax burden of over 40% and thus belongs to the group of high-tax countries. Further, this region showed an opposite trend with even a slight reduction over the last decade at 35.2% in 2009 and 35% in 2019. However, this decrease was driven by the big tax reform in Hungary in 2011 that led to a decline of the Hungarian $EATR_L$ by

9.9 percentage points. This overcompensated the observed increases in the $EATR_L$ in the other Eastern Member States, e.g., the introduction of a solidarity surcharge in the Czech Republic in 2013 (+5 pp). Especially the countervailing reforms in the Czech Republic and Hungary, which had the lowest and highest tax burdens in the considered Eastern EU countries in 2009, have led to a significant convergence of the effective tax burden in this region.

In 2019, the four industrialized non-EU countries, i.e., Japan, Norway, Switzerland, and the United States, levied low to moderate effective tax burdens on labour ranging from 28.4% in Japan to 36.9% in Norway. Thus, these countries showed, on average, a significantly lower level and slightly decreasing $EATR_L$ compared to the EU counterparts during the last decade: The average $EATR_L$ decreased from 35.7% in 2009 to 33.3% in 2019. While a slight $EATR_L$ reduction is found in Switzerland, Japan faced a minor increase. The most interesting developments in this group of countries can be observed in Norway and the United States with rather large declines of 6 and 3.7 percentage points over the last decade. In both countries, the reduction is attributable to extensive reforms in 2018 and 2019 that not only adjusted personal income tax rates and brackets but also significantly increased various personal allowances and deductions for income-related expenses. In accordance with the other non-EU countries, the four key transition economies raised a moderate effective labour tax burden between 2009 and 2019 with a relatively constant average tax burden of approximately 33%. However, the range among these countries is much broader from 16.3% in Russia to 42% in China in 2019.

The main tax drivers of the effective tax burden are, on the one hand, the statutory personal income tax rate including its progressive evolution and, on the other hand, social security rates (if classified as charges)⁷⁰ in combination with income ceilings. Still, the composition of the effective tax rate, i.e., the split between taxes and contributions of the total effective average tax rate, varies across countries. In some, e.g., Hungary, contributions to social security outweigh the labour taxes. In others, e.g., Belgium, labour taxes account for by far the largest share of the total effective average tax rate. The personal income tax base, i.e., personal allowances, earned income allowances, deductibility of social security contributions, and taxation of old-age benefits, are typically of secondary importance at these high-income levels.

The absolute minimum and maximum of the effective average tax burden, i.e., Russia and Belgium, reflect the extremes of the distribution based on the statutory top tax

Notes

⁶⁹ The reform of the occupational pension system (integration of the two previously existing constructs into one system which is shown to be advantageous in the modelling, especially for high incomes) results in a significant reduction of the effective burden, i.e., accompanied by a slight reduction of the effective tax burden due to adjustments of the progression schedule of the personal income tax. For more information on the French pension tax reform in 2019, see, https://www.cleiss.fr/docs/regimes/regime_france/an_3.html (accessed 1 Aug. 2021).

⁷⁰ The authors explicitly treat the contributions to unemployment insurance and accident insurance as charges.

rate and therefore demonstrate the significant influence of the statutory tax rate on the effective average tax burden. Russia applies a flat personal income tax rate of only 13% with ceilings on old-age and unemployment social security contributions whereas Belgian employees already face a top rate of 57.6% on income above EUR 40,480 without ceilings in social security.

The EATR_L's sensitivity to the development of the personal income tax rates is also reflected in Spain. Initially, a continuous increase is observed in the Spanish effective tax burden up to 47.5% in 2013 after which the EATR_L levelled off at a constant rate of approximately 44%. The basis for this decline (-3.5 pp) was a comprehensive reform of personal income taxation in 2011.⁷¹ Since then, regions can independently select additional tax brackets and rates. As the focus in this study's analysis is on the capital, Madrid, that is referred to as a Spanish tax haven for personal income taxation,⁷² the authors capture the significant reduction of Madrid's regional top marginal tax rate.

Besides the top personal income tax rate, the progressive schedule is decisive for the effective average tax burden. Among other countries in this study's sample, Japan applies a long progression that results in a lower effective tax burden. An applicable incremental progression further enhances this effect. The Japanese top personal income tax rate is only applicable to the part of the taxable income exceeding EUR 271,089 in 2019 (see Table 5 in the Appendix). For this reason, the most substantial divergence is observed between the statutory tax rate and the EATR_L in Japan.⁷³ Similarly, the long progression drives the divergence in Germany, Luxembourg, Switzerland, the United Kingdom and the United States.

The second main driver of the effective average tax burden is the social security system and, in particular, the existence or absence of income ceilings above which no further contributions are payable. If there are comparably low ceilings, only smaller fractions of the income are subject to social security contributions, reducing the implicit tax burden. Although most countries have a rule to limit social security contributions, the approaches are quite heterogeneous. Not only do the contribution limits differ in their absolute amount, but they can also be restricted to the employee or employer as well as to different types of social insurance. Income ceilings are only seen for all branches of social security for both the employee and the employer in Austria, China, the Czech

Republic, Germany, India, Luxembourg, the Netherlands, Slovakia, Spain, the United Kingdom, and the United States. A particular low ceiling of less than EUR 3,500 exists in India which drives the divergence of the EATR_L from the statutory tax rate. Further, there are comparably low absolute amounts of social security contributions in Denmark that positively impact the tax burden.

Another example that demonstrates the importance of income thresholds on the effective average tax burden is the abolition of the proportional tax and the simultaneous increase of the top tax rates in the Czech Republic and Slovakia in 2013. The Czech Republic introduced a solidarity surcharge of 7% on top income earners (income above EUR 59,068) whereas Slovakia introduced a progressive tax system for individuals, increasing the top rate from 19% to 25% for taxable income above EUR 37,163. In both countries, the impact of the decreasing importance of social security contributions due to their ceilings outweighs the increase in personal income tax rates. These developments show the importance of ceilings on social security contributions, especially for high-income earners. By contrast, the absence of a social security contribution ceiling in Hungary drives the stronger increase in the EATR_L compared to Russia. This effect is enhanced by higher combined contribution rates (e.g., more than 40% in HU *v.* around 30% in RU⁷⁴). Belgium, Finland, Hungary, Ireland, Norway, and Slovenia do not apply any social security contribution ceiling, thus the overall contribution rate is payable on all income.

In contrast to the results on corporate investment, there is an increase in the top statutory tax rates for high-income earners which, in some countries, resembles the intention of a wealth surcharge on the superrich whereas the average effective tax burden on labour for a disposable income of EUR 100,000 remained relatively constant over the last decade.

3.3 Synthesis of Effective Average Tax Burdens of Both Indicators

To analyse the overall attractiveness of countries for investments from a tax perspective, the indicators for the effective average tax burden of companies and highly qualified employees are combined. Figure 5 graphically illustrates the EATR_C at the corporate level together

Notes

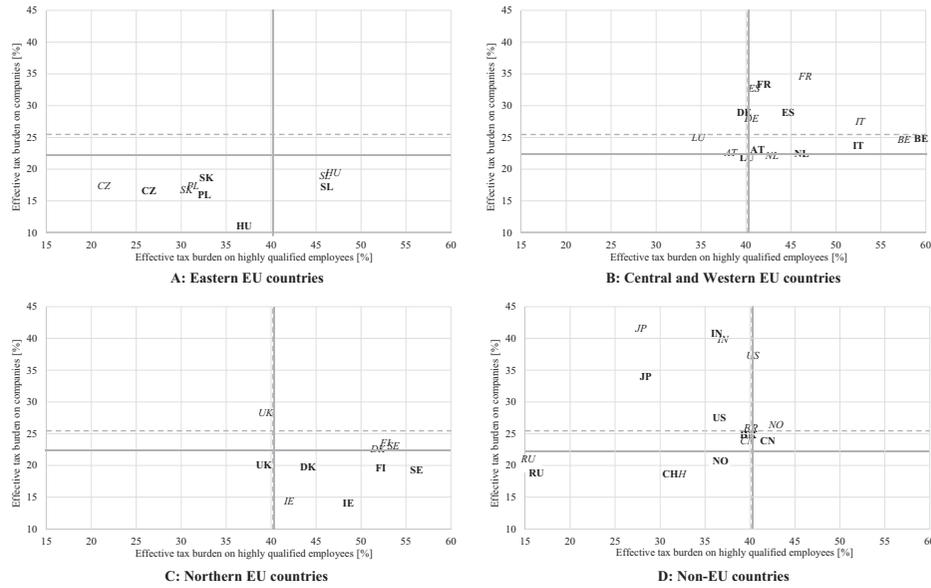
⁷¹ Since 2011, personal income tax rates are not only set at the federal level but also on a regional level. In detail, regions are allowed to introduce new tax brackets on top of those implemented by the federal level. For more institutional details on this reform, see Agrawal & Foremny, *supra* n. 30.

⁷² See Agrawal & Foremny, *supra* n. 30, at 214.

⁷³ A Japanese employee receives a gross income of approximately EUR 111,113. Existing personal allowances, allowances on earned income, tax-deductible social security contributions of the employee, and payments to an occupational pension plan result in a taxable income of EUR 66,136. For a taxable income above EUR 47,102 (JPY 6,950,000), Japanese employees are taxed at a rate of 35.1% (=23%+2.1%+10%) which combines the personal income tax, reconstruction income tax, and residence tax. The total tax burden is the sum of the tax burden of the individual steps.

⁷⁴ RU applies an income ceiling to the old age insurance (EUR 16,313) and the unemployment insurance (EUR 12,270). Contributions to health insurance and occupational accident insurance are not capped. In this study's model, especially contributions to unemployment insurance represent charges in contrast to the health insurance thus resulting in a higher increase in the effective tax burden. Further, in RU, only the employer faces contributions to the social security system.

Figure 5 Correlation of Tax Burdens on Corporations and Highly Skilled Employees, 2009 and 2019



Note: Figures A-D display the $EATR_C$ at the corporate level together with the $EATR_L$ of a single highly skilled employee with a disposable income of EUR 100,000 for the years 2009 and 2019 per country cluster. The y-axis reflects $EATR_C$, whereas the x-axis displays $EATR_L$. Italic (bold) letters reflect a country's position as of 2009 (2019). The (unweighted) averages are represented by the grey lines (dashed for 2009 and solid for 2019).

with the $EATR_L$ of a single highly skilled employee with a disposable income of EUR 100,000 for the years 2009 and 2019 per country cluster. The y-axis reflects the effective average tax burden of corporations whereas the x-axis displays the effective average tax burden of highly qualified employees. For the sake of comparability, a country's position as of 2009 (italic letters) and 2019 (bold letters) are displayed in the same figure. In addition, the (unweighted) averages are represented by the grey lines (dashed for 2009 and solid for 2019). Since the underlying methodologies to calculate the respective $EATR$ slightly differ, the focus is on the ranking and relative differences of both indicators for the respective countries in the following analysis.

At first glance, the significant reduction in the average $EATR_C$ already discussed above is striking (2009: 25.2%; 2019: 22.7%) whereas the average $EATR_L$ remains almost constant during the observation period (2009: 40.2%; 2019: 40.3%). Furthermore, the synthesis demonstrates that the effective tax burden levied on highly skilled labour may differ substantially from the effective tax burden imposed on companies. Comparing the figures in this regard shows that the overall picture for 2009 and 2019 is similar. However, some countries significantly moved their position – horizontally and/or vertically – resulting in a change in their location attractiveness for corporate investments and/or employing highly skilled employees. Hence, the synthesis leads us to the following conclusions for the countries under consideration:

Central and Western EU Member States, including Italy and Spain, are characterized by moderate to high tax burdens on labour with a trend towards above-average effective tax burdens in 2019. This development is amplified as the average $EATR_L$ was nearly constant over the last decade. Thus, in an international comparison, Central and Western EU countries are at a disadvantage in the tax competition on highly skilled labour. Among these countries, only Germany and France reduced their effective tax burden on highly skilled employees while the vast majority of countries in this cluster increased it. Throughout the observation period, Belgium offered the least attractive conditions for investments in highly qualified employees. With an effective average tax burden of approximately 60%, Belgium was nearly 20% points above the overall average. For companies, on the other hand, the situation was more differentiated but one that is typical of corporate tax competition. Large economies such as France and Germany impose a high $EATR_C$ while taxpayers in the smaller countries such as Austria, Luxembourg, or the Netherlands face rather moderate corporate tax burdens. As of 2019, only Luxembourg provides a below-average effective corporate tax burden. While Italy and Spain increased their location attractiveness for corporate investments with significant reductions in their effective average corporate tax burden over the last decade, the opposite effect can be observed for the majority of the Central and Western European countries. With a nearly constant $EATR_C$, these countries became less attractive for corporate investments from a tax

perspective. Taken together, countries of this cluster levy moderate to high effective average tax rates on companies and highly qualified employees.⁷⁵

Within the Northern EU countries, including Ireland and the United Kingdom, Scandinavian companies already faced a below-average effective corporate tax burden, and Ireland offered the most attractive investment conditions at the beginning of the observation period. In contrast, the United Kingdom imposed one of the highest effective tax burdens within the EU in 2009. Due to significant tax reductions for companies in the Scandinavian countries, i.e., Denmark, Finland, and Sweden, and in the United Kingdom, all countries of this cluster levy a below-average $EATR_C$ in 2019. Concerning highly qualified employees, the evolution is more dispersed. Whereas Sweden and Ireland significantly increased the effective tax burden on labour, the $EATR_L$ in the United Kingdom remained rather constant. Denmark occupies a special position in this country cluster as it drastically reduced its effective tax burden on highly qualified employees. Overall, this country cluster is characterized by below-average taxation of capital and a rather above-average taxation of labour. The most pronounced representative of this tax strategy is Ireland which was the most attractive location from a corporate tax perspective while imposing moderate taxes on labour in 2009. Over the last decade, it has maintained its attractiveness for corporate taxation but is now one of the five EU countries with the highest tax burden on highly skilled employees.

The group of Eastern EU Member States shows an ambivalent development in the last decade. In an international comparison, the considered Eastern EU countries remain the most fiscally competitive, at least with respect to corporate taxation. Except for Slovakia, all countries in this group show at least a slightly declining effective average corporate tax burden. Hungary, however, is an exception as it has almost halved its effective corporate tax burden to just over 10%. In contrast to their reputation as low-tax countries for corporate taxation, there is no clear trend among Eastern EU countries in the taxation of highly skilled employees. The declining corporate tax burden contrasts with a slight increase in effective labour taxation in the majority of the Eastern EU countries. Hungary also stands out in this context because it has significantly reduced its effective average tax burden on highly skilled labour, unlike all of the other countries in this cluster. Hungary has thus developed from a location with a rather moderate tax burden to a low-tax country for both indicators. With the exception of Slovenia providing above-average taxation on labour, all other countries in

this cluster are characterized by below-average taxation on capital and labour.

Among the non-EU countries, a distinction must be made between several country clusters. Brazil, China, and Norway tax corporations and highly skilled labour on a moderate level close to the average effective tax burden of the comparison countries. In contrast, Russia and Switzerland adhere to a clear low-tax strategy for corporate and labour taxes. Finally, India, Japan, and the United States differ remarkably from all other analysed countries. In 2009, the tax burden on companies was among the highest of all countries considered. Japan and the United States significantly reduced the $EATR_C$ during the observation period but were still among the high-tax countries in 2019. In contrast, highly qualified labour is taxed quite moderately or even at a comparably low level. Thus, their strategy consists of very moderate taxation of highly skilled employees combined with a (rather) substantial tax on corporate income. Especially due to the latter group, i.e., Japan and the United States, the effective corporate tax burdens converge towards the average tax burden in 2019. India did not have substantial changes in the last decade and thus occupies the last position for corporate investments over the total duration of the observation period. In contrast to all other non-EU countries, China slightly increased its overall tax burden on highly skilled employees whereas it remained nearly constant or even slightly decreased in other non-EU countries. Over the entire observation period, Russia holds the top position with the lowest tax burden for highly skilled employees.

Overall, based on the $EATR$ s for the majority of the considered countries, a clear pattern can be identified in terms of the tax strategies selected for corporate investment and labour in 2019. Thus, the countries can either pursue a strategy for which both indicators are taxed at a high or low tax rate (relative to the average) or for which a mix of these two strategies is chosen.

First, it is noticeable that the considered Eastern EU Member States – except for Slovenia – as well as Russia and Switzerland follow a classic low-tax strategy for both indicators. Further, larger economies like the United Kingdom and Norway switched from rather above-average tax burdens on corporations (and even on labour in NO) to a classical low-tax strategy over the last decade. By contrast, representatives of the second strategy – specifically, Belgium, France, Italy, and Spain – impose above-average effective tax burdens on corporations and highly skilled labour. Therefore, these countries offer the least attractive conditions from a tax perspective for corporate investments and employing highly skilled employees whereas countries belonging to the first group are the most attractive.

Notes

⁷⁵ With regard to corporate $EATR$ s, moderate tax burdens are imposed by AT, LU, and NL whereas BE, DE, and FR levy high corporate tax burdens. Concerning highly skilled employees, AT, DE, FR, and LU tax them at a moderate level while the tax burden in BE and NL is high compared to the overall sample.

Besides these two strategies, there is a clear distinction between two (regional) groups that pursue a mixture of both strategies by taxing one indicator above average and the other below average. The considered Northern EU Member States, as well as Ireland and Slovenia, are characterized by a below-average effective average tax burden on mobile capital income whereas the less mobile factor labour – in this study’s analysis, highly qualified employees – face an above-average $EATR_L$. In the fourth strategy, the tax burden on both indicators is reversed: Germany, India, Japan, and the United States tax corporations above and highly-skilled employees below average. Thus, these countries offer attractive investment conditions for one indicator but are less attractive for the other.

Finally, over the last decade, several changes can be determined in countries’ location attractiveness that partially led to a reallocation of countries between the four groups mentioned previously. The reasons for it are two-fold. On the one hand, some countries actively influenced their position via tax reforms (e.g., DK, HU, NO, UK, US). On the other hand, due to the tax competition of several considered countries, passive states that lack major tax reforms were at a disadvantage and became, in general, less attractive for investments in capital and labour (e.g., BR, DE).

4 FUTURE DEVELOPMENTS AND CHALLENGES

In the context of current political developments and progressing digitalization, it is unclear whether the ‘race to the bottom’ with regard to statutory corporate tax rates will continue in the future. Immediately after the end of this study’s observation period, hence in the years 2020 and 2021, it can still be observed that some countries are improving their location attractiveness for corporate investments by reducing their statutory corporate income tax rate. For example, Belgium decreased its statutory tax rate from 29% to 25% in 2020. France, a high-tax EU country, also demonstrated improvements in its location attractiveness by gradually reducing its statutory tax rate from 33.3% in 2019 to 27.5% in 2021. Due to these reforms and a lack of action in Germany, France eliminated the $EATR_C$ difference of 4.5 percentage points in 2019 between both countries and became equally attractive from a tax perspective. However, not only middle to high-tax countries showed positive developments in this

regard but also Switzerland that follows a classic low-tax strategy improved its position even further ($EATR_C$ 2019: 18.6%; 2020:17.4%⁷⁶

Nevertheless, in the short term, the economic consequences of the Corona crisis that affected countries worldwide unexpectedly in 2020 might impact the further development of tax competition. In order to delay the spread of the virus, contact and exit restrictions have been issued, private and public events have been banned, and business closings have been ordered (known as lockdowns). This has led to a decrease in both demand and supply that are exacerbated by the disruption of international supply chains. As a result, corporations of several industries that were profitable before the crisis faced enormous revenue declines leading to a loss-making situation. Therefore, at least in the short term, the focus of tax policy has changed. As a primary goal, governments worldwide have utilized tax policy instruments to ensure firms’ liquidity and enhance their cash flow. In the mid-term, measures such as accelerated or enhanced depreciation schemes will be (temporarily) implemented with the objective of economic recovery by vigorously promoting corporate investments and consumption. It is evidently clear that tax and non-tax measures drastically increased government spending. Hence, in the long run, these additional expenditures must be financed by fiscal consolidation measures. Therefore, as the crisis impacted all economies worldwide, it seems unclear whether the race to the bottom concerning statutory corporate tax rates will continue in the near future. Although Austria will reduce its statutory corporate income tax rate of 25% by 1 percentage point in 2023 and 2024,⁷⁷ other countries, like the United Kingdom, already announced tax rate increases (in the case of the United Kingdom, from 19% to 23% until 2023⁷⁸). Moreover, the current location attractiveness of a country might influence the discussion on whether to increase the tax burden on corporate investments. Finally, in a downturn of the economy, lowering statutory tax rates can counteract the introduced tax measures since it will decrease the tax shield of enhanced depreciation regimes and losses that can be offset against future profits.

Another current political development might curb the trends in tax competition on corporate investments that were observed over the last decades, namely, a global minimum tax. As of 9 July 2021, over 130 countries of

Notes

⁷⁶ Simultaneously, CH abolished the preferential tax treatment for holding companies that were not or only to a minor extent liable to profit tax at the cantonal level. Due to the model assumptions, this is not included in this study’s calculations. For further detailed information, see Federal Department of Finance (Schweizerische Eidgenossenschaft) (2021), <https://www.efd.admin.ch/efd/en/home/the-fdf/legislation/abstimmungen/staf/ueberblick-massnahmen.html>.

⁷⁷ See Art. 2 Bundesgesetz, mit dem das Einkommensteuergesetz 1988, das Körperschaftsteuergesetz 1988, das Umgründungssteuergesetz, das Umsatzsteuergesetz 1994, das Elektrizitätsabgabegesetz, das Transparenzdatenbankgesetz 2012, das Investmentfondsgesetz 2011 und das Finanzausgleichsgesetz 2017 geändert werden sowie das Nationale Emissionszertifikatehandelsgesetz 2022 erlassen wird (Ökosoziales Steuerreformgesetz 2022 Teil I – ÖkoStRefG 2022 Teil I); https://www.bmkoes.gv.at/dam/jcr:46ab1363-15fd-4967-af05-92240245ee10/1_21%20Teil%201%20Gesetz.pdf (accessed 1 Feb. 2022).

⁷⁸ For detailed information on the UK tax reform, see, <https://commonslibrary.parliament.uk/research-briefings/cbp-9178/> (accessed 1 Feb. 2022).

the OECD/G20 Inclusive Framework on BEPS have agreed on a two-pillar solution to address the tax challenges arising from the digitalization of the economy⁷⁹ for which the second pillar constitutes the global minimum tax. The OECD Model Rules⁸⁰ and the draft Council Directive of the European Commission⁸¹ released in December 2021 provided further details of its design. For MNEs with a group turnover of at least EUR 750 million, the minimum tax level is fixed at a rate of (at least) 15%. This constitutes the benchmark against which the effective corporate tax payable is assessed whereby the Model Rules and the draft Council Directive focus on a country-by-country analysis.⁸² The major argument on its introduction is based on the strong dispersion of effective corporate tax rates across countries (see section 3.1.2) and empirical findings (see section 2.1), demonstrating that firms do not necessarily choose investment locations according to productivity but according to tax differentials. As a sufficiently substantial number of countries has agreed to levy minimum taxes, low tax countries could be inclined to increase their national corporate tax rate up to the minimum tax rate in the future as this would not increase the firms' tax burden (since these corporations would pay the minimum tax rate anyway). A minimum tax reduces tax differentials and thus lowers the distortion-induced efficiency losses, i.e., it sets a floor for tax competition clearly above 0%.

With regard to this study's estimates of the $EATR_C$, two of the considered countries are significantly below the 15% threshold (HU: 11.1%, IE: 14.1%), assuming that the corresponding tax base of the minimum tax would be in accordance with this study's model assumptions. Thus, for MNEs operating from or making payments to these countries, cross-border activities would increase the effective tax burden up to the determined minimum tax level. However, one should treat these observations as a tentative approximation as the impact of the minimum tax depends on several conditions: First, the final scope of the minimum tax; second, the exact design of the tax base; and, third, the specific investment mix of an MNE as these can significantly affect the effective tax burden.⁸³

In addition, the tremendous pace of new digital innovation and digital transformation raises the relevance of an attractive tax environment for highly skilled labour. With an increasing international demand for highly qualified employees due to growing investments in digitalization⁸⁴ and a limited labour supply, MNEs face an intensifying international competition. As a result, it is even more difficult to pass on the tax burden to employees and consequently increases the employer's non-wage labour costs. A (comparatively) high taxation of labour income can therefore not only lead to new jobs tending to be created in low-tax countries but also to the relocation of existing jobs abroad.⁸⁵ The increasing digitalization of business models and working conditions, i.e., remote working, amplifies this trend of international flexibility of highly skilled labour demand. In particular, services that can also be provided digitally (e.g., IT services) require fewer locally bound employees; the pandemic further accelerated this development. A rising phenomena are digital nomads – an extreme case of remote working – that are location-independent, use technology for their work, and live a nomadic lifestyle with frequent travels.⁸⁶ Current analyses show that especially highly skilled employees benefit from this trend as remote working opportunities are increasingly found in this group. In addition, employees with remote-working jobs seem to receive higher remunerations.⁸⁷ Hence, a cross-country relocation of highly skilled employees could – from a country perspective – not only pose risk on revenues from the personal income taxation and the social security system. It may also negatively affect spillover effects associated with these earners such as a higher propensity to consume or the transfer of knowledge.⁸⁸ From this perspective, a reduction in the tax wedges that are comparatively high in most of the analysed countries and particularly among Central and Western EU countries is required to remain or improve the location attractiveness for investments in the knowledge-based, digital economy. As empirical evidence indicates, providing tax incentives for labour is a promising tax instrument especially for small economies as the elasticities of worker mobility are

Notes

⁷⁹ See OECD, *Statement on a Two-Pillar Solution to Address the Tax Challenges Arising From the Digitalisation of the Economy*, OECD/G20 Base Erosion and Profit Shifting Project (OECD Publishing, Paris 2021a).

⁸⁰ See OECD, *Tax Challenges Arising from the Digitalisation of the Economy – Global Anti-Base Erosion Model Rules (Pillar Two): Inclusive Framework on BEPS* (OECD Publishing, Paris 2021).

⁸¹ See European Commission, *Proposal for a Council Directive on ensuring a global minimum level of taxation for multinational groups in the Union*, COM(2021) 823 final, Brussels (2021).

⁸² For further details, see OECD, *supra* n. 80 and *ibid.*

⁸³ For an overview on the effective tax burden on investments in digital business models, see Spengel et al., *supra* n. 6.

⁸⁴ See B. Balsmeier & M. Woerter, *Is this Time Different? How Digitalization Influences Job Creation and Destruction*, 48 *Research Pol'y* 103765–1 (2019).

⁸⁵ See R. Niemann & U. Schreiber, *Herausforderungen und Entwicklungsperspektiven des Steuersystems*, 72 *Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung* 10 (2020).

⁸⁶ For further information on digital nomads, see S. Hensellek & N. Puchala, *The Emergence of the Digital Nomad: A Review and Analysis of the Opportunities and Risks of Digital Nomadism*, in *The Flexible Workplace* 195–241 (M. Orel, O. Dvoutely & V. Ratten eds, Human Resource Management. Springer (2021)).

⁸⁷ See J. I. Dingel & B. Neiman, *How Many Jobs can be Done at Home?*, 189(2) *J. Pub. Econ.* 104235–2 (2020).

⁸⁸ See de la Feria & Maffini, *supra* n. 4, at 164.

particularly high for them. Therefore, they gain the most from the introduction of preferential tax schemes for foreigners. However, introducing such incentives tends to intensify tax competition among EU countries.⁸⁹ In addition, the increasing mobility of workers and, in particular, digital nomads that work as freelance contractors or are self-employed, could challenge existing tax systems and could lead to significant administrative and compliance issues. Thus, countries might have to deal with the question of tax residency and tax compliance to ensure that these digital nomads do not escape personal income taxation.⁹⁰

In the context of increasing restrictions on corporate tax planning and the relevance of labour in digitalization processes, countries might explore new paths to retain or improve their location attractiveness for corporate and labour investments. For example, with regard to the determination of the minimum tax, countries could reclassify existing non-profit taxes as profit taxes in order to avoid an increasing corporate tax burden for domestic MNEs. As a different alternative, they could reduce other business charges of MNEs, such as non-wage labour costs, to improve their location attractiveness. In the context of this study's results, the authors ascertained a significant spread in the effective labour tax burden in the concerned countries (RU: 16.3%; BE: 59.5%) and thus a varying scope for reductions in non-wage tax costs faced by the employer. While the Eastern EU Member States (except SL), Russia, and Switzerland pursue a low-tax strategy for employees, the leeway is most limited in Russia and Hungary due to the already implemented flat tax and comparatively low statutory personal income tax rates of 13% and 15%, respectively. In the other affected countries, and particularly among the Scandinavian countries characterized by a relatively high $EATR_L$, the burden could be reduced. This could be accomplished by either increasing the progression schedule at which the proportional (top) tax rates take effect and by introducing or extending existing tax incentives for highly qualified employees. Such – temporarily restricted – preferential tax regimes for highly skilled foreigners in the form of partial tax holidays on labour income or a favourable flat tax rate are well-established tax instruments (e.g., NL: 1985, DK: 1991, FI: 1999, SE: 2001, FR: 2004, ES: 2005, IT: 2011) among European countries. This is especially evident in the Member States with an above-average tax burden that mitigates the negative impact of high taxes on the recruitment of internationally mobile foreigners (e.g., experts and managers).

5 CONCLUSION

Globalization has led to a reduction in trade barriers and transportation costs which has increased capital mobility and the transmission of ideas through labour mobility. Thus, governments compete for establishing an attractive environment for multinational corporations' investments in order to strengthen their competitiveness and comparative advantages at the international level. The rapid digital transformation process of companies, including a change in employees' working environments, exacerbates the competition among states. To decide on the best location for corporate investments and employing highly skilled employees, multinational firms include tax and non-tax factors in their decision-making. According to previous literature, it is well-known that governments lowered especially corporate tax rates over the last decades to attract corporate investments.⁹¹ However, since there is a shift from routine to non-routine tasks in the course of digitalization, providing an attractive tax environment for highly skilled employees will become increasingly important. Consequently, this study not only focuses on the trends in effective tax burdens of corporations but enriches the analysis by elaborating on a country's tax environment for highly skilled employees. The synthesis of both indicators provides valuable insights regarding the tax strategy of a country and allows drawing conclusions on the scope for future tax competition, including an analysis of ongoing political developments.

Analysing the development of tax burdens on corporations and highly skilled employees for twenty-six countries from 2009 to 2019, the authors find that the declining trend in statutory and effective corporate tax burdens continues. However, compared to previous works studying a longer time horizon, it is realized that the downward trend of the effective average tax burden on corporations slowed down over the last decade. The results regarding the trends in taxation of highly skilled employees differ significantly compared to the developments on effective corporate tax burdens. While increases are observed in the top statutory tax rates for high-income earners which, in some countries, resembles the intention of a wealth surcharge on the superrich, the average effective tax burden on labour for a disposable income of EUR 100,000 remained relatively constant.

The synthesis of both indicators offers additional insights: Eastern EU Member States – except for Slovenia – as well as Russia and Switzerland impose below-average effective tax burdens on corporations and highly skilled labour. Hence, these countries adhere to a clear low-tax strategy by offering the most attractive

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⁸⁹ See Kleven et al., *supra* n. 32, at 336, 376.

⁹⁰ See de la Feria & Maffini, *supra* n. 4, at 165.

⁹¹ For the development in the EU, see e.g., Bräutigam et al., *supra* n. 2, at 357.

investment conditions from a tax perspective. By contrast, Belgium, France, Italy, and Spain can be classified as high-tax countries compared to the sample average, indicating they are least attractive in this context. In addition, several considered countries pursue a mixture of both strategies. Northern EU Member States as well as Ireland and Slovenia are characterized by a below-average effective average tax burden on corporations whereas the less mobile factor labour faces an above-average EATR_L. The reversed situation can be observed in India, Japan, and the United States that tax corporations above and highly-skilled employees below average. Thus, these countries offer attractive investment conditions for one indicator but are less attractive for the other. Overall, the authors perceive several changes in countries' location attractiveness between 2009 and 2019, also leading in part to changes in the tax strategies mentioned previously. The reasons for it are twofold. On the one hand, some countries passed tax reforms with significant changes, especially regarding the tax rate, like Denmark, Hungary, and the United States. On the other hand, due to the tax competition of several considered countries, passive states like Brazil or Germany that lack major (corporate) tax reforms were at a disadvantage and became, in general, less attractive for investments in capital and labour.

The advantage of this study's methodology, which allows quantifying the extent of tax changes on the effective tax burden, represents a limitation at the same time. Among a variety of important location factors such as the general price level, political stability, infrastructure, and availability of qualified labour, the authors specifically target taxes. Especially in the context of industrialized and transition economies, other location factors might have a significant impact on the location decision of corporate investments and highly skilled employees. In addition, this study's models build on certain economic assumptions as outlined in the methodology sections (sections 3.1.1., 3.2.1), and certain elements of the tax system must be implemented in a stylized manner. In particular, in the context of labour taxation, some of the results must be interpreted with appropriate caution as the authors cannot capture the country-specific public health benefits available for tax-funded health care systems. Nevertheless, the results provide an objective benchmark for assessing the attractiveness of a location from a tax perspective. This could be used by political and corporate decision-makers in combination with information on other location factors to assess countries' overall attractiveness for investments.

In the context of the discussion on post-Covid-19 consolidation measures and the global minimum tax for companies, it is reiterated that effective average tax rates for companies and labour are an objective benchmark for analysing current tax developments. These measures are well suited to provide timely evidence on, in particular, unintended tax distortions in the investment behaviour of tax reforms as well as tax policy options and a

potential need for action. In the short term, the corona crisis will affect the future development of corporate tax competition. Necessary measures to delay the spread of the virus have led to a supply and demand shock and a drastic decline in corporate revenues. To counteract the economic consequences of the crisis, governments worldwide have imposed (temporary) tax measures such as extended loss-reliefs, enhanced depreciation regulations, etc. in an attempt to support the recovery process of corporations. However, additional government spending must be financed by fiscal consolidation measures. Therefore, as the crisis impacts all economies worldwide, it seems unclear whether the race to the bottom concerning statutory tax rates will continue in the near future. Furthermore, the agreement of over 130 OECD countries on a minimum tax for large corporations might significantly impact corporate tax competition in the long run and can establish a new lower bound in the race to the bottom regarding corporate tax rates. Future research could address the integration of global minimum taxation into the existing model. In particular, it could analyse heterogeneous effects on the effective tax burden of different types of companies (manufacturing, digital business models, R&D intensive businesses) in a domestic and cross-border setting. In addition, the decision on a corporate minimum tax and the fast-approaching digitalization of firms might shift the focus of tax competition from corporate tax burdens to effective tax levels on highly skilled employees. Future research should closely monitor developments in personal income taxation with numerous newly introduced special regimes for highly qualified employees and the increasing potential of remote working. In this context, there is not only the risk of increasing tax competition but also of a loss of tax revenues.

6 BIBLIOGRAPHY

- D. R. Agrawal & D. Foremny, *Relocation of the Rich: Migration in Response to Top Tax Rate Changes from Spanish Reforms*. 101(2) *Rev. Econ. & Statistics* 214–232 (2019).
- U. Akcigit, S. Baslandze & S. Stantcheva, *Taxation and the International Mobility of Inventors*, 106(10) *Am. Econ. Rev.* 2930–2981 (2016).
- U. Akcigit, J. Grigsby, T. Nicholas & S. Stantcheva, *Taxation and Innovation in the 20th Century*. NBER Working Paper Series, 24982 (2018).
- R. Altshuler & H. Grubert, *Repatriation Taxes, Repatriation Strategies and Multinational Financial Policy*, 87 *J. Pub. Econ.* 73–107 (2002).
- H. Amberger, K. S. Markle & D. M. P. Samuel, *Repatriation Taxes, Internal Agency Conflicts, and Subsidiary-Level Investment Efficiency*, 96(4) *Accounting Rev.* 1–25 (2021).
- A. J. Auerbach, *Who Bears the Corporate Tax? A Review of What We Know*, 20 *Tax Pol'y & Econ.* 1–40 (2006).

- BAK Economics and ZEW, BAK Taxation Index für Arbeitnehmer 2019/2020 (2020), <https://baktaxation.bak-economics.com/bak-taxation-index-fuer-hochqualifizierte> (accessed 5 August 2021)
- B. Balsmeier & M. Woerter, *Is this Time Different? How Digitalization Influences Job Creation and Destruction*, 48 Research Pol'y 1–10 (2019).
- S. Barrios, H. Huizinga, L. Laeven & G. Nicodème, *International Taxation and Multinational Firm Location Decisions*, 96(11–12) J. Pub. Econ. 946–958 (2012).
- S.-E. Bärsch, C. Spengel & F. Streif, *Chinese Direct Investments in the EU: New Tax Treaties and Effective Corporate Tax Burdens*, 20(6) Asia-Pacific Tax Bull. 427–432 (2014).
- A. Bénassy-Quéré, L. Fontagné & A. Lahrière-Révil, *How Does FDI React to Corporate Taxation?*, 12(5) Int'l Tax & Pub. Finance 583–603 (2005).
- Y. Benzarti & J. Harju, *Using Payroll Tax Variation to Unpack the Black Box of Firm-Level Production*, NBER Working Paper No. 26640 (2020).
- Y. Benzarti & J. Harju, *Can Payroll Tax Cuts Help Firms During Recessions?*, 200 J. Public Econ. 104472 (2021).
- A. Bozio, T. Breda & J. Grenet, *Does Tax-Benefit Linkage Matter for the Incidence of Social Security Contributions?*, IZA Discussion Paper No. 12502 (2019).
- T. Buettner, *The Impact of Taxes and Public Spending on the Location of FDI: Evidence from FDI-flows Within Europe*, SSRN Electronic J. (2002), <http://www.ssrn.com/abstract=335724>
- T. Buettner & M. Ruf, *Tax Incentives and the Location of FDI: Evidence from a Panel of German Multinationals*, 14(2) Int'l Tax & Pub. Fin. 151–164 (2007).
- T. Buettner & G. Wamser, *The Impact of Nonprofit Taxes on Foreign Direct Investment: Evidence from German Multinationals*, 16(3) Int'l Tax & Pub. Fin. 298–320 (2009).
- R. Bräutigam, K. Stutzenberger & C. Spengel, *The Development of Corporate Tax Systems in the European Union from 1998 to 2017: Qualitative and Quantitative Analysis*, 47(6/7) Intertax 536–562 (2019).
- S. Chen, L. De Simone, M. Hanlon & R. Lester, *The Effect of Innovation Box Regimes on Investment and Employment Activity*, SSRN Electronic J. (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3864574.
- J. G. Cummins, K. A. Hassett & R. G. Hubbard, *Have Tax Reforms Affected Investment?*, 9 Tax Policy & Econ. 131–149 (1995).
- R. B. Davies, I. Siedschlag & Z. Studnicka, *Corporate Taxation and the Location Choice of Foreign Direct Investment in EU Countries*. ESRI Working Paper, 591 (2018).
- L. De Simone & M. Olbert, *Real Effects of Private Country-by-Country Disclosure*, Forthcoming in Accounting Rev. (2021), <https://doi.org/10.2308/TAR-2020-0714>.
- J. I. Dingel & B. Neiman, *How Many Jobs can be Done at Home?*, 189(2) J. Pub. Econ. 04235 (2020).
- R. de la Feria & G. Maffini, *The Impact of Digitalisation on Personal Income Taxes*, 2 Brit. Tax Rev. 154–168 (2021).
- R. A. de Mooij & S. Ederveen, *Taxation and Foreign Direct Investment: A Synthesis of Empirical Research*, 10 Int'l Tax & Pub. Fin. 673–693 (2003).
- M. A. Desai, C. F. Foley & J. R. Hines, *Foreign Direct Investment in a World of Multiple Taxes*, 88(12) J. Pub. Econ. 2727–2744 (2004).
- M. P. Devereux & H. Freeman, *The Impact of Tax on Foreign Direct Investment: Empirical Evidence and the Implications for Tax Integration Schemes*, 2 Int'l Tax & Pub. Fin. 85–106 (1995).
- M. P. Devereux & R. Griffith, *Taxes and the Location of Production: Evidence from a Panel of US Multinationals*, 68(3) J. Pub. Econ. 335–367 (1998).
- M. P. Devereux & R. Griffith, *The Taxation of Discrete Investment Choices*. Institute for Fiscal Studies Working Paper, 98/16 (Revision 3) (1999), <http://www.ifs.org.uk/wps/wp9816.pdf>
- M. P. Devereux & R. Griffith, *Evaluating Tax Policy for Location Decisions*, 10 Int'l Tax & Pub. Fin. 107–126 (2003).
- M. P. Devereux, R. Griffith & A. Klemm, *Corporate Income Tax Reforms and International Tax Competition*, 17(35) Econ. Pol'y 449–495 (2002).
- M. P. Devereux & R. G. Hubbard, *Taxing Multinationals*, 10(4) Int'l Tax & Pub. Fin. 469–487 (2003).
- M. P. Devereux & S. Loretz, *What do we Know About Corporate Tax Competition?*, 66(3) Nat'l Tax J. 745–774 (2013).
- M. P. Devereux & G. Maffini, *The Impact of Taxation on the Location of Capital, Firms and Profit: A Survey of Empirical Evidence*, Working Paper (2006), https://www.researchgate.net/publication/4799414_The_Impact_of_Taxation_on_the_Location_of_Capital_Firms_and_Profit_A_Survey_of_Empirical_Evidence.
- N. Dwenger, P. Rattenhuber & V. Steiner, *Sharing the Burden? Empirical Evidence on Corporate Tax Incidence*, 20(4) German Econ. Rev. e107–e140 (2019).
- P. Egger, D. Radulescu & N. Strecker, *Effective Labor Taxation and the International Location of Headquarters*, 20(4) Int'l Tax & Pub. Fin. 631–652 (2013).
- P. Egger & M. D. Radulescu, *Labor Taxation and Foreign Direct Investment: Labor Taxation and Foreign Direct Investment*, 113(3) Scandinavian J. Econ. 603–636 (2011).
- C. Elschner, L. Lammersen, M. Overesch & R. Schwager, *The Effective Tax Burden of Companies and of Highly Skilled Manpower: Tax Policy Strategies in a Globalised Economy*, 27(4) Fiscal Stud. 513–534 (2006).
- C. Elschner & R. Schwager, *The Effective Tax Burden on Highly Qualified Employees – An International Comparison (1st ed.)*. Physica-Verlag (2005).
- C. Elschner & R. Schwager, *A Simulation Method to Measure the Effective Tax Rate on Highly Skilled Labor*, 63(4) FinanzArchiv/Public Finance Analysis 563–582 (2007).
- D. Endres, K. Finke, J. H. Heckemeyer & C. Spengel, *Corporate Taxation Trends in Europe*, 41(10) Intertax 499–506 (2013).

European Commission, Proposal for a Council Directive on ensuring a global minimum level of taxation for multinational groups in the Union, COM(2021) 823 final, Brussels (2021).

L. Evers, H. Miller & C. Spengel, *Intellectual Property Box Regimes: Effective Tax Rates and Tax Policy Considerations*, 22 (3) Int'l Tax & Pub. Fin. 502–530 (2015).

Federal Department of Finance (Schweizerische Eidgenossenschaft), *Overview of tax Reform and AHV Financing Measures* (2021), <https://www.efd.admin.ch/efd/en/home/the-fdf/legislation/abstimmungen/staf/ueberblick-massnahmen.html>.

L. P. Feld & J. H. Heckemeyer, *FDI and Taxation: A Meta-study*, 25(2) J. Econ. Surveys 233–272 (2011).

L. P. Feld & G. Kirchgässner, *The Impact of Corporate and Personal Income Taxes on the Location of Firms and on Employment: Some Panel Evidence for the Swiss Cantons*, 87(1) J. Pub. Econ. 129–155 (2002).

L. Fontagné & T. Mayer, *Determinants of Location Choices by Multinational Firms: A review of the current state of knowledge*, 51 Applied Econ. Q. 9–34 (2005).

C. Fuest, A. Peichl, & S. Siegloch, *Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany*, 108(2) Am. Econ. Rev. 393–418 (2018).

J. Gallemore & M. Jacob, *Corporate Tax Enforcement Externalities and the Banking Sector*, 58(5) J. Accounting Research 1117–1159 (2020).

A. Goolsbee, *Investment Tax Incentives, Prices, and the Supply of Capital Goods*, 113(1) Q. J. Econ. 121–148 (1998).

J. Gorter, & A. Parikh, *How Sensitive is FDI to Differences in Corporate Income Taxation Within the EU? 151 De Economist* 193–204 (2003).

J. R. Graham, M. Hanlon, T. Shevlin & N. Shroff, *Tax Rates and Corporate Decision-making*, 30(9) Rev. Fin. Stud. 3128–3175 (2017).

J. Gruber, *The incidence of payroll taxation: Evidence from Chile*, 15(S3) J. Lab. Econ. S72–S101 (1997).

H. Grubert & J. Mutti, *Taxes, Tariffs and Transfer Pricing in Multinational Corporate Decision Making*, 73(2) Rev. Econ. & Stat. 285–293 (1991).

H. Grubert & J. Mutti, *Do Taxes Influence Where US Corporations Invest?*, 53(4.1) Nat'l Tax J. 825–839 (2000).

M. Guillot, *Tax Incidence Among the Working Superrich. Evidence From the French 75% Tax on Millionaires*, SSRN Electronic J. (2021), <https://ssrn.com/abstract=3412261>.

R. E. Hall & D. W. Jorgenson, *Tax Policy and Investment Behavior*, 57(3) Am. Econ. Rev. 391–414 (1967).

M. Hanlon & S. Heitzman, *A Review of Tax Research*, 50 (2–3) J. Accounting & Econ. 127–178 (2010).

E. Helpman, *A Simple Theory of International Trade with Multinational Corporations*, 92 J. Pol. Econ. 451–471 (1984).

E. Helpman, *Multinational Corporations and Trade Structure*, 52 Rev. Econ. Stud. 443–457 (1985).

S. Hensellek & N. Puchala, *The Emergence of the Digital Nomad: A Review and Analysis of the Opportunities and Risks of Digital Nomadism*, in *The Flexible Workplace* 195–241 (M. Orel, O. Dvoutely & V. Ratten eds, Human Resource Management). Springer (2021).

J. R. Hines & E. M. Rice, *Fiscal paradise: Foreign tax havens and American business*, 109(1) Q. J. Econ. 149–182 (1994).

D. Hope & J. Limberg, *The Knowledge Economy and Taxes on the Rich*, Accepted/In press, J. Eur. Pub. Pol'y (2021), <https://doi.org/10.1080/13501763.2021.1992483>.

C. L. House & M. D. Shapiro, *Temporary Investment Tax Incentives: Theory with Evidence from Bonus Depreciation*, 98 (3) Am. Econ. Rev. 737–768 (2008).

M. Jacob, *Real Effects of Corporate Taxation: A Review*, Forthcoming in the European Accounting Review (2021), <https://doi.org/10.1080/09638180.2021.1934055>.

M. Jacob, K. Wentland & S. A. Wentland, *Real Effects of Tax Uncertainty: Evidence from Firm Capital Investments*, Forthcoming in Management Science (2021), <https://doi.org/10.1287/mnsc.2021.4072>.

E. Janeba, *Corporate Income Tax Competition, Double Taxation Treaties, and Foreign Direct Investment*, 56(2) J. Pub. Econ. 311–325 (1995).

D. W. Jorgenson, *Capital Theory and Investment Behavior*, 53(2) Am. Econ. Rev. 247–259 (1963).

M. A. King, & D. Fullerton, *The Taxation of Income from Capital: A Comparative Study of the United States, the United Kingdom, Sweden, and West Germany*, University of Chicago Press (1984).

H. J. Kleven, C. Landais & E. Saez, *Taxation and International Migration of Superstars: Evidence from the European Football Market*, 103(5) Am. Econ. Rev. 1892–1924 (2013).

H. J. Kleven, C. Landais, E. Saez, & E. Schultz, *Migration and Wage Effects of Taxing Top Earners: Evidence from the Foreigners' Tax Scheme in Denmark*, 129(1) Q. J. Econ. 333–378 (2014).

H. Kleven, C. Landais, M. Muñoz & S. Stantcheva, *Taxation and Migration: Evidence and Policy Implications*, 34(2) J. Econ. Persps 119–142 (2020).

M. Lawless, D. McCoy, E. Morgenroth & C. M. O'Toole, *The Importance of Corporation Tax Policy in the Location Choice of Multinational Firms*, Department of Finance, Dublin (2014).

M. Lawless, D. McCoy, E. L. W. Morgenroth & C. M. O'Toole, *Corporate Tax and Location Choice for Multinational Firms*, 50(26) Applied Econ. 2920–2931 (2018).

R. Lester, *Made in the USA? A Study of Firm Responses to Domestic Production Incentives*, 57(4) J. Accounting Res. 1059–1114 (2019).

T. Liebigh, P. A. Puhani & A. Sousa-Poza, *Taxation and Internal Migration? Evidence from the Swiss Census Using Community-Level Variation in Income Tax Rates*, 47(4) J. Regional Sci. 807–836 (2007).

- J. R. Markusen, *Multinationals, Multi-plant Economies, and the Gains from Trade*, 16 J. Int'l Econ. 205–226 (1984).
- J. R. Markusen, *Multinational Firms and the Theory of International Trade* (MIT Press, Cambridge 2002).
- S. Montout & M. Sami, *Determinants for Locating Research and Development Activity in Europe*, 145 Int'l Econ. 7–20 (2016).
- E. Moretti & D. J. Wilson, *The Effect of State Taxes on the Geographical Location of Top Earners: Evidence from Star Scientists*, 107(7) Am. Econ. Rev. 1858–1903 (2017).
- M. Muñoz, *Do European Top Earners React to Labour Taxation Through Migration?*, Working Paper (2019), <https://halshs.archives-ouvertes.fr/halshs-03252899>.
- R. Niemann & U. Schreiber, *Herausforderungen und Entwicklungsperspektiven des Steuersystems*, 72 Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung 1–48 (2020).
- OECD, *Statement on a Two-Pillar Solution to Address the Tax Challenges Arising From the Digitalisation of the Economy*, OECD/G20 Base Erosion and Profit Shifting Project (OECD Publishing, Paris 2021).
- OECD, *Tax Challenges Arising from the Digitalisation of the Economy – Global Anti-Base Erosion Model Rules (Pillar Two): Inclusive Framework on BEPS* (OECD Publishing, Paris 2021).
- O. Pfeiffer & C. Spengel, *Tax Incentives for Research and Development and Their Use in Tax Planning*, ZEW Discussion Paper No. 17–046, Mannheim (2017).
- E. Rubolino, *Tax-Induced Transfer of Residence: Evidence From Tax Decentralization in Italy*, SSRN Electronic J. (2020), <https://www.ssrn.com/abstract=3710932>
- M. Ruf & J. Schmider, *Who Bears the Cost of Taxing the Rich? An Empirical Study on CEO Pay*, SSRN Electronic J. (2020), <https://www.ssrn.com/abstract=3126061>
- E. Saez, M. Matsaganis & P. Tsakoglou, *Earnings Determination and Taxes: Evidence From a Cohort-Based Payroll Tax Reform in Greece*, 127(1) Q. J. Econ. 493–533 (2012).
- E. Saez, B. Schoefer & D. Seim, *Payroll Taxes, Firm Behavior, and Rent Sharing: Evidence from a Young Workers' Tax Cut in Sweden*. 109(5) Am. Econ. Rev. 1717–1763 (2019).
- D. Schanz, A. Dinkel & S. Keller, *Tax Attractiveness and the Location of German-Controlled Subsidiaries*, 11(1) Rev. Managerial Sci. 251–297 (2017).
- F. Scheuer & J. Slemrod, *Taxation and the Superrich*, 12 Annual Rev. Econ. 189–211 (2020).
- M. Schiffbauer, I. Siedschlag & F. Ruane, *Do Foreign Mergers and Acquisitions Boost Firm Productivity?* 26(6) Int'l Bus. Rev. 1124–1140 (2017).
- K. Schmidheiny & M. Slotwinski, *Tax-Induced Mobility: Evidence from a Foreigners' Tax Scheme in Switzerland*, 167 J. Pub. Econ. 293–324 (2018).
- D. Shackelford & T. Shevlin, *Empirical Research in Accounting*, 31 J. Accounting & Econ. 321–387 (2001).
- T. Shevlin, *The Future of Tax Research: From an Accounting Professor's Perspective*, 29(2) J. Am. Tax. Association 87–93 (2007).
- J. Slemrod, *Tax effects on Foreign Direct Investment in the United States: Evidence from a Cross-Country Comparison*, in *Taxation in the Global Economy* 79–117 (A. Razin & J. Slemrod eds, Taxation in the Global Economy, Chicago, University of Chicago Press 1990).
- C. Spengel, *Internationale Unternehmensbesteuerung in der Europäischen Union: Steuervirkungsanalyse, empirische Befunde, Reformüberlegungen* (IDW-Verlage, Düsseldorf 2003).
- C. Spengel, L. Fischer & K. Stutzenberger, *Breaking Borders? The European Court of Justice and Internal Market*, ZEW Discussion Paper No. 20–059, Mannheim (2020).
- C. Spengel, J. H. Heckemeyer, K. Nicolay, R. Bräutigam, O. Klar & K. Stutzenberger, *The Effects of Tax Reforms to Address the Debt-Equity Bias on the Cost of Capital and on Effective Tax Rates*, European Commission Taxation Papers, Working Paper N. 65–2016, Luxembourg (2016).
- C. Spengel, K. Nicolay, A.-C. Werner, M. Olbert, D. Steinbrenner, F. Schmidt & T. Wolf, *Steuerliche Standortattraktivität digitaler Geschäftsmodelle* (2018), <https://www.zew.de/PU80680-1>.
- C. Spengel, F. Schmidt, J. H. Heckemeyer, K. Nicolay, A. Bartholmeß, C. Ludwig, D. Steinbrenner, P. Buchmann, A. T. Bührle, V. Dutt, L. Fischer, J. Spix & B. Stage, *Effective Tax Levels using the Devereux/Griffith Methodology – Final Report 2020*. Project for the EU Commission, TAXUD/2020/DE/308 (2021).
- E. Steinmüller, G. U. Thuncke & G. Wamser, *Corporate Income Taxes Around the World: A Survey on Forward-Looking Tax Measures and Two Applications*, 26 Int'l Tax & Pub. Fin. 418–456 (2019).
- S. Stöwhase, *Profit Shifting opportunities, Multinationals, and the Determinants of FDI*, Working Paper (2002), <https://epub.ub.uni-muenchen.de/id/eprint/29>.
- C. Suárez Serrato & O. Zidar, *Who Benefits from State Corporate Tax Cuts? A Local Labor Markets Approach with Heterogenous Firms*, 106(9) Am. Econ. Rev. 2582–2624 (2016).
- J. D. Wilson, *Trade, Capital Mobility, and Tax Competition*, 95(4) J. Pol. Econ. 835–856 (1987).
- C. Young & C. Varner, *Millionaire Migration and State Taxation of Top Incomes: Evidence from a Natural Experiment*, 64(2.1) Nat'l Tax J. 255–283 (2011).
- C. Young, C. Varner, I. Z. Lurie & R. Prisinzano, *Millionaire Migration and Taxation of the Elite: Evidence from Administrative Data*, 81(3) Am. Sociological Rev. 421–446 (2016).

7. Appendix

7.1 Results

Table 3 Company Taxation: Statutory Tax Rates and Effective Average Tax Rates at the Corporate Level, 2009 and 2019

Corporation	(1)	(2)	(3)	(4)	(5)	(6)
	Statutory Tax Rates (%)		Combined Profit Tax rates (%)		Domestic EATR _C (%)	
	2009	2019	2009	2019	2009	2019
EU Member States						
Austria	25.0	25.0	25.0	25.0	22.7	23.1
Belgium	33.0	29.0	34.0	29.6	24.7	25.0
Czech Republic	20.0	19.0	20.0	19.0	17.5	16.7
Denmark	25.0	22.0	25.0	22.0	22.6	19.8
Finland	26.0	20.0	26.0	20.0	23.6	19.6
France	33.3	33.3	34.4	35.4	34.7	33.5
Germany	15.0	15.0	30.9	31.6	28.0	28.9
Hungary	16.0	9.0	21.4	11.1	19.5	11.1
Ireland	12.5	12.5	12.5	12.5	14.4	14.1
Italy	27.5	24.0	31.3	27.7	27.5	23.8
Luxembourg	21.0	17.0	28.6	24.9	25.0	21.8
Netherlands	25.5	25.0	25.5	25.0	22.2	22.5
Poland	19.0	19.0	19.0	19.0	17.5	16.0
Slovakia	19.0	21.0	19.0	21.0	16.8	18.7
Slovenia	21.0	19.0	21.0	19.0	19.1	17.3
Spain	30.0	25.0	35.7	30.6	32.8	29.0
Sweden	26.3	21.4	25.7	21.4	23.2	19.4
United Kingdom	28.0	19.0	28.0	19.0	28.3	20.2
Third countries						
Japan	30.0	23.2	40.7	31.3	41.7	34.1
Norway	28.0	22.0	28.0	22.0	26.5	20.8
Switzerland	21.2	21.1	21.2	21.1	18.7	18.6
United States	35.0	21.0	38.8	28.0	37.4	27.5
Brazil	24.0	24.0	34.0	34.0	25.9	25.0
China	25.0	25.0	25.0	25.0	23.9	23.9
India	30.0	30.0	45.2	46.3	39.9	40.8

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Russia	20.0	20.0	20.0	20.0	20.7	19.1
Mean overall	24.5	21.6	27.5	24.7	25.2	22.7
Standard deviation	5.7	5.0	7.5	7.3	7.0	6.5
Mean EU Member States	23.5	20.8	25.7	23.0	23.3	21.1
Standard deviation	5.8	5.6	6.0	6.2	5.3	5.4
Mean Third countries	26.7	23.3	31.6	28.5	29.3	26.2
Standard deviation	4.7	3.0	8.8	8.2	8.4	7.2

Table 4 Effective Average Tax Rates on Corporate Investment (EATR_C), 2009–2019

	2009	2011	2013	2015	2017	2019	Mean	Min	Max	Δ Max- Min	Δ 2019– 2009
AT Austria											
EATR _C	22.7	23.0	23.0	23.0	23.1	23.1	23.0	22.7	23.1	0.4	0.4
Δ to previous year		0.3	0.0	0.0	0.1	0.0					
BE Belgium											
EATR _C	24.7	25.9	26.5	27.8	29.3	25.0	26.5	24.7	29.3	4.6	0.3
Δ to previous year		1.2	0.7	1.3	1.5	-4.4					
CZ Czech Republic											
EATR _C	17.5	16.7	16.7	16.7	16.7	16.7	16.8	16.7	17.5	0.9	-0.9
Δ to previous year		-0.9	0.0	0.0	0.0	0.0					
DK Denmark											
EATR _C	22.6	22.6	22.0	21.3	20.1	19.8	21.4	19.8	22.6	2.8	-2.8
Δ to previous year		0.0	-0.7	-0.6	-1.3	-0.2					
FI Finland											
EATR _C	23.6	24.7	22.7	18.9	19.5	19.6	21.5	18.9	24.7	5.7	-4.0
Δ to previous year		1.0	-2.0	-3.7	0.6	0.1					
FR France											
EATR _C	34.7	32.8	34.7	38.3	33.4	33.5	34.6	32.8	38.3	5.5	-1.2
Δ to previous year		-1.8	1.8	3.6	-4.9	0.1					
DE Germany											
EATR _C	28.0	28.2	28.2	28.2	28.8	28.9	28.4	28.0	28.9	0.9	0.9
Δ to previous year		0.2	0.0	0.0	0.6	0.1					

Intertax

	2009	2011	2013	2015	2017	2019	Mean	Min	Max	Δ Max- Min	Δ 2019- 2009
HU Hungary											
EATR _C	19.5	19.3	19.3	19.3	11.1	11.1	16.6	11.1	19.5	8.4	-8.4
Δ to previous year		-0.2	0.0	0.0	-8.2	0.0					
IE Ireland											
EATR _C	14.4	14.4	14.4	14.1	14.1	14.1	14.3	14.1	14.4	0.3	-0.3
Δ to previous year		0.0	0.0	-0.3	0.0	0.0					
IT Italy											
EATR _C	27.5	24.9	25.1	23.8	23.7	23.8	24.8	23.7	27.5	3.8	-3.7
Δ to previous year		-2.6	0.2	-1.3	-0.1	0.2					
LU Luxembourg											
EATR _C	25.0	25.0	25.5	25.5	23.7	21.8	24.4	21.8	25.5	3.7	-3.1
Δ to previous year		0.0	0.6	0.0	-1.8	-1.8					
NL Netherlands											
EATR _C	22.2	21.8	21.7	22.5	22.5	22.5	22.2	21.7	22.5	0.9	0.3
Δ to previous year		-0.4	-0.1	0.9	0.0	0.0					
PL Poland											
EATR _C	17.5	17.5	17.5	17.5	17.5	16.0	17.2	16.0	17.5	1.5	-1.5
Δ to previous year		0.0	0.0	0.0	0.0	-1.5					
SK Slovakia											
EATR _C	16.8	16.8	20.3	19.6	18.7	18.7	18.5	16.8	20.3	3.4	1.9
Δ to previous year		0.0	3.4	-0.7	-0.9	0.0					
SI Slovenia											
EATR _C	19.1	18.2	15.5	15.5	17.3	17.3	17.1	15.5	19.1	3.6	-1.8
Δ to previous year		-0.9	-2.7	0.0	1.8	0.0					
ES Spain											
EATR _C	32.8	31.9	32.9	31.5	29.0	29.0	31.2	29.0	32.9	3.9	-3.8
Δ to previous year		-0.9	1.0	-1.4	-2.5	0.0					
SE Sweden											
EATR _C	23.2	23.2	19.4	19.4	19.4	19.4	20.7	19.4	23.2	3.8	-3.8
Δ to previous year		0.0	-3.7	0.0	0.0	-0.1					

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	2009	2011	2013	2015	2017	2019	Mean	Min	Max	Δ Max- Min	Δ 2019- 2009
UK United Kingdom											
EATR _C	28.3	26.9	24.3	21.5	20.5	20.2	23.6	20.2	28.3	8.1	-8.1
Δ to previous year		-1.5	-2.6	-2.8	-1.0	-0.3					
JP Japan											
EATR _C	41.7	41.7	40.1	35.7	34.3	34.1	37.9	34.1	41.7	7.6	-7.6
Δ to previous year		0.0	-1.6	-4.4	-1.5	-0.2					
NO Norway											
EATR _C	26.5	26.5	26.5	25.1	22.7	20.8	24.7	20.8	26.5	5.6	-5.6
Δ to previous year		0.0	0.0	-1.3	-2.4	-1.9					
CH Switzerland											
EATR _C	18.7	18.7	18.6	18.6	18.6	18.6	18.6	18.6	18.7	0.0	0.0
Δ to previous year		0.0	0.0	0.0	0.0	0.0					
US USA											
EATR _C	37.4	36.5	36.5	36.5	36.5	27.5	35.2	27.5	37.4	9.9	-9.9
Δ to previous year		-0.9	0.0	0.0	0.0	-9.0					
BR Brazil											
EATR _C	25.9	26.1	27.2	26.7	24.5	25.0	25.9	24.5	27.2	2.7	-0.9
Δ to previous year		0.3	1.1	-0.5	-2.2	0.5					
CN China											
EATR _C	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	23.9	0.0	0.0
Δ to previous year		0.0	0.0	0.0	0.0	0.0					
IN India											
EATR _C	39.9	38.4	39.9	40.5	40.5	40.8	40.0	38.4	40.8	2.4	0.9
Δ to previous year		-1.5	1.5	0.6	0.0	0.3					
RU Russia											
EATR _C	20.7	20.9	19.1	19.1	19.1	19.1	19.7	19.1	20.9	1.8	-1.7
Δ to previous year		0.2	-1.8	0.0	0.0	0.0					

Note: Effective tax rates are calculated for a corporation of the manufacturing sector and under the assumption that the top corporate income tax rate is applicable. The table lists the effective tax rate for every second year and the delta to the previously reported effective tax burden.
Source: Spengel et al. (2021); own calculations for transition economies (2009–2019)

Table 5 Labour Taxation: Statutory Tax Rates and Effective Average Tax Rates at the Employee Level, 2009 and 2019

Labour	(1)	(2)	(3)	(4)
	Statutory Tax Rates (%) {Tax Bracket, EUR}		EATR _L (%) {EUR 100,000}	
	2009	2019	2009	2019
EU Member States				
Austria	50.0 [60,000]	55.0 [1,000,000]	38.3	41.3
Belgium	53.5 [34,330]	57.6 [40,480]	57.6	59.5
Czech Republic	15.0 [1]	22.0 [49,315]	21.4	26.4
Denmark	57.8 [46,748]	50.9 [69,126]	51.9	44.1
Finland	48.0 [64,500]	49.3 [76,100]	52.7	52.2
France	40.0 [69,505]	45.0 [156,244]	46.6	42.0
Germany	47.5 [250,000]	47.5 [265,326]	40.6	39.8
Hungary	36.0 [6,732]	15.0 [1]	46.9	37.0
Ireland	41.0 [36,400]	43.2 [35,300]	42.0	48.6
Italy	44.9 [75,000]	45.5 [300,000]	52.7	52.2
Luxembourg	39.0 [39,885]	45.8 [200,004]	34.7	40.1
Netherlands	52.0 [54,776]	51.8 [68,507]	42.9	46.2
Poland	32.0 [19,505]	32.0 [19,505]	32.8	29.0
Slovakia	19.0 [1]	25.0 [36,256]	34.7	33.5
Slovenia	41.0 [14,821]	50.0 [70,907]	46.0	46.2
Spain	42.9 [53,407]	43.5 [60,000]	40.9	44.7
Sweden	54.7 [59,072]	54.8 [75,573]	53.6	56.2
UK	40.0 [54,839]	45.0 [219,941]	39.4	39.2

Transition to a Knowledge-Based Economy

	(1)	(2)	(3)	(4)
<i>Labour</i>	<i>Statutory Tax Rates (%) {Tax Bracket, EUR}</i>		<i>EATR_L (%) {EUR 100,000}</i>	
	2009	2019	2009	2019
Third countries				
Japan	50.0 [121,990]	57.1 [271,089]	28.1	28.4
Norway	40.0 [89,710]	38.2 [120,781]	42.9	36.9
Switzerland	40.0 [486,016]	40.0 [515,211]	31.8	31.2
United States	45.6 [1,061,571]	49.3 [608,259]	40.3	36.6
Brazil	27.5 [16,569]	27.5 [20,648]	39.9	39.8
China	45 [119,142]	45 [95,314]	39.7	42.0
India	41.2 [16,313]	46.4 [163,132]	35.7	36.3
Russia	13.0 [1]	13.0 [1]	15.3	16.3
Mean overall	40.6	42.1	40.2	40.3
Standard deviation	11.5	12.4	9.8	9.3
Mean EU Member States	41.9	43.3	42.8	43.4
Standard deviation	11.4	12.0	9.1	8.3
Mean Third countries	37.8	39.6	34.4	33.4
Standard deviation	12.0	13.8	8.6	7.6

Table 6 Effective Average Tax Rates on Highly Skilled Labour (EATR_L), 2009–2019

	2009	2011	2013	2015	2017	2019	Mean	Min	Max	Δ Max- Min	Δ 2019– 2009
AT Austria											
EATR _L	38.3	38.4	40.2	40.3	41.2	41.3	40.0	38.3	41.3	3.0	3.0
Δ to previous year		0.1	1.8	0.1	0.9	0.1					
BE Belgium											
EATR _L	57.6	57.8	56.6	60.7	60.5	59.5	58.8	56.6	60.7	4.1	1.9
Δ to previous year		0.2	-1.2	4.1	-0.2	-1.0					
CZ Czech Republic											
EATR _L	21.4	24.9	25.6	25.6	25.8	26.4	25.0	21.4	26.4	5.0	5.0
Δ to previous year		3.5	0.7	0.0	0.2	0.6					
DK Denmark											
EATR _L	51.9	50.9	47.3	46.9	45.8	44.1	47.8	44.1	51.9	7.8	-7.8
Δ to previous year		-1.0	-3.6	-0.4	-1.1	-1.7					
FI Finland											
EATR _L	52.7	52.0	52.2	52.6	53.5	52.2	52.5	52.0	53.5	1.5	-0.5
Δ to previous year		-0.7	0.2	0.4	0.9	-1.3					
FR France											
EATR _L	46.6	46.4	46.5	47.0	47.9	42.0	46.1	42.0	47.9	5.9	-4.6
Δ to previous year		-0.2	0.1	0.5	0.9	-5.9					
DE Germany											
EATR _L	40.6	40.8	40.4	40.4	40.2	39.8	40.4	39.8	40.8	1.0	-0.8
Δ to previous year		0.2	-0.4	0.0	-0.2	-0.4					
HU Hungary											
EATR _L	46.9	32.2	42.7	40.5	37.7	37.0	39.5	32.2	46.9	14.7	-9.9
Δ to previous year		-14.7	10.5	-2.2	-2.8	-0.7					
IE Ireland											
EATR _L	42.0	48.6	49.4	49.0	46.6	48.6	47.4	42.0	49.4	7.4	6.6
Δ to previous year		6.6	0.8	-0.4	-2.4	2.0					

Transition to a Knowledge-Based Economy

	2009	2011	2013	2015	2017	2019	Mean	Min	Max	Δ Max- Min	Δ 2019- 2009
IT	Italy										
EATR _L	52.7	53.1	52.8	52.8	52.9	52.5	52.8	52.5	53.1	0.6	-0.2
Δ to previous year		0.4	-0.3	0.0	0.1	-0.4					
LU	Luxembourg										
EATR _L	34.7	39.8	40.5	41.3	40.1	40.1	39.4	34.7	41.3	6.6	5.4
Δ to previous year		5.1	0.7	0.8	-1.2	0.0					
NL	Netherlands										
EATR _L	42.9	43.5	44.8	46.4	46.1	46.2	45.0	42.9	46.4	3.5	3.3
Δ to previous year		0.6	1.3	1.6	-0.3	0.1					
PL	Poland										
EATR _L	31.3	31.3	31.8	32.0	32.3	32.6	31.9	31.3	32.6	1.3	1.3
Δ to previous year		0.0	0.5	0.2	0.3	0.3					
SK	Slovakia										
EATR _L	30.6	30.9	32.3	32.6	32.1	32.8	31.9	30.6	32.8	2.2	2.2
Δ to previous year		0.3	1.4	0.3	-0.5	0.7					
SI	Slovenia										
EATR _L	46.0	46.1	48.2	48.1	46.3	46.2	46.8	46.0	48.2	2.2	0.2
Δ to previous year		0.1	2.1	-0.1	-1.8	-0.1					
ES	Spain										
EATR _L	40.9	43.3	47.5	44.1	44.3	44.7	44.1	40.9	47.5	6.6	3.8
Δ to previous year		2.4	4.2	-3.4	0.2	0.4					
SE	Sweden										
EATR _L	53.6	56.2	56.4	55.6	56.9	56.2	55.8	53.6	56.9	3.3	2.6
Δ to previous year		2.6	0.2	-0.8	1.3	-0.7					
UK	United Kingdom										
EATR _L	39.4	42.6	41.8	41.6	40.5	39.2	40.9	39.2	42.6	3.4	-0.2
Δ to previous year		3.2	-0.8	-0.2	-1.1	-1.3					
JP	Japan										
EATR _L	27.9	27.7	28.1	28.1	28.1	28.4	28.1	27.7	28.4	0.7	0.5
Δ to previous year		-0.2	0.4	0.0	0.0	0.3					

Intertax

	2009	2011	2013	2015	2017	2019	Mean	Min	Max	Δ Max- Min	Δ 2019- 2009
NO Norway											
EATR _L	42.9	42.4	41.3	40.1	40.2	36.9	40.6	36.9	42.9	6.0	-6.0
Δ to previous year		-0.5	-1.1	-1.2	0.1	-3.3					
CH Switzerland											
EATR _L	31.8	31.8	31.2	31.1	31.3	31.2	31.4	31.1	31.8	0.7	-0.6
Δ to previous year		0.0	-0.6	-0.1	0.2	-0.1					
US USA											
EATR _L	40.3	38.7	39.8	39.7	40.1	36.6	39.2	36.6	40.3	3.7	-3.7
Δ to previous year		-1.6	1.1	-0.1	0.4	-3.5					
BR Brazil											
EATR _L	40.1	40.1	40.0	39.9	39.7	39.8	39.9	39.7	40.1	0.4	-0.3
Δ to previous year		0.0	-0.1	-0.1	-0.2	0.1					
CN China											
EATR _L	39.7	39.7	41.7	43.3	43.5	42.0	41.7	39.7	43.5	3.8	2.3
Δ to previous year		0.0	2.0	1.6	0.2	-1.5					
IN India											
EATR _L	37.0	35.4	36.1	35.7	36.0	36.3	36.1	35.4	37.0	1.6	-0.7
Δ to previous year		-1.6	0.7	-0.4	0.3	0.3					
RU Russia											
EATR _L	15.3	15.9	15.9	15.3	15.7	16.3	15.7	15.3	16.3	1.0	1.0
Δ to previous year		0.6	0.0	-0.6	0.4	0.6					

Note: Effective tax rates are calculated under the model assumption of a single employee with no children and a disposable income of EUR 100,000. The table lists the effective tax rate for every second year and the delta to the previously reported effective tax burden.

Source: BAK Taxation Index (BAK Economics and ZEW, 2020); own calculation for transition economies (2009–2013).

7.2 Parameters

Table 7 Foreign Exchange Rates Used for the Calculation of the Effective Average Tax Rates on Highly Skilled Labour, Fixed for All Years

		National Currency	2009–2019
AT	Austria	EUR	1.000
BE	Belgium	EUR	1.000
CZ	Czech Republic	CZK	31.827
DK	Denmark	DKK	7.427
FI	Finland	EUR	1.000
FR	France	EUR	1.000
DE	Germany	EUR	1.000
HU	Hungary	HUF	252.525
IE	Ireland	EUR	1.000
IT	Italy	EUR	1.000
LU	Luxembourg	EUR	1.000
NL	Netherlands	EUR	1.000
PL	Poland	PLN	4.385
SK	Slovakia	EUR	1.000
SI	Slovenia	EUR	1.000
ES	Spain	EUR	1.000
SE	Sweden	SEK	9.121
UK	United Kingdom	GBP	0.682
JP	Japan	JPY	147.553
NO	Norway	NOK	7.988
CH	Switzerland	CHF	1.466
US	United States	USD	0.942
BR	Brazil	BRL	2.711
CN	China	CNY	10.072
IN	India	IND	61.300
RU	Russia	RUB	37.422

Note: The exchange rates are given as EUR 1 = CZK 31.827. The years on which the fixed exchange rate is based depend on when the respective countries were included in the BAK-Taxation Index. For example, for BR, IN, JP and RU, it corresponds to the average exchange rate from 2006–2010.

Source: Oanda und Eurostat